CLAY PRODUCTS NUMBER

THE ARCHITECT AND ENGINEER OF CALIF

25c Copy
$1.50 a Year
VOL. XXXVI
NUMBER 1

PUBLISHED MONTHLY BY
THE ARCHITECT & ENGINEER CO.
617-19 Monadnock Bldg., San Francisco, Cal.
Entered at the Postoffice, San Francisco, as Second Class Matter

FEBRUARY, 1914

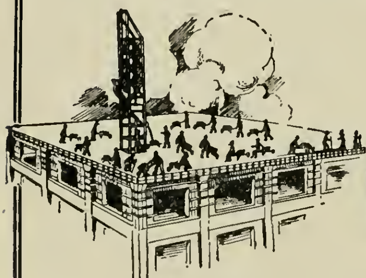
Concrete Appliances Co.

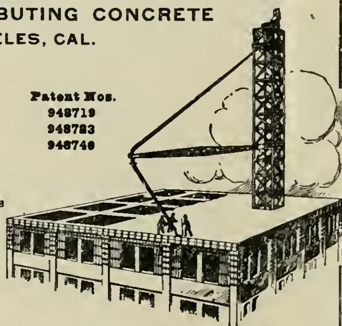
LICENSORS OF

G Y SYSTEM

OF CONVEYING AND DISTRIBUTING CONCRETE

LOS ANGELES, CAL.





THE OLD WAY	THE NEW WAY
1. Cost to Wheelbarrow or Cart Concrete, $1 to $1.75 per yard	1. Cost for Delivering Concrete, 25 to 50 Cents per cubic yard
2. Slow and Congested, 8 to 10 yards per hour	2. Rapid and Efficient, 25 to 40 cubic yards per hour
3. Loss of Initial Set, Variable Multilithic Construction	3. Obtain initial set, Homogeneous Monolithic Construction
4. Causes Separation, Aids La Tance	4. Uniform Concrete Obviates La Tence
5 Damages Floor Tile, Displaces Steel and Spills Concrete	5. No Loss of Floor Tile, Displacement of Steel or Spilling
6. Expensive Scaffolding, Runways and Staging	6. Saves Scaffolding, Runways and Staging
7. Tamping	7. No Tamping

A FEW BUILDINGS IN CALIFORNIA NOW BEING CONSTRUCTED BY THE G Y. SYSTEM:

"Little Theatre" Building, Figueroa Street, Los Angeles.
Spreckels Workingmen's Hotel, San Diego.
California State Building, Panama-Pacific Exposition, San Diego.
John S. Hawley, Jr. Building, Santa Barbara.
G. M. Jones Hotel, Ocean Park.

BUILDINGS COMPLETED BY MEANS OF THE GRAVITY SYSTEM:

Ferguson Building, Los Angeles; Columbia Hospital Building, Los Angeles; Exposition Building for the State Agricultural Park, Los Angeles; Sweetwater Dam, San Diego, Cal.; Edison Electric Co., Three Warehouses, Long Beach; Spreckels Theatre and Office Building, San Diego, Cal.; L. H. Sly Apartment House, California and Powell Streets; 21st Viaduct, Portland, Oregon (International Contract Co., Contractors); South Pasadena Bridge, Los Angeles, Cal. (T. H. Howard, Contractor); Three Acres Car Barns for Los Angeles Railway Co. (E. J. Kubach, Contractor); Mary Andrews Clark Memorial Building, Los Angeles, Cal. (G. H. Whyte, Contractor). The Garland Theatre and Office Building, Los Angeles, Cal. (National Fireproofing Company, Contractors); Tempe Bridge, Phoenix, Arizona.

HOME OFFICES

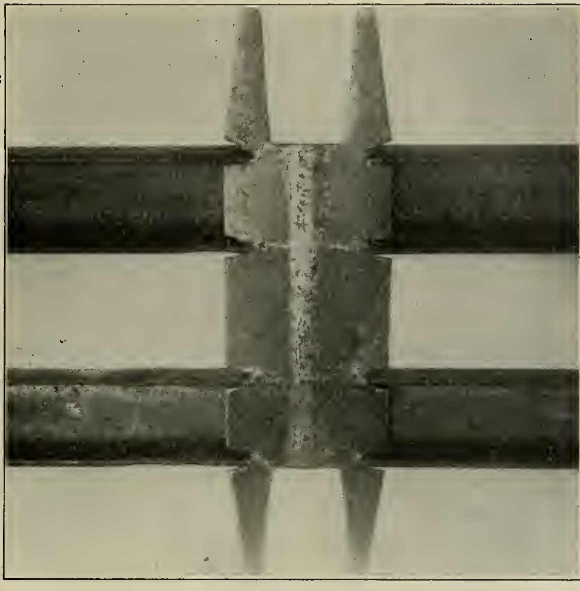
CHICAGO, ILL.

DETROIT MINNEAPOLIS ST. LOUIS DES MOINES INDIANAPOLIS

PACIFIC COAST REPRESENTATIVES

PARROTT & CO.

SAN FRANCISCO TACOMA PORTLAND
SEATTLE SPOKANE LOS ANGELES



ARCHITECTS' SPECIFICATION INDEX

(For Index to Advertisements, see next page)

An Index to the Advertisements

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CEMENT EXTERIOR WATERPROOF COATING
- American Paint & Dry Color Co., 414 Ninth St., S. F.
- California Safety Fireproofing Company, 687 Market St., S. F.
- Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See distributing Agents on page 32.]
- Biturine Co. of America, 24 California St., S. F.
- Hercules Waterproofing, manufactured by Hercules Waterproofing Cement Co., Buffalo, N. Y. Distributors: Waterhouse & Price Co., San Francisco and Oakland.
- Liquid Stone Paint Co., Hearst Bldg., S. F.
- Concreto Cement Coating, manufactured by the Muralo Company. (See full-page advertisement, color insert.)
- Trus-Con Par-Seal, made by Trussed Concrete Steel Co. See advertisement for Coast agencies.
- Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT EXTERIOR FINISH
- American Paint & Dry Color Co., 414 Ninth St., S. F.
- California Safety Fireproofing Company, 687 Market St., S. F.
- Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See list of Distributing Agents on page 31.]
- Concrewaltum Paint, manufactured by Gobeen Company, Canton, O. Coast branches, San Francisco, Portland and Seattle.
- Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- Liquid Stone Paint Co., Hearst Bldg., S. F.
- Medusa White Portland Cement, California Agents, the Building Material Co., Inc., 587 Monadnock Bldg., S. F.
- Concreto Cement Coating, manufactured by the Muralo Company. (See full-page advertisement, color insert.)
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

CEMENT FLOOR COATING
- Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. [See list of Distributing Agents on page 31.]
- Glidden's Concrete Floor Dressing, sold on Pacific Coast by Whittier, Coburn Company, San Francisco.
- Moller & Schumann Co., West Coast Branch, 1022 Mission St., S. F.

CEMENT TESTS AND CHEMICAL ENGINEERS
- Robert W. Hunt & Co., 251 Kearny St., S. F.

CEMENT GUN
- Pacific Cement Gun Company, 766 Folsom St., S. F.

CHURCH INTERIORS
- Fink & Schindler........218 13th St., S. F.

COAL CHUTES
- Majestic Furnace Company, Sherman Kimball & Co., Inc., 1st and Howard Sts., S. F.

COLD STORAGE PLANTS
- Vulcan Iron Works....................S. F.

CLOCKS—TOWER AND STREET
- Standard Electric Time Company, 461 Market St., S. F.

COMPOSITION FLOORING
- Fibrestone & Roofing Co., 971 Howard St., S. F.
- Lithoid Products Co., Merchants Exchange Bldg., S. F.

CONCRETE CONSTRUCTION
- Bluxome & Co., Monadnock Bldg., S. F.
- Clinton Fireproofing Company, Mutual Bank Bldg., S. F.
- "Mushroom" System of Concrete Flat Slab Construction, Industrial Engineering Co., Clunie Bldg., S. F.
- Barrett & Hilp ....Sharon Bldg., S. F.
- Foster, Vogt Co..........Sharon Bldg., S. F.
- Petersen, H. L. ....62 Post St., S. F.
- A. Lynch............185 Stevenson St., S. F.
- Ransome Concrete Co., Oakland & Sacramento
- W. J. McGraw, 1636 Felton St., S. Berkeley, Cal.
- F. J. R. Rickon............1859 Geary St., S. F.

CONCRETE MIXERS
- Austin Improved Cube Mixer. Pacific Coast Offices, 338 Brannan St., S. F., the Beebe Company, Portland and Seattle, and P. B. Engh, Los Angeles.
- Foote Mixers sold by Edw. R. Bacon, 40 Natoma St., S. F.
- Smith Mixers sold by Parrott & Co., San Francisco, Los Angeles and Portland.
- Marsh-Capron Mixers, sold by Langford, Bacon & Myers, Rialto Bldg., S. F.
- Koehring Mixer, sold by Harron, Rickard & McCone, San Francisco.
- Municipal Engineering Co., 338 Brannan St., S. F.

CONCRETE PILES
- Harron, Rickard & McCone, Townsend Street, San Francisco.
- Portland Concrete Pile Co., Underwood Bldg., S. F.

CONCRETE POURING APPARATUS
- Concrete Appliances Co., Los Angeles; Parrott & Co., Coast Representatives, San Francisco, Portland, Seattle.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CONCRETE REINFORCEMENT
- United States Steel Products Co., San Francisco, Los Angeles, Portland and Seattle
- Clinton Welded Reinforcing System, L. A. Norris, Monadnock Bldg., S. F.
- "Kahn System," see advertisement on page 172 this issue.
- International Fabric & Cable, represented by Western Builders' Supply Co., 155 New Montgomery St., S. F.
- Triangle Mesh Fabric, Sales Agents, The Lilley & Thurston Co....Rialto Bldg., S. F.
- Twisted Bars, sold by Woods & Huddart, 444 Market St., S. F.

CONCRETE SURFACING
- "Biturine," sold by Biturine Co. of America, 24 California St., S. F.
- Wadsworth, Howland & Co.'s Bay State Brick and Cement Coating, sold by R. N. Nason & Co., San Francisco and Los Angeles.
- Liquid Stone Paint Co., Hearst Bldg., S. F.
- "Concreta," sold by W. P. Fuller & Co., S. F.
- Glidden Liquid Cement, manufactured by Glidden Varnish Company, Whittier, Coburn Co., San Francisco and Los Angeles, Pacific Coast Distributors.
- Moller & Schumann...1023 Mission St., S. F.

CONTRACTORS, GENERAL
- F. O. Engstrum Co., East Fifth and Seaton Sts., Los Angeles.
- Foster, Vogt Co..........Sharon Bldg., S. F.
- Geo. W. Boxton.........Hearst Bldg., S. F.
- McLaren & Peterson......Sharon Bldg., S. F.
- Herman T Ludwig...24 California St., S. F.
- Howard S. Williams......Hearst Bldg., S. F.
- Graham & Jensen.......Maskey Bldg., S. F.
- Ransome Concrete Co., 1218 Broad'y, Oakland
- F. J. Rickon, C. E., 1859 Geary St., S. F.
- Robert Trost....26th and Howard Sts., S. F.
- Williams Bros. & Henderson, Holbrook Bldg., S. F
- Burt T. Owsley....311 Sharon Bldg., S. F.
- L. A. Rose..........Monadnock Bldg., S. F.
- Patrick-Nelson Company. 2011 Shattuck ave., Berkeley, Cal.
- Ward & Goodwin.........Sharon Bldg., S. F
- Barrett & Hilp..........Sharon Bldg., S. F.

CORK TILING
- David J. E. Kennedy, Inc. Sharon Bldg., S. F.

CORNER BEAD
- Union Metal Corner Company, 144 Pearl St., Boston, represented on the Pacific Coast by Waterhouse & Price.

CRUSHED ROCK
- Grant Gravel Co., ...Williams Bldg., S. F.
- Niles Rock, sold by California Building Material Company........Pacific Bldg., S. F.
- Niles Sand, Gravel & Rock Co., Mutual Bank Bldg., S. F.

DAMP-PROOFING COMPOUND
- Biturine Co. of America, 24 California St., S. F.
- Concrewaltum Paint, made by Gobeen Mfg. Co., Canton, O., sold by Sherman, Kimball & Co., Inc., S. F., A. J. Capron, Portland, and S. W. R. Dalby, Seattle, Wash.
- Glidden's Liquid Rubber, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- Hercules Waterproofing, manufactured by Hercules Cement Co., Buffalo, N. Y. Distributors: Waterhouse & Price Co., San Francisco and Oakland.
- Lithoid Product Company, Merchants Exchange Bldg., S. F.
- Trus-Con Damp proofing. See advertisement of Trussed Concrete Steel Company for Coast agencies.
- "Pabco" Damp Proofing Compound, sold by Paraffine Paint Co......34 First St., S. F.
- Liquid Stone Paint Co....Hearst Bldg., S. F.

DOOR HANGERS
- Pitcher Hanger, sold by National Lumber Co., Fifth and Bryant Sts., San Francisco.
- Reliance Hanger, sold by Sartorius Co., S. F.; D. F. Fryer & Co.. Louis R. Bedell, Los Angeles, and Portland Wire & Iron Works.
- Richards-Wilcox Mfg. Co.,..............Aurora, Ill.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

DOORS AND SHUTTERS
- Kinnear Steel Rolling Doors and Shutters, Lilley & Thurston Co., Rialto Bldg., S. F.

DUMB WAITERS
- Spencer Elevator Company, 173 Beale St., S. F.
- Excelsior Dumb Waiters, manufactured by R. M. Rodgers Co., Brooklyn; M. E. Hammond, 217 Humboldt Bank Bldg., S. F.
- Burdett-Rowntree Mfg. Co., Underwood Bldg., S. F.

ELECTRICAL CONTRACTORS
- Butte Engineering Co..683 Howard St., S. F.
- Central Electric Co..185 Stevenson St., S. F.
- Jno. G. Sutton Co.....243 Minna St., S. F.
- Pacific Fire Extinguisher Company, 507 Montgomery St., S. F.

ELECTRIC PLATE WARMER
- The Prometheus Electric Plate Warmer for residences, clubs, hotels, etc. Sold by M. E. Hammond, Humboldt Bank Bldg., S. F.

ELEVATORS
- Otis Elevator Company, Stockton and North Point, S. F.
- Spencer Elevator Company, 126 Beale St., S. F.
- S. F. Elevator Co.......860 Folsom St., S. F.
- Van Emon Elevator Company, Natoma St., S. F.

ELEVATORS, SIGNALS, FLASHLIGHTS AND DIAL INDICATORS
- Elevator Supply & Repair Co., Underwood Bldg., S. F.

ENGINEERS
- F. J. Amweg......700 Marston Bldg., S. F.
- W. W. Breite...........Clunie Bldg., S. F.
- Crosett & Eastman........Hearst Bldg., S. F.
- L. M. Hansmann........Sharon Bldg., S. F.
- Hunter & Hudson........Rialto Bldg., S. F.

EXIT DEVICES
- Von Duprin Self-Releasing Fire Exit Devices mfrd. by Vonnegut Hardware Co. (See adv. for Coast Distributors).

EXPRESS CALL SYSTEM
- Elevator Supply & Repair Co., Underwood Bldg., S. F.

FIRE EXIT DEVICES
- Von Duprin Self-Releasing Fire Exit Devices, Vonnegut Hardware Co. (See adv. for Coast Agencies).

FIRE ESCAPES
- Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, etc. Phone Market 1374; Home, J 3435..370-84 Tenth St., S. F.

FIRE EXTINGUISHERS
- Scott Company.........243 Minna St., S. F.
- Pacific Fire Extinguisher Co., 507 Montgomery St., S. F.
- Levensaler-Spier Corporation, 259 Monadnock Bldg., S. F.

FIREPLACE DAMPER
- Head, Throat and Damper for open fireplaces, Colonial Fireplace Co., Chicago. (See advertisement for Coast agencies.)

FIREPROOFING AND PARTITIONS
- Cal. Safety Fireproofing Co., 687 Market St., S. F.
- Gladding, McBean & Co., Crocker Bldg., S. F.
- Los Angeles Pressed Brick Co., Frost Bldg., L. A.
- The Jackson Fireproof Partition Co., Levensaler-Spier Corporation, Distributors, Monadnock Bldg., S. F.

FIRE-PROOF PAINT
- Liquid Stone Paint Co., Hearst Bldg., S. F.
- California Safety Fireproofing Company, 687 Market St., S. F.

FIXTURES—BANK, OFFICE, STORE, ETC.
- A. J. Forbes & Son..1530 Filbert St., S. F.
- Fink & Schindler........218 13th St., S. F.
- C. F. Weber & Co., 365 Market St., San Francisco and 210 N. Main St., Los Angeles. Cal.
- T. H. Meek Company, 1157 Mission St., S. F.

FLOOR VARNISH
- Bass-Hueter and S. F. Pioneer Varnish Works, 816 Mission St., S. F.
- R. N. Nason & Co...151 Potrero Ave., S. F.
- Standard Varnish Works, Chicago, New York and S. F.
- Moller & Schumann Co., 1022 Mission St., S. F.

FLOORS—CORK
- Nonpareil Cork Tiling, David E. Kennedy, Inc., N. Y. Distributor for the Pacific Coast., G. H. Freear, Sharon Building, S. F.

FLOORING—MAGNESITE
- Fibrestone & Roofing Co., 971 Howard St., S. F.

GARAGE EQUIPMENT
- Bowser Gasoline Tanks and Outfit, Bowser & Co. ......612 Howard St., S. F.
- Compressed Air & General Machinery Co., 39 Stevenson St., S. F.

GARBAGE CHUTES
- Bill & Jacobsen............Rialto Bldg., S. F.

GRANITE
- California Granite Co., 776 Monadnock Bldg., S. F.

GRAVEL, SAND AND CRUSHED ROCK
- Bay Development Co.....153 Berry St., S. F.
- California Building Material Co., Pacific Bldg., S. F.
- Del Monte White Sand, sold by Pacific Improvement Co......Crocker Bldg., S. F.
- Pratt Bldg. Material Co., Hearst Bldg., S. F.
- Grant Gravel Co......87 Third St., S. F.
- Niles Sand, Rock & Gravel Co., 971 Howard St., S. F.

HARDWALL PLASTER
- Henry Cowell Lime & Cement Co......S. F.
- American Keen Cement Co, Levensaler-Spier Corporation, Representatives, Monadnock Bldg., S. F.

HARDWARE
- Richards-Wilcox Mfg. Co..........Aurora, Ill.
- Russwin Hardware, Joost Bros., S. F.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

HARDWOOD FLOORING
Strable Mfg. Co...............Oakland, Cal.
Parrott & Co.......320 California St., S. F.
White Bros., Cor. Fifth and Brannan Sts., S. F.
Hardwood Interior Co., 554 Bryant St., S. F.

HARDWOOD LUMBER
Dieckmann Hardwood Co., Beach and Taylor Sts., S. F.
Parrott & Co......320 California St., S. F.
Maria Hardwood Co., 951 Brannan St., S. F.
Strable Mfg. Co., First St., betw. Washington & Clay, Oakland.
White Bros., Cor. Fifth and Brannan Sts., S. F.

HEATERS—AUTOMATIC
Pittsburg Water Heater Co., 237 Powell St., S. F.

LOCKERS
Keyless Lock Co.,......Indianapolis, Ind.

HEATING EQUIPMENT—VACUUM, ETC.
Edward Stephenson..155 Fremont St., S. F.

HEATING AND VENTILATING
Atlas Heating & Ventilating Co., Fourth and Freelon Sts.. San Francisco.
Boscus Bros..........975 Howard St., S. F.
Fess System Co......220 Natoma St., S. F.
A. Lettich..............365 Fell St., S. F.
Mangrum & Otter, Inc., 507 Mission St., S. F.
Scott Company..........243 Minna St., S. F.
Pacific Blower & Heating Co., 17th St., bet. Mission and Valencia, S. F.
Pacific Fire Extinguisher Company, 507 Montgomery St., S. F.
Petersen-James Co....710 Larkin St., S. F.

HOSE RACKS AND REELS
Levensaler-Spier Corporation, 259 Monadnock Bldg., S. F.

HOTELS
The Angelus, Loomis Bros......Los Angeles

INGOT IRON
American Rolling Mill Co., Middleton, Ohio.
California Corrugated Culvert Co., 5th and Parker Sts., West Berkeley.

INSPECTIONS AND TESTS
Robert W. Hunt & Co., 251 Kearny St., S. F.

INSULATING MATERIALS
Armstrong Cork Co........... Pittsburg, Pa.

JOIST HANGERS
Western Builders' Supply Co., 155 New Montgomery St., S. F.

LIME
Holmes Lime Company, Monadnock Bldg., S. F.
Henry Cowell Lime & Cement Co., 9 Main St., S. F.

LIGHT, HEAT AND POWER
Pacific Gas & Elec. Co..445 Sutter St., S. F.

LUMBER
Dudefield Lumber Co.........Palo Alto, Cal.
Sunset Lumber So. ....Oakland, Cal.
Santa Fe Lumber Co., Seventeenth and De Haro Sts., S. F.

MAIL CHUTES
Cutler Mail Chute Co., Rochester, N. Y. (see adv. on page 38 for Coast representatives).

MANTELS
Mangrum & Otter ....561 Mission St., S. F.
Watson Mantel & Tile Co., Sheldon Bldg., S. F.

MARBLE
Columbia Marble Co...268 Market St., S. F
Joseph Musto Sons-Keenan Co., 535 North Point St., S. F.

METAL AND STEEL LATH
Atlantic Fireproofing Co., Pacific Bldg., S. F.
Jackson Fireproof Partition Co., Levensaler-Spier Corporation, Distributors, Monadnock Bldg., S. F.
L. A. Norris & Co., Monadnock Bldg., S. F.
Pratt Building Material Co., Hearst Bldg., S. F.

METAL CEILINGS
Berger Mfg. Co......1120 Mission St., S. F.
San Francisco Metal Stamping & Corrugating Co................2269 Folsom St., S. F.

METAL DOORS AND WINDOWS
U. S. Metal Products Co., 525 Market St.
Dahlstrom Metallic Door Co., Western office, with M. G. West Co., 353 Market St., S. F.
Canton Mfg. Co., Sherman Kimball & Co., First and Howard Sts., S. F.

METAL FURNITURE
M. G. West Co...... .353 Market St., S. F.
The Keyless Lock Co.......Indianapolis, Ind.
Van Dorn Iron Works Co.......Cleveland, O.
Chas. M. Finch, 311 Board of Trade Bldg., S. F.

METAL SHINGLES
San Francisco Metal Stamping & Corrugating Co................2269 Folsom St., S. F.

OIL BURNERS
American Heat & Power Co., Seventh and Cedar St., Oakland
Fess System Co.......220 Natoma St., S. F.
T P. Jarvis Crude Oil Burner Co., 275 Connecticut St., S. F.
Compressed Air & General Machinery Co., 39 Stevenson St., S. F.

ORNAMENTAL IRON AND BRONZE
California Artistic Metal & Wire Co., 349 Seventh St., S. F.
J. G. Braun.........Chicago and New York
Ralston Iron Works, 20th and Indiana Sts., S. F.
Monarch Iron Works, 1165 Howard St., S. F.
C. J. Hillard Company, Inc., 19th and Minnesota Sts., S. F.
Shreiber & Sons Co., represented by Western Builders Supply Co., S. F.
Sartorius Company..15th and Utah Sts., S. F.
West Coast Wire & Iron Works, 861-863 Howard St., S. F
Vulcan Iron Works.....................S. F.

PAINTING AND DECORATING
D. Zelinsky.............564 Eddy St., S. F.
C. H. Krebs & Co..........Sacramento, Cal.
Horace W. Tyrrel, 1707 38th ave., Oakland.

PAINT FOR BRIDGES
Briggs Bituminous Corporation Co., J. & R. Wilson, agents.......117 Steuart St., S. F.

PAINT FOR STEEL STRUCTURES
"Biturine," sold by Biturine Co. of America, 24 California St., S. F.
Briggs Bituminous Corporation Co., J. & R. Wilson, agents.......117 Steuart St., S. F.
Carbonizing Coating, made by Goheen Mfg. Co., Canton, O. See advertisement for Coast distributors.
Joseph Dixon Crucible Co., Coast branch, 155 Second St., S. F.
Trus-Con Bar-Ox, Trussed Concrete Steel Co. See adv. for Coast agencies.
Glidden's Acid Proof Coating, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
"Bitumastic" sold by Hill, Hubbell & Co., Fife Bldg., S. F.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

PAINT FOR CEMENT

American Paint & Dry Color Co., 414 Ninth St., S. F.

Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (Inc.), [See adv. in this issue for Pacific Coast agents.]

"Biturine," sold by Biturine Co. of America, 24 California St., S. F.

California Safety Fireproofing Company, 687 Market St., S. F.

Trus-Con Stone Tex., Trussed Concrete Steel Co. See advertisement for Coast agencies.

Liquid Stone Paint Co., Hearst Bldg., San Francisco, Los Angeles and San Diego

Glidden's Liquid Cement, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

Moller & Schumann Co., West Coast Branch, 1022 Mission St., S. F.

Concreto Cement Coating manufactured by the Muralo company. (See color insert for Coast distributors.)

Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

Goheen Mfrg. Co., ...Canton, O. See advertisement for Coast distributors

PAINTS, OILS, ETC.

American Paint & Dry Color Co. 414 Ninth St., S. F.

Concreto Cement Coating, manufactured by the Muralo company. (See color insert for Coast distributors.)

Bass-Hueter Paint Company, Mission, near Fourth St., S. F.

"Biturine," sold by Biturine Co. of America, 24 California St., S. F.

Goheen Mfrg. Co., ...Canton, O. See advertisement for Coast distributors

Glidden Varnish Co., Cleveland, Ohio, represented by Whittier-Coburn Co., S. F. and Los Angeles

Moller & Schumann Co., 1022 Mission St., .S F.

Berry Bros..............250 First St., S. F.

Paraffine Paint Co....38-40 First St., S. F.

R. N. Nason Company........San Francisco

Standard Varnish Works..113 Front St., S. F.

PHOTO ENGRAVING

California Photo Engraving Co., 121 Second St., S. F.

PHOTOGRAPHY

R. J. Waters Co..........717 Market St.,S. F.

Walter Scott..........558 Market St., S. F.

PIPE—CORRUGATED INGOT IRON

California Corrugated Culvert Company, Los Angeles and West Berkeley.

PIPE—VITRIFIED SALT GLAZED TERRA COTTA.

N. Clark & Sons, 112 Natoma St., San Francisco

Gladding McBean & Co.. Crocker Bldg., S. F.

Pacific Sewer Pipe Company, I. W. Hellman Bldg., Los Angeles

Pratt Bldg. Material Co., Hearst Bldg., S. F.

Steiger Terra Cotta and Pottery Works, Mills Bldg., S. F.

PLASTER BOARD

Colonial Wall board manufactured by Mound House Plaster Co., Levensaler-Speir Corporation......259 Monadnock Bldg., S. F.

"Plastergon," sold by the Comyn Mackall & Co., 310 California St., San Francisco.

PLASTERING CONTRACTORS

Geo. MacGruer....319 Mississippi St., S. F.

Herman Bosch..........4420 20th St., S. F.

A. Knowles............985 Folsom St., S. F.

W. J. McGraw....1636 Felton St., Berkeley

PLUMBING

Boscus Bros..........975 Howard St., S. F.

Scott Company........243 Minna St., S. F.

Peterson-James Co.....710 Larkin St., S. F.

Wittman. Lyman & Co., 340 Minna St., S. F.

Alex Coleman..........706 Ellis St., S. F.

Antone Letticb...........365 Fell St., S. F.

PLUMBING FIXTURES, MATERIALS, ETC.

Crane Co....Second and Brannan Sts., S. F.

Jno. Douglas Co....571 Mission St., S. F.

N. O. Nelson Mfg. Co., 978 Howard St., S. F.

California Steam Plumbing Supply Co., 671 Fifth St., S. F.

Mark-Lally Co..First and Folsom Sts., S. F.

Western States Porcelain Company, San Pablo, Cal.

J. L. Mott Iron Works, D. H. Gulick, selling agent ....135 Kearny St., S. F.

POTTERY

Steiger Terra Cotta and Pottery Works, Mills Bldg., S. F.

PULLEYS, SHAFTING, GEARS, ETC.

Meese and Gottfried Company..........San Francisco, Seattle, Portland and Los Angeles

RADIATORS

Kauffman Heating & Engineering Co., St. Louis, represented in San Francisco by Sherman Kimball, Inc.

ROAD MACHINERY

Langford, Felts & Myers..Rialto Bldg., S. F.

REFRIGERATORS

McCray Refrigerators, sold by Nathan Dohrmann Co., Geary and Stockton, Sts., S. F.

Vulcan Iron Works..................S. F.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

REVOLVING DOORS

American Revolving Door Co., 2514 Monroe St., Chicago, Ill.
Van Kennel doors, sold by U. S. Metal Products Co........525 Market St., S. F.

ROLLING DOORS, SHUTTERS, PARTITIONS, ETC.

Lilley & Thurston Co., Rialto Bldg., S. F.
C. F. Weber & Co......365 Market St., S. F.
Wilson's Steel Rolling Doors. U. S. Metal Products Co., San Francisco and Los Angeles

ROOFING AND ROOFING MATERIALS

Biturine Co. of America, 24 California St., S. F.
Golden Gate Brick Co..660 Market St., S. F.
Grant Gravel Co..............Williams Bldg., S. F.
Fibrestone & Roofing Co., 971 Howard St., S. F.
Genasco Ready Roofing, sold by Parrott & Co................320 California St., S. F.
"Ruberoid," manufactured by Paraffine Paint Company, Lilley & Thurston, distributors. Rialto Bldg., S. F.
Mackenzie Roof Co., 425 15th St., Oakland.
United Materials Co.... Balboa Bldg., S. F.
Redwood Shingle Association, 44 California St., S. F.

ROOFING TIN

American Sheet & Tin Plate Co., Pacific Coast representatives, U. S. Steel Products Co., San Francisco, Los Angeles, Portland and Seattle.

RUBBER TILING AND MATTING

New York Belting & Packing Co., 129 First St., S. F.
Compressed Air & General Machinery Co., 39 Stevenson St., S. F.

SAFES, VAULTS, BANK EQUIPMENT

M. G. West Co........353 Market St., S. F.

SAFETY TREADS

Universal Safety Tread Co., represented by Waterhouse and Price, San Francisco and Oakland.
American Mason Safety Tread—See advertisement on page 131 for Coast Agents.

SANDSTONE BRICK

Sacramento Sandstone Brick Co., Sacramento, Cal.
Golden Gate Brick Co..660 Market St., S. F.

SANITARY DRINKING FOUNTAINS

N. O. Nelson Mfg. Co., 978 Howard St., S. F.

SASH CORD

Puritan Sash Cord Company. (For Coast Agents, see advertisement.
Samson Cordage Works, Manufacturers of Solid Braided Cords and Cotton Twines 88 Broad St., Boston, Mass.
Silver Lake A Sash Cord, represented by Sanford Plummer, 149 New Montgomery St., S. F.

SCENIC PAINTING—DROP CURTAINS, ETC.

The Edwin H. Flagg Scenic Company, 1638 Long Beach Ave., Los Angeles.

SCHOOL FURNITURE AND SUPPLIES

C. F. Weber & Co....365 Market St., S. F. 512 S. Broadway, Los Angeles.

SCREENS

J. A. Murray, sales agent for the Higgin All Metal Window Screen. 805 Monadnock Bldg., S. F.

SCULPTORS

Western Sculptors, 533-535 Turk St., S. F.

SHEATHING AND SOUND DEADENING

Samuel Cabot Mfg. Co., Boston Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

SHEET METAL WORK, SKYLIGHTS, ETC.

Berger Mfg. Co......1120 Mission St., S. F.
Capitol Sheet Metal Works, 1927 Market St., S. F.
Western Furnace & Cornice Co., 1645 Howard St., S. F.
U. S. Metal Products Co., 525 Market St., S. F.

SHINGLE STAINS

Cabot's Creosote Stains, sold by Waterhouse & Price, San Francisco, Los Angeles and Portland.

SPIRAL CHUTE

The Haslett Spiral Chute Co., 310 California St., S. F.

STEEL AND IRON—STRUCTURAL

Central Iron Works..621 Florida St., S. F.
Dyer Bros......17th and Kansas Sts., S. F.
Judson Manufacturing Company, 819 Folsom Street, San Francisco.
Brode Iron Works,..31 Hawthorne St., S. F.
Mortenson Construction Co., 19th and Indiana Sts., S. F.
J. L. Mott Iron Works, D. H. Gulick, Agt., 135 Kearny St., S. F.

Turner Mushroom System

of Concrete Construction for Buildings and Bridges

IMPORTANT DECISION

Recently rendered by the Honorable Charles A. Willard, in favor of the Mushroom System in the Drum vs. Turner Concrete Patent case. This decision sets at rest all pretended claims of Mr. Turner's imitators.

The Mushroom System is the original reinforced concrete flat slab system and is the only legitimate flat slab being erected to-day. C. A. P. Turner, the inventor of the ***Mushroom Flat Slab System*** has patents which are broad and cover the basic elements of ***the Circumferential Cantilever Flat Slab Construction.***

Mr. Turner has in his employ at the present time five of the best known and most able firms of patent attoineys in the United States. All infringers are being prosecuted.

OWNERS PROTECT YOUR INTERESTS by demanding that your flat slab designers furnish an infringement bond of an amount equal to the cost of your building, for the reason that the patent monopoly covers the right to use. ***Demand a bond for a five year term*** and make yourselves safe.

C. A. P. TURNER

Phoenix Bldg., MINNEAPOLIS, MINN.

Pacific Coast Representatives

INDUSTRIAL ENGINEERING CO.
Clunie Building, San Francisco
E. T. FLAHERTY,
I. W. Hellman Building, Los Angeles
A. P. HUECKEL,
Vancouver Building, Vancouver, B. C.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

STEEL AND IRON—STRUCTURAL—Cont'd.
- Pacific Rolling Mills, 17th and Mississippi Sts., S. F.
- Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, Etc. Phone Market 1374; Home, J 3435..370-84 Tenth St., S. F.
- Ralston Iron Works, Twentieth and Indiana Sts., S. F.
- Schrader Iron Works ....San Francisco
- U. S. Steel Products Company, Rialto Bldg., S. F.
- Schreiber & Sons Co., represented by Western Builders Supply Co., S. F.
- Vulcan Iron Works...........San Francisco
- Western Iron Works....141 Beale St., S. F.
- Woods & Huddart ...444 Market St., S. F.

STEEL PRESERVATIVES
- American Bitumastic solution sold by Hill, Hubbell & Co.............Fife Bldg., S. F.
- Dixon's Graphite, manufactured by Jos. Dixon Crucible Co.........155 Second St., S. F.

STEEL BARS FOR CONCRETE REINFORCEMENT
- Judson Manufacturing Company, 819 Folsom Street, San Francisco
- Kahn and Rib Bars, made by Trussed Concrete Steel Co. See advertisement for Coast agencies.
- Woods & Huddart....444 Market St., S. F.

STEEL DOORS AND TRIM
- Dahlstrom Metallic Door Co., 353 Market St., S. F.

STEEL DOOR GUARDS
- Ashlock Steel Door Guard Co., 291 Monadnock Bldg., S. F.

STEEL FURNITURE
- The Keyless Lock Co.......Indianapolis, Ind.

STEEL MOULDINGS FOR STORE FRONTS
- J. G. Braun, 537 W. 35th St., N. Y., and 615 S. Paulina St., Chicago.

STEEL FIREPROOF WINDOWS
- Canton Mfg. Co., represented by Sherman Kimball & Co., First and Howard Sts., S. F.

STEEL STUDDING
- Collins Steel Partition, Parrott & Co., S. F.
- "Lesco," Metal Stud, Levensaler-Speir, Corporation,..........Monadnock Bldg., S. F.

STONE
- California Granite Company, Monadnock Bldg., S. F.
- Parry Stone Co., "Sanpeta," "Colete," and "Manti" white stone, 223 Sheldon Bldg., S. F.
- Boise Sandstone Co.............Boise, Idaho

STORAGE SYSTEMS
- S. F. Bowser & Co., 612 Howard St., S. F.

SURETY BONDS
- Globe Indemnity Co., Insurance Exchange Bldg., S. F.
- Mass. Bonding & Insurance Co., First Nat'l Bk. Bldg., S. F.
- Fidelity & Deposit Co. of Maryland, Mills Bldg., S. F.
- Pacific Coast Casualty Co. Merchants' Exchange Bldg., S. F.

TERRA COTTA CHIMNEY PIPE
- Gladding-McBean Co....Crocker Bldg., S. F.

TILES, MOSAICS, MANTELS, ETC.
- Mangrum & Otter....561 Mission St., S. F.
- Watson Mantel & Tile Co., Sheldon Bldg., S. F.
- John Petrovffsky......523 Valencia St., S. F.

TILE FOR ROOFING
- Fibrestone & Roofing Co., 971 Howard St., S. F.
- Gladding, McBean & Company, Crocker Bldg., S. F.
- United Materials Co......Balboa Bldg., S. F.

TILE WALLS—INTERLOCKING
- California Denison Block Co., 401 Monadnock Bldg., S. F.

TIN PLATES
- American Tin Plate Company, Rialto Bldg., S. F.

VACUUM CLEANERS
- Bill & Jacobsen..........Rialto Bldg., S. F.
- Blaisdell Machinery Co., represented by Sherman Kimball, Second and Howard Sts., S. F.
- The Vak-Klean Vacuum Cleaner, Pneulectric Co., Pacific Coast Agts., 943 Phelan Bldg., S. F.
- Giant Stationary Suction Cleaner, manufactured by Giant Suction Cleaner Co., 731 Folsom St., S. F., and 3d and Jefferson Sts., Oakland.
- "Tuec" Air Cleaner, manufactured by United Electric Co...........110 Jessie St., S. F.

VALVES
- Jenkins Bros..................247 Mission St., S. F.

VALVE PACKING
- "Palmetto Twist," sold by H. N. Cook Belting Co.............317 Howard St., S. F.

VARNISHES
- American Bitumastic solution, sold by Hill, Hubbell & Co............Fife Bldg., S. F.
- W. P. Fuller Co............All Coast Cities
- S. F. Pioneer Varnish Works, 816 Mission St., S. F.
- Moller & Schumann Co., Brooklyn, N. Y., Chicago and S. F.
- Berry Bros., "Liquid Granite," mfrd. and sold by Berry Bros..250-256 First St., S. F.
- R. N. Nason & Co., San Francisco and Los Angeles.

VENETIAN BLINDS, AWNINGS, ETC.
- C. F. Weber & Co....365 Market St., S. F.

WALL BEDS
- Marshall & Stearns Co., 1154 Phelan Bldg., S. F.

WALL BOARD
- Levensaler-Spier Corporation, Monadnock Bldg., S. F.
- "Plastergon," sold by Comyn-Mackall & Co., 310 California St., San Francisco.

WALL SAFES
- Lowrie Wall Safe, sold by C. Roman Co., 173 Jessie St., S. F.

WATER HEATERS
- Pittsburg Water Heater Co., 237 Powell St., S. F.

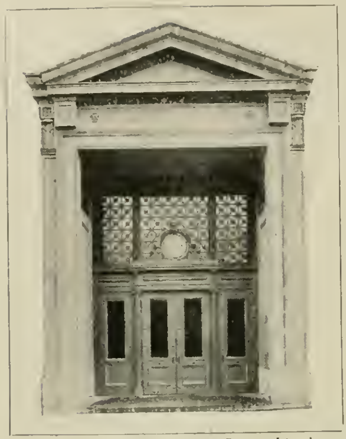
WATERPROOFING FOR CONCRETE, ETC.
- Briggs Bituminous Paint Co., J. & R. Wilson, agents..............117 Steuart St., S. F.
- "Ceresit," manufactured by the Ceresit Waterproofing Co., sold by Parrott & Co., San Francisco, Los Angeles and Portland, and Julien A. Becker Co., Seattle, Wash.
- Concrewaltum, made by Goheen Mfg. Co., Canton, O. See advertisement for Coast distributors.
- Concreto Cement Coating, manufactured by the Muralo Co. (See color insert for Coast distributors.)
- California Safety Fireproofing Company, 687 Market St., S. F.
- Fibrestone & Roofing Co., 971 Howard St., S. F.
- Glidden's Concrete Floor Dressing and Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- Hercules Waterproofing Cement Co., represented by Waterhouse & Price, San Francisco and Oakland.
- Liquid Stone Paint Co., Hearst Bldg., S. F.
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.
- The Building Material Co., Inc., 583 Monadnock Bldg., S. F.

WHITE ENAMEL FINISH
- "Satinette," Standard Varnish Works, 113 Front St., S. F.
- Moller & Schumann Co., West Coast Branch, 1022 Mission St., S. F.
- Trus-Con Sno-wite, manufactured by Trussed Concrete Steel Company, See adv. for Coast distributors.

WIRE FABRIC
- U. S. Steel Products Co., Rialto Bldg., S. F.

WOOD MANTELS
- Fink & Schindler......218 13th St., S. F.
- Mangrum & Otter....561 Mission St., S. F.

PERALTA APARTMENTS, 13TH & JACKSON STREETS, OAKLAND, CALIFORNIA
EDWARD T. FOULKES, Architect



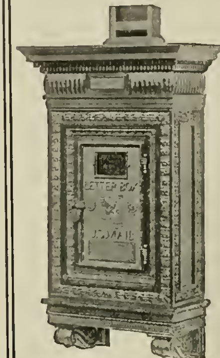
Cast Iron Entrance and Bronze Doors. Lincoln High School, Portland, Oregon

EXECUTED BY

Sartorius Company, Inc.
·Ornamental Iron & Bronze·

San Francisco, Cal.

The Cutler Mail Chute



MAIL BOX—SHARON BUILDING
SAN FRANCISCO, CAL.
GEORGE W. KELHAM, ARCHITECT

Pacific Coast Representatives:

San Fancisco, Cal.,
THOMAS DAY COMPANY.

Portland, Ore.,
C. W. BOOST.

Seattle and Tacoma, Wash.,
D. E. FRYER & CO.

Spokane, Wash.,
E. C. TOUSLEY.

Cutler Mail Chute Co.,

Cutler Building. ROCHESTER, N.Y.

Circular Iron Stairs in Hall of Records, San Francisco
Erected 1876

Vulcan Iron Works

(ESTABLISHED 1851)

STRUCTURAL STEEL
CAST IRON COLUMNS, ETC.
ORNAMENTAL IRON

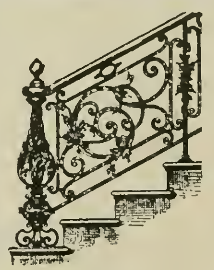
Works and Office — Francisco and Kearny Streets, San Francisco, Cal.

THE·L· SCHREIBER & SONS Co

ORNAMENTAL IRON & BRONZE STRUCTURAL STEEL

CINCINNATI

SAN FRANCISCO
WESTERN BUILDERS SUPPLY CO
155 NEW MONTGOMERY ST.
LOS ANGELES
SWEETSER & BALDWIN SAFE CO
200 EAST 9TH ST



The Architect and Engineer

of California

Pacific Coast States

Terms of Subscription. $1.50 per Year

Single Copies. 25 Cents

Issued monthly in the interests of Architects, Structural Engineers, Contractors and the Allied Trades of the Pacific Coast.

Entered at San Francisco Post Office as Second Class Matter.

Contents for February

(Index to Advertisements, page 8.)

Frontispiece
The Architect and Engineer
of California
for February, 1914

RESIDENCE OF MR. P. COL, COLLEGE PARK, CALIFORNIA
F. D. Wolfe, Architect
C. J. Wolfe, Associate

THE

Architect and Engineer

Of California

Pacific Coast States

VOL. XXXVI. FEBRUARY, 1914. No. 1.

A San Francisco Architect Comments on Some Eastern Architecture

By WILLIAM A. NEWMAN*

IT IS gratifying to note the material improvement architecturally in the buildings that are now being erected in the larger Eastern cities, especially in the more general use of fireproof materials, architectural bronze, fancy marbles and mosaic ceilings.

A great deal can be said of the quaint and very interesting homes and other landmarks in the older sections of New Orleans and Baltimore, but there is probably nothing more inviting on this continent to the Western architect than a ramble among the magnificent public and semi-public buildings in the capitol at Washington.

Next to the library, the Pan-American building meets with the heartiest appreciation. Both inside and outside, in design and execution, it has such an appeal as to bring forth the architect's exclamation, "Good."

The convention I attended in Washington was a most successful one, having for its object the standardization and improvement of methods used by the Government in unifying and expediting the construction of Federal buildings. These matters had the attention of members of Congress and of President Wilson's cabinet, and there promises to result through this educational process a better appreciation of art and architecture.

A few days' stay in the New York metropolis enabled me to enjoy the beauties of the Woolworth and new Municipal buildings, the Custom House and Library, and to view the luxurious homes and apartments on Riverside Drive, together with Columbia College, St. John's Cathedral and Union Theological Seminary, which latter group is admirable for its fine Gothic feeling and execution. The Metropolitan Museum of Art is within and without very attractive to an architect.

For a good interior in polychrome terra cotta, together with an oyster and a hot bird, etc., I would recommend the McAlpin grille.

In Boston Messrs. Peabody & Stearns have something creditable under way in the new addition to the Custom House which is towering into the skyline a la Oakland City Hall.

Down town in Chicago it is still as smoky as ever and discouraging for any architect (but a blind one), for after a few months it is impossible to tell the architect's color scheme of a building, let alone the material used on the exterior. But there are some splendid interiors, notably those to be found in the La Salle and Blackstone hotels, the Pompeiian room in the Auditorium, and the new Peoples' Gas building, the latter unquestionably

*Mr. Newman is associated with Supervising Superintendent Jos. W. Roberts of the Treasury Department, San Francisco. Mr. Newman has recently returned from a month's visit in the East, where he attended the annual convention of the Society of Constructors of Federal Buildings.

the late Daniel Burnham's best work. For a first-class interior terra cotta job it would be hard to improve upon the Railway Exchange. The glass mosaic ceiling in Marshall Field's is also worth seeing, being executed in blue.

Out here on the Pacific Coast every now and then we hear the local architect unfavorably contrasted with his eastern brother, but you can tell that one to "Forget it" when you recall seeing in the east the all-too-many good projects spoiled by faulty design or improper selection of materials used.

How many local architects could get by with such a number of big, ugly and prominent patches as you will find on the exterior columns of McKim, Mead & White's Pennsylvania Railroad Station in New York, or how many would last a week in San Francisco after such iron rust stains began to checker with ocher the granite walls of that important and costly new Scottish Rite Cathedral in Washington, is problematical.

In conclusion I want to say that everywhere there was manifested a feeling of confidence in future business conditions, and I predict that San Francisco will surely have some prosperity in the next twelve months.

* * *

Domestic Architecture that is Different

SOMETHING different. That is what Messrs. Wolfe & Wolfe, the San Jose architects mean to give their clients. That they have succeeded one need only to glance at some of the accompanying pictures, which show the wide range of domestic architecture covered by them. For the most part their work is very good, although a few houses they have designed are so unusual in their treatment that the critics are bound to be heard from. In San Benito county Messrs. Wolfe & Wolfe have recently completed a house for Mr. Macomber, a wealthy cattle raiser, which is unique, indeed. The owner wanted "something different." He has it. The architects have developed a style which might be termed a modern adaptation of the Moorish. Were this unusual architectural effort placed upon a city lot we fancy it would call forth a world of criticism, but placed where it is, 'mid the low, rolling hills of San Benito, with their ever-changing California colors, the house seems to fit in very well. The colors blend splendidly with the surrounding country and there is a certain feeling in the style that gives a charm to the place which a more serious or dignified design might not create.

The firm has done some very good work along Mission and Spanish lines, notably the house of Dr. Bangs in San Jose and a number of smaller houses of the bungalow type. The roof of the Beard residence in Modesto indicates the adaptability of clay tile for residence work.

The residence of Peter Col, in College Park, is a pleasing example of the latest style in domestic architecture. The style is a natural result of a growing tendency to use asphalt materials for roof coverings. The well-known work of Frank Lloyd Wright is along these same low, broad lines.

Santa Clara has shown a pleasing interest in so-called "open-air" schools—buildings in which the windows are so arranged as to readily open whole sides of the building to the outside. Quite a number of these have been designed by Mr. Frank Wolfe and his son. A typical suburban school is shown in this number.

The façade of the Santa Clara County Hospital is a good example of the firm's Colonial work.

ELKS BUILDING,
SAN JOSE, CALIFORNIA

F. D. Wolfe, Architect

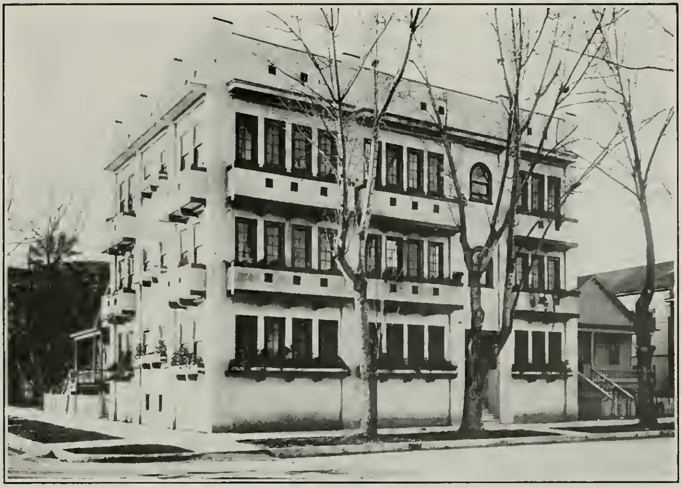
COUNTY HOSPITAL,
SAN JOSE, CALIFORNIA

F. D. Wolfe, Architect

WENGER-CLARK-KNAPP APARTMENTS,
SAN JOSE, CALIFORNIA

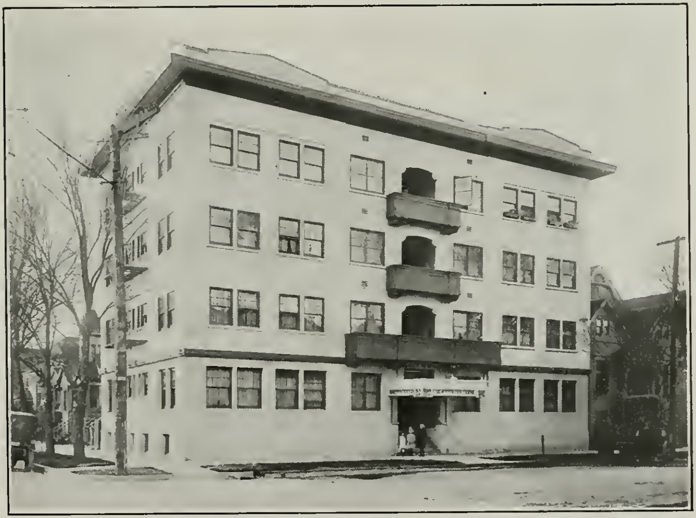
F. D. Wolfe, Architect

FIRE DEPARTMENT HEADQUARTERS
SAN JOSE, CALIFORNIA



F. D. Wolfe, Architect
C. J. Wolfe, Associate

TRUMPLER APARTMENTS, SACRAMENTO, CALIFORNIA



CASA DEL REY APARTMENTS, SACRAMENTO, CALIFORNIA

F. D. Wolfe, Architect
C. J. Wolfe, Associate

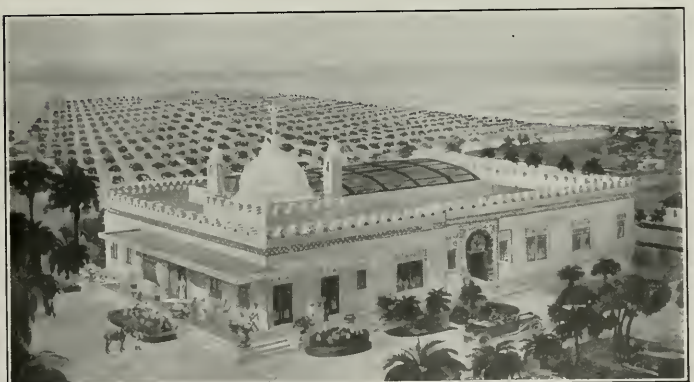
F. D. Wolfe, Architect
C. D. Wolfe, Associate

ALEXANDRIA APARTMENTS, SACRAMENTO, CALIFORNIA

F. D. Wolfe, Architect

LAMOLLE HOUSE, SAN JOSE, CALIFORNIA

WOLFE APARTMENTS,
SAN JOSE, CALIFORNIA

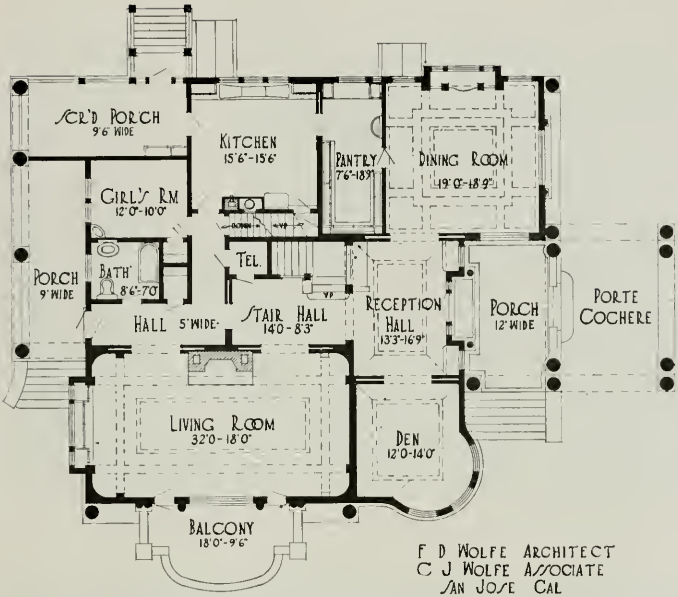


F. D. Wolfe, Architect
C. D. Wolfe, Associate

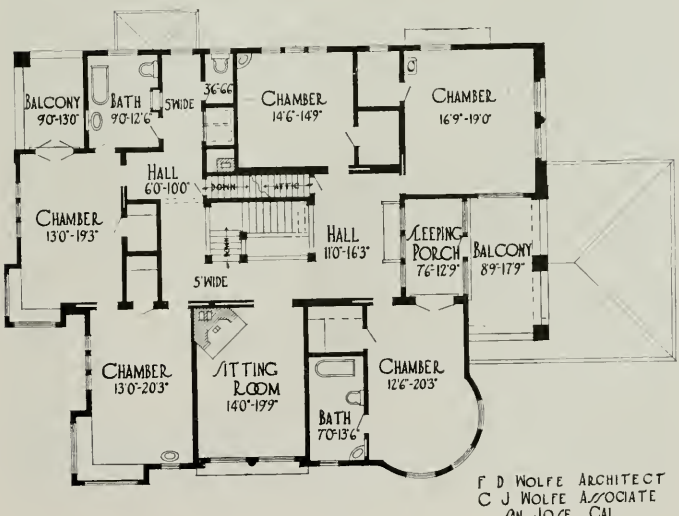
MOORISH COUNTRY HOUSE
FOR MR. A. K. MACOMBER,
PAICINES, CALIFORNIA

RESIDENCE OF MR. E. HATCH, COLLEGE PARK, CALIFORNIA

F. D. Wolfe, Architect
C. J. Wolfe, Associate

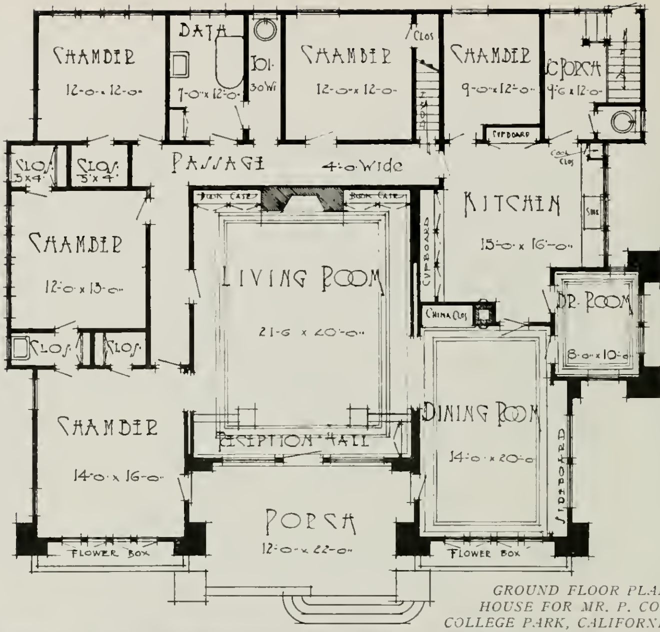


FIRST FLOOR PLAN



SECOND FLOOR PLAN

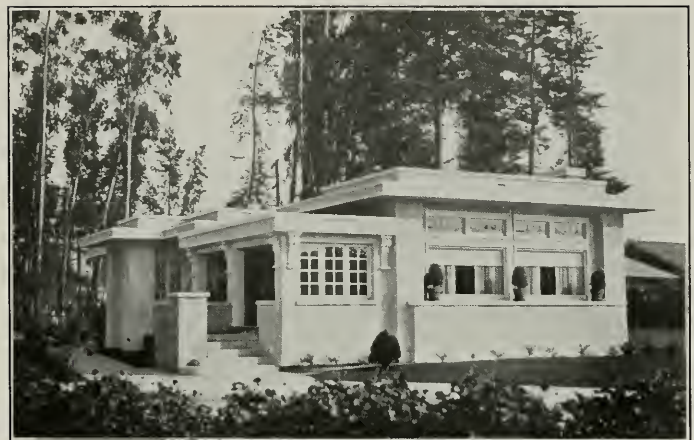
RESIDENCE OF MR. E. HATCH,
COLLEGE PARK, CALIFORNIA



GROUND FLOOR PLAN,
HOUSE FOR MR. P. COL,
COLLEGE PARK, CALIFORNIA

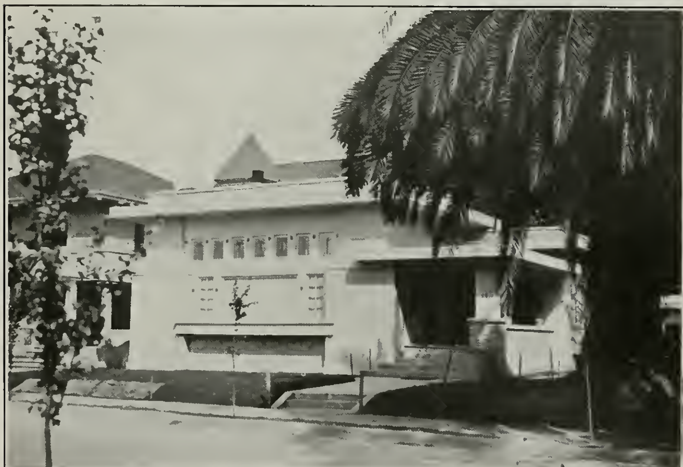
F. D. Wolfe, Architect
C. J. Wolfe, Associate

DINING ROOM, RESIDENCE OF MR. PETER COL,
COLLEGE PARK, CALIFORNIA



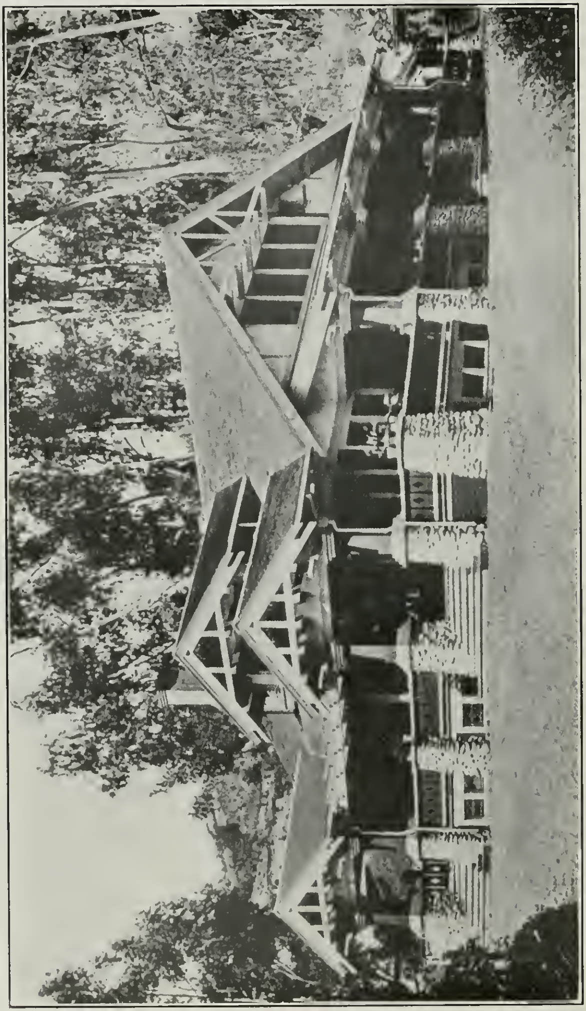
F. D. Wolfe Architect
C. J. Wolfe, Associate

BUNGALOW FOR MR. JOSEPH HAGEMAN,
SAN JOSE, CALIFORNIA



F. D. Wolfe, Architect
C. J. Wolfe, Associate

BUNGALOW FOR MR. ROY ATKINSON,
SAN JOSE, CALIFORNIA

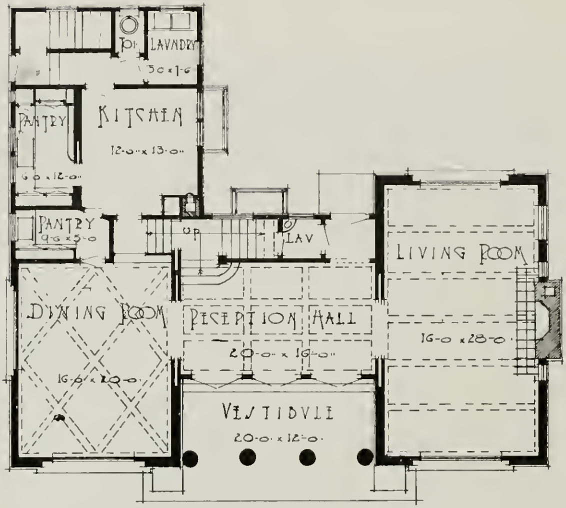


COUNTRY RESIDENCE OF MR. C. H. CORDES, GILROY, CALIFORNIA

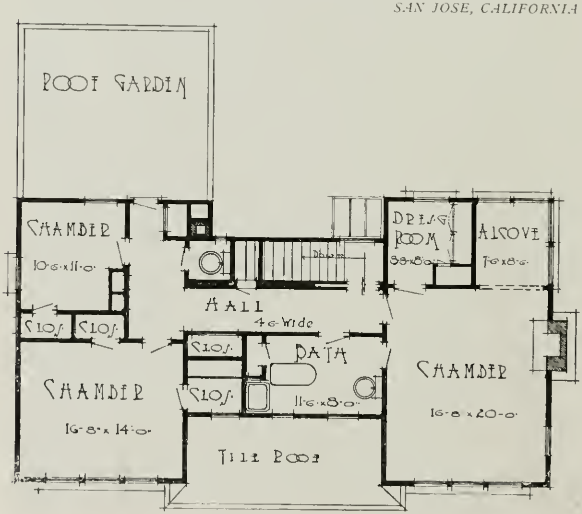
F. D. Wolfe, Architect
C. J. Wolfe, Associate

RESIDENCE OF DR. F. H. BANGS,
SAN JOSE, CALIFORNIA

F. D. Wolfe, Architect
C. J. Wolfe, Associate



FIRST FLOOR PLAN,
RESIDENCE OF DR. F. H. BANGS,
SAN JOSE, CALIFORNIA



SECOND FLOOR PLAN,
RESIDENCE OF DR. F. H. BANGS,
SAN JOSE, CALIFORNIA

F. D. Wolfe, Architect
C. J. Wolfe, Associate

HOUSE FOR CONTRACTOR T. K. BEARD,
MODESTO, CALIFORNIA

HOUSE FOR MR. R. T. EVENS,
PALO ALTO, CALIFORNIA

BUNGALOW FOR MRS. L. BENNETT,
SAN JOSE, CALIFORNIA

F. D. Wolfe, Architect
C. J. Wolfe, Associate

OPEN-AIR SCHOOL HOUSE
FOR AUSTIN DISTRICT SCHOOL

F. D. Wolfe, Architect
C. J. Wolfe, Associate

Illumination

By CHARLES T. PHILLIPS, C. E.*
(Second Paper)

THE NEED of artificial daylight has long been felt, and there are a number of lamps on the market provided with colored glass screens to produce a spectrum resembling daylight. These devices are more for special than for general use. Industries such as textile mills, lithographing establishments and stores where color matching is desired have use for them. The theater stage has felt the want of some type of illuminant that will give a daylight effect, and some of the large theater owners have spent considerable money experimenting along those lines.

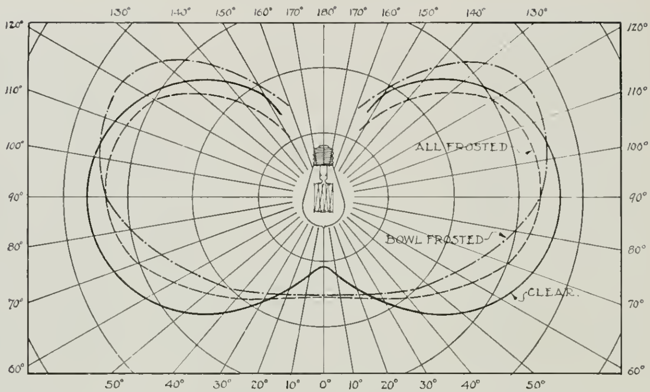
The deficiency of most artificial light is the lack of blues and the great excess of orange and red. This is shown in various spectro-photometric curves and colorimeter readings published from time to time. If a temperature of approximately 6000°C. could be obtained in an incandescent body, a white light could be produced, but, as this is impossible, other means will have to be used to obtain the same results. A subtractive process, where undesirable radiations are filtered out, will accomplish this result, but it is not commercially possible on a large scale. Another process where white light is obtained by various mixtures of spectrum colors will give a physiological white, but it can not be used for color matching.

The object in frosting incandescent lamps is to hide from view the brilliant filament. The frosting presents a broken reflecting surface to the rays of light, causing them to be redirected or diffused. Although the candle-power is decreased by frosting, it is not the frosted surface that absorbs the light, however, but the fact that the frosted surface diffuses the light and causes some of it to be redirected through the glass perhaps three or five times. This redirected light is absorbed by the glass and carbon deposit on the inside of the bulb. Frosting also causes a change in the distribution, decreasing the horizontal candle-power and increasing it at the tip. The life of a frosted lamp is also less and the useful life is very much less. If a tungsten lamp is bowl frosted, the tip candle-power is increased, the horizontal candle-power is decreased, and the mean spherical candle-power is decreased about 5 per cent. Frosting the entire lamp reduces the mean spherical candle-power about 10 per cent. The effect of frosting is shown by Fig. 1.

As there is no light source on the market which gives a correct distribution of light, for all conditions, it is necessary to use suitable reflectors or globes to modify and correct the distribution. Owing to the high intrinsic brilliancy of modern illuminants, the light source should not be exposed to view. Some diffusing medium should be used, even though there is a small loss of light. The eye will see objects more distinctly, even if the intensity on the plane to be illuminated is lower.

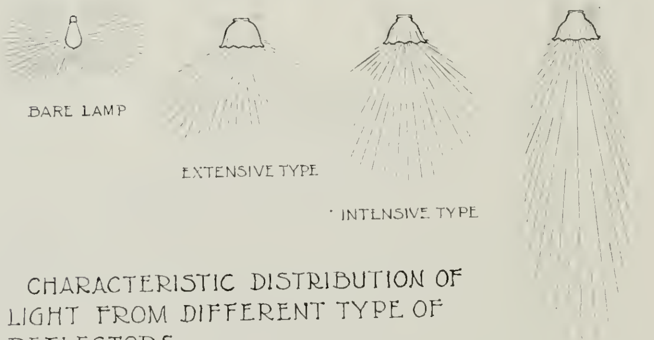
The efficiency and effectiveness of various types of reflectors for incandescent lamps do not seem to be fully understood by the average person. The clear glass prismatic and opalescent reflectors have a lower loss by absorption (being as low as 9 per cent) than the opaque type. The latter has an absorption of from 14 to 40 per cent, depending on the make. This comparison shows that the opaque type is the least efficient, yet for certain purposes it is most effective, consequently the most efficient to use. The distribution of light from three types of prismatic reflectors is shown by Fig. 2.

*Pacific Building, San Francisco.



DISTRIBUTION CURVE SHOWING THE EFFECT OF FROSTING ON THE LIGHT DISTRIBUTION OF AN INCANDESCENT LAMP.

FIG 1.



CHARACTERISTIC DISTRIBUTION OF LIGHT FROM DIFFERENT TYPE OF REFLECTORS.

CHAS. T PHILLIPS
CONSULTING ENGINEER
SAN FRANCISCO

FIG 2.

It seems hard to realize the difference in the distribution of the light flux which a change in the position of the lamp in a reflector will make, or how the success of an installation depends on the location of the fixtures, the type of reflectors and holders used, the color of the walls and ceiling and the height at which the fixtures are hung.

To buy reflectors because the price is low is poor economy. The reflecting surface of these reflectors is generally inefficient, the design is usually poor and the results of the installation is not satisfactory. The next mistake is to use a type of reflector which is not suited to the conditions. This is often shown where an installation which is properly designed is copied for a condition that is radically different.

In the efficient lighting of a room it is not only necessary that the greater portion of the light flux be directed to the plane of illumination, which is generally about thirty inches from the floor, but it is also necessary that the upper portion of the room shall not be in darkness. This is where the reflectors and globes of prismatic glass meet the demand. They not only deliver to the plane to be illuminated the majority of the light rays, but also permit a certain quantity of the rays to penetrate to the upper portion of the room. The control and redirecting of the light rays is shown in a marked degree in searchlights, where a parabolic reflector is used to concentrate the light flux in a slender beam. It is a well known fact that a perfect parabolic reflector, equipped with an absolute point source of light at its focal point, would reflect all the light incident upon its surface in a direction parallel to the axis, and thus form a beam with the same intensity for an indefinite distance, barring only atmospheric absorption. It is not practical to obtain this result, due to the fact that it is impossible to obtain a true point source, and it is evident with the light sources we have, a cone of light will be emitted. This can be noted in automobile headlights where it is possible to obtain a much better and stronger beam of light with an electric lamp of eight candle-power than with an acetylene lamp of twenty candle-power it not being possible to locate the acetylene flame at the focal point of a parabolic reflector, due to the heat from the flame which would damage the reflecting surface, and the shape of the flame which is not suited for this purpose.

Reflection from all painted or calcimined surfaces is largely of a diffused nature with a slight amount of regular reflection. The law that "the angle of reflection equals the angle of incident" is hardly practical to apply to painted or calcimined surfaces, unless it is for general results only. It has been found that the reflecting power of colored surfaces depends to a great extent on the quality of light by which they are illuminated.

The statement is frequently made by salesmen of reflectors that their reflectors increase the amount of light given by the lamp. This statement is not correct because, as a matter of fact, a reflector will absorb a portion of the light and thus decrease the mean spherical candle-power of the lamp. The object of the reflector is to redirect the light flux to the working plane. The majority of the lamps require some means to accomplish this result, although there are some types of lamps which for certain conditions do not require a reflector. Glassware, which is purely for diffusing purposes, must not be confused with that where the principal of specular reflection is employed. The first is for diffusing the light and concealing the light source, and is of no value where it is desired to redirect the light. Ground glass, opal glass, etc., are of this type.

No one manufacturer makes a line of lighting supplies that is best suited to all conditions, and frequently the illuminating engineer is compelled to design apparatus to suit certain conditions. The Allegheny County Soldiers' Memorial Hall, Pittsburg, is perhaps the best example of where apparatus made by a number of firms was used to get the desired results. The light is diffused downward through glass plates which form a false ceiling, and the riotous color effect produced has been a wonder to all beholders. There is the golden yellow light from the flame arc lamp, bluish green from the mercury vapor lamps, rose from the nitrogen

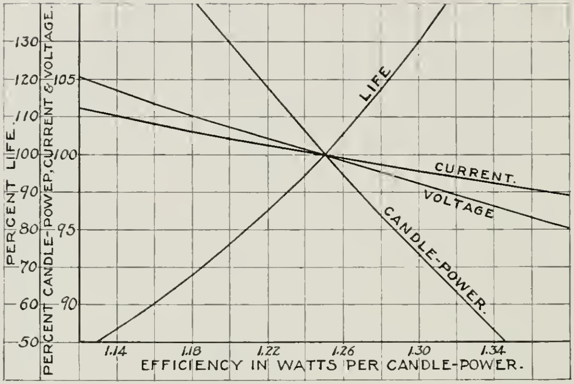


FIG. 3

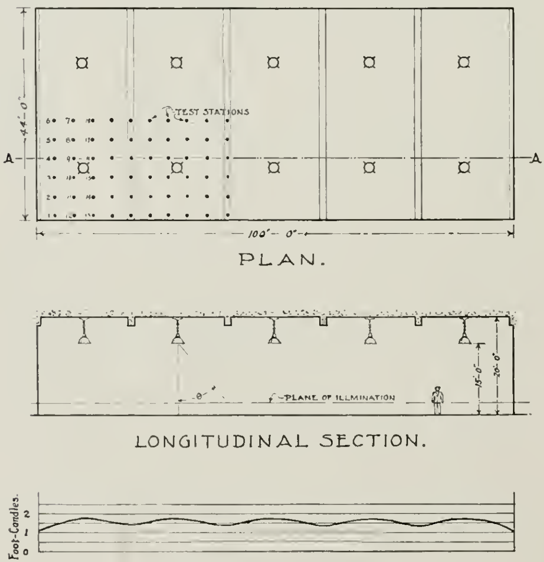


FIG. 4

CHAS. T. PHILLIPS.
CONSULTING ENGINEER.
SAN FRANCISCO.

vapor tubes, amber and white from carbon filament and tungsten lamps, and other shades from a combination of different lamps and colored glass.

While manufacturers of lighting fixtures have striven to improve their product from an artistic point of view, the possibilities of the scientific application of shades, reflectors and lamps have received scant attention. The non-appreciation of the fact that art and science should work hand in hand is to be deplored, especially since the advent of the newer type of lighting units. There has been considerable criticism of the fact that some of the electric fixture manufactures are from five to ten years behind the times. This unfortunate state is due more to the consumer than to the manufacturer. The average person, in selecting a lighting fixture, considers those that are pleasing to the eye only. If the fixture does not give sufficient light, larger lamps are substituted, or the shades are removed. If the light from the fixture is objectionable, due to glare or other reasons, the lamps are blamed and not the fixture, thus the fixture manufacturer is not encouraged to consider the inherent possibilities in combining art and good illuminating practice. The aesthetic taste is gratified, but utility and efficiency are neglected, consequently the consumer pays high electric bills, suffers from improper lighting and accepts it all as one of the ills to which flesh is heir. An incident that can be cited is the case of a retail store having about 70000 square feet of floor. Several firms, supplying fixtures, wiring, etc., were called in to remodel the lighting. The work was done but it was not satisfactory. There was not sufficient light, the distribution was poor and the monthly bill was higher. Tungsten lamps were used both before and after the change. The owners then called in an engineer who made a survey of the installation, designed a new layout, using the same apparatus, with the exception of some changes in the reflectors and wiring, and the result was approximately twenty per cent better lighting and fifty-six per cent reduction in the monthly current bill.

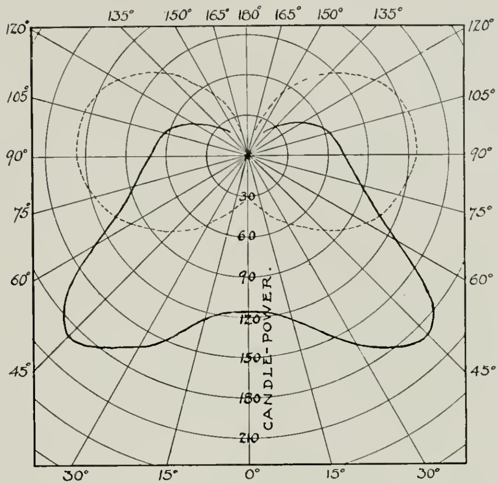
Objects of practical utility, such as lighting fixtures, in as far as they claim to be within the realms of beauty, make two demands upon our attention. They must fill a practical purpose as a lighting fixture, and they must achieve this end in a smooth and harmonious manner. The object of a lighting fixture is to illuminate. No architect specifies them as necessary to the harmonious completion of a building, then why should not the decorative features be built around the lighting units, thus obtaining utility and efficiency, instead of the lighting being a secondary consideration to the design of the fixture? Does an architect design a building and then have the lot and purpose to which same is to be used, adapted to his design? The adaptability and construction of a building are of vastly more importance than its ornamentation, as the lighting of a building for the comfort of its occupants should receive first consideration, rather than lighting for ornamentation or display. Service first and ornamentation second, as the lighting is simply a means to an end. In a certain public building, there is a room in which there are very elaborate lighting fixtures, costing thousands of dollars, and more than overdone in design. Directly beneath one of these fixtures is a desk used for writing, and in order to make it adaptable to its purpose, it is necessary to furnish a drop cord from this ornate fixture, with a cheap desk lamp and a green glass shade. This two dollar drop lamp accomplishes the purpose that the elaborate fixture does not. The room was intended for a reading and writing room, and not a show room for electric fixtures.

The subject of direct versus indirect lighting has been discussed and compared so often that it would seem that the last word has been said. Salesmen handling each line have numerous arguments to advance the sale of their goods, each claiming the superiority of their product, yet, when boiled down to concrete cases, we find that there is no set rule by which the different systems can be compared. The indirect system is, of course, the least efficient as far as the watts required for a given intensity on the working plane is concerned. With a correctly designed system of indirect lighting, under ideal conditions, perhaps not over 55 per cent additional current is required for the same intensity as that required for a well designed system of direct lighting, but these ideal conditions are rarely ever met in practice. The factors to be considered in the design of a system of indirect lighting are the kind and quality of reflectors, the color of the ceiling, the color of the side walls, the ceiling height, the shape of the ceiling, whether domed or broken with plaster ornaments or beams, the height the fixtures can be hung and the arrangement of the lamps and reflectors in same. The efficiency of various systems of direct and indirect lighting with average conditions may be assumed as follows: indirect cove lighting 20 to 30 per cent, indirect with suspended units 40 per cent, direct lighting with frosted lamps placed near the ceiling 50 per cent, and direct lighting with lamps equipped with efficiency reflectors, 70 per cent.

While it is well to consider a system of lighting from a standpoint of current efficiency, other points will have to be considered also, and current consumption may be secondary to many of them. The beauty of the space to be lighted, the absence of glare and the feeling of comfort should first be considered, still efficiency should not be lost sight of in striving to perfect the other considerations.

Whether the voltage loss in wiring should be considered seriously is a subject hard to cover in a limited space. On a 115-volt system the voltage drop will run from a fraction of one per cent to ten per cent, the measurement being made between the service and the socket. A loss of three volts will mean a loss of about 10 per cent in candle-power for tungsten lamps, and at the same time the life of the lamp is lengthened, but the watts per candle-power is increased, thus lowering the efficiency. Whether it would be economy to increase the wire sizes, and by this means increase the efficiency of the system from a current consuming standpoint, or keep the cost of the installation as low as possible and raise the maintenance, is a problem in which the following factors will have to be considered: increased cost of wiring, cost of current, load factor, cost of lamps for renewing, quality of the light and depreciation of the wiring.

There are two variables which should be considered if the maximum result in the use of incandescent lamps is to be obtained—efficiency and life, the increase of one being accomplished at the expense of the other. If the cost of current is known, when designing an installation, and the approximate number of hours per day the system will be used, a balance between the two variables can be found at which it is most economical to operate the lamps. Tungsten lamps are rated at 1.25 watts per candle, but they can be operated at as low a current consumption as 0.4 watts per candle, although at a sacrifice of life. In the first instance, the average life will be about 1000 hours, while in the latter case, only a few hours. The most economical efficiency must then be determined by considering the cost of the lamp, the cost of energy and the number of hours per day that the lamps are in use. The characteristic curves of tungsten lamps, as shown by Fig. 3, illustrates the effect of operating these lamps at different efficiencies. These curves do not apply to other types of lamps, as each has its own characteristics and will vary considerably from those shown for the tungsten filament. There are two life ratings of incandescent lamps, the actual life, of the length of time before the lamps



DISTRIBUTION OF LIGHT FROM A PRISMATIC REFLECTOR WITH 150 WATT BOWL FROSTED TUNGSTEN LAMP.

DOTTED LINES SHOW DISTRIBUTION OF LIGHT FROM A BARE 150 WATT LAMP.

FIG. 5

Chas T. Phillips
Consulting Engineer,
San Francisco

burn out and is no longer serviceable and the useful life, which is the length of time before the candle-power falls to 70 per cent of its rating. Incandescent lamps which have deteriorated until the bulb is black and the candle-power has decreased materially had better be replaced by a new lamp, for usually the increased current consumption per candle-power of the old lamp will pay for a new lamp.

TABLE OF LIGHT INTENSITIES FOR DIFFERENT CLASSES OF SERVICE.

	Light intensity in foot-candles.
Theaters, churches and auditoriums	1 to 3
Reading rooms	3 to 4
Ball rooms	3 to 6
Residence (general illumination)	1 to 2
Desk lighting	2 to 4
Stores (general illumination)	3 to 8
Show windows, show cases, etc.	6 to 20
Bookkeeping	3 to 5
Drafting, engraving and watch repairing	5 to 10

In all vocations there are certain beliefs more or less firmly rooted in the popular imagination but actually based upon erroneous ideas. The electrical industry is full of them, and in spite of the advance of technical education and repeated disproofs, there is still a large number of fallacies that have not been exploded. That the cheapest method of producing light will produce the cheapest illumination, is one of them. The fallacy that a high intensity of light is good lighting is another. A high intensity will frequently cause a glare that will strain the eye which, under continued exposure, radiates to the socket and surrounding regions of the face and head. The intensity of artificial illumination required for comfortable reading has been tested numerous times by various engineers and scientists, and the amount required has been found to vary considerable, depending on the person, the surrounding conditions and the direction from which the light is received. Specular reflection from the paper has considerable influence on the amount of light required. With artificial light an intensity of from one to two foot-candles is considered necessary, although some individuals can read with ease with an intensity of from 0.5 to 1.0 foot-candles or even lower. From tests made with natural light, it was found that with an intensity of 0.22 foot-candles certain individuals could read with considerable comfort, while other persons could not read without eye strain. Black print upon a white page may have a ratio of brightness of 20 to 1, while the ratio of the brilliancy of a incandescent lamp filament to a shadow cast by same may be several million to one. It is evident then that if there is a difference in the brightness of various parts of the object, our ability to see plainly is more a matter of contrast than of the actual amount of light. We can read a printed page with ease with an intensity of one foot-candle, but should we raise the intensity to five foot-candles the ratio between the black print and the white paper would remain the same. In fact, we could raise the intensity to a point where the black is physically many times brighter than the white originally was, and even then the appearance is still black and white.

Owing to the high intrinsic brightness of the modern illuminant, the direct rays are very injurious to the eye and cause eye discomfort and visual inefficiency. In designing lighting systems for factories and offices, the loss of eye efficiency means a loss in the amount of work that can be accomplished. In theaters, stores and public buildings, the physiological effect of lighting systems should be given careful consideration.

The commercial value of artificial illumination seems to be well recognized and the effect of a brilliantly lighted store or theater façade seems to affect the human being much the same as the moth is drawn to the flame. There is perhaps no way in which the merchant can achieve as satisfactory results, with the same expenditure, as with a properly designed system of show-window lighting.

In the case of lighting an industrial plant, two conditions have to be considered. One class is where the workman's attention is confined closely to some particular point of operation. Therefore, in designing a system of lighting to meet this condition, attention must be centered upon the point of operation and the general lighting becomes secondary. If the case does not require close attention of the eye, the importance of local lighting is subsidiary to the general lighting. The proper lighting of modern industrial plants requires even more thought than is necessary for any other class of buildings, and, where high efficiency is desired, the effect of well lighted (both artificial and natural) and cheerful surroundings has been long recognized by efficiency experts as an important factor to consider. Good illumination, where clerical work or drafting is done is economy in a number of ways.

The output is increased, the quality of the work is better and the electrical bills are decreased.

Apparently little consideration has been given to the lighting of public libraries. Here again the conservation of vision should be the keynote of the interior arrangement, yet judging from the dearth of information on the subject, little or nothing has been done to improve upon the now obsolete system of chandeliers, with local lighting on the desk and tables.

In the lighting of a home, the illuminating engineer comes in closer contact with the personality of the inmates than in any other class of building. If the installation is pleasing and comfortable with due consideration to efficiency and to the artistic, it is sure to bring forth praise and appreciation from members of the family. In no class of building can the conservation of vision be more easily accomplished than in the home, although the school room will be a close second.

There are a number of methods in vogue of calculating illumination, two of which are commonly used. They are known as the point-by-point method and the flux-of-light method. In regard to accuracy, it is safe to say that each has merit. There are certain conditions under which both may be relied on, and other conditions where one is necessary to check against the other. The point-by-point method is tedious, especially where there are several sources of light in the same room. In this case we have a number of tables and curves from which we can obtain the illumination at any point from each lamp. The distance at which the lamps are spaced and the height it is desired to hang them must be decided first. Taking an imaginary plane, known as the plane of illumination, which is usually about thirty inches from the floor (the height of a desk or table), point by point we calculate the light flux produced by each source singly and then add them, the reflection from the walls and ceiling also being considered. This method will give the uniformity of the illumination which is generally plotted in a curve, as shown on Fig. 4.

The principal objections to the flux-of-light method is that it does not given an idea of the uniformity of the illumination. It requires experience to use this method and get satisfactory results. The formula for the use of the flux of light method is as follows: Lumens required = (area in square feet $\times$ intensity in foot-candles desired) $\div$ (per cent effective lumens). The per cent of lumens that are effective depend on the kind and type of reflectors used and the color and character of the walls and ceiling. The data pertaining to the reflectors can be obtained from data books or by making photometer test of same. For instance, a room having unbroken walls and ceiling surface of white plaster and using prismatic reflectors, the effective lumens are 60 per cent.

A simple problem is shown in Fig. 4, where it is desired to design an efficient system of lighting for an auditorium. Referring to the accompanying table of light intensities for different classes of service, we find that an auditorium requires from 1 to 3 foot-candles. We will take the average of 2 foot-candles and, applying the formula for the flux-of-light method, we find that 14,666 lumens are required. Dividing the space between the beams, as shown, and placing a fixture outlet in each space, we have a total of ten outlets. This will mean 1466 lumens per outlet, and, in referring to data on tungsten lamps we find that they will give 7.84 lumens per watt. This will then require 187 watts per outlet. As there are no single lamps of the wattage required, we will be compelled to use either three 60 watt lamps per outlet, or two 100 lamps, which will be more than required, or one 150 or one 250 watt lamp. As it is desired to design the installation as efficiently as possible, and keep the installation cost low, the 150 watt lamp will be best, although the intensity will be less than we first estimated. To plot a curve of the illumination it is necessary to divide a typical portion of the floor to be lighted into small squares, as shown, the intersection of the lines being stations (see Plan, Fig. 4), at which the intensity will be calculated.

Curves, showing the distribution of light with 150 watt tungsten lamps from different type of reflectors, are necessary, and we will select a prismatic glass reflector, giving an extensive distribution of light, as shown by Fig. 5. Assuming that these reflectors will hang fifteen feet from the floor, which is the proper height for good light distribution with this reflector, the light is then calculated from each lamp, and reflected light from the ceiling and side walls, to each station and, from the result thus obtained, the curve shown at Fig. 4 is plotted. The formula used is: Foot-candles = (Candle-power X Cosine of Angle (θ $\div$ (Distance, in feet, that lamps are from the Test Station on the Plane of Illumination)^2. The angle θ is the angle which the ray of light makes with the vertical. In spite of the fact that the maximum light flux from the reflector is at an angle of 40°, the intensity is higher under the lamp. The reason for this can be seen by performing the calculation.

* * *

Discovery of a Roman Pottery

A RECENT report of the excavations at Corstopitum shows that a Roman pottery of importance was at one time established there. The remains of a house have been discovered, the northern half of which was clearly devoted to the manufacture of pottery. "In the north-east room," says the report, "two small tanks were found, constructed of flags set on edge and abutting against the north wall; they were filled with clay, apparently unworked, and a considerable heap of the same material was found near them, lying on the latter floor level, which was eight to twelve inches above the original floor, the latter being about 2 feet 9 inches below the present surface. The adjacent chamber to the west showed similar levels, and in each of these rooms, on or above the latter floor, a large quantity of unbroken pottery was found, which had evidently been manufactured on the spot from clay found in the neighborhood. The ware was coarse, and most of it of a yellowish brick-red color, but some fragments had been fired in a muffled kiln and showed a dull purple. Several types of vessel were represented, the most noteworthy being flat dishes, some of which had been a large size. The kiln adjoined the west wall of the second of these rooms. It was 9 feet long and 2 feet 2 inches wide, and was floored with flat tiles, 8 inches square and 1¾ inches thick; the sides were of masonry, with two flues, 6½ inches wide, on either side. Apparently the ends had been stopped and the top domed with clay at each firing, as a large quantity of burnt clay was found in the kiln, as well as broken pottery of the same character as that already mentioned; and, in order to gain access to the north end, a portion of the original north wall of the house had been taken down, and rebuilt in the space which had previously divided this house from the building on the northern half of the site. To the south of the brick flooring, and on the same level, was a floor of clay, 2 inches thick, lying on a layer of good opus siginum. The discovery is of particular interest, as confirming the indications found in previous years of the manufacture of pottery at Corstopitum; but the quantity of fragments unearthed was so large that it has been thought advisable to defer a more detailed description, which, it is hoped, will be included in a future report.

Bonds in Brick Work

SEVERAL of the bonds that are now employed in exterior brick work are described in an interesting article by H. D. Eberlien. He says the most common bond, in fact, almost the only one employed during a great part of the Nineteenth Century, is the running bond, in which all the courses are composed of "stretchers," that is to say, brick laid lengthwise, the only "headers" or endwise brick visible being at the window jambs, at the starting of piers and pilasters and in straight header courses at more or less frequent intervals where their use is made obligatory by the local buildings laws to tie the face-wall to the backing. Each course breaks joints vertically with the courses immediately above and below. Running bond is perhaps the simplest and certainly the least interesting and artistic way of laying brick and has little to commend it except considerations of economy.

The Flemish bond, in which every course consists of alternate headers and stretchers is, after the running bond, the one we most commonly meet with, having been generally used in our brick buildings of Colonial date, in which the black header and red stretcher effect is so often noticeable. Flemish bond is constructionally honest, artistic and satisfying, and its almost universal employment in modern building of Colonial style cannot be too strongly commended.

The double-stretcher Flemish bond which, as its name denotes, consists of two stretchers together, followed by a single header in all courses, the headers being laid above the joints between the two stretchers in the course next below. It is coming more and more into vogue in America and has been used in some of our largest buildings with signal success.

For the vertical joints between the contiguous stretchers mortar colored to exactly match the brick is often used, thus making a blind joint and giving the effect of one double-length stretcher. The use of double-stretcher Flemish bond sets a big, broad scale and can be employed to advantage in large wall surfaces, particularly where it is desired to take off somewhat from the appearance of height, as the strongly marked horizontal lines have that effect. This feature can be further emphasized by slightly increasing the thickness of the horizontal mortar joints.

English bond and Dutch cross bond, like both the single-stretcher and double-stretcher Flemish bond, are replete with artistic feeling and deserve to be far more widely known and used than they now are in America. Not only are they essentially artistic but they are strong and honest in structure. Both English bond and Dutch cross bond have alternate courses, the one wholly of stretchers and the next wholly of headers; but in the English bond the stretchers of all the courses come directly above each other while in the Dutch cross bond the stretchers of the first and fifth courses break joints with the stretchers and of the third and seventh courses respectively and thus throughout, giving a diagonally diapered appearance if the mortar joints and the hue of the brick be judiciously contrasted.

The bonds mentioned are the most usual kinds, but one also meets with special adaptations of recognized types; it is, however, quite sufficient for general purposes to remember the five enumerated. In fact, many people, who are supposed to have some knowledge of such matters, have difficulty in keeping the differences clearly in mind and generally fall down in trying to describe them.

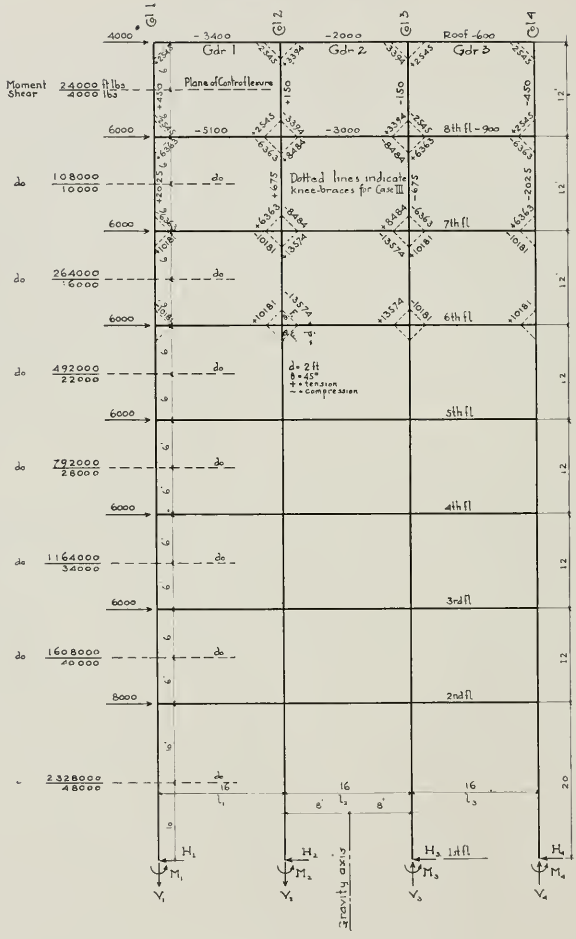


FIG. 1 CASE I

TABLE I

Story	Shear	Moment about plane of contraflexure	Direct Stress Inner Cols	Direct Stress Outer Cols	Shear Outer Gdrs	Bending Moment Outer Gdrs	Bending Moment Inner Gdrs	Shear Inner Gdrs	Shear Outer Cols	Shear Inner Cols	Bending Moment Outer Cols	Bending Moment Inner Cols	Direct Stress Gdr 1	Direct Stress Gdr 2	Direct Stress Gdr 3 *
h	ΣP (lbs)	M (ft lbs)	$V = M/10l$	$V' = 3V$	$S_1 = V_n - V_{n+1}$	$M_1 = S_1 l/2$	$M_2 = \frac{4}{3}M_1$	$S_2 = M_2/\frac{l}{2}$	$H_1 = \frac{3}{20}\Sigma P$	$H_2 = \frac{7}{20}\Sigma P$	$H_1 \frac{h}{2}$	$H_2 \frac{h}{2}$	F_1	F_2	F_3
8th 12	4000	24000	150	450	450	3600	4800	600	600	1400	3600	8400	3400	2000	600
7 - 12	10000	108000	675	2025	1575	12600	16800	2100	1500	3500	9000	21000	5100	3000	900
6 - 12	16000	264000	1650	4950	2925	23400	31200	3900	2400	5600	14400	33600	5100	3000	900
5 - 12	22000	492000	3075	9225	4275	34200	45600	5700	3300	7700	19800	46200	5100	3000	900
4 12	28000	792000	4950	14850	5625	45000	60000	7500	4200	9800	25200	58800	5100	3000	900
3rd 12	34000	1164000	7275	21825	6975	55800	74400	9300	5100	11900	30600	71400	5100	3000	900
2nd 12	40000	1608000	10050	30150	8325	66600	88800	11100	6000	14000	36000	84000	5100	3000	900
1st 20	48000	2328000	14550	43650	13500	108000	144000	18000	7200	16800	72000	168000	6800	4000	1200
h			l = 16		[illegible]	l = 16		l = 16					* Stress at a joint, including shears		

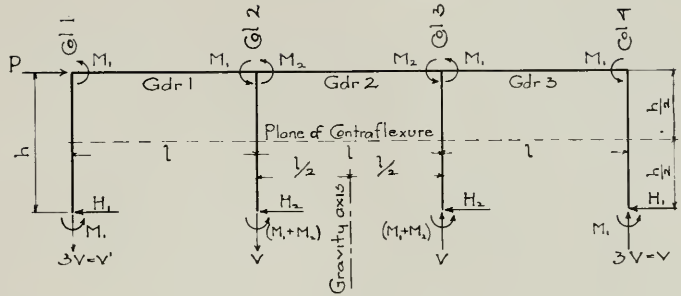


Fig 2

Simplified Design of Wind Bracing in Tall Buildings

By ALFRED J. KRAFFT, Associate Member American Society C. E.*

IN ENGINEERING NEWS of March 13th, 1913, there appeared an article on wind-bracing by Mr. R. Fleming. A method there given (Method I) for finding the stresses in the girders and columns of a building, due to wind pressure, is similar to that of Mr. A. C. Wilson in Engineering Record of Sept. 5th, 1908. Both Mr. Wilson and Mr. Fleming have likened the frame work of a building under wind pressure to a rectangular cantilever beam under concentrated loading, and from a consideration of the theory of flexure have determined, approximately, the existing stresses.

But it is obviously more direct and more conducive to clearness to investigate the stresses according to the fundamental equations of equilibrium, since these equations are the foundation for the theory of flexure.

By so doing a vast amount of unnecessary explanation is eliminated, certain useful relations are found to exist, and the amount of labor involved is, in consequence, greatly reduced—the method lending itself readily to rapid slide-rule calculation.

The proposed method will be applied to the following three cases:

Case I—Equal bays.
Case II—Unequal bays.
Case III—Equal or Unequal bays and knee-braces.

CASE I.
(Equal Bays)

Take the eight-story building with loads, dimensions, etc., as indicated in Fig. 1.

To find the stresses in the entire frame, an analysis of a single story bent will suffice for deducing relations which hold good for the entire structure.

The single-story bent is shown in Fig. 2, with the outer forces, reactions, bending moments, etc., as indicated and according to the following assumptions:

(1) Bending moments at the top and bottom of a column are equal.
(2) Bending moments at the ends of a girder are equal.

} Points of contra flexure at mid-length.

*J. E. Krafft & Sons, Architects and Engineers, San Francisco, Cal.

(3) The vertical reactions of the columns are directly proportional to their distances from the gravity axis of the column group and act upward on the leeward side and downward on the windward side of the gravity axis.

(4) Columns deflect equally, and girders deflect equally.

There are now five unknown quantities which can be obtained from the following five equations:

$$\begin{array}{llll}
(1) & H_1 + H_2 = \frac{P}{2} & \text{from} & \Sigma H = O \\
(2) & H_1 h = 2M_1 & \text{"} & \Sigma M = O \text{ on outer cols.} \\
(3) & H_2 h = 2(M_1 + M_2) & \text{"} & \text{" on inner cols.} \\
(4) & 3Vl = 2M_1 & \text{"} & \text{" on outer gdrs.} \\
(5) & 4Vl = 2M_2 & \text{"} & \text{" on inner gdrs.}
\end{array}$$

From these five equations we deduce the following:

$$V = \frac{P\frac{h}{2}}{(10)l} = \frac{M}{(10)l}$$

$$H_1 = \frac{3}{20}P$$

$$H_2 = \frac{7}{20}P$$

$$M_2 = \frac{4}{3}M_1$$

And the stresses in the entire frame according to these relations are given in Table I.

CASE II

(Unequal Bays)

Assumptions same as for Case I.

If x = distance from Col. 1 to gravity axis of column group, from assumption (3) we have:

$$V_2 = \frac{V_1}{x}(x - l_1)$$

$$V_3 = \frac{V_1}{x}(l_1 + l_2 - x)$$

$$V_4 = \frac{V_1}{x}(l_1 + l_2 + l_3 - x)$$

And $\Sigma V = O$ gives $x = \frac{(3)l_1 + (2)l_2 + l_3}{4}$

Let $l_1 = 10$ ft, $l_2 = 12$ ft, $l_3 = 14$ ft, then $x = 17$ ft.

And

$$V_2 = \frac{7}{17}V_1$$

$$V_3 = \frac{5}{17}V_1$$

$$V_4 = \frac{19}{17}V_1$$

Since the l's differ, all the M's and H's differ, giving for this Case, the additional unknowns—M_3 on Gdr 3, H_3 on Col. 3, H_4 on Col. 4, making 8 unknown quantities.

The eight unknown quantities can be determined from the following eight equations:

(1)	$H_1 + H_2 + H_3 + H_4 = P$	from	$\Sigma H = O$	
(2)	$H_1h = 2M_1$	"	$\Sigma M = O$	on Col. 1.
(3)	$H_2h = 2(M_1 + M_2)$	"	"	on Col. 2.
(4)	$H_3h = 2(M_2 + M_3)$	"	"	on Col. 3.
(5)	$H_4h = 2M_3$	"	"	on Col. 4.
(6)	$10V_1 = 2M_1$	"	"	on Gdr. 1.
(7)	$12\left(\frac{24}{17}V_1\right) = 2M_2$	"	"	on Gdr. 2.
(8)	$14\left(\frac{19}{17}V_1\right) = 2M_3$	"	"	on Gdr. 3.

From these eight equations we deduce the following:

$$V_1 = \frac{17}{724}P\frac{h}{2} = \frac{17}{724}M$$

$$M_2 = \frac{144}{85}M_1$$

$$M_3 = \frac{133}{85}M_1$$

$$H_1 = \frac{85}{724}P$$

$$H_2 = \frac{229}{724}P$$

$$H_3 = \frac{277}{724}P$$

$$H_4 = \frac{133}{724}P$$

And the stresses in the frame, according to these relations, are obtained as in Case I.

CASE III.

(Equal or Unequal Bays and Knee-Braces.)

Knee-braces are indicated in Fig. I of Case I.

The ends of the columns and girders are now assumed hinged. Hinges are also assumed to exist at the ends of the braces.

The shears and direct stresses in the middle portions of the girders and columns are the same as in Case I, but change at the brace intersections by an amount equal to the algebraic sum of the horizontal or vertical components, as the case may be, of the brace stresses.

The maximum bending moments in the girders and columns are at the brace intersections, where the shears change sign.

KNEE-BRACE STRESSES.

The moments which were at the girder and column intersections of Case I are, in this Case, resisted by direct stresses in the knee-braces.

Therefore $M = (F + F_1)\ d \sin\theta$

And $F = \frac{M}{d}\operatorname{cosec}\theta - F_1$

Or expressing F in terms of the moments we have:

$F = (M_n - M_{n+1} + M_{n+2} - M_{n+3} + \text{etc.})\,\frac{\operatorname{cosec}\theta}{d}$ Where M_n = end moment on gdr. of story in question, M_{n+1}, M_{n+2}, etc. = end moments on successive gdrs. next above.

[Note that since the knee-braces are all of the same length and slope, it follows from the assumptions, that in any one panel the stresses in the knee-braces are numerically equal.]

The case of Unequal Bays and Knee-Braces is similar to that of Equal Bays and Knee-Braces.

THE LATE WILLIAM CURLETT,
F. A. I. A.

William Curlett, F. A. I. A.

IN THE death of Mr. William Curlett, which occurred at his country home in Menlo Park on January 21st, San Francisco has lost one of its best citizens and the architectural profession has been deprived of one of its most valued members. Mr. Curlett had been ill for a long time and months ago was compelled to yield the active cares of business because of broken health.

Mr. Curlett was born in Belfast, Ireland, in 1846, and received his early education in that city. His architectural training was also obtained in Ireland and England, where he practiced for several years. He came to America in 1871, taking up his residence in San Francisco. Later he journeyed to Los Angeles and established an architectural practice, designing among other structures the Severance building at Sixth and Main streets. During that period he also took an active part in promoting the city's interests and laid out St. James Park, which has become one of the show places of Los Angeles.

Returning to San Francisco, Mr. Curlett continued his professional work with uninterrupted success, among his architectural achievements being the Phelan building, Head building, Shreve building, Mutual Savings Bank building and residences for Mrs. M. Pauline Payne at Menlo Park, for Mrs. William H. Crocker on Nob Hill and for former Mayor Jas. D. Phelan at Los Gatos.

Since his early association and partnership with Augustus Laver, the architect of the City Hall of San Francisco, destroyed in the fire of 1906, he designed many of the best known commercial buildings and residences in San Francisco and throughout California, including the court houses of Los Angeles and Fresno counties, the San Bernardino State asylum and the Flood mansion in San Mateo county. In much of his Los Angeles work Mr. Curlett was associated with his brother-in-law, Theodore Eisen, of that city.

Many of his early architectural works were destroyed in the fire of 1906, including the residences of Wm. Crocker, W. Sherwood, L. L. Baker and the old Clunie building.

Mr. Curlett was a man of fine attainments and his life was one of useful and meritorious achievements. He possessed a personal poise and dignity that commanded respect and admiration and kindly qualities that endeared him to his friends. He had that pure love of his art which makes professional ideals paramount to commercial gain and he strove to give the best that was in him to his work, however much he was hampered by matters that conflicted with ideals of architecture and art.

Mr. Curlett was a Fellow of the American Institute of Architects, a member of the California Chapter A. I. A., former president of the State Board of Architecture, member of the Bohemian Club, Doric Lodge No. 216, F. & A., Masons, also a 32nd degree Mason and a member of the Scottish Rite bodies. He was selected as chairman of the advisory board of architects for the exposition in 1915.

Mrs. Curlett, who is a sister of Architect Theodore Eisen of Los Angeles, a son, Aleck E., and a daughter, Mrs. L. Mills, of San Francisco survive.

Robert B. Young

Robert Brown Young, senior member of the firm of R. B. Young & Son, architects, of Los Angeles, and president of the Southern California Chapter of the American Institute of Architects, passed away at his residence, 1101 South Hoover street, Los Angeles, January 29. The end came peace-fully after months of intense suffering which he had borne with remarkable fortitude. He was elected president of the Southern California Chapter of the A. I. A. in October and accepted the honor by letter but on account of continuing ill health was unable to actively assume the duties of the office.

Mr. Young was born in Huntington county, Quebec Province, Canada, April 1, 1855. He received his early education there and when a young man decided to seek his fortune in the West and went to Denver, Colo. There he acquired a training in construction and architectural work. In 1880 he was wedded to Mary C. Wilson of Denver and the following year they moved to San Francisco. They remained there but a short time and about 1883 went to Los Angeles, Mr. Young at once embarking in the practice of architecture. Thirty years ago there were not many large structures in Los Angeles and Mr. Young became identified with many of the earlier large building enterprises. Among the buildings of which he was the architect may be noted the Westminster, Hollenbeck, Lankershim, Occidental and Lexington hotels; the Barker Bros., Blackstones and California Furniture commercial buildings; and the Seminole and Westonia apartments. He was the resident architect of the new Orpheum Theater in Los Angeles. He also designed a number of Catholic churches and school buildings in the diocese of Los Angeles and Monterey. His architectural practice in later years extended to Arizona, the Yuma county court house being among his achievements there.

Theodore F. White

Theodore F. White, 1526 Wilcox avenue, Hollywood, mining engineer, street and highway contractor and better known as father of oiled roads in California, was drowned in the flood waters overflowing from Lytle creek at a point on Eighth street, Colton, on January 27th. Mr. White had been active in street and highway contracting during the last twelve years, was a man of sterling character, respected by his associates and the engineers with whom he came in contact, beloved of his employes, and regarded by many inspectors on the contracts he was executing as having only one fault—that he did his work too well for his own good. Mr. White was 69 years of age.

* * *

Arizona Architectural Competition

Architect Myron Hunt of Los Angeles, advisor to the regents of Arizona University in the proposed architectural competition for a university building to cost $150,000, announces that the competition will be an open one under the rules of the American Institute of Architects. No geographical lines will be drawn upon those eligible to compete. The program for the competition has been drawn, but the regents of the university are waiting to have some points regarding the Arizona law requiring competitions on public buildings cleared before announcement is made. Arizona has a law identical with that passed by the California Legislature in 1872 which the courts of this State have recently held to be inoperative. The Arizona law has been observed in a desultory fashion and conflicting opinions have been rendered by county attorneys regarding its status. As a matter of fact the Arizona law is as much of a dead letter as the California law and it is believed the same grounds exist for declaring it invalid as were found in California. The matter is now receiving the attention of Arizona legal authorities.

The Practical in Architecture

By HERBERT BOOTH KING

SKILL and knowledge more than genius are the important factors in Modern Architecture. To enclose a piece of ground with four walls and subdivide it to meet certain prescribed requirements is more of a mathematical than an artistic problem. When, in addition to this, the commercial side demands economy, stability and a fin de siècle equipment, new responsibilities occur of a decidedly practical nature. The tendency of many architects to clothe themselves with an almost impenetrable armor of reserve (and even disdain) when approached by the man behind the mixer, the hod or the plane, is not justified by their relative importance—for one could better eliminate the Italian glow than the Irish bog. The architect who lives continually in the atmosphere of his academic training is often a dreamer and of little use excepting for Moorish villas, Swiss chalets, Spanish pagodas, Indian kiosks and similar importations. A modern apartment house, hotel or factory, when careful study is required of working drawings rather than perspectives, does not appeal to him. He is like a tailor who studies lines instead of linings, who adheres to texts to the disregard of textures. The practical tendency of architecture has led to a division among the architects themselves. Certain theorists, not being overburdened with orders, settle down as teachers of architecture instead of practicing architects—at least one seldom hears of them excepting through long-winded addresses at Institute meetings, when they delight to expound the "ethics" of the profession and deplore the decadence and venality of certain of their brethren.

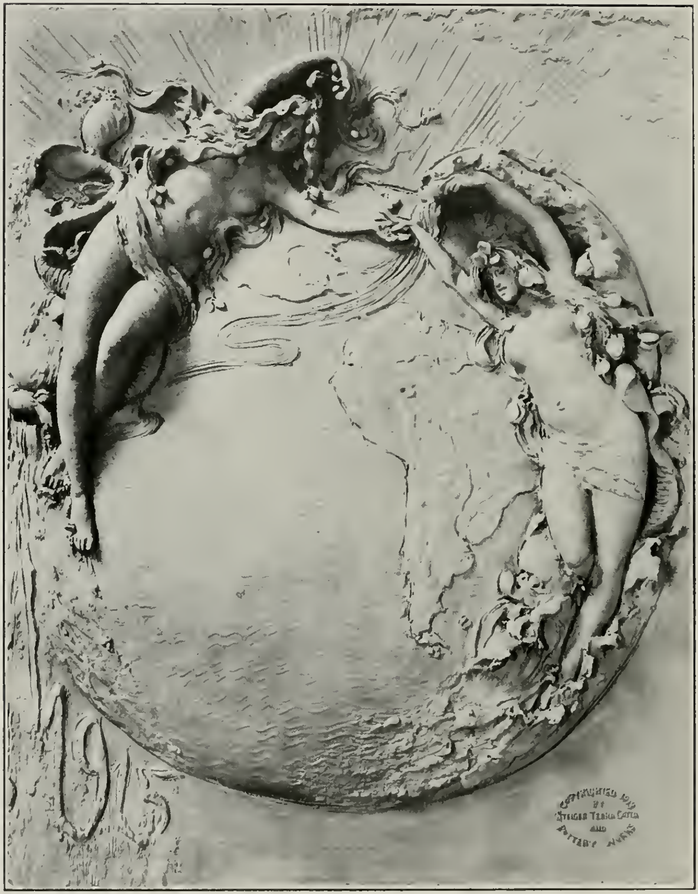
They become like Greek statues, objects to be adored at a distance, but seldom approached by the vulgar horde of capitalists and builders. It is a joy to have a few men of this class in any profession or business—they lend color and tone without causing much disturbance among the activities. They use as a fetich to explain their inaction—"It is unprofessional to solicit orders"—and sit undisturbed in their artistic dens, preferring to be lionized rather than employed. It is this tendency of the old-time architectural bodies to Knight the dreamers and condemn the workers that has led to the formation of competitive organizations where mathematics will stand for more than astronomy or star-gazing, and where the European sketch-book will not be consulted oftener than the practical publications and the manufacturers' catalogues. This seceding class believe that "a new idea is born each day" which will be of use to them and are watching out for the modest leaflet or the timid stranger that will acquaint them with the newest development which will add to the practicability, efficiency or permanency of their work, and they find in every co-worker, however humble, a valuable contributor to their fund of information. Such an architect is a seeker after knowledge, and every new building he plans shows the result of his hospitality and receptivity and is not a mere duplicate of the last one.

The late George Post was approached by a gushing female who said, "Tell me, Mr. Post, what is the foundation stone, the first requisite, the essential factor in your noble profession of architecture?"

"Getting the job!" growled out the old war horse.

If she had propounded another inquiry as to what had contributed most largely to his success, he would doubtless have replied, "Knowing how to use other people's brains and not depending entirely on my own."

Success to the new movement!—which means a shaking off of the old shackles of conventionality and precedent and emerging into a broad atmosphere of auricular and visual contact with the building world and an absorption and appreciation of its developments and accomplishments.



"UNION OF THE OCEANS"

Executed in Terra Cotta by the
Steiger Terra Cotta and Pottery Works.

Union of the Oceans

By WALTER E. DENNISON

WHEN the form of Aphrodite graced the universal flood
In her shell of pearly whiteness, all unmindful of the waves,
Rode the Earth's first precious cargo, purest Beauty and her dove,
Argosie of priceless value, under seal of Earth's first love,
Bound for port of rose and myrtle, where the peaceful water laves
Amber strand of Amphitrite. Pulsed first then the sailor blood.

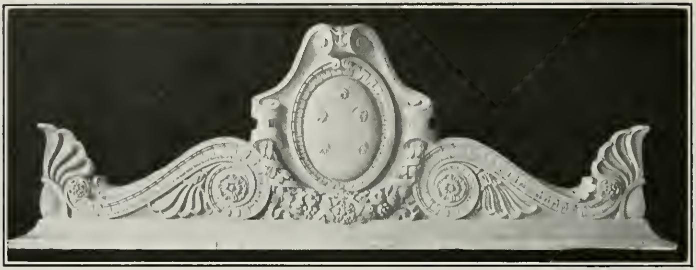
Many cycles Oceanus felt the stroke of fearless keel,
Not alone of hardy Argo, but of pirate ship as well;
One in quest of fleece of Colchis, shining with its dust of gold,
Other flying flag of darkness, swarming with its robbers bold,
Preying on the ships of commerce, making every course a hell
Leading down to realms of Pluto. Now the oak has turned to steel.

Now the god of competition all the fruits of earth would seize.
Broken are the continental bars and bonds of Atlas' hold.
All the maids of ocean revel o'er the land of tropic sprites.
Waters strange with waters stranger bid their creatures see the sights,
See the union of the ocean where those trod who sought our gold.
In the sap of the equator lies the sweetness of the seas.

From

Plymouth Rock and Albion,
Baltic and the Euxine Sea,
Land of Lap and Hindustan,
Steppes of Russ and vines of France,
Pyrenees and Switzerland,
Danube, Rhine and Amazon,
Hoang Ho and Yenisei,
Ganges' Mouths and hidden Nile,
Italia, Jerusalem,
Land of Kurd and land of Ham,

Australia and Sandwich Isles,
Hudson's Bay, Pierian Spring,
Arcadia, Hesperides,
Sirius and Southern Cross,
Zenith heights and Nadir depths,
Canals of Mars and Milky Way,
Come on, come on to Panama;
Taste California's sugarbush.
In the sap of the Equator
Lies the sweetness of the Seas.



PEDIMENT OVER ENTRANCE, BUILDING FOR NORTHWESTERN BANK, PORTLAND, OREGON
Doyle & Patterson, Architects

A History of Architectural Terra-Cotta*

By HARRY LEE KING

THERE are about twenty-five factories in the United States producing terra cotta and these are located principally in the States of New York, New Jersey, Pennsylvania, Maryland, Georgia, Illinois, Indiana and Missouri, and in the West Coast States of California and Washington. The oldest of these plants was established about thirty-five years ago. The process of manufacture pursued in each is fundamentally the same, though there is some variation in the newer plants by reason of the introduction of improved methods.

In the eastern part of this country the source of clay supply is principally from the rich deposits in New Jersey.

In the Middle West the best clay is found in Indiana, while on the Pacific Coast very fine clays are found in Central and Southern California, Northern and Eastern Washington, and in the southern part of British Columbia.

*Illustrations show interior views of the Gladding-McBean Factory at Lincoln, California. The terra cotta models were executed by the same company.

TERRA COTTA DETAIL, LOS ANGELES ATHLETIC CLUB BUILDING
Parkinson & Bergstrom, Architects

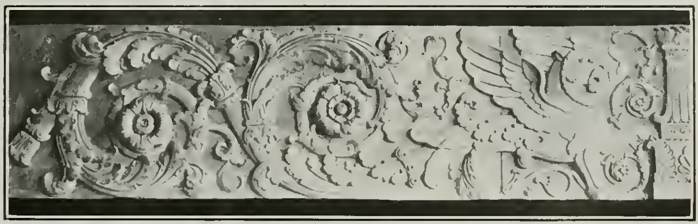
*FRIEZE ON SECOND STORY CORNICE,
NORTHWESTERN BANK BUILDING, PORTLAND, OREGON*

The clay is mined in open pits, by hand or steam shovel, and hauled to the factory by railroad, overhead cable lines or teams.

In California mining is done almost entirely in the summer time. Raw material is stored in huge piles at the factory, protected from the weather.

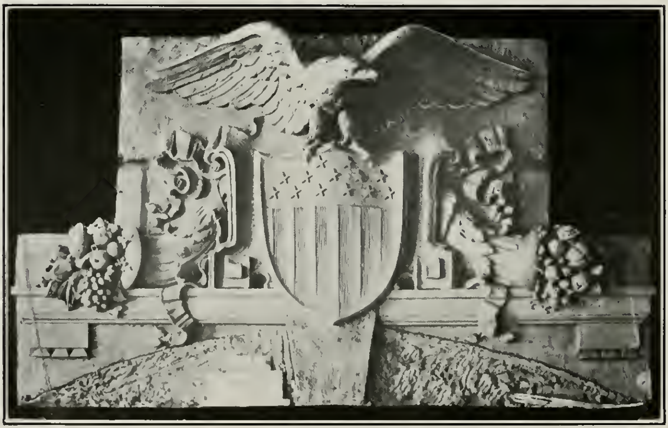
The mixing of the body is an interesting process, in that it is done according to a prescribed formula, which demands the use of several different clays, selected according to their physical behavior under fire and for other qualifications; with these are mixed certain chemicals and a large proportion of "grog," which is ground up grit—originally pottery saggers or terra cotta rejected from the kilns. This grit having once passed through the fire, is unaffected by another application of a high heat, and thus its function is to control the action of the clay body and to prevent warping and twisting. After passing through a series of mills, fitted with knives which cut the clay to a fine consistency, sufficient water having been introduced to make it pliable, the body is ready for delivery to the men who are to press it into the moulds. It is interesting to note that all of the ingredients which combine to make the body, are nicely calculated to a standard point of maturity of 2,300° Fahrenheit. This also applies to the color glazes. There is also a factor of shrinkage in the clay to be considered, and this contraction is about one inch to the foot. So every piece of terra cotta goes into kiln proportionately one inch to the foot larger than it emerges.

One of the essentials to good service from a terra cotta factory is a well equipped drawing office, and in this department the architect's drawings are thoroughly dissected (and weighed in the balance, in other words) and the whole scheme subdivided into features and these again are diagramed



*FRIEZE, SECOND STORY CORNICE,
NORTHWESTERN BANK BUILDING, PORTLAND, OREGON*

GROUP OVER ENTRANCE, LOS ANGELES ATHLETIC CLUB BUILDING
Parkinson & Bergstrom, Architects



TERRA COTTA DETAIL OVER ENTRANCE TO FEDERAL PRISON, ALCATRAZ ISLAND, CALIFORNIA

DRAFTING ROOM

into single units, each of which is carefully measured and sized. For before any manufacture can be commenced, absolutely accurate drawings must be made. So the first action under a contract is the preparation of shop drawings which analyze construction, size of individual pieces, length of feature, the relation of the terra cotta to contiguous building materials, its connection with the steel framing, and all other details. These shop drawings are submitted to the architect for his approval, accompanied by full size details, except in instances where the latter are previously furnished by him. Upon approval of these drawings a computation is made of the various sizes and shapes of pieces, with a tabulation of repetitions, and records are accordingly made and forwarded to the plaster working department together with shop drawings and the full size details. In order to provide a sufficient allowance for shrinkage of the clay from the time it is milled until the burned state is attained, an inch is added proportionately to fourteen inches, and terra cotta shrinkage drawings are customarily drawn to this scale, or as it is generally expressed, 1 to 14.

The plaster shop is naturally divided into two branches of work—model making and moulding—which in their relation are negative and positive. The models in general contour take the same shape in which the finished product will appear, except in decorative features. Such instances require only a plain background which is delivered into the modelling shop where the ornamentation is executed, as will be explained more in detail later on. From the positive model a negative mould is made, and on this is registered a record of identification, giving the order number, the section letter and the mould number, all of which correspond to the shop and setting drawings, and these markings are transferred to the terra cotta when pressed. By means of this system of marking, a single piece can be ordered from a building and accurately remade.

The modelling shop is a component part of the plant with a pervading atmosphere which is scarcely akin to inert clods of clay and dull plastic forms. In it are modelling boards bearing

MODELLING ROOM

MODEL AND MOULD DEPARTMENT

FITTING SHOP

PRESSING AND FINISHING DEPARTMENT

STOCK ROOM

the most varied and contrasted details in process of execution. Here the pliant modelling clay, under the skillful manipulation of artists, takes on many forms, perhaps to the graceful sweep of some festooned panel, a stately caryatid, a graceful capital, or to a fanciful grotesque. (Consider for a moment the collections of different designs which meet here, each representative of the genius of an architect, and then realize that a few weeks hence they will be everlastingly moulded into fixed form and separated by perhaps the extent of the whole continent.) In this department artists of recognized ability only are employed, oftentimes the development of ornamental detail is left by the architect entirely to the modeller. It is the practice of the trade to maintain a competent photographic department and through it the modelling is submitted to the architect for inspection and if not at first entirely satisfactory, corrections are made and resubmitted until finally approved. Many architects prefer to inspect the modelling in person, and this method of approval is encouraged by the manufacturer.

SHIPPING ROOM

KILN FOR BURNING

The pressing shop is the next department in progressive sequence and there the clay body is pressed into the moulds. This operation is performed principally by manual labor, but in some plants machinery is also employed for work of simple character. The usual manner is to press a piece face down, building up the sides secondarily and finally to insert the cross webs. When sufficiently dried it is turned out of the mould on to a flat board, face upward, and then the process of "finishing" is begun. This operation consists of smoothing down rough places, squaring sides, truing angles and generally touching up ornamental parts, usually a slow procedure and one requiring considerable skill. The material must be thoroughly dried before being fit for the kiln and this state is hastened by the introduction at night of waste heat from the kilns. While pieces of average size dry in about five days, as much as ten days or two weeks and even longer is required for those of largest proportions and greatest solidity.

The spraying of terra cotta merits attention. For the most part the glazes are atomized on the terra cotta, the number of coats applied varying from one to four, according to the shade desired. In granite colors, however, the glaze is oftentimes sponged on, and the black spots similar to the fleckings in granite are obtained by means of "sputterers" or by other special machines with some such colloquial title. For there is a nomenclature peculiar to the business. There is also a branch of this department which demands most skillful handiwork and attention—where polychrome sprays are applied. But one color can be put on at a time, and an intricate design requires utmost care and long time in execution.

After being sprayed, terra cotta is ready for the last stage of manufacture—burning. The kilns are worthy of brief description. Exteriorly they resemble conventional bee hives in general form, save for a flattened roof, and are constructed of fire brick, bound with strong iron bands. There is an exterior and also an interior wall, and the heat rises through the flue between and is carried down a large central stack, thus giving complete radiation to all parts of the circular interior. Coal has been the medium employed for many years for firing, but the modern plants are now burning liquid fuel oil, which is easier to handle, cleaner, more readily controlled, and more combustible. The use of oil as a fuel permits a perfect control of firing units, and by simple mechanical adjustment a steady feed is maintained and the fluctuation, caused by the banking and drawing of coal fires is avoided. The loading of terra cotta in kilns requires care and skill. The customary method is to build up compartments in fire-brick slabs (not unlike the method employed in building houses of cards) and into these the pieces are placed separately. Discrimination is used in setting, and contact must be prevented, for when the degree of maturity is reached, two pieces touching would become fused. This does not obtain with the fire-brick slabs, for these having already been burned to a higher heat are not in a fluxing condition at 2,300° Fahrenheit. At this point it is again interesting to remember that the component elements that combine to make up this product are nicely calculated to mature when this high temperature is reached. Fifteen days is the allotted time for loading, burning, cooling and unloading a kiln. There are some of a small design and, therefore, limited capacity which turn over in half this time, but these are used principally for hurrying forward remakes or final pieces. The average capacity of terra cotta kilns is about forty-five to fifty tons—the more modern ranging to between eighty and a hundred tons.

Terra cotta is carefully laid out in features and fitted prior to shipment. Any unevenness, due to uncontrollable shrinkage, is adjusted on large rubbing beds, which grind the pieces to exact size and thus perfect alignment and even jointing is assured. Well regulated fitting shops pay particular attention to special features, such as first story and entrance work, columns, caps and extraordinary work.

Fragile by nature, this material requires careful attention throughout its manufacture and this point is especially emphasized in shipping. It

TERRA COTTA DETAIL,
NORTHWESTERN BANK BUILDING,
PORTLAND, OREGON

is loaded in quantities of salt hay and every precaution is taken to safeguard its journey. Yet it oftentimes finally falls into the hands of a careless truckman and suffers some chipping before delivery at the building.

The only practical means of transporting terra cotta to extended points is by railroad car, and by deck boats. The material to be carried in holds of steamers must necessarily be crated first, an operation which consumes much time and is costly.

One other department of a terra cotta factory, not previously mentioned, is the chemical laboratory. The constant service of a chemist of high standing is required and his working hours are entirely occupied with the preparation of sprays or glazes, and in carrying on experiments in colors. While there is a range of standard colors closely maintained by the trade, each manufacturer has a line of special shades and composition peculiar to his factory. Terra cotta is regularly obtainable in many shades of gray (matching limestone in general tone), buff, red, white and cream, with vitreous, matt glaze and full glaze finishes. Some manufacturers carry a special line of material, which faithfully reproduces the texture, veinings and fleckings found in the different granites. The development in recent years of polychrome terra cotta has placed at the disposal of architects an unlimited range of combinations to choose from.

CAPITAL TO PILASTERS

Terra cotta becomes a distinct and unique material from the fact alone that it can be produced with several hard-burned, unchangeable, and enduring colors on one piece, and in this respect it stands alone.

Commercially speaking, it recommends itself to architects, builders and owners through qualities which it possesses distinct from and in contrast to other building materials. A kiln product, it is fireproof, making it primarily a logical building material, and a necessity in large structures. It is also a hollow ware and its relatively light weight, as compared with the density of stone, granite or marble, renders it most adaptable for tall structures, and this represents a great economy

TERRA COTTA DETAIL,
PUBLIC LIBRARY BUILDING
PORTLAND, OREGON

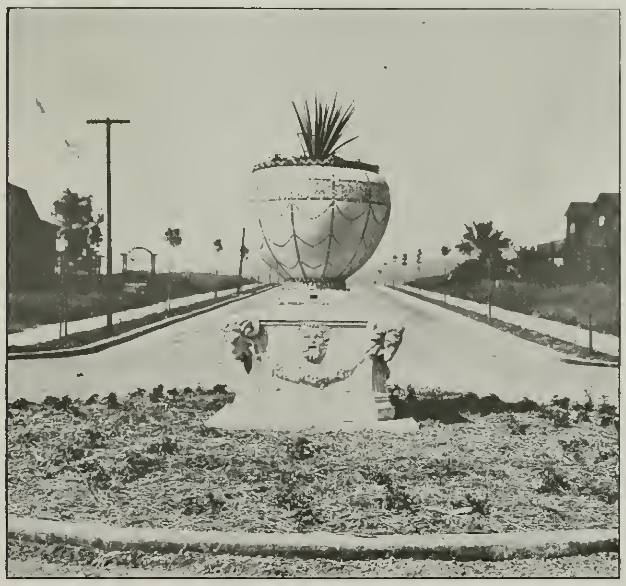
in planning steel skeleton construction. The cost of modelling in clay is reasonable and represents a considerable saving when compared to that of carved stone, and it is equally permanent. Not only in ornamentation or decorative features can terra cotta be successfully employed, but whole façades, from sidewalk to parapet, are now being generally built entirely of this product.

Briefly then, some of its potential advantages are that is it a practical building material, fireproof and weatherproof, readily adaptable through its lightness in construction to structures of any size, and at the same time structurally strong and possessing a tensile strength sufficient for its designated purpose.

To the builders it is a material which works in perfect harmony with brick, stone, marble or granite. It is readily obtainable, easy to handle, quickly set and economical in use.

To the owner it represents a great saving in the initial investment, for it can be used as stone and is cheaper in comparative cost. This fact becomes more pronounced in considering ornamental designs.

Not only for this reason does it appeal to the architect, but also for its ready adaptation to ornament, and because the pliant clay, responding to the touch of the modeller, retains when burned an artistic expression hardly obtainable in chiseled stone.



GARDEN FURNITURE IN HADDON HILL, OAKLAND, CAL.
By Sirsi Studios

The Quantity System of Estimating Again

IN THE ARCHITECT AND ENGINEER of recent date there was published an article by Mr. Sullivan W. Jones of the firm of Palmer, Hornbostel & Jones, architects, of New York City. The article was in the nature of an appeal to the architects of the country for the adoption of the quantity system of estimating.

Mr. R. Clipston Sturgis, the new president of the American Institute of Architects, sent the Brickbuilder the following expression of the proposition:

Your article brings to general attention a matter of extreme interest. It has long been a matter of wonder to those familiar with the work of the quantity surveyor abroad that the waste, duplication of labor, and liability to serious mistakes and loss incident to our haphazard methods should be allowed to continue. The excuse contractors have given for the continuance of the system of individual quantity-taking has been that no two take off quantities or figure alike. Some figure brick per thousand laid, some figure the materials and the labor as separate items. Some might cube a building and submit a straw bid based on a cost per cubic foot. It is certainly time that this babel of methods and this guesswork bidding should be replaced by accurate methods generally accepted.

The condemnation of the plans and specifications prepared by architects for bidding is unfortunately based on a considerable majority of drawings and specifications so used; but it might also be stated with truth that a large number of architects have neither the education nor experience to justify their being classed as architects. The majority of men who in their respective communities command respect as architects of good standing produce working drawings and specifications which are fairly clear, exact and complete. Even these would, however, be benefited by the scrutiny of the quantity surveyor in taking off quantities.

Many individual architects have given "constructive thought to the active relationship existing between himself, the contractor and owner," and the standard documents of the American Institute of Architects were largely based on individual documents. It is not, therefore, quite fair to state the contrary so strongly, but one delights to hear it definitely stated that failure in a specification is due to "want of intelligent preliminary investigation," "lack of accurate knowledge" and lack of "the power of expression." These appear to be the very kernel of the matter, and it cannot be too often stated and insisted upon that writing specifications is a task of great difficulty requiring exceptional knowledge and no little literary acumen. The man who knows his subject and knows how to express himself will never take refuge behind blanket clauses.

Anything that will encourage better drawings and specifications should receive the support of all architects—even if we never attain the Utopian ideal of wording that "shall not be capable of more than one clear and definite interpretation by the bidders." The interpretation of words is an extremely complex and difficult subject in a country so large, where the same word means different things in different parts of the country.

To produce drawings and specifications such as are desired requires time, and the owner who wishes the doubtful advantage of competitive bids should be given clearly to understand that such bids are properly based on complete drawings and accurate specifications, and for this the owner must not only allow time, but must also know what he wants. In any comparison with Europe one must bear in mind that our building operations take very much less time than theirs, and that any system which requires English time for execution is out of the question here.

The introduction of making one survey of quantities for all builders would eliminate much waste of time and put all on the same basis as to data. It is not clear, however, how a builder could estimate "on bills of quantities and not on drawings and specifications."

The payment of the cost of the survey should surely come directly on the owner and not indirectly. He must pay it in the end, and as the work, like that of the architect, is done for him and in his interests, the surveyor should be paid by and be responsible to the owner. It is not clear why he should be paid on the basis of the cost of the work. It is no more laborious to take off plain marble ashlar than to take off the quantities of shingles. It would seem as if quantities rather than cost should be the basis of the charge, unless indeed it were frankly based on time.

The general scheme proposed seems excellent and should be supported.

From Mr. Ferdinand Parmentier, Secretary of the Southern California Chapter, A. I. A., the following was received:

Some six years ago an attempt was made to introduce this system in Los Angeles. A firm of quantity surveyors established offices and carried on their practice for a period of six months or so, in accordance with the so-called English system of quantity surveying. The system, however, at the end of that time was abandoned, and the surveyors left our city for good. It developed from the information that I had received from architects, as well as contractors, that the practice of these quantity surveyors had not been carried on in a strictly regular manner, with the result that neither architects nor contractors have since that time been enthusiastic to reintroduce the system.

I fully agree with Mr. Jones, and realize the unfortunate condition of affairs in the average architect's failure to properly co-ordinate his drawings and specifications, and his awkward attempt to establish his own infallibility by means of the wording of the contract, such a general custom making it impossible to effect any material uplift in the standard of the architect's relations to the owner and the contractor. The great difficulty that presents itself, however, seems to me to be the insurance of the honesty of a quantity surveyor. Mr. Jones suggests standard rules and units for the measurements of the executed work, but even then the possibilities of irregular conduct on the part of the quantity surveyor for the interest of some particular contractor would be difficult to avoid. The Code of Rules as a tentative basis proposed for the working out of an American quantity system is practical and feasible in so far as Rules 2, 3, 4 and 5 are concerned, but I should find Rule 1 exceedingly difficult of enforcement in California.

In giving the various aspects of the operation of the quantity system Mr. Jones presents a good illustration of the law of averages, establishing theoretically that by this system the owner would receive a more favorable bid from the successful contractor, thereby more than compensating him for the payment of the quantity surveyor's fee. In this particular, perhaps, the majority of architects will agree with Mr. Jones. However, I believe that the average owner would not entertain the same confidence in this theory, but count on the contractor's competitive efforts to secure the work to neutralize any "overhead" expenses that might be charged by him.

This question of quantity surveying was brought up for discussion before a regular meeting of our Chapter held on September 10th, 1912, and elicited little or no enthusiasm among the members at that time. Personally, I think the system of quantity surveying, as outlined by Mr. Jones, is a good one, and I should like to see it adopted by architects throughout the country.

DON LEE GARAGE, SACRAMENTO
Exterior Finished in Sacramento Sandstone Brick

Making and Laying of Composition Floors

By ROBERT P. SKINNER*

THE report on "floorings of sawdust and magnesium chloride" has given rise to innumerable inquiries from correspondents from various parts of the United States, all of whom express a desire for further details. It was stated in the original report that extensive use was being made in Germany of a flooring composition consisting of a solution of chloride of magnesium to which pulverized magnesia is added, together with considerable proportions of sawdust, and which, being skilfully compounded, provided a relatively inexpensive and fairly fireproof flooring material, especially useful in large office buildings and public halls. One inquirer stated that the art of laying these floorings in Germany is far ahead of the practice in America, and asked particularly for the method of coloring the material and of governing its expansion and contraction.

According to my information, there should be neither expansion nor contraction of the material from any cause whatever, after a flooring of magnesium chloride is once laid. The very ingredients are such that there is no buckling or cracking due to heat or cold: In Hamburg the composition is mixed and spread where the building operations are being carried on, the prepared dry meal being delivered in bags from the factory and the lye water made on the spot. It is impossible to state the precise rule for the composition of the meal or for the lye solution, these being the manufacturers' secrets and each manufacturer claiming particular merits for his own formula. These formulas are not patented, and there is no doubt that they are all substantially alike. Several manufacturers have expressed a willingness to sell their process, either for the whole of the United States or for a restricted territory. One Hamburg firm sold its formula for a small place in Southern Germany for $1,428.

The mixture of meal and lye water is made in a mortar box, and when a thickness of not more than 2 inches is proposed it is spread and smoothed with a hand trowel; when a thickness of four inches is desired, the material is tamped and then smoothed. The amount of lye water used in mixing the meal depends upon whether the flooring is to be simply spread or tamped; if spread the ordinary practice seems to be to use from 4 to 6 buckets of the lye water to 1 sack of meal, the sack apparently containing from 50 to 60 pounds.

These floorings were first utilized in large office buildings in Hamburg, and probably elsewhere, as a basic flooring for linoleum and also for the addition of artificial wood-marble flooring. These wood-marble floorings are substitutes for wood, and the panels are polished like hardwood floors; that is to say, smoothed with steel shavings and given a coating of wax. When linoleum is applied, it is glued to the magnesium-chloride foundation with a linoleum cement, which is said to be composed of copal resin and putty.

In Germany linoleum is never tacked to wood or artificial stone flooring, as is usual in the United States, but it is invariably glued in place, an ordinary flour paste being used when it is applied to wooden floors. Linoleum thus laid is washed afterwards with soap water and when dry given a coating of wax, exactly like a hardwood floor. This treatment is the ordinary practice in the large office buildings in Germany, even in hallways where thousands of people pass in the course of a week.

The magnesium-chloride flooring was first considered a particularly excellent foundation for linoleum, and it is only in comparatively recent times that it has been found possible to color it and to lay it so attractively that no linoleum covering is necessary. It is laid tight against the side walls, making the entire floor waterproof. In bathrooms and around toilets, it is brought to

*U. S. Consul General, Hamburg, Germany.

the edge of the porcelain and the joints are rounded upward, so that no crevices present themselves in which dust or dirt can collect, nor should there be any joint through which water might percolate.

The favor in which linoleum is held in this country is such that manufacturers of these new composition floorings have some difficulty in inducing buyers to put down this material, in solid or varied colors, in preference to a similar natural color foundation with linoleum coverings, although the cost and wearing qualities of the former method are said to be much in its favor. Linoleum costs in Hamburg about 86 cents per square meter (a square meter equals 1.2 square yards), and the cheapest class of magnesium-chloride foundation pavement costs 48 cents, making a total of $1.34 per square meter against a cost of $1.19 per square meter for a colored wood-marble floor attractively finished. The new floorings may now be obtained in almost any color, or in mottled colors. When mottled colors are desired, the different colored mixtures are prepared separately and tamped in together as the floor is laid. Special dyes are required for these operations, and there are a number of manufacturers who produce them. In a general way, from 15.4 to 22 pounds of color are necessary for 220 pounds of mortar. The proportions vary with the strength of coloring desired. The colors themselves are of different prices. One manufacturer quotes red, blue, black and brown at $4.76 per 220 pounds; oxide green, $53.55; and blue, $19.04 to $21.42 per 220 pounds. Another manufacturer quotes red dye, very much in demand, at an average price of $3.81 per 220 pounds. The prices again vary with the quantity ordered. The more delicate tints, such as green and blue, are more sensitive to light, particularly if exposed for a long time, than the quiet colors, such as black, red and brown. Red is especially favored, and the many different shades are said to be absolutely unchangeable. Most of the manufacturers of these dyes also supply dyes for cement tiles, stucco, imitation marble, sand-lime bricks, and cement blocks.

One Hamburg manufacturer claims for his own composition that it is crack-free under all circumstances, warm under foot, elastic and sound-proof, preferable to linoleum, as linoleum curls at the edges after a time, breaks or wears away, and absorbs water, permitting it to leak through. This same manufacturer submits a certificate of examination from the royal board of examiners of material in the Technical High School in Berlin, reporting as follows on the examination of samples of his material:

1. After the sample plates were soaked in water and had been exposed to frost 25 times at 15 degrees C. below zero, the samples remained unharmed.

2. After the plates had been lying in water for eight days a very small proportion of water (9 per cent) had been absorbed.

3. After the plates had been attached to a vessel containing water—after 24 hours, none; after 48 hours, 2 cubic centimeters, or 5 per cent; after 72 hours, 4 cubic centimeters, or 10 per cent, of moisture had been absorbed.

This manufacturer also claims that in this country his composition is cheaper than pine flooring, tiling, or stone; that it may be used to cover old worn-out wood and stone-plate floorings, staircases, and the like without the necessity of removing the old floors. Wherever a foundation is firm and dry it may be laid without any complicated preparations. Finally, it may be cleaned with cold water and only very seldom should lukewarm water be applied. After complete cleansing and thorough drying, the flooring should be rubbed with raw linseed oil or should be waxed.

Magnesium chloride, the chief ingredient of these compositions, is worth, in 50-ton lots, in casks of 880 pounds f. o. b. Hamburg, $11.50 per ton fused. If in lesser lots, $12 per ton. Greek calcined and powdered magnesite, in barrels of 396 to 440 pounds, is worth $33.32 to $35.70 per 2,000 pounds f. o. b. Rotterdam. Raw Magnesite, in casks, is worth $30.94 per 200 pounds f. o. b. Hamburg.

The Architect Saves You Money

By LOUIS C. NEWHALL, President Boston Architectural Club.

THE architect, like Shakespeare's "Man," plays many parts in his profession. Yet the part he plays in the planning and erection of a building of any kind is an almost unknown quantity in the minds of business men and owners generally, whether this involves the expenditure of much or little money, in the building of a small private house or the erection of an imposing business structure.

The province of the architect bears the same relation to the owner as that of a specialist in medicine to his patient. It is the architect's business to know all the conditions that the owner wants to meet in a house or building.

It is the architect's business to be so familiar with costs of labor and materials that he can, with a reasonable degree of accuracy, tell the intending builder the cost of the structure that is to be built. It goes without saying that a specialist in medicine will often save the cost of his fee to his patient by knowing exactly what to do, and so where an owner consults an architect who has had training and experience, he will pay for the cost of services and obtain a result proportionate thereto.

It has been a mistaken notion on the part of many people that the employment of an architect would necessarily increase the cost of a building. This is not so, because the trained architect, knowing his cost of labor and material, will so apportion this cost and so plan his building that he will save his commission to the owner by economical planning and designing, and at the same time produce the most economical building, at the least possible cost.

This is where the owner many times makes his mistake. The public at large do not realize that architecture is a precise profession; one that is based absolutely on experience in building matters, and that the trained architect can and does build economically and reasonably, and that he can obtain, with the use of the same amount of labor and materials that an untrained man would use, results far better than this same untrained man, under the same circumstances, and often times at less cost.

Real estate owners, and men who develop property, think many times that they are economizing in obtaining mediocre ability and that by buying plans outright from builders they are saving on their investment. The result is quite to the contrary. After the development is completed, the buildings done, they find they do not have the investment value that some other building, or some other property has which has been carefully considered, not only from the standpoint of architecture, but from the standpoint of investment also.

Too often the real estate promoter cuts his nose off and never realizes that his property is not as attractive as some other, and does not yield the same proportionate profit. It has been demonstrated to many real estate promoters that the employment of the very best class of architects obtainable is really the wisest kind of an investment for them, and a real economy in the long run.

This is true, not only in designing, but in superintending of buildings, for the architect who is thoroughly trained should be of decided value to an owner in the carrying out of any building project. There are numberless instances during the progress of a building where an architect's advice, decision and initiative are of the utmost value and importance. These things the owner knows little of, and it is not of advantage to the contractor to advise him against his (the contractor's) own interest.

These things the owner, unless he has had a vast experience in building operations, realizes little or nothing of. It is the architect's business to act as the owner's representative, to consult with and advise the owner regarding estimates obtained from responsible builders, in many cases these bids being from each trade separately, thereby assuring a minimum cost. This is called a split contract—where the architect acts almost as the general contractor in obtaining and letting these sub-contracts, usually saving the owner the general contractor's profit on the same.

The owner's interests are carefully looked after during the progress of construction by the architect, and contractors and sub-contractors are sure of being dealt with in an absolutely fair and impartial manner, thus insuring to the owner the very best class of work consistent with the amount of money being spent therefor. The comparatively small fee which the architect charges for these services will be more than offset by the savings effected in the contract price alone, and by the better class of work thereby obtained.

In general, the province of the architect is not only to represent the owner and see that his interests are fully provided for and covered, but also to see that the contractor has absolutely fair play, that no more is exacted of him than he has figured to do, and in short, to act as a mediator between the owner and contractor to the end that the owner may get the building that he wants, and that the contractor may erect the building in exactly the manner in which the plans and specifications upon which he has figured require.

It will be seen, therefore, that the architect is acting in a dual capacity, representing the owner and also protecting the contractor, so that the owner shall not exact more than belongs to him, nor the contractor do any less than required of him by the contract which he has signed.

* * *

Architects Becoming Known by Their Work

By B. COOPER CORBETT, Architect.

ARCHITECTURE is as a mirror and reflects the taste of the people who build, and those that are sensible know that it is penny-wise and pound-foolish to be without an architect for their own future home, palatial or humble.

The average citizen is now commencing to approve of the skill of an architect and knows the difference between a cheap set of "ready-made plans" in the hands of the "well-meaning builder" and those under the superior supervision of a professional architect.

"What makes Paris one of the most beautiful cities in the world? Not alone the taste and appreciation of art of the French people; not alone their thrift, energy and sound business sense. Proper architectural supervision has most to do with it."

One of the greatest wrongs is the manner in which some daily journals, especially in their Sunday issues, illustrate our local building enterprises. Care and judgment should be shown by them in the selection of buildings that are meritorious in design, and the work of the legitimate architect should be given preference. They would then have plenty of fine material from architects who are somewhat reluctant now to illustrate in a daily journal, because some building company's design, without architectural proportions, is given an equal or greater display in the same page.

Another evil is to be found in the way some real estate firms allow the erection of indiscriminately designed buildings, not designed by real architects, in their tracts, setting a poor example when there should be a high architectural standard.

* * *

Something About Advertising

THE failure of a trial advertisement has set more business men against advertising than any other factor in publicity. This is a pity when the indefiniteness of a trial advertisement is considered. A trial advertisement represents low-water mark—absolute bottom.—It is not decisive. It has no more value as evidence than a first meeting with an individual who afterwards becomes your friend. Of all the advertisements in a long campaign, the first ad is the worst, though it is written by an adept. If it is written by a novice in advertising, that novice will never write a weaker one. It is like the first discord struck out of the piano by a beginner. If a student becomes disgusted with such an initial effort he will never get farther, and if a merchant abandons his advertising intentions because the first advertisement was unremunerative, he will never get farther. The first attempt at anything is valuable only as an educator. Advertising is like seed sown, it's got to have time to grow before you can reap the harvest.

If a paper, after careful examination, impresses you at all favorably, it's worth giving a fair trial. In no case should a trial ad be inserted for less than six months. If the paper is going to be a paying investment for you, it will begin to show results by that time.

There is a big difference between feeding a cow just enough to keep her alive, and feeding her enough to create a profit.

The same is true about advertising. Nine times out of ten a small advertisement inserted one or two times is simply a waste of money, while the same advertisement inserted for six or more months would have become a paying investment.

* * *

Asbestos-Coated Steel Indestructible!

Here is a new construction material—asbestos-covered steel—which is said to be practically indestructible. The Duckback brand, for exterior use, is composed of a steel sheet, of U. S. Standard gauge, 18, 20, 22, 24 or 26, coated on both sides, with one or two layers of asphalt, applied hot, on which is compressed a layer of long-fiber asbestos, in gray or terra cotta colors. The sheets are either flat, corrugated or beaded, and are attached to the roof structure in the same manner as black or galvanized plates. Their weights range from 125 to 225 pounds per 100 square feet. The price of 22-gauge metal is $11.50 per 100 pounds.

The asbestos will take and hold paint, if desired, but this is not necessary for the preservation of the material, one of its recommendations being that the cost of maintenance is practically eliminated. The material has been proved under the most severe use, as roofing and siding for acid factories, steel plants, coal-mine installations and fertilizer factories near the seacoast. About 400,000 square feet of this material were recently used in covering a modern zinc-smelting works.—Mining Journal.

Fire Prevention Again

By F. W. FITZPATRICK.

The following breezy and reminiscent paper by Mr. Fitzpatrick was read at the recent convention of the American Society of Municipal Improvements, held at Wilmington, Del. It is a reiteration of vital truths which Mr. Fitzpatrick has told in the past, and in many instances his predictions which were ignored have come to pass with even greater disaster than was prophesied.—Editor.

YOUR committee on Fire Prevention has been good enough to invite me to address you upon my favorite theme, Fire Prevention. They've added that I should limit myself to the educational features of that subject, which stirs up all sorts of and pretty ancient memories. Mr. Evans and other more able teachers than I will entertain you with the details and fine points and technique of that subject, so I may be pardoned if I go a bit into reminiscences, the early efforts made to arouse interest in Fire Prevention, the struggle we had to have it recognized at all, its history as a mere infant that may be all the more interesting when we note the splendid proportions it has now reached, its magnificent adolescence if not full-grown maturity. True, we see all about us grave errors in construction, lax prevention of fire, gross negligence and all that sort of thing, but to one who remembers what conditions were thirty years ago the present is indeed almost perfection personified. We've grown not by little inperceptible inches, but by jumps and bounds. Think of it; here are popular as well as scientific societies devoting whole evenings to fire prevention; great societies have been organizd devoting all their energies to that one end; technical and popular journals and papers discuss it, and even the editors of daily papers intelligently comment upon it; there is not a city or town in the land that has not recently added special enactments in its laws looking to the prevention of fire; states and large cities have established fire prevention days, a sort of Fourth of July affair, when extraordinary efforts are made to teach the young, the employed, all citizens, the real significance of the term; fire departments are giving attention to the subject, and even our architects and builders are awakening to the realization that it is good policy, real economy, to build not only as well but a bit better than they are compelled to by law. Heretofore you've had to knock them down and sit on them in order to get them to make any move in that direction at all. And all this has been accomplished in less than thirty years, for prior to that time the term fire prevention had not even been coined, let alone any of its significance understood, and it all has been accomplished through education, sheer persistence, the everlasting reiteration of its simple truths, their expounding on tons of paper via other tons of printer's ink! Education! Why, in fire prevention or in anything else it's the whole thing; with it you can do wonders; without it all is lost.

The Beginning of Fire Prevention

Almost thirty years ago there appeared in some technical journals a few weakly written, purely tentative and absolutely academic articles on fire, and the suggestion was made that perhaps there was too much fire! Before that fire was accepted as a visitation from on high, a punishment for our sins, a necessary evil, something to be borne with resignation and fortitude. Then a city of the West revised its building code and a young architect had something to do with that revision. He injected most carefully here and there, between party wall requirements and fees for inspectors, a word or two calling for better construction, a little less inflammability of buildings. The city attorney caught those items, he was aghast that anyone should have injected such "jokers;" they must, forsooth, be for some fell and sinister purpose, so out they went. The matter was taken up in council, and that dignified body gravely settled that a city had no business to say how a building should be built; such regulations would be insufferable curtailments of individual rights and liberty, and the fire and police committee was up in arms because someone had invaded the city's sacred rights to fires. Was the author of those regulations trying to insult the fire department? It was there to put out fires; did he imagine it could not attend to its business that he should talk about lessening fires?

The newspapers were approached, editors glanced at the matter submitted, laughed sarcastically and pityingly informed the fire prevention enthusiast that the insurance protection was all that anyone needed; they wouldn't clutter up their columns with any new-fangled nonsense as long as there was a dog fight or other real newsy item to display under scare-heads to their expectant readers.

Some fire prevention matter was printed at private expense and distributed like the mustard seed of old. Some of it stuck, however, and appeared first, in the little jerk-town papers and later in the big fellows, and that was the signal for the insurance anvil chorus to begin. Fireproof construction, intelligent handling of explosives and combustibles, etc., etc., was all rot. The fire departments would put out fires and the salvage folk would save what they could and the insurance companies would pay the balance of the loss. That's the way it had been for years, and so must it continue, the ordinary and accepted way. Architects pooh-poohed fire prevention, and when they did try to build a bit better they merely substituted unprotected iron for wood, and cried derision at us and our theories when fire warped and twisted that iron and let the building down on top of the firemen. And the builders rose in arms. We were, of course, a pack of visionary idiots, but if we ever did get our fool fire prevention theories established there would soon be no work for the builders, for, as it was, about six-elevenths of the building done was merely to replace burnt buildings; no fires, very little building, therefore scant picking for the builders and a complete readjustment of economic conditions. Why not leave well enough alone?

Uphill Work for the Educators

And so it went, mighty uphill work for the educators, ceaseless and bitter criticisms, obstacles that seemed almost insurmountable, a thankless task, interesting withal, and the less encouragement it received the more urgent seemed the necessity of its prosecution, and those few enthusiasts kept at it grittily. To you gentlemen, who are too young to remember those early stages of the movement, or who were so busily engaged in other lines that you had not yet given it any attention, it may all seem a very rational growth. The advantages of fire prevention are so obvious that it sounds almost monstrous that it ever could have been opposed, or that its simple requirements were ever looked upon as insufferable. But you can believe me that it was a long and bitter fight. I have been interested in and watched from the inside the progress of many reforms, many drastic upheavals that have been deeply resented, but nowhere else have I seen so much, such well-generaled and heavily financed opposition as was directed at fire prevention. Even today you can see how it will still crop out. Go and suggest some little improvement in a building code and watch the procession of interested opponents, big business men, builders, real estate sharks and their cohorts that will file into the city hall, there to register their solemn protest against the innovation that is aimed at the welfare of the city.

The turning point came about ten years ago. Not only was the subject tolerated, but there was actually some enthusiasm shown. The papers opened their columns freely to our sermons and exhortations; more than that, some of them gave whole sections to the discussion and exploitation of fire prevention. The technical journals sanely commented upon the happenings of the day that pointed a moral. The colleges added a few words to their engineering courses. The architects came to the realization that steel and other materials might be unburnable, but nevertheless were very damageable by fire, so they protected them and did, more or less reluctantly, other preventive things. And then came the really big and convincing lessons in our education. Some wild-eyed enthusiast had been prophesying dire disaster to our cities; one had in fact written an article that had been widely quoted in which he foretold—quite by accident, I assure you—the order in which the most likely cities would be attacked by fire (and had been well hooted at because those two cities had such exceptionally fine fire departments that they made it impossible for the foolish prophecy to be verified). Well, earthquake and fire conspired with him and Baltimore and San Francisco were laid low!

The Impressive Sermon of Big Fires.

No more impressive sermon was ever preached than those two fires, nor was ever a lesson so quickly and respectfully heeded. There was literally—for a while—a veritable scuffle to see which city would most thoroughly amend its code, which manufacturing concern would make the most rigid rules anent prevention or which individual would shout the loudest approval of all that was being done in that direction. No spanked school boy ever promised abiding and complete reform so quickly and earnestly as did the great United States and Canada at that time.

Educate in fire prevention? Oh, yes, that's my subject, and I'm expected to enounce some wise homilies thereon. One could string out such homilies for endless pages; I'll bunch mine in a paragraph.

Just keep everlastingly at it, that's all. The public, through years of hammering at it, is in a receptive mood. Let everyone who has seen the light and knows the simple rules of the game of fire prevention elect himself a committee of one to preach them and write them wherever he can. See a billboard advertiser at work and learn from him the efficacy of keeping a subject or matter before the people. Go and do likewise. Never let an opportunity escape, and lo, before many years you'll find the country so well versed in the art, so insistent upon obeying its every requirement that you will wonder indeed that there ever could have been a time when education in fire prevention seemed necessary.

Some Notes on Causes of Failure of Stucco Work

A NUMBER of years ago stucco was quite generally used in certain localities, but owing to failures of the material to withstand the action of the elements and to other causes, this type of construction was almost entirely abandoned. During the last few years, however, there has been a very marked tendency by the building public to take up this class of construction again; therefore this word of caution.

We do not want to have the same experience with this class of work as the concrete block industry has had, and yet, unless due care is used in drawing specifications and in their application, there are going to be a great many failures as in the past. Our architectural friends are very partial to stucco exterior, and if it is properly mixed and applied will come up to their expectations in every way. So much depends on the selection of the material, proper mixing and proper application that only skilled mechanics who are familiar with this class of work should be employed.

I remember one residence in particular, where there were a great many horizontal cracks in the stucco running almost the entire length of one side of the building. These cracks were about two feet apart and were very pronounced. The whole area of sides and ends was very unsightly. After a careful investigation it was found that in nearly every instance where cracks had developed, they were at a point where the wire lath was lapped, and in many places less than one-quarter inch thickness of stucco was over these laps. In some instances by cutting out the cracks it was found that the metal lath was not even tacked solidly in place, and yet stucco work in general was condemned by a number of parties on the results obtained in this one building. It was quite apparent that the trouble was not due to any fault of the material, but in this particular instance was entirely due to the application of the wire lath and stucco. In addition to the large cracks at the laps of the wire lath, there were a number of hair cracks throughout the entire area, which apparently were caused by too much troweling of the concrete mass, and as was found by investigation there was a coating or frosting of Portland cement on some of the areas and the cracks penetrated just through this frosting. Other areas were entirely smooth and cracks had not developed.

In another case regular lime mortar plaster without any Portland cement was used for the scratch coat. The first coat consisted of regular interior plaster and the second coat consisted of Portland cement, asbestos rock and asbestos fiber. The second coat was very thin and the damp salt air and moisture penetrated through to the first coat. The lath became swollen and the stucco came off in sheets. The stucco on this work was condemned and the faults were laid at the door of the asbestos and Portland cement. Upon investigating the matter thoroughly, it was readily proven that the entire trouble was due to the nature of the lath and the materials entering into the first coat.

I have referred to these buildings with a view of cautioning people interested in stucco construction to see that this particular part of the building is given proper attention. In the past succo has been applied in two coats, the total thickness being about one-half inch to five-eighths inch. Past experience is teaching us, however, that one inch is by far better, and if the material is applied in this thickness house owners and architects should not have reason to regret its use.

Another point of considerable importance is the color. A uniform color is rather difficult to obtain, on smooth surfaces particularly, but it can be obtained if proper attention is given to the selection and mixing of the ingredients and if the stucco is properly applied. When Portland cement and sand are used, it is very essential that the sand should be absolutely free from any organic materials which have a tendency to discolor. It is also of vast importance that the ingredients be mixed very accurately and carefully and that a sufficient amount be mixed at one time to cover certain areas exposed to the same lights and shadows.

For example, the work should not be left in an uncompleted condition half way between windows or half way down the side walls, for just as surely as this is done, there will be a streak showing where the latter work was started. If it is necessary to do a certain given area at two operations, care should be used to get the materials properly blended and the new stucco floated or troweled to correspond exactly to that already done. By using a little care on details of this kind the ultimate results will be much more satisfactory.

Portland cement and sand as a stucco mixture has been used with fair success where work has been carefully supervised, but there has been such a lack of proper attention to the mixing and application that there have been some bad failures. The use of asbestos rock and fiber to take the place of sand is meeting with considerable success. The asbestos fibers have a tendency to hold the water which is used to mix the concrete mass, longer, thus giving the Portland cement ample opportunity to become properly set, and in this way stucco mixtures are possible that are more uniform in color and less liable to crack, as the fiber also furnishes additional bond.

There is one point which is frequently lost sight of; that is, it is possible to manufacture or make concrete slabs that are free from cracks and that can be exposed to the elements for an indefinite period without discoloration. Therefore, should cracks develop in a well-constructed stucco work it can be invariably traced to settling of the building or the shrinking of the frame. By insisting upon thicker stucco walls the liability of the stucco's cracking is reduced to a minimum.

The price of lumber is readily advancing and the desire for fireproof exteriors, especially in the suburban districts, as well as artistic effects that may be obtained from stucco, are creating a universal demand for this type of construction, and while the initial cost may be slightly more it is such a small part of the total outlay and such an important part of the structure that the best is the cheapest in the end.—Cement and Engineering News.

* * *

The Troubles of an Architect

Architect—"Now, where would you prefer the drawing room, sir?"

Mr. Strukile—"Look here, young man, I've let you put up a smokin' room, when I don't smoke; a music room, when I couldn't play a mouth-organ; a nursery, when I ain't got no nurse, and a pantry, when I don't pant. But I'm goin' to draw the line at a drawin' room, when I couldn't even draw a straight line."

* * *

From 350 pounds pressure to 22 pounds is the record of the water which climbs to the top of the Woolworth building in New York City, the tallest in the world. That is, 350 pounds pressure in the big pumps is needed in the basement to lift water to the top of the 57-story pile, and have 22 pounds of force left. This is said to be twice the pressure needed to bore a hole through the strongest brick wall.

The Architecture of Open-Air Schools

By JOHN R. VAN PELT,*

UNLIKE the architecture of the ordinary school where experiment has prescribed the type, open-air schools have not yet been built and tried out. Open-air school rooms have been built or altered from old school rooms as minor parts of buildings, roofs covered and uncovered, have been turned to the purpose, but the complete school, planned in all its details toward the one end and of an advanced type, is yet to come.

In describing the ideal conditions to which I think such a school should conform, I have in mind a type slightly less radical than what is sometimes known by the title, namely: a school that is entirely out of doors, with little more than a roof, and is typified by those at Shrewsbury House and Bradford in England. On the other hand, something that is considerably more open than what has been styled the low-temperature school, such as the Graham School, or such schools as No. 21 in New York, where the rooms have been adapted from the regular type by merely changing the pattern of the windows and keeping them open.

In other words, I propose a building so constructed that the air in all parts of rooms where the children remain will be continually replaced by outdoor air that has only sojourned a few seconds within the limits of the building, yet not a building that is entirely without heat.

The ground for such a school should be sandy or gravelly, without too much clay, so as to preclude a humid condition in the entering air. It should be protected from the wind—pine, spruce, etc., forming an excellent screen; but these trees should not be too close to the building and should not cast a shade upon it. City schools should be so situated that sun will not be cut off from them by adjacent skyscrapers. This is also important because the high buildings of our later construction cause concentrated air currents that would render work in an open-air school almost impracticable, by blowing papers and material about and forcing dust and dirt up and through the school.

Toilets are to be placed so that odors cannot reach the open class rooms. An unsanitary condition of this kind will become particularly objectionable in warm weather.

It is essential that the plan be so arranged that all class rooms, study rooms, the auditorium and wherever the children remain shall have ventilation on two or more sides, and to really fulfill conditions properly, the room should be open on at least two sides that are opposite each other. Corner rooms with windows on the sides perpendicular to each other may be satisfactory when there is a sufficient amount of wind; but when there is little movement in the atmosphere, a dead corner with eddies is likely to retain the air in certain portions of said rooms. On the other hand, if rooms are entirely open on two opposite sides without protection a storm or misty rain will carry completely across the room. For this reason an open gallery is advantageous.

General plans may be divided into three classes: The "U" or "H" plan, where the wings are about open courts, the "T" or "Star" plan, where the wings radiate from a center, and the enclosed court plan. The last named is not so good, and all plans should so enclose the courts that the latter are open on at least one side which is not the north. This is to insure the entrance of the sun into all parts of the court during some part of the day.

*School of Architecture, Columbia University. (Read at the Fourth International Congress on School Hygiene, Buffalo, N. Y.)

I see no objection to building three stories high above basement or higher, if means of ascent can be provided. Open galleries and open staircases are good, provided they are protected from snow and sleet. A great advantage is that children passing between the cold rooms do not undergo a sudden change of temperature.

An objection to placing class rooms on the ground floor is dust and odors from the street and the general impurity of the air.

Class rooms may have the floor warmed. This would slightly temper the air and keep the children's feet from becoming cold, tending to dry them if they had not come to school with rubbers. If the floor is heated it must necessarily be of a material that will not be affected by the heat. For this reason the warmed floor may be attained by metal plates separated by composition.

Coat rooms should be well ventilated, but kept reasonably warmed, that is, about 65 degrees Fahrenheit. This will appear quite warm to the pupils coming from the class rooms and halls, and a higher temperature would be uncomfortable before the smaller children could succeed in adjusting their clothes. It may be suggested that coat rooms could be omitted, in that the children wear about the same clothing in the class room that they do out of doors. If they have to come to school through snow and storm, their outer wraps should be taken off and dry wraps put on, and I believe it would be better to provide a proper place to keep such wraps, allowing the damp ones to dry.

Furthermore, exceptional cases occur where fragile or anemic children suffer from time to time from the cold. This has been noted in the Graham School reports, and the warmed cloak room offers an excellent place where their vitality may catch up. Although limited space may seem to force wardrobes in the class rooms, I consider it a bad solution. In such case a warmed room for recuperation should be provided on each floor.

Toilets must necessarily be warmed. In very cold weather plumbing pipes would freeze. A temperature of 60 degrees to 65 degrees Fahrenheit is ample. Anything higher than this would be bad.

In the laboratories, manual training rooms, etc., provision often has to be made to maintain such a temperature that liquids under study will not freeze, and where fine and delicate work is done the temperature cannot be allowed to go quite as low as where some protection for the hands may be worn in cold weather. Furthermore, below a certain temperature, it is not easy, and for some persons, not possible to perform very delicate work. Steam radiators should be introduced in such rooms, and if a number of small radiators are scattered about, the heat can easily be graduated by turning on one or more and allowing the others to remain empty. Provision must be made for draining these radiators rapidly.

Rooms for visitors should be provided where the temperature is not allowed to fall too low, and heat will probably be required in the principal's and teachers' rooms.

In spite of the fact that such a school is open and a considerable amount of heat lost, the fact that the average temperature of the building is kept so much lower than is ordinarily the case will probably show a slight saving in coal over the usual type of school house. Sufficient experiment along this line has not yet been made to definitely determine the proportion.

History of Vitrified Clay Sewer Pipe

Venerable Past of a Product Five Thousand Years Old Found to Embody "Modern" Principles of Manufacture

By BENJAMIN BROOKS in Contract Record

BEFORE the history of Europe really began—say, approximately, five thousand years ago—there were current in the Greek "myths," or fairy tales, numerous persistent rumors of a magnificent and powerful people inhabiting a mysterious island to the south, in the Mediterranean Sea. Was it history or was it just a fairy tale?

Nobody could be quite sure which, until less than a generation ago, a freak of the desert winds blew the sand off the ruins of Egypt's ancient foreign office and disclosed the little clay tablets whereon were recorded as plainly as in print the letters sent and received by the ancient and honorable Minister of Egypt's Foreign Affairs. Although these letters had been written and filed so many thousand years ago, it was perfectly plain to any archaeologist who glanced at them that about the time Moses was a gallant young man ready to fight any ruffian who crowded a good-looking girl out of her turn at the public well, this magnificent and powerful civilization hinted at in the Greek fairy tales really did exist on the Island of Crete.

There was bountiful trade with other countries; there was much trouble about who handled the customs receipts, and with pirates, and with encroachments of barbarous armies. But there were also huge profits and great wealth, and there was a king who was enough of a sportsman to make a Roman holiday look like a county fair on a rainy day.

Bull fighting was the king's special delight—not such tame sport as it is nowadays, but bull-baiting without red flags or horses or weapons of any kind; just a troupe of lithe young men and women, quick as lightning on their feet, who danced before the enraged taurus, grasped his long horns as he charged them and leaped lightly over him through the air to be caught in one another's arms. Some royal sport! But the king had another and a quicker way of spending money if his gold and silver and ebony checker-board, recently discovered, is any indication. And, of course, he had a magnificent palace, and the best Egyptian architect imported to build it—which brings us to the hero of the story.

Palaces were a common thing with this celebrated architect no doubt, but this palace for the Cretan king—half pirate and half patron of royal sports—was to be something extra. The ruins of it still proclaim the fact. And one of the little extras that was to make it a famous palace was the idea that it should be drained not merely with open, mosquito-ridden ditches or rough stone waterways, but in a truly up-to-date and sanitary manner with pipes. But pipes of what?

It is not difficult to see how he arrived at his choice of materials. The Egyptians had already developed the use of clay bricks. One pyramid had been built of them (and it still stands) and there were the everlasting clay tablets bearing the hieroglyphics, and clay vessels of every sort to contain wine and water. Now if a tall clay vase with a bottom in it would hold water, why wouldn't a succession of tall clay vessels without bottoms, and fitted end to end, convey running water? And this was the invention of vitrified clay sewer pipe, five thousand years ago.

The comparison of the first locomotive, the first steamboat, or the first printing press, with the last, is usually interesting by contrast, but if we take the first clay sewer pipes as they were dug from the ruins of this

Cretan king's palace, still in perfect condition, and compare them with the clay pipe of today, we are struck by the great similarity of the two. There they are, four inches in diameter, in thirty-inch lengths, with bell-and-spigot joints, without blisters, cracks or any imperfections that would prevent their giving good service in any town of today.

How much did this far distant architect know and how much was he guessing? Did he realize that in creating bell-and-spigot clay sewer pipe he was giving something to the world that would be an important feature in its civilization ever afterward? Did he realize that in selecting clay for his material of sanitation he had chosen absolutely the only material that could have carried sewage and resisted its acid-bearing vapors, or carried water and resisted its solvent carbonic acid, and remained to be rediscovered after five thousand years? If an untutored girl like Cleopatra, only a few centuries later, knew that lemon juice would dissolve pearls or any other limey substance, this king's architect may have known more than we think about the destructive chemistry of sewage and the great value of burned clay to resist it. If he knew how to cut 40-ton blocks of stone from quarries without powder, float them across the Nile without tug boats, haul them across the desert without railroads, steam, donkeys or wire cables, pile them up in a temple without derricks or jackscrews, and fit them together without mortar so that not a five-hundredth of an inch intervened between them, it is difficult to guess how much he knew about sewerage and sanitation. It is fortunate, perhaps, that there was no regular patent office in Egypt, or we might still be paying him royalties as we do to the organized brigands of Gizeh who have come to own the Pyramids.

Now there are two sides to engineering—the Adventurous and the Commonplace. This original inventor, whoever he was, with no building ordinances to bother him, and plenty of the king's money to spend, must have enjoyed the adventure of it exceedingly. But that was five thousand years ago. Today the big money is to be found on the Commonplace side. The most successful engineers of today hire draughtsmen at $2.00 a day to invent details for them while they deal strictly in standard materials and keep their eyes on standard specifications and their fulfilment. Not being the inventors of the Briggs logarithms, a lot of us must be content to use them faithfully without alteration to the sixth decimal place—for a living. It is the same with vitrified clay sewer pipe. We did not have the fun of inventing it or using it as an experiment, but we must use it as the standard of all first-class sanitation. And, after all, there is great honor in dealing in the most indestructible material ever invented and in carrying forward the world's sanitation as well and as thoroughly as the most wonderful of all builders did for the Kings of Crete.

* * *

The Autoclave Test for Portland Cement

MR. W. LAURENCE GADD, an English cement expert, recently read at a meeting of the Concrete Institute in London a paper entitled "Some Fallacies in Cement Testing." The paper is somewhat exhaustive, touching upon a number of points regarding which cement experts are pretty generally agreed, but containing one paragraph which, because the subject has recently been the cause of some warm discussion on the Pacific Coast, the Architect and Engineer believes it will be of interest to many of its readers to reprint.

The paragraph in question contains Mr. Gadd's ideas upon the value of the "Autoclave Test," so called, and is as follows:

This test, recently proposed by Mr. H. T. Force, in charge of testing materials on the Delaware, Lackawanna and Western Railroad of Scranton, Pa., is merely a revival of Dr. Erdmeyer's high-pressure steam test introduced in Germany about 1881, and rejected by German cement experts as being unreliable and misleading. In the words of Professor Gary of the Royal Bureau of material testing, it is even less adapted to distinguish useless cements from useful cements than the usual methods of determining constancy of volume. According to Dr. Cushman of Washington, the details of the test have been several times revised during the last twelve months, but the procedure is now as follows:

For each test three neat briquettes are made, and after twenty-four hours in a moist closet these are weighed and then placed in the autoclave, sufficient water being added to cover them. Pressure is then raised by heating the apparatus by gas burners or other suitable means, the time taken to raise the pressure to 295 lb. per square inch being not more than one hour.

The pressure is maintained at 20 atmospheres for a further period of one hour, at the end of which time the autoclave is slowly blown off, the briquettes removed (when their conditions permits) and placed in the moist closet for one hour. They are then re-weighed and broken in the cement-testing machine in the usual manner. The tensile strength so obtained is compared with that of twenty-four-hour neat briquettes kept in moist air, and must show an increase of at least 25 per cent over the latter. The autoclave briquettes must also develop a strength of at least 500 lb. per square inch, and the gain in weight must not be greater than 1 per cent. Expansion bars, 1 sq. in. in section and 6 in. long, are also made up and tested for expansion after twenty-four hours in the moist closet and two hours in the autoclave. The expansion of these bars must not exceed one-half of 1 per cent.

Under this test some cements developed greatly increased strength whilst others were reduced to powder. Comparison of results, extending over twelve months, showed that the failure could not be due to the presence of free lime, but it was thought to be due to the presence of coarse granules of cement which are not hydrated when the cement is gauged, but which might threaten the stability of the structure by subsequent hydration after a lapse of time.

The disruption of the briquettes by the hydration of the coarser particles of cement clinker, under high pressure and heat, is probably correct. I myself drew attention to this in an article published more than six years since, but numerous experiments have convinced me that such coarser particles hydrate eventually in the cold without expansion. If it were otherwise the whole of the concrete work, in this and other countries, carried out with coarsely ground cements during the last twenty years, should now be in a very precarious condition.

I have made a number of tests with the autoclave with somewhat erratic results; but with finely ground modern rotatory cements, the Le Châtelier expansion of which did not exceed 2 mm., the whole of the samples, with one exception, conformed to the test as laid down. The one exception, curiously enough, was the most finely ground member of the series, the residue on the 180^2 sieve being only 1·6 per cent.

On the other hand, a number of samples ground to the fineness stipulated in the standard specification, viz., from 12 to 18 per cent on the 180^2 sieve, failed to withstand the conditions of the autoclave test, although they were perfectly sound when tested by the ordinary boiling or Le Châtelier methods.

I hold that growth of strength by age is of less importance and is not such a criterion of quality as is generally considered. Modern cements prepared from purer clinker and much more finely ground than formerly attain a strength approximating to the maximum much more quickly, and it is evident that a cement which attains, say, ·8 of its maximum strength at short dates, has less margin for growth than one which only develops ·5 of the maximum in the same time.

The stipulated pressure to be maintained in the autoclave (20 atmospheres) is needlessly high and serves no useful purpose. The same effect is produced at a pressure of 5 atmospheres as at 20 atmospheres, as the following tests on a sample of cement show:

Pressure in Autoclave

Tensile strength (lbs. per square inch.)

5 Atmos.	10 Atmos.	20 Atmos.
745	760	780
790	795	740
767	777	760

There is, therefore, nothing to be gained by carrying out the test at the high pressure advocated in America.

Among the Architects

American Institute of Architects

(ORGANIZED 1857)

OFFICERS FOR 1914-15

President..........R. Clipston Sturgis, Boston
First Vice-President....Thos. R. Kimball, Omaha, Neb.
Second Vice-President....Frank C. Baldwin, Washington
Secretary..........D. Knickerbacker Boyd, Washington, D. C.
Treasurer .... J. L. Manran, St. Louis
Auditor......T. J. T. Fuller, Washington, D. C.

Board of Directors

For One Year—Irving K. Pond, Chicago; John M. Donaldson, Detroit; Edward A. Crane, Philadelphia.

For Two Years—C. Grant La Farge, New York; Burt L. Fenner, New York; H. Van Buren Magonigle, New York.

For Three Years—W. R. B. Willcox, Seattle, Wash.; Octavius Morgan, Los Angeles; Walter Cook, New York.

San Francisco Chapter

President ....George B. McDougall
Vice-President..............Edgar A. Mathews
Secretary-Treasurer....Sylvain Schnaittacher
Trustees.................. Geo. B. McDougall, Henry G. Schulze

Southern California Chapter

Vice-President.............Albert C. Martin
Secretary ....Fernano Parmentier
Treasurer.................August Wackerbarth

Board of Directors

Octavius Morgan   J. J. Blick
H. M. Patterson

Portland, Ore., Chapter

President....................Edgar M. Lazarus
Vice-President.................Jno. G. Wilson
Secretary-Treasurer............H. A. Whitney
Trustees............ Morris H. Whitehouse, Ellis F. Lawrence

Washington State Chapter

OFFICERS 1913-14

President ....Charles H. Alden
Vice-Presidents .... J. F. Everett, George Gove, Albert Held
Secretary ....Arthur L. Loveless
Treasurer ....A. C. P. Willatzen
Additional Members of Council.............. D. J. Myers, D. R. Huntington, W. R. B. Willcox

California State Board of Architecture

NORTHERN DISTRICT.

President..................John Bakewell, Jr.
Secretary and Treasurer.Sylvain Schnaittacher

Members

Jno. Bakewell, Jr.   Edgar A. Mathews
Joseph C. Newsome

SOUTHERN DISTRICT.

President....................John P. Krempel
Secretary-Treasurer..........Fred H. Roehrig
Members.................... Octavius Morgan, Sumner P. Hunt, Wm. S. Hebbard

San Francisco Architectural Club

OFFICERS FOR 1913-14

President ....Geo. E. Greenwood
Vice-President..............Chas. Peter Weeks
Secretary......................A. L. Williams
Treasurer ....Wm. D. Sherman

Directors

Henry A. Thomsen   James A. Magee

Los Angeles Architectural Club

President.............Arthur Rollano Kelly
Vice-President..............Harry F. Withey
Secretary-Treasurer .... Henry E. Bean

Chairman Educational Committee

John T. Vawter

Chairman House and Entertainment Committees, Massier of Atelier

Gilbert Stanley Underwood

San Diego Architectural Association

President.........................J. B. Lyman
Vice-President....................F. C. Cressy
Secretary.....................Robt. Halley, Jr.
Treasurer......................G. A. Haussen

Portland Architectural Club

OFFICERS FOR 1913

President........................Frank Logan
Vice-President................Jno. M. Hatton
Secretary...................Wm. H. Flanigan
Treasurer.................William P. Dawson

Architectural League of the Pacific Coast

President........Carl F. Gould, Seattle, Wash.
Vice-President.......Myron Hunt, Los Angeles
Secretary............J. S. Cote, Seattle, Wash.
Treasurer..........W. C. Hays, San Francisco

Next Convention City—Seattle.

Concrete Office Building

Engineers Mayberry & Parker, 472 Pacific Electric building, Los Angeles, are preparing working plans for an 8-story and basement reinforced concrete store and office building to be erected on Central avenue in Phoenix, Arizona, for Dwight B. Heard and associates.

The World a Field of Contest

At the annual meeting of the Architect and Engineer's Association in Los Angeles, President Arthur B. Benton gave an interesting talk, touching at some length upon the belief that the universe is one vast field of conquest wherein the survival of physical fitness has been accomplished by elimination of weaklings, nations or individuals. "If, as we hope," said Mr. Benton, "the future advance of the race is to be unhampered by wars, history in the future will in ever increasing volume record the conquests by men of the tremendous forces of nature.

"With the era of world-wide peace will come congestion of populations, to provide for whose welfare, even to avert whose extinction, will demand generals of engineering and of architecture as resourceful and as courageous as the greatest military heroes of the past. Even today, could architecture and engineering have proper consideration in their highest practice, the greater part of the harvest of the 'Grim Reaper,' who is, after all, the one relentless and insatiable enemy of mankind, would be the reaping of grain white for garnering, and not, as now, also the destruction of the tender blade, the corn in the milk and the wheat of humanity in the summertide of growth and development.

"It is proverbial that 'the good die young,' and why? Is it not that this is a physical environment in which we must live? Mind is in some sort lord of matter, but mind must wage constant war with matter in a material universe, or go down in disastrous defeat. It is a combat which should enlist the enthusiasm of men of our professions, as war for principle has that of the splendid men of the past. We hear much of the victims of war; but men generally think little of the innumerable multitude of victims of the ordinary conditions wherein men attempt to live and thrive. Ordinary conditions, I say, even in our most civilized communities and richest cities.

"Man alone of all the animals must teach himself architecture and engineering in order to live the life which his nature demands for its proper development. War as a destroyer must give preeminence to bad building and bad engineering in the places where men are born and work, where they attempt to live and thrive, and where they die miserably, even as fools perish. They bar out the sunshine, they stifle the air, they overheat, thy underheat. They spend much money to conserve filth and to pollute water. They build traps to invite fire and cunningly contrive breeding places for germs. They murder thousands by grade crossings, and tens of thousands by needless congestion. They starve for want of proper means of transportation for the wasting fruits and grains of a marvelously fertile earth. It is impossible to more than suggest at this time the crimes of ignorance which men everywhere commit for want of good engineering and right architecture, or the terrible toll which death collects from that ignorance.

"It is because of this dependence of the whole race for its physical well-being upon its builders and mechanicians that I so exalt our professions and would demand for them a better recognition in this so-called scientific and practical age. I say "so-called" of deliberation, for life is many-sided, and in truth no age is scientific or in truth practical that progresses unequally; that magnifies unduly the physical, the mental or the spiritual attributes of humanity. A man of perfect physique, deficient in mind and without morals is but a brute. If to perfect physical development we add keen mentality, without spiritual vision, he becomes a standing menace to his fellows. How silly and inane this constant harping of miscalled 'practicability,' as if the harp of man's nature had but one string! I am glad that tonight I address men who to succeed in their professions must limit their aspirations by no chains of half-knowledge or inadequate conceptions of the dignity of humanity or of the magnificence of their opportunity for service."

San Francisco Chapter Notes

At the January meeting of San Francisco Chapter, A. I. A., a communication from Mr. Harris Allen with reference to the competition for the Elks' Hall building at Berkeley was referred to the Board of Directors, as was also the letter from the San Francisco Architectural Club in regard to an architectural exhibit in 1915.

The Secretary was directed to notify the Panama-Pacific International Exposition that the Chapter had been instrumental in the selection of Los Angeles as the convention city for 1915, and that San Francisco would be included in the itinerary of the visiting architects, and that the Chapter had a committee for that purpose.

The Chair announced with regret that since the last meeting the Chapter had lost from its membership through death Ernest Martin Hoen of Sacramento and F. H. Martens of San Francisco. The Secretary was directed to send suitable letters of condolence and sympathy, expressing the regret of the Chapter at the demise of the deceased members.

Le Brun Traveling Scholarship Competition

The second bi-annual competition for the Le Brun Traveling Scholarship, founded by Pierre L. Le Brun, will be held in the early spring. It is open to any architect, a citizen or resident of the United States, between twenty-three and thirty years of age and who is not, nor has been the beneficiary of any other traveling scholarship, and who has had at least three years experience as draughtsman or practicing architect. The amount is $1,000, the period of the scholarship not less than six months.

Each competitor must be nominated by a member of the New York Chapter, A. I. A., who shall certify in writing that the above conditions are fulfilled by the nominee and that in his opinion the nominee is deserving of the scholarship.

Berkeley Architect Wins Scholarship

Chandler Harrison of Berkeley recently sailed for Paris, where he will spend two years at the Beaux Arts school, pursuing his studies of architectural art. He then expects to spend a year in the east studying architecture before returning to the coast. In a prize competition last spring Harrison won a $1,000 scholarship in the Paris art school, which was offered by the Architectural League of the Pacific Coast. He has been associated with Bakewell & Brown, architects of San Francisco, for several years.

Architectural Exhibit at San Francisco, 1915

The committee appointed to make a report to the Board of Directors of the American Institute of Architects as to the advisability and practicability of an architectural exhibit in connection with the San Francisco Exposition in 1915 presented the following report at the recent convention in New Orleans:

1. It is recommended that the Executive Committee request the directors of the exposition to assign approximately 3,000 square feet of floor area in the Palace of Fine Arts for the purpose of an architectural exhibit; that in making this request the Executive Committee notify the directors of the exposition that the Institute will, in case this assignment is made, appoint a suitable committee to take full charge of the selection of exhibits, and the arrangement and hanging of the same, provided the directors of the exposition are willing to delegate this power to the Institute.

2. The Institute shall undertake no responsibility in the matter of defraying any part of the expense of such exhibit.

3. A member of the institute, resident in San Francisco, should be appointed as chairman of the exhibition committee, and this appointment should be made in advance of the request of the directors of the exposition, in order that the chairman may be empowered to discuss with the directors of the exposition and the chief of the Department of Fine Arts all questions as to the exact jurisdiction of the Institute and the exposition authorities in connection with the architectural exhibition.

4. The exhibit above mentioned should be planned in such a way as to be particularly expressive of the development of architecture as an art, and should include architectural drawings and photographs, models and cartoons, selected with special reference to beauty of design. It should not include material illustrative of the progress in the science of architecture and building. As a means of expressing the latter phases of architectural development, the Institute should recommend the allotment of space in the Liberal Arts Palace for an exhibit, with regard to which the Institute's committee should not be concerned, except as its advice might be called for.

5. Provided the request for the assignment of space in the Department of Fine Arts is granted under the conditions outlined, an exhibition committee should be appointed, under the chairmanship of the member above mentioned, consisting for the most part of members of the Institute resident in San Francisco, with additional members in the otber principal cities.

6. In case the above recommendations are approved by the Board of Directors of the Institute, the present committee will immediately proceed to formulate more detailed suggestions as to the plan and scope of the proposed exhibition.

J. MONROE HEWLETT, Chairman.

Willis Polk to Design Sweeney Building

It is stated that Willis Polk & Company of San Francisco will design the Sweeney skyscraper to be erected on the site of the old Occidental Hotel, at Montgomery and Bush streets, San Francisco. Previous reports of this building first credited Architect L. B. Dutton as the designer and later a report was circulated stating that J. Martyn Haenke of Los Angeles had been commissioned to prepare the plans. Mr. Polk states that he has a contract with the owner's son, Robert Sweeney, and that preliminary plans have already been started. A building twenty stories high is proposed. The cost will be in the neighborhood of $2 000,000.

Fixes a Schedule on Building Loss

An exhaustive investigation into the subject of depreciation of buildings has been made by the San Francisco Real Estate Board through a special committee. The inquiry was conducted with architects, contractors and fire underwriters, and also experts among real estate men, who gave results of experience in valuing buildings, and as an outcome of the deliberations a report has been formulated giving depreciation on class A buildings at 2 per cent a year, on class B buildings at 2½ per cent a year and C class includes brick walls, with or year.

Class A buildings are limited to those having a full steel frame, with concrete or brick walls and concrete or hollow tile floors and roof and fireproof partitions. The next class comprehends reinforced concrete structures, while the class B type includes brick walls, with or without a steel frame, and reinforced concrete buildings, in all of which the floors have wooden joists and the interior partitions are made up of wooden studs.

No estimate of the depreciation of frame buildings was given in the report.

Tentative City Planning Ordinance

A tentative ordinance for the creation of a San Francisco City Planning Commission was presented to the Welfare Committee of the city government last month. The ordinance has the approval of the City Architects, the Park Commissioners, City Engineer, City Attorney, Charles H. Cheney and others who are interested in the City Planning movement. The committee agreed to report favorably on the resolution of Supervisor Murdock that an appropriation be made to secure a date for San Francisco of a City Planning Exhibition which is being shown throughout the country by the American City Bureau of New York.

12-Story Skyscraper for Oakland

Architect C. W. Dickey of Oakland has returned from the East, where he spent several weeks acquainting himself with modern office building features, which he will embody in a 12-story skyscraper to be erected at the corner of Washington and Fourteenth streets, Oakland, for a syndicate of capitalists and business men, headed by C. J. Heesman, Alfred Kutner and A. L. Levinson.

More Honor for Architect Weeks

Architect William H. Weeks of San Francisco, who probably has designed as many, if not more, high-class school buildings in California than any other architect, has been commissioned to prepare plans for two splendid grammar schools to be erected in Santa Rosa at a total cost of $180,000.

THE
Architect and Engineer
OF CALIFORNIA

Member of California Periodical Publishers' Association and General Contractors' Association, San Francisco

Published Monthly in the interests of the Architects, Structural Engineers, Contractors and the Allied Trades of the Pacific Coast by the Architect and Engineer Co.

OFFICES
617-619 Monadnock Building, San Francisco
Telephone Douglas 1828
Builders' Exchange, Oakland

TERMS OF SUBSCRIPTION
(Including postage) to all parts of the United States $1.50 per annum; to Canada 50c additional; to all Foreign points $1 additional.

Vol. XXXVI. Feb., 1914 No. 1.

SUBSTITUTIONS

The architect who spends time in selecting the best and most permanent materials and then writes his specifications so as to open the door for cheap substitutes is little short of a weakling. The contractor plays the "or equal" to its logical conclusion. Better cut out these disturbing words and thus leave less to chance and the persuasive contractor.

EXCHANGES VERSUS INTERCHANGES

Whether Builders' and Contractor's Exchanges are a blessing or an evil is a question often agitated. The advocates plead that by interchange of information and ideas good results follow. The opponents say that the incentive for lounging during the business hours of the day and the temptations of the [illegible] room annex offset any good which might result from having general meeting plans. What say our readers?

WHO WILL HOUSE THE MULTITUDE?

With 300,000 Europeans booked for this port as soon as the canal opens and six times this number likely to land here within the next two years, the question of building for this army's residence and encampment offers an interesting problem. It offers an interesting problem. It opens up a future market for building supplies which should be foreseen and provided for. And it should set the banking interests to thinking. If somebody don't "loosen up" before long the crowds will be here and there will be no place to put them. San Francisco needs more hotels and apartment houses.

ESTIMATING AT LONG RANGE

Eastern manufacturers who do not establish themselves on the coast with more than a nominal agency often complain that they do not secure Pacific Coast business. It is but natural that an architect does not care to

San Francisco Society of Architects

Regular Meetings Second Wednesday of Each Month

PRESIDENT - - - - - - LOUIS C MULLGARDT
VICE-PRESIDENT - - - - - ALBERT PISSIS
SECRETARY AND TREASURER - - - - - CLARENCE R. WARD

BOARD OF DIRECTORS
L. C. MULLGARDT, ALBERT PISSIS, CLARENCE R. WARD, GEO. W. KELHAM and JOHN BAKEWELL, JR.

COMMITTEES:—
Membership—LOUIS P. HOBART, WILLIAM C. HAYS.
Architectural Practice—J. HARRY BLOHME, JOHN REID, JR., J. J. DONOVAN.
Entertainment—FREDERICK H. MEYER, JOHN BAKEWELL, JR., WILLIS POLK.
Allied Arts—HOUGHTON SAWYER, LORING P. RIXFORD.
Publicity—CHARLES PETER WEEKS, E. COXHEAD.
Education—JOHN G. HOWARD, BERNARD R. MAYBECK.
Competitions—ARTHUR BROWN, JR., JOHN BAUR.
Constitution and By-laws—GEORGE W. KELHAM, W. O. RAIGUIL.
Special Committee on Institute Membership—JOHN G. HOWARD, ALBERT PISSIS, L. P. HOBART.

The constitution and by-laws of the society are substantially those of the American Institute of Architects.

The society has voted not to increase its membership beyond the present number for an indefinite period. When the society decides to withdraw this temporary restriction, then, in accordance with the by-laws, any practicing architect or any architect engaged in architectural education or any architectural draftsman, over thirty years of age, will be admitted to membership if he can submit proofs of bis honorable personal and professional standing. The applicant for membership will require the approval of all the members, to be elected. The annual meeting takes place in June.

---

delay action until prices can come from a point three thousand miles away and then if a contract is awarded await still further delay before papers can be executed. We are judged by the confidence we have in ourselves and those manufacturers who appreciate the importance and possibilities of this section's trade and establish a branch or agency here with authority to act decisively on business from this territory, will gain both confidence and orders. If in addition they can warehouse stock here so prompt deliveries can be assured the results will be all the more certain.

HIGH BIDDER AND LOW BIDDER

Every so often we hear of a surprising difference of opinion as to the cost of doing a given piece of construction work and if the contract happens to be let to the low bidder frequent comments are heard as to just how the low man will "pull out." Recently bids were opened for the construction of one of the Fair buildings for the Panama-Pacific Exposition Company. The low bidder was $58,000 under the next lowest man and $145,000 under the highest bidder. At Berkeley a few weeks ago a contract was let to T. J. Shea of Los Angeles to construct a concrete sewer for $52,505.40, or $33,000 under the highest bidder. At a recent sewer letting in the East the prices of the low bidder amounted to $277,500, while the high man bid $542,400. In the last named case were two men, both of them experienced contractors, by the way, figuring on the same contract and their bids showed a difference of nearly 100 per cent. Which bid was right? If the work could be done at a profit at the prices named by the low bidder, then the high man would have made a remarkable clean-up. If the high bidder was right in his estimate the low man stands to suffer a heavy loss. Possibly, of course, the high bidder didn't particularly care whether or not he got the contract; possibly also the low bidder wanted the work badly, and for that reason was willing to take it at little profit. But this doesn't account for the 100 per cent difference in their bids.

The average of the total bids was about $383,000, and five of the bidders were below this sum. That the bid of the high man was excessive there is little doubt; that the low man bid too low remains to be seen. These incidents are cited only to show the difference of opinion of the contractors.

State, County and Municipal Engineering
Good Roads—Water—Sewers —Bridges—Fire Protection

Common Sense in Road Building

THE wide-spread interest in road building, which has developed during the past ten years, has brought forth a great mass of educational literature on this subject. The papers read before conventions and the books published, have all been helpful in making widely known the general principles of grading, drainage, foundations and surfacing. But this movement has had in common with the scientific management propaganda and other thoroughly commendable business reforms some theories advanced for general application which are not practicable. For instance, there have been laid down for the guidance of those building roads certain "standards" in construction. When these "standards" apply to the foundations of roads they are by no means applicable to all conditions of soil. A "standard" construction suitable in one place cannot sensibly be followed at all in another. In a recent number of the Scientific American, Mr. Charles E. Foote tells of a six-mile stretch of roadway being built in New York State which showed such a variation of conditions even in this short distance that it will be necessary to change the "standard" specifications if the work is done rationally. Mr. Foote then goes on to say:

"Why does it not occur to the engineers who make the cross-sections and prepare the plans, to except from the general foundation plan those stretches which require different treatment? The veriest tyro in the road-building business should know that the standard, as applied to the sand and gravel subgrade, will not be successful when applied to other soils. There must be carefully studied systems of underdrainage, to lower the level of the bench-water to a point below the frost line; or back drainage, to prevent seepage of moisture into the road foundation; or such other treatment as the condition may require, even if the stretch of road be not more than two rods in length. Besides, under any such conditions the field stone foundation course should give place to a solid course of evenly broken stone, rolled down, sanded or filled with stone dust, flushed, and rolled some more, so as to make a foundation worthy a good road.

"The one thing that may be standardized is the surface. Under present conditions of traffic the standards of today are likely to be obsolete tomorrow, even as the waterbound macadam road, the standard for a century or more, has virtually passed out of consideration in new construction.

"About the only materials available for road surfacing under present conditions are vitrified brick, broken stone with a binder of bitumen of some sort, and Portland cement concrete. By reason of the limited deposits of clay, which will make good road brick, and the expense of freights, the use of vitrified brick is confined to limited areas. Wherever it can be used economically brick makes a most excellent road surface.

* * * *

"Concrete of Portland cement with sand and either broken stone or carefully selected gravel as a mineral aggregate, is attracting much attention. Wayne county, Michigan, has put down a large mileage of concrete roads during the past four years, and the officials express themselves as entirely pleased and satisfied with the results. Recently a plan of putting on the concrete a surfacing, or mat, of bituminous material mixed with coarse sand or fine gravel has been adopted. This method has become sufficiently recognized so that it has been adopted for a large protion of the California State highway system.

"But these are merely the surfacings. The roadbed itself is the road. The surface can be repaired and replaced whenever necessary, as part of the upkeep. It can be standardized today, and the standards readily changed tomorrow if found necessary.

"In the same absurd ratio that the soil, climate, etc., must be standardized to enable a standard foundation to be made, must the traffic be standardized to permit surfacing standards to be established. Otherwise all standards must fail.

* * * *

"Therefore, while standards may be made for road surfaces which will meet present travel conditions, what certainty is there that the same standards will be available ten years, five years, or even one year hence? With the stresses on the roadway at least twenty-five times greater than they were ten years ago, what right have we to assume that ten years hence, either by changes and development in vehicular construction, or some new application of power, or the augmentation of traffic in some other direction, the stresses placed on the highways will not be twenty-five times greater than they are now?"

Concrete Road Building—Four Fundamentals

THERE seems to be four cardinal considerations in the proper construction of a concrete road:

A subgrade which is compact and well drained.

A concrete which has a mortar that binds firmly and an aggregate which is highly resistive to abrasion, so placed that these two qualities are most available where they are most needed.

Methods of curing which insure the fullest possible development of the strength of the material.

Joints in the work which are filled with an elastic material and so protected at the edges as not to break down under the impact of traffic.

SUBGRADE—The subgrade, the foundation, is of first importance—not merely because its preparation is the first operation, but because all the good work which may follow is seriously impaired by a neglect of what precedes it. The subgrade must be firm, compact and well drained. Cracks in concrete roads are more often the result of improper drainage in, or insufficient compacting of the subgrade, than anything else.

CONCRETE—Concrete must be sufficiently tough to resist the varied abrasive influences of traffic. The mortar in this concrete must be sufficiently strong so that the hammering of traffic—for even on a comparatively smooth surface there is, in a degree, a hammering action—will not dislodge the wearing particles in the surface. Nothing should be required of the mortar, in an ideally built road, but to keep the pebbles or the crushed stone in place. Mortar should not be called upon to resist abrasion, yet there should be sufficient mortar to make a perfect matrix for the stone. The stone should be hard enough to resist so far as possible the abrasion of traffic. To get these two qualities, a mortar which binds and a stone which wears, it is necessary that the material shall be hard, clean and well graded. All road builders will soon be convinced that the supply of gravel which is available nearest to the work is frequently an unsuitable material. A washed, graded material should be used. It is at once the most expensive and the cheapest. Occasionally nature has a deposit of material already washed and graded. Yet even nature cannot be depended upon to run true, all through the bank or the pit. In one-course work it has been found that a mixture of 1 part cement, 1½ parts sand and 3 parts stone (crushed or pebbles, ¼" to 1½") gives a satisfactory result under laboratory tests with stimulatd and accelerated traffic and under actual conditions of traffic wear. Experience has seemed to indicate that uniform hardness in aggregate is the thing to be desired. A few soft pebbles may start a hole just as one soft brick threatens the life of a large area of brick pavement. Though probably desirable, a one-course pavement is not essential. It is often possible to get sufficient aggregate of high quality for a top course when the price would be considered prohibitive for its use throughout the entire work.

The mixture as it goes into the work should be wet but not sloppy and be worked so as to secure density—a perfect matrix—and so finished as to make the mortar bind and the stone wear, at the same time securing a true surface, for any unevenness greatly accelerates the action of impact and abrasion.

CURING—The concrete, once laid, should be properly cured. It must not dry out rapidly. It must be covered from the sun and wind and kept wet during the early period of hardening.

JOINTS—The joints are still a moot question only in the sense that there is a growing disposition to leave them out of the pavement altogether. It may in time be found better practice to lay a pavement with no provision in the way of transverse joints for expansion and contraction and to maintain the joints which nature afterwards creates, than purposely to provide joints at the outset. Yet conservative judgment seems to be in favor of the creation of joints at predetermined intervals, 25', 30' or perhaps 40' and provision made in advance for their protection and maintenance. Inasmuch as this is being done satisfactorily at a moderate cost in the use of steel protective plates and an elastic filler, this practice undoubtedly should be followed until such experiments as those of the United States Office of Public Roads form a safe basis for different practice.—Cement Age.

Method for Cleaning Stone Work

A builder in Virginia had a contract involving the use of brick work with granite trimmings and he found it necessary to clean the stone work. He made the attempt with dilute acid, but it did not give satisfaction, although the stock brick around the trimmings cleaned up very nicely. The granite, however, still showed the streaks of dirt. He stated his case in a recent issue of The Painters' Magazine and the suggested remedy was as follows:

Builders' acid, which is equal parts of muriatic acid and water, will remove spots of mortar on brick or stone work, but is not the right material for cleaning stone that is begrimed from smoke and dirt. To accomplish this, apply to the surface, with a long-handled fiber brush, a strong solution of caustic soda or pearl ash. Let it remain on for about fifteen minutes, then wash several times with clear water, using a stiff brush or broom for the purpose. If this will not be effective enough, scrub the stone with a stiff fiber brush, using soft soap and concentrated lye and sand, allowing this to remain on the stone until nearly dry, then rinse with clear water, using a brush to remove the cleansing material. Protect your hands with rubber gloves.

"Quantity System"

An Ohio architect, referring to Architect Wright's remarks upon the quantity system as explained before the General Contractors' Association of San Francisco, writes: "I could underline every word you say." The president of an Eastern chapter, A. I. A., says: "I have long wished that the system you advocate might prevail, and I will gladly do what I can to bring that end about." The secretary of another chapter puts it this way: "It is my intention to suggest that a meeting of the chapters be devoted to a discussion of this matter." A New York architect, who has retired from practice, writes: "I agree to every word you say, the advantages are many to all concerned, and no doubt the system will be finally adopted." Another chapter secretary says: "I thoroughly agree with you and appreciate the need of reform, the system should eliminate mistakes, and ought to be an advantage to every one desirous of a square deal. I trust your efforts will find favor in all sections. I recall a remark made once by an experienced contractor to the effect that more contracts were awarded on a 'mistake' than on a fair correct bid, and I am inclined to believe it true."

The subject of the "Quantity System" has been suggested for discussion at the next meeting of the San Francisco Chapter, A. I. A.

The Butterfly Map

(From the San Francisco Chronicle.)

In March, 1910, the Chronicle published a full description of a new land map of the world on an original projection invented by Architect B. J. S. Cahill, and ventured the prophecy that San Francisco was destined to acquire added fame by reason of the fact that one of her citizens had made so important a contribution to cartography. The prediction has been fulfilled. Distinguished geographers in all parts of the world have expressed the conviction that the "Butterfly Map," as the Cahill device is popularly known, is certain to displace the familiar design of Mercator.

It may take a number of years before all the maps now in use are discarded as erroneous representations of the earth's surface. They are woeful distortions, but the cost of replacing them is an important factor, as is also the prejudice in favor of their simplicity. Mercator's diagrammatic representation makes Greenland far too large and Africa far too small, and it is wholly impossible for calculating the shortest distances between points, yet mankind having been so long accustomed to this faulty picture will not readily adapt itself to the novelty of the Cahill outlines.

Fortunately the leading educationalists are already persuaded that it is better to have truth, even if a little more complex, than simple error. At a first glance the new map is for all the world like a butterfly, but after gazing at it for some time one realizes that it is the only way of correctly picturing the earth as a flat surface. Cut an orange into four equal parts, remove the sections of skin, press them out flat, place them together so that the four points are equi-distant from each other and lie on the rim of a half-circle, and you have the outlines of the field on which is drawn the Cahill map. If your orange were a rubber globe correctly mapped and were cut in the same way you would have the completed design.

A number of fanciful poetic images have been drawn from the butterfly appearance of the new projection, but the most curious circumstance is that it gives the land three distinct points, Cape Town, Cape Horn and Tasmania, thus calling to mind Shakespeare's reference in "King John" to "the three corners of the world."

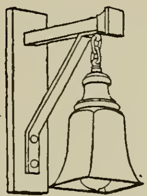
Though of absorbing interest to students, the average reader may ask of what practical value is the change. To this there are many answers, the most important of which is, probably, that supplied by Professor McAdie, who, in arguing for a rational projection for maps, points out that the Mercator distortion is absolutely valueless for charting storm areas.

As mankind from China to Peru is interested in the weather, it will soon be interested in the Cahill map when it is shown that no other is so well suited for meteorological purposes.

Banquet in Tower of Berkeley Campanile

The completion of the structural steel frame of the 300-foot campanile of the University of California was marked with a banquet to the forty workers who laced it together, served 240 feet above the base of the structure, by the California Construction Company. Three times the banquet was arranged for by Engineer George B. Sturgeon, in charge of construction, but each time the affair had to be postponed on account of inclement weather. It was necessary to send the food up to the top in a basket hoisted by a pulley.

The campanile will not be formally dedicated until it is finished in a sheath of white marble. It was provided by the gift of $200,000 by Mrs. Jane K. Sather, and the architecture is the design of John Galen Howard.



Heating and Lighting

Plumbing and Electrical Work

Decorative Periods Applied to Lighting Fixture Design

By F. N. COOLEY.

In this article which is also an appeal for correctness in fixture design, the author describes the various periods thus far utilized and the historical associations of each. Mr. Cooley is fixture specialist with the Western Electric Company, San Francisco.

TO THE casual observer, the detail, which is sometimes very carefully worked out in the design of lighting fixtures, is not always understood or appreciated The fixture itself may be composed of very fancy curved arms, ornate but meaningless cast scrolls and ornamentation and still attract the average person's eye. But to the keen eye of the designer or architect, or a person who has made a study of decorative periods, each leafed ornament, cast canopy, extension or scroll, should bring out some distinct meaning.

Space will not permit of a thorough review of all the various periods of decoration which are recognized by the architects and decorators, and such a review, while interesting from the artist's or historian's viewpoint, would be superfluous in this article, as but a small percentage of the many interesting periods are represented in the design of lighting fixtures.

We cannot go too far back, however, by commencing with the Grecian ornaments. Evidence of this style is commonly used in the cast mouldings on body bands, break ornaments and canopy extensions. Our fixture industry would be in a sad plight if we could not bring into frequent use the egg and dart moulding effect. This ornament was originated in the fifth century, B. C., and used with most success in the Erechtheion, which is considered the most beautiful monument of Grecian art.

It was during this period that the Doric, Ionic and Corinthian designs originated, so much in use now by our architects. The Grecian period was divided into four epochs. First, the mythical period, sometimes termed the Heroic Epoch, which terminated about 1104 B. C.; second, the Doric or Archean period, from 1104 to 470 B. C.; third, the Ionic period from 470 to 338 B. C., and fourth, the Hellenic period, from 338 to 146 B. C.

In Italy the Romans were dissatisfied with the simplicity of the Grecian designs and new designs sprung into existence there, called the Roman ornaments. These designs, however, embodied, for the most part, Grecian ornaments, but were greatly elaborated. Roman and Grecian designs became the standard of art and continued in prominence for many centuries.

In the 14th century the religious mysticism then prevailing found expression in a new design called the Gothic ornament. These ornaments were always expressions of harmony and are used for the greater part in the designing of our churches. The most significant emblem of the Gothic designs is the Gothic arch.

During the 15th century, about 1420 A. D., a great change in the social conditions occurred in Italy which consequently affected religion, science and art. This universal re-birth was called in Italy the Rinascimento and by the French Renaissance.

Designs of this period at first greatly resembled the Gothic ornament which had had such full sway, but as the years passed these designs grew more and more individual and gradually spread all over Europe. France was the first to adopt these new ornaments, and while the Gothic was slowy displaced by the new art, it took many years before it actually had full sway. This period is generally spoken of as the Renaissance period and is generally connected with the particular country affected, such as Italian Renaissance and French Renaissance and is divided generally into two epochs—early Renaissance, 1500 to 1550, and high Renaissance, 1550 to 1643.

The Renaissance period in Germany dates from about 1525 to 1620, as this country was very slow to adopt the radical changes from Gothic to the Renaissance designs prevailing in Italy and France. The oldest example of German Renaissance, however, dates back to 1492, when the portal of the Castle of Mahrisch-Trubau was erected.

The Renaissance period prevailed in the Netherlands between the years 1520 and 1621, but this class of art never reached the same height in perfection as did the Gothic designs.

Renaissance ornamentation gradually succumbed to a new and more elaborate decoration called Barocco ornament, and during the later Renaissance or Barocco periods the craze for more elaboration finally produced what is known as the Rococo design.

The Barocco period prevailed in most of the European countries during the 17th century and was known in France as Louis XIV style.

Barocco and Rococo design are in great evidence in the design of our modern lighting fixtures. Considerable criticism is due, however, to uninformed designers who make use of various casting patterns and pressed leaf stampings without due regard of their relations to each other or to the general period they are trying to emphasize. An instance of this promiscuous use of ornamentation reminds the writer of a prominently placed chandelier on which were counted six representations of distinct influences. There is an old saying that "what the people don't know won't hurt them," but to the architect or interior decorator these makeshifts of art are irritating, and it is the architects and decorators who pass on the fixture design, especially if some particular period is to be represented. On the other hand there are manufacturers of lighting fixtures who appreciate the importance of correct design and employ designers who are well informed on decorative periods. The designing of a fixture is the first step in its creation and should receive the consideration it merits. The balance of its creation, while of importance, is purely mechanical.

During the years of 1720 and 1755 the Rococo decoration, as it was called in Germany and Louis XV style in France, was under full sway, and it is safe to say that few other decorative ornaments have been so widely used in fixture designing. In France the Louis XV ornament lost all semblance to symmetry, so strong was the demand for elaboration of leaved effect.

The Rococco or Louis XV designs dissolve the lines in free curves not bound with each other, under strict avoidance of symmetry.

This style was rarely used in Italy or the Netherlands, but a style in England which was very popular at this time closely resembles it, called Chippendale style, named after Thomas Chippendale.

During the middle of the 18th century interest began to lapse in the flourishes and unsymmetry of the Rococo design, and the work of substituting classic quiet and simplicity began. As the second Renaissance took place during the reign of Louis XVI this style was called in France Louis XVI style, but was destroyed later, during the French revolution, as was everything else that reminded the people of monarchy. Louis XVI designs were replaced by the Empire designs which are used extensively at the present time in the designing of our lighting fixtures. These designs embody mostly festoons of leaves and flowers and the wreath tied at the bottom or top with a bow of ribbon. This last ornament has been used unceasingly in the design of gas keys and finial ornaments.

The Empire ornaments were used in most of the European countries during the end of the 18th century and were admired in art circles mostly for their elegant and purely classic architectural form.

While all these famous decorative styles were being created and subsequently discarded in the European countries, a new country was being born on the American continent. Naturally the United States at this time contained a representative class of artists, and it will be easily understood that art styles were intimate with the designs predominating in the original country of the artist, but after a time all these different styles became united with one another, forming themselves into the so-called Colonial style.

The old Colonial buildings erected in New England states in 1725 to 1775 correspond somewhat to the Queen Anne and King George styles in England, and notwithstanding the European characteristics which they contain, the artistic creations of the 18th century in America possess certain national traits of their own.

We find among the Colonial designs ornaments in hexagon and octagon patterns and as candles were extensively used in these pioneer days, the modern colonial lighting fixtures are equipped with imitation porcelain or enameled metal candles with frosted candelabra lamps to imitate the flame.

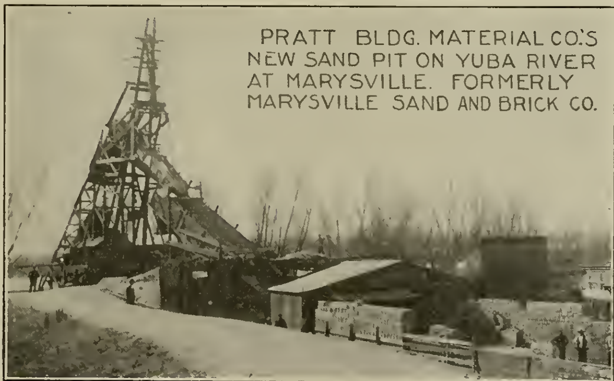
The relationship of Colonial designs can of course be traced directly to England and other countries, and in fact there apparently is nothing strictly original in decoration, as the ornaments of each successive period obtain their origin from the period directly previous. However, additions and elaborations being added from time to time gradually change the lines until the resemblance of a few centuries before is lost.

We find in the Colonial design a beading, commonly known as Colonial bead, which was used in Grecian architecture several centuries B. C. and the crystal pendant, the use of which is traced back as far as the 17th century.

Colonial styles embody in the most part long, sweeping, but symmetrical curves. These lines are emphasized in the designing of spun or turned spindles for use on arms or pendants in shower fixtures, while a lack of elaborate castings or scrolls is also noticeable in Colonial effects.

When Florida and the western country became settled and larger buildings erected, the inclination was naturally to resort to the Spanish Renaissance, and we still see plenty of evidence of this class of architecture in our California missions and even in the newer buildings on the old Spanish mission type. These styles, however, are strongly of the Gothic influences.

Since the lighting fixture industry is practically new, and owing to the many methods of support of the lamp itself, no set of rules could be laid down which would guide the designer to correct period lines. The fixture designer must therefore be a good copyist, and an originator only in his methods of applying his copied patterns into his creation of the lighting fixture.—Journal of Electricity, Power and Gas.



MARYSVILLE SAND, CEMENT BLOCK & BRICK COMPANY SELLS OUT

The Pratt Building Material Company of San Francisco who operate sand and gravel pits in eight or ten counties in California, have purchased the brick plant and sand pit of the Marysville Sand, Cement Block and Brick Company, located on the Yuba river levee near the D street bridge. Mr. G. E. Greene, well known in Marysville has been selected as general manager to look out for the interests of Mr. Pratt in Northern California. The new company will remodel the plant adding new machinery and will manufacture concrete fence post and irrigation pipe. The new company expect to ship 1,000 cars of sand per year. C. F. Pratt, President of the Pratt Building Material Company, says that Marysville river sand is by far the best sand for concrete work, plastering or brick mortar in the entire State. — From Marysville Daily Appeal.

Lincoln Highway Sentry Pump

The greatest monument ever erected in honor of any man is the Lincoln Highway, named in honor of our hero, statesman and martyred President, Abraham Lincoln. Extending across the continent from coast to coast, it stands a vivid example of the possibilities for the good roads movement and the automobile industry. This highway will soon be the convenience and comfort of the tourists, and towns and cities through which it passes may well consider themselves fortunate.

As has been the case in every other phase of gasolene and oil storage, S. F. Browser & Company, Inc., have come to the front with equipment designed for the convenience and comfort of the tourist or local autoist and which affords to dealers handling gasolene a fine opportunity to effectively solicit their business. The Bowser "Lincoln Highway Sentry" Gasolene Pump will be a welcome guidepost to those traveling the Lincoln Highway and an ever-ready source of pure, filtered gasolene, free from water and other impurities.

Autoists have long since learned that it pays to buy a good grade of fuel, of uniform quality, and have become accustomed to watch for the Bowser "Red Sentry" Gasolene Pump. Now, when they see the "Lincoln Highway Sentry" they will drive up with a renewed feeling of satisfaction, knowing that they will receive gasolene with all its original power-producing qualities, free from water and other impurities.

The garage or supply house which has this pump installed in front of its place of business will be known nationally as one link in the chain of gasolene supply stations covering the Lincoln Highway from the Atlantic to the Pacific.

The outfit is the Bowser Standard "Red Sentry" equipment, with the exception that the doors of the pump are an exact representation of the "Lincoln Highway" sign. It is equipped standard with meter, filter, discharge register, two-way nozzle, hose and portable nozzle.

The equipment will be sold only for use on the Lincoln Highway and for no other place.

San Francisco's Wonderful Building Record

The total amount of building contracts entered into in the city of San Francisco since the fire is $244,972,562. Buildings, however, erected within two years of the fire, when no contract price was named by the builder, but when all buildings were built on a percentage basis, cost 25 to 30 per cent more on the average than the original recorded contract price, and it is therefore estimated that the total amount expended for building operations since the fire is not less than $301,500,000.

The building figures for the past nineteen years are:

1895	$ 5,639,942
1896	5,621,442
1897	4,203,900
1898	3,490,603
1899	4,732,748
1900	6,390,705
1901	7,437,562
1902	14,289,938
1903	14,984,514
1904	16,916,118
1905	20,111,861
1906	39,254,467
1907	50,499,499
1908	35,128,549
1909	30,411,196
1910	22,873,942
1911	24,495,168
1912	26,269,006
1913	32,797,259

It is noted that the immense building impetus, beginning with 1906, reaching its climax in 1907, has gradually decreased until it can be said that the building operations of the past three years are practically down to the normal requirements of a large and growing city. The building operations for the past year were $32,797,259, while for the year 1905, just previous to the fire, they were $20,111,861. This year they will unquestionably run as high as $35,000,000.

By the Way

Some Industrial Information Worth the While

Copper Bearing Sheets and Tin Plates

The question of increased durability from sheet metal products is an important one, and it is quite natural therefore that the advent of copper-bearing sheets and copper-bearing terne plates, together with the convincing evidences of their superior service qualities, should awaken an intense interest on the part of buyers and users of these commodities.

The most practical and important developments along the line of improving quality, and the betterment of the products used by the sheet-metal trade, have been due to the efforts of the American Sheet & Tin Plate Co. of Pittsburg, Pa, which firm for a number of years has been making these matters a subject of diligent research, and has been conducting service tests of the various materials now in common use. The results of these tests are absolute and unequivocal, since actual time and weather determined the measure of service, and likewise the loss from rust and corrosion.

The acid test as a correct measure of corrosion is practically everywhere now regarded as an exploded theory, and has been relegated to the ash heap of abandoned "proofs." It is unreasonable to suppose that submitting a product for a few hours to a highly destructive agency should in anywise be regarded as a fair or conclusive proof of its durability when exposed to the elements. In contrast to this, the results of actual service tests have proven beyond disputation that many of the widely exploited materials, which were supposed to possess exceptional resistance to rust and corrosion, are in reality much less durable than copper-bearing steel under the same identical conditions of service.

It is an established fact that scientifically manufactured steel when alloyed with a certain percentage of copper, possesses remarkable durability and will resist corrosion and the action of the elements to a greater degree than ordinary steel without copper, or those products for which sweeping claims for durability are made, based on the alleged "purity" of the materials. It now appears that these products are largely dependent for any increased durability on their certain contents of copper rather than on their purity. This has been demonstrated repeatedly under actual service conditions, and also by careful analyses which disclose the fact that they all contain copper to a greater or less degree.

The working qualities of copper-bearing steel are likewise important. This material is softer and more ductile, and experience has proved it to be more satisfactorily worked when subjected to severe drawing or forming operations.

It is a logical conclusion, therefore, as a result of these findings, that copper-bearing sheets and copper-bearing terne plates are destined to fill a long-felt want in the sheet-metal trades. It has also been shown that these products are better adapted for the manufacture of roofing, siding, culverts, tanks, car roofs, and all exposed sheet-metal work, where durability and resistance to the deteriorating influences of weather and soil are highly important factors.

The only sure and certain measure of value for all sheet-metal products is service, and copper-bearing steel has unquestionably proven its superiority along this line. Then, too, the name is not fanciful or misleading, but clearly indicates the nature of the product—a feature that is appreciated by both buyer and user. In view of all developments, it is but fair to predict that the use of copper-bearing steel is but in its infancy, and as a material to meet general needs, it has come to stay.

It is a matter of note that many leading concerns have already recognized the truth of the claims made for copper-bearing steel and have adopted it for their requirements. Other users have been investigating and have conducted tests individually, but with practically the same results as obtained by the manufacturers. Notable among these are prominent railroad systems, stove and range manufacturers, culvert, tank and silo manufacturers.

Leading buyers and users have been thoroughly convinced of the superiority of this material, and its worth is further evidenced by the increasing demand for copper-bearing steel sheets, both black and galvanized, and for copper-bearing roofing tin. The manufacturers will gladly supply any metal worker or distributor with full and explicit information regarding copper-bearing steel, together with illustrations, tables and analyses of many exhaustive tests which have been conducted. It is to the interest of the trade to secure complete information on this important subject, since the merits of this material are now being everywhere recognized.

"The World's Best Anti-Corrosives"

This is how the Briggs' Bituminous Composition Company describe their coatings. Their success largely justifies a superlative description, for these well known solutions and enamels have been applied to the world's largest—Briggs' refrigerating plants, docks, warships, barges, steamers, structural steel frames, warehouses, etc. The preparations have proven to be perfect preservatives, withstanding the highly corrosive influence of moist winds, great vibrations, etc, and being vastly superior to lead or oxide compositions.

The Briggs Bituminous Composition Company have secured contracts for three new steamers for Messrs. W. R. Grace & Company built by Messrs. Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa.: SS. Santa Catalina, SS. Santa Cecelia, SS. Santa Clara.

Bunkers, coal chutes, tank top, inner bottom compartments, bilge well pockets, inner bottom plating—on these they supplied and applied their Bituminous Solution and Bituminous Ferroid Enamel.

At present they are are work on six barges for the Isthmian Canal Commission being constructed by the Maryland Steel Company at Sparrow's Point. Their Bituminous Solution and Enamel is being applied to bottom frames, bottom shell, bilge brackets, hopper coaming, hopper struts, bulkheads, trusses, etc.

They have done considerable work for the Lehigh Valley Railroad, Central Railroad of New Jersey, Lehigh-Wilkesbarre Coal Company, Erie Railroad, New York, Susquehanna & Western and other companies.

They recently secured a contract from the Grand Trunk Railway for the exclusive application of their Bituminous Solution and Enamel on the entire interior and exterior surfaces of wings, viz: Sides, top ends, bulkheads, trusses, etc., and all constructional angles, exterior underside bottom of wings on a large sectional dry dock, 22,000 tons capacity, which is going to be erected at Prince Rupert, British Columbia.

Also, they are doing considerable work in connection with structural steel frames, where the use of a good preservative is recommended by leading architects, who often specify Briggs' Tenax Solution.

J. & R. Wilson, 17 Steuart street, San Francisco, are the Pacific Coast agents for all of the Briggs' specialties, including Briggs' Ferroid Enamel, Briggs' Tenax Solution and Briggs' Marine Glue.

Paris Prize Competitions

A preliminary Paris prize competition was held by the various architectural clubs of the Pacific Coast on January 10th. The second preliminary competition will be held February 21 and the final will take place April 25th. Following is a list of coast cities having supervisors of the preliminary competitions:

Berkeley, Cal.—W. C. Hayes, University of California.

Los Angeles, Cal.—D. C. Allison, 1405 Hibernia building.

Ontario, Cal.—Wm. Taylor.

Portland, Oregon—E. F. Lawrence, Chamber of Commerce building.

Sacramento, Cal.—Geo. C. Sellon, 1005 K street.

San Francisco—Loring P. Rixford, Sharon building.

The National Competitions for the Paris Prize are organized for the purpose of choosing a scholar to pursue his studies in the First Class of the Ecole des Beaux-Arts of Paris, according to the regulations adopted by the French Ministry of Public Instruction and Fine Arts. If the winner of the Final Competition is unable to qualify according to these regulations, to the satisfaction of the Annual Committee on the Paris Prize of the Society of Beaux-Arts Architects within six months after the judgment of the Final Competition, then the prize may be allowed to lapse for the present season.

The Paris Prize scholar will receive $250 quarterly for two years and a half, dating from his arrival in Europe which shall not be later than seven months from the judgment of the Final Competition in Design. The competitions are open to all citizens of the United States under 27 years of age. No other qualifications are necessary.

State Buildings for the Exposition

Architect Albert Farr of San Francisco is preparing plans for an Exposition building for the Republic of Chile, Architect Phillip Schwerdt has finished the plans for a $40,000 building for Guatemala. Architect C. W. Dickey of Oakland has finished the plans for the Hawaiian Exposition building.

Architect A. F. Hyde of San Francisco has recently had his plans approved for the Washington State building and he will be ready to take bids in the near future, Architect Henry Hornbostle of New York, who designed the Oakland City Hall, is making the plans for the Pennsylvania State building to be erected at the Exposition.

Massachusetts will be represented at the Exposition by a magnificent State building in reproduction of the famous Bulfinch front State House on a somewhat reduced scale.

The general plan of the building, which is by Architects Wells & Dana of Boston, includes an impressive entrance hall, large registration, reception and reading rooms, together with executive offices on the main floor; a ladies' parlor, dining and tea rooms and a kitchenette and five bed rooms on the second floor and a large auditorium on the ground level in which will be shown moving pictures depicting the principal industries of the State.

Plastergon the Choice of the Fra

Fra Elbert Hubbard's Roycroft Inn at East Aurora, N. Y., has recently been all dolled up. Where the visiting elect partake of reflection—the state dining room, in fact—the walls and ceiling have been all done over, using Plastergon wall board.

To the builder, wall board has specially attractive features. First of all, it has added a very marked source of profit to his business, inasmuch as the walls and their coverings were formerly a distinct and separate part of the work, which only interested the builder from the point of view of how much money he would lose through the delays of the plasterers. Now, with wall board, the builder is interested in the walls and their coverings, from the point of view of how much money he can make by taking the plasterer's job into his own contract; and how much money he can save by having the building finished at the convenience of the builder, and not at the convenience of the plasterer. The builder is also interested in the fact that wall board being cheaper than lath and plaster, he is thereby enabled to make a lower bid for the whole job than can be obtained by the owner through separate contracts for building, plastering, decorating, etc.

Among the pioneer manufacturers of wall board is The Plastergon Wall Board Company of Tonawanda, N. Y., whose product has become thoroughly familiar to builders through their extensive advertising in the trade papers, the magazines and the newspapers. The enormous success which the product of this company has attained has proved beyond question the merit of Plastergon, while their up-to-date, progressive methods have won the favor of the trade.

The Plastergon Company claim certain features in their board, which merit the consideration of builders who are taking advantage of the opportunity for extra profit which wall board affords them. While these features are many, the one which principally interests builders, and which therefore includes all the rest, is that every Plastergon board is guaranteed to give absolutely satisfactory service. The price of Plastergon also is right.

Builders who realize the great profit-making possibilities of wall board will do well to communicate with The Plastergon Wall Board Company of Tonawanda, N. Y., or the Weston Barrel Company of San Francisco, and ascertain from them their prices, business-making plans, etc., which, together with samples of Plastergon, will be forwarded on request.

Art Glass De Luxe

One of the busiest places on the coast devoted to the production of artistic art and leaded glass of all kinds is that of Mr. Sylvain LeDeit, 124 Lenzen avenue, San Jose, California. A large number of the big planing mills of the interior of the State entrust all their special and art glass work to Mr. LeDeit. Nearly all of the work of Architects Wolfe & Wolfe, illustrated in this issue, shows more or less of the beautiful handiwork of this establishment. All of the art glass work in the T. K. Beard residence at Modesto, the Moorish residence of A. K. Macomber at Paicines, and the residence of P. Col was supplied by Mr. LeDeit. He is now getting his factory ready to start on the art glass work for the new Modesto Hotel. On this job he will supply all the art and leaded glass, all the prism work and some very elaborate art ceiling lights. Water color sketches will be supplied gratis to any one contemplating using art glass, be he architect, owner or builder. Mr. LeDeit's advertisement will be found elsewhere in these pages.

Exterior Finish and Damp Proofing—Liquid Stone

SINCE the recent heavy rains a question uppermost in the minds of many California architects, engineers, contractors and owners of brick, concrete and cement plastered buildings has been: Is there such a thing as a damp-proof paint that is really damp-proof? The damp-proof question is a thorn in the side of many an architect and engineer. They try this, that and the other thing with little or no satisfaction. Unfortunately, in obtaining the desired decoration of the exterior of a brick, concrete or cement plaster wall, frequently at the lowest possible cost, the proper methods are sadly neglected. For example, a "Damp-proof Paint" may be used that has magnesite as a base but is mixed with chemicals that take away its powers, or a "Damp-proof Paint" may be used that has animal or vegetable matter in it which oxidizes and deteriorates with exposure to weather, with the result that it will check, craze and rub off.

To get a proper coating for concrete and one that will be impervious to the conditions that will attack the coating, both from exterior forces and also from the concrete itself, it is absolutely necessary that the coating must not contain any pigment or oil that can not resist the saponifying action of the alkali and the extreme changes of weather. A coating to meet these requirements must necessarily, therefore, be a mineral product and one that really becomes a part of the concrete itself.

Combining decorative and protective qualities it is necessary for the architect to not only have in mind a material which will lend beauty but should have in mind a material that will insure service as well.

Cost plays a very important part in the specifications that are issued from an architect's office. The architect is often limited to a certain amount by his client, who wants all he can possibly get for his money, and as the painting is the last thing to be considered, a material is often used that claims to be "just as good" with the result of an unsightly looking building in a short time, and an extra expense in having the work done over.

It only takes a heavy rain, such as we have had for the past two months, to decide whether a paint is damp-proof or not.

The Liquid Stone Paint Company of San Francisco, California, have had their damp-proof paint tested in various laboratories throughout the United States, and it has been found capable of withstanding a pressure of 40 pounds to the square inch. This is a remarkable and a very convincing test for a liquid paint.

The manufacturers of Liquid Stone, through their untiring efforts, have brought their material up to a standard of absolute perfection, and if honestly and intelligently applied, will not only damp-proof a wall but will give it a beautiful finish as well.

Two coats of Liquid Stone on a concrete wall that has been finished with cement plaster, will give that wall a stone finish with an enamel glaze that has the appearance of terra cotta.

Cement plaster exterior for private dwellings and apartment houses are on the increase in this part of the State. In the southern part of California cement plaster houses are quite numerous, and Liquid Stone has been used to a great extent on these buildings, damp-proofing them as well as giving them an ideal finish.

This California product is attracting the attention of material men throughout the United States and foreign countries.

Why Germany Won't Exhibit

(American Machinist.)

IT should be most emphatically pronounced that the reasons for the German Government's attitude toward the San Francisco exhibition are not to be found in politics. They are of a matter-of-fact kind and purely commercial. The balance sheet of German trade with the United States has not been and is not considered at all satisfactory, and there is little confidence that the new American tariff will produce any improvement. Besides, the German exhibits at Chicago and St. Louis were a failure as far as material results are concerned, says a Berlin correspondent in the "American Machinist."

The decision of the German Government in this matter, as in all exhibition matters, is not wholly based on its own finding, but largely influenced by a semi-official body, the "Permanent Committee on Exhibitions." This committee was formed originally to investigate all exhibition propositions, public or private, to give due warning to industry of exhibitions of a doubtful and shady character, and generally to point out to the public such exhibitions as it would be considered inadvisable to take part in. These negative functions of the committee have in the course of time been converted into positive ones and on this committee nows rests more or less all the responsibility of official decisions in exhibition matters.

German industry is not so much tired of exhibitions as prejudiced against them. This prejudice is specially strong in the case of big general exhibitions and loud voices have been heard during the last decade declaring such exhibitions to be devoid of all practical importance. This opinion has been pronounced so repeatedly and was backed by such impressive statistical data, that the German industry, as far as it has preserved any interest in exhibitions at all, is strongly in favor of small speciality or branch exhibitions.

It is widely known that urgent persuasion has been used by the government to move the heavy steel and iron corporations in the matter of the two great exhibitions of past years at Brussels and at Turin, both important market places for German products and easily reached without great trouble and expense. In spite of this persuasion, the results were not nearly what the government desired.

A comparison of distance of those places on the one side and San Francisco on the other side should alone be sufficient to gauge the result of governmental intervention in the matter of the Panama Exhibition. No wonder that the German Government has not even made a feeble attempt in this direction, especially as the government itself was rather undecided.

Good Roads Stimulate Traffic in California

The influence of good road construction upon increase in traffic is strikingly shown in figures compiled by the California Highway Commission relating to the increase of the number of motor trucks in Los Angeles county since the 300 miles of improved county highway began to be available in that section. Since December 31, 1909, when the good roads agitation began to crystalize into construction in Los Angeles, motor trucks in that county have increased as follows: Number in use December 31, 1910, 64; on December 31, 1911, 985; on December 31, 1912, 1880; on December 31, 1913, 3100 or more.

As the improved highways have been built for greater distances out of Los Angeles the delivery zones have been steadily widened. Business houses whose heads testify that at one time they refused to make deliveries as far out as Jefferson and Main streets in Los Angeles, a distance of some forty blocks, now make delivery trips daily to the beach and foothill cities nearby. Reguiar truck hauls are made from Los Angeles to Santa Monica, Long Beach, Whittier, Pasadena, San Bernardino, Pomona, Riverside and other cities fifteen to sixty miles distant. In some instances owners of trucks have made hauls at rates practically equivalent to the shorthaul rates of the steam and electric lines.

A feature which will be developed by state highway construction, in the opinion of motor truck experts, is the use of motor truck trains, in which tractors will pick up trailers at different ranches to haul products cheaply to the centers of population.

Heath & Milligan Specialties

Architects who wish "tried and proven" paint specialties will do well to specify "Heath & Milligan's Cement Coating," "Heath & Milligan's Railway White Lead" and "Heath & Milligan's Flat Interior Wall Finish." These are warehoused in San Francisco and can be supplied immediately. Write or call up their San Francisco branch, 665 Howard street, San Francisco (Kearny 3966), and samples and additional information will be furnished.

Class A Building

Architects Parkinson & Bergstrom, 1035 Security building, Los Angeles, are preparing working drawings for the 12-story and basement class A bank and office building to be erected at the northeast corner of Spring and Fifth streets for the Commercial Fireproof Building Company. The first story will be occupied by the Citizens National Bank and the upper stories will contain 462 offices.

WHAT MAKES IRON RUST?

No. 2

IF YOU attempted to make an ordinary voltaic cell or electric battery, using two pieces of iron for electrodes, you wouldn't get any action because there would be no electrical difference between the two plates.

¶ If you substituted copper for one of these plates, electro-chemical action would begin immediately.

¶ In the same way, in a sheet of absolutely pure iron no rusting (auto-electrolysis) will take place, because it is all of one substance.

¶ AMERICAN INGOT IRON approaches this ideal more nearly than any ever placed on the market.

American Rolling Mill Company

American Ingot Iron (Armco Brand)

Roofing, Siding, Sheets, Plates, Pipe, Gutter and Terne Plate

MIDDLETOWN, OHIO, U. S. A.

William Curlett & Son, Architects

PHELAN BUILDING
SAN FRANCISCO

An Undercoating and Enamel Finish of High Quality

(Contributed.)

Attention is called to the practical results and beautiful finish obtained by the use of Bass-Hueter's Gold Seal Flat for undercoatings and Gold Seal Enamel as a finish.

The increased demand for high-grade enamels caused the Bass-Hueter Paint Company to make extensive laboratory tests with a view of supplying the trade with an undercoating and enamel finish equal to any manufactured, and practical comparative tests have demonstrated that the Gold Seal, both flat and enamel, is equal to anything manufactured and superior to most.

CITY AND COUNTY HOSPITAL GROUP, SAN FRANCISCO

Many of the architects are now specifying Gold Seal in preference to any other enamel. Many of the large buildings on the coast have been, and are to be done with Gold Seal. A large quantity of both Gold Seal flat and Gold Seal enamel was used in finishing all the woodwork throughout the new City and County Hospital of San Francisco. It is done in a light ivory tint, rubbed down, and the result is most pleasing.

Used as directed, this enamel is absolutely guaranteed against cracking or crazing. It is a safe statement to make that there is probably more Gold Seal enamel used on the coast than all other enamels combined.

The Bass-Hueter Paint Company's well equipped and modern plant is kept running to its full capacity manufacturing this enamel, special wall finishes, concrete paints and their full line of strictly pure colors in oil and paint specialties.

Herewith is shown a view of the Phelan building finished throughout with Hueter's best architectural varnish—Interior Durable. This varnish is almost invariably included with other high-grade architectural finishes by the architect acquainted with the reputation of the material. There is nothing nearer perfect than Hueter's Interior Durable. It is pale in color, tough, and can be rubbed or polished, as the case may be.

The Hueter varnishes have been manufactured on the coast since 1857, and are in every respect standard.

The Bass-Hueter Paint Company and the San Francisco Pioneer Varnish Works are glad at all times to be consulted in regard to any interior or exterior painting and finishing. They carry a large stock at their various branches—Los Angeles, Portland and Seattle.

C. A. P. Turner Wins Decision

The decision just rendered in favor of the defendant, C. A. P. Turner, in Equity Case No. 1083, in the U. S. District Court, is of interest to all engaged in the building business, says the Improvement Bulletin of Minneapolis, Minn.

Nearly seven years ago the first successful flat slab and column construction was completed in the city of Minneapolis, designed by C. A. P. Turner, of this city, and erected for the John C. Johnson Wholesale Grocery Company. This building was the turning point in the history of reinforced concrete construction in the development of a new and wonderfully popular type of building of which Mr. Turner himself since that date has designed over 2,000 structures scattered throughout the United States, Canada, Australia, India, Porto Rico, Holland, etc.

In the early development of this novel construction, engineers did not believe it could carry the dead weight of the materials of which it was made, to say nothing of additional loading, on account of the new and novel principles involved in its construction, so that the building department of the city of Minneapolis refused to issue a permit for the first building except as a permit for an experimental building. Its original introduction in 1907 was due to the foresight of Mr. Charles A. Bovey and his

The Question of Floors

THE OFFICE FLOOR

Here is shown the largest office in the largest and best known office building west of the Hudson River, probably the largest undivided office in the World. This building was erected and is occupied by a corporation known for its economy. It was designed by an Architect that has designed more business buildings than any other Architect in the World.

The floor is of Nonpareil Cork Tiling. Why? Because it is soft, silent, non-absorbent, sanitary, odorless, fireproof, comfortable to work on; it is elastic and cannot open or crack; it is durable; its net cost per year of service is less than any other floor. At least this Architect and this Corporation were so convinced. So were the Architects and Owners of the Bankers Trust Building and the Woolworth Building, the two best known office buildings being erected in New York today.

The Nonpareil Cork Tile Floor illustrated above covers 20,000 square feet in Acconnting Department of the People's Gas Bnilding, Chicago, D. H. Bnrnham & Co., Architects.

Specification

Cork tiling, like any other material, should be of a certain standard.

To secure this standard write us for Standard Cork Tile specifications, or specify NONPAREIL CORK TILING.

See Sweet's Catalog.

Nonpareil Cork Tiling—The Ideal Floor

DAVID E. KENNEDY, Inc., Sharon Building, San Francisco

Distributors for the Armstrong Cork Company

Write our nearest office for Catalog D and Samples.

BOSTON CHICAGO PHILADELPHIA PITTSBURG ST. LOUIS MONTREAL ATLANTA

son, Mr. Wm. Bovey, C. E., superintendent of the Washburn-Crosby Milling Co., to whom the matter was referred after consultation with the inventor and Mr. Fred Johnson.

In 1908 Mr. Turner designed the reinforced concrete work of the huge eight-story building for the John Deere Plow Co. at Omaha, Neb., the Leonard Construction Co. being the contractors, and Turner furnished a bond in the sum of $50,000, guaranteeing the strength of the construction. Mr. Turner subsequently designed a building for the Velie Motor Vehicle Co. for the same contractors at Moline, Ill.

In the mean time the application for the patent had been pending for several years, and two interference proceedings were being fought out in the patent office with those with whom the original inventor had started in the reinforced concrete business, and for whom he had designed buildings of this type. These interference proceedings kept the basis patent tied up in the patent office for a period of seven years, when it was finally issued in September, 1911.

The non-appearance of the broad patent during this long period of time led to the assumption by many that Mr. Turner never would secure a patent and imitators and infringers sprang up on every side.

The decision just rendered by Judge Charles W. Willard sets at rest pretended claims of Mr. Turner's imitators, who hold the title by purchase for an inconsiderable sum, of the so-called Norcross patents. It sets at rest for all time any contention that the Turner construction is not original, and that the Turner patents and claims are not basic.

This sweeping decision of Judge Willard will unquestionably place all imitators of the well-known mushroom system in the position where they will be forced to give bonds against infringement, as Mr. Turner is rigidly prosecuting all infringers, having in his employ at the present time five of the best known and most able firms of patent attorneys in the United States.

Minneapolitans can well take some local pride in that in their home town has originated this new and novel type of construction which has so completely revolutionized the construction of heavy buildings throughout this and other countries, a type of construction which all at present engaged in the reinforced concrete business have been forced to imitate in order to receive any consideration in the competitive field where the many advantages of the flat ceiling are appreciated and its wonderful economy well known.

The Turner system is represented in San Francisco by the Industrial Engineering Company, Clunie building.

Varnish and Satisfaction

Successful builders are building more than houses. They are building reputations.

It is the satisfied customer who spreads the good word around and sends new trade to the builder who has really pleased.

To do a bum job and then run may get the money once, but it doesn't last long. Good work, good materials, honest methods and fair profits are the only means of lasting success.

Of all the materials that enter into the making of a residence, there is none more important than varnish, judged from the standpoint of the owner's satisfaction with the finished work. A hardwood floor may be of ever so beautiful a grain and laid in the most tasteful pattern, but if poor varnish is used over it, the floor is entirely spoiled.

If a varnish refuses to dry, but stays tacky; if it proves to lack toughness and strength, so that it mars easily; if it becomes brittle, easily cracking; or if it is softened or discolored by water—a poor, unsatisfactory floor is the result. The owner is never satisfied and he holds a grudge against the builder, even though the builder may not himself have done the varnishing.

Floor varnish has to stand the racket. It has hard work to do, and must be especially qualified if it is to do it satisfactorily. Not every varnish will do for finishing floors.

Some of the leading varnish makers have given an astonishing amount of study to this floor varnish question. The work of Berry Brothers, Inc., along this line has been notable. For fifty-five years they have been making varnishes. They have produced a floor varnish known as "Liquid Granite," which they guarantee to be water-proof, mar-proof and sanitary. Floors finished with it are safe from snow and water. Heavy blows won't crack it, and washing with soap and water does not affect its appearance, except to clean and brighten it up.

Berry Brothers make several other special varnishes also. Their "Luxeberry Wood Finish," for instance is what they recommend as the best for the finest rubbed or polished finish on interior woodwork.

Here is one dealer's experience with Berry Brothers' varnishes:

North Battleford, Sask., Sept. 10, 1913.

Berry Brothers, Detroit, Mich.

Gentlemen:—We are in receipt of yours of the 5th, giving us contract which you will find signed and enclosed.

We are greatly pleased with the sale of your goods this season, also with the results they have brought us.

We carry two lines of varnishes, namely, Pratt & Lambert and Berry Brothers, the former we are dropping at the end of this season, as we have found Berry Brothers Varnishes move five gallons to one of the other make and in no case have we ever had any complaint against your goods. Yours very truly, MUNRO & SON.

OUTSIDE VIEW OF INDOOR-OUTDOOR BED

An Indoor-Outdoor Bed

"IF only we could afford to have a sleeping porch!" How often one hears this lamentation from those whose homes, built years ago, were not equipped with the popular out-of-door bed room It is only within the last five or six years that the sleeping porch has come into general use, hence the houses put up before that time have no porches. To build one or more would mean to change the architecture of the house very materially and the cost would be no small item. The sleeping porch for the new home also means an added item of expense and some folks consequently are compelled to do without.

But the problem of out-of-door sleeping without the necessity of building a porch has been solved by the California Fresh Air Bed Company of 166 Geary street, San Francisco, which is manufacturing an indoor-outdoor bed—a bed that can be used like any other bed—in your sleeping room—or can be moved outside in a twinkling with all the benefits of a sleeping porch.

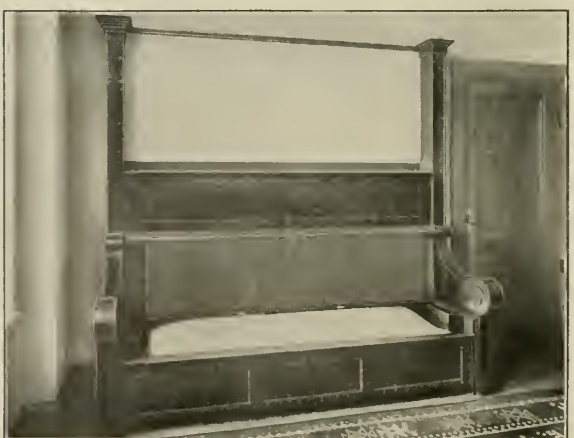
As the reader can readily see from the illustrations, about one-third of the bed is concealed under the seat of a davenport in the room proper and the rest in an alcove-like addition extending outside about two and one-half feet. The dome-shaped wall of the alcove revolves and by simply swinging it over to the inside, the occupant of the bed finds himself out in the open, protected by a heavy wire screen and an adjustable storm-proof curtain. By reversing the operation, the bed is really inside again—just as much so in fact, to all intents and purposes, as any other article in the room, thereby making it possible for one to retire to his room, sleep in the life-lengthening fresh air all night and arise in the morning, again in the warmth and comfort of his own room.

This indoor-outdoor bed can be aired all day and yet be concealed. It can be used as a three-quarter fresh air bed and as a davenport at the same time. There is no other built-in bed that can be used and yet be concealed. It takes up less room space than any other bed on the market. It is endorsed by architects and recommended by physicians.

The bed can be installed at a very small cost in houses already built, and the number of new houses being erected every month with provisions made for this open-air bed is surprisingly large.

The company also manufactures to order a special fresh air bed which is undoubtedly one of the greatest conveniences devised for hospital or sanitarium use. In this bed there is no necessity for concealment and, therefore, the davenport feature is eliminated, but the revolving-dome-wall is used, which not only makes it possible to instantly change a patient from indoors to outdoors (or vice versa), but also practically makes every cot a room by itself.

INSIDE VIEW—BED CLOSED,
USED AS DAVENPORT



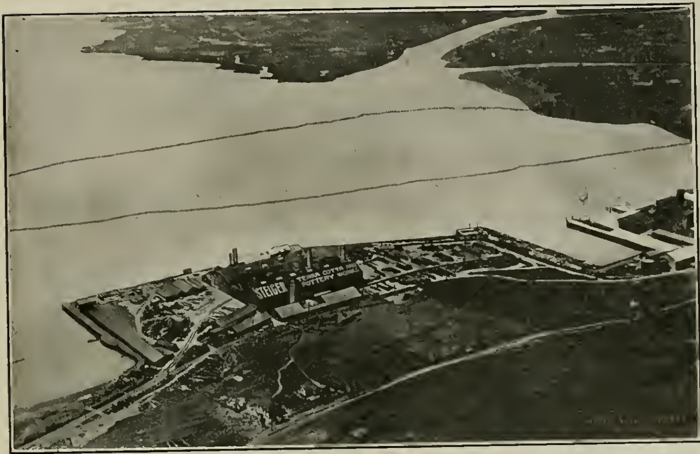
SEAT RAISED,
SHOWING PART OF BED

COMPLETELY OPEN, REVEALING FULL SIZE
DOUBLE BED AND REVOLVING WALL

REVOLVING WALL TURNED INSIDE,
LEAVING OCCUPANT IN OPEN AIR,
AS SHOWN IN FOLLOWING ILLUSTRATION

OUTSIDE VIEW, SHOWING
ADJUSTABLE STORM PROOF CURTAIN

SHOWING ARCHITECTURAL EFFECT
ON CEMENT BUILDING



*AEROPLANE VIEW OF
STEIGER TERRA COTTA & POTTERY WORKS
SOUTH SAN FRANCISCO*

The RU-BER-OID Man And His BOOK ON BUNGALOWS

For the Architect or Contractor

Illustrated with Actual Photographs, Showing Floor Plans and Giving Approximate Costs

MADE IN CALIFORNIA U.S.A.
REGISTERED

Southern California Bungalow Showing a Beautiful **RU-BER-OID** Roof.
These Roofs come in Red, Green, White and Slate Colors.

TRADE MARK
REG US PAT OFFICE

Ask Us for a Copy of this Book on Bungalows

—— IT IS FREE ——

Let Us Help **YOU** with **YOUR** Roofing Problems —

Our Motto is — **"SERVICE."**

The Lilley & Thurston Co.

Rialto Building, San Francisco

Graham & Jensen Move Offices

The well-known contracting firm of Graham & Jensen have moved into larger and more convenient offices at 415 and 416 Mashey building, 46 Kearny street, San Francisco.

This firm is now engaged on the construction of the new reinforced concrete $50,000 high school at Orland, Cal., W. H. Weeks architect, also extensive alterations to the Portuguese-American Bank building in this city. These gentlemen have erected some of the best buildings in the city of Willows within the past year or two, among which are the City Hall, Masonic Temple and Glenn County Savings Bank.

Bakersfield County Jail

The Supervisors of Kern County, California, will receive bids up to April 6th for the construction of a two-story and part basement Class "A" county jail building at Bakersfield. The plans were prepared by Architect Orville L. Clark of Bakersfield, and the estimated cost of the work is $150,000. Separate bids will be taken for the plumbing, heating and cell work.

To Move Building

Nichols & Handley, whose record in moving the High School building from the present Civic Center site has been so successful, have taken a contract to remove the High School at Olympia, Wash.—a concrete building 76x112 ft. and 3 stories high.

PROPOSALS FOR BRICK COTTAGE-DORMITORIES. Department of the Interior, Office of Indian Affairs, Washington, D. C., February 2, 1914. Sealed proposals, plainly marked on the outside of the sealed envelope: "Proposals for Brick Cottage-Dormitories at Pueblo Bonito Indian School, New Mexico," and addressed to the "Commissioner of Indian Affairs, Washington, D. C.," will be received at the Indian Office until 2 o'clock p. m. of March 19, 1914, for furnishing materials and labor for the construction of three brick cottage-dormitories at the Pueblo Bonito Indian School, New Mexico, in strict accordance with the plans, specifications and instructions to bidders, which may be examined at the office of the paper or periodical in which this advertisement appears, the U. S. Indian Warehouse at Chicago, Ill., St. Louis, Mo., Omaha, Nebr., and San Francisco, Cal., and at the Pueblo Bonito Indian School. For further information apply to the Superintendent of the Pueblo Bonito Indian School, Crownpoint, New Mexico. Cato Sells, Commissioner.

PROPOSALS FOR ADDITIONS TO TWO STONE DORMITORIES. Department of the Interior, Office of Indian Affairs, Washington, D. C., February 3, 1914. Sealed proposals, plainly marked on the outside of the sealed envelope: "Proposals for Additions to two Stone Dormitories at Western Navajo Indian School, Arizona," and addressed to the "Commissioner of Indian Affairs, Washington, D. C.," will be received at the Indian Office until 2 o'clock p. m. of March 23, 1914, for furnishing materials and labor for the construction of additions to two stone dormitories at the Western Navajo Indian School, Arizona, in strict accordance with the plans, specifications and instructions to bidders, which may be examined at the office of the paper or periodical in which this advertisement appears, the U. S. Indian Warehouses at Chicago, Ill., St. Louis, Mo., Omaha, Nebr., and San Francisco, Cal., and at the Western Navajo Indian School. For further information apply to the Superintendent of the Western Navajo Indian School, Tuba, Arizona. Cato Sells, Commissioner.

Factory Building of The American Paint & Dry Color Co., 414 Ninth St., just recently completed, Welsh & Cary, Architects,

Manufacturers of ALVALINE WASHABLE WALL FINISH and CEMENTOLINE DAMP PROOF PAINT.

AMERICAN PAINT & DRY COLOR CO.

Phone Market 113 ***414 Ninth Street, San Francisco***

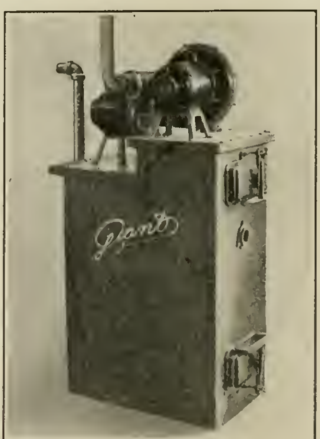
Some recent buildings finished with our products: Gantner & Mattern Factory Building, 10th and Mission; Livingston Building, Geary and Grant Ave.; Phelan Building, Market and O'Farrell.

GIANT

A moderate priced Air Cleaning System which is designed at a small cost to aid you in having a modern home. This can be installed in houses already built or those under construction. Thoroughly guaranteed, manufactured under our own patents and installed directly by the manufacturer who has had years of experience in large and small stationary plants.

Send for descriptive circulars and list of purchasers. Advice cheerfully given. Consult our engineering department.

Giant
SUCTION CLEANER COMPANY



Third and Jefferson Streets - Oakland
731-33 Folsom Street - San Francisco

Master Painters of California Guess the Flaxseed

The proceedings of the California Master Painters' Convention in Stockton, January 22d, 23d and 24th, were enlivened by a novel contest arranged by Mr. Peterson of the Moller & Schumann Company.

A glass jar partly filled with flaxseed was on display in the Convention hall. A large sign announced that every person attending the convention was entitled to one guess as to the number of flaxseed contained in the jar. To stimulate the guessing, prizes of M. & S. Co. products were offered.

After everyone had registered their guess, the flaxseeds were counted by a committee of the delegates, and the prizes awarded.

First Prize—One gallon "Molmanite," to the Reliable Painting Co., S. F.

Second Prize—Half gallon "Hilo" Marine Spar, to M. Cohn & Co., S. F.

Third Prize—Quarter gallon "Hilo" Flat Finish to A. Blumert & Co., Oakland.

Visitors to the convention all entered into the spirit and fun of the occasion, and voted Mr. Peterson the privilege of the floor for a speech.

A fine display of finished panels—Californian and in other woods—was exhibited by Mr. Peterson at his headquarters. These panels proved of considerable interest to the delegates.

Another of the Architect's Troubles Removed—The Concrete Painting Problem

Buildings of porous masonry construction such as concrete, brick, stucco, etc., give the greatest trouble when being painted by reason of their porosity and the presence of free lime and other alkalies. Such surfaces absorb more or less water, the presence of which causes the paint to decay and decompose. By sealing the pores with a strongly adhesive, penetrating and alkali-proof liquid, an impervious condition of the surface is obtained, which at the same time becomes hardened and consolidated, presenting an ideal surface for the initial coat of paint.

To meet the demand for a material of this nature the Muralo Company of New Brighton, New York, which manufactures concrete cement coating (see page 27) have recently placed Concrete Liquid Sealer on the market. This material is to be applied before the paint and is particularly adapted to meet all conditions incidental to concrete painting, rendering the surface impervious and imparting thereto an admirable condition of solidity and uniformity, over which the paint can be applied with perfect results.

Samples of the material are at the disposal of any architect.

Permanency in Building Construction

The Brick Builders' Bureau of San Francisco is inaugurating a publicity campaign in the interest of brick as a building material. The work of the Bureau is under the direction of N. Ellery, former head of the California State Engineering Department. We are in receipt of a copy of the second volume of their "Album," entitled "Permanency in Building Construction," and presenting sixty-one reasons why brick and steel construction should be used. The book is a large volume of expensive and high-class work, made up almost entirely of half-tones, and contains reproductions of many of the finest buildings in San Francisco and a few from other cities. There are in all over 100 half-tones.

Redwood Shingles

The Redwood Shingle Association, with main offices at Eureka, California, are planning a very extensive campaign for the advancement of the shingle industry. Their San Francisco offices are located in the Welsh building, 244 California street. Mr. J. C. Arthur has charge of all publicity matters and a vigorous selling campaign is being inaugurated under the leadership of Mr. E. Layton. The merits of redwood shingles of the better grades are well known among California builders, and no better roofing material is known.

Napa Store Building

Architect L. M. Turton of Napa has completed plans and will shortly award a contract for the construction of a 2-story class C store and office building for W. H. Young of Napa. The estimated cost is $12,000. Mr. Turton has also made plans for a bungalow for himself.

JENKINS BROS.

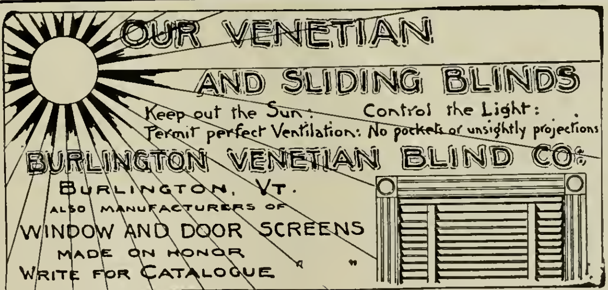
Practical, Quick Opening RADIATOR VALVES

Designed for Atmospheric Vacuum Return Line and Vapor Systems. Has graduated opening arrangement which prevents cutting of seat and disc. Opens full way in less than one turn. Steam can be supplied to part of the radiator if desired. Made from ***Jenkins Bros.*** Standard Pattern and fitted with genuine Jenkins Discs.

JENKINS BROS.

247 Mission Street
SAN FRANCISCO, CAL.

300 West Lake Street
CHICAGO, ILL.

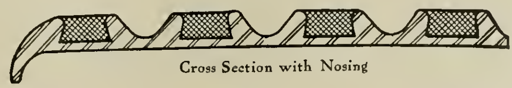


Agencies for California C. F. WEBER & CO., 365 Market St., San Francisco and 512 So. Broadway, Los Angeles. Agents for Oregon, Washington and Montana, NORTHWEST SCHOOL FURNITURE CO., 244 Third Street, Portland, Ore. and 113 South Jefferson Street, Spokane, Wash.

MASON SAFETY TREAD

THE STANDARD STAIR PROTECTION *for*

Schools, Factories, Railroad Stations, Stores and all Good Buildings



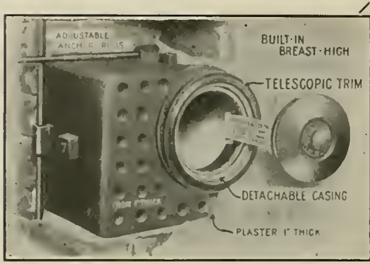
Cross Section with Nosing

C. Jorgensen & Co., San Francisco and Los Angeles
Nelson Martin, San Diego

Timms, Cress & Co., Inc., Portland
F. T. Crowe & Co., Seattle and Tacoma
Charles F. Porter, Salt Lake City

AMERICAN MASON SAFETY TREAD CO., Mfgrs.

SUNSET PUBLISHING CO., SAN FRANCISCO
(HY-RIB Exterior Walls)



Indispensable for Up-to-date Apartment Houses

Lowrie Wall Safe

Absolutely Burglar and Fire-proof

Weighs 100 pounds. Occupies no floor space and is easily concealed by any small picture or calendar.

The Lock is a **three number combination.**

San Francisco Agents

C. ROMAN CO.

173 Jessie St., opposite Builders' Exchange

STEEL FURNITURE and FIXTURES

FILING CASES, STORAGE CABINETS, ROLLER AND PLAIN SHELVING, ETC.

A complete line of Steel Furniture for Court Houses, Banks, Office Buildings and general usage.

Requirements figured and preliminary drawings and estimates furnished free of cost to Architects and Buyers. Send us your specifications.

Metal Furniture Department **THE KEYLESS LOCK COMPANY** INDIANAPOLIS, INDIANA

A. KNOWLES

Metal Furring, Plastering and Decorations

Phone Douglas 3451

985 FOLSOM ST. SAN FRANCISCO, CAL.

Specialist

in

"CAEN STONE"

Folded back during day Locked at night

Make your home an absolutely safe sleeping porch by equipping your lower floor and porch windows and rear doors with

The ASHLOCK Steel Folding Burglar-Proof Door and Window Guards

ARCHITECTS PLEASE SPECIFY

Office and Salesroom:

295 Monadnock Bldg., San Francisco

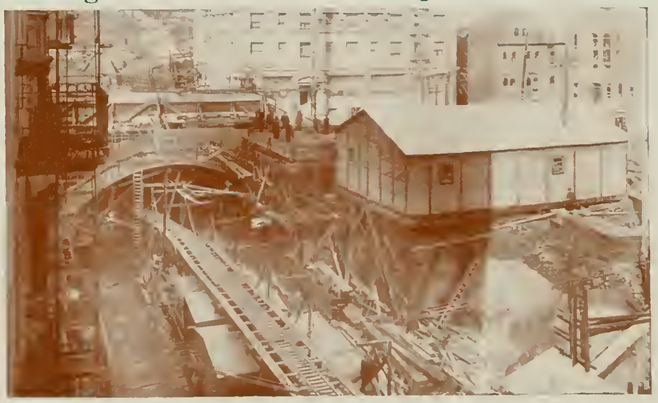
Telephone Sutter 661

THE ARCHITECT AND ENGINEER OF CALIFORNIA

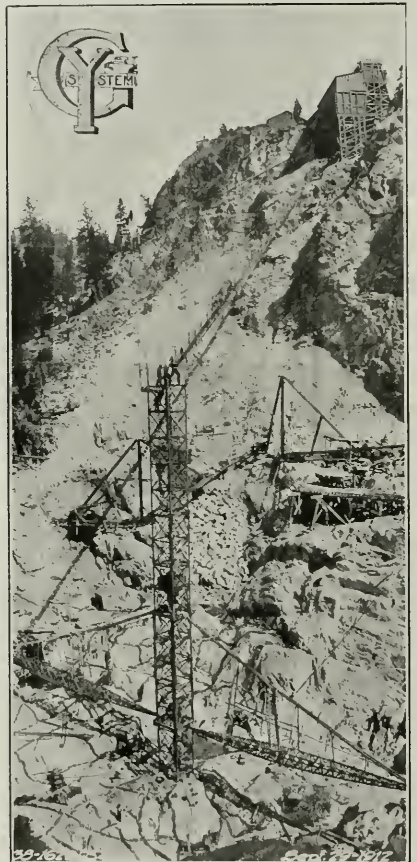
ILLUSTRATING SOME CALIFORNIA WORK BY LOUIS CHRISTIAN MULLGARDT

MARCH 1914
VOLUME XXXVI NUMBER 2
PUBLISHED IN SAN FRANCISCO
50¢ PER COPY $1.50 PER YEAR

IT INTERLOCKS



Progress Picture of the Stockton Street Tunnel. A Double-Track Municipal Car Line Will Run Through This Bore to the Fair Grounds.



Send for Your Copy
of this
FREE BOOK

Here's a book that every architect, contractor or builder should have. "Natural Woods and How to Finish Them." Written by an expert, and full of valuable information that you'll be mighty glad to have at hand.

Remember that the finish on the job is sometimes the principal factor in determining the satisfaction of the owner. Fifty-six years of varnish-making experience have gone onto this book and there'll be many times when you will want to consult it.

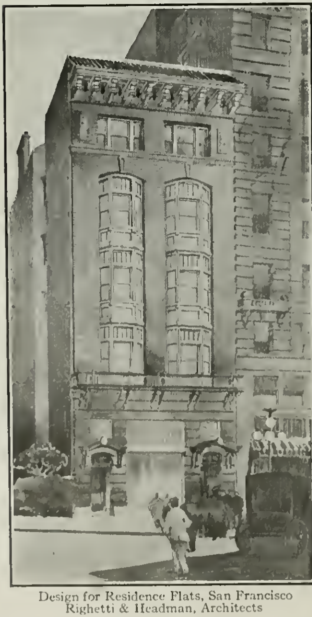
Simply write and say you want the book, and it will go forward at once.

BERRY BROTHERS

(Incorporated)

World's Largest Varnish Makers

DETROIT SAN FRANCISCO WALKERVILLE, ONT.



Design for Residence Flats, San Francisco
Righetti & Headman, Architects

¶ ***The Careful Architect Specifies Only High Grade Materials.***
The class of work which he turns out has a great deal to do with his future success.

PITCHER'S SLIDING DOOR HANGERS

are specified and installed in the Best Apartment Houses and Homes in San Francisco.

NATIONAL MILL & LUMBER COMPANY

SAN FRANCISCO

ARCHITECTS' SPECIFICATION INDEX

(For Index to Advertisements, see next page)

AIR CLEANERS
- "Tuec" air cleaners, manufactured by United Electric Co., 110 Jessie St., San Francisco.

AIR COOLERS
- California Air Purifying Co., 17th St., between Mission and Valencia, San Francisco.
- Kauffman Heating & Engineering Co., 2317 Olive St., St. Louis; Sherman Kimball, Inc., San Francisco agents.

ARCHITECTURAL SCULPTORS, MODELING, ETC.
- O. S. Sarsi, 123 Oak St., San Francisco.
- Florentine Art Studio, 932 Vallejo St., San Francisco.
- I. P. Lipp Co., 153 Seventh St., San Francisco.
- The Schoenfeld Marble Co., 265 Shipley St., San Francisco.
- Western Sculptors, 533-535 Turk St., San Francisco.

ARCHITECTURAL TERRA COTTA
- Gladding, McBean & Company, Crocker Bldg., San Francisco.
- Steiger Terra Cotta and Pottery Works, Mills Bldg., San Francisco.
- Independent Sewer Pipe & Terra Cotta Co., 235 S. Los Angeles St., Los Angeles.

ART GLASS
- Sylvain Le Deit, 124 Lenzen Ave., San Jose.

AUTOMATIC SPRINKLERS
- Scott Company, 243 Minna St., San Francisco
- Pacific Fire Extinguisher Co., 507 Montgomery St., San Francisco.

BANK FIXTURES AND INTERIORS
- Van Dorn Iron Works Co., Cleveland, Ohio.
- A. J. Forbes & Son, 1530 Filbert St., San Francisco.
- Fink & Schindler, 218 13th St., San Francisco.
- C. F. Weber & Co., 365 Market St., San Francisco.
- T. H. Meek Co., 1157 Mission St., San Francisco.
- M. G. West Co., 353 Market St., San Francisco.
- Home Mfg. Co., 543 Brannan St., San Francisco.
- Weary & Alford Co., 1033 Van Nuys Bldg., Los Angeles.

BEDS—INDOOR-OUTDOOR
- California Fresh Air Bed Co., 166 Geary St., San Francisco.

BELTING, PACKING, ETC.
- H. N. Cook Belting Co., 317-319 Howard St., San Francisco.
- New York Belting & Packing Co., Ltd., 129 First St., San Francisco.

BELLS—TOWER, ETC.
- McShane Bell Foundry Co., 461 Market St., San Francisco.

BLACKBOARDS
- C. F. Weber & Co., 365 Market St., San Francisco.

BONDS FOR CONTRACTORS
- Fidelity & Deposit Company of Maryland, Insurance Exchange Bldg., San Francisco.
- Globe Indemnity Co., Insurance Exchange Bldg., San Francisco.
- Levensaler-Speir Corporation, Monadnock Bldg., San Francisco.
- Massachusetts Bonding & Insurance Company, First National Bank Bldg., San Francisco.
- Pacific Coast Casualty Co., 416 Montgomery St., San Francisco.

BRICK
- Diamond Brick Co., Balboa Bldg., San Francisco.
- Gladding, McBean & Company, Crocker Bldg., San Francisco.
- Golden Gate Brick Co., Balboa Bldg., San Francisco.
- Los Angeles Pressed Brick Co., Frost Bldg., Los Angeles.
- Livermore Fire Brick Co., Livermore, Cal.
- Pratt Building Material Co., Hearst Bldg., San Francisco.
- Steiger Terra Cotta & Pottery Works, Mills Bldg., San Francisco.
- United Materials Co., Balboa Bldg., San Francisco.

BRICK AND CEMENT COATING
- American Paint & Dry Color Co., 414 Ninth St., San Francisco.
- Wadsworth, Howland & Co., Inc. (See Adv. for Pacific Coast Agents.)
- Trus-Con Par-Seal, made by Trussed Concrete Steel Co. (See Adv. for Pacific Coast Agents.)

BRICK STAINS
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

BRONZE AND BRASS WORK
- Louis De Rome, 150 Main St., San Francisco.

BUILDERS' HARDWARE
- Russell & Erwin Mfg. Co., Commercial Bldg., San Francisco.
- Vonnegut Hardware Co., Indianapolis. (See Adv. for Coast agencies.)

BUILDERS' SUPPLIES
- Waterhouse & Price, San Francisco and Oakland.
- Burt E. Edwards, 1025 Phelan Bldg., San Francisco.
- Western Builders' Supply Co., 155 New Montgomery St., San Francisco.

BUILDING MATERIAL
- C. Roman, 173 Jessie St., San Francisco.
- C. F. Pratt Building Material Co., Hearst Bldg., San Francisco.
- Golden Gate Brick Co., Balboa Bldg., San Francisco.

CAEN STONE
- A. Knowles, 985 Folsom St., San Francisco.

CEMENT
- Atlas Portland Cement Co., represented by United Materials Co., Balboa Bldg., San Francisco.
- Mt. Diablo, sold by Henry Cowell Lime & Cement Co., 9 Main St., San Francisco.
- "Golden Gate," manufactured by Pacific Portlan Cement Co., Pacific Bldg., San Francisco
- Standard Portland Cement Co., and Santa Cruz Portland Cement Co., Crocker Bldg., San Francisco.

An Index to the Advertisements

ARCHITECTS' SPECIFICATION INDEX—*Continued*

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CONCRETE REINFORCEMENT—Continued
International Fabric & Cable, represented by Western Builders' Supply Co., 155 New Montgomery St., San Francisco.
Triangle Mesh Fabric. Sales Agents, The Lilley & Thurston Co., Rialto Bldg., San Francisco.
Twisted Bars, sold by Woods & Huddart, 444 Market St., San Francisco.

CONCRETE SURFACING
"Biturine," sold by Biturine Co. of America, 24 California St., San Francisco.
"Concreta" sold by W. P. Fuller & Co., San Francisco.
Wadsworth, Howland & Co.'s Bay State Brick and Cement Coating, sold by R. N. Nason & Co., San Francisco and Los Angeles.
Liquid Stone Paint Co., Hearst Bldg., San Francisco.
Glidden Liquid Cement, manufactured by Glidden Varnish Co., Whittier, Coburn Co., San Francisco and Los Angeles, Pacific Coast Distributors.
Moller & Schumann, 1023 Mission St., San Francisco.

CONTRACTORS, GENERAL
American Concrete Co., Humboldt Bank Bldg., San Francisco.
Foster, Vogt Co., Sharon Bldg., San Francisco.
M. Fisher, California-Pacific Bldg., San Francisco.
Geo. W. Boxton, Hearst Bldg., San Francisco.
Herman T. Ludwig, 24 California St., San Francisco.
Howard S. Williams, Hearst Bldg., San Francisco.
Graham & Jensen, Maskey Bldg., San Francisco.
McLaren & Peterson, Sharon Bldg., San Francisco.
Monson Bros., 1907 Bryant St., San Francisco.
Ransome Concrete Co., 1218 Broadway, Oakland.
F. J. Rickon, C. E., 1859 Geary St., San Francisco.
Robert Trost, 26th and Howard Sts., San Francisco.
Williams Bros. & Henderson, Holbrook Bldg., San Francisco.
Burt T. Owsley, 311 Sharon Bldg., San Francisco.
L. A. Rose, Monadnock Bldg., San Francisco.
Patrick-Nelson Company, 2011 Shattuck Ave., Berkeley, Cal.
Ward & Goodwin, Sharon Bldg., San Francisco.
Barrett & Hilp, Sharon Bldg., San Francisco.

CORK TILING
David J. E. Kennedy, Incg., Sharon Bldg., San Francisco.

CORNER BEAD
Union Metal Corner Co., 144 Pearl St., Boston, represented on the Pacific Coast by Waterhouse & Price.

CRUSHED ROCK
Grant Gravel Co., Williams Bldg., San Francisco.
Niles Rock, sold by California Building Material Company, Pacific Bldg., San Francisco.
Niles Sand, Gravel & Rock Co., Mutual Bank Bldg., San Francisco.

DAMP-PROOFING COMPOUND
Biturine Co. of America, 24 California St., San Francisco.
Concrewaltum Paint, made by Goheen Mfg. Co., Canton, O., sold by Sherman, Kimball & Co., Inc., San Francisco; A. J. Capron, Portland, and S. W. R. Dalby, Seattle, Wash.
Glidden's Liquid Rubber, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
Hercules Waterproofing, manufactured by Hercules Cement Co., Buffalo, N. Y. Distributors: Waterhouse & Price Co., San Francisco and Oakland.
Imperial Co., 183 Stevenson St., San Francisco.
Lithoid Product Co., Merchants Exchange Bldg., San Francisco.
Trus-Con Damp Proofing. (See advertisement of Trussed Concrete Steel Company for Coast agencies.)
"Pabco" Damp Proofing Compound, sold by Paraffine Paint Co., 34 First St., San Francisco.
Liquid Stone Paint Co., Hearst Bldg., San Francisco.
Wadsworth, Howland & Co., Inc., 84 Washington St., Boston. (See Adv. for Coast agencies.)

DOOR HANGERS
Pitcher Hanger, sold by National Lumber Co., Fifth and Bryant Sts., San Francisco.
Reliance Hanger, sold by Sartorius Co., San Francisco; D. F. Fryer & Co., Louis R. Bedell, Los Angeles, and Portland Wire & Iron Works.

DOORS AND SHUTTERS
Kinnear Steel Rolling Doors and Shutters, Lilley & Thurston Co., Rialto Bldg., San Francisco.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

DUMB WAITERS
- Spencer Elevator Company, 173 Beale St., San Francisco.
- Excelsior Dumb Waiters, manufactured by R. M. Rodgers Co., Brooklyn; M. E. Hammond, 217 Humboldt Bank Bldg., San Francisco.
- Burdett-Rowntree Mfg. Co., Underwood Bldg., San Francisco.

ELECTRICAL CONTRACTORS
- Butte Engineering Co., 683 Howard St., San Francisco.
- Central Electric Co., 185 Stevenson St., San Francisco.
- Scott Co., Inc., 243 Minna St., San Francisco.
- Pacific Fire Extinguisher Co., 507 Montgomery St., San Francisco.

ELECTRIC PLATE WARMER
- The Prometheus Electric Plate Warmer for residences, clubs, hotels, etc. Sold by M. E. Hammond, Humboldt Bank Bldg., San Francisco.

ELEVATORS
- Otis Elevator Company, Stockton and North Point, San Francisco.
- Spencer Elevator Company, 126 Beale St., San Francisco.
- San Francisco Elevator Co., 860 Folsom St., San Francisco.
- Pacific Gurney Elevator Co., 186 Fifth St., San Francisco.
- Van Emon Elevator Co., Natoma St., San Francisco.

ELEVATORS, SIGNALS, FLASHLIGHTS AND DIAL INDICATORS
- Elevator Supply & Repair Co., Underwood Bldg., San Francisco

ENGINEERS
- F. J. Amweg, 700 Marston Bldg., San Francisco.
- W. W. Breite, Clunie Bldg., San Francisco.
- Crosett & Eastman, Hearst Bldg., San Francisco.
- L. M. Hansmann, Sharon Bldg., San Francisco.
- Chas. T. Phillips, Pacific Bldg., San Francisco.
- Hunter & Hudson, Rialto Bldg., San Francisco.

EXIT DEVICES
- Von Duprin Self-Releasing Fire Exit Devices, manufactured by Vonnegut Hardware Co. (See Adv. for Coast Distributors.)

EXPRESS CALL SYSTEM
- Elevator Supply & Repair Co., Underwood Bldg., San Francisco.

FIRE EXIT DEVICES
- Von Duprin Self-Releasing Fire Exit Devices. Vonnegut Hardware Co. (See Adv. for Coast Agencies.)

FIRE ESCAPES
- Pacific Structural Iron Works, Structural Iron and Steel. Fire Escapes, etc. Phone Market 1374; Home J. 3435. 370-84 Tenth St., San Francisco.

FIRE EXTINGUISHERS
- Scott Company, 243 Minna St., San Francisco.
- Pacific Fire Extinguisher Co., 507 Montgomery St., San Francisco.
- Levensaler-Spier Corporation, 259 Monadnock Bldg., San Francisco.

FIRE BRICK
- Livermore Fire Brick Co., Livermore, Cal.

FIREPLACE DAMPER
- Head, Throat and Damper for open fireplaces, Colonial Fireplace Co., Chicago. (See advertisement for Coast agencies.)

FIREPROOFING AND PARTITIONS
- Cal. Safety Fireproofing Co., 687 Market St., San Francisco.
- Gladding, McBean & Co., Crocker Bldg., San Francisco.
- Los Angeles Pressed Brick Co., Frost Bldg., Los Angeles.
- The Jackson Fireproof Partition Co., Levensaler-Spier Corporation, Distributors, Monadnock Bldg., San Francisco.

FIREPROOF PAINT
- Liquid Stone Paint Co., Hearst Bldg., San Francisco.

FIXTURES—BANK, OFFICE, STORE, ETC.
- A. J. Forbet & Son, 1530 Filbert St., San Francisco.
- Fink & Schindler, 218 13th St., San Francisco.
- C. F. Weber & Co., 365 Market St., San Francisco and 210 N. Main St., Los Angeles, Cal.
- T. H. Meek Co., 1157 Mission St., San Francisco.

FLOOR VARNISH
- Bass-Hueter and San Francisco Pioneer Varnish Works, 816 Mission St., San Francisco.
- R. N. Nason & Co., 151 Potrero Ave., San Francisco.
- Standard Varnish Works, Chicago, New York and San Francisco.
- Moller & Schumann Co., 1022 Mission St., San Francisco.

FLOORS—CORK
- Nonpareil Cork Tiling, David E. Kennedy, Inc., N. Y. Distributor for the Pacific Coast: G. H. Freear, Sharon Bldg., San Francisco.

FLOORING—MAGNESITE
- Fibrestone & Roofing Co., 971 Howard St., San Francisco.

GARAGE EQUIPMENT
- Bowser Gasoline Tanks and Outfit, Bowser & Co., 612 Howard St., San Francisco.
- Compressed Air & General Machinery Co., 39 Stevenson St., San Francisco.

GARBAGE CHUTES
- Bill & Jacobsen, Rialto Bldg., San Francisco.

GRANITE
- California Granite Co., 776 Monadnock Bldg., San Francisco.

GRAVEL, SAND AND CRUSHED ROCK
- Bay Development Co., 153 Berry St., San Francisco.
- California Building Material Co., Pacific Bldg., San Francisco.
- Del Monte White Sand, sold by Pacific Improvement Co., Crocker Bldg., San Francisco.
- Pratt Building Material Co., Hearst Bldg., San Francisco.
- Grant Gravel Co., 87 Third St., San Francisco.
- Niles Sand, Rock & Gravel Co., 971 Howard St., San Francisco.

HARDWALL PLASTER
- Henry Cowell Lime & Cement Co., San Francisco.
- American Keen Cement Co., Levensaler-Spier Corporation, representatives, Monadnock Bldg., San Francisco.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

HARDWARE
Russwin Hardware, Joost Bros., San Francisco.
HARDWOOD FLOORING
Parrott & Co., 320 California St., San Francisco
White Bros., Cor. Fifth and Brannan Sts., San Francisco.
Hardwood Interior Co., 554 Bryant St., San Francisco.
HARDWOOD LUMBER
Dieckmann Hardwood Co., Beach and Taylor Sts., San Francisco.
Parrott & Co., 320 California St., San Francisco.
White Bros., Cor. Fifth and Brannan Sts., San Francisco.
HEATERS—AUTOMATIC
Pittsburg Water Heater Co., 237 Powell St., San Francisco.
Hoffman Heaters, factory branch, San Francisco.
LOCKERS
Keyless Lock Co., Indianapolis, Ind.
HEATING EQUIPMENT—VACUUM, ETC.
Edward Stephenson, 155 Fremont St., San Francisco.
HEATING AND VENTILATING
Atlas Heating & Ventilating Co., Fourth and Freelon Sts., San Francisco.
Boscus Bros., 975 Howard St., San Francisco.
Fess System Co., 220 Natoma St., San Francisco.
A. Lettich, 365 Fell St., San Francisco.
Mangrum & Otter, Inc., 507 Mission St., San Francisco.
Scott Company, 243 Minna St., San Francisco.
Pacific Blower & Heating Co., 17th St., bet. Mission and Valencia, San Francisco.
Pacific Fire Extinguisher Co., 507 Montgomery St., San Francisco.
Petersen-James Co., 710 Larkin St., San Francisco.
F. P. Walsh, 244 Kearny St., San Francisco.
HOLLOW BLOCKS
Denison Hollow Interlocking Blocks, Monadnock Bldg., San Francisco, and Chamber of Commerce Bldg., Portland.
HOTELS
The Angelus, Loomis Bros., Los Angeles.
INGOT IRON
American Rolling Mill Co., Middleton, Ohio.
California Corrugated Culvert Co.,, 5th and Parker Sts., West Berkeley.
INSPECTIONS AND TESTS
Robert W. Hunt & Co., 251 Kearny St., San Francisco.
INSULATING MATERIALS
Armstrong Cork Co., Pittsburg, Pa.
JOIST HANGERS
Western Builders' Supply Co., 155 New Montgomery St., San Francisco.
LIME
Holmes Lime Co., Monadnock Bldg., San Francisco.
Henry Cowell Lime & Cement Co., 9 Main St., San Francisco.
LIGHT, HEAT AND POWER
Pacific Gas & Elec. Co., 445 Sutter St., San Francisco.
LUMBER
Dudfield Lumber Co., Palo Alto, Cal.
Sunset Lumber Co., Oakland, Cal.
Santa Fe Lumber Co., Seventeenth and De Haro Sts., San Francisco.
MAIL CHUTES
Cutler Mail Chute Co., Rochester, N. Y. (See Adv. on page 38 for Coast representatives.)
MANTELS
Mangrum & Otter, 561 Mission St., San Francisco.
Watson Mantel & Tile Co., Sheldon Bldg., San Francisco.
MARBLE
Columbia Marble Co., 268 Market St., San Francisco.
Joseph Musto Sons-Keenan Co., 535 North Point St., San Francisco.
METAL AND STEEL LATH
Atlantic Fireproofing Co., Pacific Bldg., San Francisco.
Jackson Fireproof Partition Co., Levensaler-Spier Corporation, distributors, Monadnock Bldg., San Francisco.
L. A. Norris & Co., Monadnock Bldg., San Francisco.
Pratt Building Material Co., Hearst Bldg., San Francisco.
METAL CEILINGS
Berger Mfg. Co., 1120 Mission St., San Francisco.
San Francisco Metal Stamping & Corrugating Co., 2269 Folsom St., San Francisco.
METAL DOORS AND WINDOWS
U. S. Metal Products Co., 525 Market St.
Dahlstrom Metallic Door Co., Western office, with M. G. West Co., 353 Market St., San Francisco.
Canton Mfg. Co., Sherman Kimball & Co., First and Howard Sts., San Francisco.
METAL FURNITURE
M. G. West Co., 353 Market St., San Francisco.
Van Dorn Iron Works Co., Cleveland, Ohio.
Chas. M. Finch, 311 Board of Trade Bldg., San Francisco.
METAL SHINGLES
San Francisco Metal Stamping & Corrugating Co., 2269 Folsom St., San Francisco.
OIL BURNERS
American Heat & Power Co., Seventh and Cedar Sts., Oakland.
Fess System Co., 220 Natoma St., San Francisco.
T. P. Jarvis Crude Oil Burner Co., 275 Connecticut St., San Francisco.
Compressed Air & General Machinery Co., 39 Stevenson St., San Francisco.
ORNAMENTAL IRON AND BRONZE
California Artistic Metal & Wire Co., 349 Seventh St., San Francisco.
J. G. Braun, Chicago and New York.
Ralston Iron Works, 20th and Indiana Sts., San Francisco.
Monarch Iron Works, 1165 Howard St., San Francisco.
C. J. Hillard Company, Inc., 19th and Minnesota Sts., Sain Francisco.
Shreiber & Sons Co., represented by Western Builders Supply Co., San Francisco.
Sartorius Company, 15th and Utah Sts., San Francisco.
West Coast Wire & Iron Works, 861-863 Howard St., San Francisco.
Vulcan Iron Works, San Francisco.
PAINTING AND DECORATING
D. Zelinsky, 564 Eddy St., San Francisco.
C. H Krebs & Co., Sacramento, Cal.
Horace W. Tyrell, 1707 38th Ave., Oakland.
PAINT FOR BRIDGES
Briggs Bituminous Corporation Co., J. & R. Wilson, agents 117 Steuart St., San Francisco.
PAINT FOR STEEL STRUCTURES
"Biturine," sold by Biturine Co. of America, 24 California St., San Francisco.
Briggs Bituminous Corporation Co., J. & BR. Wilson, agents, 117 Steuart St., San Francisco.
Carbonizing Coating, made by Goheen Mfg. Co., Canton, Ohio. (See Adv. for Coast distributors.)
Joseph Dixon Crucible Co., Coast branch, 155 Second St., San Francisco.
Trus-Con Bar-Ox, Trussed Concrete Steel Co. (See Adv. for Coast agencies.)

ARCHITECTS' SPECIFICATION INDEX—*Continued*

PAINT FOR STEEL STRUCTURES—*Continued*
Glidden's Acid Proof Coating, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
"Bitumastic" sold by Hill, Hubbell & Co., Fife Bldg., San Francisco.

PAINT FOR CEMENT
American Paint & Dry Color Co., 414 Ninth St., San Francisco.
Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (Inc.). (See Adv. in this issue for Pacific Coast agents.)
"Biturine," sold by Buturine Co. of America, 24 California St., San Francisco.
California Safety Fireproofing Co., 687 Market St., San Francisco.
Trus-Con Stone Tex., Trussed Concrete Steel Co. (See Adv. for Coast agencies.)
Liquid Stone Paint Co., Hearst Bldg., San Francisco, Los Angeles and San Diego.
Glidden's Liquid Cement, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
Moller & Schumann Co., West Coast Branch, 1022 Mission St., San Francisco.
Concreto Cement Coating, manufactured by the Muralo company. (See color insert for Coast distributors.)
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

PAINTS, OILS, ETC.
American Paint & Dry Color Co., 414 Ninth St., San Francisco.
Concreto Cement Coating, manufactured by the Muralo company. (See color insert for Coast distributors.)
Bass-Heuter Paint Co., Mission, near Fourth St., San Francisco.
"Biturine," sold by Biturine Co. of America, 24 California St., San Francisco.
Heath & Milligan Mfg. Co., 9-15 Fremont St., San Francisco.
Glidden Varnish Co., Cleveland, Ohio, represented by Whittier-Coburn Co., San Francisco and Los Angeles.
Moller & Schumann Co., 1022 Mission St., San Francisco.
Berry Bros., 250 First St., San Francisco.
Paraffine Paint Co., 38-40 First St., San Francisco.
R. N. Nason Co., San Francisco.
Standard Varnish Works, 113 Front St., San Francisco.

PHOTO ENGRAVING
California Photo Engraving Co., 121 Second St., San Francisco.

PHOTOGRAPHY
R. J. Waters Co., 717 Market St., San Francisco.
Walter Scott, 558 Market St., San Francisco.

PIPE—CORRUGATED INGOT IRON
California Corrugated Culvert Co., Los Angeles and West Berkeley.

PIPE—VITRIFIED SALT GLAZED TERRA COTTA
Gladding, McBean & Co., Crocker Bldg., San Francisco.
Pacific Sewer Pipe Co., I. W. Hellman Bldg., Los Angeles.
Pratt Building Material Co., Hearst Bldg., San Francisco.
Steiger Terra Cotta and Pottery Works, Mills Bldg., San Francisco.

PLASTER BOARD
Colonial Wall Board manufactured by Mound House Plaster Co., Levensaler-Speir Corporation, 259 Monadnock Bldg., San Francisco.
"Plastergon," sold by the Comyn Mackall & Co., 310 California St., San Francisco.

PLASTER CONTRACTORS
George MacGruer, 319 Mississippi St., San Francisco.
Herman Bosch, 4420 20th St., San Francisco.
A. Knowles, 985 Folsom St., San Francisco.
W. J. McGraw, 1636 Felton St., Berkeley.

PLUMBING
Boscus Bros., 975 Howard St., San Francisco.
Scott Co., Inc., 243 Minna St., San Francisco.
Peterson-James Co., 710 Larkin St., San Francisco.
Wittman, Lyman & Co., 340 Minna St., San Francisco.
Alex Coleman, 706 Ellis St., San Francisco.
Antone Lettich, 365 Fell St., San Francisco.

PLUMBING FIXTURES, MATERIALS, ETC.
Crane Co., Second and Brannan Sts., San Francisco.
Jno. Douglas Co., 571 Mission St., San Francisco.
N. O. Nelson Mfg. Co., 978 Howard St., San Francisco.
California Steam Plumbing Supply Co., 671 Fifth St., San Francisco.
Mark-Lally Co., First and Folsom Sts., San Francisco.
Western States Porcelain Co., San Pablo, Cal.
J. L. Mott Iron Works, D. H. Gulick, selling agent, 135 Kearny St., San Francisco.

POTTERY
Steiger Terra Cotta and Pottery Works, Mills Bldg., San Francisco.

PULLEYS, SHAFTING, GEARS, ETC.
Meese & Gottfried Co., San Francisco, Seattle, Portland and Los Angeles.

RADIATORS
Kauffman Heating & Engineering Co., St. Louis, represented in San Francisco by Sherman Kimball, Inc.

REFRIGERATORS
McCray Refrigerators, sold by Nathan Dohrmann Co., Geary and Stockton Sts., San Francisco.
Vulcan Iron Works, San Francisco.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

REVOLVING DOORS
- American Revolving Door Co., 2514 Monroe St., Chicago, Ill.
- Van Kennel Doors, sold by U. S. Metal Products Co., 525 Market St., San Francisco.

ROLLING DOORS, SHUTTERS, PARTITIONS, ETC.
- Lilley & Thurston Co., Rialto Bldg., San Francisco.
- C. F. Weber & Co., 365 Market St., San Francisco.
- Wilson's Steel Rolling Doors, U. S. Metal Products Co., San Francisco and Los Angeles.

ROOFING AND ROOFING MATERIALS
- Biturine Co. of America, 24 California St., San Francisco.
- Golden Gate Brick Co., 660 Market St., San Francisco.
- Grant Gravel Co., Williams Bldg., San Francisco.
- Fibrestone & Roofing Co., 971 Howard St., San Francisco.
- "Ruberoid," manufactured by Paraffine Paint Co., Lilley & Thurston, distributors, Rialto Bldg., San Francisco.
- Mackenzie Roof Co., 425 15th St., Oakland.
- United Materials Co., Balboa Bldg., San Francisco.
- Redwood Shingle Association, 44 California St., San Francisco.

ROOFING TIN
- American Sheet & Tin Plate Co., Pacific Coast representatives, U. S. Steel Products Co., San Francisco, Los Angeles, Portland and Seattle.

RUBBER TILING AND MATTING
- New York Belting & Packing Co., 129 First St., San Francisco.
- Compressed Air & General Machinery Co., 39 Stevenson St., San Francisco.

SAFES, VAULTS, BANK EQUIPMENT
- M. G. West Co., 353 Market St., San Francisco.

SAFETY TREADS
- American Mason Safety Tread. (See Adv. on page 147 for Coast agents.)
- Universal Safety Tread Co., represented by Waterhouse & Price, San Francisco and Oakland.

SANDSTONE BRICK
- Sacramento Sandstone Brick Co., Sacramento, Cal.
- Golden Gate Brick Co., Balboa Bldg., San Francisco.

SANITARY DRINKING FOUNTAINS
- N. O. Nelson Mfg. Co., 978 Howard St., San Francisco.

SASH CORD
- Puritan Sash Cord Co. (See Adv. for Coast agents.)
- Samson Cordage Works, manufacturers of Solid Braided Cords and Cotton Twines, 88 Broad St., Boston, Mass.

SCENIC PAINTING—DROP CURTAINS, ETC.
- The Edwin H. Flagg Scenic Co., 1638 Long Beach Ave., Los Angeles.

SCHOOL FURNITURE AND SUPPLIES
- C. F. Weber & Co., 365 Market St., San Francisco; 512 S. Broadway, Los Angeles.

SCREENS
- J. A. Murray, sales agent for the Higgin All-Metal Window Screen, 805 Monadnock Bldg., San Francisco.

SCULPTORS
- Western Sculptors, 533-535 Turk St., San Francisco.

SHEATHING AND SOUND DEADENING
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

SHEET METAL WORK, SKYLIGHTS, ETC.
- Berger Mfg. Co., 1120 Mission St., San Francisco.
- Capitol Sheet Metal Works, 1927 Market St., San Francisco.
- U. S. Metal Products Co., 525 Market St., San Francisco.

SHINGLE STAINS
- Cabot's Creosote Stains, sold by Waterhouse & Price, San Francisco, Los Angeles and Portland.

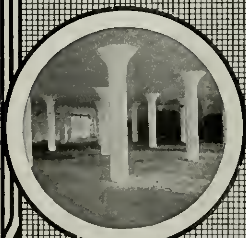
SPIRAL CHUTE
- The Haslet Spiral Chute Co., 310 California St., San Francisco.

STEEL AND IRON—STRUCTURAL
- Central Iron Works, 621 Florida St., San Francisco.
- Dyer Bros., 17th and Kansas Sts., San Francisco.
- Judson Manufacturing Co., 819 Folsom St., San Francisco.
- Brode Iron Works, 31 Hawthorne St., San Francisco.
- Mortenson Construction Co., 19th and Indiana Sts., San Francisco.
- J. L. Mott Iron Works, D. H. Gulick, agents, 135 Kearny St., San Francisco.
- Pacific Rolling Mills, 17th and Mississippi Sts., San Francisco.
- Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, etc. Phone Market 1374; Home, J. 3435, 370-84 Tenth St., San Francisco.
- Ralston Iron Works, Twentieth and Indiana Sts., San Francisco.
- Schrader Iron Works, San Francisco.
- U. S. Steel Products Co., Rialto Bldg., San Francisco.
- Schhreiber & Sons Co., represented by Western Builders Supply Co., S. F.
- Vulcan Iron Works, San Francisco.
- Western Iron Works, 141 Beale St., San Francisco.
- Woods & Huddart, 444 Market St., San Francisco.

Turner Mushroom System

of Concrete Construction for Buildings and Bridges

The original reinforced concrete flat slab. No beams or girders.
Permits of a very rapid erection.
Effects a great saving in form cost and labor.
Vibration reduced to a minimum.
Makes possible accurate computation of deflection and strength.
Successfully used in more than 1000 important structures.
A system that assures economy and rapidity of construction together with durability and low maintenance.



C. A. P. TURNER
Phoenix Bldg., MINNEAPOLIS, MINN.

Pacific Coast Representatives
INDUSTRIAL ENGINEERING CO.
Clunie Building, San Francisco
E. T. FLAHERTY,
I. W. Hellman Building, Los Angeles
A. P. HUECKEL,
Vancouver Building, Vancouver, B. C.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

STEEL PRESERVATIVES
- American Bitumastic solution sold by Hill, Hubbell & Co., Fife Bldg., San Francisco.
- Dixon's Graphite, manufactured by Jos. Dixon Crucible Co., 155 Second St., San Francisco.
- Wadsworth, Howland & Co., Boston Mass. (See Adv. for Coast agencies.)

STEEL BARS FOR CONCRETE REINFORCEMENT
- Judson Mfg. Co., 819 Folsom St., San Francisco.
- Kahn and Rib Bars, made by Trussed Concrete Steel Co. (See Adv. for Coast agencies.)
- Woods & Huddart, 444 Market St., San Francisco.

STEEL DOORS AND TRIM
- Dahlstrom Metallic Door Co., Market St., San Francisco.

STEEL DOOR GUARDS
- Ashlock Steel Door Guard Co., 353 Market St., San Francisco.

STEEL FURNITURE
- The Keyless Lock Co., Indianapolis, Ind.

STEEL MOULDINGS FOR STORE FRONTS
- J. G. Braun, 537 W. 35th St., New York, and 615 S. Paulina St., Chicago.

STEEL FIREPROOF WINDOWS
- Canton Mfg. Co., represented by Sherman Kimball & Co., First and Howard Sts., San Francisco.
- United States Metal Products Co., San Francisco and Los Angeles.

STEEL STUDDING
- Collins Steel Partition, Parrott & Co., San Francisco.
- "Lesco," Metal Stud, Levensaler-Speir Corporation, Monadnock Bldg., San Francisco.

STONE
- California Granite Co., Monadnock Bldg., San Francisco.
- Parry Stone Co., "Sampeta," "Golete" and "Manti" white stone, 223 Sheldon Bldg., San Francisco.
- Boise Sandstone Co., Boise, Idaho.

STORAGE SYSTEMS
- S. F. Bowser & Co., 612 Howard St., San Francisco.

SURETY BONDS
- Globe Indemnity Co., Insurance Exchange Bldg., San Francisco.
- Massachusetts Bonding & Insurance Co., First National Bank Bldg., San Francisco.
- Fidelity & Deposit Co. of Maryland, Mills Bldg., San Francisco.
- Pacific Coast Casualty Co., Merchants' Exchange Bldg., San Francisco.

TERRA COTTA CHIMNEY PIPE
- Gladding-McBean Co., Crocker Bldg., San Francisco.

TILES, MOSAICS, MANTELS, ETC.
- Mangrum & Otter, 561 Mission St., San Francisco.
- Watson Mantel & Tile Co., Sheldon Bldg., San Francisco.
- John Petrovffsky, 523 Valencia St., San Francisco.

TILE FOR ROOFING
- Fibrestone & Roofing Co., 971 Howard St., San Francisco.
- Gladding, McBean & Co., Crocker Bldg., San Francisco.
- United Materials Co., Balboa Bldg., San Francisco.

TILE WALLS—INTERLOCKING
- California Denison Block Co., 401 Monadnock Bldg., San Francisco.

TIN PLATES
- American Tin Plate Co., Riato Bldg., San Francisco.

VITREOUS CHINAWARE
- Western States Porcelain Co., Richmond, Cal.

VACUUM CLEANERS
- Bill & Jacobsen, Rialto Bldg., San Francisco.
- Blaisdell Machinery Co., represented by Sherman Kimball, Second and Howard Sts., San Francisco.
- The Vak-Klean Vacuum Cleaner, Pneulectric Co., Pacific Coast Agts., 943 Phelan Bldg., San Francisco.

VACUUM CLEANERS—*Continued*
- Giant Stationary Suction Cleaner, manufactured by Giant Suction Cleaner Co., 731 Folsom St., San Francisco and Third and Jefferson Sts., Oakland.
- "Tuec" Air Cleaner, manufactured by United Electric Co., 110 Jessie St., San Francisco.

VALVES
- Jenkins Bros., 247 Mission St., San Francisco.

VALVE PACKING
- "Palmetto Twist," sold by H. N. Cook Belting Co., 317 Howard St., San Francisco.

VARNISHES
- American Bitumastic solution, sold by Hill, Hubbell & Co., Fife Bldg., San Francisco.
- W. P. Fuller Co., All Coast Cities.
- Glidden Varnish Co., Cleveland, O., represented on the Pacific Coast by Whittier-Coburn Co., San Francisco, and Tibbetts-Oldfield Co., Los Angeles.
- S. F. Pioneer Varnish Works, 816 Mission St., San Francisco.
- Moller & Schumann Co., Brooklyn, N. Y.; Chicago and San Francisco.
- Berry Bros., "Liquid Granite," manufactured and sold by Berry Bros., 250-256 First St., San Francisco.
- R. N. Nason & Co., San Francisco and Los Angeles.

VENETIAN BLINDS, AWNINGS, ETC.
- C. F. Weber & Co., 365 Market St., San Francisco.

WALL BEDS
- Marshall & Stearns Co., 1154 Phelan Bldg., San Francisco.

WALL BOARD
- Levensaler-Spier Corporation, Monadnock Bldg., San Francisco.
- "Plastergon," sold by Comyn-Mackall & Co., 310 California St., San Francisco.

WALL SAFES
- Lowrie Wall Safe, sold by C. Roman Co., 173 Jessie St., San Francisco.

WATER HEATERS
- Pittsburg Water Heater Co., 237 Powell St., San Francisco.

WATERPROOFING FOR CONCRETE, BRICK, ETC.
- Briggs Bituminous Paint Co., J. & R. Wilson, agents, 117 Steuart St., San Francisco.
- Concreto Cement Coating, manufactured by the Muralo Co. (See color insert for Coast distributors.)
- Fibrestone & Roofing Co., 971 Howard St., San Francisco.
- Glidden's Concrete Floor Dressing and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- Hercules Waterproofing Cement Co., represented by Waterhouse & Price, San Francisco and Oakland.
- Imperial Co., 183 Stevenson St., San Francisco.
- Liquid Stone Paint Co., Hearst Bldg., San Francisco.
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.
- The Building Material Co., Inc., 583 Monadnock Bldg., San Francisco.
- Wadsworth, Howland & Co., Inc. (See Adv. for Coast agencies.)

WHITE ENAMEL FINISH
- "Satinette," Standard Varnish Works, 113 Front St., San Francisco.
- Moller & Schumann Co., West Coast Branch, 1022 Mission St., San Francisco.
- Trus-Con Sno-wite, manufactured by Trussed Concrete Steel Co. (See Adv. for Coast distributors.

WIRE FABRIC
- Wadsworth, Howland & Co., Inc. (See Adv. on page 31 for Coast agencies.)

WIRE FABRIC
- U. S. Steel Products Co., Rialto Bldg., San Francisco.

WOOD MANTELS
- Fink & Schindler, 218 13th St., San Francisco.
- Mangrum & Otter, 561 Mission St., San Francisco.

CANTON ADJUSTABLE FIREPROOF METAL WINDOWS

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

"Canton" Fireproof Windows [illegible]

[illegible]

THE CANTON MANUFACTURING CO.

CANTON, OHIO

PACIFIC COAST AGENCIES

San Francisco—[illegible] & Co. [illegible]
Los Angeles—[illegible] & Co. [illegible] E. Third St.

STANDARDIZED PRODUCTS

ELASTICA FLOOR FINISH

SPECIFY BRANDS OF MERIT

The Brands that have always and will always give entire satisfaction

ELASTICA FINISH No. 2

Their reliability and uniformity have made them famous

Used by men who know.

Satinette WHITE ENAMEL

STANDARD VARNISH WORKS

New York *Chicago* *San Francisco*
London *Berlin* *Melbourne*

INTERNATIONAL VARNISH CO., LTD.
Toronto, Canada

KLEARTONE STAINS

The Empire Court Apartments were completed

THREE YEARS AGO

The Cement Work Received Two Coats of

CONCRETO
CEMENT COATING

Made by the MURALO CO.

EMPIRE COURT APARTMENTS, Bush and Leavenworth Sts., San Francisco
Designed by E. L. Malsbary

The condition of this paint, now, after three years exposure is

POSITIVE PROOF

of the wearing qualities of CONCRETO. Upon application, we will furnish the names of many buildings which have been painted with this material from three to five years, which are now in good condition.

SOLE MANUFACTURERS **THE MURALO CO.,** NEW YORK.

SAN FRANCISCO DISTRIBUTORS:

D. H. RHODES,
546 VALENCIA ST.

A. L. GREENE,
311 CALIFORNIA ST.

When writing to Advertisers please mention this magazine.

Protect Your Concrete or Stucco

TRADE MARK

Reg. U. S. Pat.

I want you to know **BAY STATE** *Brick and Cement Coating* is being specified by the leading architects and contractors not only as a coating on cement, stucco, and brick surfaces to protect them against moisture, but on high grade interior work on both wood and plaster.

You know how necessary it is to protect concrete surfaces against dampness. My coating is damp-proof, a fire retarder and gives a pleasing appearance without destroying the texture of concrete. It is the best coating for mills, factories, bridges or stucco houses.

Write for particulars about Bay State Brick and Cement Coating. Address for booklet No. 20

WADSWORTH, HOWLAND & CO., Inc.,

PAINT AND VARNISH MAKERS AND LEAD CORRODERS

82-84 Washington St. Boston, Mass.

DISTRIBUTING AGENTS: Hiram W. Wadsworth, Chamber of Commerce Building, Pasadena, Cal. F. T. Crowe & Co., Portland, Ore., Spokane, Seattle, Tacoma, Wash., Vancouver, B. C.; Jones-Moore Paint House, San Diego, Cal.; R. N. Nason & Co., 54 Pine Street, San Francisco; R. N. Nason & Co., 1047 South Main Street, Los Angeles.

ARE YOU SATISFIED

with the finish that you are getting on your Cement Plastered Houses?

Do the White Cements give you the Even Color and Lasting Finish that you would like to get, and are they WATER-PROOF?

A Scratch and a Brown Coat of Ordinary Portland Cement and Two Coats of

LIQUID-STONE

will give you a BETTER and CHEAPER FINISH than any of the Patent Cements or Plasters.

This is the time of year to WATER-PROOF that basement. We can do it.

ASK ANY OF US

THE LILLEY & THURSTON CO., SAN FRANCISCO

HERRINGBONE METAL LATH CO. Los Angeles, Cal.
PEARSON-WILLETT CO., Spokane, Wash.
WATERHOUSE & PRICE CO., Oakland, Cal.
H. P. GREENE, San Diego, Cal.
LEWERS & COOKE, Ltd., Honolulu, T. H.
GALBRAITH, BACON & CO., Seattle, Wash.
FLANNIGAN WAREHOUSE CO., Reno, Nev.
CRESCENT PAINT CO., Phoenix, Ariz.
DOMINION DOCK & SUPPLY CO., Ltd. Vancouver, B. C.
H. M. FAIRFOWL, Portland, Ore.

THE LIQUID-STONE PAINT CO., Mfrs., San Francisco, Cal.

THE PICTURE TELLS THE STORY

TUEC

The

UNITED ELECTRIC CO.

CANTON, OHIO

110 Jessie Street, San Francisco

LEVENSALER - SPEIR CORPORATION

259-67 MONADNOCK BLDG., 681 MARKET ST.

TELEPHONE DOUGLAS 3472 SAN FRANCISCO, CAL.

- LESCO -
TRADE MARK REGISTERED

BUILDING MATERIALS COMMERCIAL MINERALS

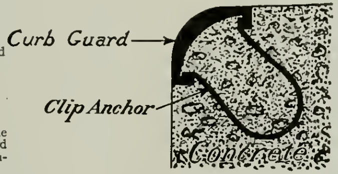
DISTRIBUTORS FOR STATE OF CALIFORNIA:

AMERICAN KEENE CEMENT CO. MOUND HOUSE PLASTER CO.
CLIP BAR MANUFACTURING CO. THE JACKSON FIREPROOF PARTITION CO.
COMMERCIAL MINERALS FOR BUILDING PURPOSES

We desire to call your attention to an inovation in Curb Guard in the form of the Clip-Bar Guard.

The principal claims for the "CLIP BAR" Galvanized Curb Guard and Concrete Reinforcement are:

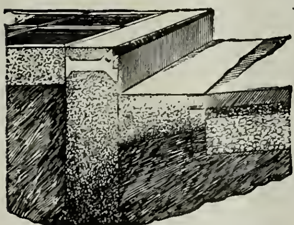
1.—Lighest section compatible with strength.
2.—Simplicity of installation.
3.—Efficiency of service.
4.—Greater wearing surface than any other curb guard
5.—Positive reinforcement of the concrete.
6.—Ornate appearance.
7.—Not affected by frost.
8.—Stronger and cheaper than granite.
9.—Not affected by expansion and contraction, as the guard is of practically uniform thickness throughout and therefore expands and contracts uniformly with the concrete in which it is imbedded.



We also handle the "T-HEAD" Curb Guard which is used under San Francisco, Oakland and Berkeley, City Engineers specifications.

WAINWRIGHT STEEL-BOUND CONCRETE CURB

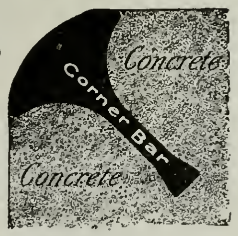
HAS A RECORD OF FIFTEEN YEARS' USE WITHOUT A FAILURE



"WAINWRIGHT PATENTS"
March 9, 1897 November 22, 1898
May 5, 1903 March 26, 1907
August 29, 1907 August 2, 1910

OVER
FIVE MILLION
FEET

IN USE IN MORE THAN
FOUR HUNDRED
CITIES
IN THE UNITED STATES



THE WAINWRIGHT GALVANIZED STEEL CORNER BAR

HAVING SOLID ROUNDED HEAD AND DOVETAILED WEB, EXTENDING TWO INCHES INTO THE CONCRETE ITS ENTIRE LENGTH, FORMING CONTINUOUS INTEGRAL ANCHORAGE, IS THE ONLY BAR THAT CAN BE DEPENDED ON TO PERMANENTLY RETAIN ITS PLACE IN CONCRETE

FROST WILL NOT DISPLACE THE WAINWRIGHT BAR, AS IT WILL ANY BAR ANCHORED AT INTERVALS

PACIFIC COAST REPRESENTATIVES

SEATTLE, P. W. SMITH, 1900 Fourth Avenue, North
LOS ANGELES, F. F. FOSTER & CO., 443 East 3rd St.
SAN FRANCISCO, LILLEY & THURSTON CO., Rialto Bldg.

METAL PARTS FOR SALE. SEND FOR COPYRIGHTED BOOKLET NO. 16

STEEL PROTECTED CONCRETE CO. REAL ESTATE TRUST BUILDING PHILADELPHIA, PA.

The Architect and Engineer of California Pacific Coast States

Terms of Subscription, $1.50 per Year

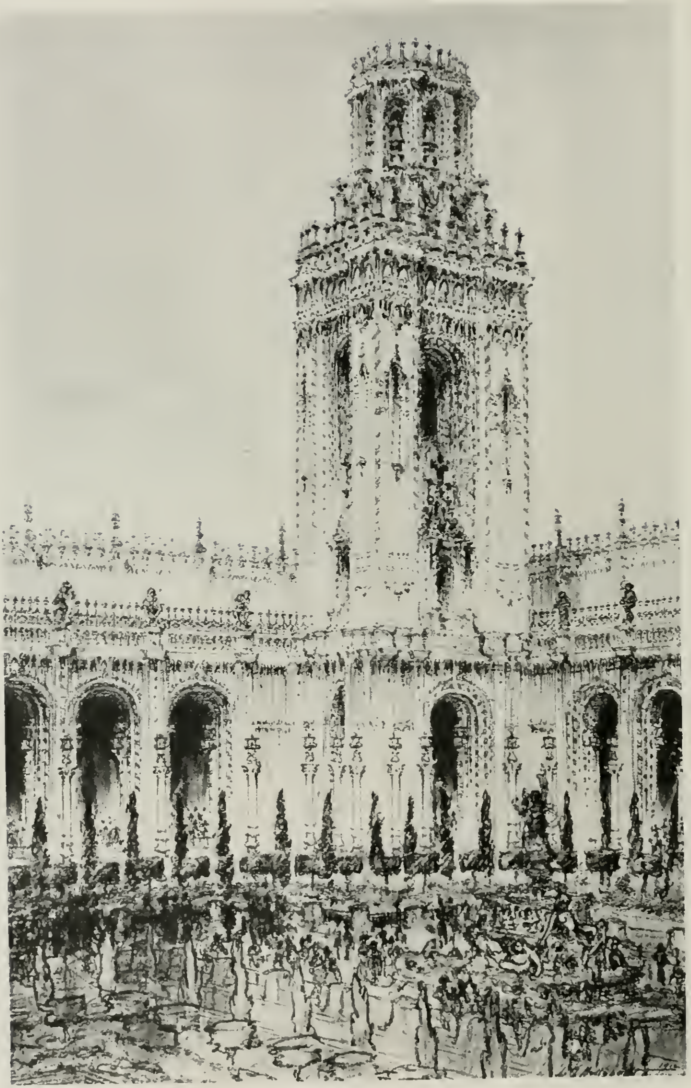
Single Copies, 50 Cents

Issued monthly in the interests of Architects, Structural Engineers, Contractors and the Allied Trades of the Pacific Coast.

Entered at San Francisco Post Office as Second Class Matter.

Contents for March

(Index to Advertisements, page 8.)



ECHO TOWER COURT OF THE AGES
LOUIS CHRISTIAN MULLGARDT, ARCHITECT

Frontispiece
The Architect and Engineer
of California
For March, 1914.

THE

Architect and Engineer

Of California

Pacific Coast States

Vol. XXXVI. MARCH, 1914. No. 2

Some of the California Work of Louis Christian Mullgardt, F. A. I. A.*

By HERBERT D. CROLY.

Terra Cotta Roof Covering of Mr. Taylor's Residence, Claremont Hills

Mr. Louis Christian Mullgardt, some of whose work is illustrated herewith, is emphatically an original designer. The freshness of his vision and the novelty of many of his technical expedients will be manifest to the most superficial observer, while at the same time it is equally obvious that his innovations have not been conceived in any perversity of spirit. He is a man who goes his own way, because he has to go his own way; but there is no implicit assertion that his road is the only right road, and the road itself can be traced back to a familiar country and opens up a vista towards an architecturally more habitable region.

The Californian prepossession for architectural forms, derived from Spain, usually expresses itself in a frivolous and furious gesticulation and capering to what is supposed to be the music of the old Mission buildings. Mr. Mullgardt's houses, on the other hand, are sober, simple and self-possessed adaptations of Spanish street architecture to modern uses. Like the old houses in Monterey, they are placed firmly on the ground, are devoid of ornament, and have overhanging roofs, which, from certain points of view, have an effect similar to that of a Spanish sombrero. The walls are, however, necessarily very much more broken by windows than in the older Spanish building, and this fact compels the architect to dispense with large, bare, unbroken wall spaces, upon the effect of which so much of the dignity of the old Spanish buildings depended.

He shows himself to be essentially, if not exclusively, a landscape architect—an architect who sees a dwelling not on paper, but as a landscape painter might see it. His houses take form in his mind as an accent

*Excerpts from an article, "An Architectural Innovator, a Group of California Homes," published in the Architectural Record of August, 1911, written after a visit of the editor of The Record to California in January of that year.

and an element in a certain group of natural surroundings. They are designed both to fit into the site and in certain cases to fit the spirit and the general forms of an entire countryside. Mr. Mullgardt is a landscape architect not in the sense that he knows where to plant shrubs and how to make them grow, but in the sense that he knows how to make a house grow out of the whole group of natural surroundings which enter into any relation to it. The best of his houses are moulded to their sites; they are softened and enveloped by the neighborhood foliage; they are warmed and tinted by the sunlight; they give one the sense of breathing the very air. In short, they have a way of appearing to live on the spot where they happen to have been put. Mr. Mullgardt has evidently been fascinated by the California landscape; and it is no wonder that he has been. It is surely one of the most perfectly modeled and composed landscapes in the world. One does not have to go in search of picturesque and charming points of view. Its most ordinary aspects are gracious and bewitching—wherever it has not been ruined by houses. Moreover, it is a landscape which has been wrought particularly for human habitation. The scale of its valleys and hills, the character and distribution of the foliage, its quick response to planting and cultivation, its climate—these and a score of other characteristics make the countryside of the coast districts of California the best place in America in which to live a wholesome and varied country life, and at the same time the landscape in which an architect with any imagination would most prefer to build a house. It offers the architect opportunities of fitting buildings to landscape, which certainly are not surpassed elsewhere in the world. Any architect who is also a bit of a poet, as Mr. Mullgardt evidently is, cannot but be fascinated by visions of castles and villas which would constitute not a desecration to the landscape, as are the great majority of present buildings, but its crown and glory.

The only house in the design of which Mr. Mullgardt has had an opportunity of expressing his talent at its best is that of Mr. H. W. Taylor. It crowns a hill back of Berkeley. Because of its site it becomes a conspicuous object in the landscape from many different points of view in the neighborhood; and it is seen in immediate relation to a certain amount of unoccupied land and certain masses of foliage. Thus it really has surroundings into which it can be tied, to an extent that a house situated directly on a street never can have. Obviously, it is extremely difficult to obtain photographs which do justice to the subtle and elusive intimacies which an architect may create between a house and its site; but the reader can, we believe, get some idea of the unusual character of the relation between Mr. Taylor's house and Mr. Taylor's hill from the accompanying illustrations. The distribution of the masses of the building, the salient roof, the grouping of the windows and the contrasts and harmonies of color, all contribute essentially to the intimacy. Yet, one can hardly account for it by any enumeration of technical expedients. Back of it all is a gift, which enables the architect to make his detail piquant while at the same time keeping it subdued, and to design a house for which the hill had been waiting since the day of its birth. Mark the way in which the sky line of the house continues and completes the sky line of the hill, and the way in which the salient chimney rises at just the right point for the purpose of tying together the two slopes of the hill. Neither is the house disappointing on a nearer view.

Remark how naturally the building rises out of the ground; how solid it is near the earth, and how cleverly the necessarily large number of openings are grouped above a single level. Remark how the terracing of the hill to the left of the house ties the land to the building, while at the same time the low, dense planting prevents its effect from becoming merely architectural. Remark how much gayer and more entertaining the old Spanish forms have become in this rendering. The building, instead of being planned as a fortress to exclude sunlight and the air, has been opened up and ventilated. The sunlight and the air have been made welcome in good, wholesome American fashion, while at the same time the structure has been kept substantial and dignified by the solidity of its lower parts.

The photographs necessarily fail to do any justice to one of the interesting and original aspects of Mr. Mullgardt's work, and that is to his use of color. He realizes in the first place that color has a more important part to play in the architecture of California than it has in that of the eastern states. "Florida and California," he says in his paper on the "Use of Color in Architecture," "with their Oriental atmosphere show a natural tendency in that direction, partly due to early Spanish influence, but largely because climatic conditions call for it. The Occidental has not fully awakened to this fact as yet; but he will, as is proven by the more extensive use of the lighter tints, approaching white, in the walls which he builds today. We are beginning to realize that it is the white wall which makes the blue sky seem more blue than it was, and that the red roof is more red. In this are the first signs of an awakening which will be but the forerunner of an ultimate acceptance of the complete gamut of color."

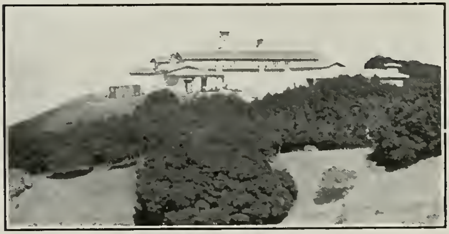
Mr. Mullgardt himself uses color delicately, but with assurance. With the exception of a few wooden bungalows, his houses are plastered; and he has invented a method of putting on the final coating of plaster in a much more interesting and varied texture than such walls ordinarily get. Moreover, the color of the plaster, instead of being the usual dead gray, has been warmed up, and it mellows very effectively with age. During the summer in California there is a good deal of dust in the air, which is caught by the roughened plaster, and which makes it steadily improve in color.

Even more original is Mr. Mullgardt's treatment of the surface of his roofs. One of the illustrations of Mr. Taylor's house gives a near view of the roof, which looks as if it were covered with flat, irregular cobblestones. As a matter of fact, the roofing material consists of flat, but rounded and irregular, pieces of reddish terra cotta, laid in cement; and it makes, we believe, an entirely satisfactory as well as a very good looking roof. The joints between the pieces of terra cotta are much more conspicuous in the photograph than they are from the angle at which they are ordinarily seen. Usually one gets the sense of a pretty solid mass of color, broken only by a sort of irregular pattern, which is, I think, much pleasanter to the eye than are the regular undulations made by the ordinary tiled roof. The color of Mr. Mullgardt's tiles is, also, much less harsh than is that of the modern imitations of the old Spanish tiles; and Mr. Mullgardt varies it in different buildings. The originality and beauty of this aspect of Mr. Mullgardt's work must be seen in order to be appreciated.

We shall not attempt any specific account of Mr. Mullgardt's other houses. They, all of them, are unmistakably the work of the man who designed the residence of Mr. H. W. Taylor. He has approached his other problems with the same fresh eye, and he has used the same original and well-devised set of technical expedients. On the whole they constitute a real attempt to give the old Spanish forms a local meaning and propriety under California conditions; and there can be no doubt that Spanish architecture at its best assuredly constitutes the most available point of departure for the domestic buildings in California. They are all worth careful attention, because they illustrate on the one hand Mr. Mullgardt's fertility and on the other his integrity. Mr. Mullgardt is, above all, an artist, whose dominant ambition is to make his work a genuine expression of himself. But he needs, in order that he may do himself justice, the same sort of an opportunity that he had in the house of Mr. H. W. Taylor. His unique gift is that of being able to make a building a real and natural supplement to a landscape; and this gift implies both a deep love and a discriminating appreciation of nature, and an ability to imagine architectural forms which really serve his purpose. It is very much to be hoped that he will be granted many chances to express his very rare and distinguished talent, and that Californians will understand that in him they have an architect who is capable of establishing a novel intimacy between the landscape they love so well and the houses they build so badly.

The Country House in California

The following consists entirely of excerpts from an article published in the Architectural Record of December, 1913, under the caption, "The Country House in California:"



Henry W. Taylor Residence in the Berkeley Hills

The country house in California is a young and tender plant, which, like many another American architectural sprig, is full of life and promise. The soil is rich, the air is kindly and the need is great. But the prospect of its future is clouded by the fact that it has as yet no sufficient salient tendency to grow in one fruitful direction. Its energy is partly dissipated by the divided counsels which determine its growth, and Californians will do well to bear in mind that they have less excuse for miscellaneous experiments in the kind of country house they build than have their fellow countrymen in the east.

So far as the east is concerned one could hardly give good reasons for asserting that a man ought to build any one kind of country house, because so much would depend upon the neighborhood in which he had happened to buy his land.

Californians, on the other hand, have inherited and have partly accepted such a style—a style which has some authority because it is both local and appropriate; and its peculiar propriety consists first in the fact of its adaptability to the California country side.

The country in California, with all its variety, possesses in its arable parts certain admirable and uniform characteristics which invite the building of a particular sort of house; and inasmuch as this sort of house has already been built to a certain extent upon local soil, Californians are in the fortunate position of having good reasons for remaining faithful to a simple and comparatively familiar style of domestic architecture.

It will, I am afraid, immediately occur to some of my readers that the style to which I refer is that of the Missions, but such is not the case. The Missions architecture was ecclesiastical rather than domestic, and the attempts which have hitherto been made to adopt the peculiarities of the Mission style to the design of contemporary American houses have been almost wholly grievous in their effects. The Missions contained in their architecture much that was rudimentary, awkward and ununiformed.

If one wishes to disengage the valuable remnant in Mission architecture, one should go back to the originals from which they were derived, for the local variations which the Friars made upon these originals were due almost entirely to ignorance, and the necessary lack of proper tools, materials and mechanism.

The one respect in which the Mission buildings may in the end have a useful formative effect upon the design of Californian country houses lies in the fact that it did stamp the Spanish tradition upon Californian architecture, and the Spanish tradition is only, it must be remembered, a picturesque version of what may in general be described as the Latin or Italian tradition. But this Spanish tradition has left traces of its former sway in California, which are much more useful to the modern American house builder than are the Missions, viz., the old adobe dwellings, and it is these dwellings which constitute the most valuable model for a Californian domestic style.

The adobe houses, also, are only distant echoes of the highly and carefully wrought Spanish and Italian buildings from which they were derived, but even when erected in a primitive land, and under rude economic conditions, they retained something of the high style of their models. They were long, low, restful structures with salient, but gently sloping tiled roofs, overhanging eaves, enclosed porches or piazzas, and bare stretches of plastered walls.

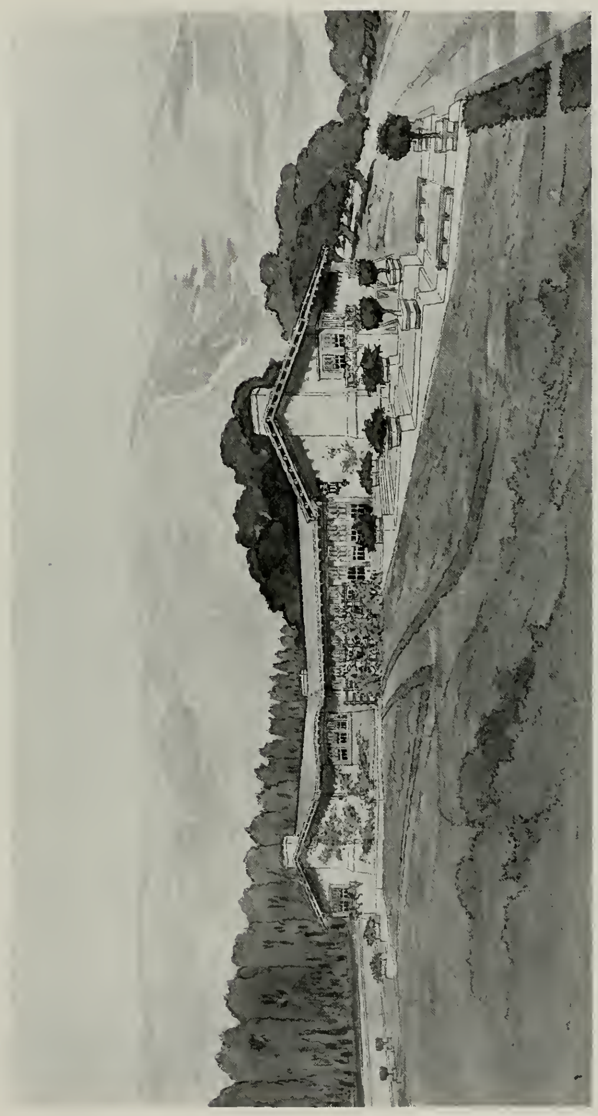
Californians enjoy their country more naturally and more innocently than do the inhabitants of any other state in the Union, and this attitude of theirs toward country life will undoubtedly have an important effect upon the design of their country houses.

In the vicinity of the larger cities the rich are making country places which are intended to afford an opportunity for the most elaborate and expensive pleasures of country life.

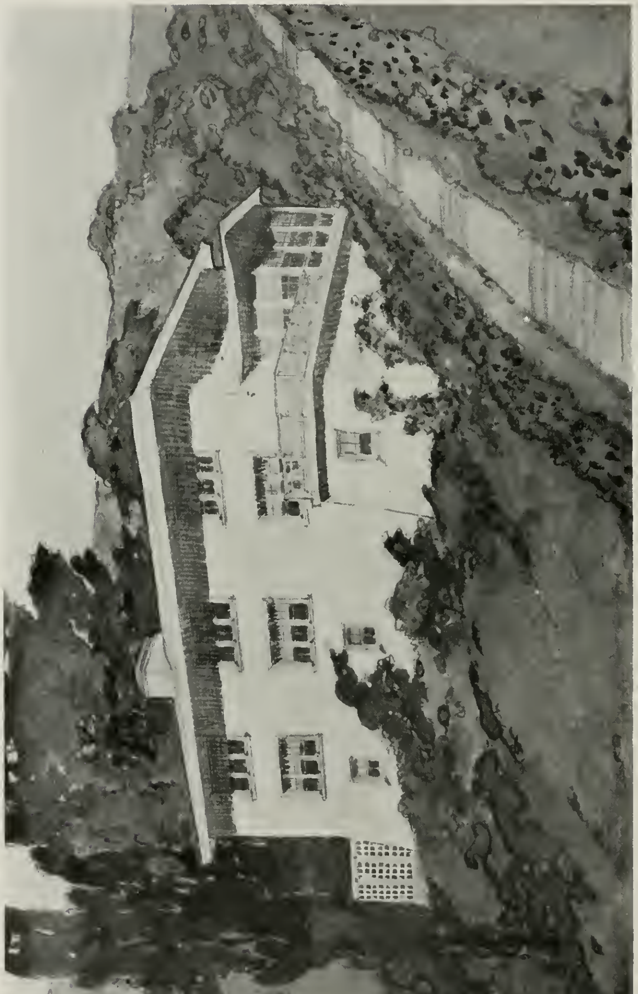
They remind one of the lines and proportions of the ranch houses which I have already described, and in this respect they perpetuate the best available tradition. They tend to be one or two-story buildings, with long, low lines, and with a roof overhanging and dominating the upright members. The piazza, which was so necessary to the farmer in the interior valley, is generally dropped, and an enclosed porch substituted in its place, so that the rooms of the house will receive the grateful sunshine.

Indeed one may safely prophesy that California, more than any other state in the Union, will little by little become the land of great country estates, because not only will the well-to-do Californians themselves seek more permanent and elaborate houses, but the New York and the Chicago millionaire will frequently covet a fitting residence in California, just as an English duke or a German prince has his villa on the Riviera. The Californian country side is assuredly destined to become something more

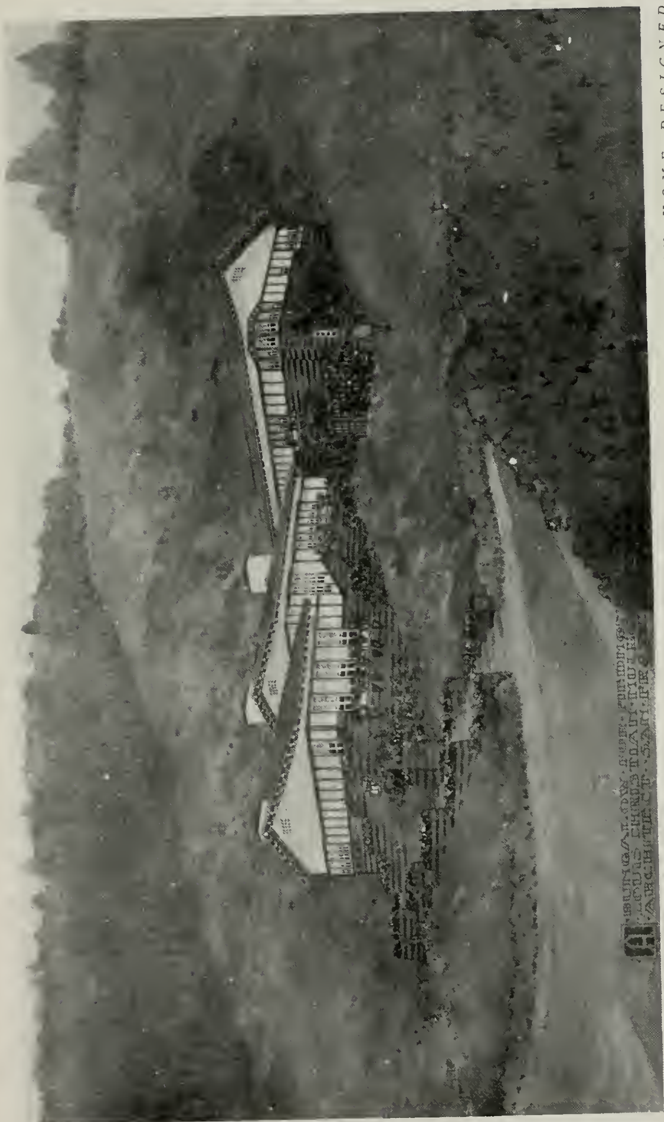
RESIDENCE OF MRS. JAMES MOFFITT, EAST VIEW
LOUIS C. MULLGARDT, ARCHITECT



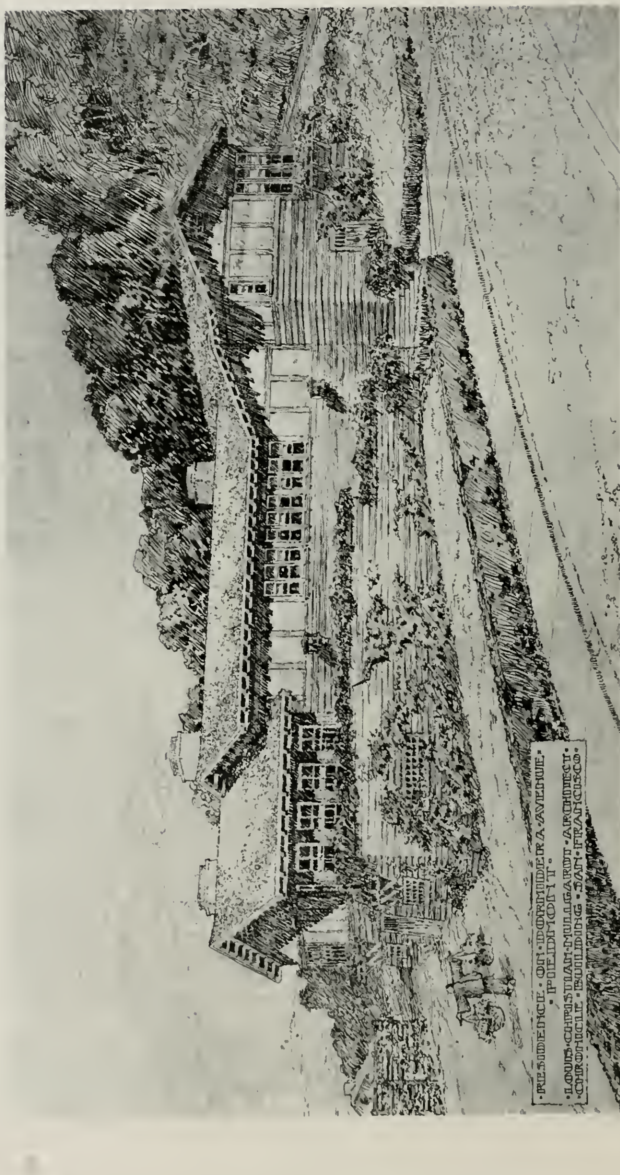
SUBURBAN HOME DESIGNED FOR MRS. LOUIS C. MULLGARDT
LOUIS CHRISTIAN MULLGARDT, ARCHITECT



SUBURBAN HOME FOR WICKHAM HAVENS, INC.
LOUIS C. MULLGARDT, ARCHITECT

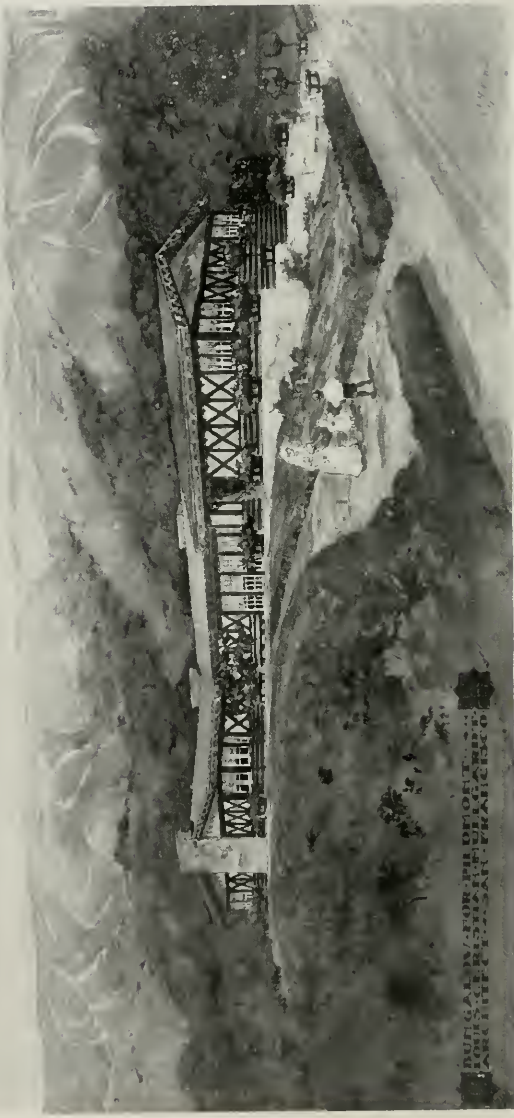


SUBURBAN HOME DESIGNED FOR PIEDMONT HILLS, CALIFORNIA
LOUIS CHRISTIAN MULLGARDT, ARCHITECT

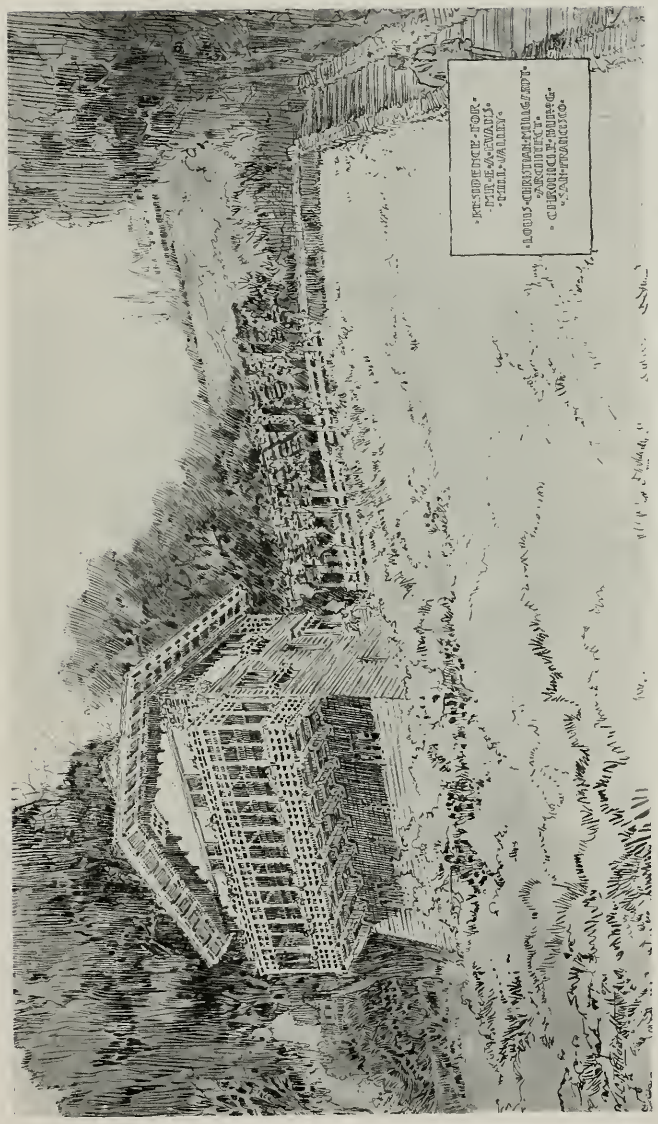


SUBURBAN HOME ERECTED IN PIEDMONT HILLS
LOUIS CHRISTIAN MULLGARDT, ARCHITECT

COUNTRY HOME OF DOUGLAS WATSON, ESQ., WHITE OAKS
LOUIS C. MULLGARDT, ARCHITECT



HOUSE FOR PIEDMONT HILLS
LOUIS MULLGARDT, ARCHITECT



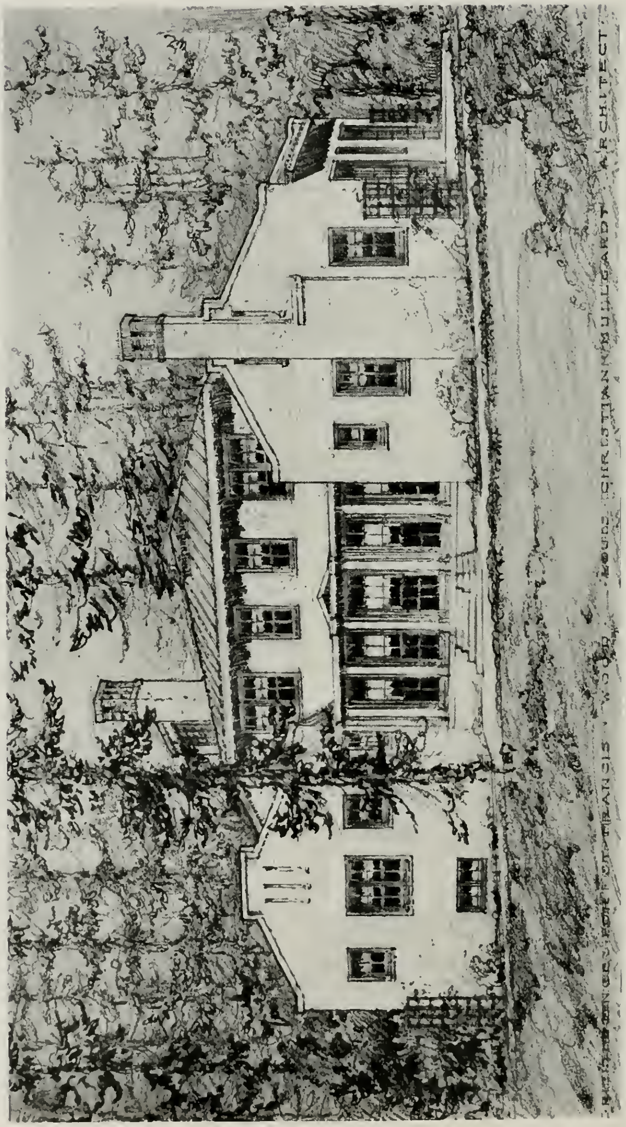
HILLSIDE HOME FOR MR. E. A. EVANS, MILL VALLEY, CALIFORNIA
LOUIS CHRISTIAN MULLGARDT, ARCHITECT

RESIDENCE, GARAGE AND PERGOLA FOR MR.
ROBERT J. TYSON IN THE PIEDMONT HILLS
LOUIS C. MULLGARDT, ARCHITECT

SUBURBAN HOME FOR MR. KENNETH NEWETT, EUREKA
LOUIS C. MULLGARDT, ARCHITECT

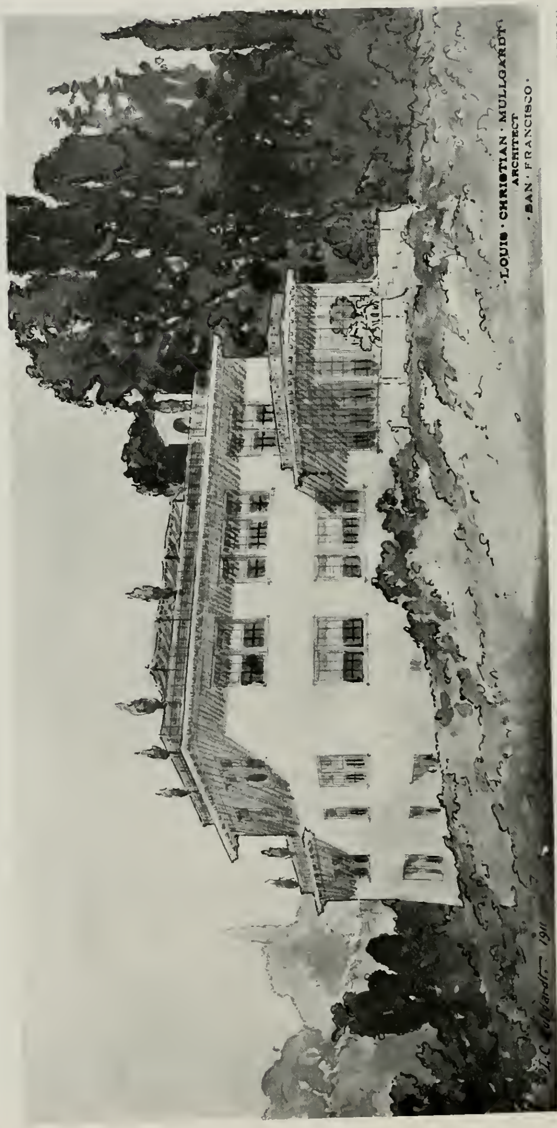
HOME FOR MR. CHARLES W. FORE, PIEDMONT HILLS
LOUIS C. MULLGARDT, ARCHITECT

PRELIMINARY DESIGN FOR THE RESIDENCE OF MRS. JAMES MOFFITT, PIEDMONT HILLS
LOUIS CHRISTIAN MULLGARDT, ARCHITECT

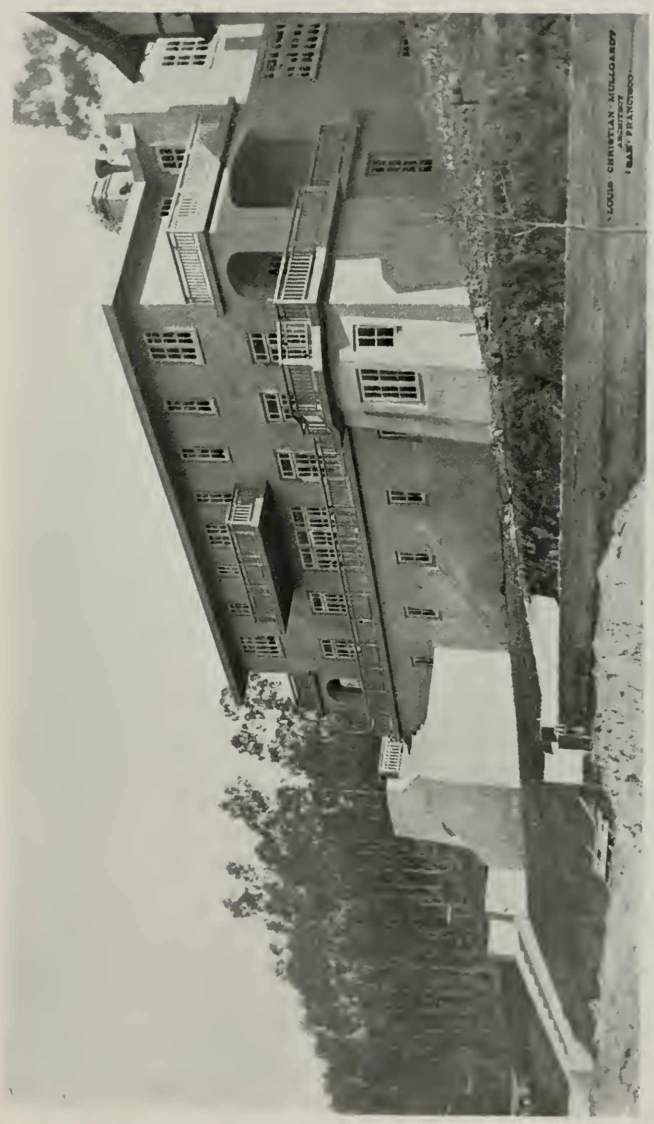


HOUSE ERECTED IN ST. FRANCIS WOOD, SAN FRANCISCO
LOUIS C. MULLGARDT, ARCHITECT

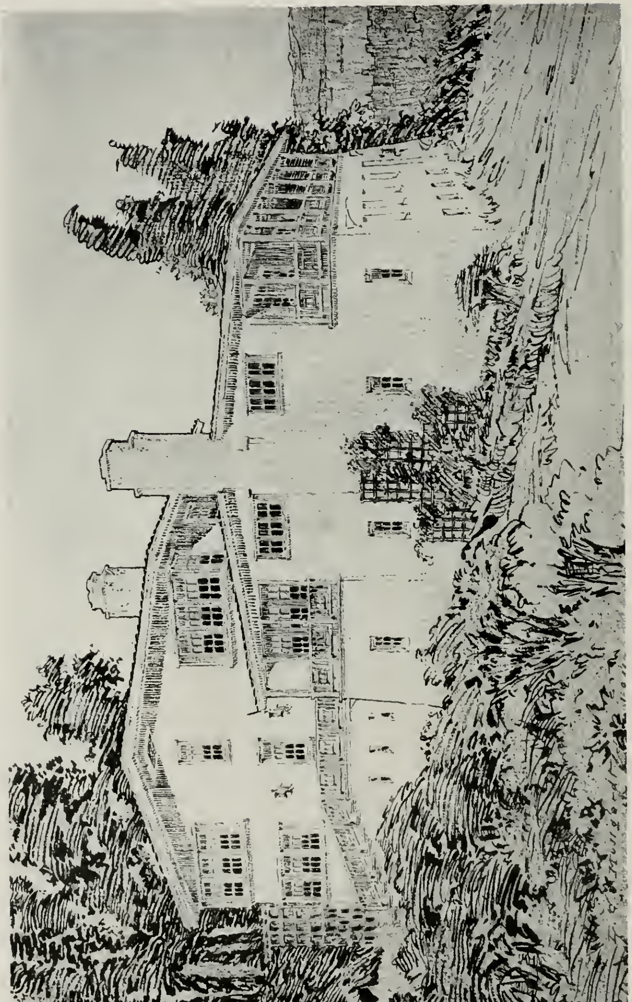
WEST VIEW, SHOWING REAR OF MR. HENRY W. TAYLOR'S RESIDENCE BERKELEY, CALIFORNIA LOUIS C. MULLGARDT, ARCHITECT



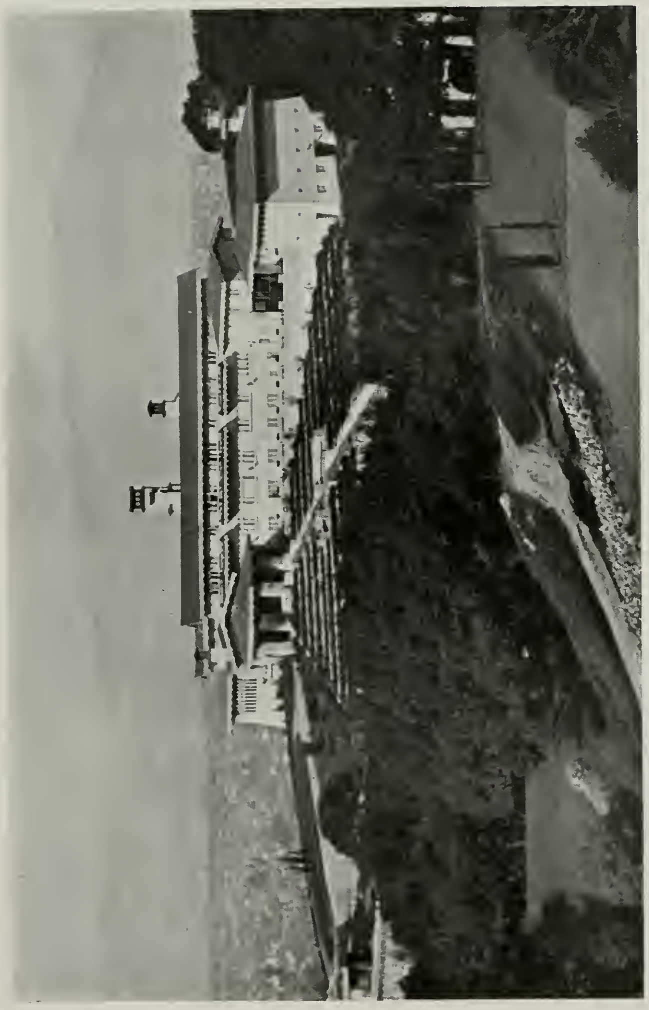
HOME DESIGNED FOR MR. MORTON IN PIEDMONT HEIGHTS, CALIFORNIA
LOUIS CHRISTIAN MULLGARDT, ARCHITECT



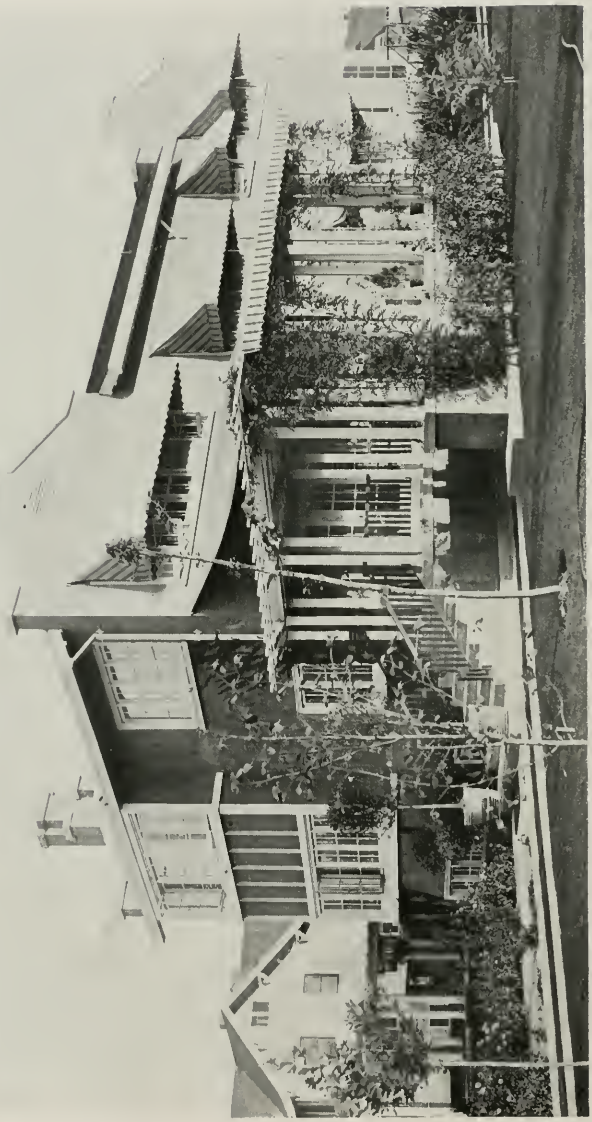
HOME OF MR. ALEXANDER SCLATER, CLAREMONT HILLS, CALIFORNIA
LOUIS C. MULLGARDT, ARCHITECT



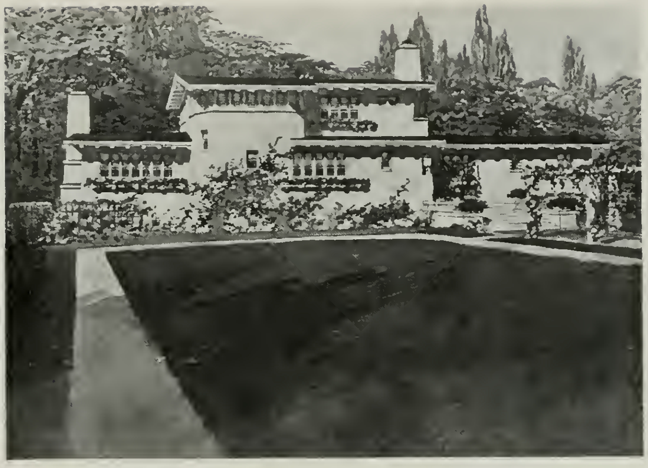
HILLSIDE HOME OF MR. EVERETT M. GRIMES, PARNASSUS HEIGHTS, SAN FRANCISCO
LOUIS CHRISTIAN MULLGARDT, ARCHITECT



EAST VIEW OF MR. HENRY W. TAYLOR'S RESIDENCE IN THE BERKELEY HILLS
LOUIS C. MULLGARDT, ARCHITECT

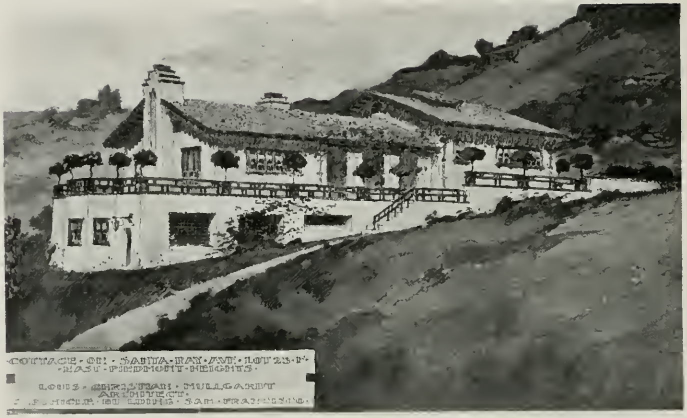


HOME OF MR. C. B. COLBY, BAKERSFIELD, CALIFORNIA
LOUIS C. MULLGARDT, ARCHITECT



THE "POPLARS," A SUBURBAN HOME DESIGNED FOR THE "DELINEATOR"
Louis C. Mullgardt, Architect

HOME OF MR. W. L. WOLCOTT, BERKELEY, CALIFORNIA
Louis C. Mullgardt, Architect



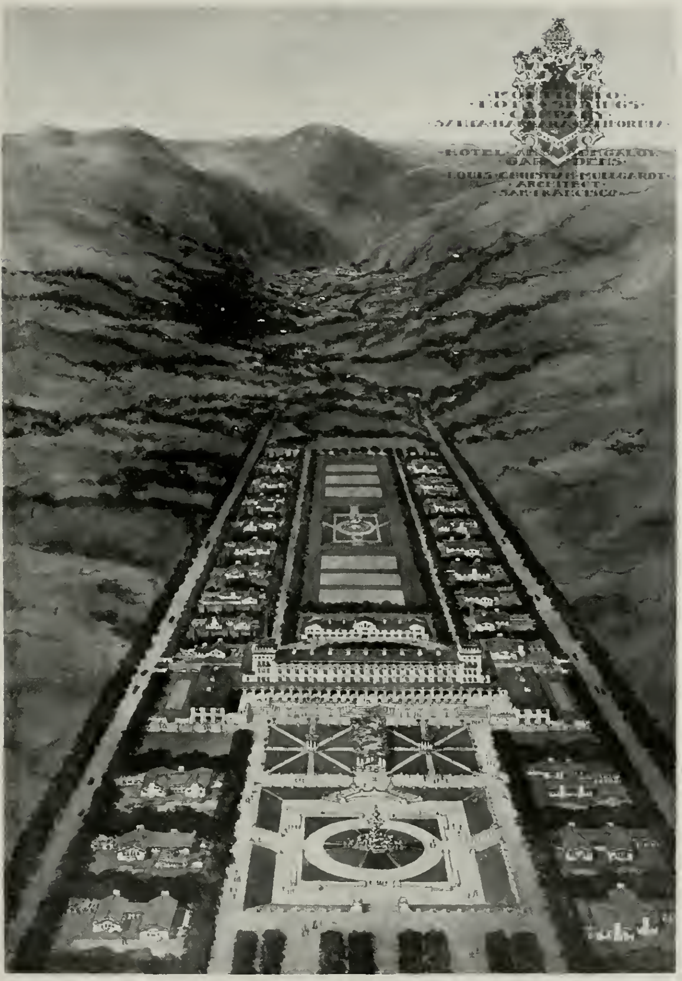
HILLSIDE HOME DESIGNED FOR PIEDMONT HEIGHTS, OAKLAND
Louis C. Mullgardt, Architect

TYPICAL COTTAGE FOR LA PARRA GRANDE
Louis C. Mullgardt, Architect

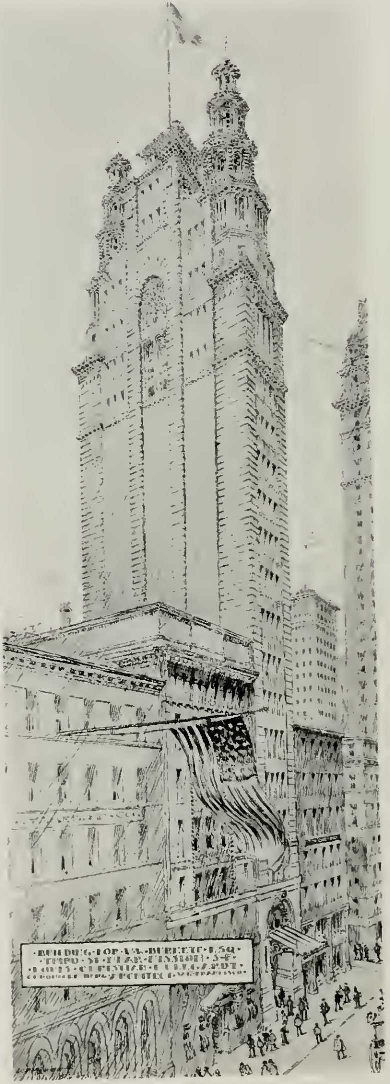
NORTHEAST VIEW, RESIDENCE OF MR. S. O. JOHNSON, BERKELEY
Louis C. Mullgardt, Architect

SCIENTIST CHURCH FOR ALAMEDA, CALIFORNIA
Louis C. Mullgardt, Architect

PERGOLA, POOL AND FOUNTAIN IN MRS. MOFFITT'S GARDEN, PIEDMONT HILLS, CALIFORNIA

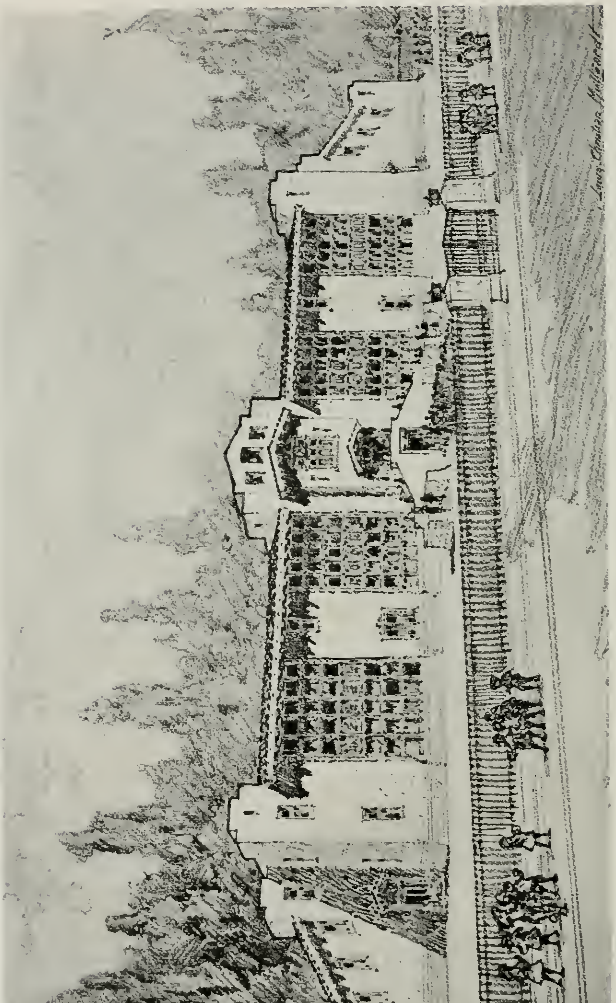


HOTEL, COTTAGES, GARAGE, GARDENS AND OTHER BUILDINGS FOR LA PARRA GRANDE, MONTECITO HOT SPRINGS
LOUIS CHRISTIAN MULLGARDT, ARCHITECT

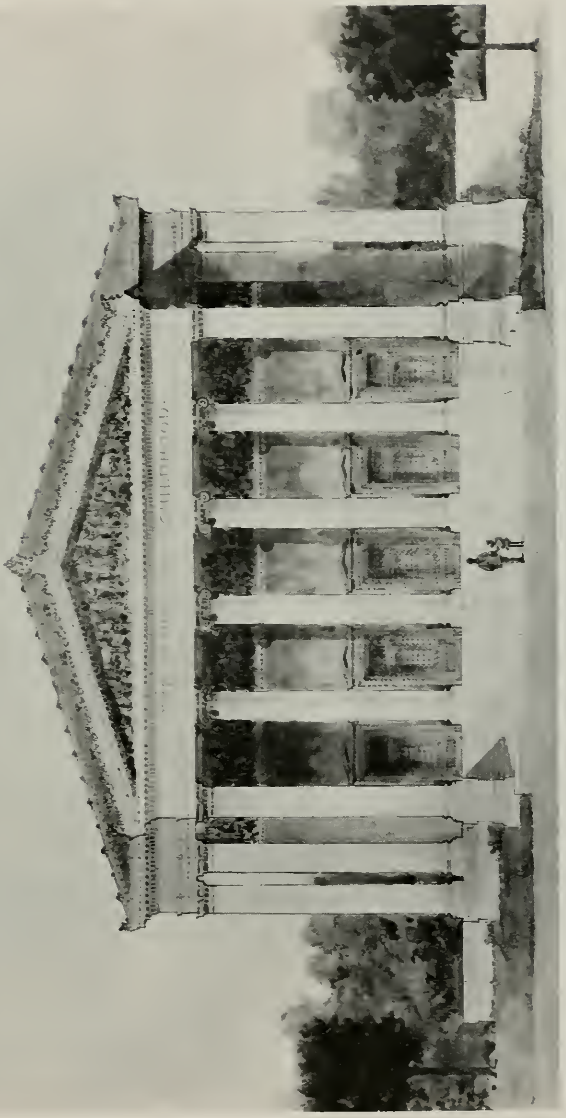


BUILDING FOR THE BURNETT ESTATE, SAN FRANCISCO
LOUIS C. MULLGARDT, ARCHITECT

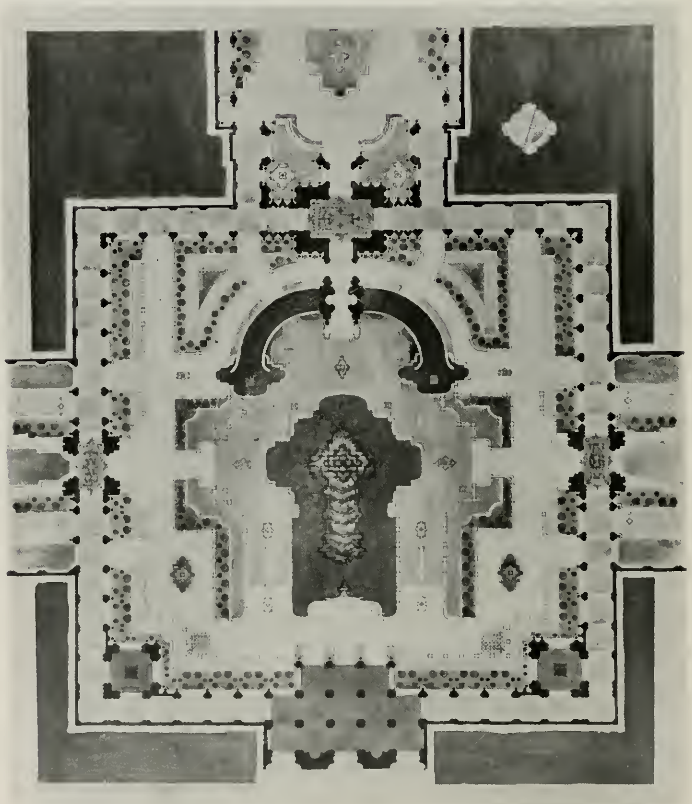
COMPETITIVE DESIGN FOR THE PERRY MEMORIAL AND LIGHT HOUSE, SOUTH BASS ISLAND, LAKE ERIE
LOUIS C. MULLGARDT, ARCHITECT



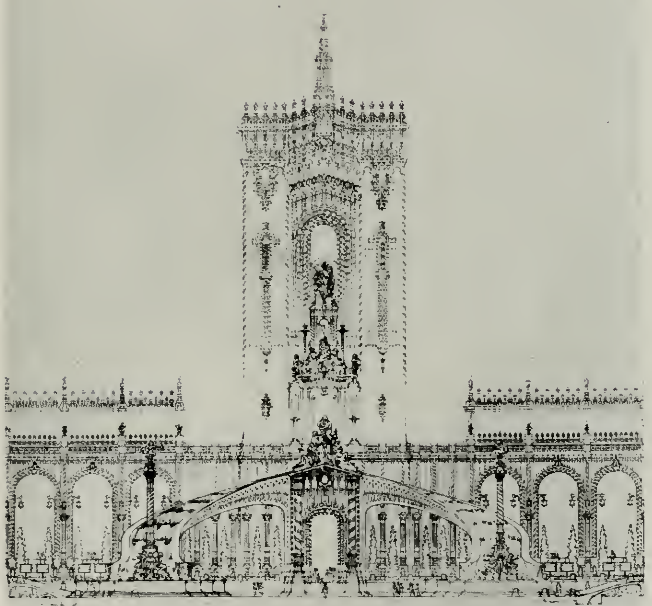
THE DURRANT PUBLIC SCHOOL BUILDING BEING ERECTED IN OAKLAND, CALIFORNIA
LOUIS C. MULLGARDT, ARCHITECT



TEMPLE OF CHILDHOOD, AN EDUCATIONAL STRUCTURE, TO BE ERECTED AT THE P. P. I. E., AND DEVOTED ENTIRELY TO THE INTERESTS OF CHILDREN
LOUIS CHRISTIAN MULLGARDT, ARCHITECT

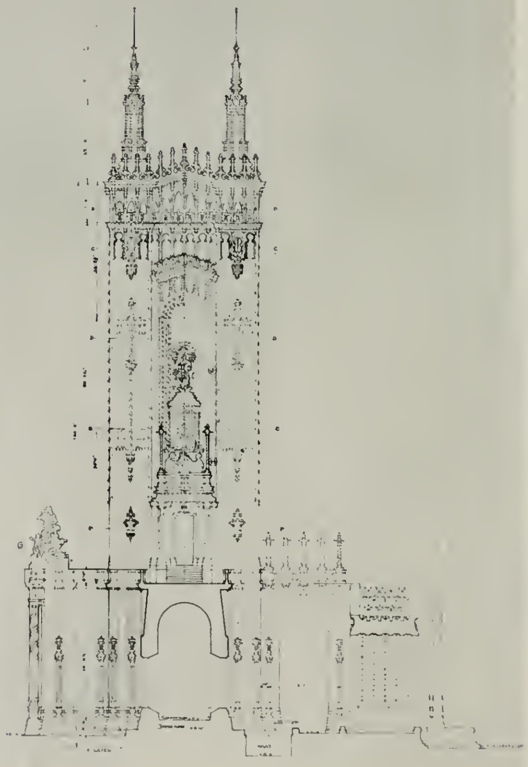


PLAN OF THE COURT OF THE AGES,
PANAMA - PACIFIC EXPOSITION
LOUIS C. MULLGARDT, ARCHITECT



SOUTH ELEVATION OF CHIMES, TOWER AND CASCADES, COURT OF THE AGES, P. P. I. E.

These Cascades Symbolize the Wonderful Phenomena of the Appearing and Disappearing of Water. They Are Overgrown With Slender Water Plants; at Night They Are Mysteriously Illumined from Underneath. *Louis C. Mullgardt, Architect.*



WEST ELEVATION OF CHIMES TOWER,
COURT OF THE AGES, P. P. I. E.

"LISTENING TO THE STORY OF THE AGES,"
NORTH AVENUE, COURT OF THE AGES,
SHERRY E. FRY, SCULPTOR

PREHISTORIC FIGURE, "MAN FEEDING A PELICAN," TO BE USED AS ONE OF THE FINIALS OVER ARCADE OF THE COURT OF THE AGES, P. P. I. E.
ALBERT WEINERT, SCULPTOR

SIDE APPROACH, ARCHES AND ARCADES, COURT OF THE AGES, P. P. I. E.

than a granary and a fruit garden for its permanent residents and a health resort for birds of passage.

Certain favored parts of it are manifestly destined to be an ornamental garden for Americans, both from within and without the state, who want and can afford the most elaborate and highly wrought pleasures of country life.

It is the design of these large houses in particular which need to be influenced by a single good and appropriate style.

The Californian country side, while neither English, French, nor even Italian, is something better than any of these. It is normal. It is temperate. It is well balanced.

It is classic. Like all classic and normal things, it makes its effect by a mixture of daring and discretion, and is as free from timidity on the one hand as it is on the other from excess. The architectural and horticultural embellishment which it receives should partake of the same character.

It should seek effects which are both simple and vivacious, but whose simplicity is not obtained by mere reticence and elimination, and whose vivacity is neither disorderly nor bizarre. Its simplicity that is, is precisely equivalent to a triumphant mastery of all the elements, either natural or architectural, which contributes to the total effect. Its architecture should not mutulate the natural grace of the countryside in the interest of some stiff and rigid scheme, but neither should it fear to impose an appropriate architectural scheme upon the round contours of the hills.

It should neither try to imitate natural effects in its architecture and planting, nor should it seek to sear the landscape with lines which ignore and disregard such natural effects.

Just as it is the part of good manners to be polite and cordial without being stiff and insincere, so it is the part of good landscape architecture to be formal and self-possessed without being unnatural and prim. In the absence of such intimate and successful combination between the artificial, practical and aesthetic needs of men and the artless irregularity and diversity of nature, the architecture of a country house and its grounds cannot possess any classic propriety of form.

The design of every country house, which is a matter of serious architectural consideration, should be approached from two points of view—the point of view of how the house will look in relation to the landscape, and how the important features of the landscape will look when seen from the house in relation to the necessary artificial arrangement of its grounds.

In the case of the country house in California, the first of these points of view is of more than usual importance. The coast country consists throughout of small hills and valleys, and the tops of these hills will naturally be generally chosen as the sites for dwellings. In such situations these houses will be conspicuous features in the landscape. They should be designed so that they will neither be out of place on their hills, nor merged inconspicuously into them and the surrounding trees. They should consequently be buildings which are long in proportion to their height, because a house which is cocked up in the air does not look well on a hill, and because the live oaks which will be planted in their immediate vicinity are not big enough in scale to provide a proper background for a tallish building.

The walls of these houses should be light in color, because a very positive color is the best means of emphasizing a building, which is both conspicuous and is surrounded by trees, and because white or gray houses look well in the brilliant California sunshine.

It should have a gently sloping roof, but one which is broken in outline, large in surface, gay in color, and emphatic in the shadow which is cast by its eaves. A building in the foregoing type would resemble in some respects an Italian villa, but it would have many characteristics which depend upon local conditions. It would be a more picturesque building than the Italian villa usually is, because the American taste for the picturesque is too strong to be disregarded. Its walls should be pierced by many more openings, because the sunlight is grateful and necessary, even in California, and because the plan of a modern American house demands a large number of rooms and consequently of windows. Then again, the amount of ornamental detail to which one is accustomed in Italy might well be reduced on these houses, because in our country such detail costs more than it is worth.

Sculptured ornament there will be, of course, but the architect should depend for his effect upon the masses and color of his building, and the shadow it casts, and its plainness should be relieved chiefly by trees, shrubbery and vines.

When we come, however, to consider the house, not from the point of view of its place in the landscape, but as a means of introducing its inhabitants to the countryside and there amusing them, we reach a very different set of requirements. The house must not merely hold its own in the landscape without becoming an excrescence, but it must be planned in relation to its surroundings so as completely to satisfy the complicated practical aesthetic needs of its inhabitants. Such is the meaning, the purpose, of formal landscape architecture and gardening. The formal treatment of a country place does not consist, as many people seem to imagine, in laying out straight roads and paths irrespective almost to the nature of the ground, and then outlining or terminating them with walls and pergolas.

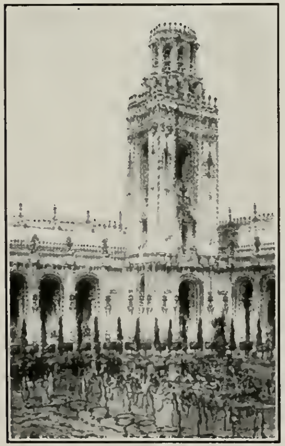
It consists, first, in laying out the roads, approaches and buildings connected with the estate so that convenience will not interfere with the good looks. It consists, secondly, in effectively outlining the most beautiful landscape views, which are accessible in the immediate vicinity of the house and in shutting off those which are not beautiful. It consists, finally, should a flower garden be wanted, in giving that flower garden a size, a layout and a frame which is adapted to its situation and its necessary natural and architectural surroundings.

This is not, however, an essay in landscape gardening, and I cannot go any more into detail. But it was desirable to give some idea of the house and garden which was adapted to the coast country of California, because that country manifestly demands a certain kind of architectural treatment. Such methods of treatment may or may not come to prevail, but whatever authority the architectural profession can exercise in California should be used in their favor. So rare and perfect an opportunity exists nowhere else in the United States, and it remains to be seen whether Californians will have the good sense to use it discreetly. They will have every temptation to go astray, and to disfigure the landscape with an eruption of architectural and horticultural blotches, because it is a country in which almost any kind of house is practical and almost any kind of plant will grow.

Nevertheless there are at least some reasons for believing that they will come to appreciate the desirability of treating such a simple, temperate and normal landscape in a simple, temperate and normal spirit.

The Californians love their country without affectation and without effort; they possess a greater potency of successful achievements in the arts than do the inhabitants of any other single section of the Union; and, best of all, they have shown an unusual power of co-operating either formally or informally to accomplish some purpose which is recognized to be good. They show an active and adaptable intelligence, that is, without being arbitrary and perverse in its exercise, and they may well reach some common sensible understanding about the sort of country house best adapted to their countryside.

The Court of the Ages.



Echo Tower "Festal Court," Panama-Pacific International Exposition

The Court of the Ages (sometimes known as the Court of Abundance and Festal Court) of the Panama Pacific International Exposition, partly illustrated in this issue, is one of three inner courts. The inner courts are like great rooms within an enormous structure, having the sky as ceiling.

The architectural style of the Court of the Ages is similar to the Spanish Gothic.

This court will be seen as a unit. It is 340 feet square. The avenue extending north to the esplanade is 156 feet wide and 475 feet long. The four palaces surrounding this court and flanking North avenue are over 70 feet high. The court has a continuous cloister on its four sides, 20 feet wide and 50 feet high; above and back of this the palaces form a clerestory. The chimes tower is 200 feet high and connects with the avenue leading to the esplanade. It is designed to contain a complete set of electrically controlled chimes suitable for the rendition of classical music. The echo towers are 150 feet high, the three towers forming an equilateral triangle in plan. The side approach arches accent the east and west avenues, which link the three inner courts.

The theme of this court is based on the world's geological development. Effects of water and fire as constructive elements are symbolized by cascades, sculpture, architectural embellishments and mural paintings. Mural panels within the cloister symbolize water, earth, air and fire.

The court has three levels, the middle portion, being the lowest, affords an unobstructed view from the cloister and the outer or second level of the court.

The cascades symbolize the activities of water. They are overgrown with long slender plants through which the water flows.

The central basin contains a processional fountain symbolizing the ages and the progressive growth of life upon earth. There will be cypress and orange trees in front of the arcade. Ferns and creeping plants will trail into moats which mirror the cloister.

The sculpture of the chimes tower illustrates the world's progress. The color and texture of all walls will be that of Roman Travertine stone. Everything will be viewed under the most favorable modern lighting.

Pools, bordered with low growth, will be in the north avenue. The main tower and the colossal sculptured figures will be reflected in these pools. The walls of this avenue will be enriched with eucalyptus and magnolias set in a low tangle of plants.

The principal entrance to the Court of the Ages is from the south. A deep-set arcade, out of which one sees the sunlighted chimes tower and cascades. In the immediate foreground is the basin and fountain.

The cascade terminations have groups of water sprites, the columns are surrounded by figures symbolic of Neptune's reign.

* * *

Architect's Duty Two-fold.

MR. FREDERICK L. ACKERMAN, A. I. A., explains in his paper on "Present Unfortunate Conditions of Practice and the Remedy" (Journal of American Institute of Architects) that the task of the architect is two-fold. "As architects and as artists our duty is to formalize and to express in material form the activities and thought of our day. This we do quite unconsciously in our offices, and our achievements there are an exact measure of our individual ability and the limitation set by the people in their laws and ordinances. No amount of inspiration, no degree of talent, will carry us beyond a simple expression of the demands and desires of the people, and the limits set by them in the laws and ordinances which stand as the principal factors in our progress.

"As citizens, our duty is to provide the conditions for a better architecture. Our knowledge of the arts, the logical nature of our training, and our attitude of mind towards such problems entitle us to the position of directing the forces which are at hand. We know the nature, the importance, and the necessity of the laws needed. We also know better than the people why these laws cannot be passed, for we have tried and failed.

"Our task, therefore, if we are to spend our time and effort in other than a useless endeavor, is to explain to the people by every honorable means within our power, and in terms of logic and common sense, the simple nature of our ideals, to the end that all shall come to understand and realize that idealism of the architect and the desires of the people for a habitable city are but the same thing."

Are Engineers Underpaid?

OF COURSE, it could not be claimed that the average compensation of this profession is excessive; nobody claims or supposes that civil engineers as a class are getting rich out of their professional work, says the Engineering News in editorially commenting on the statistics collected by the American Society of Civil Engineers. But if the average civil engineer at the end of five years' experience is earning $2,000 a year, increasing at the end of 11 years to $3,000 a year, and to $4,000 at the end of 15 years and $5,000 at the end of 21 years—if the average civil engineer gains this much return from his professional work, then he has small cause to complain. There can be little doubt that he is doing better than the average physician or lawyer, to say nothing of clergymen and teachers.

But are these average earnings thus compiled really the average earnings of the civil engineering profession? We do not believe that these earnings by any means represent the average compensation of engineers. Rather, they show the average earnings of those who achieve exceptional success in the profession; and that changes their whole significance.

In the first place the membership of the American Society of Civil Engineers represents the men who have succeeded in the profession. In the second place, the professional requirements for membership distinctly limit the privilege to those who are or have been "in responsible charge of work," as the society's constitution puts it.

It would be interesting to inquire what percentage of the civil engineers of the United States hold membership of one grade or another in the American Society of Civil Engineers.

*
* *

Government Offers a Billion Feet of Timber.

Secretary of Agricultrue Houston has offered for sale one billion feet of western yellow pine timber on the Kaibab national forest in northwestern Arizona, just north of the Grand Canyon of the Colorado.

This sale is the largest yet proposed by the government, and was recommended by Forester Henry S. Graves after a personal examination, supplemented by a careful investigation on the part of the logging engineers of the forest service. They reported that this amount of timber not only could be cut in accordance with forest principles, but that it would be necessary to offer at least a billion feet as a sufficient inducement to warrant the building of a railroad and other facilities to develop the timber and other resources of the region.

Bids will be received for this timber up to June 15, 1914, and the minimum initial prices which the government will accept for stumpage are $2 a thousand feet for yellow pine and $1.40 a thousand for fir and spruce. These rates will be adjusted at the end of every five-year period, the readjustments being based on the current market price at the end of such period. Three years will be allowed for the building of the railroad, and twenty-five years for the cutting of the timber.

*
* *

Don't expect outsiders to give you a big rating on a one-inch space.

Some Waterproofing Problems*

By LOUIS G. MAUER

THE task assigned to me this evening—that of addressing you on the problems of waterproofing, is one that should, perhaps, be handled by a person more competent than myself. However, it is not my purpose to enter into an extended discussion of the history of waterproofing and the merits of the various preparations on the market. My intention is to tell you my experience in solving the problems that have come to me. I want to tell you about waterproofing as I have seen it in the ten or more years that I have made it a specialty.

Every architect here knows very well that when he gets a client, two factors must be taken into consideration. One is results, and the other is cost. The client who doesn't demand the most possible for his money has something the matter with him and ought to see a physician. It is the most natural thing in the world for a man to look to his architect for results, for that is what he hires him for. And while the results are wanted in generous quantities, the cost factor must not be overlooked. Keep the cost down, he tells you, and in the same breath he demands the best results possible. Just as you architects are required to give your client satisfactory results, so each contractor must perform his respective part of the work in a creditable manner. Unfortunately the factor of cost is too frequently looked upon by clients as the most important thing to be considered. In such cases the architect is powerless to provide the things that he knows will insure best results. His alternative is to provide a substitute, which invariably is an inferior article. This "penny-wise-pound-foolish" policy was only too apparent during the recent heavy rains. What cheap waterproofing did to some of our best buildings is too well known to require further exploitation here.

Now the problem that interests all of you is how to obtain most satisfactory results in waterproofing at a minimum cost. There are two classes of waterproofing—one underground, the other above. Underground work, as a rule, is subjected to water pressure either by seepages, springs or direct pressure where basements are below tide or streams. Work of this character requires an entirely different method of treatment than waterproofing the building above ground, since it must effectually resist a constant water pressure.

Walls above ground are not subjected to constant water pressure, therefore they require a treatment to be water repellant; that is to say, a remedy to prevent the absorption of water.

There are four distinct methods employed to accomplish waterproofing results:

First. By density of the materials from which your walls are constructed; density of the material itself or the aggregates of which it is composed.

Second. By the membrane system. This method is used principally for underground work. For floors it is placed between concrete slabs, or on the outside of walls where the water pressure is against the wall.

Third. By a surface coating composed of asphaltum, tar, or any oil base material. The latter being water repellant, fairly good results are obtained. A surface coating is only efficient, however, as long as the material applied remains intact.

*Extracts from and a few additions to a paper read before the San Francisco Chapter, American Institute of Architects, February 19, 1914. Mr. Mauer is manager of the Imperial Waterproofing Company of San Francisco.

Fourth. By non-absorption or the elimination of capillary attraction. The material I have found to accomplish this result is a chemical solution having a water base, and which can be readily mixed in the cement aggregates for either underground work or surface application above ground.

In regard to the first method—Density—you are probably all aware that the aggregates of a concrete mass or cement mixture may be proportioned in such a manner as to obtain a density that will not permit the perculation of water, but to obtain this result in a concrete wall or plaster surface after they have hardened would incur a task that would not be practical for ordinary construction, nor could this method be judiciously applied to a brick wall which is always more or less porous and absorptive.

The second method, the membrane system, is one that is very successfully used. To adopt this method for floor work it is necessary to place a concrete slab, then the membrane system, composed of asphaltum and felt, in such number of layers as deemed necessary, then the additional slab of concrete. The upper slab necessarily must be of sufficient strength to withstand the hydrostatic pressure. The actual cost of this method is the felt and asphaltum membrane, plus the cost of the lower slab of concrete. The membrane being composed of an absolute foreign material to the concrete does not become a component part of either slab or concrete—in fact, separates them entirely, the only bond between the two slabs being the cohesion of the asphalt itself.

Although it is claimed that the membrane system of waterproofing is to a certain extent elastic, still, it is frequently found that breaks occur when the concrete slabs develop contraction cracks, thereby impairing the results of waterproofing efficiency.

The membrane system is also used on the exterior of walls. This requires the necessary excavation to give room for applying the membrane. The cost of this work is the membrane plus the cost of excavation and back-filling of same, and in many cases a protection wall. If for any reason a membrane system could not be applied on the outside, and same would be adopted on inside of wall, it would be necessary to construct a special wall; otherwise, if the water should percolate through the outer walls, it would press away the membrane. The cost of this work for inside walls would be the cost of membrane plus the cost of wall to hold the membrane in place.

If, for any reason, breaks should occur in the membrane system, permitting water to penetrate the membrane, it would not necessarily mean that the break is where it shows on the surface, as the water may travel some distance between the membrane and the upper layer of concrete before finding the weakest point to the surface.

The third method—surface coating—is used quite extensively for treating walls above ground, and to a certain extent for underground work as well.

By applying a good surface coating of asphaltum, tar or any oil-base material where the water pressure presses the coating against the wall, good results will be obtained so long as the life of the asphaltum or oil is retained in the coating. As a rule the oils are quickly absorbed when applied to any absorptive surface, leaving the solids of the coating as a more or less inert substance with its binder, in fact, its principal element of life, separated. To avoid this it is very important to have a foundation that will prevent the separation of oils and solids contained in the surface coating.

To apply a surface coating on the inside of walls under plastering, the so-termed damp-proofing or plaster-bond coat is, in my opinion, an absolute waste of the expense incurred. This applies to all material without exception. Whenever a wall is thoroughly saturated with water from the outside up to the point of the damp-proofing coat, there is no material, be it ever so elastic, solid or efficient, that will withstand the pressure. As a matter of fact it must then withstand a direct water pressure instead of being only a water repellant at intermittent intervals.

The fourth method—non-absorption—means the elimination of capillary attraction. Under this method and by using the materials referred to I have accomplished results on those problems that have come under my direct supervision, both underground where subjected to severe water pressure, and in treating buildings above ground by surface application. This material is a chemical solution (water base contains no oils), penetrates an absorbent substance and becomes a part thereof, accomplishing the waterproof results, not by the filling of voids or a surface coating, but by making the substance to which applied non-absorptive and impervious to water.

If you will carefully analyze the fact, you will find that even a very porous material containing a large percentage of voids will not become saturated with water unless it is absorptive, nor will you find that water will follow fine cracks in any surface, unless the substance itself has suction and absorb water. Now, then, this being a fact, the method of waterproofing by having the aggregate of the material made non-absorptive to resist water pressure and eliminate capillary attraction, for all surfaces exposed to water absorption at intermittent intervals, is one that will solve many of your difficulties.

Let us first consider its application for work below ground. In basements we accomplish results by the most direct and simple means. The plastering of the walls on the inside with waterproof mortar and the floors with waterproofed mortar topping, thereby saving the expense of exterior excavation and cribbing which would be necessary in order to apply a membrane or surface coating to the outside.

On new work where walls are green and bonding of plaster certain, no greater expense is involved than the nominal cost of the waterproofing material, which is to be added to the sand and cement for plastering and topping.

But in old basements or any surface not permitting a perfect bond, quite a different problem presents itself. Here the surface to be plastered must be carefully prepared to insure proper bonding of plaster by roughening the surface. We all know the weakest point is the angle between the floor and wall, therefore particular care must be taken to reinforce this point by forming a cove so as to make the connection between the floor topping and wall plaster continuous.

Should the argument be advanced that floors or walls waterproofed are liable to crack, thereby causing leaks, let me say that the chances are very slight indeed, if the walls are properly designed and constructed and the floors thick enough to resist the hydrostatic pressure.

Walls and floors that crack due to contraction or expansion or other causes will sever or open up a membrane almost as quickly as a plaster coating. And what is the result? A heavy expense is incurred, owing to the fact that the break in the membrane may be many feet away from the point where the leakage shows on the surface. With the membrane method repairs are virtually impossible, while a waterproof plaster coating may be quickly and permanently repaired at very small expense. The leakage always exists where it shows on the surface. The cracks could easily be cut out to a certain depth and pointed up, making same absolutely water tight.

Many basements in our city presenting all sorts of conditions from seepage of ground water to tide pressure have been successfully waterproofed with this method.

Time does not permit going into this subject to such an extent as it might justify, but permit me to say, I would not hesitate to undertake to make absolutely dry any basement under the most severe water pressure by plastering it on the inside and using this material as a part of the water gauging the cement and sand mortar. This mortar can be applied even while the water is percolating through the wall.

If necessary the mortar could be held in place with boards pressed against the wall. This might develop small holes, permitting the water to escape, but which could easily be plugged up after the other portions are thoroughly set. Cement mortar applied on walls saturated with water will gradually dry out even with the water pressure against the wall.

No doubt this question will come to your mind: will the use of this material, used in the aggregates of cement mortars, be detrimental to its strength or cause additional labor in its use? In answer to this, I wish to state that on the contrary the use of this material is a decided advantage; the initial set is somewhat retarded, but in thirty-six or forty hours you will find the cement mortar much harder and stronger, this in comparison with equally proportioned cement mortar gauged with water alone. The working of cement mortar is also made much easier and smoother, the action being similar to that obtained by the use of lime putty in cement mortar.

For treating a building above ground, the result can be obtained by a thorough surface application, by either brush or spray, preferably the latter. By this I mean every particle of the wall must be saturated. This will leave no surface coating and will not change the color or texture of any surface to which applied, be it a white sand or a lime stone or a red brick. A surface application will only give results and become effective when applied on any absorptive material.

Take, for instance, a porous brick. It requires very little effort to obtain penetration with this material of ¼" or even ½", and to this depth waterproof results would be found, permitting you to remove a part of the surface and texture of the brick, without destroying the waterproofing efficiency.

The method employed for treating walls that require a change of color is this: Waterproof as above mentioned, then apply any concrete paint for color effect only. By treating the walls with this material you have the most perfect foundation for any oil base material. The surface made non-absorptive prevents the absorption of the oils in your paint pigments. This, as you all know, is the life of any oil paint.

At this time I wish to caution you to guard against careless workmanship by the individual mechanic, the economical use of the material contrary to directions and requirements, and the lack of knowledge of these special problems by those in charge of the work.

Architectural Acoustics—Fundamental Principles*

IN TWO PAPERS—I

By JOHN T. VAWTER, Architect

WE are apt to think of the subject of architectural acoustics as a comparatively new one, but upon a little investigation we find that its history began centuries ago, long before that of many of the more perfectly developed sciences which we now regard as venerable.

Modern writers seem fond of classifying the subject with the so-called "lost arts," and numerous articles and references may be found claiming that the Greeks were once masters of the science. Some of these statements are backed by the results of special investigations of the old ruins and the logical conclusions drawn therefrom, but in all cases known to the writer these arguments, however logical and however closely knitted in their association of ideas, contain some oversight of the well established laws of physics, and with all due regard to the sagacity of that wonderful people it remains yet to be proven that the Greeks were ever in possession of more than an intuitive knowledge of the science of acoustics.

If such a statement is to carry any degree of conviction we must give some attention to the reasons behind it, but in so doing we would be compelled to make other statements not yet proven, so for the present let us leave the question to be answered by implication in the remainder of the paper, remembering that if the science of acoustics is proven to be based upon the "laws of motion" and "the law of the conservation and interchangeability of energy," and those alone, we may then rightfully pass the burden of proof to those who would maintain that the Greeks were familiar with these laws and that they themselves belong to the lost art class and were merely rediscovered by such men as Galileo, Newton, Joule and Helmholtz in modern times.

These laws are the basis of all engineering design and practice and of all scientific, physical research. In all problems involving their principles we must start with them in reasoning from the known to the unknown and their application to literature on the subject of acoustics is a safe and sure test of what should be accepted and what should be rejected. A more or less disregard for these laws or perhaps in some cases an ignorance of them, has led to a common treatment of the subject of acoustics as a problem filled with unexplicable mysteries only to be approached by those versed in a half supernatural power, much as the problem of legerdemain, witchcraftry and spiritualism are supposed to be approached.

Superstitions Have Vanished

Such an attitude has left the science undeveloped through ages and it is to Professor Sabine of Harvard University that we now owe the present rational method of attacking the problem. The superstitious element has vanished; there are no more mysteries; the stretched wires, the empty beer bottles, the unnailed sheathing, the roughened plaster, and the draped chandeliers are no longer offered upon the altar to appease the wicked god of auditory disturbance.

In place of these we are turned to old familiar laws of universal application, and a few mathematical formulas so simple and easily understood in their handling that it makes little difference whether or not we are able to derive them for ourselves.

A review of these natural laws may not be out of place here, even though they be so well and universally established, for they are many faced laws and our recognition of them often depends upon the angle by which they are approached.

*Paper read before the Southern California Chapter American Institute of Architects, March 10, 1914.

The Law of Motion

Newton has given us the laws of motion in three postulates, as follows:

First: Every body (particle) continues in its state of rest or uniform motion in a straight line, except in so far as it may be compelled by external force to change that state.

Second: Change of motion is proportional to the impressed force and takes place in the direction of the straight line in which the force is impressed.

Third: To every force there is a corresponding force equal in magnitude and opposite in direction.

Here then is our starting point, the same point from which we started in the solution of stresses in trusses, beams, girders and columns and the basis of our design in wood, steel and concrete. These old familiar friends are welcome at any time and a feeling of confidence springs up when we realize they can again assist us over the difficulties which appeared insurmountable in our first survey of the problem of acoustics. As a statement, however, this may not be quite acceptable without a word of proof. We may say these laws are good and true but they are the laws of dynamics dealing with matter, motion and force, and so far we are not certain that the propagation of sound has anything to do with these elements. Our doubts could only be allayed by experiments but if we should provide ourselves with a large glass tube with closed ends in which a bell had previously been placed so as to ring when the tube were swayed back and forth, and if all of the other materials and apparatus mentioned below were at our hand we could doubtless prove to our own satisfaction that the production of sound depends upon not one but all of the elements of dynamics.

Dynamic Theory of Sound

Suppose the tube to be closed air-tight but filled with air; we sway the tube and hear the ringing of the bell. Suppose then we replace the air of the tube with hydrogen, oxygen, or gases of mixed elements and each time sway the tube; we find in each case that the sound of the bell is audible and we would also find that the volume of sound were proportional to the specific gravity of the surrounding gas. Futher experiments might be carried on by compressing the gases to different degrees and in each case we would find that the denser the medium the better the sound would be transmitted. Now let us exhaust all gases and air from the tube, leaving it empty; no matter now intervenes between the bell and the walls of the tube, we sway the tube and see the clapper strike the sides of the bell but no sound is heard. We have expended force in swaying the tube; we have seen the motion of the bell clapper but by isolating our bell in a vacuum we have cut off all material connection between it and our sense organ of hearing. This experiment alone will probably suffice for a positive proof of the dynamic theory of sound, but if we wish a negative proof let us try to think of some sound which we have heard which was independent of any one of the elements of matter, motion or force.

Energy Interchangeable

If we accept the dynamic theory of sound our other law of the conservation and interchangeability of energy will need no proof, for the ideas of matter, motion and force comprise all ideas of energy and a statement of the principle is sufficient.

Energy is the ability to move mass; it may be either potential or kinetic according to whether or not the movement actually takes place the two forms are interchangeable but indestructible. We may wind up the weight of a clock, thereby expending kinetic energy which is then stored as potential energy in the clock weight and reconverted into kinetic energy as the weight slowly descends and causes the swinging of the pendulum. Numerous examples of this interchangeability of forms might be given but there are at least two other ways in which the interchangeability of energy may take place and we must allow the one example to stand as typical of the many, and pass on to another viewpoint.

In the several manifestations of energy the elements of motion and force may be regarded as unchanging but differently applied to matter; while matter may be regarded as made up of atoms, molecules, and total mass, and though still interchangeable the form and properties of the energy varies. This variation depends upon whether the force is applied to the atom, molecule, or total mass. When the force is applied to the atom the resultant energy is known as chemical; when applied to the molecule it may be either electrical energy, heat energy, or light; and when applied to the total mass it is known as mechanical energy or work.

The way in which these different manifestations of energy are convertible one into another without loss is a subject upon which we might spend our lives and perhaps base an investigation of every natural phenomenon and action of man, but for the purpose of a discussion of acoustics we shall only need to consider two of these forms of energy, namely, mechanical energy and heat.

If we should have carried our bell and tube experiment a step farther we might have proven that while sound travels only through matter it may do so freely without, insofar as we know, changing any property of that matter. That is, a test of the air through which sound is passing shows no evidences of either chemical, or electrical disturbances or of the production of either heat or light. From this condition we may then safely assume that the propagation of sound is a mechanical phenomenon dealing with the total mass moved by a force. It is a form of mechanical energy indestructible, but convertible. The only converted form with which we shall deal here is that of heat; the transformation being made by way of that condition known by the ignorance covering name of friction.

Wave Transmission

A discussion of the production and transmission of wave energy in general should be logically introduced here before passing on to the specific form of sound energy, but as we are perhaps already more familiar with the wave theory of sound than of heat, light or electricity, with which we would have to deal, we may confine our discussion to a single example of a wave transmission of mechanical energy.

Let us consider a long piece of gas-pipe fitted at each end with a well-made piston and let us consider it as completely filled with water. If we should move one of the pistons slowly in by means of a lever, the piston at the other end would reciprocate to the movement. If the pipe were very long in comparison to the piston we may readily see that while the force was transmitted from end to end of the pipe the individual drops of water in the pipe made only a very short travel. If the motion of our lever had been very rapid we might have noticed a very perceptible difference of time between the corresponding movements at the opposite ends of the pipe. This difference of time, of course, depending upon the length of the pipe, and if it were of sufficient duration we might make several rapid movements of our piston back and forth before the first were responded to by the piston at the opposite end.

(Concluded in the April Number.)

NATHANIEL ELLERY, C. E.

The Highways of California

By NATHANIEL ELLERY, C. E.*

No subject carries with it keener interest right now than good roads. With about every fifth person in California owning an automobile, the question of good highways is an alluring one. Naturally the automobile owner wants the best road that his money will buy—we say his money because he is paying more than his share when you take into consideration the new automobile license rates, together with the increased tax levy authorized by the people five years ago for the construction of the new state roads. Nathaniel Ellery, former state engineer, has been asked by this magazine to describe what has been accomplished thus far in the state highway work, and his first paper is printed herein. Mr. Ellery will discuss the subject as a citizen interested in the welfare of the commonwealth. It is not his purpose to make a political issue of the matter. He will undertake to show, without fear or favor, the inadequacy of the present methods of construction. Mr. Ellery has no fault to find with the materials now being used. It is proposed to show in succeeding articles the actual conditions by photographs.—EDITOR.

TO THE people of California I shall extend a review of a problem which at this time is of intense interest. To not only those of the rural districts of the state, but to each and every citizen who pays to construct or maintain the road there are facts, stripped of any deceptive verbiage that should be considered with sober thought. After an experience and study of this engineering problem in our state for nearly fourteen years and striving only for the service of the public during that period, I approach the subject with the view of the official and the citizen interested in the welfare of the commonwealth. For two years now have I watched the progress of highway work within our borders as a private citizen, and in consequence have the two sides in perspective. As an official I did not seek the dollar at the price of dishonor, nor did I ever uphold official intrigue for popular praise. It matters not therefore where the truth strikes, for I bow obsequiously to no man for political prestige, nor do I cringe at the crack of the political whip. It is my positive desire to treat the whole highway subject from an independent and fair standpoint and give my readers the benefit of a somewhat intimate knowledge of the matter. In this article I shall review the historical and legal phases of the question and in subsequent writings give engineering facts on construction and maintenance of our roads.

Until recent years the states of the American Union allowed their counties to administer the highway affairs within their territory. After years of this method of handling such affairs in which time local interests became so involved in local politics as to preclude any effectual work or lasting results, there has been devised other plans of road administration and procedure. In California from the official position of Highway Commissioner and later State Engineer, I traced, had to do with and watched the evolution of the ways and means of handling this vast public expenditure.

The funds of the counties devoted to roads were applied for political effect with little thought of results. The great bulk of the tax money was thrown into mud holes or a desultory repair with no thought of a real maintenance. Political debts were paid with this money, and the application of private business efficiency was entirely lacking. From the standpoint of the taxpayer who had any "inside" information, the seething mass of road business was steeped in infamous politics and dishonesty.

People were stirred to action in this public business through the advent of bicycle in about 1893 and the automobile and motor-driven vehicle later. No one had taken any particular interest in our neglected common

*Formerly State Engineer of California.

roads, and the farmer and those who had business to travel them had become reconciled to wallowing through the mud in winter and the dust in summer. In spots local pride sometimes caused a small improvement, but in the whole 50,000 miles of our highway these efforts were inappreciable. All this is now in the process of changing, as the motor has wrought havoc with this road lethargy. The cry and demand now is for permanently improved highways, and millions of dollars are being spent in the transformation.

Distinctly do I remember a few years ago my own endeavors to create some enthusiasm for improved roads, but it required a potent factor—a necessity of the people—not only for business but for pleasure. We would tell the farmer the relative cost per ton mile haulage over the road, railroad and water. We would show the beneficial results from the improvement, but obstacles were always placed in the way. Necessity has now changed it all, and we are rapidly turning out road work, some good, some bad and some mediocre.

My reader, let me go back and retrace a few of the more important features and show you we have not obtained an entirely satisfactory solution of the problem. New Jersey was the pioneer state to break away from the old accustomed plan and establish a state aid system for roads. This occurred as far back as 1892. Other eastern states followed this lead, and then after about twelve years heavy state bond issues for this improvement began to appear. The aid plan for roads seemed to avert much of local politics and was therefore given an advantage in so far as results were concerned. The state, the county and a district or county subdivision proportioned the construction expense and built under state supervision later, usually to turn over to the county the thus improved roadway for maintenance under state inspection. This was a distinct advance step.

California had created by statute a Bureau of Highways to investigate and report on road conditions and devise improved plans and methods. In the same year, 1895, our state took over the first state road—Smith's Flat, El Dorado county, fifty-eight miles to Lake Tahoe. A departure in state affairs—a new state institution requiring upkeep and maintenance the same as any other institution. The bureau lasted until 1897, when it was superseded by a Department of Highways with three commissioners at the head. The law provided automatically for the retirement of two commissioners at the end of the first two years, when a single head took charge. In 1901 the Sonora and Mono state road was acquired by act of the legislature. It was about seventy-eight miles long and extended from above Sonora to Bridgeport, Mono county, over the Sierras. Another move to establish a road policy in our state, but we had no provision in our organic law to permit of a system of state roads or aid for such. In November, 1902, there was voted by the people of the state a constitutional amendment (Article IV, Section 36) providing for a liberal state road policy, and now the way was cleared for action. The first results of this constitutional change was many special road bills introduced at each session of our legislature, but most of them were finally found in the waste basket. Pet measures to satisfy constituents were now in vogue and a state road looked good to many.

The brunt of the expenditures for roads had fallen on the rural districts, as incorporated cities and towns were excluded from taxation for country road purposes except perhaps where the statutory law allowed the county supervisors to exact a little money from the county general fund for bridges and sprinkling. Bonding cities for roads had received its quietus in the case of the proposed model road from Sacramento to Folsom. The Supreme Court of our state handed down a decision in 1898 (Cal. 121, p. 670) denying the right to tax the citizens of the city of Sacramento for the purpose of improving the Folsom-Sacramento model highway. This general condition prevailed with our counties until, in 1907, State Senator Savage introduced a bill in our legislature providing for bonding the counties, including cities, for road purposes and outlying a plan of procedure. Mr. Bacon and Mr. Fleming of Los Angeles came to me about this law and asked my support, but I assailed the plan as incorrect in its method of dealing with the problem. They desired to try out the scheme in Los Angeles and asked now that the points raised against it be withheld in order to give Los Angeles a chance to improve its roads. The law was passed, but has been amended each succeeding two years mostly in minor details, but neither of the two main objections I advanced have been corrected—a provision of maintenance and the no-commission scheme. Political commissions are worthless, and unsalaried commissions are worse than worthless. For a while a new commission may sweep clean, but sooner or later it cannot help but lack efficiency. Who ever saw a private enterprise successful without a distinctive head to direct business and execute orders? Fourteen years actual experience has led me to this positive conclusion. Place a man at the head of a work and make him responsible. There will be no passing the "buck" or evading responsibility as the board or commission scheme invariably does. He must stand up to his work or else fail. I cite for your consideration the work on the Panama Canal and now the method provided at the Canal zone for the government of that terrritory. The administrative head is given an untrammeled right to select his own immediate help and thus approach a better efficiency standard than if hampered by red tape and official interference.

The Savage Act vested in the Board of Supervisors the power to appoint three commissioners to serve until the bond money, if voted, was spent and the construction work was completed in accordance with the outlined scheme, and then the improvement was turned into the old channel for maintenance. Understand, California has been endeavoring to maintain roads without system for forty years. Letting the proper care of roads go as secondary is surely a mistake and was so pointed out at the time of the passage of the act. I shall show later this plan as wasteful, unwise and incommensurate with private business efficiency.

Prior to this county bonding act there was permitted by law (Statutes 1901, p. 277) a bond issue for roads on a subdivision of a county not including a city or incorporated town. It was known as the Permanent Road Division Law, but was only applied in a few isolated cases. It still remains a law of the state, but has practically given away to the Savage bonding scheme.

During my incumbency of office at Sacramento, I struggled to obtain recognition for some good road laws. The state had engaged in assuming control of some old mountain roads and also undertook the construction of some needed highways in the isolated districts. All the while, I studied the problem and saw the necessity of proper legislation that we might get the road business from politics or at least get some space between these subjects.

The laws of Europe and of the American states were investigated. The management of this public business was seriously considered, and I became a convert to the state aid plan and finally concluded the Higbie-Armstrong law of New York could be effectually applied in California.

In 1903 I proposed such a law to our legislature; it passed, but the Governor at that time thought the law in advance of our needs. Again and again I stood by and had this law introduced in our legislature, and then had it turned down, as it looked the only supporter and real advocate was the highway commissioner. While the county bonding act was being applied in some of our counties, Governor J. N. Gillett at a road meeting at Stockton, California, promulgated his law for bonding the state for $18,000,000 to construct a system of roads. At that time some opposition developed, as Mr. Daggett of the Los Angeles county commission and others thought it might damage the chance of voting the county bonds. However,

Los Angeles county voted	$3,500,000,
San Joaquin county voted	1,890,000,
San Diego county voted	1,250,000,
Sacramento county voted under the general statute....	660,000,

for road improvement.

Shortly after the bonding of Los Angeles county for the foregoing amount I, as state engineer, was requested to meet in the city of Los Angeles to discuss the highway situation. We met in the offices of the Chamber of Commerce, and some of those attending were as follows: Mr. J. M. Eddy, secretary Stockton Chamber of Commerce; Mr. Wiggins, secretary Los Angeles Chamber of Commerce; Mr. G. Cooley of San Bernardino, Mr. P. Holt of Stockton, Mr. M. C. Marsh of Long Beach, myself and two or three others. The discussion related to the proposed Gillett measure, and Mr. Eddy initiated a plan to have three or five commissioners at a comfortable salary instead of the plan as Mr. Gillett advocated, i. e., placing the work under the State Department of Engineering. Now, my reader, I shall give you the real facts that led up to the state bonding act for road improvement and the present status of it.

Before the session of the 1909 legislature many people visited Governor Gillett and advocated different schemes, and they nearly all desired an appointed commission. He flatly refused, placing the work in the State Department of Engineering under practically one head with an advisory board. It is here I cannot refrain from extolling his good sense and judgment and condemn the unwise and disastrous overthrow of the intent of the law by his successor, Governor Johnson. In due time Governor Gillett's highway bonding act was introduced in the legislature after the Attorney General had shaped it to meet the Governor's views. Accompanying this act was another bill providing for an appropriation of $70,000 to determine the routes of the roads, cost, data, etc., but this latter act was summarily killed, as it was thought by the legislators it would jeopardize a favorable vote by the people of the state on the main act. The constitution of California (article XVI, section 1) provides for a referendum or vote of the people to bond the state for over $300,000, and necessarily the Highway Act fell in this category. The State Highway Act passed the legislature after being amended to recompense some counties for work done under the Savage Act. There remained yet the vote of the people at the next general election to either discard the proposition or make it law. Thoroughly interested in a plan for a state road system, I gave much time and funds to help carry the bonding plan, while Mr. J. M. Eddy fought the scheme with vehemence. He issued a pamphlet and talked against it.

Let me quote from the pamphlet: "If the California Good Roads Association desires to perform a lasting service to the state, it will not only oppose by every honorable means the adoption of the bonding law, but will formulate a broad and comprehensive system for the state supervision of highways, for state aid in maintaining the principal highways when once properly constructed, and providing for an efficient administration of state highway matters through a commission of five business men, who will give their undivided attention to the work for which they should be paid an adequate salary. I say a commission of five men instead of three, because of the great extent of the state and of the great diversity of conditions."

Mr. Reader, you certainly see the similarity of this and a previous statement made by me of a meeting over two years previous to the issue of the above statement. Politics are all very well in their place, but not in road matters. Mr. Eddy is a road theorist, and the above quoted plan is all rot, not calculated for efficiency, but a soft political snap for five of the faithful. Notwithstanding considerable opposition, the bonds carried and the act became a law of the state. Apparently nothing remained but the carrying out of the provisions of this law when there appeared a cloud on the horizon. Politics again entered, and the 1911 legislature devoted much time in an effort to defeat the will of the people as expressed by their votes. Numerous acts were proposed and the political sop of having commissioners was at the bottom of it. The administration wanted a measure passed in effect divorcing the administration of the law from the Department of Engineering. Mr. W. F. Chandler, a member of the assembly and a staunch administration supporter, tried various means to meet the demands of the "program," but the Attorney General ruled against legally separating the work as defined by the law from the engineering department. Finally a fake way of planning the coup was evolved by increasing the advisory board of the department of engineering with three paid members. A highway engineer at a salary of $25,000 per annum was first put forth, but finally a salary of "not to exceed $10,000 per annum" was allowed. The paid members of the advisory board and the highway engineer are paid from the general appropriation of the state and not the proceeds of the bond issue. This sum amounts to $10,800 per annum for the three paid advisory board members and $10,000 per annum for the highway engineer. The appointment of all road help under the 1911 amendment to the department of engineering laws was placed directly in the Governor's hands from the office boy up. The bill known as the Chandler Act which accomplished all of this was so zealously advocated by its author, Mr. Chandler, that he took the bill from the assembly and later from the senate without an order from either house as prescribed in the joint rules 16 and 17. This action was strictly illegal, but easily accomplished along the path of immunized politics. Remember the law of the department of engineering did not create a state highway commission, but by the Chandler act there were three members added to the advisory board of the department after the bond issue for state roads had become a law. By a resolution of the advisory board of the department a state highway commission was created—not by law, but by resolution of a state board. Let me call your attention further to this resolution that you may better pass judgment and note the politics played at the very inception of the state road plan.

A meeting of the advisory board was held in the Governor's office on Tuesday, August 8, 1911, when the Governor and his friends undertook the formation of the resolution. Neither myself as state engineer or the secretary of the department were present at the time of its formation, but on the following day Mr. Al McCabe, private secretary to the Governor, brought the resolution to me to be placed upon the minutes of the meeting of the day previous. Some time after this transfer of legal rights by a combination of executive and legislative skill, Mr. Carleton, the attorney appointed to attend the needs of the highways, stated he could not understand by what legal authority there existed a highway commission. In an opinion from Attorny General Webb dated Jan. 19, 1912, I quote: "The name 'California Highway Commission' is derived purely from a resolution of the advisory board of the department of engineering. In law it has no significance or recognition." This is fine. The expenditure of $18,000,000 by a commission which legally has no recognition. Did the people intend *that* when they voted the bonds? The state department of engineering law makes the state engineer the chief executive officer, and further states, quoting: "He shall have charge of all the engineering and structural work of the department." The resolution says the California Highway Commission shall have the following powers: "(1) To take full charge of the entire matter of the construction and acquisition of a system of state highways in and for the state." It was always my opinion that legislation came from the legislative branch of the government and not otherwise. Again, the Engineering Act of March 20, 1909, makes the Attorney General the attorney for the department of engineering, but you note Mr. Carleton is the highway board's attorney at a salary of $200 per month. Politically this may be what they want, but it has no value in road business. In the strife to get our highways away from politics, there seems no end to the machinations of the politicians. Here we have the spirit and letter of the law defeated by the chief executive of the state. The voters approved the plan under a department of engineering, but as a matter of fact it is run for all practical purposes by three men even whose official position was created subsequently. This pseudo commission is handling bond money which is really a trust fund with apparently no warrant of law. The state engineer has been relegated to a back place and some of his power, even though he is under bond to perform his duties, has been usurped by the commission. Further, the Highway Bonding Act uses this language: "The department of engineering shall have full power and authority to purchase all supplies, material, machinery and to do all other things necessary or proper in the construction and maintenance of said highways." If my diagnosis of this statement is correct it means all things, including labor and help. But how about the Chandler amendatory act granting to the Governor of the state the employment of all help under the bonding scheme? Again, let me quote the Attorney General in an opinion issued Jan 22, 1912. "It follows that the act of 1909, providing for a system of state highways, cannot in any respect be modified nor can the plan or method of pursuing or accomplishing the same be changed by legislative act." Again let me quote Simonton, an authority on bonds. He writes: "The act usually designates the body or officers who may authorize the issue of the bonds, in which case they can be issued by no other body or officers. Likewise when it designates what officers shall execute the bonds no other officers can do so." Where the necessity for this legal entanglement comes in I never could see, as the original plan was clear and sufficient under the department of engineering to do the work without too much political interference. Strangely at this particular time an investigator at the other side of the continent in the state of New York recommends the removal of the whole state highway system there from the field of party politics.

In the succeeding article I shall deal mainly with the location and construction of the county and state highways.

Government Would Have All Federal Buildings Alike

WHENEVER a city or town makes public inquiry about its long-delayed postoffice building, the Washington authorities send out the stereotyped excuse that "the supervising architect's office is six years behind in its work." To bring daylight to the supervising architect's office, buried under constantly increasing work, it is said to be the plan of the Treasury officials to suggest to the Public Buildings Committee of Congress a plan for adopting standard types of buildings to be erected in cities of similar size throughout the country. This plan is thus outlined in a recent press report:

"Treasury officials have been at work for several months on a preliminary report to the Public Building Committee created by Congress to work out and improve some system by which a standard could be formed for public buildings, so that cities of a certain size should get a prescribed size of buildings. By its adoption, it was argued, the necessity of drawing plans for every new building would be eliminated, the expense of the upkeep of the supervising architect's office would be lessened and the actual time consumed between the authorization of a building and its completion would be greatly diminished."

Are we then, in going from one end of the country to the other, to see the same postoffice and federal building everywhere? Perhaps if it were a really good type of architecture it would be more pleasing to see it duplicated occasionally, rather than to find abortions in the design of our public structures, through an attempt to originate something different.

But how much better would it be to follow the plan of the American Institute of Architects, expressed by resolution at the last convention, to relieve the congestion in the Treasury Department by the employment, through selection or by competition, of architects in private practice for the work in that department? As admirably expressed by the convention, what our public structures most need is "that some orderly system should be adopted by the United States government in the designing of its buildings, monuments, etc., in the purchase, selection and acceptance of sculpture, painting and other works of art, whereby the services of those architects, sculptors and painters best qualified for such work may be made available."

Senator George C. Perkins has written to the Berkeley Chamber of Commerce that he will help to pass the proposed bill which provides for employment of additional consulting architects in the office of the Secretary of the Treasury. Several hundred projected buildings are held up in Washington because of lack of consulting architects to complete plans and specifications, Berkeley's building being among the number thus hindered.

* * *

$30,000,000 Museum Group

STEPS have been taken to found a group of museums in New York City, to be known as "The Museums of the Peaceful Arts." The group is to consist of 20 buildings, and when completed will constitute the greatest institution of its kind in the world. The entire cost of the group is estimated at about $30,000,000, and the annual maintenance charges at between $2,000,000 and $3,000,000.

It is proposed that the museums shall be divided into the following branches: Electricity, steam, astronomy and navigation, safety appliances, aviation, mechanical arts, agriculture, mining, labor, efficiency, historic records, health and hygiene, textiles, ceramics and clays, architecture, scenic embellishment, gardening, roads and road-building materials, commerce and trade, printing and books. In addition, there will be a central library containing books and periodicals relating to the subjects of the museums. This is the first project looking toward the establishment of a museum of science and industry to take definite form in the United States.

MODESTO HOTEL, MODESTO, CAL.
Bernard Joseph, Architect
Exterior Faced with Sacramenta Sandstone Brick

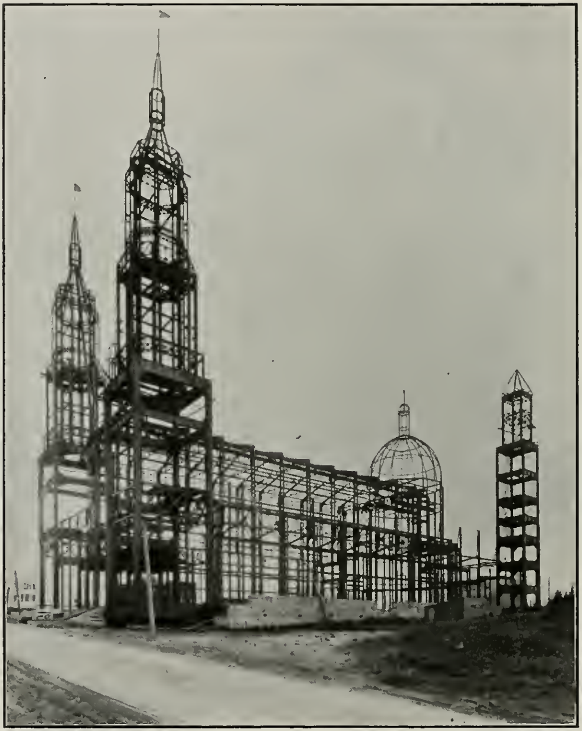
San Francisco Public Library Competition

SIX San Francisco architects have been invited to prepare competitive plans for the proposed $1,000,000 Library building to be erected in the San Francisco Civic Center. The competition is authorized by the Library Trustees, who have retained the Consulting Board of Architects, composed of Messrs. John G. Howard, Frederick H. Meyer and John Reid, Jr., as advisers, and the program has been prepared by them with the approval of the American Institute of Architects. The competitors are George W. Kelham, G. Albert Lansburgh, Edgar A. Mathews, Albert Pissis, Reid Bros. and Ward & Blohme.

The designs are to be submitted not later than noon May 4th, and the judgment will be made by a jury of three persons, one to be a member of the Board of Library Trustees, one architect to be chosen by the board from a list of five names proposed by the advisers, and the third member to be an architect who is not a resident of California and to be chosen by the competitors, subject to the approval of the board. Each of the successful competitors submitting designs in accordance with the program will be paid $1,000 in consideration of his services. The selection of the successful design will be made not later than May 18, 1914.

* * *

You can't get figs from thistles. Nor can you get an assured income from a shoe-string advertising proposition.

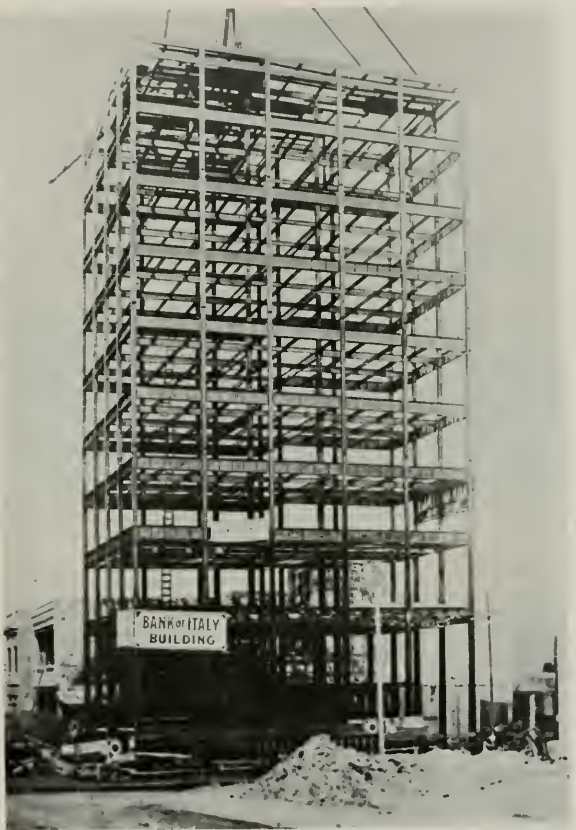


STEEL FRAME OF ST. IGNATIUS CHURCH, SAN FRANCISCO
Chas. J. I. Devlin, Architect

The Steel and Iron Industry of the Pacific Coast

V—THE CENTRAL IRON WORKS.

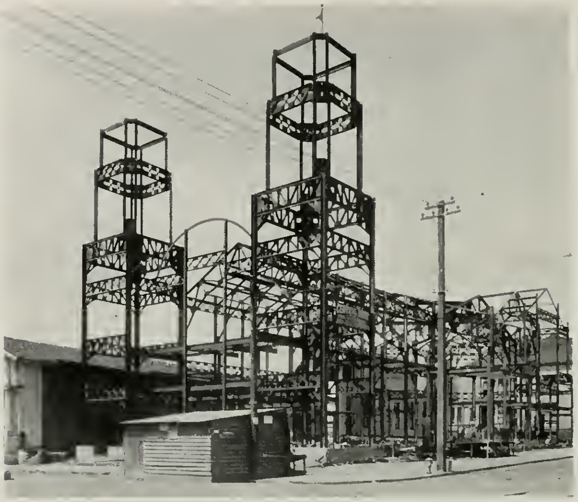
OF THE score or more steel and iron industries of San Francisco, probably none has enjoyed a more successful career than the Central Iron Works. Starting as a small repair shop with Messrs. F. Stoesser and A. A. Devoto as its proprietors, the concern has developed into a factor in the Iron World of the Pacific Coast. The first plant was located at the corner of Beale and Howard streets, the site of the old Ralston Iron Works. In 1904 the plant was moved to Eighteenth and Florida streets, but it was not until in 1906 that the present considerable space was utilized. The company is now using over 30,000 square feet of room and has one of the most complete and modern fabricating plants on the coast. Its capacities may be said to run as high as 250 tons per day. The company makes a specialty of quick deliveries and guarantees high-class workmanship.



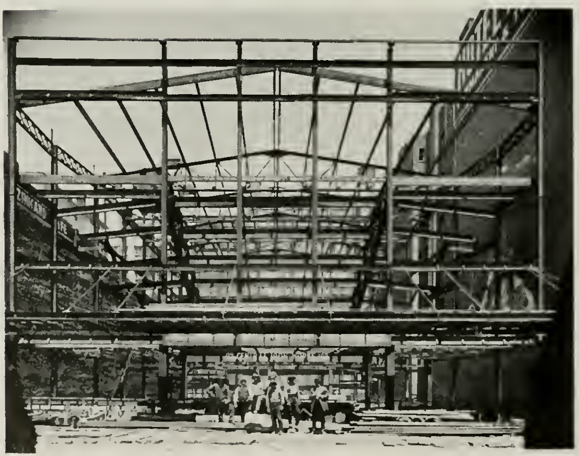
STEEL FRAME, BANK OF ITALY, SAN FRANCISCO
Shea & Lofquist, Architects

One of the first steel frame contracts filled by the Central Iron Works was in connection with the old Cooney building on Powell street, between Sutter and Post. The frame work for this structure was part way up at the time of the fire and earthquake, and it remained intact during these disturbances. The work was completed after the fire, and the building was one of the first to be finished following the conflagration. Frank T. Shea was the architect.

Some of the most notable installations have been in church work, the largest being the fabrication and erection of 1400 tons of structural steel for St. Ignatius church, Charles J. I. Devlin, architect, the steel contract on this job alone amounting to over $100,000. Another church whose



THE NEW MISSION DOLORES, SAN FRANCISCO
Shea & Lofquist, Architects



ANDERSON'S GAIETY THEATER, SAN FRANCISCO
O'Brien & Werner, Architects

steel frame was fabricated by the Central Iron Works is the new Mission Dolores at Sixteenth and Dolores streets, Shea & Lofquist, architects. The steel and iron work for a number of theaters have also been furnished by this company, including 450 tons for the Pantages theater, Miller & Colmesnil, architects. This was a sixty-day rush job. Some 350 tons of steel were fabricated for Anderson's Gaiety Theater, the same being supplied in 70 days' time. The steel for the Tivoli Theater, amounting to over 400 tons, was turned out in less than 65 days. This building was designed by Architects O'Brien & Werner.

Probably the largest rush job ever turned out west of Chicago was the fabrication of 350 tons of structural steel in 59 days from the date of signing the contract to the date of completion of the work, for a nine-story steel frame for the Bank of Italy building, San Francisco. The plans were prepared by Architects Shea & Lofquist.

While most of the large jobs have been in the city of San Francisco the company is in a position to fill outside orders with the same speed and satisfaction as it does the local work. The accompanying pictures give the reader an idea of the class and volume of work done by this company.

* * *

What Concrete Will Not Stand

PRACTICALLY every failure and near failure in concrete has been due to confidence on the part of somebody that concrete can surmount all manner of bad usage.

The fact is that there are plenty of good standards in concrete design and in concrete construction, but that they are not observed by many of those engaged in concrete building.

This neglect has a three-fold cause: ignorance, undue economy and over-confidence—and the first two could not exist were it not for the last. It is a pretty poor concrete man who does not know that frozen concrete will not set—but there are plenty who will take a chance with ten-day concrete at 40 degrees F. if they need the forms. Why? Primarily because they want to save the money that an additional set of forms would cost. But if there were not confidence that the concrete will stand up, the pocketbook would not govern judgment.

Practically every designer of concrete buildings will admit that 850 pounds per square inch is too high a stress in the concrete beams over the room where his own family sits down to dinner, but he is not so worried about that stress when it is in someone's garage. He feels confident that it will not fall down, in spite of tests which show it to have a low safety factor.

Throughout the whole field this pernicious combination of ignorance and complacency extends; instances might be multiplied almost without end. It is the duty of the societies such as the American Concrete Institute, which recently convened in Chicago, to urge upon the workers in the industry a proper appreciation of the dangers of this over-confidence. Skinning of work is a species of ignorance, for nothing is quite so evident as the fact that good work in concrete construction pays. But the man who thinks he knows more than the so-called authorities is the hardest to reach because he is clad in the nearly impenetrable armor of conceit.

Every concrete failure means a slight betterment in methods, for a certain number of hitherto unconvinced practical or commercial men are shown by that most potent object lesson, a heap of ruins, just what concrete will not stand.—Engineering News.

Cut Rating the Architect's Fee

By WILLIAM SCHULTZ, Architect*

THERE comes a time in almost every successful man's life when after profitably manipulating his biggest deal or accumulating a fat bank account by persistent and consistent saving, he lays back in his easy chair and sees through the rings of smoke from his jimmy pipe the picture of his future home—the home that is to be his very own.

After deciding to build one must have suggestions as to what he wants, for although we live in houses every day of our lives, and see what is good and what is bad in their planning, the very familiarity breeds contempt and often the things we most often meet are least noticed. There are houses and houses, and all intended to serve the varying purposes of the varied occupants. He must find out just what house is most suited to his needs. Building decided upon, the family rummage through all the old copies of the Ladies' Home Journal and the Woman's Home Companion—household oracles. Single stories, two stories, houses large and houses small, houses good and houses bad introduce themselves in all the catchy, tawdry array of glowing description and nicely colored illustrations, with landscape gardening to match. Passing the news stand a "house book" fresh from the press catches the intending owner's eye. He dives into the store and the book changes owners.

The family burn the midnight oil studying the latest addition to their library. Its promises are seductive. One of the most attractive is: "A beautiful eight-room cottage, of first-class materials, with all modern improvements, including hot air or steam heating, which has been actually constructed for $2,500. Blue prints, typewritten specifications and bill of materials complete for $5.00." They have struck the trail. This is just what they want.

Hundreds of such "bargains" can be found in the "house books" that are scattered over the country. Experience proves to the bargain seekers that the stated cost of these houses is purposely underestimated to get a ready sale for the stock plans. But, like most experience, it comes too late. Says one of the cut raters: "Our plans are much more carefully drawn than the plans provided by the average architect who charges from $100 to $200 for his services, ours being accurate and correct in detail. The cost of the original tracings, the writing of the original specifications, is from $100 to $200, varying according to the size and style of the house." These statements can be challenged. Nearly all stock plans are the work of junior draftsmen or apprentices, often miserably drawn, turned out in much the same manner as sausage is ground out of a sausage machine and with about as much concern for architectural qualities and the owner's comfort.

Any reputable architect who charges for his services the prices mentioned by our contemporaries, gives not only his best efforts to the planning and design of each individual house, but his personal supervision to their construction. According to the system proposed by the job-lotters either the owner must know something about building methods or supervision must otherwise be conspicuous by its absence.

There are hundreds of dissatisfied home owners who wish when they built they had employed an architect to look after their work. Accuracy is the supervisor's watchword. He sees that no defective materials go into the building, that all fulfills the terms of the specifications, that the workmanship is good; in short, that the owner gets what he is paying for.

*New Orleans, La.

By this method such nuisances as leaky roofs, defective plumbing, smoky chimneys and premature deterioration are avoided. Suppose, for instance, a porch flooring inferior to the grade specified is used—and it can be easily done by an unscrupulous builder, few persons knowing anything about lumber—this would mean several years shortening of the life of the floor. Paint can be "doped" with whitening to save material, and a building so treated requires repainting two or three years sooner than it would with a good job of work.

A stock plan seldom meets expectations. Alterations are always necessary, and often the owner is compelled to turn the whole matter over to a legitimate architect for reworking of the plans.

There are many stock plans published. The best are from California. But the California house is hardly adaptable to the less sunny climes of other parts of the United States. The main objection is that they are mostly of the low type which must be covered with composition roofing; this is far from being ideal where rains are frequent because it is difficult to make them absolutely water tight. Los Angeles can employ them with impunity because there the rainfall during the whole year is scarcely enough to moisten the ground. The room sizes and general dimensions of these houses are somewhat scantier than is considered good practice for permanent dwellings. Still the California bungalow teaches designers valuable lessons in charming originality of exterior and economy and compactness of planning. There are numerous examples of clever adaptation of them to other localities. But they must be adapted, and it takes your local architect to do it.

Stock designs from the north and east as a rule fall short of excellence. While cleverness is often exhibited in interior planning, the elevation is but too often a repetition or some phase or other of the perishing Queen Anne cottage, elsewhere termed the "genteel" style. Its abortions are many. Wriggles, twists, squirms and all kinds of acrobatics cavort on its wall surfaces, and many of them would serve as apt models for the candied gingerbread of quaint old Nuremburg.

Now a word about the "architect who charges from $100 to $200 for his services." He has a knowledge of your needs. He knows because he has studied them and everything else concerning his profession. His incentive is love of his work; his reward is his client's satisfaction. The product of his pencil is accurate and reliable, not tinged with commercialism, but finished with the touch that only certain knowledge and artistic instinct can give. His recommendation is the healthfulness and attractiveness of the homes he has produced—their occupants' comfort. And all this for the enormous sum of about one month's salary of the contented beneficiary!

* * *

Absolutely Necessary

We may live without poetry, music and art;
We may live without conscience and live without heart;
We may live without friends, we may live without fads;
But business today cannot live without ads.

* * *

Show us an architect who believes in keeping his plans to himself!

Advantages to the Architect in Mechanically Mixed Paints

By G. B. HECKEL, Secretary P. M. A. of U. S.

ARCHITECTS, being human, are subject to the same frailties as the rest of men. One of these is the proneness of human nature to follow the beaten path, even though it may be as direct as that made by the fabled calf traversing the primeval forest.

The question of mixing paints is entirely a problem in mechanics. For mechanical work machinery is more efficient and more economical than manual labor, therefore a paint mixed by machinery is better and cheaper than paint of the same composition mixed by hand.

The proposition is very simple on the face of it. Here, however, the prejudice against ready mixed paints comes into play, and this in conjunction with the routine habit of writing specifications for painting, make a combination difficult to overcome.

The real objection to ready mixed paints is seldom stated. It is not composition, nor consistency, nor the difficulty of adaptation; it is the fact that painters' tradition is violated by their use. Painters have mixed paint from time immemorial and the natural inertia of human nature rebels against change of procedure.

The objection commonly heard is that every job requires different treatment—dependent upon the character of the materials and their condition. The painter is supposed to know how to vary his mixtures to meet these conditions.

Some painters do this, sometimes. More frequently the foreman painter follows routine, and if he finds the consistency of his material not to his liking, adds a little oil or volatile thinner, or a little "japan," to facilitate working.

It is entirely possible, however, to vary the consistency of prepared paint, within very wide limits, by pouring off a part of the thinner portion, if too thin, or by adding oil or "thinners" if too thick. The ordinary painter needs no instruction on this procedure.

Granted, then, that it is possible to adapt prepared paints to all ordinary situations, and granted that these products must, from the manner of their production, be better mixed and more uniform than hand-mixed paints, why are they not always specified?

One objection is that their composition is unknown. The composition of paints mixed by painters is also unknown, at least in one vital factor—the composition and percentage of "liquid dryer" used. Moreover, in the northwestern states generally the paint cans carry formulas; hence this objection is not valid. Furthermore, knowledge of the formula really helps but little. There are well made and ill made pigments and paints of the same composition. "Purity" is by no means synonymous with quality. The ability and integrity of the manufacturer is really a better guarantee than the formula.

As a matter of fact, the objection to prepared paints harks back always to architects' routine and painters' inertia. It is a matter of pretty general knowledge among technical consumers of paint that two or more of the prime white pigments (basic carbonate and basic sulphate white lead, zinc oxide and leaded zinc) in combination, with or without a moderate percentage of inert reinforcing pigment (barytes, silica, asbestine, etc.) make paint that is in every way superior to paint made from any single pigment.

Such paint covers more surface, affords better protection for a longer period, holds its color better and, because it covers more surface per gallon, is cheaper to the consumer than a single pigment paint. All the better grades of prepared paint on the market meet these specifications and in practice justify these conclusions.

The writer has been intimately connected with paint testing on a large scale for the past ten years and is convinced that the architects' routine above referred to is in no small measure responsible for the general dissatisfaction with painting "as she is did."—Western Architect.

* * *

No Institute Competition for University Building

The Board of Regents of the University of Arizona have been compelled to abandon their project to hold a competition in accordance with the code of the American Institute of Architects to secure plans for a new Agricultural building to be erected at the university in Tucson for the reason that there is in the statutes of Arizona a state law which is a verbatim copy of the old California law of 1872. Unfortunately, on account of the lack of Arizona court decisions for a precedent, the attorney general of that state has been compelled to rule that the law is still operative in Arizona, and as its provisions are incompatible with the ethics and rules of the American Institute of Architects it was found to be impossible to frame a program which could be approved by the Institute. Since the law requires that plans for public buildings be secured by competition the Board of Regents had no alternative except to hold on open competition in accordance with the requirements of the act, and to comply with its provisions the successful architect, among other things, will be required to furnish a bond that the building can be built for the sum specified, which will be about $150,000.

The regents of the university were particularly desirous of having an Institute competition, as they sought to interest the best talent not only in the west but also in the east. They had engaged the services of Architect Myron Hunt of Los Angeles, who was to act as professional advisor.

* * *

How Many Engineers Are There?

There is at the present time, and has been for some years past, an annual output of graduates from the schools of civil engineering in the United States amounting probably to 4,000 to 6,000 per annum. Besides this annual increment, there must be included the large number of students who take a partial course in the engineering schools and leave without graduation to take up engineering work. There is also the considerable number of men who work into engineering without the advantage of an engineering school course, adding to their practical experience on actual work such knowledge as they can gain from the correspondence schools' aid in home study.

What the total number of civil engineers in the United States may be at the present time can only be guessed, especially since, as noted above, there is no possibility of drawing a hard and fast line as to who is and who is not a civil engineer. It is probable, however, that those engaged in civil engineering work of one sort or another, not including, of course, those engaged merely as laborers or skilled workmen, number not less than 100,000 at the present time.—Engineering News.

A Los Angeles Architect's Impressions of New Orleans and the Recent A. I. A. Convention*

By JOHN C. AUSTIN.

ON FRIDAY, the 28th day of November, 1913, a committee from the Southern California Chapter of the American Institute of Architects, consisting of Messrs. A. C. Martin, A. F. Rosenheim, Fernand Parmentier, and myself, started on the Southern Pacific train for the annual convention of the American Institute of Architects to be held in New Orleans.

Needless to say, every member of that committee was weighed down with the responsibilities placed upon him, and each one felt that any business that any other passenger might have must be of minor importance in comparison with their own.

The two delegates from San Francisco (Mr. William Mooser and Mr. Henry A. Schulze) were both affected in the same way, but they showed their dignity more definitely than did the Southern California delegation, as they had a "drawing room" all to themselves and for two days held aloof from all the rest of the passengers while they wrote ream after ream of material that must be brought before the national body in order to prevent its dissolution.

The journey was a pleasant one owing to the fact that the members of the two Chapters were congenial, each having in mind one object only, viz.:—The betterment of all building conditions. The time flew by as mile after mile of country was passed, all of it more or less monotonous. The first two days was through desert land, the balance of the time swamp succeeded swamp; and we all felt that fate had indeed placed our homes in pleasant places when compared with those that we saw on our journey.

We arrived in New Orleans on Sunday evening, and went straight to the Grunewald Hotel, where the convention was to be held. We were received by the hotel management with the statement that the hotel was full, and there seemed to be some hesitation about giving us rooms, notwithstanding a letter produced by Mr. Rosenheim showing that rooms had been reserved. Eventually Mr. Martin and I were given a room that was usually used as a "sample room;" in it were two beds, about half a load of lumber, a dressing table, two chairs, and dust over everything. The next day the lumber and some of the dust were removed, and we were made more comfortable.

We found that many of the delegates from other parts of the country had arrived before us, and until the time of the starting of the convention more delegates came in on every train. I recognized a number of the men that I met in San Francisco at the convention held there in January of 1911, other men's faces and names were familiar to me through the publicity given to them by their marvelous achievements. When I met some of the men and mentally compared their achievements with mine, I could feel all of my egotism was oozing away, and that my hat band was becoming perceptibly loose.

On Monday morning we met Mr. Favrot, the president of the New Orleans Chapter, and found him to be a "Prince of Good Fellows" and overflowing with the hospitality for which the south has a world-wide reputation.

*Abstract of a Report read before Southern California Chapter.

With Mr. Favrot was a committee from the New Orleans Chapter of the American Institute of Architects, whose duty it was to show us through the French quarter of the city. The French quarter is the oldest part of the city, and in it are some of the oldest buildings in America. The streets are narrow, and the paving in some instances is of stone blocks laid over a hundred years ago; the surface is very irregular, and the odors are legion.

On each side of these narrow streets are quaint old buildings, some of red brick and some of stucco. On the first story of these buildings are funny little stores with low ceilings with whitewashed beams and plaster more or less smoky and begrimed. Above the stores there are open balconies connecting with every story. These balconies are the chief charm of the "Quarter." All of the railings and supports are of cast iron, and some of them are exquisite in both design and execution.

We went through the old hotel, which is now abandoned, but which was used in early days by the aristocrats and the wealthy. The rooms were lofty and spacious, also they were well appointed when the time that they were used is taken into consideration. It was easy to form an opinion of the luxury that was then enjoyed. In this hotel we saw the place where slaves were offered for sale, and one could hardly repress a shudder at the thought of such hopeless misery and such luxury being under one roof.

The "Absinthe House" was one of the quaint old houses that we saw —low ceiled, old-fashioned bar, whitewashed walls, and plank floors scrubbed to a bonelike whiteness. Here again one could let his fancy bring up grisly spectres of misery engendered by the chase after the luxury of the moment.

We didn't miss the "haunted house" where the tradition runs that an old woman would whip and torture her slaves to death. The inference is that these slaves still send forth pitiful wails of distress during the dark hours.

The French Quarter of New Orleans would furnish enjoyment to a lover of the quaint, the old and the beautiful, for as many days as we had hours to devote to it; so the description I give must be, to say the least, very superficial.

The buildings show that men of education and refinement designed them. The detail in many instances is beautiful, and the excellent preservation of the buildings show that the work was well done and that the percentage obtained by an investor was not the sole factor thought of by the one who erected them.

The city of New Orleans is built below the level of the river, and the water is kept out by means of levees or dykes. Less than ten years ago all of the sewage of the city was carried away by means of open gutters in the streets, but now there is an up-to-date plant and the sanitary conditions are good. However, when the new sewer was installed a great deal of damage was done to buildings owing to the undermining of foundations—notably the old Roman Catholic Cathedral, which was so badly damaged that the upper walls had to be tied together with iron rods. These rods are very unsightly, but I believe that after the foundations have been rendered safe and considerable repair work done in all parts of the building that they will ultimately be removed.

The Jesuit Church from the outside is an insignificant structure crowded in between other buildings; and while one can see that it is a church, yet one is entirely unprepared for the beauty of the interior. After passing the huge entrance doors (which are of cast iron covered with heavily moulded small panels like a honey-comb) and crossing a rather dingy vestibule, you enter one of the most striking auditoriums in America. It is lofty as a cathedral, its decorations are gorgeous, and its windows beautiful. Strange to say, the interior of this building is in the style of the Moors. The columns, arches, enrichments and outline are all Moorish, carried out in the bright colors that only the Moors could use without being garish. The subdued light filtering through the stained glass windows mellows everything, and there isn't a harsh note anywhere. It is truly a "House of Worship" notwithstanding the fact that every detail was evolved by a race of people who viewed the Christian religion with hate and abhorrence.

I started out to give my impressions of the Convention, but drifted off into a description of a few of the things that I saw; and as one convention is much like another with the exception of a few vitally new subjects, I have very little to say. Reports of committees were read and usually approved, and some of them were of the utmost importance.

The subject touching on government architecture and the supervising architect was discussed. It was stated that the work of that department was six years behind if no other work was brought in, yet new work is constantly being brought in that must take its turn.

We in the west feel the bad effects of long delays worse than the older communities of the east. Our towns sometimes double their population in ten years, yet men who can not possibly understand our problem are commissioned to design a building to fit a certain sum of money appropriated to fill the needs of the time that the appropriation is made. A few years after the appropriation is made a building is built that is inadequate before it is completed.

Generally the Federal buildings resemble a Greek Temple dedicated to a heathen god, and in many cases the heathen god would have kicked at the results. Take our own postoffice, with the lower half of granite and the upper half of red-brown sandstone; both halves are good in design if taken by themselves, but taken together the result is chaos.

The specifications are sometimes written without a knowledge of the materials that are best for the locality, and in some cases they are written with the intention of using materials that are easily obtained in the locality where the building is to be erected. A postoffice is being built in Riverside, and the interior trim is of redwood. Some years ago redwood was used in finishing our cheap cottages, but its use was discontinued owing to its softness. Redwood isn't much harder than cork; yet someone writing the specifications with the best intention in the world, thinking that he was benefiting the locality by using a native wood, has specified something softer than yellow pine. I can readily see that exhibition samples of curly redwood, which is taken from the roots of the tree, and which is hard, has given a false impression of the wood. Curly redwood is hard to get and is expensive, but common redwood is as poor as any finishing material for a public building can be.

I will venture to say that if tht government work were given to architects of reputation who lived in and knew the locality in which a government building was to be built, that a saving of far more than the architect's fee would be saved owing to the architect's knowledge of local conditions, and the building would fit its surroundings.

It has been suggested that plans of postoffices be standardized, and that a plan for a certain sized town would be known by number; such a suggestion is hardly worthy of comment. The same design for a town in Arizona with its hot sunshine and level plains could not be appropriate for a town of like population in the Alleghany mountains, or the wet climate of Oregon. Each building will present a different problem, and it is hard to comprehend why men of brains and education could possibly think of a rubber-stamp method for government architecture.

The American Institute of Architects' code governing competitions was thoroughly threshed out in committee, and the undesirable features removed. It provides every facility for those who desire a variety of ideas to call upon men skilled in their profession, and to obtain their ideas with fairness to all.

The building public has drifted into the habit of thinking that it has the privilege to call upon an architect to spend his time and money in giving it the benefit of his skill and knowledge without compensation. Why this condition exists is hard to say, but I believe the fault is largely with the architect who is too anxious for work, and who does not think of the harm that he is doing the profession at large when he agrees to make sketches, etc., for nothing.

* * *

The Kind of Architectural Competition that Hurts the Profession

RECENTLY the Board of Education of the city of Chico, California, advertised for competitive plans for a brick school house. The program was apparently prepared by a novice—possibly the city hall janitor—at any rate it has not been taken seriously by members of the profession, as is indicated by Mr. August G. Headman's letter to the city superintendent of schools. The program and letter are reprinted in full herewith:

NOTICE TO ARCHITECTS.—For the benefit of architects inquiring concerning plans for a new brick school building to be erected in Chico School District, the Board of Education of the city of Chico in and for Chico School District, hereby invite architects to submit designs for a school building that shall furnish the last mentioned rooms and accommodations as a minimum requirement. The Board of Education shall judge and select or reject the plans. It is especially understood that no premium or award shall be offered for any rejected plan. The accepted plan shall become the design and plan from which the building shall be erected.

Plans for the proposed new Oakdale grammar school building shall be made to the scale of one-eighth inch to one foot, and shall consist of the following drawings:

Foundation plan.

Basement story plan.

Main floor plan.

Second story plan.

Roof plan, and a longitudinal and a transverse section, four elevations, front, rear and both sides. The proposed building to be combined elementary and grammar school for approximately 400 pupils, half boys and half girls. The building shall be two stories and basement in height—not fewer than eight class rooms size 24x32 and about 14 feet with cloak rooms, each class room with built-in bookcase, not smaller than 12 cubic feet inside. One office. One library well provided with shelving. One auditorium of seating capacity of not less than 600. Two basement rooms for manual training. Two basement rooms for domestic arts. Kitchen to be plumbed for water and gas. Entrances, halls, office and auditorium to be wired for electricity. Basement to contain heating plant for auditorium and a room for bicycles. No toilet system other than for teachers' use need be installed. Small lavatory and drinking founts must be on each floor.

Plans shall be completely and accurately figured with all necessary dimensions and spacings, and thickness of walls in each story shall be clearly indicated. Specifications shall be complete, and shall accurately describe all materials and labor required in the construction and finishing of the building. Each architect who submits plans shall furnish the secretary of the Board of Education two complete sets of plans and specifications as above enumerated, on or before the 9th day of March, 1914, and one of the sets furnished by the successful architect shall be kept as a public record from the date of and following the selection by the Board of Education of such plans and specifications for use in the construction of a public building. The successful architect will be required to finally furnish four full sets of plans and specifications, and four full sets of blue-print detail drawings. Full-size detail drawings for all mill work, stair work and other parts of the proposed structure shall be furnished and delivered to the board by the successful architect within three weeks from the date of the official adoption of the plans for the building.

In case the successful architect becomes the superintendent of construction of the building the board will allow as an entire compensation 6 per cent of the contractor's price of the building exclusive of furnishing and fixtures. In case the architect does not become the superintendent of building construction, then compensation of 6 per cent shall be divided between the architect and building superintendent in accordance with the prescribed rules for architects' fees. Th entire compensation of the successful architect is to be dependent upon the cost of the building, without change in plans or specifications, from original filed copies—the total cost as shown by regular bids from reliable contractors to not exceed the sum of $30,000. In case the board fails to get a bid from a reliable contractor to erect the proposed building for $30,000 or less, then the architect furnishing the plans, etc., shall forfeit all claim to any compensation whatever for his plans and specifications, etc.

The Board of Education expressly reserves the right to reject any or all plans, also to require such minor changes as may be found necessary before the final adoption of any plan.

CHAS. H. CAMPER,
Secretary Board of Education.

City Hall, Chico, Cal.

San Francisco, California, Feb. 16th, 1914.

Mr. Chas. H. Camper,
City Supt. and Sec. Chico School Dept.,
Chico, California.

Dear Sir:—We beg to acknowledge the receipt of data entitled "Information for Architects," also your letter dated February 6th, written in respect to the proposed new Oakdale grammar school building, to be erected in Chico.

It is the policy of our firm to enter, when convenient, architectural competitions of recognized standard, when the interests of our profession are protected, and the demands of the program within reason and in accordance with the Code of Competitions of the American Institute of Architects. The information, or rather program of competition, as issued by your board is, to say the least, unfair and defective in many ways and will not attract the serious attention of any responsible men of the architectural profession.

We note in one clause of your program that the architectural compensation of 6 per cent shall be divided between the architect and superintendent in accordance with prescribed rules of architectural fees. This is one of the many items contrary to the code and good practice, and inasmuch as your board therein admits knowledge of the architectural schedule, it is to be regretted that your board or architectural advisor did not study the code more carefully.

I am taking the liberty of mailing your board a copy of a circular of "Advice and Information on Architectural Competitions," issued by the American Institute of Architects. I might also mention that should your board desire to seek any advice in reference to the above matter, the San Francisco Chapter of the American Institute of Architects has a special committee for that purpose, who would be pleased to assist you without charge, of which Architect Wm. Mooser, Nevada Bank building, of this city, is chairman.

It is not the intention of the writer to offend your board, nor to be considered as a critic of your actions, but it is my desire, if you will permit me, to inform you of the proper recognized procedure in cases of your kind, and in turn uphold the standard and code of the architectural profession, thereby protecting the interests of the entire community.

With my best wishes to your board and to your undertaking, and hoping that you will accept this letter in the spirit in which it is written, I am,

Yours most respectfully,
AUGUST G. HEADMAN.

Among the Architects

American Institute of Architects

(ORGANIZED 1857)

OFFICERS FOR 1914-15

President..........R. Clipston Sturgis, Boston
First Vice-President....Thos. R. Kimball, Omaha, Neb.
Second Vice-President....Frank C. Baldwin, Washington
Secretary..........D. Knickerbacker Boyd, Washington, D. C.
Treasurer .... J. L. Manran, St. Louis
Auditor......T. J. T. Fuller, Washington, D. C.

Board of Directors

For One Year—Irving K. Pond, Chicago; John M. Donaldson, Detroit; Edward A. Crane, Philadelphia.

For Two Years—C. Grant La Farge, New York; Burt L. Fenner, New York; H. Van Buren Magonigle, New York.

For Three Years—W. R. B. Willcox, Seattle, Wash.; Octavius Morgan, Los Angeles; Walter Cook, New York.

San Francisco Chapter

President ....George B. McDougall
Vice-President..............Edgar A. Mathews
Secretary-Treasurer....Sylvain Schnaittacher
Trustees.................. Geo. B. McDougall, Henry G. Schulze

Southern California Chapter

Vice-President..............Albert C. Martin
Secretary ....Fernand Parmentier
Treasurer..................August Wackerbarth

Board of Directors

Octavius Morgan — J. J. Blick — H. M. Patterson

Portland, Ore., Chapter

President ....Morris H. Whitehouse
Vice-President.................Albert E. Doyle
Secretary................. ..Ellis F. Lawrence
Treasurer ....Folger Johnson
Council Members .... Edgar M. Lazarus, Frank Logan

Washington State Chapter

President ....Charles H. Alden
Vice-Presidents .... J. F. Everett, George Gove, Albert Held
Secretary ....Arthur L. Loveless
Treasurer ....A. C. P. Willatzen
Additional Members of Council.............. D. J. Myers, D. R. Huntington, W. R. B. Willcox

California State Board of Architecture

NORTHERN DISTRICT.

President...................John Bakewell, Jr.
Secretary and Treasurer.Sylvain Schnaittacher

Members

Jno. Bakewell, Jr. — Edgar A. Mathews — Joseph C. Newsome

SOUTHERN DISTRICT.

President.....................John P. Krempel
Secretary-Treasurer..........Fred H. Roehrig
Members.................... Octavius Morgan, Sumner P. Hunt, Wm. S. Hebbard

San Francisco Architectural Club

OFFICERS FOR 1913-14

President ....Geo. E. Greenwood
Vice-President..............Chas. Peter Weeks
Secretary.......................A. L. Williams
Treasurer ....Wm. D. Sherman

Directors

Henry A. Thomsen — James A. Magee

Los Angeles Architectural Club

President..............Arthur Rolland Kelly
Vice-President...............Harry F. Withey
Secretary-Treasurer .... Henry E. Bean

Chairman Educational Committee

John T. Vawter

Chairman House and Entertainment Committees, Massier of Atelier

Gilbert Stanley Underwood

San Diego Architectural Association

President.........................J. B. Lyman
Vice-President....................F. C. Cressy
Secretary....................Robt. Halley, Jr.
Treasurer.......................G. A. Haussen

Portland Architectural Club

OFFICERS FOR 1913

President........................Frank Logan
Vice-President.................Jno. M. Hatton
Secretary...................Wm. H. Flanigan
Treasurer..................William P. Dawson

Architectural League of the Pacific Coast

President........Carl F. Gould, Seattle, Wash.
Vice-President.......Myron Hunt, Los Angeles
Secretary.............J. S. Cote, Seattle, Wash.
Treasurer...........W. C. Hays, San Francisco
Next Convention City—Seattle.

Honor for Mr. John H. Schumann

Mr. John H. Schumann, Jr., president of the Moller & Schumann Company of Brooklyn, N. Y., has been elected to the directorate of the Citizens Trust Company of Brooklyn, to fill the vacancy caused by the death, in December, of Mr. John H. Schumann, Sr.

Architect Wright Returns

Architect G. Alexander Wright of San Francisco recently completed a tour of the United States, visiting twenty-nine of the larger cities and their building exchanges for the purpose of bringing about more efficient estimating and contracting methods.

Last winter Mr. Wright visited England, where he talked over exposition matters with some of the British officials. He asserts that the true reason why the British Government is not exhibiting is because British manufacturers are so busy with orders taxing the capacity of their plants that they have become indifferent to the exposition. The Panama canal toll has no bearing on the situation, according to Mr. Wright.

Speaking of local building conditions, Mr. Wright said: "In visiting twenty-nine of the largest cities of the United States, I must say that I have seen nothing in any of the big Eastern cities that could show San Francisco how to do anything in the building line. Our building ideas seem to be far in advance of those of the East."

New Architects

The State Board of Architecture, Southern California Division, has granted certificates for the practice of architecture to the following: W. S. Greene, 1036 Van Nuys building; Francis Barry Byrne, 805 Trust & Savings building; and Clinton Hall, 801 South Union avenue; all of Los Angeles; R. Rayner Christien, 931 North Spurgeon street; Birger A. Elwing, 410 West Second street; and J. Flood Walker, 303 East Fourth street, all of Santa Ana; and John Cyril Bennett, 176 Terrace Drive, and Charles E. Norberg, 1211 Avoca avenue; both of Pasadena.

Given State Certificates

At a meeting of the State Board of Architecture, Northern Division, held on Tuesday, February 24th, the following were granted certificates to practice architecture in this State: J. S. Gould, Lloyd A. Rally, Kenneth MacDonald, Sr., V. Wyss Thalman, Charles E. Butner, Fresno; Ralph P. Morrell, Stockton.

Architect Lenzen Busy

Architect Theodore W. Lenzen, Humboldt Bank building, San Francisco, has quite a little work in his office. He has recently taken figures for the construction of a three-story frame apartment house on Guerrero street for the Braun Realty Company, and bids have also been taken for a two-story frame store and flat building for B. Longo. Plans are being prepared for a moving picture theater and also an apartment house.

Wants Portland Chapter to Wake Up

In his annual report, Edgar M. Lazarus, F. A. I. A., and retiring president of Oregon Chapter, A. I. A., urged the members to infuse new life into the organization, otherwise, he predicted that it would surely die a painless death.

The new officers of the Chapter are: Morris H. Whitehouse, president; Albert E. Doyle, vice-president; Ellis F. Lawrence, secretary; Folger Johnson, treasurer; Edgar M. Lazarus and Frank Logan, members of the council.

The following committees, with their respective chairmen, have been appointed for the present year: Municipal plans and affairs, Folger Johnson; program and entertainment, Andrew Fouilhoux; professional practice, A. E. Doyle; educational architectural league, William G. Holford; legislative, D. L. Williams; membership, F. A. Naramore; quantity surveying, Chester Hogue; building laws, H. A. Whitney, and publicity, Ellis F. Lawrence.

Advisory Architect for Fresno Schools

A new building policy in the handling of the $450,000 school bond issue has been decided upon by the Board of Education of Fresno city which has determined to employ an advisory architect, for whom the State will be searched, to have general charge of all construction plans, and to place the detailed work on the actual blueprints in the hands of a local draughtsman.

Superintendent of Schools C. C. Starr, as secretary of the board, was instructed to send out circular letters to the leading architectural firms in the State advising them of the plans of the local department and asking them for a statement of qualifications to undertake the supervision of the work.

Country Club House

Architect Edward G. Garden, Phelan building, San Francisco, is preparing working drawings for an attractive country club house to be built near Elmhurst, Alameda county, for the Sequoia Country Club. The estimated cost is $70,000.

Country Residence

Architects Willis Polk & Company, Merchants Exchange building, San Francisco, are preparing plans for a $200,000 country residence for W. B. Bourn, president of the Spring Valley Water Company.

Berkeley Residence

Architect C. W. Ratcliffe, Jr., of Berkeley has completed plans and taken figures for the construction of a two-story and basement Mission style house in Claremont for E. A. Nickerson. The estimated cost is $20,000.

Pittsburg City and County Building

Another competition of unusual interest has just been decided. The plans of Architect E. B. Lee, Pittsburg, associated with the architectural firm of Palmer, Hornbostel & Jones of New York City, have been selected for the proposed county and city building, which is to be erected on a site bounded by Grant, Diamond and Ross streets and Fourth avenue in the Iron City. The commission which finally chose the architects included County Commissioners J. Denny O'Neil, I. K. Campbell and S. J. Toole, and Councilmen John M. Ghoering, Robert Garland, Dr. J. P. Kerr, Dr. G. A. Dillinger, W. A. Hoeveler and Dr. S. S. Woodburn. Cass Gilbert and Walter Cook, architects of New York City, acted as advisers to the commission. The competition included fifteen Allegheny county architects. The firms receiving honorable mention were MacClure & Spahr, R. M. Trimble, Janssen & Abbott and Rutan & Russell. Mr. Lee receives no immediate prize, but is allowed $5 000 for preparing plans and specifications to realize his design. The design of the building is of Romanesque style.

Personal

Architect Frank Lloyd Wright, Jr., landscape architect of Chicago, will establish an office in Los Angeles, being at present with Architects Montgomery & Montgomery, 805 Trust & Savings building.

Architect Francis Barry Byrne of Los Angeles, has taken charge of the architectural offices of Walter Bailey Griffin of Chicago during the absence of Architect Griffin in Melbourne, where he will superintend the erection of the Australian capitol buildings.

The firm of R. B. Young & Son, architects, will continue under that name in their offices in the Lankershim building. The son, Mr. Frank Wilson Young, the junior member of the firm, who is well known both socially and in a business way, has practically had charge of the business for the last six months, as Mr. R. B. Young had been confined to his home ever since an operation performed last August.

Charles L. Johnson of the Atlas Portland Cement company of New York, was a recent visitor in San Francisco and Los Angeles. Mr. Johnson reported business conditions much improved. He is quite enthusiastic over prospects for an exceptionally good business year on the coast. The Santa Cruz White Portland Cement Company has exhausted its supply of white cement and discontinued its manufacture. They are now selling the Atlas Portland White Cement.

Announcement has been made that since the death of Mr. William Curlett the architectural firm of William Curlett & Son will be continued under the same name and management as heretofore by Aleck E. Curlett. The offices will remain in suite 1027 Title Insurance building, Los Angeles.

Mr. George P. Robinson of Los Angeles, and assistant supervising engineer of street construction in the City Engineer's office, has accepted the position of City Engineer for the city of Santa Barbara.

Firemen's Fund Company to Build

The Firemen's Fund Insurance Company has adopted plans by Architect Lewis P. Hobart of San Francisco, for a monumental home office building to be erected upon the site of the old building of the company at the southwest corner of California and Sansome streets, San Francisco. Construction is scheduled to begin April 1st.

With a site 87½ feet square, this new structure will harmonize with the classic Bank of California building on the opposite corner. It will be three stories high, with provision for three additional floors to be erected in the future, and its facades will be dominated by double columns, the design being in the Corinthian order. The base will be of granite and the columns and cornices of terra cotta of a light color. The recessed walls will be mostly of bronze and plate glass.

The building is to be used entirely as the home office of the insurance company. It will be of class A construction throughout, with a full steel frame and reinforced concrete walls, partitions, floors and roof.

Architect Brings Suit

W. H. Crim, an architect of San Francisco, has filed suit in the Superior Court against W. N. Hohfeld of Mayfield for $566 for alleged services rendered.

The case came uo in the San Francisco courts, but as Hohfeld is a resident of Mayfield, a change of venue was demanded and granted. The case will be heard in the Superior Court of Santa Clara county.

Fraternity House

Architect John Reid, Jr., member of the consulting board of architects of the city of San Francisco, has completed plans for a $25,000 fraternity house to be erected on Hearst avenue and Highland place, Berkeley, for the Phi Delta Theta Society. The building will be frame and plaster, with clay tile roof and will be equipped with all modern conveniences.

The Butterfly Map

The Panama-Pacific International Exposition Company have adopted the new style world map invented by Architect B. J. S. Cahill to show the route of aviators in the forthcoming flight around the globe, to take place from San Francisco in 1915.

THE
Architect and Engineer
OF CALIFORNIA
Member of California Periodical Publishers' Association and General Contractors' Association, San Francisco

Published Monthly in the interests of the Architects, Structural Engineers, Contractors and the Allied Trades of the Pacific Coast by the Architect and Engineer Co.

OFFICES
617-619 Monadnock Building, San Francisco
Telephone Douglas 1828
Builders' Exchange, Oakland

TERMS OF SUBSCRIPTION
(Including postage) to all parts of the United States $1.50 per annum; to Canada 50c additional; to all Foreign points $1 additional.

Vol. XXXVI. March, 1914 No. 2

A PLEA FOR HARMONY IN THE CHAPTERS

It is time the different Institute Chapters on the Pacific Coast awakened to the fact that if the real purpose of the organization is going to be accomplished, trivial differences must be adjusted and fancied wrongs overlooked and forgotten. New working blood must be infused into the all but dormant bodies, and the members should each one take it upon himself to boost and not belittle his Chapter. These words of advice are directed particularly to the San Francisco and Oregon Chapters.

In Los Angeles, Southern California Chapter is pulling together splendidly — a recognized characteristic of the townspeople there, by the way. Up in Seattle the Chapter is doing good work, and its meetings are well attended, but in Portland, the Oregon Chapter is moribund, if we are to accept the statement of the retiring president, Mr. Edgar M. Lazarus, F. A. I. A., who, in his annual report presented at the Chapter meeting in December, declared that unless more interest is aroused in the Chapter proceedings the organization will shortly die a painless death.

Now as to the San Francisco Chapter—its troubles are altogether too well known to need further airing here. The Architect and Engineer has refrained from exploiting any of the dissensions that have all but wrecked the organization, although it has been repeatedly urged to do so. In some instances the Chapter is right in the position it has taken with reference to flagrant disregard of ethics of certain of its members, but in some other matters its policy is open to criticism, and until its tactics are changed we can see little else than a turbulent career. And what a pity it should be so! The architect whose very success is dependent upon a harmonious blending of lines and colors—here we find him in his own society, intended to help him to maintain his professional standard and dignity—here we find him,

San Francisco Society of Architects

Regular Meetings Second Wednesday of Each Month

PRESIDENT	LOUIS C. MULLGARDT
VICE-PRESIDENT	ALBERT PISSIS
SECRETARY AND TREASURER	CLARENCE R. WARD

BOARD OF DIRECTORS

L. C. MULLGARDT, ALBERT PISSIS, CLARENCE R. WARD, GEO. W. KELHAM and JOHN BAKEWELL, JR.

COMMITTEES:—

Membership—LOUIS P. HOBART, WILLIAM C. HAYS.
Architectural Practice—J. HARRY BLOHME, JOHN REID, JR., J. J. DONOVAN.
Entertainment—FREDERICK H. MEYER, JOHN BAKEWELL, JR., WILLIS POLK.
Allied Arts—HOUGHTON SAWYER, LORING P. RIXFORD.
Publicity—CHARLES PETER WEEKS, E. COXHEAD.
Education—JOHN G. HOWARD, BERNARD R. MAYBECK.
Competitions—ARTHUR BROWN, JR., JOHN BAUR.
Constitution and By-laws—GEORGE W. KELHAM, W. O. RAIGUIL.
Special Committee on Institute Membership—JOHN G. HOWARD, ALBERT PISSIS, L. P. HOBART.

wreaking discord, decrying the character of his brother members, and maintaining a spirit of animus that would put a school boy to blush.

Those architects who seceded from the Chapter and established an independent society are by no means immune from criticism. Their action, taken while they were still members of the Institute, is greatly to be deplored, and it would seem to be as much up to them as to those who remained in the Chapter to bring about a reconciliation and restore harmony. This magazine has a good many readers and some friends, we are pleased to say, on both sides of the controversy, and we have no disposition to show any partiality. But it seems to us that to continue as two different bodies, as at present, must eventually result in disaster for one or the other, or both. As matters stand, neither organization is accomplishing anything. If any good is to be accomplished the two factions have got to get together, arbitrate their differences and start a clean slate.

Now, why not each side appoint a committee of arbitration (and see what can be done? At the outset there should be less fault finding and more earnest effort to accomplish something. The anvil chorus has no place in the ranks of a body of learned men such as comprise the greater part of the architectural profession.

Be a power in the community instead of the laughing stock of the public; make your influence felt; place the profession of architecture where it belongs—beyond the reach of the jealous ones and the sensational press.

More of the progressive sentiment is needed—the kind that dominated the New Orleans convention, for example. If the National body could conscientiously dispense with the services of one of its executive officers who had filled the position so many years, the same thing could probably be accomplished in the local Chapter with beneficial results.

THE YOUNG ARCHITECT AND HIS CASTLES

The young architect who aspires to the new and the novel must needs find him a client financially able as well as conventionally radical. Great projects demand considerable expenditures.

The men who control the necessary financial resources are not as a rule sympathetic to flights of genius of a daring innovatory order of design. Capital is seldom partial to the radical. It leans to the old, the tried, the safe and the established order.

In architecture as in sculpture, in painting, in music and in verse men save their dearest dreams for the intimacy of the studio and a chosen few of "the friends who know." As Rodin put it, "Some of them are of such scope that it would require a great deal of money to carry them out, and for the artist it is not always easy to find cash, especially if he sticks faithfully to his ideals."

State, County and Municipal Engineering

Good Roads—Water—Sewers —Bridges—Fire Protection

The Fee System at Oakland of Reimbursing the City for the Cost of City Engineer's Department

THE city of Oakland supports its city engineering department by fees collected from other city departments and from private individuals. All employees are salaried and the salaries and other expenses, such as field and office equipment and supplies, are paid by the city. The city then charges for all work done in private or public service, the fees fixed by ordinance and these fees are credited as income against expenditures in salaries, etc. This system of accounting has been in force since July 1, 1911, and in the report of the Department of Streets for June 30, 1913, are given some data in the operation of the system which we summarize here:

The Commissioner of Streets is in charge of the Department of Streets. The superintendent of streets is ex-officio City Enginner. The engineering department is under the Deputy City Engineer, and not only handles the engineering work for the Department of Streets, but also for the Harbor Department and all other departments of the city. The results obtained have been very satisfactory. All orders are passed out through the proper heads which eliminates friction and confusion and gives a means of checking efficiency and of recognizing ability and good service. Vacancies in the technical service of the department are filled by civil service examinations and an eligible list of applicants is maintained for filling such vacancies as may occur from time to time. The organization and salaries paid as fixed by city ordinance are as follows:

1 Deputy City Engineer, at a salary of $3,000 per year.

4 Assistant Engineers, at a salary of not less than $1,980 and not more than $2,400 per year each.

3 Office Engineers at a salary of not less than $1,620 and not more than $1,920 per year each.

1 Field Engineer, at a salary of not less than $1,620 and not more than $1,920 per year.

1 Junior Engineer, at a salary of $1,680 per year.

4 Instrumentmen, at a salary of $1,500 per year each.

2 Instrumentmen, at a salary of $5 per day each.

14 Draughtsmen, at a salary of not less than $1,320 and not more than $1,500 per year each.

1 Assistant Draughtsman, at a salary of not less than $720 and not more than $840 per year.

10 Chainmen, at a salary of not less than $900 and not more than $1,080 per year each.

4 Chainmen, at a salary of $3 per day each.

1 Senior Bookkeeper, at a salary of not less than $1,200 and not more than $1,500 per year.

1 Junior Stenographer, at a salary of not less than $780 and not more than $1,080 per year.

1 Senior Clerk, at a salary of not less than $1,200 and not more than $1,500 per year.

In addition to the above, there is assigned to the engineering department a right of way agent, under salary bv the city, whose duties are to obtain by voluntary dedication such miscellaneous rights of wav and street openings as may be necessarv for the public welfare and convenience. This arrangement has resulted in considerable saving to the city as compared with the method formerly employed.

As indicating the financial workings of the system the income and expense account of the department for one year are given. The total cost of maintaining the department was as follows:

Salaries	$53,296.82
Office supplies	1,301.03
Office equipment	664.89
Field Supplies	621.51
Field equipment	1,004.80
Total	$56,889.05

Under the head of office supplies are included such articles as drafting material, blueprints, pens, pencils, ink, pads and such other articles necessary for general office use. Under office equipment are included such permanent articles as drafting tables, filing cases, calculating machines, of which the department purchased two at a cost of about $550, planimeters, pantographs, etc. Under field supplies are included such articles as stakes, monument castings, car fare, etc.; and under field equipment are included such permanent articles as surveyors' transits (three having been purchased at a cost of $750), levels, rods, tapes, plumb-bobs, etc.

As a partial offset to the amount paid for maintenance, by the city, the following items are taken from the department books:

Fees collected on private lot surveys	$ 2,861.75
Fees collected on private grade surveys	355.90
Fees collected on street openings	233.82

Fees collected by street department on street work covered by engineers' certificates....	36,770.51	40,221.98
(Both public and private contracts.)		
Work performed for school department	2,183.49	
Work performed for park department	965.38	
Work performed for playground department	67.20	
Work performed for department of public health and safety—		
Fire department	7.50	
Police department	11.80	
High pressure fire system...	245.18	
Work performed for civil service board	136.50	
Work performed for municipal water district	311.21	
Help assigned to the department of public works (harbor division)	4,079.87	8,008.13
Total		$48,230.11

No account is taken in the foregoing of the amount expended for the general operation of the office, of the cost of miscellaneous work ordered bv the City Council or of the labor performed ($7,840.18) in bringing the maps and records of the office up to date.

Big Steel Bridge

County Surveyor F. A. Steiger of Solano county has completed the drawings for the proposed new bridge between Solano and Sacramento counties at Rio Vista. The approval of the engineers of the War Department of the plans is necessary before the bridge can be built. The Supervisors of both counties have decided in favor of the project.

The proposed bridge is to be about 3.200 feet long, consisting of twenty 150-foot stationary spans and one 200-foot lift span, under which the steamers will pass. It will leave a space of 100 feet in the clear when lifted. The plans call for a modern steel structure set on cylindrical piers driven to bedrock or into gravel.

For one-half its distance the bridge will pass over the present river channel, and the other half will be over what is now, except in time of freshet, dry land. This dry land is to be dredged in the work of "uncorking" the river and the present levee is to be set back 200 feet from its present line.

Concrete Streets Cripple Horses

(Engineering News.)

Are horses' feet harmed by concrete paving? One of the main contentions against the use of concrete pavement is that it is very hard on horses' feet, and statements have been made at times that veterinaries in districts where concrete paving is prevalent have noted a pronounced increase in the number of horses treated for sore and damaged feet. The common council of Hartford, Conn., has just passed an ordinance requiring that stable floors in the city be made of concrete, and in opposition to this ordinance the statements noted above have been brought forward. Any of our readers who have had experience in this matter would help the investigation if they forwarded the results of their experience to the Aberthaw Construction Co. of Boston, Mass., which is studying this question and proposes to compile a symposium of views from all parts of the country.

Stockton St. Tunnel Puzzles Engineers

OWING to unexpected conditions encountered in digging of the Stockton street tunnel, an additional cost of $80 000 has already been entailed. And while the end of the extra work is not yet in sight, the available money is all but gone and there promises to be a deficit of between $40,000 or $50,000. Strenuous objection is being voiced by property owners in the assessment district against going to further expense and just where the extra money that it is believed will be necessary for the completion of the work is coming from is a matter of conjecture.

In the belief that the Stockton street hill was of solid rock a tunnel with a very flat arch was designed with a thin wall of concrete as a lining. But the rock proved to be one large boulder about the size of a house off to one side of the tunnel. The rest of the hill is shale. There is no strength in it and it will not hold up its own weight. The flatness of the tunnel arch gives it no great strength and with the weight of rock it has to support it was found necessary to add an outside coat of concrete to the lining of the tunnel fifteen inches at the base, tapering to eight inches at the top.

But with the sides of the tunnel thus strengthened the bottom is giving indications of coming up. In the three drifts that now pierce the hill it is found that the pressure on the sides of each of these lesser tunnels is having the effect of forcing up the soft earth in the center of the floor. This pressure is so strong in these smaller tunnels that it breaks the 3x8-inch scantlings that are used as flooring. What this pressure will be when it comes on the main arch can at present only be surmised. It is believed, however, that it will be necessary to lay a heavy curved floor as thick as the tunnel walls, that will have the effect of holding the sides apart and complete what will then in effect be a flattened concrete tube.

Contractor Bade said yesterday that he expected to have the bore of the tunnel completed by July. What the engineers will consider necessary to make the tunnel a success, he says, can only be determined when it comes to removing the core.

Lumbering Our Greatest Manufacturing Industry

According to E. T. Allen of Portland, Oregon, lumbering is the greatest American manufacturing industry and is exceeded only by agriculture in supplying the essentials of life. In a recent address before the conservation congress Mr. Allen called attention to the comparative lack of the public's knowledge of the economics of subjects which touch each individual so closely as forestry and lumbering.

Mr. Allen is forester of the Western Forestry and Conservation Association, an organization of lumbermen whose principal activity is the protection of their holdings from fire. A large part of the association's efforts are directed to making the public realize the loss which each individual suffers, directly and indirectly, from forest destruction. In this connection he pointed out that forest preservation can not be conducted wholly by business managers or boards of directors. "It is a mutual co-operative enterprise," he said, "requiring daily participation by all concerned. The American forest policy must exist not because a few say it should, but because a majority of citizens understand what is needed and why it is needed and put the policy into effect.

"The only reason the average citizen does not realize the importance of forestry and does not give it the same active and intelligent interest that he gives his home town problems is that he can not see it so clearly. The very immensity and importance of the lumber industry causes its several processes of growing, manufacture and distributing to be conducted separately, and this confuses the public mind. Different communities see different parts of the whole process, but get no thorough grasp of forest economics.

"In many a little German village the whole community sees the forest grown, cut, manufactured and used. Those who do not actually participate, serve or supply those who do. Their forestry needs no propaganda. The people could not understand the need for it any more than of propaganda for raising wheat and making bread.

"We talk too much about forests as though they were an end in themselves. We might just as well talk only of land when trying to improve agricultural conditions, or of water when urging the protection and propagation of food fishes. The average citizen must be brought to consider all forest production and all forest use as little or no different from the production and use of any necessary crop, obviously to be encouraged and stabilized on a permanent basis profitable to all concerned. Whether he is a private citizen or a lawmaker serving private citizens, he must be familiar with all the factors. As long as he thinks an uncut forest is forestry, and that such forestry is good and all lumbering bad, there will be no real progress.

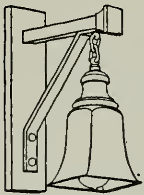
"There is little trouble in passing laws for the protection and advance of agriculture, horticulture and dairying, because people understand the governing conditions of these industries and see the point of such laws readily.

"To succeed in the United States forestry must be so closely allied with lumbering that neither forester, lumberman nor public makes any distinction. This being true, the need is to teach the principles of the business from start to finish. Every process, its cost, and its relation to other processes and to the final price of the product should be common knowledge.

How Bridges Expand

Three years ago I made a series of observations of steel railway bridges erected on various lines of the New York, New Haven & Hartford Railway, to determine the action of the expansion bearings, says a writer in the Engineering News. The bridges on which the observations were made are all relatively new, having been erected during the past ten years. In all, 45 observations were made, on as many different bridges. Of these 16 were pin-connected trusses, varying in length from 182 to 217 feet; 11 were riveted through trusses, 70 to 145 feet in span; and 18 were deck plate-girder bridges, 70 to 111½ feet in span. The winter temperatures during which observations were made (1910-11) ranged from +15 to +56° F., and the summer temperatures (the following summer) ranged from 45 to 86° F. The variation from high to low temperature during a single set of observations ranged from 18° change as a minimum to 54° change as a maximum.

To complete the coefficient of expansion, it was necessary to know the temperature of the bridge at each observation. It might be thought that very precise temperature readings would be necessary, but the following observation indicated that this was not the case: a 217-foot pin-connected truss span was watched while the atmospheric temperature was rapidly rising under the warm rays of the morning sun. It was noted that a movement occurred at the roller bearing for every 3 to 5° F. rise in temperature, and whenever such a movement occurred there was a loud noise. The bridge and its bearings were in good condition. It is concluded from the observations that, even under nearly ideal conditions of free movement, the expansion movement of a bridge does not take place smoothly and continuously.



Heating and Lighting

Plumbing and Electrical Work

Lighting Effects With Gas and Steam

STEAM and gas will be extensively used in some of the original schemes for night illumination of the Panama-Pacific International Exposition. It is believed that some of the most spectacular effects will be gained where these are combined.

This will be particularly noticeable in the Court of Abundance in which the architect has taken for his theme the creation and development of the earth and has presented a symbolic idea of the history of man from the prehistoric day to the present. The rise of man and the development of the earth has been treated by a series of graduated scales; the lowest form, or the unicellular life being presented on the ground level and the various stages of advance noted on ascending planes.

The court will be illuminated almost exclusively by means of high pressure gas. Urns will be placed about the court and on the borders of a still lagoon in the center, from which twisted gas flames ten to fifteen feet in height will rise.

Great sheets of flame will lick the fireproof sides of the court and rise along the facades and up the scores of columns supporting huge carved figures of prehistoric men.

A haze will hang over the entire court created by steam forced through perforated pipes laid along the ground level. The cloudy vapor and the reddish-yellow flames will produce an effect of mystery which the entire architectural scheme will carry out.

It is the intention of the designer to have gas released under pressure just beneath the surface of the water in the lagoon which will be ignited upon striking the air. The details of this ingenious plan, however, have not yet been worked out.

As a substitute for the usual pyrotechnic displays, steam will be used at the Panama-Pacific International Exposition. While this is not unique, having been successfully used to a slight degree at the Hudson Fulton celebration in New York, this will he the first occasion upon which it will take the place of fire-works.

Set pieces of pipe in various shapes are being made and placed near the Scintillator—a battery of forty-eight 36-inch searchlight projectors—on the bay front of the site. Through these pipes steam under high pressure will be forced to a height of three hundred feet or more. An automatic device at the base will cause the steam to be turned on for a certain number of seconds and then shut off.

The vapor will assume form under the colored rays of the Scintillator, waver and dissolve like wraiths into the upper air.

The gas used at the Exposition will be distributed through a high pressure system by a San Francisco company and will be the oil gas made of crude petroleum commonly used in California. Its heat value is 600 B.t.u. per cubic foot and it has a candlepower value in excess of 18. Being exceptionally free from sulphur and other impurities it will be used for heating in all of the buildings. A low pressure system will also be operated at about six inches water pressure for lighting purposes in the various buildings.—Waldemar H. F. N. De Bille.

School Room Lighting

By ROMAINE W. MYERS, Oakland, Cal.

PUBLIC school houses of our large Western cities are quite often used for evening classes, so that the question of proper lighting is of considerable consequence. The importance of good illumination in rooms where students are working, cannot be overestimated.

We have read a great deal in the past few years regarding the conservation of natural resources, but how about the conservation of this greatest of nature's resources—the eye of the child? This should receive more attention, in fact, if this were so, the doctors employed to investigate the health of school children would have their labors considerably lessened.

Improper or insufficient lighting produces a disturbance of the balance of the retina, affecting the nervous system thereby also causing headaches, etc. The danger that children are subjected to when the equipment violates every requirement of proper lighting is evident, and the possible loss to the nation equally obvious.

It is a serious enough handicap for children to have to attend night school to obtain an education. The fact that by doing so they are subjecting themselves to an obstacle so serious as to impair their eyesight should be remedied. Poor lighting has more to do with intermittent or non-attendance at night schools than any other cause. Good lighting methods will ensure better health and better results from the students' efforts.

Until recently architects, school boards and teachers have been perhaps pardonably, but nevertheless, sinfully lax in providing the best lighting possible for the rising generation. This is because they have been either absolutely indifferent or ignorant of the physiological requirements of artificial lighting. It is time that all should realize that the eyes of the children in their charge, are of more importance than the decorative features or artistic effect of the lighting fixtures in the school room.

An example of good lighting is found in two rooms of the Oakland High School. The lighting is installed at a minimum of expense and consists of placing the outlets unsymmetrically with reference to the rows of desks, so that the shadows on the pupil's desk will fall from left to right.

The Panama Canal and the Pacific Coast Ports

Forbes Lindsay, the well-known traveler and lecturer, contributes an interesting paper entitled "The Panama Canal and the Pacific Coast Ports" to the current issue of Lippincott's Magazine.

"No other portion of the United States will benefit so greatly by the opening of the Panama canal as will the Pacific coast region," he tells us. "A vast amount of produce which now moves to its market in an easterly direction will take the water route from coast to coast when that shall have become available. Great quantities of foodstuffs that could not stand the expense of the rail haul will be raised in the Far Western States and shipped to the East. The cost of sending a ton of merchandise from San Francisco to New York by water will be little more than one-fourth of the present rate for transportation between these points. There will be little, if any, loss of time. Fast freight trains occupy fourteen or fifteen days in crossing the continent. Eighteen-knot vessels will complete the circuit in the same time. It is easy to believe that, with the extension of turbine engines and the introduction of oil-burning furnaces, such a rate of speed will be commonly maintained by merchant ships.

"The Panama canal will revolutionize the internal trade of the United States and greatly expand its foreign commerce. The Pacific Coast ports realize that they must be important factors in this development, and they are one and all preparing to play an effective part in the prospective era of maritime activity. Before the beginning of 1915, upward of one hundred millions of dollars will be spent in improving the facilities of the harbors and ports of our Pacific seaboard for the accommodation of ocean-going vessels. It is a noteworthy fact that almost all these improvements are being carried out at the public expense and under the direction of State and city officials. All along the coast contests have been waged for years between municipalities and commercial corporations for the control of water-fronts and docking facilities. Without an important exception, the people have won in these fights to secure possession of properties which are vital factors in the prosperity of this region."

Mr. Lindsay goes on to tell how Seattle, Tacoma, Portland, San Francisco, Oakland, Los Angeles and San Diego are making the most of their opportunities to profit by the opening of the canal.

Medusa Waterproofing Patent Sustained

In the United States District Court, Northern District of Illinois, on February 13, 1914, a decree was entered declaring the Newberry patent, No. 851,-247, to be good and valid, and that the McCormick Waterproof Portland Cement Co. and S. T. Sjoberg infringed said patent and are perpetually enjoined from making or selling waterproof cement or carrying on the process described in said patent, and that the complainant shall recover the damage resulting from said infringement. Suits against other infringers have been begun and will be vigorously prosecuted.

Direct Contract Letting

Considerable importance is to be attached to the following resolution adopted by the American Institute of Architects at its annual convention:

"Resolved, That the American Institute of Architects in convention assembled, recommends to the members of our profession the adoption of the practice of direct letting of contracts for mechanical equipment, such as heating apparatus, plumbing and electrical equipment. This recommendation is based on the conviction that direct letting of contracts, as compared with sub-letting through general contractors, affords the architect more certain selection of competent contractors and more efficient control of execution of work, and thereby insures a higher standard of work, and, at the same time, serves more equitably the financial interests of both owner and contractor."

It is certainly of interest to the profession to know that for some years there has been a strong movement on the part of the members of the National Association of Master Plumbers and the National Association of Master Steam and Hot Water Fitters to secure the letting of their contracts by owners and architects instead of general contractors. They have petitioned the Institute to take under serious consideration the evils of the general contract system, so far as it affects the mechanical equipment of buildings. They presented the matter in the most temperate and reasonable way, maintaining that the system of indirect contracts works injury to the legitimate interests of all concerned. They mentioned that general contractors, after securing contracts on the basis of bids of competent plumbing and heating contractors, proceed to farm out the work to lower grade contractors, and, by putting in their own pockets the difference in price between cheap and good work, lower the quality of labor to no advantage except their own.

It is the custom of many offices to let contracts for mechanical equipment separate from the general contracts and it is gratifying to note a tendency in this direction on the part of architects in general. It is interesting to note in this connection that laws have been passed in New York and Pennsylvania requiring exclusion from general contracts and the direct letting of plumbing and heating apparatus for State and municipal work, and that in perhaps a dozen other States legislation along similar lines has already been undertaken.

There is a strong feeling in employers' associations, aroused by the treatment accorded them by general contractors, and made intense by the lowering of standards of work to which the best men are committed, and there is little doubt that they might, if they would adopt union methods, make a concerted effort to boycott general contractors in their bidding. It is evident, however, that the best men in their associations are totally opposed to the adoption of such tactics

and that they prefer to appeal in a legitimate way to the architectural profession. The prominent members of the architectural profession have already to a large extent made it a practice to let directly contracts for mechanical equipment—work which is most sure to suffer and most difficult for the architect to protect where there is a tendency to lower the quality of construction.

Such activity on the part of the American Institute is in character with its general policies, and it is to be earnestly hoped that all architects, whether institute members or not, will support this kind of reform.

Moral—Use Redwood Shingles—They Won't Burn

Recently Fire Marshal W. E. Longley of Indiana issued a bulletin dealing with the danger caused in his State by shingle roof fires. The report goes on to say:

"One of the greatest sources of fire in Indiana cities is the shingle roof. Shingles not only act as tinder to be kindled by sparks from locomotives and chimneys, but when ablaze they easily fly through the air and fire adjoining roofs.

"Figures on spark fires throughout the State for the period May 15 to September 27 bear out the fire marshal's statement, for during that time there was a total of 567 fires caused from sparks falling on shingle roofs. The loss resulting from these spark fires reached $657,179.

"Fires on roofs usually start from two sources: Flying sparks from locomotives or nearby smokestacks, and from the chimney of the roof itself. According to the fire marshal's figures, 186 fires were caused in Indiana from May 15 to September 27 by sparks from locomotives. The loss was $556,555. During the same period there were 381 fires caused by sparks from chimneys, witb a loss of $118,624."

Specialty Contractors Meet

The third annual convention of the Specialty Contractors' Protective Association of California was held last month in the San Francisco Builders' Exchange, Delegates from San Francisco, San Jose, Stockton, Sacramento and other cities were present. The following officers were elected for the coming year:

President, Joseph Albach; first vice-president, J. J. Connolly; second vice-president, M. Cohn; sercetary, W. S. Scott; treasurer, W. S. Hanbridge; sergeant-at-arms, Joe Kaiser, all of San Francisco.

Executive board—H. T. Lynch, San Francisco; P. J. O'Brien, Sacramento; W. T. Beck, San Francisco; L. A. Danner, Stockton; J. J. O'Connor, San Francisco; William Herman, San Jose; L. R. Boynton, San Francisco.

Some Recent Legal Decisions.

A provision in a contract for the construction of a federal building that the decision of the supervising architect as to the proper interpretation of the specifications should be final and conclusive did not warrant such architect in interpolating something into the contract not justified by its fair interpretation, nor authorize him to require the removal of pipe of a character authorized by the plumbing contract, because the contractor did not furnish pipe of a different character, also authorized.—Northwestern Marble & Tile Co. v. Megrath, 130 P. (Wash.) 484.

Where, after a house was completed and accepted, it was discovered that something remained to be done, and the owner accepted the promise of the contractor to do that work, the date of the first acceptance is the time when the period of limitation for the filing of mechanic's liens begins to run, and not the date when the work is done.—Bewick v. Price et al., 154 S. W. (Mo.) 876.

Where material is purchased by the owner of a structure into which it is to be placed, it is not necessary, in proceedings to enforce liens against the structure, to allege its actual use therein, though such an allegation is required in case of material furnished to a contractor.—Fry et al. v. P. Bannon Sewer Pipe Co., 101 N. E. (Ind.) 10.

California State Highway Work

The following bulletin is furnished by the California State Highway Commission:

The care with which the State highway is being laid out by the engineers of the California Highway Commission is being demonstrated in all parts of California during this winter's unusual rains. In a number of instances the judgment of the highway engineer and his assistants was vindicated by passable roads under conditions where the absence of the State highway would have left a community without any road.

Such a condition has existed south of Hopland, where the highway division engineer recommended a route on the west side of the Russian river instead of following the old route along the east side. This was a subject of much discussion last summer, as the east side road was well established. The State highway was kept passable during the storms, however, while the old road was out of use and at a time when railroad traffic was almost blocked. A similar condition existed at Marysville, and in section south of San Francisco.

* * *

The State highway concrete bridges built by the counties under the Highway Commission's requirements have withstood the floods where it is admitted that the old type would have been carried away. The State highway is planned for permanence as much as possible, avoiding flood possibilities, cutting out dangerous curves and railroad crossings and keeping within maximum grades of 6 to 7 per cent. On numerous mountain roads grades in excess of 20 per cent are to be replaced by smooth highways with a 6 per cent grade under the Highway Commission's surveys.

The Supreme Court decision of February 24, sustaining the motor vehicle act, releases money for State highway maintenance which had been tied up during the fight on the constitutionality of the law. As the act was the only source of funds for maintenance of the State highway the Highway Commission was entirely without money for maintaining the road already constructed. In spite of the severe demands through abnormal weather conditions of the present winter, the highway engineer's force was able to keep up the highway without material loss.

* * *

Now that maintenance funds are made available the plans submitted to the Highway Commission some time ago by Highway Engineer Fletcher providing for maintenance will be made effective. These include organization of a veritable "flying squadron" for maintenance of the 2,700 miles of State highway on which work is now under way. By use of the motor truck the amount of territory covered by one maintenance outfit is greatly widened and quick repair work in case of floods will be possible. The maintenance plans as developed by Highway Engineer Fletcher and approved by the Commission are especially adapted to the widely varying conditions of California highways.

The State has been laid out in seven divisions for maintenance purposes by the highway engineer, and in each of these divisions there will be installed a complete repair outfit costing probably $20,000. The major portion of the expense will be for motor spraying outfits for making surface applications of bitumen. These will be heavy duty trucks carrying huge tanks for California asphaltic oil, while smaller trucks will distribute sand or screenings. It is estimated that the crews with these will make as high as fifty miles in a day.

Portland-Vancouver Bridge

Waddell & Harrington, consulting engineers, Kansas City, Mo., are preparing plans and will supervise the construction of an interstate highway bridge over the Columbia river, connecting Portland, Oregon, with Vancouver, Washington. They will receive $65,000 as a flat fee for engineering services. This engagement was authorized by the Interstate Bridge Commission, consisting of Oswald West, Governor of Oregon; Rufus C. Holman, W. L. Lightner and D. V. Hart, commissioners of Multnomah county, Oregon; and A. Rawson, W. S. Lindsay and S. M. Secrist, commissioners of Clark county, Washington. It is announced that construction work will begin May 1, 1914, and that the structure will be completed before the close of 1915.

Cargo of Spanish Cedar Here

Notwithstanding the disturbed conditions in Mexico, the Dieckmann Hardwood Company, the pioneer hardwood log importers, have lately discharged a cargo of Spanish cedar and Primavera logs brought up on the steamer "Cetriana," and are awaiting another parcel within a month.

By the Way

Some Industrial Information Worth the While

Big Ferry Clock Has New Face

Probably no incident in the daily life of busy San Francisco occasioned greater comment the past month than the stopping of the giant clock in the tower of the Ferry building. The thousands of commuters crossing the ferry morning and evening wondered why the big hands had ceased to move. The explanation came in the course of a few days when the four gigantic dials of the clock, as by magic, were transformed from a dark and grimy appearance to a pleasing ivory white. The material used to accomplish this transformation was Amylite, an exterior and interior enamel coating, manufactured by the Adams & Etting Company of Chicago, manufacturers of the well-known Ad-el-ite paint specialties. These products are distributed in San Francisco and bay cities by the Manufacturers' Agency Department of the Comyn-Mackall Company, of which Mr. Jack Lawson is manager.

Atlas White Portland Cement

A very interesting and practical book has just recently come to our attention. It presents a little different outlook on the advertising of building materials than is perhaps usually found today. To quote entire the brief introduction of the book:

"All books such as this can be divided roughly into two classes; one in which it is necessary to read a great deal to get a little real information, and one in which it is necessary to read only a little to get a great deal of good information. Every effort which has gone into this book has been centered on placing it in the latter class. You can judge with what success.

"Architectural books dealing with materials constitute a source of valuable information to the architect and prospective builder, when the subject matter is carefully selected, concise and trustworthy. The fact that some deal with the product of individual manufacturers is in no way detrimental to their value to those whose knowledge of the subject treated should be thorough and comprehensive.

"This book deals with established facts, and as such, we sincerely believe it will prove valuable to you from the standpoint of an intelligent understanding of the latest practice in the varied use of white cement in building.

"You will be the best judge of that, however, and we ask you to read it thoroughly in order that you may appreciate for yourself the truth of these statements."

The book is a cloth-bound, limited and numbered edition, covering in great detail with accurate data, the application of white Portland cement to building work. It is of especial value to the architect and contractor, and the fact that the particular product advertised is Atlas white Portland cement is subordinated throughout.

Parrott & Company Have New Account

Parrott & Co., building material dealers, who maintain offices and branch ware houses in all the principal coast cities, have recently taken on the Owen Bucket account, which is one of the largest concerns in the country handling buckets for dredging, quarry work and loading excavated matter on cars. One of these buckets has recently been sold to J. P Holland in connection with the Stockton tunnel work. Parrott & Company have a large warehouse at Fifth and Bluxome streets, San Francisco, and carry on hand concrete mixers, hoisting engines, derricks and other contractors' equipment. The company is in a position to do repair work promptly and with satisfaction.

Percy W. Rochester

Percy W. Rochester, one of the most widely known men in the building material business in the West, and manager of the Association of Western Portland Cement Manufacturers, committed suicide on Tuesday, February 17th, by chloroforming himself in his office in the Northwestern Bank building in Portland, Oregon. He is survived by a widow, a son and daughter. Neither the family nor any of his business associates can offer any explanation for the tragedy. Mr. Rochester had been engaged in the building material business for twenty years with offices in Seattle, Portland and San Francisco. For a number of years he was sales manager of the Western Building Material Company of San Francisco, and after the fire he started the United Materials Company with offices on Third street, near Market.

Former Mayor Jas. D. Phelan will build a $100,000 home in San Francisco's fashionable residence district from plans now being prepared by Architect Charles Peter Weeks.

Troubles of Roberts Bros.

The Sacramento Bee published the following:

JACKSON, (Amador Co.)—The financial affairs of the contractors of the county high school at Sutter Creek are in a tangle. The Board of Education has held out $8,500 due to unpaid workmen's claims. While the building is being used, it has not been accepted because it is alleged that the work is not in accordance with the plans and specifications in that the molding and interior plastering were poorly done.

The contract price was $20,367, Messrs. Roberts Bros. of San Francisco being the lowest bidders.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.

(Required by the Act of Congress, August 24, 1912.)

The Architect and Engineer of California and Pacific Coast States; published Monthly at San Francisco, Calif.

Note: This statement is to be made in duplicate, both copies to be delivered by the publisher to the postmaster, who will send one copy to the Third Assistant Postmaster General (Division of Classification), Washington, D. C., and retain the other in the files of the postoffice.

NAME OF

Editor . . . . FREDERICK W. JONES,
Publisher and Manager . . . E. M. C. WHITNEY,

POSTOFFICE ADDRESS

617 Monadnock Bldg., San Francisco.

OWNERS: (If a corporation, give names and addresses of stockholders holding 1 per cent or more of total amount of stock.)

E. M. C. WHITNEY, Sole Owner

Known Bondholders, mortgagees and other security holders, holding 1 per cent or more of total amount of bonds, mortgages or other securities.

None

A. I. WHITNEY, Treas.,

Signature of Editor, Publisher, Business Manager or Owner.

Subscribed and Sworn to before me this 21st day of March, 1914.

SID S. PALMER,

SEAL

Notary public in and for the City and County of San Francisco, State of California.

Artistic Treatment of Cement Surfaces

By A. M. MACMURRAY.

CEMENT and concrete houses have become very popular throughout this country, and the public no longer looks upon them as fads or experiments. They have demonstrated their superiority over frame and brick buildings in respect to strength, durability and cheapness. They have been found wanting, however, in their tendency to absorb moisture and in their uninviting color.

Whether the house is built of monolith concrete, concrete blocks, or just stucco over frame or lath, they all show that monotonous blue gray of ordinary Portland cement, and it was absolutely impossible, at first, to obtain an even color throughout the building. For this reason, as well as on account of its tendency to absorb moisture, the use of cement for exterior surfaces has, until comparatively recently, been strongly advised against.

Before

After

On account of the increased demand for houses of this nature, architects and builders are giving more attention to the artistic treatment of these surfaces, and have tested out various methods of overcoming these difficulties in the use of cement for exterior surfaces.

The application of a wash or cold water paint has been tried in many cases; but this material, when dry, is even more absorbent than the concrete, and shows dampness for days after a storm. It being made with a glue or caseine binder soon rots under the action of the alkali and dampness contained in the cements, and either dusts or washes off.

Up to the present time the use of various colored pigments in the mix has not been popular, and the effect of coloring ingredients upon the strength of concrete, is not definitely known. However, it is generally understood that the addition of foreign coloring matter weakens the concrete; and if the same is mixed in more than one batch it is impossible to obtain an equality of color by this method.

The use of lead and oil paints, as we all know, is out of the question, as good results cannot be obtained with any coating which contains oil after drying. Cement contains a large percentage of alkali, which, having an affinity for oil, will readily attack the oil in the coating and form a soapy mixture which cannot dry hard, and therefore easily deteriorates.

Many of the leading paint manufacturers throughout the country have tried to solve this most perplexing problem by manufacturing a coating applicable to cement, which, when applied, would give a durable, pleasing exterior finish without showing a painted effect and at the same time be unaffected by dampness or alkali action.

Wadsworth, Howland & Co., Inc., who are represented in San Francisco by R. N. Nason & Co., have proved by practical demonstration, to the satisfaction of the leading architects and contractors throughout the country, that the base of such a compound must be of a concrete nature. The only medium suitable to such a base is one which does not contain an oil which is affected by alkali, and one which would evaporate immediately and entirely upon application, leaving the base of the coating an integral part of the surface, and not as a skin coating like ordinary paint.

Bay State Brick and Cement Coating is manufactured from such a base, and does not turn yellow. This cement coating is made in many pleasing tints, and therefore opens an unlimited field of possibilities for the owner, architect, or contractor who seeks an artistic, pleasing, and harmonious effect on these surfaces.

The superiority of such a coating over ordinary paints is apparent in the fact that, while the latter is easily affected by the alkaline matter exuding from concrete and cement surfaces, as well as the dampness usually contained therein, a cement coating is absolutely unaffected by any such action when applied over a properly prepared concrete.

The progressive architect and contractor of today is always ready to adopt time and money-saving methods; but we still find many architects and builders adhering to antiquated methods and wasting valuable time and money trying to find a coating which will do this work for the lowest possible first cost. The person who employs these methods has yet to learn what many others have learned by practical experience, that the lowest first cost is the most expensive in the end, as it can only be obtained by sacrificing good workmanship and materials.

Famous Sculptor May Design Coleman Fountain

A world-wide competition among the most famous sculptors for the work of designing and modeling the Florence Coleman founts for birds and animals, funds for which become available almost immediately because of a decision of the State Supreme Court, is the suggestion of City Commissioner E. M. Wilder of Sacramento.

"With the $26,000 it will be possible for Sacramento to interest the most famous sculptors in the world," said Dr. Wilder. "The monument, too, should be one of the finest in the world. It is my impression that St. Gauder's Sherman in Central Park, New York, did not cost more than that sum. The competition among sculptors should be a great advertisement for the city."

A Wonderful Lightweight Firebrick

The Livermore Fire Brick Company of Livermore, California, has been conducting a series of experiments with a new kind of fire brick which have terminated successfully and if the demand for the new product is as brisk as appearances would indicate the plant will be the pioneer in a great industry. The object of the experiment has been to produce a light fire brick which can be used for insulation and for fireboxes which are suspended or otherwise situated so as to demand the minimum of weight. This has long been a problem, but until now it has never appeared anywhere near a solution. Manager C. F. Wente has sent the Architect and Engineer a full-size fire brick which weighs but fourteen ounces, or just one-fifth of the weight of the ordinary fire brick. The brick has responded to every test given it thus far, resisting the most intense heat without crumbling or losing shape.

The principal ingredient in the new brick is diatomaceous earth, generally known as infusorial earth. It is the fossil remains of organisms of the lowest animal type, belonging to the coral family. This earth is found in great abundance in several parts of the world where the bottom of the sea has been raised by convulsions and where the deposits are so extensive as to form veritable mountains. The earth used for the local experiments came from Southern California where there are deposits several thousand acres in extent, assuring an abundance of material should a big commercial demand for the new brick materialize.

The lightness of the raw material and the finished product makes the transportation problem easy of solution.

Another use for the new bricks has been suggested. It has been found to be excellent material for lining large refrigerators such as are used in breweries and meat markets.

The new brick presents a very handsome appearance as it is a delicate cream color and is uniform throughout.

Medusa White Portland Cement on the Pacific Coast

San Francisco buildings are well represented in a booklet just published by the Sandusky Portland Cement Company, manufacturers of the well-known Medusa stainless cement. This cement has been very generally used in California ever since it was first placed on the market and architects have only words of praise for the material. Among the

buildings illustrated in the booklet are the State Normal School, San Jose; Elks, Fredericks, Dunne and Phoenix buildings, San Francisco; apartment house at Bush and Powell streets, St. Mary's hospital, San Marco hotel, San Francisco, and a number of beautiful residences in Los Angeles and Oakland, all having Medusa white cement exterior finish.

The manufacturers give the following facts about Medusa white Portland cement:

"Portland cement has proved superior to all other building materials in strength, convenience, durability and cheapness, and has practically supplanted them in all heavy construction, but its unattractive color has prevented its use in the higher class of ornamental work.

"Gypsum plaster in various forms has been largely used for interior work, but has proven unsatisfactory for outdoor use through its inability to stand exposure to weather. Certain slag cements, and the 'grappier' cement, made by grinding the residue of hydraulic lime manufacture, are nearly white in color, and have been considerably used in Europe, but are so far inferior to Portland cement in strength and hardness as to have given little satisfaction.

"Experiments made by the general manager of this company finally produced Medusa white Portland cement of pure white color, and equal in strength and other qualities to the best gray Portland cement. This company built a special factory for the manufacture of this product, and for the past several years has been shipping it in large quantities, to the universal satisfaction of customers.

"Medusa white cement is the first true white Portland ever manufactured and is guaranteed to be a high testing Portland, passing standard specifications. It is shipped in duck sacks, which are returnable, or in paper lined wooden barrels, of standard size for ordinary Portland cement."

Wins School Competition

Architect A. W. Cornelius of San Francisco has been commissioned to prepare plans for a $60,000 school building at Pittsburgh, Contra Costa County. Mr. Cornelius' plans were accepted in competition.

The Way Our Flat Is Heated

Janitor—"Who was dat whislin' down de tube?"

Helper—"Woman on de third floor front wants some steam."

Janitor—"Hit de third pipe a couple o' times wit de hammer."—Judge.

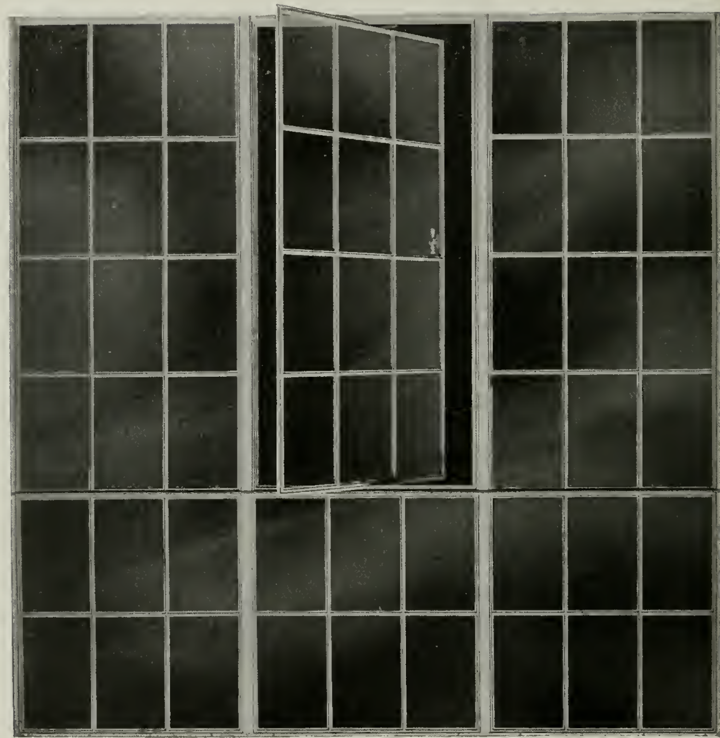
PERALTA APARTMENTS, OAKLAND, CALIFORNIA
Edward T. Foulkes, Architect

Cement Paint Stands Test of Years

The Peralta Apartment building, Oakland, is receiving considerable attention by San Francisco and bay cities architects because of the fact of its having been one of the first large buildings about the bay district to be painted with a cement finish.

This building is located at Thirteenth and Jackson streets, Oakland, and was built nearly five years ago by H. D. Atkinson of Oakland from plans by Architect Edward T. Foulkes of San Francisco. The cement work was painted with two coats of the Muralo Company's Concreto Cement Coating and the local representatives of that firm are pointing with considerable pride at the present splendid condition of the paint on this building.

The local distributors rely entirely upon past results to get new business. They state that their one method of showing their samples is to give the prospective buyer or architect a list of local buildings which have been painted for years with Concreto and are still in good condition—that looking at and examining a building which has been out in the weather four or five years is much more enlightening than looking at a freshly-painted brick or bit of concrete held in the hand in a man's office.



THE TRUSSED CONCRETE STEEL COMPANY'S UNITED STEEL CASEMENT

United Steel Casements

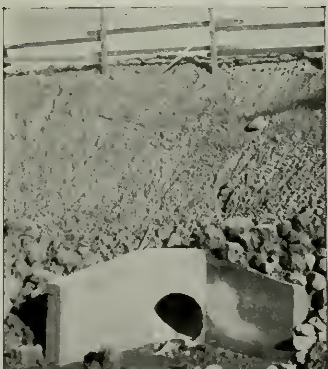
A large section of the plant of the Trussed Concrete Steel Company at Youngstown, Ohio, is now being devoted to the manufacture of special high-grade types of steel sash called "United Steel Casement." The same improved methods of assembling the sash sections as used in the United Steel Sash is adopted for the casement, thereby securing exceptional strength and day-lighting properties.

Special care is given to the finishing of these sashes at every point, so that they embody the highest skill in manufacture and workmanship. Every joint is carefully inspected and gone over by hand and a special finish is given to the steel. The hardware is in strict keeping with qualities of sash, and is especially designed and manufactured for the purpose. United Steel Casements meet in every way the exacting requirements of the higher grade of commercial buildings, schools, public buildings and constructions of every nature.

These casements are made up to meet all conditions for day-lighting and ventilating any type of building. The ventilators can be arranged in any size, location or method of operation desired.

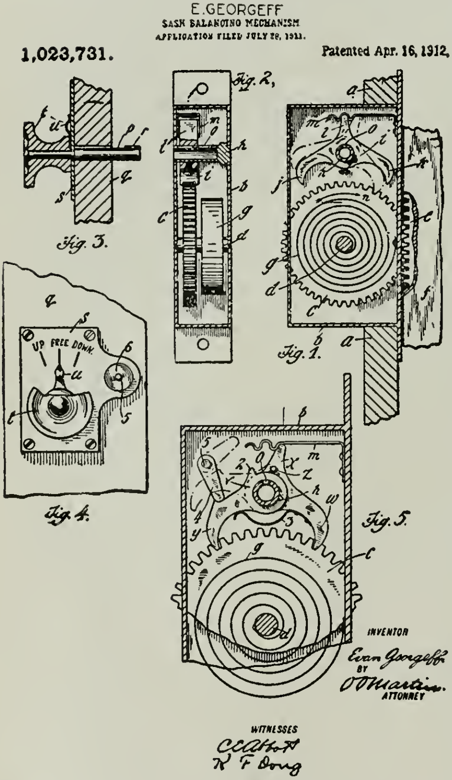
United Steel Casements are only one type of a complete line of solid steel sash manufactured by the Trussed Concrete Steel Company. Other types include Standard Pivoted sash for industrial buildings; vertical sliding sash with all methods of counter balances; United steel partitions; sliding and swing doors, top hung and center hung; continuous sash, etc.

Catalogs and complete information referring to this interesting product by the Trussed Concrete Steel Company, Detroit.



A New Window Locking Device of Exceptional Merit

Architects and builders are displaying keen interest in a new window operating device which is about to be placed upon the market by the Automatic Window Lift and Fastener Company, with offices in the Mechanics building, San Francisco. A factory will be established in Richmond, and the device will probably be sold by the various hardware dealers as well as by factory branches which will be maintained in the principal coast cities. Architects who have witnessed demonstrations of the lock declare it to be the best device of the kind yet invented and a positive barrier to the sneak thief or professional burglar.



No cords or weights are necessary, and the window, top or bottom, may be raised any height and when it becomes stationary it locks itself automatically. The lock is released by pressing a small button at the side of the casement. The invention will readily appeal to housewives, for with the windows thus equipped they are always locked, whether entirely closed or part way open, and no outside intruder can possibly raise or lower them.

Such reputable architects as Willis Polk & Company have investigated the device and are enthusiastic about it. The inventor is E. Georgeff, and the mechanism is fully protected with patent rights. The device can be installed at practically no greater expense than the old-style equipment. Less room is required for operating the window, too. The accompanying diagrams show the mechanical construction of both lock and lift.

The following is the opinion of the Board of Underwriters of the Pacific after their inspection of the device:

San Francisco, Cal., March 7, 1914.

Automatic Window Lock & Lift Co.,
Mechanics Building, San Francisco.

Gentlemen: The installation of your device for counterbalancing sliding window sash will not have any effect on insurance rates so far as ordinary windows are concerned, though there is a small advantage in being able to block up the space required for operating balance weights as usually found.

Yours truly,
(Signed) JOHN CANEGHERN,
District Secretary.

Confine Themselves to Tile

The Watson Mantel & Tile Co. have given up the sale of fireplace fixtures and will devote their energies in the future exclusively to wall, floor and mantel tile. Their warerooms will be at the same place as they have been since they opened in San Francisco, but their offices will be located at 206 Sheldon building. The Watson Mantel & Tile Co. have long been known as large dealers in tile, and their prices are sought for every large job that goes forward in this section. Mr. Watson's experience here and in Denver (where they also have a large business), makes his advice of value on any subject affecting tile installation.

Immaculate Conception Cathedral, Denver, Colorado, in the Tower of Which Is Installed a Chime of Fifteen Bells made by the McShane Bell Foundry Co., Baltimore, Md., (Standard Electric Time Co., Sheldon Building, San Francisco, Pacific Coast Agents).

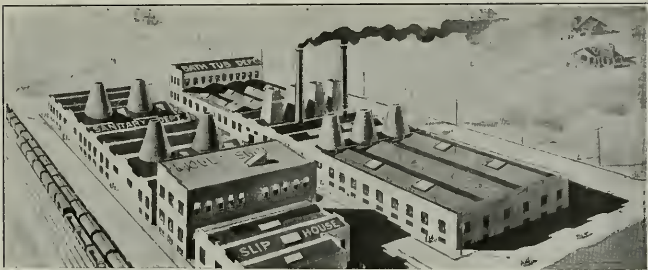
Chimes and Peals

THE growing popularity of chimes and peals has led the McShane Bell Foundry Company of Baltimore, Md., to establish an agency in San Francisco.

Bells are so intimately associated with the ancient ritual of the church that they have come to be regarded as of a sacred character, and we are all familiar with the Angelus Bell, the Vesper Bell and the Sanctus Bell. From time immemorial chimes of bells have been in use. To cast any number of bells to a given note and suspend them in a frame in a church tower was all that was attempted by the ancient bell founders. A certain unevenness of attunement was bound to occur. It has been left to the McShane foundry to perfect a system by which is secured as absolute attunement as in the best tuned piano. The bells are tuned according to the revised system of equal temperament, every bell being of that evenness and smoothness of tone that properly fits into any key in which the chime is to be played. There is nothing left to chance—they are all worked out on a certain scientific principle and are absolutcly of the same attunement and temperament and of the richest, sweetest tone - quality. Musical experts, who have traveled abroad and heard the noted chimes in foreign countries are loud in their praises of the McShane chimes.

To the inexperienced the difference between a chime and a peal is not very clear. A chime of bells is a combination of eight or more bells, while a lesser number is called a Peal. A popular combination is known as the Westminster Peal of four or five bells. These Peals are used very extensively in connection with tower clocks (as is the case with the Oregon Journal building, Portland, Oregon, illustrated in our December issue.)

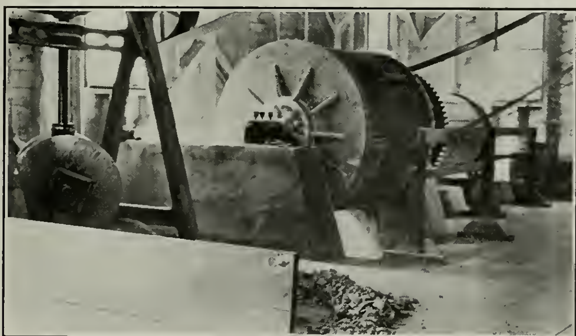
The McShane Bell Foundry Company are prepared to build Peals of any number of bells equipped with special hangings for scientific change ringing as practiced throughout England. They have issued some very attractive bulletins and catalogues dealing with chimes, peals, church bells, tower clock bells, Westminster chimes, courthouse, fire alarm, chapel and school bells, as well as bells for other uses, which will be sent on request.



AEROPLANE VIEW OF WESTERN STATES PORCELAIN COMPANY'S BIG PLANT AT RICHMOND, CALIFORNIA

A Successful California Industry

THE Western States Porcelain Company of Richmond, Cal. (which should not be confounded with another porcelain factory of similar name), has already, after one year's successful business, become an institution of which California may be proud. Controlled by men of character and standing and backed by ample capital it has proven that in a section which produces every grade and kind of material necessary to the successful manufacture of the finest porcelain it is not necessary to go to Eastern centers for our vitreous sanitary ware. It is possible to make a better product and at less cost in Richmond than in East Liverpool, Ohio, or Trenton, New Jersey. This factory, therefore, has not had to appeal alone to local sentiment for its business (although "made in California" is an effective slogan), but it has been able to appeal as well to the judgments and the purses of our architects and builders in securing mention in their specifications, as no other pottery is getting net results as favorable. When we consider that (outside of one other—a small concern, this is the only plumbers' vitreous chinaware factory on the Pacific Coast, whereas East Liverpool, Ohio, has fifty and Trenton, New Jersey,. about as many, we can understand the possibilities for growth. The Western States Porcelain Company has started out with a good sized tract of six acres located on the Rivers-Andrae tract, Richmond, Cal., on the main line of the Santa Fe railroad. Three kilns are now in operation and two more are to be added. When the plant is in full operation, 150 men will be employed. At present the manufac-



THE BELL MILL, WESTERN STATES PORCELAIN COMPANY RICHMOND, CALIFORNIA

NORTH SIDE OF NO. 2 PRESSING ROOM, WESTERN STATES PORCELAIN COMPANY

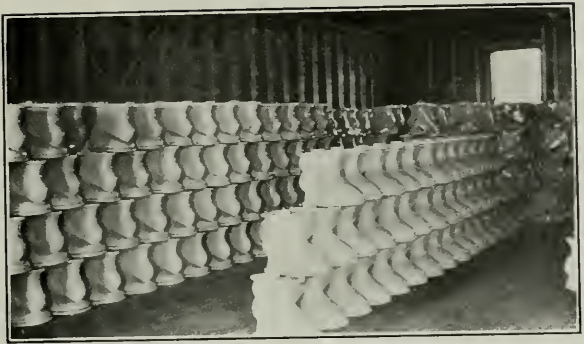
tures are confined to toilets, tanks and basins, producing 1,000 pieces per week. Skilled Eastern mechanics are employed and many of them have purchased property adjoining the factory and erected their own homes. All the workmen are members of the National Brotherhood of Operative Potters and the Western States products all bear the union label.

The personnel of the company is one to inspire confidence. The president, Herbert F. Brown, is one of the best known men on the Pacific Coast—a man whose name is a tower of strength to the concern. The factory manager, Matthew Platts, has been engaged in the pottery business in America for the past twenty-five years. He built and managed several large Eastern plants and his opinion of the prospects of the industry in California is certainly worthy of much weight. He says:

"I believe Richmond, Cal., is destined to be the center of the porcelain industry on the Pacific Coast and that this industry is going to be one of great magnitude. The ideal climate, excellent shipping facilities and location cannot be equaled by any other city in the United States."

The sales manager is K. J. Peterson, who was formerly identified with Bird-Archer Company. Many leading Californians (including bankers, merchants, etc.) are included in the list of stockholders, and it is proposed that the workmen that mould and finish the product of the factory shall share in the profits.

THE GLOST-WARE ROOM, WESTERN STATES PORCELAIN COMPANY
RICHMOND, CALIFORNIA



THE SHIPPING ROOM, WESTERN STATES PORCELAIN COMPANY RICHMOND, CALIFORNIA

Certainly the Western States Porcelain Company deserve well of all our readers, and we shall be pleased if this notice of the enterprise leads to many requests being made to them for copies of their new catalogue. Address Western States Porcelain Company (Herbert F. Brown, president), Richmond, Cal.

PROPOSALS FOR ADDITIONS TO BRICK DORMITORY. Department of the Interior, Office of Indian Affairs, Washington, D. C., March 4, 1914. Sealed proposals, plainly marked on the outside of the sealed envelope: "Proposals for Additions to Brick Dormitory, Santa Fe Indian School, New Mexico," and addressed to the "Commissioner of Indian Affairs, Washington, D. C.," will be received at the Indian Office until 2 o'clock p. m. of April 13, 1914, for furnishing materials and labor for the construction of additions to girls' brick dormitory at the Santa Fe Indian School, New Mexico, in strict accordance with the plans, specifications and instructions to bidders, which may be examined at the office of the paper or periodical in which this advertisement appears, the U. S. Indian warehouses at Chicago, Ill., St. Louis, Mo., Omaha, Neb., and San Francisco, Cal., and at the Santa Fe Indian School. For further information apply to the Superintendent of the Santa Fe Indian School, Santa Fe, New Mexico. Cato Sells, Commissioner.

Low Prices for Building Materials

Out of town contractors will do well to write or telephone C. Roman Co., 163 Jessie street, San Francisco (opposite the Builders' Exchange) and get their prices on building materials. Mr. Roman is well known in the building fraternity and can be counted on for fair dealing.

Successful Vacuum Cleaner

The Blaisdell Machinery Co. (Sherman, Kimball & Co., San Francisco agents) point with pride to the large number of Pacific coast installations, which include the following, one or more sweepers being used in each case:

San Francisco—A. B. Spreckels' residence, Cecil hotel, Shasta hotel, Towanda hotel, Blackstone apartments.

Oakland—First Presbyterian church, Pacific office building, Penn school, Thirteenth avenue school, Fifty-fourth and Market streets school, Durant school.

Modesto—Hotel Hughson.

Los Angeles—Hotel Woodward, Vale apartments, Moore apartments, J. J. Haggerty residence.

Seattle, Wash.—New Providence hospital, Bon Marche, Cobb building, Henry building, Green building, Rhodes Co., Old Colony apartments, Normandie, and residences of C. F. White, A. H. Anderson, F. H. Brownell, C. D. Bowles, H. S. Conner, Mrs. M. Donahoe, D. E. Skinner, F. M. Jordan, M. Prager, Cobb building, two automatic compressors; Broadway Auto Co., one automatic compressor.

Tacoma—Chester Thorne residence.

Olympia—Temple of Justice.

Spokane—Paulsen building, Spokane high school, Spokane Club, Empire State building, Zeigler building, American Theater building and hotel, August Paulsen residence, City Hall, Davenport hotel.

Portland, Ore.—Portland Railway, Light & Power Co., Ben Selling building, Lincoln high school, Ladd school, Mt. Tabor school, Stevens school, Cramer & Fries hotel, Atiyeh Bros., Dekum building, Kohler residence, Oregon hotel and annex, Metropolitan Investment Co.

Albany, Ore.—Bank of Albany.

Montana—First National Bank, Miles City.

Bellingham, Wash.—U. S. post office.

Vancouver, B. C.—Spencer building, Bank of Ottawa, British Columbia Railway, Light & Power Co.

Victoria, B. C.—Victoria high school, residence manager Bank of Montreal, Campbell building, three compressors; Hibben-Bone building, one compressor.

The Blaisdell machine is easily regulated by the vacuum regulator for low, medium or high pressure.

The Blaisdell machine is one which has to be reckoned with in any large installation..

The northwestern office is in charge of Wm. A. Cox, Boston Block, Seattle.

MASONIC HOSPITAL, SAN FRANCISCO
O'Brien & Werner, Architects

A Difficult Problem Satisfactorily Solved

One of the difficult problems of household management is that presented by the fact that preparation and serving of food cannot be carried on simultaneously unless the kitchen and dining room open into each other. The exclusion of kitchen sounds and odors calls for the interposition of a serving room or butler's pantry. A hot closet or plate warmer at this point takes care of food and dishes until wanted. While this is the function of the hot closet in connection with a formal meal, it has wider uses if this method of heating is simple in operation.

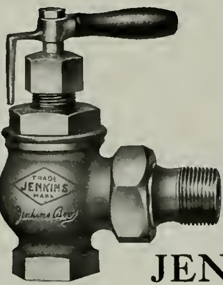
While steam heating is merely an extension of the house system, it requires additional valves to be watched. Gas heating involves attention, odor and external heat. The ideal manner of heating the plate and food warmer is by electricity. The attention required is confined to turning on or off the key of the switch. There is no external heat —no odor—no noise—and, where the heat is not applied to the shelves, no danger of drying up food or injuring dishes. With the electric hot closet, no ventilation of the interior is needed, so that an entire meal may be held indefinitely, ready for service, without losing its tastiness.

The late luncheon, a "bite" before retiring, delay of train or driving party—all these infractions of domestic routine are looked after by the automatic butler—the electric food and plate warmer. It takes care of baby's food and the invalid's nourishment, without spoiling. It is an ideal apparatus for use when polishing glassware—just the right dry heat for both glass and towel.

Industries Hard Hit by New Compensation Law

One of the largest planing mill and lumber establishments in central California, located in Santa Clara county, finds upon computation that to take out insurance under the new state employes' compensation law would cost them between $10,000 and $12,000 a year. As a result the company has not insured and will not on the ground that it would prefer going out of business.

A prominent official of the company would not permit it to be positively stated that such drastic course would be pursued, but he did say without hesitation that the company could not afford any such expense under present business conditions. It is very well known that many industrial establishments of lesser importance are also contemplating closing down in preference to paying the new insurance, but none of them employ nearly so large a force of highly paid artisans as the company referred to.



JENKINS BROS.

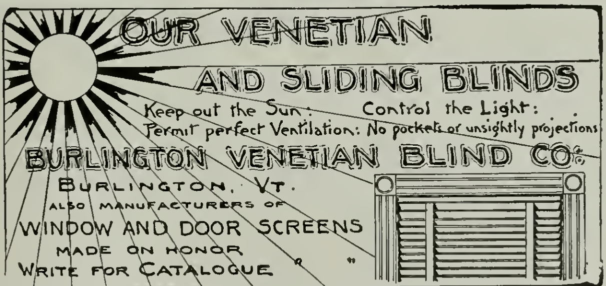
Practical, Quick Opening RADIATOR VALVES

Designed for Atmospheric Vacuum Return Line and Vapor Systems. Has graduated opening arrangement which prevents cutting of seat and disc. Opens full way in less than one turn. Steam can be supplied to part of the radiator if desired. Made from ***Jenkins Bros.*** Standard Pattern and fitted with genuine Jenkins Discs.

JENKINS BROS.

247 Mission Street
SAN FRANCISCO, CAL.

300 West Lake Street
CHICAGO, ILL.



Agencies for California C. F. WEBER & CO., 365 Market St., San Francisco and 512 So. Broadway, Los Angeles. Agents for Oregon, Washington and Montana, NORTHWEST SCHOOL FURNITURE CO., 244 Third Street, Portland, Ore. and 113 South Jefferson Street, Spokane, Wash.

Millwork Manufactured...

....AND DELIVERED ANYWHERE

Plans or Lists sent us for Estimates will have careful and immediate attention

DUDFIELD LUMBER CO.

Main Office, Yard and Planing Mill - PALO ALTO

JNO. DUDFIELD, Pres. and Manager. JOSEPH A. JURY, Secty. and Mill Supt.

Monotti-Larimer Co.
San Francisco

Macdonald & Applegarth
Architect

UNITED SASH

FOR EVERY BUILDING

There is a particular type of UNITED SASH for every building construction of a permanent nature. Standard Sidewall Sash, with pivoted ventilators or vertical sliding with either spring balance or counter-balance, or horizontal sliding; Partition Sash and Doors: Casement Sash for highest class office-building, residences, churches, etc., having a very superior appearance and attention to detail.

UNITED SASH is machine made throughout in powerful 300 ton presses, which insure absolute accuracy of size and finish. The details of construction permit of any size lights and arrangement of ventilation. Various sizes of units combined with expandible mullions will allow wide variation to conform to architectural requirements and lines.

UNITED SASH is permanent, economical, fire-proof construction. We will promptly furnish Sash designs and estimates upon application, covering any building proposition.

TRUSSED CONCRETE STEEL CO.

Spokane Seattle Portland San Francisco Los Angeles San Diego

THE ARCHITECT AND ENGINEER OF CALIF

APRIL
1914

25c Copy VOL. XXXVI.
$1.50 a Year NUMBER 3.

PUBLISHED MONTHLY BY
THE ARCHITECT & ENGINEER CO.
Entered at the Postoffice, San Francisco, as Second Class Matter

617-19 Monadnock Bldg.,
San Francisco, Cal.

SAN FRANCISCO PORTLAND SEATTLE LOS ANGELES VANCOUVER

L. A. NORRIS CO.

ENGINEERS

Clinton Welded Reinforcing System

STEEL BARS AND CLINTON FABRIC

Furnished and Installed

CLINTON WIRE LATH

Phone Kearny 5375 643 MONADNOCK BLDG.

SAN FRANCISCO

THE FINEST, MOST MODERN and BEST EQUIPPED PUBLIC HOSPITAL IN THE UNITED STATES

New City and County Hospital, San Francisco

NILES WASHED CONCRETE GRAVEL AND CRUSHED ROCK USED IN THE CONSTRUCTION OF THIS GROUP OF BUILDINGS

California Building Material Co.

Pacific Building San Francisco, Cal.

IT INTERLOCKS

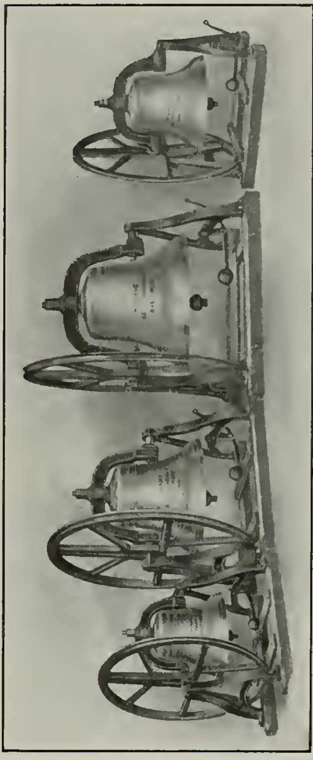
DENISON
Hollow Interlocking
BLOCKS

CALIFORNIA DENISON BLOCK CO.
Phone Sutter 4509 401 MONADNOCK BLDG.
SAN FRANCISCO, CAL.

OREGON DENISON BLOCK CO.
Phone Marshal 5892 1043 CHAMBER OF COMMERCE
PORTLAND, ORE.

THE OLD and RELIABLE BELL FOUNDRY

ESTABLISHED IN 1856



PEAL OF FOUR BELLS WITH COMPLETE MOUNTINGS

CHURCH BELLS, CHIMES and PEALS

TOWER CLOCK BELLS and WESTMINSTER CHIMES

COURT HOUSE and FIRE ALARM BELLS

CHAPEL and SCHOOL BELLS

LIGHT HOUSE, FOG SIGNAL and SHIP BELLS

The making of bells, for all purposes, has our undivided attention, and our facilities are unrivaled. We have furnished upwards of 50,000 bells since we were established, and our bells are ringing from the finest towers everywhere. We have sent them to every section of our own country and Canada; also to Europe, Great Britain, Asia, Africa, South America, Central America, Australia, China, Japan, West Indies and the farthest islands of the sea.

We solicit correspondence from those in any way interested in bells and shall be pleased to send our full illustrated catalog, including testimonials, etc.

McSHANE BELL FOUNDRY CO.

Home Office and Foundry: BALTIMORE, MD., U. S. A.

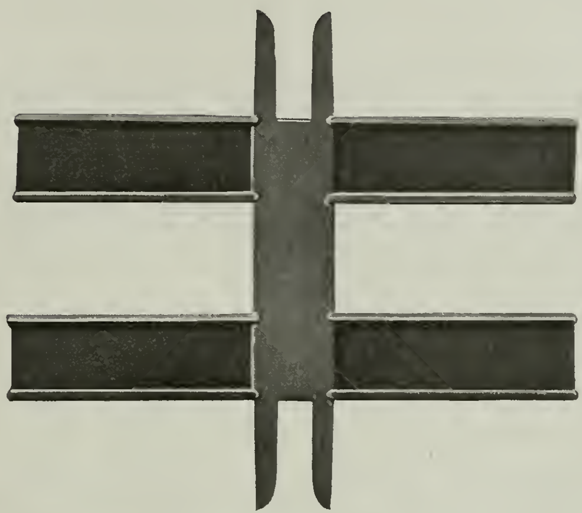
PACIFIC COAST AGENTS:

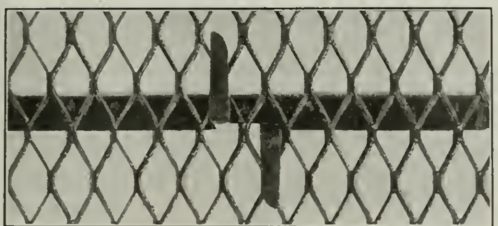
The Standard Electric Time Co.

461 MARKET STREET, SAN FRANCISCO, CAL.

Telephone Sutter 241

Portland	Seattle	Los Angeles
202-204 Commercial Club Bldg.		706-707 Marsh-Strong Bldg.





ARCHITECTS' SPECIFICATION INDEX

(For Index to Advertisements, see next page)

AIR CLEANERS
Giant Suction Cleaner Co., 731 Folsom St., San Francisco; Bacon Block, Oakland.
"Tuec" air cleaners, manufactured by United Electric Co., 110 Jessie St., San Francisco.

ARCHITECTURAL SCULPTORS, MODELING, ETC.
O. S. Sarsi, 123 Oak St., San Francisco.
Florentine Art Studio, 932 Vallejo St., San Francisco.
I. P. Lipp Co., 153 Seventh St., San Francisco.
The Schoenfeld Marble Co., 265 Shipley St., San Francisco.
Western Sculptors, 533-535 Turk St., San Francisco.

ARCHITECTURAL TERRA COTTA
Gladding, McBean & Company, Crocker Bldg., San Francisco.
Steiger Terra Cotta and Pottery Works, Mills Bldg., San Francisco.
Independent Sewer Pipe & Terra Cotta Co., 235 S. Los Angeles St., Los Angeles.

ART GLASS
Sylvain Le Deit, 124 Lenzen Ave., San Jose.

AUTOMATIC SPRINKLERS
Scott Company, 243 Minna St., San Francisco
Pacific Fire Extinguisher Co., 507 Montgomery St., San Francisco.

BANK FIXTURES AND INTERIORS
A. J. Forbes & Son, 1530 Filbert St., San Francisco.
Fink & Schindler, 218 13th St., San Francisco.
C. F. Weber & Co., 365 Market St., San Francisco.
T. H. Meek Co., 1157 Mission St., San Francisco.
M. G. West Co., 353 Market St., San Francisco.
Home Mfg. Co., 543 Brannan St., San Francisco.
Weary & Alford Co., 1033 Van Nuys Bldg., Los Angeles.

BEDS—INDOOR-OUTDOOR
California Fresh Air Bed Co., 166 Geary St., San Francisco.

BELTING, PACKING, ETC.
H. N. Cook Belting Co., 317-319 Howard St., San Francisco.

BELLS—TOWER, ETC.
McShane Bell Foundry Co., 461 Market St., San Francisco.

BLACKBOARDS
C. F. Weber & Co., 365 Market St., San Francisco.

BONDS FOR CONTRACTORS
Fidelity & Deposit Company of Maryland, Insurance Exchange Bldg., San Francisco.
Globe Indemnity Co., Insurance Exchange Bldg., San Francisco.
Levensaler-Speir Corporation, Monadnock Bldg., San Francisco.

BONDS FOR CONTRACTORS—Continued.
Massachusetts Bonding & Insurance Company, First National Bank Bldg., San Francisco.
Pacific Coast Casualty Co., 416 Montgomery St., San Francisco.

BRICK—PRESSED, PAVING, ETC.
California Paving Brick Co., Phelan Bldg., San Francisco.
Diamond Brick Co., Balboa Bldg., San Francisco.
Gladding, McBean & Company, Crocker Bldg., San Francisco.
Los Angeles Pressed Brick Co., Frost Bldg., Los Angeles.
Livermore Fire Brick Co., Livermore, Cal.
Pratt Building Material Co., Hearst Bldg., San Francisco.
Steiger Terra Cotta & Pottery Works, Mills Bldg., San Francisco.
United Materials Co., Balboa Bldg., San Francisco.

BRICK AND CEMENT COATING
American Paint & Dry Color Co., 414 Ninth St., San Francisco.
Wadsworth, Howland & Co., Inc. (See Adv. for Pacific Coast Agents.)
Trus-Con Par-Seal, made by Trussed Concrete Steel Co. (See Adv. for Pacific Coast Agents.)

BRICK STAINS
Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

BRONZE AND BRASS WORK
Louis De Rome, 150 Main St., San Francisco.

BUILDERS' HARDWARE
Russell & Erwin Mfg. Co., Commercial Bldg., San Francisco.
Vonnegut Hardware Co., Indianapolis. (See Adv. for Coast agencies.)

BUILDERS' SUPPLIES
Pacific Building Materials Co., San Francisco.
Burt E. Edwards, 1025 Phelan Bldg., San Francisco.
Western Builders' Supply Co., 155 New Montgomery St., San Francisco.

BUILDING MATERIAL
C. Roman, 173 Jessie St., San Francisco.
C. F. Pratt Building Material Co., Hearst Bldg., San Francisco.
Golden Gate Brick Co., Balboa Bldg., San Francisco.

CAEN STONE
A. Knowles, 985 Folsom St., San Francisco.

CEMENT
Atlas Portland Cement Co., represented by United Materials Co., Balboa Bldg., San Francisco.
Mt. Diablo, sold by Henry Cowell Lime & Cement Co., 9 Main St., San Francisco.
"Golden Gate," manufactured by Pacific Portlan Cement Co., Pacific Bldg., San Francisco.
Standard Portland Cement Co., and Santa Cruz Portland Cement Co., Crocker Bldg., San Francisco.

An Index to the Advertisements

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CEMENT EXTERIOR WATERPROOF COATING
- American Paint & Dry Color Co., 414 Ninth St., San Francisco.
- California Safety Fireproofing Company, 687 Market St., San Francisco.
- Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (See distributing Agents on page 32.)
- Biturine Co., of America, 24 California St., San Francisco.
- Hercules Waterproofing, manufactured by Hercules Waterproofing Cement Co., Buffalo, N. Y. Distributors: Waterhouse & Price Co., San Francisco and Oakland.
- Liquid Stone Paint Co., Hearst Building, San Francisco.
- Concrete Cement Coating, manufactured by the Muralo Company. (See full-page advertisement, color insert.)
- Imperial Waterproofing, manufactured by Imperial Co., 183 Stevenson St., San Francisco.
- Trus-Con Par-Seal, made by Trussed Concrete Steel Co. (See Adv. for Coast agencies.)
- Glidden's Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.

CEMENT EXTERIOR FINISH
- American Paint & Dry Color Co., 414 Ninth St., San Francisco.
- California Safety Fireproofing Co., 687 Market St., San Francisco.
- Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (See list of Distributing Agents on page 31.)
- Concrewaltum Paint, manufactured by Gobeen Company, Canton, O. Coast branches, San Francisco, Portland and Seattle.
- Glidden"s Liquid Cement and Liquid Cement Enamel, sold on Pacific Coast by Whittier Coburn Co., San Francisco and Los Angeles.
- Liquid Stone Paint Co., Hearst Bldg., San Francisco.
- Medusa White Portland Cement, California Agents, the Building Material Co., Inc., 587 Monadnock Bldg., San Francisco.
- Concrete Cement Coating, manufactured by the Muralo Company. (See afull-page adverment, color insert.)
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

CEMENT FLOOR COATING
- Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (See list of Distributing Agents on page 31.)
- Glidden's Concrete Floor Dressing, sold on Pacific Coast by Whittier, Coburn Company, San Francisco.
- Heath & Milligan Mfg. Co., 7-15 Fremont St., San Francisco.
- Moller & Schumann Co., West Coast Branch, 1022 Mission St., San Francisco.

CEMENT TESTS—CHEMICAL ENGINEERS
- Robert W. Hunt & Co., 251 Kearny St., San Francisco.

CHURCH INTERIORS
- Fink & Schindler, 218 13th St., San Francisco.

COAL CHUTES
- Majestic Furnace Co., Sherman Kimball & Co. Inc., 1st and Howard Sts., San Francisco.

COLD STORAGE PLANTS
- Vulcan Iron Works, San Francisco.

CLOCKS—TOWER AND STREET
- Standard Electric Time Co., 461 Market St., San Francisco.

COMPOSITION FLOORING
- Fiberstone & Roofing Co., 971 Howard St., San Francisco.
- Litboid Products Co., Merchants Exchange Bldg., San Francisco.

CONCRETE CONSTRUCTION
- American Concrete Co., Humboldt Bank Bldg., San Francisco.
- Bluxome & Co., Monadnock Bldg., San Francisco.
- Clinton Fireproofing Co., Mutual Bank Bldg., San Francisco.
- "Mushroom" System of Concrete Flat Slab Construction, Industrial Engineering Co., Clunie Bldg., San Francisco.
- McGibben & Taylor, 2125 Shattuck Ave., Berkeley.
- Otto, W. H., 269 Park Ave., San Jose.
- Barrett & Hilp, Sharon Bldg., San Francisco.
- Foster, Vogt Co., Sharon Bldg., San Francisco.
- Petersen, H. L., 62 Post St., San Francisco.
- A. Lynch, 185 Stevenson St., San Francisco.
- Ransome Concrete Co., Oakland and Sacramento.
- W. J. McGraw, 1636 Felton St., South Berkeley, Cal.
- F. J. R. Rickon, 1859 Geary St., San Francisco.

CONCRETE MIXERS
- Austin Improved Cube Mixer. Pacific Coast Offices, 338 Brannan St., San Francisco; the Beebe Company, Portland and Seattle, and P. B. Engh, Los Angeles.
- Foote Mixers sold by Edw. R. Bacon, 40 Natoma St., San Francisco.
- Smith mixers sold by Parrott & Co., San Francisco, Los Angeles and Portland.
- Marsh-Capron Mixers, sold by Langford, Bacon & Myers, Rialto Bldg., San Francisco.
- Koebring Mixer, sold by Harron, Rickard & McCone, San Francisco.

CONCRETE PILES
- Harron, Rickard & McCone, Townsend St., San Francisco.
- Portland Concrete Pile Co., Underwood Bldg., San Francisco.

CONCRETE POURING APPARATUS
- Concrete Appliances Co., Los Angeles; Parrott & Co., Coast Representatives, San Francisco, Portland, Seattle.

CONCRETE REINFORCEMENT
- United States Steel Products Co., San Francisco, Los Angeles, Portland and Seattle.
- Clinton Welded Reinforcing System, L. A. Norris, Monadnock Bldg., San Francisco.
- "Kahn System," see advertisement on page 158, this issue.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

CONCRETE REINFORCEMENT—Continued
- International Fabric & Cable, represented by Western Builders' Supply Co., 155 New Montgomery St., San Francisco.
- Triangle Mesh Fabric. Sales Agents, Pacific Building Materials Co., 523 Market St., San Francisco.
- Twisted Bars, sold by Woods & Huddart, 444 Market St., San Francisco.

CONCRETE SURFACING
- "Biturine," sold by Biturine Co. of America, 24 California St., San Francisco.
- "Concreta" sold by W. P. Fuller & Co., San Francisco.
- Wadsworth, Howland & Co.'s Bay State Brick and Cement Coating, sold by R. N. Nason & Co., San Francisco and Los Angeles.
- Liquid Stone Paint Co., Hearst Bldg., San Francisco.
- Glidden Liquid Cement, manufactured by Glidden Varnish Co., Whittier, Coburn Co., San Francisco and Los Angeles, Pacific Coast Distributors.
- Moller & Schumann, 1023 Mission St., San Francisco.

CONTRACTORS, GENERAL
- American Concrete Co., Humboldt Bank Bldg., San Francisco.
- Foster, Vogt Co., Sharon Bldg., San Francisco.
- M. Fisher, California-Pacific Bldg., San Francisco.
- Geo. W. Boxton, Hearst Bldg., San Francisco.
- Herman T. Ludwig, 24 California St., San Francisco.
- Howard S. Williams, Hearst Bldg., San Francisco.
- Graham & Jensen, Maskey Bldg., San Francisco.
- McLaren & Peterson, Sharon Bldg., San Francisco.
- Monson Bros., 1907 Bryant St., San Francisco.
- Ransome Concrete Co., 1218 Broadway, Oakland.
- F. J. Rickon, C. E., 1859 Geary St., San Francisco.
- Robert Trost, 26th and Howard Sts., San Francisco.
- Williams Bros. & Henderson, Holbrook Bldg., San Francisco.
- Burt T. Owsley, 311 Sharon Bldg., San Francisco.
- L. A. Rose, Monadnock Bldg., San Francisco.
- Patrick-Nelson Company, 2011 Shattuck Ave., Berkeley, Cal.
- Ward & Goodwin, Sharon Bldg., San Francisco.
- Barrett & Hilp, Sharon Bldg., San Francisco.

CORK TILING
- David J. E. Kennedy, Inc., Sharon Bldg., San Francisco.

CORNER BAR
- Dolbear Curb Bar, manufactured by American Steel Bar Co., 1 Sheldon Bldg., San Francisco.
- Wainwright Steel Corner Bar, made by Steel Protected Concrete Co., Philadelphia, Pa.

CORNER BEAD
- Union Metal Corner Co., 144 Pearl St., Boston, represented on the Pacific Coast by Pacific Building Materials Co., 523 Market St., San Francisco.

CRUSHED ROCK
- Grant Gravel Co., Williams Bldg., San Francisco.
- Niles Rock, sold by California Building Material Company, Pacific Bldg., San Francisco.
- Niles Sand, Gravel & Rock Co., Mutual Bank Bldg., San Francisco.

DAMP-PROOFING COMPOUND
- Biturine Co. of America, 24 California St., San Francisco.
- Concrewaltum Paint, made by Goheen Mfg. Co., Canton, O., sold by Sherman, Kimball & Co., Inc., San Francisco; A. J. Capron, Portland, and S. W. R. Dalby, Seattle, Wash.
- Glidden's Liquid Rubber, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- Hercules Waterproofing, manufactured by Hercules Cement Co., Buffalo, N. Y. Distributors: Pacific Building Materials Co., 523 Market St., San Francisco.
- Imperial Co., 183 Stevenson St., San Francisco.
- Lithoid Product Co., Merchants Exchange Bldg., San Francisco.
- Trus-Con Damp Proofing. (See advertisement of Trussed Concrete Steel Company for Coast agencies.)
- "Pabco" Damp Proofing Compound, sold by Paraffine Paint Co., 34 First St., San Francisco.
- Liquid Stone Paint Co., Hearst Bldg., San Francisco.
- Wadsworth, Howland & Co., Inc., 84 Washington St., Boston. (See Adv. for Coast agencies.)

DOOR HANGERS
- Pitcher Hanger, sold by National Lumber Co., Fifth and Bryant Sts., San Francisco.
- Reliance Hanger, sold by Sartorius Co., San Francisco; D. F. Fryer & Co., Louis R. Bedell, Los Angeles, and Portland Wire & Iron Works.

DOORS AND SHUTTERS
- Kinnear Steel Rolling Doors and Shutters, Pacific Building Materials Co., 523 Market St., San Francisco.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

ARCHITECTS' SPECIFICATION INDEX—*Continued*

HARDWARE
Russwin Hardware, Joost Bros., San Francisco.

HARDWOOD FLOORING
Parrott & Co., 320 California St., San Francisco
White Bros., Cor. Fifth and Brannan Sts., San Francisco.
Hardwood Interior Co., 554 Bryant St., San Francisco.

HARDWOOD LUMBER
Dieckmann Hardwood Co., Beach and Taylor Sts., San Francisco.
Parrott & Co., 320 California St., San Francisco.
White Bros., Cor. Fifth and Brannan Sts., San Francisco.

HEATERS—AUTOMATIC
Pittsburg Water Heater Co., 237 Powell St., San Francisco.
Hoffman Heaters, factory branch, San Francisco.

LOCKERS
Keyless Lock Co., Indianapolis, Ind.

HEATING EQUIPMENT—VACUUM, ETC.
Edward Stephenson, 155 Fremont St., San Francisco.

HEATING AND VENTILATING
Atlas Heating & Ventilating Co., Fourth and Freelon Sts., San Francisco.
Boscus Bros., 975 Howard St., San Francisco.
Fess System Co., 220 Natoma St., San Francisco.
A. Lettich, 365 Fell St., San Francisco.
Mangrum & Otter, Inc., 507 Mission St., San Francisco.
Scott Company, 243 Minna St., San Francisco.
Wittman, Lyman & Co., 341 Minna St., San Francisco.
Pacific Fire Extinguisher Co., 507 Montgomery St., San Francisco.
Petersen-James Co., 710 Larkin St., San Francisco.
F. P. Walsh, 244 Kearny St., San Francisco.

HOLLOW BLOCKS
Denison Hollow Interlocking Blocks, Monadnock Bldg., San Francisco, and Chamber of Commerce Bldg., Portland.

HOTELS
The Angelus, Loomis Bros., Los Angeles.

INGOT IRON
American Rolling Mill Co., Middleton, Ohio.
California Corrugated Culvert Co.,, 5th and Parker Sts., West Berkeley.

INSPECTIONS AND TESTS
Robert W. Hunt & Co., 251 Kearny St., San Francisco.

JOIST HANGERS
Western Builders' Supply Co., 155 New Montgomery St., San Francisco.

LIME
Holmes Lime Co., Monadnock Bldg., San Francisco.
Henry Cowell Lime & Cement Co., 9 Main St., San Francisco.

LIGHT, HEAT AND POWER
Pacific Gas & Elec. Co., 445 Sutter St., San Francisco.

LUMBER
Dudfield Lumber Co., Palo Alto, Cal.
Sunset Lumber Co., Oakland, Cal.
Santa Fe Lumber Co., Seventeenth and De Haro Sts., San Francisco.

MAIL CHUTES
Cutler Mail Chute Co., Rochester, N. Y. (See Adv. on page 38 for Coast representatives.)

MANTELS
Mangrum & Otter, 561 Mission St., San Francisco.
Watson Mantel & Tile Co., Sheldon Bldg., San Francisco.

MARBLE
Columbia Marble Co., 268 Market St., San Francisco.
Josenh Musto Sons-Keenan Co., 535 North Point St., San Francisco.

METAL AND STEEL LATH
Atlantic Fireproofing Co., Pacific Bldg., San Francisco.
Jackson Fireproof Partition Co., Levensaler-Spier Corporation, distributors, Monadnock Bldg., San Francisco.
L. A. Norris & Co., Monadnock Bldg., San Francisco.
Pratt Building Material Co., Hearst Bldg., San Francisco.

METAL CEILINGS
Berger Mfg. Co., 1120 Mission St., San Francisco.
San Francisco Metal Stamping & Corrugating Co., 2269 Folsom St., San Francisco.

METAL DOORS AND WINDOWS
U. S. Metal Products Co., 525 Market St.
Dahlstrom Metallic Door Co., Western office, with M. G. West Co., 353 Market St., San Francisco.
Canton Mfg. Co., Sherman Kimball & Co., First and Howard Sts., San Francisco.

METAL FURNITURE
M. G. West Co., 353 Market St., San Francisco.
Chas. M. Finch, 311 Board of Trade Bldg., San Francisco.

METAL SHINGLES
Meurer Bros., 630 Third St., San Francisco.
San Francisco Metal Stamping & Corrugating Co., 2269 Folsom St., San Francisco.

OIL BURNERS
American Heat & Power Co., Seventh and Cedar Sts., Oakland.
Fess System Co., 220 Natoma St., San Francisco.
T. P. Jarvis Crude Oil Burner Co., 275 Connecticut St., San Francisco.
Compressed Air & General Machinery Co., 39 Stevenson St., San Francisco.

ORNAMENTAL IRON AND BRONZE
California Artistic Metal & Wire Co., 349 Seventh St., San Francisco.
J. G. Braun, Chicago and New York.
Ralston Iron Works, 20th and Indiana Sts., San Francisco.
Monarch Iron Works, 1165 Howard St., San Francisco.
C. J. Hillard Company, Inc., 19th and Minnesota Sts., Sain Francisco.
Shreiber & Sons Co., represented by Western Builders Supply Co., San Francisco.
West Coast Wire & Iron Works, 861-863 Howard St., San Francisco.
Vulcan Iron Works, San Francisco.

PAINTING AND DECORATING
D. Zelinsky, 564 Eddy St., San Francisco.
C. H. Krebs & Co., Sacramento, Cal.
Horace W. Tyrell, 1707 38th Ave., Oakland.

PAINT FOR BRIDGES
Briggs Bituminous Corporation Co., J. & R. Wilson, agents 117 Steuart St., San Francisco.

PAINT FOR STEEL STRUCTURES
"Biturine," sold by Biturine Co. of America, 24 California St., San Francisco.
Briggs Bituminous Corporation Co., J. & BR. Wilson, agents, 117 Steuart St., San Francisco.
Carbonizing Coating, made by Goheen Mfg. Co., Canton, Ohio. (See Adv. for Coast distributors.)
Joseph Dixon Crucible Co., Coast branch, 155 Second St., San Francisco.
Trus-Con Bar-Ox, Trussed Concrete Steel Co. (See Adv. for Coast agencies.)

ARCHITECTS' SPECIFICATION INDEX—*Continued*

PAINT FOR STEEL STRUCTURES—*Continued*
- Glidden's Acid Proof Coating, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- "Bitumastic" sold by Hill, Hubbell & Co., Fife Bldg., San Francisco.

PAINT FOR CEMENT
- American Paint & Dry Color Co., 414 Ninth St., San Francisco.
- Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co. (Inc.). (See Adv. in this issue for Pacific Coast agents.)
- "Biturine," sold by Buturine Co. of America, 24 California St., San Francisco.
- California Safety Fireproofing Co., 687 Market St., San Francisco.
- Trus-Con Stone Tex., Trussed Concrete Steel Co. (See Adv. for Coast agencies.)
- Liquid Stone Paint Co., Hearst Bldg., San Francisco, Los Angeles and San Diego.
- Glidden's Liquid Cement, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- Moller & Schumann Co., West Coast Branch, 1022 Mission St., San Francisco.
- Concreto Cement Coating, manufactured by the Muralo company. (See color insert for Coast distributors.)
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

PAINTS, OILS, ETC.
- American Paint & Dry Color Co., 414 Ninth St., San Francisco.
- Concreto Cement Coating, manufactured by the Muralo company. (See color insert for Coast distributors.)
- Bass-Heuter Paint Co., Mission, near Fourth St., San Francisco.
- "Biturine," sold by Biturine Co. of America, 24 California St., San Francisco.
- Heath & Milligan Mfg. Co., 9-15 Fremont St., San Francisco.
- Glidden Varnish Co., Cleveland, Ohio, represented by Whittier-Coburn Co., San Francisco and Los Angeles.
- Moller & Schumann Co., 1022 Mission St., San Francisco.
- Berry Bros., 250 First St., San Francisco.
- Paraffine Paint Co., 38-40 First St., San Francisco.
- R. N. Nason Co., San Francisco.
- Standard Varnish Works, 113 Front St., San Francisco.

PAVING BRICK
- California Brick Company, Phelan Bldg., San Francisco.

PHOTO ENGRAVING
- California Photo Engraving Co., 121 Second St., San Francisco.

PHOTOGRAPHY
- R. J. Waters Co., 717 Market St., San Francisco.
- Walter Scott, 558 Market St., San Francisco.

PIPE—CORRUGATED INGOT IRON
- California Corrugated Culvert Co., Los Angeles and West Berkeley.

PIPE—VITRIFIED SALT GLAZED TERRA COTTA
- Gladding, McBean & Co., Crocker Bldg., San Francisco.
- Pacific Sewer Pipe Co., I. W. Hellman Bldg., Los Angeles.
- Pratt Building Material Co., Hearst Bldg., San Francisco.
- Steiger Terra Cotta and Pottery Works, Mills Bldg., San Francisco.

PLASTER BOARD
- Colonial Wall Board manufactured by Mound House Plaster Co., Levensaler-Speir Corporation, 259 Monadnock Bldg., San Francisco.
- "Plastergon," sold by the Comyn Mackall & Co., 310 California St., San Francisco.

PLASTER CONTRACTORS
- George MacGruer, 319 Mississippi St., San Francisco.
- Herman Bosch, 4420 20th St., San Francisco.
- A. Knowles, 985 Folsom St., San Francisco.
- W. J. McGraw, 1636 Felton St., Berkeley.

PLUMBING
- Boscus Bros., 975 Howard St., San Francisco.
- Scott Co., Inc., 243 Minna St., San Francisco.
- Peterson-James Co., 710 Larkin St., San Francisco.
- Wittman, Lyman & Co., 341 Minna St., San Francisco.
- Alex Coleman, 706 Ellis St., San Francisco.
- Antone Lettich, 365 Fell St., San Francisco.

PLUMBING FIXTURES, MATERIALS, ETC.
- Crane Co., Second and Brannan Sts., San Francisco.
- N. O. Nelson Mfg. Co., 978 Howard St., San Francisco.
- California Steam Plumbing Supply Co., 671 Fifth St., San Francisco.
- Mark-Lally Co., First and Folsom Sts., San Francisco.
- Western States Porcelain Co., San Pablo, Cal.
- J. L. Mott Iron Works, D. H. Gulick, selling agent, 135 Kearny St., San Francisco.

POTTERY
- Steiger Terra Cotta and Pottery Works, Mills Bldg., San Francisco.

PULLEYS, SHAFTING, GEARS, ETC.
- Meese & Gottfried Co., San Francisco, Seattle, Portland and Los Angeles.

REFRIGERATORS
- McCray Refrigerators, sold by Nathan Dohrmann Co., Geary and Stockton Sts., San Francisco.
- Vulcan Iron Works, San Francisco.

REVOLVING DOORS
- American Revolving Door Co., 2514 Monroe St., Chicago, Ill.
- Van Kennel Doors, sold by U. S. Metal Products Co., 525 Market St., San Francisco.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

ROLLING DOORS, SHUTTERS, PARTITIONS, ETC.
- Pacific Building Materials Co., 523 Market St., San Francisco .
- C. F. Weber & Co., 365 Market St., San Francisco.
- Wilson's Steel Rolling Doors, U. S. Metal Products Co., San Francisco and Los Angeles.

ROOFING AND ROOFING MATERIALS
- Biturine Co. of America, 24 California St., San Francisco.
- Golden Gate Brick Co., Balboa Bldg., San Francisco.
- Grant Gravel Co., Williams Bldg., San Francisco.
- Fibrestone & Roofing Co., 971 Howard St., San Francisco.
- "Ruberoid," manufactured by Paraffine Paint Co., Pacific Building Materials Co., 523 Market St., San Francisco.
- Mackenzie Roof Co., 425 15th St., Oakland.
- United Materials Co., Balboa Bldg., San Francisco.
- Redwood Shingle Association, 44 California St., San Francisco.

ROOFING TIN
- American Sheet & Tin Plate Co., Pacific Coast representatives, U. S. Steel Products Co., San Francisco, Los Angeles, Portland and Seattle.

RUBBER TILING AND MATTING
- Compressed Air & General Machinery Co., 39 Stevenson St., San Francisco.

SAFES, VAULTS, BANK EQUIPMENT
- M. G. West Co., 353 Market St., San Francisco.

SAFETY TREADS
- American Mason Safety Tread. (See Adv. on page 147 for Coast agents.)
- Universal Safety Tread Co., represented by Waterhouse & Price, San Francisco and Oakland.

SANDSTONE BRICK
- Sacramento Sandstone Brick Co., Sacramento, Cal.
- Golden Gate Brick Co., Balboa Bldg., San Francisco.

SANITARY DRINKING FOUNTAINS
- N. O. Nelson Mfg. Co., 978 Howard St., San Francisco.

SASH CORD
- Samson Cordage Works, manufacturers of Solid Braided Cords and Cotton Twines, 88 Broad St., Boston, Mass.

SCENIC PAINTING—DROP CURTAINS, ETC.
- The Edwin H. Flagg Scenic Co., 1638 Long Beach Ave., Los Angeles.

SCHOOL FURNITURE AND SUPPLIES
- C. F. Weber & Co., 365 Market St., San Francisco; 512 S. Broadway, Los Angeles.

SCREENS
- J. A. Murray, sales agent for the Higgin All-Metal Window Screen, 805 Monadnock Bldg., San Francisco.

SCULPTORS
- Western Sculptors, 533-535 Turk St., San Francisco.

SHEATHING AND SOUND DEADENING
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.

SHEET METAL WORK, SKYLIGHTS, ETC.
- Berger Mfg. Co., 1120 Mission St., San Francisco.
- U. S. Metal Products Co., 525 Market St., San Francisco.

SHINGLE STAINS
- Cabot's Creosote Stains, sold by Waterhouse & Price, San Francisco, Los Angeles and Portland.

SPIRAL CHUTE
- The Haslet Spiral Chute Co., 310 California St., San Francisco.

STEEL AND IRON—STRUCTURAL
- Central Iron Works, 621 Florida St., San Francisco.
- Dyer Bros., 17th and Kansas Sts., San Francisco.
- Judson Manufacturing Co., 819 Folsom St., San Francisco.
- Brode Iron Works, 31 Hawthorne St., San Francisco.
- Mortenson Construction Co., 19th and Indiana Sts., San Francisco.
- J. L. Mott Iron Works, D. H. Gulick, agents, 135 Kearny St., San Francisco.
- Pacific Rolling Mills, 17th and Mississippi Sts., San Francisco.
- Pacific Structural Iron Works, Structural Iron and Steel, Fire Escapes, etc. Phone Market 1374; Home, J. 3435, 370-84 Tenth St., San Francisco.
- Ralston Iron Works, Twentieth and Indiana Sts., San Francisco.
- Schrader Iron Works, San Francisco.
- U. S. Steel Products Co., Rialto Bldg., San Francisco.
- Schreiber & Sons Co., represented by Western Builders Supply Co., S. F.
- Vulcan Iron Works, San Francisco.
- Western Iron Works, 141 Beale St., San Francisco.
- Woods & Huddart, 444 Market St., San Francisco.

STEEL PRESERVATIVES
- American Bitumastic solution sold by Hill, Hubbell & Co., Fife Bldg., San Francisco.
- Dixon's Graphite, manufactured by Jos. Dixon Crucible Co., 155 Second St., San Francisco.
- Wadsworth, Howland & Co., Boston Mass. (See Adv. for Coast agencies.)

Turner Mushroom System

of Concrete Construction for Buildings and Bridges

The original reinforced concrete flat slab. No beams or girders.
Permits of a very rapid erection.
Effects a great saving in form cost and labor.
Vibration reduced to a minimum.
Makes possible accurate computation of deflection and strength.
Successfully used in more than 1000 important structures.
A system that assures economy and rapidity of construction together with durability and low maintenance.

C. A. P. TURNER
Phoenix Bldg., MINNEAPOLIS, MINN.

Pacific Coast Representatives
INDUSTRIAL ENGINEERING CO.
Clunie Building, San Francisco
E. T. FLAHERTY,
I. W. Hellman Building, Los Angeles
A. P. HUECKEL,
Vancouver Building, Vancouver, B. C.

ARCHITECTS' SPECIFICATION INDEX—*Continued*

STEEL BARS FOR CONCRETE REINFORCEMENT
- Judson Mfg. Co., 819 Folsom St., San Francisco.
- Kahn and Rib Bars, made by Trussed Concrete Steel Co. (See Adv. for Coast agencies.)
- Woods & Huddart, 444 Market St., San Francisco.

STEEL DOOR GUARDS
- Ashlock Steel Door Guard Co., 353 Market St., San Francisco.

STEEL FURNITURE
- The Keyless Lock Co., Indianapolis, Ind.

STEEL MOULDINGS FOR STORE FRONTS
- J. G. Braun, 537 W. 35th St., New York, and 615 S. Paulina St., Chicago.

STEEL FIREPROOF WINDOWS
- Canton Mfg. Co., represented by Sherman Kimball & Co., First and Howard Sts., San Francisco.
- United States Metal Products Co., San Francisco and Los Angeles.

STEEL STUDDING
- Collins Steel Partition, Parrott & Co., San Francisco.
- "Lesco," Metal Stud, Levensaler-Speir Corporation, Monadnock Bldg., San Francisco.

STONE
- California Granite Co., Monadnock Bldg., San Francisco.
- Parry Stone Co., "Sampeta," "Golete" and "Manti" white stone, 223 Sheldon Bldg., San Francisco.
- Boise Sandstone Co., Boise, Idaho.

STORAGE SYSTEMS
- S. F. Bowser & Co., 612 Howard St., San Francisco.

SURETY BONDS
- Globe Indemnity Co., Insurance Exchange Bldg., San Francisco.
- Massachusetts Bonding & Insurance Co., First National Bank Bldg., San Francisco.
- Fidelity & Deposit Co. of Maryland, Mills Bldg., San Francisco.
- Pacific Coast Casualty Co., Merchants' Exchange Bldg., San Francisco.

TERRA COTTA CHIMNEY PIPE
- Gladding-McBean Co., Crocker Bldg., San Francisco.

TILES, MOSAICS, MANTELS, ETC.
- Mangrum & Otter, 561 Mission St., San Francisco.
- Watson Mantel & Tile Co., Sheldon Bldg., San Francisco.
- John Petrovffsky, 523 Valencia St., San Francisco.

TILE FOR ROOFING
- Fibrestone & Roofing Co., 971 Howard St., San Francisco.
- Gladding, McBean & Co., Crocker Bldg., San Francisco.
- United Materials Co., Balboa Bldg., San Francisco.

TILE WALLS—INTERLOCKING
- California Denison Block Co., 401 Monadnock Bldg., San Francisco.

TIN PLATES
- American Tin Plate Co., Riato Bldg., San Francisco.

VITREOUS CHINAWARE
- Western States Porcelain Co., Richmond, Cal.

VACUUM CLEANERS
- Bill & Jacobsen, Rialto Bldg., San Francisco.
- Blaisdell Machinery Co., represented by Sherman Kimhall, Second and Howard Sts., San Francisco.
- The Vak-Klean Vacuum Cleaner, Pneulectric Co., Pacific Coast Agts., 943 Phelan Bldg., San Francisco.
- Giant Stationary Suction Cleaner, manufactured by Giant Suction Cleaner Co., 731 Folsom St., San Francisco and Third and Jefferson Sts., Oakland.
- "Tuec" Air Cleaner, manufactured by United Electric Co., 110 Jessie St., San Francisco.

VALVES
- Jenkins Bros., 247 Mission St., San Francisco.

VALVE PACKING
- "Palmetto Twist," sold by H. N. Cook Belting Co., 317 Howard St., San Francisco.

VARNISHES
- American Bitumastic solution, sold by Hill, Hubbell & Co., Fife Bldg., San Francisco.
- W. P. Fuller Co., All Coast Cities.
- Glidden Varnish Co., Cleveland, O., represented on the Pacific Coast by Whittier-Coburn Co., San Francisco, and Tibbetts-Oldfield Co., Los Angeles.
- Standard Varnish Works, 113 Front St., San Francisco.
- S. F. Pioneer Varnish Works, 816 Mission St., San Francisco.
- Moller & Schumann Co., Brooklyn, N. Y.; Chicago and San Francisco.
- Berry Bros., "Liquid Granite," manufactured and sold by Berry Bros., 250-256 First St., San Francisco.
- R. N. Nason & Co., San Francisco and Los Angeles.

VENETIAN BLINDS, AWNINGS, ETC.
- C. F. Weber & Co., 365 Market St., San Francisco.

WALL BEDS
- Marshall & Stearns Co., 1154 Phelan Bldg., San Francisco.

WALL BOARD
- Levensaler-Spier Corporation, Monadnock Bldg., San Francisco.
- "Plastergon," sold by Comyn-Mackall & Co., 310 California St., San Francisco.

WALL SAFES
- Lowrie Wall Safe. sold by C. Roman Co., 173 Jessie St., San Francisco.

WATER HEATERS
- Pittsburg Water Heater Co., 237 Powell St., San Francisco.
- Hoffman Heater Co., Sutter St., San Francisco.

WATERPROOFING FOR CONCRETE, BRICK, ETC.
- Briggs Bituminous Paint Co., J. & R. Wilson, agents, 117 Steuart St., San Francisco.
- Concreto Cement Coating, manufactured by the Muralo Co. (See color insert for Coast distributors.)
- Fibrestone & Roofing Co., 971 Howard St., San Francisco.
- Glidden's Concrete Floor Dressing and Liquid Cement Enamel, sold on Pacific Coast by Whittier, Coburn Company, San Francisco and Los Angeles.
- Hercules Waterproofing Cement Co., represented by Waterhouse & Price, San Francisco and Oakland.
- Imperial Co., 183 Stevenson St., San Francisco.
- Liquid Stone Paint Co., Hearst Bldg., San Francisco.
- Samuel Cabot Mfg. Co., Boston, Mass., agencies in San Francisco, Oakland, Los Angeles, Portland, Tacoma and Spokane.
- The Building Material Co., Inc., 583 Monadnock Bldg., San Francisco.
- Wadsworth, Howland & Co., Inc. (See Adv. for Coast agencies.)

WHITE ENAMEL FINISH
- "Gold Seal," manufactured and sold by Bass-Hueter Paint Company. All principal Coast cities.
- "Satinette," Standard Varnish Works, 113 Front St., San Francisco.
- Moller & Schumann Co., West Coast Branch, 1022 Mission St., San Francisco.
- Trus-Con Sno-wite, manufactured by Trussed Concrete Steel Co. (See Adv. for Coast distributors.

WIRE FABRIC
- Wadsworth, Howland & Co., Inc. (See Adv. on page 31 for Coast agencies.)
- U. S. Steel Products Co., Rialto Bldg., San Francisco.

WOOD MANTELS
- Fink & Schindler, 218 13th St., San Francisco.
- Mangrum & Otter, 561 Mission St., San Francisco.

The RU-BER-OID Man And His

Book on Bungalows

For the Architect or Contractor

Illustrated with Actual Photographs, Showing
Floor Plans and Giving Approximate Costs

MADE IN CALIFORNIA U.S.A.
REGISTERED

Southern California Bungalow Showing a Beautiful **RU-BER-OID** Roof.

These Roofs come in Red, Green, White and Slate Colors.

TRADE MARK
REG US PAT OFFICE

Ask Us for a Copy of this Book on Bungalows

— IT IS FREE —

Let Us Help **YOU** with **YOUR** Roofing Problems —

Our Motto is — **"SERVICE."**

Pacific Building Materials Co.

SUCCESSORS TO

THE LILLEY & THURSTON CO.

San Francisco

SPECIFY

STAR ASPHALTUM

AND

PETROLASTIC CEMENT

FOR

WATER PROOFING	BUILDING FELTS
ROOFING	COATING PIPES
DAMP PROOFING	TENNIS COURTS
BUILDING PAPERS	SHOP FLOORS

PAVING

Write us for full particulars

Standard Oil Company

(California)

Standard Oil Building — San Francisco

Temporary City Hall, San Francisco
Wright, Rushford & Cahill, Architects

Exterior Treated with

IMPERIAL WATER PROOFING

We Specialize Water Proofing Problems

ABOVE GROUND **IMPERIAL METHOD** UNDER GROUND

ASSUME ALL RESPONSIBILITY
GUARANTEE RESULTS

Imperial Company

Builders Exchange Building

183 Stevenson St. — San Francisco

"BERGER'S Classik" METAL CEILINGS

offer the most complete selection of artistic embossed steel ceiling. They represent eleven distinct classes of architecture, each made in a variety of designs, making possible hundreds of beautiful combinations. *Our handsome catalog is well worth having. Write for it to-day.*

The Berger Mfg. Co.

1120-26 MISSION ST., SAN FRANCISCO

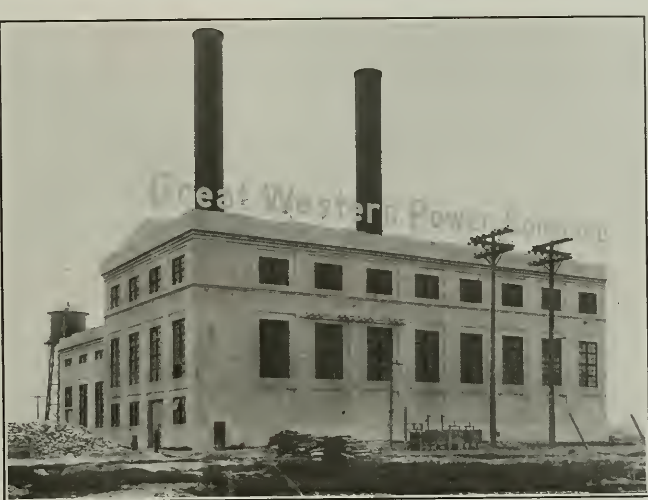
. The Cement Finish on this building received

ONE COAT

of the MURALO CO.'S

CONCRETO
CEMENT COATING

FOUR YEARS AGO



STEAM PLANT, GREAT WESTERN POWER COMPANY
Foot of 5th Ave., Oakland Estuary

Any building originally finished with one or two coats of CONCRETO CEMENT COATING can be repainted after a number of years with CONCRETO in absolute safety, as the paint will never shell off, blister or peel.

SOLE MANUFACTURERS **THE MURALO CO., NEW YORK.**

SAN FRANCISCO DISTRIBUTORS:

D. H. RHODES,
546 VALENCIA ST.

A. L. GREENE,
311 CALIFORNIA ST.

This Attractive Store and Apartment Building Faced with

White Sandstone Brick

MANUFACTURED BY

The Sacramento Sandstone Brick Co.

1217 EIGHTH ST., SACRAMENTO, CAL.

Lauppe Building, Sacramento. Seadler & Hoen, Architects
Lindgren Co., Contractors

STEIGER TERRA COTTA AND POTTERY WORKS

ARCHITECTURAL TERRA COTTA, PRESSED BRICK, SEWER PIPE
CHIMNEY PIPE, FLUE LINING, FIRE BRICK
MANTEL TILE, ACID WARES

FACTORY: SOUTH SAN FRANCISCO, SAN MATEO CO. YARD: 18TH AND DIVISION STS. SAN FRANCISCO

MAIN OFFICE: 729 MILLS BUILDING

TELEPHONE DOUGLAS 3010 SAN FRANCISCO, CAL.

WHAT THE CITY ENGINEER OF THE SECOND LARGEST CITY OF SOUTHERN CALIFORNIA SAYS OF

VITRIFIED SEWER PIPE

"A vitrified salt-glazed sewer pipe, burned to the point of vitrification, has been proved beyond all question to be proof against any destroying agent whatever, except fire, and is used in all conservative practice of able sanitary engineers throughout the United States."

PACIFIC SEWER PIPE CO. Manufacturers of Vitrified Salt Glazed Sewer Pipe

825 EAST SEVENTH STREET, LOS ANGELES, CAL.

GLADDING, McBEAN & CO.

MANUFACTURERS CLAY PRODUCTS

CROCKER BLDG. SAN FRANCISCO

WORKS, LINCOLN, CAL.

Protect Your Concrete or Stucco

I want you to know **BAY STATE** *Brick and Cement Coating* is being specified by the leading architects and contractors not only as a coating on cement, stucco, and brick surfaces to protect them against moisture, but on high grade interior work on both wood and plaster.

You know how necessary it is to protect concrete surfaces against dampness. My coating is damp-proof, a fire retarder and gives a pleasing appearance without destroying the texture of concrete. It is the best coating for mills, factories, bridges or stucco houses.

Write for particulors about Bay State Brick and Cement Coating. Address for booklet No. 20

WADSWORTH, HOWLAND & CO., Inc.,

PAINT AND VARNISH MAKERS AND LEAD CORRODERS

82-84 Washington St. Boston, Mass.

DISTRIBUTING AGENTS: Hiram W. Wadsworth, Chamber of Commerce Building, Pasadena, Cal. F. T. Crowe & Co., Portland, Ore., Spokane, Seattle, Tacoma, Wash., Vancouver, B. C.; Jones-Moore Paint House, San Diego, Cal.; R. N. Nason & Co., 54 Pine Street, San Francisco; R. N. Nason & Co., 1047 South Main Street, Los Angeles.

LIQUID-STONE

Used by Willis Polk & Co. on this Pumping Station of Spring Valley Water Co.

SOME OF OUR AGENTS:

PACIFIC BUILDING MATERIALS CO., San Francisco, Cal.
HERRINGBONE METAL LATH CO. Los Angeles, Cal.
J. M. McLEOD, 1715 Telegraph Avenue, Oakland, Cal.
H. P. GREENE, San Diego, Cal.
LEWERS & COOKE, Ltd. Honolulu, T. H.
GALBRAITH, BACON & CO., Seattle, Wash.
FLANIGAN WAREHOUSE CO., Reno, Nev.
CRESCENT PAINT CO., Phoenix, Ariz.
DOMINION DOCK & SUPPLY CO., Ltd. Vancouver B. C.
H. M. FAIRFOWL, Portland, Ore.

THE LIQUID-STONE PAINT CO., Mfr., SAN FRANCISCO

The New Freedom

of architectural design has been made possible by the great adaptability of such beautiful materials as Atlas-White non-staining Portland Cement in the hands of able men. Pure white, and as for strength — it has the strength of Atlas.

Pacific Coast Distributors of Atlas-White:

United Materials Co., Balboa Bldg., San Francisco, Cal.
Pacific Portland Cement Co., San Francisco, Cal.
Oro Grande Lime & Stone Co., Los Angeles, Cal.
Sunset Lime Company, - Los Angeles, Cal.
Los Angeles Lime Company, Los Angeles, Cal.
Western Commercial Company, Los Angeles, Cal.
Jarvis-Winn Co., - - San Diego, Cal.
California Portland Cement Co., Pasadena, Cal.
Howard Company - - Oakland, Cal.
F. T. Crowe & Company, Seattle, Wash.
F. T. Crowe & Company, Tacoma, Wash.
F. T. Crowe & Company, Spokane, Wash.
F. T. Crowe & Company, Portland, Ore.
F. T. Crowe & Company, Vancouver, B. C.
Evans, Coleman & Evans, Vancouver, B. C.
Evans, Coleman & Evans, Victoria, B. C.

DRAWN FROM PHOTOGRAPH

UNNECESSARY

SPECIFY THE COLONIAL HEAD THROAT and DAMPER

THE BEST DEVICE FOR OPEN FIREPLACES
SEE SWEETS INDEX PAGES—1702-3

SOLD ON THE PACIFIC COAST BY

Aurora Mfg Co.	Higgins Bldg., Los Angeles
D. O. Church	San Francisco
Scott, Lyman & Stack	Sacramento
D. E. Fryer & Co.	Seattle
Wm. N. O'Neil & Co.	Vancouver, B. C.
M. J. Walsh Co.	Portland, Ore.

COLONIAL FIREPLACE COMPANY
:: CHICAGO ::

CRANE COMPANY

Second & Brannan Sts.
SAN FRANCISCO

High Grade . . .

PLUMBING SUPPLIES

Steam and Hot Water Heating
PIPE, VALVES, FITTINGS

Power Plant and Water Works Materials

STEAM SPECIALTIES

CALIFORNIA STEAM AND PLUMBING SUPPLY CO.

PIPE, VALVES AND FITTINGS
FOR
STEAM, GAS, WATER AND OIL

COMPLETE STOCK OF
The Kelly & Jones Company Products
WRITE FOR CATALOGUE

OFFICE AND WAREHOUSE:
671-679 FIFTH STREET
Corner Bluxome
SAN FRANCISCO, CALIFORNIA

Telephone Sutter 737

LITHOID FLOORING and LITHOID DAMPPROOFING

This composition mixed and tested upon strict Chemical Analysis.
FLOORS made of this material POSITIVELY GUARANTEED.

LITHOID PRODUCTS CO.

General Offices: 1034 MERCHANTS EXCHANGE BLDG.
Telephone Sutter 1475 SAN FRANCISCO

The Architect and Engineer

Terms of Subscription, $1.50 per Year — of California — Single Copies, 50 Cents

Pacific Coast States

Issued monthly in the interests of Architects, Structural Engineers, Contractors and the Allied Trades of the Pacific Coast.
Entered at San Francisco Post Office as Second Class Matter.

Contents for April

Frontispiece
The Architect and Engineer of California.
for April, 1914.

VIEW ACROSS POOL IN GARDEN, SHOWING CONSERVATORY. RESIDENCE OF ALFRED I. DUPONT, WILMINGTON, DEL. CARERRE & HASTINGS, ARCHITECTS

THE

Architect and Engineer

Of California

Pacific Coast States

Vol. XXXVI. APRIL, 1914. No. 3

The Decorative Possibilities of Concrete*

By C. W. BOYNTON, M. W. S. E., and J. H. LIBBERTON, Assoc. W. S. E.

IN THE early days of construction, the architect and engineer appeared on the work under the title of master-mason. This individual wore long robes as an indication of his authority, and the designs on his trestle board are a matter of history. With the passing of the master-mason came the architect and engineer, the one a worker in lines, the other a worker in figures.

The combination is ideal; one specializing on beauty and the other, safety and efficiency. Too often, however, safety and efficiency receive first consideration, and the beauty only gets its share after costs have been carefully calculated.

In reality, the most common buildings of a manufacturing type can be made to conform to pleasing lines without the additional expenditure sometimes thought necessary. After pleasing lines have been determined, then comes the question of decoration. In many instances this is carried to extremes, and we find exquisite examples of stone carving and cornice work being placed at the top of an eighteen or twenty-story office building, which no one can see or appreciate except a possible few located in the offices upon the opposite side of the street.

This may be said of the Chicago postoffice (Fig. 1), with the exception that here the entire structure has been injudiciously placed. It is well recognized that a structure of this kind occupies a maximum ground area with a minimum return in floor space and light area. This building was a large undertaking from an engineering standpoint, but whether or not it is an architectural success, few may judge because of the impossibility of viewing the entire building at one time. Of the same type is the capitol at Washington, but so judiciously has it been placed that a full view may be obtained from all sides without obstruction. In the open, or upon the crest of a hill, the Chicago postoffice, even though inefficient in design, would be architecturally beautiful.

There is an old maxim to the effect that the designer should ornament his construction and not construct his ornamentation. This is an admirable

*Abstract of a paper read before the Western Society of Engineers.

Fig. 1.—CHICAGO POSTOFFICE, WEST FRONT

saying, but should be subordinated to another rule, that he should ornament his structure only if he lacked the skill to make it beautiful in itself. A structure of any kind that is intended to serve a useful end, should have the beauty of appropriateness for the purpose it is to serve. It should tell the truth, and if the character were such that it can be permitted to tell the whole truth, so much the better. It should preferably be beautiful and not beautified.

There is a certain charm about a massive structure almost irrespective of design. The sight of a pyramid on the desk would call forth no expression of interest or enthusiasm, but let this grow in size until it assumes the proportions of those famous structures of Egypt and many pilgrimages will be made to view it. Of course the Egyptian pyramids are assumed to be the resting place of kings, and the placing of the blocks required the use of more muscle or machinery than we at present have any knowledge of, but our idea of their beauty and grandeur obtains primarily from the immensity of the structures.

There is no reason, however, why mass should not be combined with decoration, provided the design is not made subordinate to the decoration. This combination has often been used very effectively. The question is, what medium shall be chosen? At the Unity Church, Oak Park (Fig. 2), the building is not only monolithic concrete, but the ornamentation partakes of the same characteristics, having been cast at the same time and of the same material. In a building of this type, however, much attempt at decoration would be fatal and the unobtrusive style adopted detracts not in the slightest from the dignity obtained by large areas and

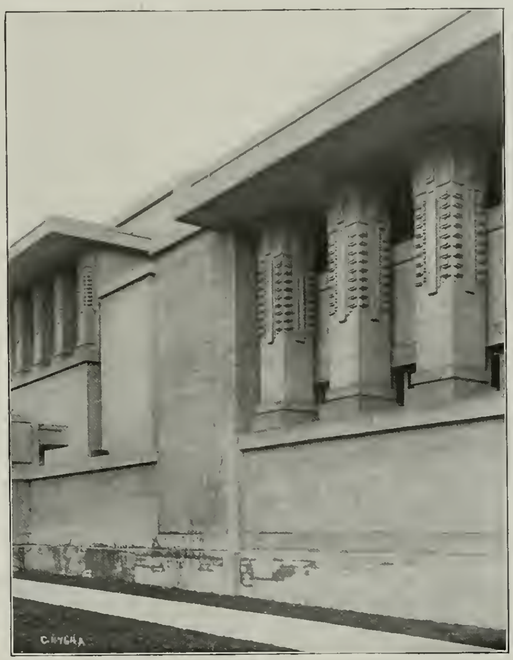


Fig. 2.—DETAIL OF UNITY CHURCH, OAK PARK, ILLINOIS

massive construction. With a different style of building, such as the Administration building at Washington Park (Fig. 3), the treatment may be entirely different and the concrete be called on to assume the most intricate shapes.

Both of these buildings show the same surface finish. The architecture determines the decoration. With conditions reversed and the decorations transposed, the effect would be ludicrous. In these buildings the monotony of the form concrete has been relieved by the use of a rather dry surface mixture which discloses the nature of the aggregate used.

Fig. 3.—ADMINISTRATION BUILDING AND BALUSTRADE, WASHINGTON PARK, CHICAGO

Fig. 4.—ENTRANCE DETAIL. ADMINISTRATION BUILDING, WASHINGTON PARK, CHICAGO

Fig. 5.—MANUFACTURING BUILDING OF THE PIQUA HOSIERY CO., PIQUA, OHIO

DETAIL OF ENTRANCE TO THE BUILDING OF THE PIQUA HOSIERY CO., PIQUA, OHIO

In work of this kind, particular attention must be paid to methods of obtaining uniformity of surface and absence of horizontal joint markings (Fig. 4), although the latter blemish is not nearly so noticeable on work of this character as with the wet mixture.

After all, the question of pleasing effects depends not only on the surfaces and the surface treatment, but on the combination of design with the surface texture.

The method of treatment on the Piqua Hosiery Company's building (Fig. 5) is especially pleasing. So is the exterior finish of the Western Fire Sta-

Fig. 6.—WESTERN FIRE STATION, WESTON, MASS.

tion (Fig. 6), where panels have been bush hammered, preserving the corners and margins intact. Consistent with its purpose, the entire structure is of reinforced concrete.

No doubt everyone is familiar with what seems to be the proverbial small town water supply tank, with its hemispherical bottom and sprawling legs; anything but an ornament to the community. This same type of structure was installed at Gary, Indiana (Fig. 7), but so well has it been concealed that the tower is a thing of beauty and possesses real architectural merit. The work of molding so large a structure in reinforced

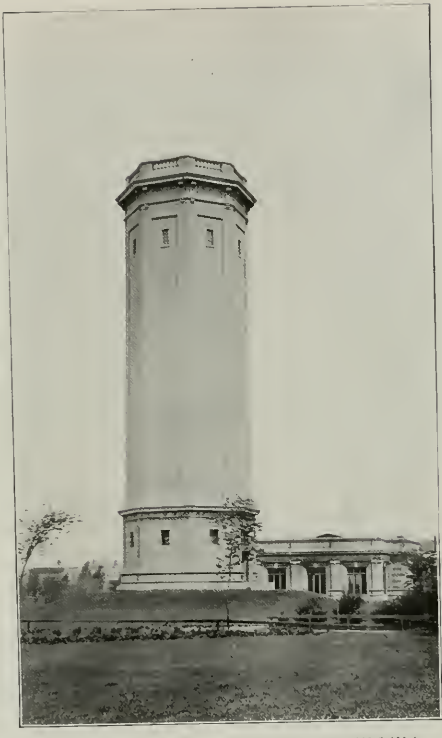


Fig. 7.—GARY WATER TOWER, GARY, INDIANA

concrete was greater because of the forms required, the total height being 125 feet. But the finished structure justified the labor. The lower 25 feet and the upper cornice are of cast concrete stone, made by George Rackle & Sons of Cleveland. The remainder is of reinforced concrete. The relief of the surface monotony is seen in the decorative work at the top and base.

Decoration, however, is not an essential of mass construction, as has been clearly demonstrated by the Spanish in the design of the adobe dwellings and missions. But adobe perishes and our interesting relics of former days will soon be a thing of the past. Noting the possibilities of monolithic concrete for preserving this architecture, Frank Miller has undertaken to petrify indefinitely, as it were, some of the most interesting details of the mission architecture developed by the Franciscan Fathers

Fig 8.—COURTYARD, GLENWOOD INN, RIVERSIDE, CALIFORNIA
Arthur B. Benton, Architect

Fig. 9.—GLENWOOD INN, RIVERSIDE CAL., LOOKING FROM THE STREET INTO THE COURTYARD

in California (Fig. 8). Thus when the last adobe wall has crumbled we shall still have a replica of the Campanile of San Gabriel (Fig. 9) and the imposing arches of San Fernando, these having been duplicated in the Glenwood Inn at Riverside, California. Little other material than concrete has been employed—except the roof tile, which undoubtedly lend color to the scheme and interest to the picture. On the roof is a famous collection of bells, over 300, dating back to 1278. It seems, consequently, particularly fitting that these old relics, after their furious experiences, may now rest content, enclosed and surrounded by a structural material which will preserve their last resting place intact through the centuries to come.

Of the mission type, also, are the rest or way stations of the Pacific Electric Railway, at Pasadena, California. These are fast replacing the old wooden rough-and-ready stations, none of which was consistent with the high-class residential district through which the company operated. On both sides a bench is built into the wall so as always to furnish protection from rain.

Fig. 10.—THROOP POLYTECHNIC INSTITUTE, LOS ANGELES, CAL.
Myron Hunt, Architect

An unexpected test of building materials presented itself during the San Francisco earthquake, and the architect for the delightful bell tower on the Mills College campus, Miss Julia Morgan, states that it was one of the few buildings which remained undamaged in that vicinity.

Because it includes some of the most notable sculpture on the coast, the building of the Throop Polytechnic Institute at Los Angeles, Cal., may have interest (Fig. 10). It is all of reinforced concrete, even to the tower, and was designed by Architect Myron Hunt of Los Angeles. The sculpture was executed in New York and cast in glue molds by a local company, the cost of this one item being something over $5,000. Warm climates seem particularly suited to plain concrete construction, and its general adoption may partially be explained by the cool appearance of the plain surface.

Concrete, still in its formative state of development, is a comparatively new architectural material, although structurally it has been proving its permanence for many years. The particular reason for gratification comes in the new discoveries, and new uses to which it is continually being put. Every day there arises some Philistine who has discovered something new and worthy of consideration.

A few years ago the theory of applying concrete by means of a hose and nozzle met with derision, but every day we hear of more work being done by this method, the machine being designated as the "cement gun" and the concrete "gunite." An interesting piece of work has been accomplished by the Boston Elevated Railroad at the foot of O street, Boston, where a garden fence has been constructed by this method. The base and posts are built of concrete poured into the forms in the usual way, the posts being relieved by protecting brick quoins (Fig 11). The street face of the panels were shaped by means of a wooden form, and each central panel was faced with steel. The concrete was applied from the rear with the cement gun, making the panels 2½ inches thick and the styles 4 inches thick. The interesting point in the operation is that the entire panels are made in one piece at one operation.

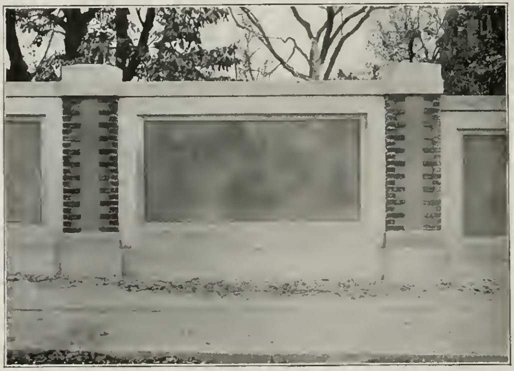


Fig. 11.—CEMENT GUN CONSTRUCTION ON WALL OF THE BOSTON ELEVATED RAILWAY

A building should be fitted to the country in which it is to be located, and more and more attention is continually being given to the unity which must exist between the landscape and the layout of concrete structures which are to be added as permanent improvements. A striking example of this is to be found on the Duke estate at Somerville, N. J. (Fig. 12), where white cement and white sand have been used in facing the concrete, in order, possibly, to give more contrast against the natural beauty of the surroundings. The bridge (Fig. 13) harmonizes with the rest of the work, but might be improved if the surface markings were eliminated—the general lines accentuated by bush hammering, or some one of the other numerous interesting surface treatments, to which concrete may be subjected.

Fig. 12. CONCRETE RETAINING WALL AND BALUSTRADE ON DUKE ESTATE, SOMERVILLE, N. J.

In a similar manner the concrete posts which have been added to the Lake Shore Drive in Chicago not only add materially to the dignity and beauty of this boulevard, but are, themselves, better set off by being so well located (Fig. 14). Imagine this particular design on South Clark and Harrison streets. For a while the posts would look entirely out of harmony with their surroundings, but there is every probability that their advent would produce a desire on the part of the property owners to clean up the streets and buildings so as better to accord with the dignity of the lamp standards.

A note on the method of construction of these poles may be of interest since they are of reinforced concrete, cast in one piece, including the base. The surfacing is made of a special mixture of cement, dark red Wisconsin granite and a small amount of mica, which is washed, after removing from the mold, with a weak solution of hydrochloric acid. The design is the result of a contest in the Chicago Architectural Club, the successful contestant being John Hamilton.

Fig. 13.—CONCRETE ARCH BRIDGE ON THE DUKE ESTATE, SOMERVILLE, N. J.

Fig. 14.—LAKE SHORE DRIVE, CHICAGO, WITH CONCRETE LAMP STANDARDS

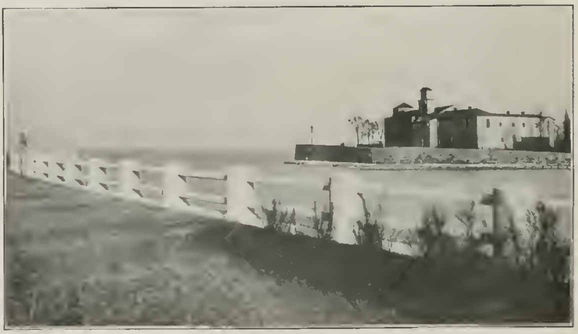


Fig. 15.—CONCRETE RAILING AROUND ENTRANCE TO JACKSON PARK HARBOR, CHICAGO

Fig. 16.—INDEPENDENCE BOULEVARD VIADUCT, BALTIMORE AND OHIO RAILWAY, CHICAGO

Fig. 17.—OGDEN AVENUE VIADUCT, BALTIMORE AND OHIO RAILROAD CHICAGO, SHOWING TILE INLAYS

Of a similar nature is the work on the concrete railing around Jackson Park Harbor, also in Chicago (Fig. 15). Here, as before, the concrete depends for its beauty upon the surroundings rather than upon the excellence of the design, although it is well agreed that little could be added which would improve the dignity and solidity indicated by this superior example of a concrete railing. The white surface is obtained by the use of limestone screenings which emphasizes the important part of the aggregate plays in determining the color of the concrete into which it enters.

The attention which is being paid to the design of improvements which will harmonize with the surroundings may well be illustrated by the work of the B. & O. Railroad on its Independence boulevard viaduct, Chicago (Fig. 16). A total of some twelve to fifteen different designs were prepared, and only after careful consideration was one finally decided upon, which the railroad officials thought would be suitable to submit to the Park Board. How well they succeeded is evident. Were the plain steel structure considered by itself, a realization could be had of the tremendous improvement which has been effected by the simple addition of the reinforced concrete covering. Some of the earlier work of the B. & O. Railroad shows an entirely different method of handling concrete, depending upon the inlaid tile for decoration rather than upon the excellence of the design (Fig. 17). Of course, as this bridge is located on West Ogden avenue, Chicago, there is nothing in the way of beautiful landscape to mention and probably the officials believed that a little brightening of the concrete surface would relieve the monotony of a busy business street. But work of this kind is extremely expensive and can best be illustrated by a comparison of this bridge with the Independence boulevard structure, which is of 250-foot span.

Fig. 18.—SACRAMENTO BOULEVARD VIADUCT, BALTIMORE AND OHIO RAILROAD, CHICAGO

Fig 24.—CONCRETE BLOCKS IN THE CONSTRUCTION OF THE NORMAL PARK METHODIST CHURCH, CHICAGO

Fig. 25.—KINGSBURY APARTMENTS, ST. LOUIS, MO.

For some time Alfred Hopkins of New York City has been a strong advocate of reinforced concrete for the construction of buildings and has added a large amount of information to our knowledge of the concrete of the old Romans, having investigated this point personally and in some detail. Nevertheless, Mr. Hopkins has never brought himself to believe that concrete should be used for the ornamentation upon buildings of the same material. For this purpose he advocates terra cotta (Fig. 21). This building is all of reinforced concrete to the roof, and part of this has been constructed of concrete slabs. But for the panels and column capitals, Mr. Hopkins has turned to terra cotta tile, with excellent results. For the average individual, of course, a detail of this kind would be prohibitive in cost. But with such a sized undertaking as this mammoth residence the high individual cost of these panels is small when compared with the total cost of the building. However, with the advances which are being made in the use of colored aggregates, it is generally possible to obtain all the color variations necessary in the concrete itself.

INTERIOR OF GAGE E. TARBELL'S RESIDENCE, GARDEN CITY, L. I., SHOWING SUBSTITUTION OF FRESCO FOR LATTICE

Oswald Hering has utilized lattice work on one of his most important dwellings in combination with decoration of molded concrete. But where Mr. Hopkins would use terra cotta, as in the panel inserts, Mr. Hering has used concrete, depending upon exposed aggregate to furnish the touch of color needed.

Wood paneling will also break up large areas of concrete surface and is entirely in keeping with the old half-timbered style of architecture, so familiar to our forefathers. It is impossible to appreciate the pleasing surface which has been obtained on this modest appearing dwelling (Fig. 23), but a slight explanation may help to make clear how the effect is obtained. The finish is known as a dry dash, and in this instance has been applied to concrete blocks. After the plaster coat has been placed, a dash mixture of white marble and blue stone chips with gravel screen-

Fig. 22.—CEMENT STUCCO RESIDENCE OF L. G. STUMER, CHICAGO

Fig. 23.—RESIDENCE, JAMAICA ESTATE, L. I.

rooms on the opposite side of the central portion of the building are without roof, but are fitted with concrete rooms and steel lockers in double tiers. In order to reach the beach the bathers must pass through a pool of water and through a triple shower direct from above and from both sides, so that a partial wetting is received before reaching the beach.

The concrete was deposited rather dry in order to obtain a rough finish, and the form marks do not seem to detract in any way from the pleasing surface made by the coarse aggregate. The decorations are of brick and clay tile, the brick having been placed when the concrete was poured, but the tile subsequently, space being made for them by tacking wooden shapes to the inside of the form.

It is not surprising that an individual directly connected with the cement industry as is Albert Moyer, should build of concrete, nor is it surprising that one who is so well versed in concrete construction should obtain very pleasing effects as indicated by the work on his residence at South Orange, New Jersey. Liberal use has been made of exposed aggregates, employing a mixture of Portland cement with limestone screenings, marble chips and dark trap rock (Fig. 19). Not stopping here, much dependence has been placed upon Moravian pottery decoration, which harmonizes well with the concrete surface, as is shown in the fireplace, with its inlaid panel showing an Indian at a fire, whether warming his hands or starting the blaze being not self-evident (Fig. 20). The balcony, also, has been worked out in pottery, but somewhat differently than the fireplace. The distinguishing feature lies in the fact that instead of being inlaid the figure comes out in bas-relief, and although somewhat serpentine in design, seems fairly consistent with the grape-vine motive. Undoubtedly this panel would be somewhat softened to its improvement by the ivy, which was evidently not in leaf when the picture was taken.

Fig. 21.—PORCH DETAIL, RESIDENCE OF CHAS. E. RUSHMORE, WOODBURY FALLS, N. Y.

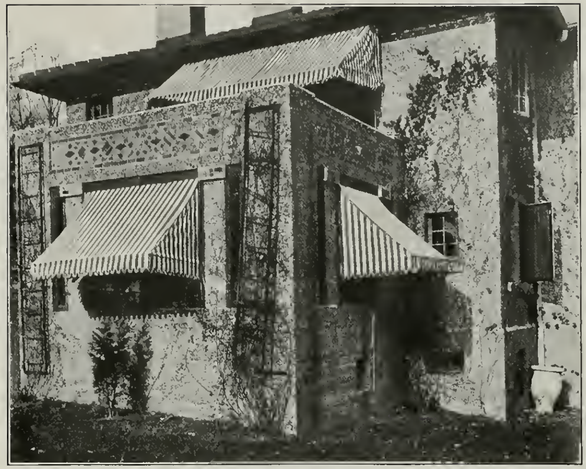


Fig. 19.—PORCH DETAIL, RESIDENCE OF ALBERT MOYER, SOUTH ORANGE, N. J.

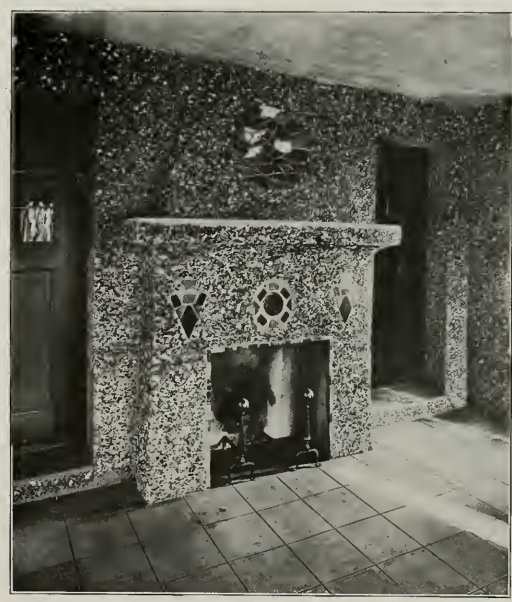


Fig. 20.—FIREPLACE IN THE HOME OF ALBERT MOYER, SOUTH ORANGE, N. J.

The Ogden avenue viaduct is 135 feet between abutments, and yet the cost of concrete finish and inlay tile was greater than the total for the other structure of 250-foot span. A simpler structure has been designed for Sacramento boulevard (Fig. 18), but as this street is much narrower than Independence boulevard, naturally an entirely different method of treatment was necessary and the lines have been made to follow somewhat along the Mission style.

Notwithstanding the excellent decorative work which has been done in plain and reinforced concrete, there are, nevertheless, numerous advocates of tile decoration. Instances are many where the use of brick or tile emphasizes the contour and enlivens the surface at very little expense. A little touch of color relieves the monotony of a single toned exterior and is illustrated in the seed warehouse of Otto Schwill & Co. at Memphis, Tennessee. This building would undoubtedly be equally as efficient were it built without any attention to pleasing architectural effects. With the present leaning toward pleasant work rooms for employes, this idea

OFFICE BUILDING, PACKARD AUTOMOBILE COMPANY, BUFFALO, N. Y.

has spread to the exterior with the result that our factories are surrounded by grass plots and gardens, and the buildings themselves, so far as possible, are made to conform with the tendency toward providing pleasant environment.

The office building of the Packard Automobile Company at Buffalo, New York, is an equally good example of the combination of concrete and brick, although the decoration is of cast concrete.

Another example of the use of colored clay tile for concrete decoration is to be found in Minneapolis, where on the north shore of Lake Calhoun a large building has been constructed of reinforced concrete, called the Calhoun Baths. The central portion of the building is roofed and serves as the entrance, housing the ticket office, the rooms where bathing suits, towels and keys to lockers are distributed, and the refectory. It also connects directly with the terrace above the bathing beach. The dressing ings is thrown on, which imbed in the mortar and furnish a clean, bright surface without further treatment. When a coarser effect is desired it can be obtained by a rough cast, the mortar mixture being thrown on with a paddle and the texture of the surface depending entirely upon the size and character of the aggregate and the consistency of the mixture.

Stucco finish has found favor when applied to concrete blocks as a backing, and there are some architects who believe that this is the only satisfactory means of handling what has seemed to be in many cases a sad makeshift so far as a building material having architectural merit is concerned. This impression has probably grown from the continued manufacture of rock-faced and inferior blocks by those who are entirely unqualified to undertake this kind of work. Such examples as the Normal Park Methodist Church in Chicago (Fig. 24), the blocks for which were built by the American Hydraulic Stone Company, and the design executed by H. B. Wheelock has done much to eliminate this impression. The tone contrast was here obtained entirely by the use of colored aggregates, using the natural sand finish on the trim, but a dark granite for the body. The surfaces were then scrubbed to expose the aggregate, and the building is itself a strong recommendation for the much maligned concrete block.

After considering the all-concrete buildings and the buildings in which other material has been used for ornamentation, it is interesting to turn to work where the latter condition has been reversed and is well illustrated by the work of S. T. Yourtee on the Kingsbury apartments in St. Louis (Fig. 25). The blocks were cast in sand molds, and on account of the surface given by this method, subsequent treatment was unnecessary because of the peculiar matte surface which the rough sand-mold provides. Very intricate figures are easily worked out by this process and many buildings in St. Louis attest to Mr. Yourtee's skill in handling concrete.

Another prominent figure in the manufacture of decorative concrete stone is the Economy Concrete Company of New Haven, Conn., which has begun at home to demonstrate the possibilities of concrete for furnishing the ornamentation for buildings of other material. Some of the most interesting work which this company has done, and that which it prizes most highly because of the personal interest, can be seen at the company's home office, where a fireplace is composed principally of ornamental concrete stone (Fig. 26). The figures above the mantel are

Fig. 26.—FIREPLACE DETAIL. ECONOMY CONCRETE CO., NEW HAVEN, CONN.

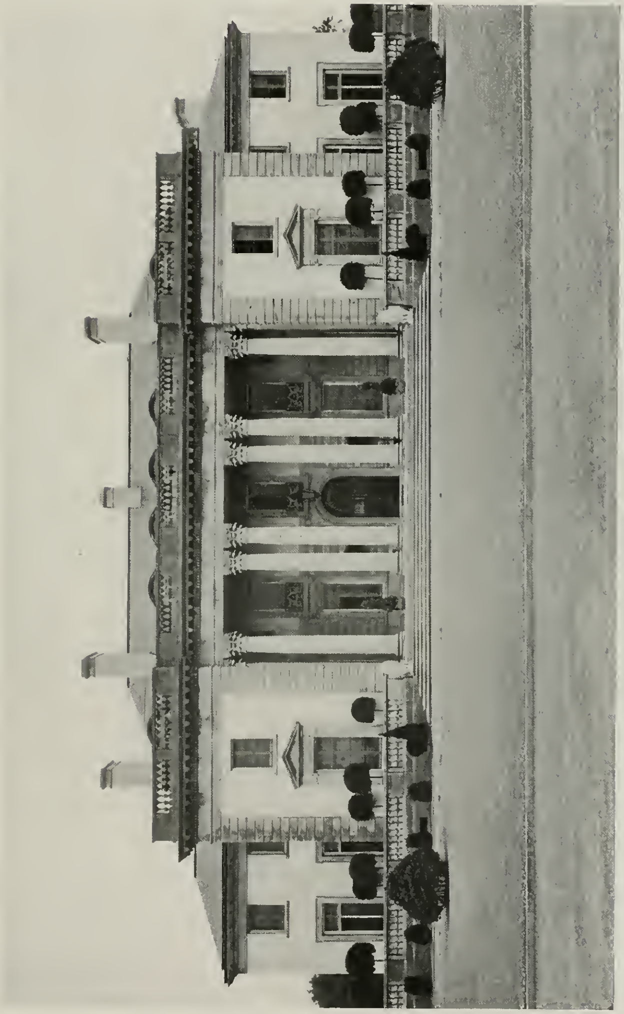
molded after the various workmen about the plant, with the exception of the one at the far right, who represents transportation. The other figures represent in their order (1) the draftsman laying out the plan, (2) the sculptor working over the pattern, (3) the laborer pouring the concrete, and (4) the workman putting the finishing touches on the surface and correcting any flaws caused by removing the forms.

The work is all cast in solid and uniformly proportioned concrete without special surfacing, using wooden or plaster molds. Where necessary, glue molds are employed for the under-cut work. This, of course, gives a rather smooth surface and is the only criticism which could be made of the product. With but slight additional expense, however, the surface can be chiseled so as to relieve what sometimes appears to be a rather putty-like surface when fresh from the molds.

Fig. 27.—GYMNASIUM, U. S. MILITARY ACADEMY, WEST POINT. ALL TRIM ABOVE THE FIRST STORY OF CONCRETE STONE
Cram, Goodhue & Ferguson, Architects

The work of this company has favorably impressed such architects as Cram, Goodhue & Ferguson, who designed a number of buildings at West Point, including the gymnasium and cadet barracks (Fig. 27).

The writers, not being architects, have dealt somewhat sparingly with the subject of architectural and decorative possibilities of concrete and have rather depended upon the illustrations to indicate the purpose of this paper. After all, architecture and architectural decoration is a peculiar study On the one hand, we have those who contend for close adherence to the ancient styles of architecture, and on the other hand we have many brilliant minds who have achieved wonderful results and designed some of our most pretentious structures along entirely new lines, yet without voluminous criticism from those who consider themselves authorities.



Courtesy of Real Estate Magazine, New York

MAIN FACADE. RESIDENCE OF ALFRED I. DUPONT, WILMINGTON, DELAWARE
CARERRE & HASTINGS, ARCHITECTS

Architectural Acoustics—Fundamental Principles*

By JOHN T. VAWTER, Architect

A DISCUSSION of the production and transmission of wave energy in general should be logically introduced here before passing on the specific form of sound energy, but as we are perhaps already more familiar with the wave theory of sound than of heat, light or electricity, with which we would have to deal, we may confine our discussion to a single example of a wave transmission of mechanical energy.

Let us consider a long piece of gas pipe fitted at each end with a well-made piston, and let us consider it as completely filled with water. If we should move one of the pistons slowly in by means of a lever, the piston at the other end would reciprocate to the movement. If the pipe were very long in comparison to the piston we may readily see that while the force was transmitted from end to end of the pipe the individual drops of water in the pipe made only a very short travel. If the motion of our lever had been very rapid we might have noticed a very perceptible difference of time between the corresponding movements at the opposte ends of the pipe. This difference of time, of course, depending upon the length of the pipe, and if it were of sufficient duration we might make several rapid movements of our piston back and forth before the first were responded to by the piston at the opposite end. What actually takes place is that momentum is given to a quantity of water equal to its mass times its velocity and this amount of energy is transmitted to the next adjacent equal quantity of water and so on throughout the length of the pipe. The forward movement of the piston may be considered as producing a compression and the backward movement as producing a rarefaction of the water. These follow each other as pulsations or inequalities of pressure, and when these inequalities of pressure are plotted as ordinate along a straight line and their extremities joined we have as a result the sign curve or wave. It will be seen from this that the wave has no counterpart in the phenomenon itself, but is merely a name given to one representation of the phenomenon. This example is roughly typical of all wave motion and of the propagation of sound.

A sounding body is one which is causing between 50 and 30,000 of such pulsations to advance through a medium in one second of time. Vibrations may be produced either more or less rapidly than this, but the human ear does not record them, and even these limits are sensed between the dullest "thud" and the shrillest "squeak." Tones are distinguished over a much narrower limit of frequencies and well toward the lower end; middle C being usually placed at 256 vibrations per second.

We should be careful not to confuse this frequency of vibration which is a purely mechanical phenomenon with the time of sensing a sound which is purely psychological. The human ear as an approach to the mind is only capable of recording about fifteen distinct sensations per second. That is, if more than fifteen tone groups of waves fall upon the ear in one second they tend to blend into a single sensation, but if less than fifteen such groups are equally distributed over the time they may each be attended to separately by the mind. A familiar illustration of this endurance of sensation is presented by the moving picture in which one picture is substituted for another before the sensation caused by the first has ceased to endure. In this way we obtain a smoothly blended sensation as of motion, whereas if the substitution of one picture for an-

*Conclusion of paper read before the Southern California Chapter American Institute of Architects, March 10, 1914. The first installment of this paper appeared in the March number of The Architect and Engineer.

other before our eyes had been so slow as to allow a cessation of one image before the next were presented we would have only been aware of a succession of different pictures.

In speaking of the sound waves proceeding from a sounding body of a particular surface or to a particular point, either by a direct or indirect path, it is often called a "sound ray" or simply a "sound." It should be understood that this is a purely ideal term and that nothing of the kind actually exists.

Origin and Progress of Sound

Although not strictly true, we may, for convenience, assume that sound proceeds from a source of sound (considered as a point) as the surface of a constantly enlarging sphere. The surface of this sphere is made up of the air through which it passes and consists simply of a variable series of strata of air either more or less dense than the surrounding and surrounding air of the sphere. A plane section of this sphere is well illustrated by the dropping of a pebble into a quiet pool of water; the circular wave which is produced shows by its elevated part the water which is more dense than that inside or outside the circle, while the depressed part of the wave shows the position of the water which is less dense than that either inside or outside the circle.

This wave circle proceeds from the center of disturbance with a certain radial velocity, but the water itself has no such radial motion. Each drop of water has been raised above the surface during compression and has dropped below the surface when the pressure was relieved; it has therefore moved only in a vertical path and not along a radius of the wave circle.

Sound waves proceed in a very similar manner, without actually moving the air through which they pass and of which they are made up; there is no radial motion and therefore no such thing as a sound ray. However, if we wish to designate a particular part of the surface of a sphere whose center is fixed, we may best do so by designating the radius of the sphere to that point, and this is what is meant when we speak of the "sound ray" or simply a sound.

Since in architectural acoustics we are dealing with surfaces, rather than with points and since a radius might be drawn to each and every point in a surface, the element or unit with which we deal is a conical prism or a cone of rays whose base is the surface under consideration and whose volume is made up of the rays conceived to be drawn from every point in the surface to the common center. This cone of rays may be shown or at least designated, on a drawing by drawing its axis, or that ray which terminates in the center of gravity (or strictly the centeroid) or the base. In speaking of a sound we should conceive of such a cone of rays, and in speaking of a "sound ray" we usually mean the axis of such a cone.

Absorption and Reflection

When a sound is thrown against a surface, it is partially absorbed and partially reflected according to the nature of the surface. If the surface is such as to entangle the sound waves its temperature is raised; that is, it transforms sound energy into heat energy, and it is said to be an absorbent surface; if a surface offers little opportunity for the entanglement of sound waves they are reflected and the surface is said to be non-absorbent. No known substances possess either the property of total absorption or total reflection; but each has a definite absorbing value per unit of surface; the open air is the most absorbent medium known, and therefore one square foot of an opening in a ceiling or top of a tight room has been chosen as an absorption unit. The specific absorption per square foot of all materials is expressed decimally as compared with one absorption unit; thick walls of polished stone have the most reflective surfaces known, and the most absorbent surface is that of a wall built up of layers of felt separated by dead air spaces of from two to six inches. The depth of these air spaces have a particular and definite relation to the pitch of the sound to be absorbed.

Sound is reflected from every surface upon which it is thrown in an inverse proportion to the specific absorbing value of the material of the surface. If a sound were thrown upon a surface having a specific absorption of .02 it would be reflected with a diminished intensity equal to 100—(100×.02) or 98% of its original intensity, if reflected again from a similar surface .02 or 98% is absorbed, and the intensity of the reflected sound is .9604 of the original and so on. In this way a sound may suffer over two hundred impacts upon a highly reflecting surface before it is reduced to inaudibility from absorption alone.

The law governing the reflection of sound is identical with that of heat or light or any other form of energy, namely, that "the angle of incidence is equal to the angle of reflection." Whatever can be accomplished with light in the way of reflections, the direction or focusing of rays, may also be done with sound, and by the same instruments. It will be noticed, therefore, that in the reflecting of a cone of rays from a plane surface that the degree of divergence, that is, the angle between the axis and the elements, is maintained constant throughout the reflected path regardless of the number of impacts. This very important point should be constantly borne in mind in the consideration of diagrams representing only the axes of cones because it explains how a very small surface receiving the initial impact may effect an entire auditorium and also enable us to analyze the phenomena of reverberation.

The Echo

The word "echo" is rather loosely used to designate a reflected sound.

A true echo is rarely distinguishable within a room for the reason that it is usually "interfered" with by the overlapping of numerous lesser echoes and is blurred into a condition known by another name and more fully described under reverberation. However, the fact that an interior echo is rarely distinguishable does not mean that it may be neglected in the analysis of the problem of architectural acoustics; on the contrary, it might be considered as the primary element with which we deal in considering most other difficulties and a complete understanding of interference and reverberation depends entirely upon the understanding of the echo and all the accompanying conditions of the phenomena.

The true echo occurs in the open air in the neighborhood of shear cliffs of the walls of buildings. A simple direct echo is one in which the speaker may hear his own voice thrown back to him after a single reflection. A simple indirect echo is one in which the voice of the speaker after a single reflection is heard not by himself by a listener situated at some distance from him. The path of sound in this case makes an angle at the reflecting surface of less than 180 degrees and greater than the angle of divergence of the cone whose base is the reflecting surface. A multiple echo is one in which the sound comes in contact with more than one reflecting surface before it is thrown to the listener. It may be either direct or indirect according as to whether or not the speaker is able to hear the reflection of his own voice. Two or more simple echoes may be heard from separate reflecting surfaces either simultaneously or in succession. Such an echo might be called a compound echo and it is obvious that it might be either direct or indirect. Two or more multiple echoes may in the same way be compounded either simultaneously or successfully and may be direct or indirect according to whether or not they are audible to the speaker.

The Single Echo

Let us now consider the conditions of a single echo, the element into which all others may be resolved and for convenience let us consider it as direct. From our law of reflection, we see that in order to enable the speaker to hear a simple reflection of his own voice he must be located on a line which is perpendicular to the planes of the reflecting surface; further, he must be at such a distance from the reflecting surface as to allow the subsidence of the original sensation in his ear before the reflected sound has time to reach him. The period of duration of sensation in the human ear is about one-fifteenth of a second and during this time a sound wave, which advances at the rate of about eleven hundred feet per second, has traveled a distance of approximately 72 feet. Since the sound travels the same path twice and in opposite directions it is evident that the shortest distance from the speaker to the reflector for the production of an echo would be 72/2 feet, or 36 feet. Such an echo would be very short and quick and for that reason barely perceptible, although of ample intensity. As the distance is increased the echo becomes more distinctly separated from the original sound and a greater number of syllables will be repeated by it; the intensity, however, is diminished by the principle of the divergency of the cone.

This echo has been considered as existing in the open air for the reason that we wished to consider only that part of the total sound sphere included in the cone of rays which had the reflecting surface for its base. The remainder of the sound sphere in this case has passed away or been converted into heat by doing work on whatever came in its path. Had we chosen to consider instead of a simple direct echo one of a more complex nature, for instance a successive, compound, multiple, direct echo, we would have been obliged to deal with more than one cone of rays, each cone would have suffered more than one reflection and the paths traveled by each cone would have been varied in length. This would lead to a very complicated problem even out of doors where that part of the sound sphere not attended to would be dissipated by the atmosphere; conceiving these conditions as existing within a room we would be overwhelmed by the complication, for in this case we would be compelled to deal with the total surface of the sphere. That is, as the sound sphere swelled outward from the speaker in every direction it would come in contact with every window, moulding, pilaster and cornice of the several walls, with every chair, piece of furniture and fixture on the floor, and every beam and modification of surface of the ceiling. Each of these objects would in its several parts present different planes of reflection at all different angles, and each of these surfaces would become the base of a cone of rays. Each one of this almost infinite number of cones continue as we have seen to diverge as multiple reflections goes on and each is consequently broken up infinitely at each successive impact. We have seen that a single sound may be reflected as many as 200 times before it is reduced to inaudibility, so that what appeared as a successive compound echo out of doors becomes in a room a condition so complicated as to defy conception. The number of cones is infinite, the number of times each diverging cone is broken up approaches infinity, the variety in the length of path traveled is infinite, and the only approximate known quantity we have is the number of reflections which is probably less than 200.

Reverberation

In this condition, known as reverberation, the sound energy permeates every corner and part of the room so completely that Professor Sabine found by experiment that reverberation was reduced by absorbent materials in the room regardless of their location. While this statement has never been disputed it has led to some very erroneous ideas regarding the correct placing of absorbing material among those who have not considered the fact that reverberation originates in a condition possessing either part or all of the qualities of an echo. If we consider as simultaneous any two sounds which reach the ear within the same one-fifteenth or a second, we may say that simultaneous sounds mutually reinforce each other. In this way either an echo or a reverberation may be very desirable, or in a large room, even indispensable. It is evident, therefore, that the utmost care should be exercised in sorting the first reflections of echo conditions, killing off by absorption those which would otherwise develop into objectionable reverberations and preserving to the last degree all those that can be classed as simultaneous.

The term interference seems to have been very loosely applied to two distinct phenomena. Strictly speaking, it refers to a headon collision of two sounds of equal wave length which having equal momentum completely neutralize and destroy each other. This condition is not met with to my knowledge in architectural acoustics and since sounds of different wave lengths pass freely through each other we have little to do, as far as we know now, with interference in its strictest sense.

The interference which concerns us is the imposition of the echo of a preceding sound upon the sound which should properly be heard at the instant. This condition obtains at a point in an audience which receives either a simple or multiple echo whose path exceeds by 72 feet that of the direct path to the speaker. The reason for the limit of 72 feet has been discussed in its relation to the velocity of sound, and a reference to the successive compound echo will make clear the condition of the overlapping of sounds sometimes known as interference.

Resonance

As a physical phenomenon, resonance is fairly well understood but in the as yet undeveloped science of architectural acoustics it has been given little attention by scientific men. Musicians and intuitive writers on the subject often give to resonance the most important position in their discussions and attribute to its presence or absence all good or bad acoustic conditions. This is easily explained by the fact that the scientific man has never traced the cause of a defective room to either the presence or absence of resonance and as most of his investigations have been in the nature of corrections, he has given the matter little time and attention; on the other hand every musical instrument used by man depends upon resonance for the quality and intensity of its tone and the users of such instruments have in an intuitive way conceived the room in which they play to be an accessory to their instruments. There is little doubt but that a scientific relation actually exists but as yet it is little understood.

Resonance is the effect of "sympathetic vibrations." It is that quality possessed by a body (surface, material, volume or mass) of first absorbing and then emitting sound energy. The absorption in this case should not be confused with the absorption wherein the form of energy is changed to heat. In the present case the absorption is purely mechanical and depends upon the elasticity of the absorbing body and the resistance it offers to the initial sound wave. As a homely illustration let us consider a mason's hod supported on a crotched board in position to be filled with mortar; let us suppose that the crotched board were rigidly secured at the ground, but had no braces or other support, and that the board were unusually long and flexible. If now the hod carrier should throw a shovel full of mortar into the hod from a distance the hod and board would be swung violently backward, the elasticity of the board would bring it forward again, and a vibration to and fro would be set up which at each forward swing would throw off a few drops of mortar: this action would be kept up until the hod were emptied or the energy imparted to it by the initial impact had been expended. In a similar manner when a sound wave strikes a resonating body the sound energy is transformed into motion, and that motion produces sound energy.

The physical principle is that of the "reversal of cause and effect." In the first instance, the throwing of mortar into the hod caused a motion which effected the throwing of the mortar out of the hod; in the second instance the energy of the sound wave caused the vibration of the resonating body, and the vibration of that body effected the emission of sound waves.

Rate of Vibration

Every body possesses a definite rate of vibration according to its mass, tension or elasticity and dimensions, just as the string of a musical instrument possesses a definite rate of vibration according to its tension, size and length. This period of vibration represents for each body a state of stable equilibrium, and the body is sensitive to the slightest impulse to vibrate when acted upon by an influence of its own period, but is insensitive to impulses of any other period. This susceptibility of a body to be thrown into vibration by the action of a body with which it "is in tune" is the sympathetic vibration referred to in the above definition.

It will be seen that every pew back or seat, every wood panel, every board and beam in the ceiling, the plaster on the wall, and the columns of air between the studs of a room is possessed of a definite period of vibration. If it happens that a sound is produced in the room having a period of vibration corresponding to a particular wood panel, that wood panel is set in sympathetic vibration and emits its tone until it has consumed the energy given to it by the original impact.

Since the sound emitted by a resonant body is an inarticulate tone its effect in overlapping or interfering with spoken words is not detrimental but adds "quality" to the speaker's voice. This quality while desirable is by no means indispensable to a good room for speaking. It is, however, highly desirable for music, but in this case it may be replaced insofar as we know by reverberation, for since music consists of inarticulate tones and since its reverberation must also be inarticulate there seems to be no real difference between reverberation and resonated tone.

Subject of Acoustics Is Broad

As a discussion of the fundamental principles of acoustics this brings us to a logical stopping point, bearing in mind, however, that the foregoing is the briefest statement consistent with clearness. The subject is in reality a broad one, and only a starting has as yet been made upon it in a scientific way. Professor Sabine has spent twenty years in his experiments and has outlined enough more to occupy twenty more men for the same length of time, and perhaps even then we would only be the wiser of our deficiencies.

The practical application of these principles to architecture is well covered in a series of articles by Hugh Tallant in the Brickbuilder of 1910.

These articles are scientific and sufficiently accurate in all details to warrant their implicit acceptance, but, as will be realized as one works further into the subject, each room is a problem in itself, and broad general statements and rules of procedure are dangerous and misleading.

Perhaps the most that can safely be said on this part of the problem is that in general we should first provide a sufficiency of sound by properly directing it into the audience. When such direction is accomplished by artificial reflection it should be by the shortest possible path, and whenever a reflected ray exceeds a direct ray to the same listener by more than 72 feet it should be eliminated. In the same way all rays which might otherwise wander at will through the room should be arrested at the earliest opportunity.

* * *

A Modern Terminal Railroad Station

THE new $2,000,000 Great Northern Railway Station in Minneapolis, Minnesota, which was opened for service early this year, is the final word in modern terminal railway construction. It stands on the river front, facing Hennepin avenue. The station is built according to the following general arrangement:

Main building with entrance on street level; waiting room, 62x155 feet and concourse 252x50 feet, on street level, with stairways and elevators leading to train platforms.

Twelve through tracks served by six platforms with "butterfly" type train sheds.

Overhead trucking gallery for handling baggage, mail and express, with elevators leading to all platforms at far end of station, so that baggage trucks are never in the way of passengers. These baggage trucks are driven by electric power, and they are rubber tired, which will make the handling of baggage almost noiseless.

Mail and express building on site of old station (across street from station), the two connected by trucking galleries. This makes a terminal a quarter of a mile in length, the tracks extending under Hennepin avenue.

Power house at north end of the station yard and connected to the main buildings by an overhead "pipe gallery."

The mail and express building is now being built on the site of the old station, razing of which was begun the moment the new station went into service. This new building will be 300 feet in length, facing on High street and Hennepin avenue.

Six roads use the new Great Northern station: The Great Northern, Northern Pacific, Great Western, Chicago, Burlington & Quincy, Chicago & Northwestern and the Chicago, Minneapolis, St. Paul & Omaha.

The exterior of the new station is of tooled Kettle river sandstone from the quarries in Sandstone, Minn. The trucking galleries and stairs to the train platforms are of reinforced concrete. The power house and stack exterior are of brick. The only wood used in construction is in the doors and narrow casings. Entrance and inner vestibule floors are of art marble tile. The walls are wainscoted with Tennessee marble. The door frames and booths around the waiting room are of ornamental

THE NEW GREAT NORTHERN RAILWAY STATION, MINNEAPOLIS, MINN.

cast iron. The women's retiring room has an art marble floor, with wainscoting of mottled gray Vermont marble. The smoking room has De Smet marble cement floor tile, with Tennessee marble wainscoting, and the dining room (on second floor) has a marble tile floor and Vermont marble wainscoting. On the second floor are the offices of the chief train dispatcher, his assistants, division superintendent and station officials. The third floor is to be used for storage purposes.

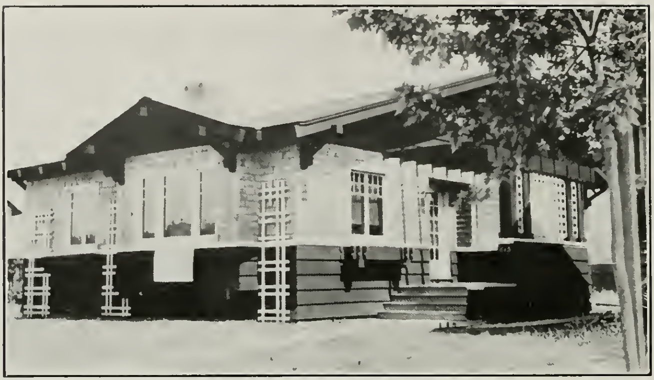
A novelty in the new Great Northern station is the ventilation of the big building. Water-washed air is poured into the waiting room by means of enormous fans, while at the same time the vitiated air is removed by exhaust fans, and the temperature is kept even. During the summer the air will be cooled to a refreshing temperature by ice and pumped into the station at the rate of 35,000 feet a minute.

The main waiting room and train concourse are lighted by large ornamental chandeliers with tungsten units. In the new depot Minneapolis people are given their first sight of recessed lights at the base of all stairway landings, minimizing mis-steps in going down these stairways.

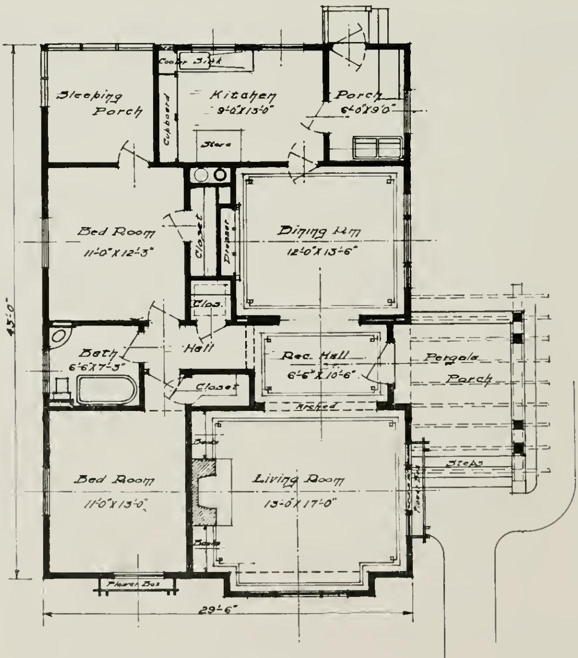
The electrical equipment of this new Great Northern station is the finest in the northwest, as well as the most expensive. More than eleven miles of galvanized iron conduit was used, and more than 25 miles of rubber-covered wire. All of the wire used in this installation is of a quality better than the standard adopted by the National Board of Underwriters, the insulation being 30% pure para rubber.

More than 500 switches are used for controlling the various lighting circuits, in addition to which there are a number of remote control switches for controlling groups of lights from various remote locations in the station. All of the remote control points have small lamps back of a bullseye lense to indicate if the lights located at a remote point are burning or are cut off.

The power house, for furnishing the light, heat and power to the station, is located approximately 1,000 feet north of the building, the wires for supplying light and power and the steam for operating pumps and for heating purposes being carried through an aerial passageway connecting the two buildings.



A CALIFORNIA BUNGALOW
Ernest L. Norberg, Architect



FIRST FLOOR PLAN

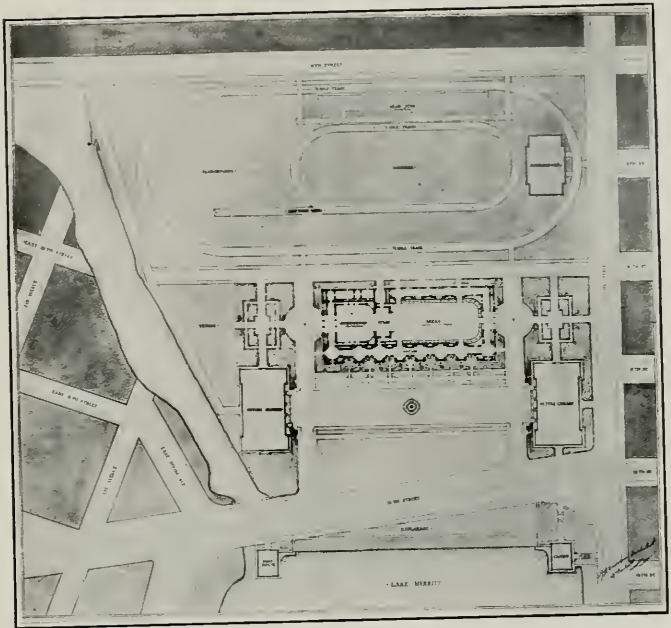


Fig. 1.—GENERAL PLAN OF OAKLAND AUDITORIUM, SHOWING DEVELOPMENT OF CIVIC CENTER
J. J. Donovan, Supervising Architect

Municipal Auditorium for the City of Oakland

By O. P. SHELLEY, Assoc. Mem. Am. Soc. C. E.

THE controversy over Oakland's new Auditorium, which has been waged back and forth in the press and elsewhere, has rather tended to obscure the really comprehensive character of the general plans for the development of Oakland's Civic Center and the dignified completeness of the Auditorium itself. It is not within the province of this article to enter into this controversy, but the facts as to the Auditorium itself have been so distorted that a few words regarding the building since its inception will lead to a clearer understanding of the structure itself.

Early in 1912 the City of Oakland first felt the imperative need of a public Auditorium, and bonds to the extent of $500,000 were voted for this purpose, J. J. Donovan, supervising architect for the City of Oakland, being directed to design the structure. The original scheme called primarily for a convention hall which would have satisfied the present requirements, but it soon became apparent that a general plan for Oakland's Civic Center must be adopted, and that the convention hall then in mind would not meet the needs of the Oakland of the future with its assured growth,

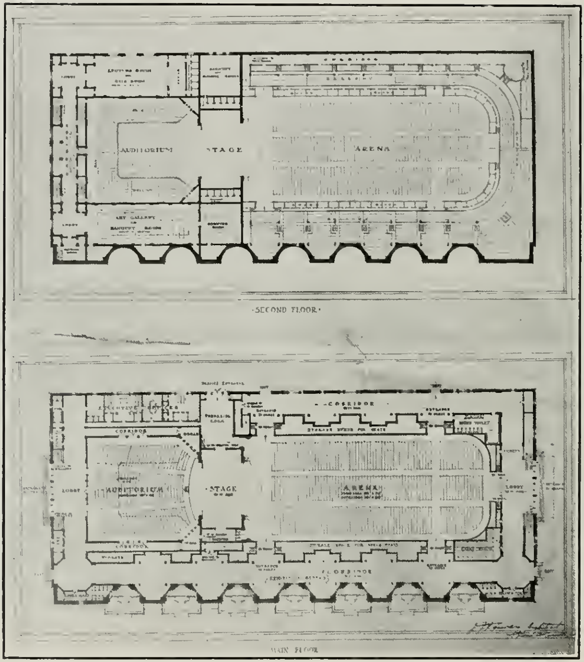


Fig. 2.—FIRST AND SECOND FLOOR PLANS, OAKLAND AUDITORIUM

due to the Panama Canal and the extensive plans for the development of her own harbor.

Improvement Clubs and Civic Organizations came to the front with demands for an adequate structure and resulted in the final design of a monumental building of the highest type, containing an Arena or Convention Hall to seat 10,000 people, a complete Theater to seat 3,000, and also containing a Ballroom 39 by 81 feet, an Art Gallery 39 by 110 feet, reception rooms, etc., in addition to all the service and other rooms which would usually accompany an Arena and Theater.

It was only to be expected that the finished cost of this large structure would overrun the original bond issue, and failure to understand the above reasons led to much unjust criticism regarding the building itself. It is noteworthy and only fair to mention that both Thomas Cox, a Consulting Engineer appointed to report on the Auditorium by the Tax Association of Alameda County, and later, Walter J. Matthews, a well-known Architect appointed by the City of Oakland as supervisor of actual construction, reported that the structural design could not be improved on, while to cheapen the architectural features would render the Auditorium out of keeping with the dignity of a city the size of Oakland.

Fig. 4.—FRONT ELEVATION, OAKLAND AUDITORIUM

Fig. 3.—PERSPECTIVE VIEW, NORTH ELEVATION, OAKLAND AUDITORIUM

It is noteworthy that Mr. Donovan called in to collaborate with him on the design of the Civic Center and the Auditorium itself an Architect of national reputation, Henry Hornbostel of New York City, who won recognition as a member of the firm of Palmer & Hornbostel, the successful Architects in the national competition for the design of Oakland's new City Hall. For the structural design Maurice C. Couchot was selected as Consulting Engineer. Mr. Couchot has been Consulting Engineer for most of the school buildings that have been erected in Oakland, including the group of buildings for the Polytechnic High School, which forms possibly the finest Polytechnic High School in the West, this also being erected under the design and supervision of Mr. Donovan. In passing it may be stated that Mr. Couchot was also selected as consulting structural engineer on the Fine Arts building, the only fireproof structure being erected at the Panama-Pacific Exposition. The heating, ventilating, electrical work, etc., for the Auditorium was turned over for design to Mr. Hudson of Hunter & Hudson, mechanical engineers, and Romaine Meyers, electrical engineer of Oakland. Messrs. Hunter & Hudson are well known as the engineers of the mechanical equipment of the Palace Hotel in San Francisco. Only recently they were selected by Architect Charles Peter Weeks as Consulting Engineers for the heating and ventilating equipment of the million dollar Infirmary in Alameda County.

What will be Oakland's Civic Center in the future is situated in Peralta Park, which is that part of Lake Merritt lying south of Twelfth street, and which was "filled in" some years ago. The arrangement of this Civic Center will be very clearly seen from the accompanying Fig. 1, in which the Auditorium is shown overlooking Lake Merritt toward the north and flanked on the east side by the future Museum and on the west by the future Library, while to the rear lies the Playground and Athletic Field. The plan calls for adequate parking space to develop the architectural features of the buildings to the utmost; in fact, the three buildings will be visible from the lake shore for several miles. This plan properly links Lake Merritt as forming a part of the Civic Center, for on the shore to the north of the Auditorium at the head of Thirteenth street (though not shown in Fig. No. 1) is already located the Municipal Signal and Fire Alarm Station, while still further along the lake shore is located the Pumping Station and the new Municipal Boat House, which latter has just been finished, the boulevard around the lake shores tending to unify the whole scheme.

The Auditorium itself is 400 feet long by 200 feet wide, and, as we have mentioned, is divided into two separate parts containing an Arena 180 feet wide by 265 feet in length over all; the Arena floor dimensions being about 100 feet long by 225 feet, this room having a seating capacity of 10,000 people. The other end of the Auditorium is taken up by the Theater, which, as we have mentioned, will seat 3,000 people and is about 100 feet square, Fig. 2 showing the floor plans very clearly. A decidedly novel feature of the Auditorium is the use of a common stage for both the Arena and the Theater, making it possible to use this stage for either hall as desired; or in fact the stage could be lowered and the two halls thrown into one immense convention hall. Another feature is the extremely liberal use of skylights over the Arena, turning this vast room almost into an open-air amphitheater.

The entire exterior of the Auditorium lends itself toward dignity and simplicity; this being apparent not only in Fig. 3, showing the prospective view of the north elevation, but also in the elevation (Fig. 4), showing the Auditorium in conjunction with the future Library and Museum. The chief

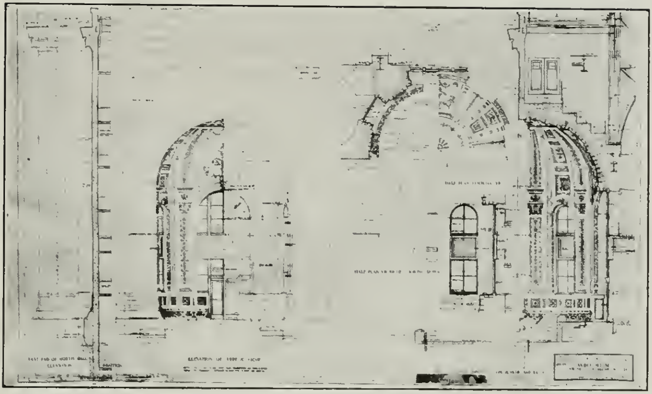


Fig. 5.—DETAILS OF NICHES, OAKLAND AUDITORIUM

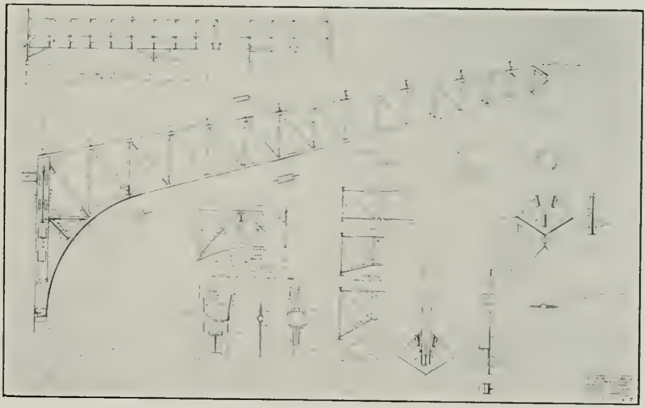


Fig. 7.—STEEL DETAILS, OAKLAND AUDITORIUM
M. C. Couchot, C. E.

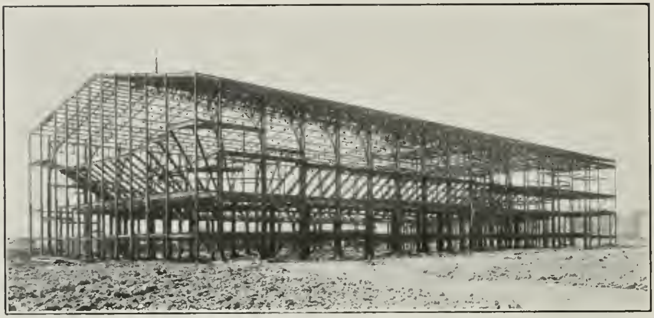


Fig. 6.—STEEL FRAME, OAKLAND AUDITORIUM
Fabricated and Erected by Dyer Bros.

Fig. 8.—A CLOSE VIEW OF STRUCTURAL STEEL WORK

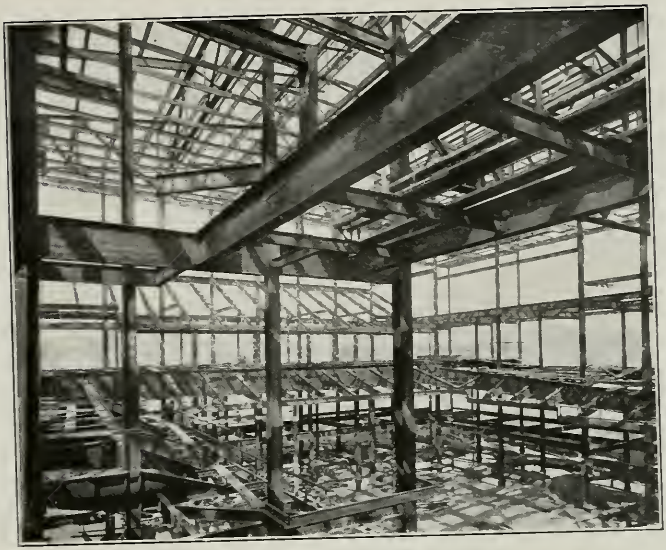


FIG. —SHOWING STRUCTURAL STEEL WORK

architectural features of the elevation of the Auditorium are the niches, the fine character of these being clearly shown in Fig. 5, giving the details of this design.

The massive character of the building is perhaps nowhere better shown than in Fig. 6, which illustrates the steel frame after erection. In the Arena the steel framing is of especial importance, as, of course, it is left exposed as regards the main trusses, and Fig. 7 shows the pleasing outlines of the "three-hinged" trusses and the accompanying steel details developed by Mr. Couchot. It is notable that these trusses do not give the heavy, cumbersome appearance usually associated with long-span trusses of this character. The cantilever balconies of both the Arena and the Theater are also of interest and are shown in Figs. 8 and 9, these giving a very positive idea of the main layout of the two parts of the building. It will be readily noted in Fig. 8 that the first floor of the arena is at some distance above the ground, the concrete piers for the floor columns already being shown in the picture. The light appearance of the steel work in purlins, trusses and columns over both the arena and the theater is largely helped by the use of a thin "Self-Sentering" roof. This, while saving in the first cost and giving more than the requisite strength required, cuts down very largely on the dead load, and therefore lightens the steel work appreciably. This lightening of the structural steel frame, through the use of a "Self-Sentering" roof, is one which could be adopted with advantage by many engineers.

Another novel feature which Mr. Donovan has worked out for the Auditorium is the entire absence of stairways, easy inclined planes being used throughout and affording very easy access to all parts of the structure.

These, while more massive and taking more room than stairways, will certainly be appreciated, especially by the women; for to climb the tortuous steps of the average theater or hall is certainly wearisome in the extreme.

The foundations for the Auditorium were put in by the Foster & Vogt Company of San Francisco, while the steel frame was furnished and erected by Dyer Bros. Christenson Bros. of Oakland have just started work on the fireproofing contract, having been awarded this on their bid of $196,360, and it is interesting to note that there was only a few hundred dollars difference between their bid and that of the second lowest bidder. Bids are now being called for the stone work for the exterior walls, and it is planned to rush the building towards completion to be ready for the conventions which are coming to Oakland in 1915.

*

* *

A Subway Scheme to Relieve Traffic Congestion

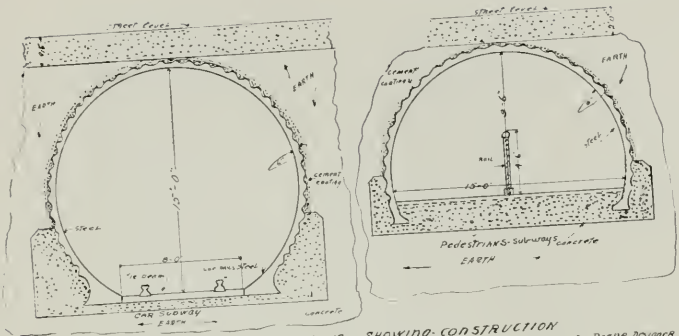
MR. GUY QUINTIN DOANE of 1827½ Addison street, Berkeley, has developed a rather unique and in many respects practical plan for relieving the traffic congestion at the foot of Market street, San Francisco. The accompanying design has been worked out with the idea of making the structure permanent, yet economical to build. The erection of unsightly additions to the present Ferry building will not be necessary if Mr. Doane's plan is followed. There are four pedestrians' subways and one car subway, the latter eight feet in the clear, which allows three feet on either side of the standard width car track. The subway walls are to be of solid concrete construction.

Describing his plans, Mr. Doane writes:

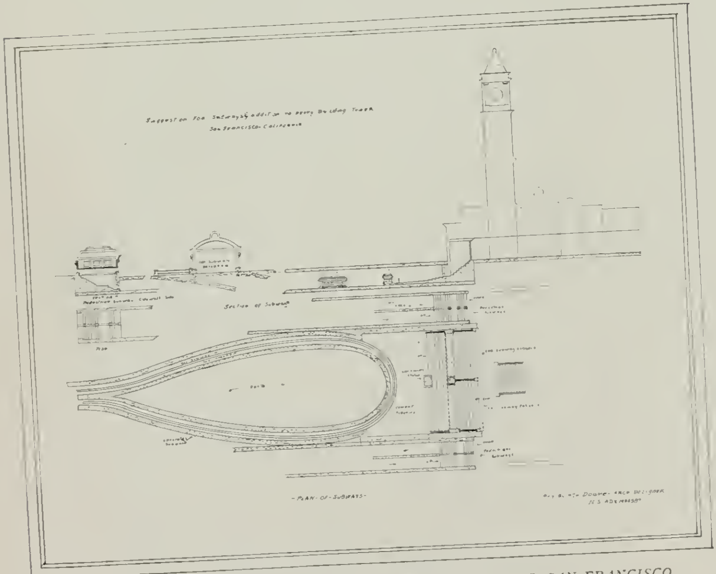
"The pedestrians' subway entrances at the Ferry building are nine feet six inches high and fifteen feet wide, allowing a six-inch railing in the middle, sub-dividing the fifteen feet into two companionways, one for going and one for coming, as shown in the cross section. The height from the floor of these subways to the street level is eleven feet six inches, allowing two feet for the thickness of the street bed. The use of four subways for the pedestrians, two on either side, affords advantages as to traffic congestions that would not be possible with only one subway. The convenience and practicability of the plan are apparent when one considers that there are four bodies of people, two on either side, going in opposite directions almost continuously. People going and coming from the eastern side of the bay will use the east side subways, while those residing in San Rafael and other Marin county towns will take the south subway. The entrances to the pedestrians' subway, running out to the sidewalk ends, are to be housed in a pavilion constructed at the ends of the sidewalk proper, allowing eight feet of the sidewalk and enough more of the street to give the required depth needed for the drop of eleven feet six inches to the subway floor below.

"The car subway requires a greater depth than do the pedestrian subways, being fifteen feet high. The entrance at the Ferry building, therefore, is carried down fifteen steps to the car subway levels.

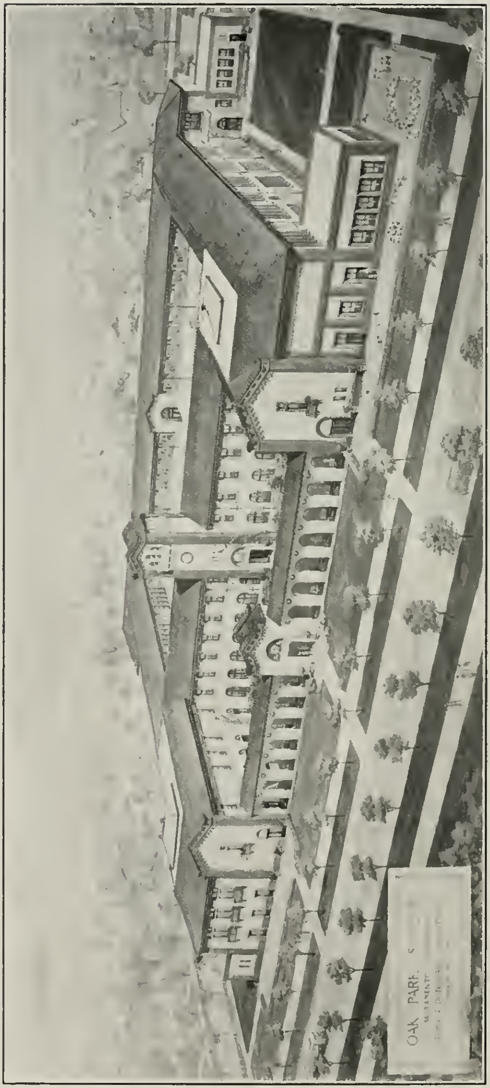
"In regard to the material to be used, the construction need not be wholly of concrete. The frame of the arch could be of structural sheet iron with a concrete base and buttresses to receive the stress of the arch."



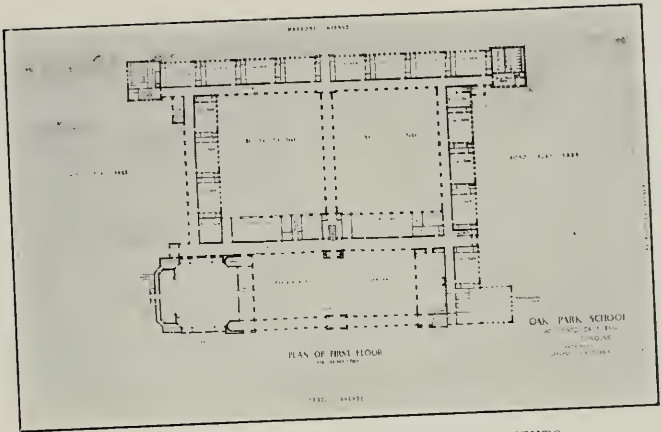
CROSS-SECTION-OF-SUBWAYS – SHOWING-CONSTRUCTION
Guy Quintin Doane Designer.



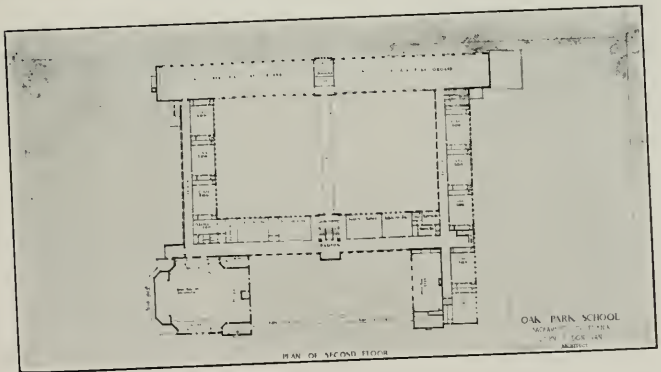
SUGGESTION FOR SUBWAY AT FOOT OF MARKET STREET, SAN FRANCISCO
Guy Quintin Doane, Designer



ACCEPTED DESIGN FOR OAK PARK SCHOOL BUILDING, SACRAMENTO, CAL.
JOHN J. DONOVAN, ARCHITECT



FIRST FLOOR PLAN, OAK PARK SCHOOL, SACRAMENTO
John J. Donovan, Architect



SECOND FLOOR PLAN, OAK PARK SCHOOL, SACRAMENTO
John J. Donovan, Architect

The Oak Park Grammar School, Sacramento

PLANS by Architect John J. Donovan of Oakland have been accepted and contracts will soon be awarded for the construction of the Oak Park grammar school in Sacramento. This structure, when completed, will be a splendid example of the school building whose class rooms can be converted into open-air rooms because the corridors are arcades and the class rooms have transoms opening into these arcades.

It will be noticed from the plan that the experimental gardens are in the fore-court and the smaller boys' and girls' play grounds are in the interior court, divided by an arcade. The larger boys' playground is to the east and the larger girls' playground is to the west of the building.

The orientation of this school is particularly well adapted for the climate of Sacramento. The windows of the rooms face the north and east, the corridors opening onto the south and west.

A very important feature is the two open-air play grounds, or play spaces, on the second floor towards the north. These play spaces will extend the entire length of the building and are 35x162 feet in area. They will be entirely open towards the north, with windows on the south, which are to be closed only during rainy weather. These play grounds will be well illuminated so that they may be used freely at night under the jurisdiction and control of the playground department of the city.

The building is 272x396 feet, which includes courts and experimental gardens and arcades. The architecture of the building is of the Italian type and will be constructed of reinforced concrete. The exterior will be trimmed with brick, concrete panels and a red mission tile roof.

As regards the open-air class room feature, the windows occupy five-sixths of the lighting wall space and extend from two feet above the floor to the ceiling. Each window will be divided into thirds, and a type of window will be used which can open horizontally, thus having the entire room open on the lighting side. In conjunction with this will be the transoms on the opposite side of the room, thus making each class room as nearly open-air as possible without abandoning windows.

A feature which the Board of Education of Sacramento has adopted is that of having two wardrobes to each class room, one for boys and one for girls. The girls' is at the rear and the boys' at the front of the room, and in each wardrobe is a watercloset and lavatory. This has been thought out by the Board of Education and adopted by them after very careful consideration on their part.

The experiment gardens are intended to be not only flower gardens, but gardens where the children can be taught botany and the history and growth of plants and flowers.

It is interesting to note the paved terrace around the entrance to the library and enclosing the kindergarten so that the kindergarten children have a playground entirely their own and separated from the larger children. This paved terrace will be enclosed with a hedge for further protection to the little ones.

The building will be electrically equipped so that evening classes may be held.

The heating and ventilating system will be the dual system—direct heat from the radiators under the windows, and the indirect, heated air forced into the rooms.

The plumbing will be of vitreous china for the fixtures, each fixture vented into a utility chamber.

The Thrall of the Axis!

By F. W. FITZPATRICK

NOWHERE does the average and, indeed, even many of the exceptionally brilliant in our profession show the almost exclusively academic, theoretic and altogether impractical training we receive than in our abject subjection to the thrall of the axis, the paper attractiveness of our projects, the unyielding insistence we place upon an imaginary, a drawn "balance" that in reality generally means absolutely nothing.

This was particularly impressed upon me by the plans recently submitted to me for a great city by a great architect. The what I call "fatal defects" in his plan, however, obtain in pretty nearly everything that has been devised in the line of city betterments, civic centers and such projects in recent years, beginning with the Art Commission's plan of reformed Washington ten years ago.

In these plans I have before me the "balance" is carried to a ridiculous extreme. Of course there is a central avenue, a monumental affair, an axis. Well over on one side of that axis is an athletic field and gymnasium for men. The natural and reasonable thing to have done would have been to make a larger gymnasium and used it for men and women, some rooms and apparatus and the field in common or on alternate days, and all under one executive management. But no! That would not have balanced on the "Axis," so, equally distant from that axis, on the other side, is planned a similar field and building for the women, a mile away from the men, a senseless duplication of halls and apparatus and stadium, and all just to preserve a fictitious balance that would never be appreciated or even perceived save on paper or possibly dimly so from an aeroplane traveling very low and very slowly.

In another city recently revamped, a "Civic Center" affair, there was planned a central axis, an avenue starting from a central, civic building. To the left, from the same radius, branched off a diagonal street of some importance. The architect wanted a balancing street to the right. At little cost and trouble one could have been arranged by using existing streets, alleys and short sections of private property, but such a street would have been at a slightly different angle than that to the left. Only on paper would that have been noticed, and the reasons perfectly evident, and besides, any practical man would have applauded the architect for his ingeniousness in preserving an apparent balance under adverse conditions. Do you suppose he did it? No; his plan proposes such a street exactly the same reverse angle as that of its left, and cut through private property its entire length, which will cost hundreds of thousands of dollars; and why, just to satisfy the architect's senseless, purely theoretic longing for a pretty paper arrangement. It's sinful, wasteful and calculated but to increase the contempt already too often expressed and always felt by the business, practical men of affairs for our utter disregard for the cost (to others) of our hobbies and whims.

And we carry the same absurd relics of our faulty schooling into our lesser endeavors than city-planning. If we design a library or other more or less monumental building the whole thing must be abjectly subservient to the most exacting of masters, the great Axis. We establish that sacred and imaginary line. Then plan-exigencies decree that on the right of it we have a monumental stairway. Immediately we slap another stairway, to balance it, on the left. No matter if that stairway serves no practical purpose, or if it would be infinitely more useful in some other part of the building, it must go right there, nowhere else; the beauty and even balance of the plan must be sacredly preserved. If we plan a lot of rooms one side of a corridor and the purposes of the building make a row of shorter rooms on the other side desirable we'll tear our shirts and spend many simoleons of our client's money to keep those rooms exactly the same depth each side of the fetish axis of that corridor. What matters the practical requirements of the building or the fact that no one will ever notice the difference unless he sees the plan? The aeroplane possibility is nil owing to the intervention of the roof. So it must be to preserve the inviolability of the sanctified axis on the plans in his store room that the architect will resort to such trouble and expense in the pursuit of that perfect symmetry that passeth our understanding!

Why, I'm amazed that the ultra-altruistic, the real Beaux-Arts product should let the unbalanced door knob or bell button get by him. I fully expect to see, ere long, a door knob on either hand of the central axis of the door, a bell button on either jamb of the door and face butts on both edges to preserve the perfect balance, the symmetry so dear to our artistic souls.

Are there none among us who are brave enough to get from under the thrall of the axis? Must our schools always dally with theories and frills and instill nothing but the purely academic flub-dub into our young? No, I am not clamoring for an inartistic solution of our practical problems, but I do vociferously pray and beseech my fellows to throw away their fetiches, break up their golden calf and false gods, the Axis, the Great Temple, the Antique, the abject worship of All that Has Been. We have new problems—the ancients never dreamed of them and our teachers got but little of them—we have new materials, we have novel and complex conditions to cope with, commercial, domestic, religious; let us face them like men; let us give the client what he really needs (not merely what will please our eye on paper), what will produce the very best results in facilitating his business operations, or in producing the greatest profit. Doing that we will prove our claim to efficiency. Then let us build well and sanely and proceed to decorate the simple and truthful structure in a dignified, consistent and really artistic manner. Then, and then only, will we be real architects and will have graduated from the class of mere copyists of antiquity, jumblers of our problems, hack workmen, worshippers of the frayed-out theories and of the overworked axis.

A Symposium on Heating and Ventilation and Some Mechanical Errors of Installation*

By THOMAS MORRIN, M. E.

THERE is, perhaps, no branch of engineering which comes within the scope of the architect's responsibilities that has been so much abused, hampered and trifled with as that of heating in its various forms of radiation, ventilation and domestic hot water; at the same time there is none that is so simple and assured of satisfactory results as this particular portion of a structure when properly designed and installed. There is absolutely no mystery, superstition or difficulty about the whole problem if one would consider for a moment the natural laws of gravity and the effect of heat.

Heat or heat losses are the cause of action in all heat radiating apparatus, be the medium steam, water or air. If this heat action is combated or thwarted by an apparatus that is designed contrary to, or preventing the natural effect of the laws of gravitation, without the assistance of some mechanical device to overcome this defect, there will be trouble, and unsatisfactory results will occur.

You will hear people, who are not correctly informed in these principles, talk of forcing the circulation of hot water or air in this way or that way; such remarks, belief and suggestions are ridiculously wrong. There is no such thing as forcing the circulation of any of these elements, in any direction, in a piping system that is arranged contrary to the laws of gravity unless, as I said before, it is assisted by some mechanical device in the way of a pump, fan, air, steam or water blast, or similar arrangement that will have to be maintained by power, especially brought in or connected for the purpose.

As steam at low pressure is the most common agent, and as direct radiating systems are the most popular for heating purposes, we will take that branch up first as a matter of discussion.

Steam at low pressure requires piping of a large size (note steam table) and so arranged that the condensed water and steam may travel in the same direction, as far as possible and practical, and the mains so arranged that they will be comparatively dry at all times, and of such dimensions that the difference in pressure between the source of supply and the point of return will be so small that a water head of a few inches will overcome it; that is, this condition is absolutely necessary for a successful gravity return system such as is commonly used in dwellings, apartments, small hotels and kindred buildings that do not have a complete steam power plant using high pressure steam.

The velocities through the mains should not exceed 20 feet, and at the outside 25 feet per second for the steam, and for water a maximum of 6 to 8 feet per second will give satisfactory results. If these conditions are changed and the velocities increased by the use of smaller pipes, you may expect trouble, and the trouble will be with you as long as you live. There is no escaping the result in a conflict with the law of gravity, no more than there is in a conflict with other laws of nature. New discoveries are being made every day, new schemes devised, new apparatus invented, promoted and foisted upon the people as a cure-all and the last word in all these troubles. If you purchase the arrangement you are assured that you will be forever freed from the annoyances of a noisy

*A paper delivered before the San Francisco Chapter, American Institute of Architects, March 19th, 1914.

heating system and the constant nagging of dissatisfied clients because of the unsatisfactory condition of the piping.

By adopting some of these modern mechanical schemes of improved valves, etc., some relief may result, and it often does, but not any more from the adoption of the improved apparatus than from the opportunity this change affords a good practical heating engineer or steam fitter to change the system in general, so that results would very often be as satisfactory without the improvement as with it; but such opportunity would never have occurred had not the change been imposed by the placing of the improved apparatus that receives a credit to which it only is indirectly entitled. So much for steam.

In the matter of hot water for radiation or for a domestic hot water sanitary service, the circulation is usually controlled by the difference of density due to the heat infused into the water by conduction, convection or radiation. The source of heat matters little as long as the temperatures are acquired. The circulation through a system, unless accelerated by mechanical means, depends entirely upon the law of gravitation, and the velocity of motion is determined by the law of falling bodies, counteracted by the friction in the piping, bends, valves, angles, etc.

Now, it may surprise some of you to know that the small difference by expansion between the heights of a column of water at, we will say, 180 degrees and at 160 degrees Fahrenheit, a difference of 20 degrees, is the sole and only influence that causes hot water to circulate in a gravity system. You will realize, therefore, the importance of having the piping of such a size and arranged in such a manner as to minimize the resistance to the flow of water under these influences so that you may reap the full benefit of the coal or other fuel used for generating the heat. If the circulation is affected because hot water, like steam, is constantly either taking on or radiating heat, it is never at rest. It is not like unwarmed air or normal gases that do not change their temperature. It must be very plain to you that it is a mistake to presume that you can get as good results from small or contracted pipes as you can from full-sized ones from a fuel efficiency point of view.

Heating systems and the distribution of steam and hot water for heating purposes in general have so far escaped the rigid rules laid down by the local law makers for sanitary systems, because the failure of the former does not so materially affect the public health as does the latter, but I have often felt that it would be wise on the part of the community, as a protection to the owner and to the renting population, to prescribe that established rules for the placing of a heating apparatus should be as carefully protected by a simple law as are the sanitary rules that we are now working under, and that said law should be enacted controlling the installation of ventilating equipments similar to that of the Massachusetts law for public institutions now in force in many of the states throughout the Union; and the architects should be the people to demand and to see that such a law is passed in every state, because they, themselves, are often duped by unscrupulous, incompetent and selfish engineers and contractors to whom they entrust the design and installation of these plants.

When a faulty system is once installed and the building enclosed and finished, it is a hard problem to change or to rectify the defects without a serious disturbance to the structure and occupants of the building, and a great additional cost to the owner. These difficulties have brought about a serious state of affairs since the institution of street service, as I know from personal experience, having been called in on several occasions to rectify these difficulties, that, in the imagination of the owner, are brought about by connecting steam with the street; and while the street service has its shortcomings, yet it often is unjustly condemned because of inherent defects in the heating systems and in the general arrangement of the plant before the street connections are made. These annoyances have been the cause of a great deal of dissatisfaction and bickering between the street service corporations and the property owners in many instances.

Architects, as a rule, are prone to conceal piping, very often to the detriment of the system, not that it is necessary to expose piping if sufficient space is allowed for the pipe and the necessary insulation to prevent unnecessary radiation and comply with the underwriters' rules.

Again, others are not satisfied unless a forest of pipes and risers are installed in a system, for no useful purpose whatever, except of causing an excessive fuel consumption and corresponding overhead loss to the owner for all time. They seem to lose sight of the fact that these conditions remain forever, that there is absolutely no relief except a complete remodeling of the whole system, which very often is next to impossible.

Ventilation

The distribution of air in buildings, particularly in wooden structures, brings about, as a rule, a warm contest between the architect and the engineer, because of the difference between the size of ducts necessary for efficient service, and the size existing in the imagination of people who do not go into the merits of the system in the proper form or frame of mind. An architect would not think of reducing the size of a sanitary main or of a water pipe for a certain specified service, yet he will wrangle with you for an hour to get a few inches off a hot-air duct or spread it out in pancake form, which makes it next to impossible to get any air through it at all, to say nothing of the generous volume that is actually required for a satisfactory ventilation or indirect heating.

It is a well-known fact that a square chimney is only useful to the extent of the largest circle that may be inscribed within the square; the corners are useless owing to the excess friction, but the peculiar condition of our construction of brick and mortar, the square or rectangular chimney is more conveniently constructed and conforms better to architectural lines than the circle where the chimney is built into the wall and made part of the structure; yet we are compelled sometimes to make ventilating ducts of a square or rectangular form that increases the skin friction to such an extent that, although of the same sectional area, they are practically useless for chimneys or air ducts, and the purpose for which they are originally intended is completely lost sight of or destroyed.

If it is necessary to pass 1,500 cubic feet of air through a duct per minute at a velocity of not to exceed 1,500 feet (which should be the maximum for any air circulating scheme), that duct should be circular and of one square foot in area or square, or perhaps rectangular, but the least width should never be less than two-thirds the side of the square necessary for the area required, because as soon as you begin to increase the width and diminish the depth you are increasing the skin friction of the duct to an injurious and sometimes prohibitive extent. Who has not seen an 8-inch diameter duct flattened out and squeezed into a 2½-inch thick by 22-inch space in a framed partition, and the contractor condemned because he could not deliver the maximum amount of heat and air through the register connected to a duct distorted in this manner?

I am not calling your attention to these facts in a spirit of fault-finding or of egotism on the part of the engineer; I am simply mentioning them to expose an objectionable and ill-founded practice, and to emphasize the point that in the correct make up of a building the heating and ventilating portion of the equipment stands on a par in importance with its other details. It is time for the architect and for the engineer to realize that truth and to exercise a mutual regard for each other's participation towards the common goal of the successful accomplishment of good work. This will never fail to appeal to the man who pays the fuel bill, and who is the party to be considered first, last and at all times. His satisfaction will work to the mutual benefit of those who have procured it, and their harmonious co-operation should not be considered as involving the professional pride of either, but merely as an intelligent realization of their common interest.

* * *

An Inexpensive Small Farmhouse

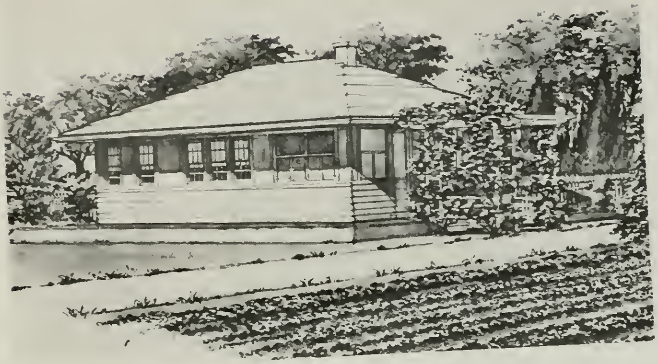
THE Department of Agriculture has made public the first of a series of plans for farm houses to be prepared by its specialists with a view to enabling farmers to construct inexpensive and better homes. The basis of the inquiry is the belief that the farm house is the most important building on the farm, and money judiciously expended in its planning and construction is well invested. The objects sought in the plans are to provide structures reasonable in cost and of good material, and so arranged as to give the maximum in health, comfort and happiness to the family, and added convenience to the housewife in her domestic operations.

The plans are for the construction of an inexpensive farm tenant house, although the house contains many valuable suggestions for owners with small families. The provision of proper tenant houses on farms, it is believed, is of increasing importance to farm management because of the increasing number of rented farms, the growing demand of tenants for modern houses, and a better understanding of the influences of the home upon farm labor and field efficiency. The census report of 1910 shows an increase during the previous ten years of more than 324,000 rented farms. The cost of these houses commonly is inconsistent with the value of the farms, and the lack of improvements in them too often is in striking contrast with the outbuildings, farming machinery and field equipment.

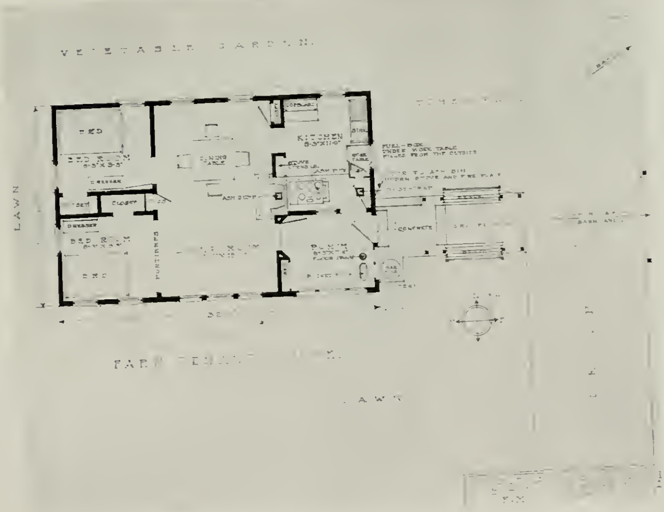
The important principles of planning, applicable to all buildings, which effect saving in construction and in the performance of indoor work have been carefully considered in these plans. Endeavor has been made to provide good lines and pleasing proportions which are essential to genuine beauty in all structures, and are the production of skillful designing rather than of additional material and labor.

The architects' studies seem to make it clear that many homes in towns as well as in the country could have been greatly improved and at the same time built at less expense if they had been studiously planned to meet the family needs, skillfully designed, and carefully constructed.

The tenant house, perspective drawing and plans of which are shown, is a simple, four-cornered structure, without bay windows, gables and dormers, or any projection save the cornice, which overhangs and protects the walls and window openings. The house is planned for the smallest dimensions and the most inexpensive arrangement consistent with the needs and the convenience of a small family. It has but one chimney and but one outside entrance.



DESIGN FOR AN INEXPENSIVE FARMHOUSE
U. S. Department of Agriculture, Architects



GROUND AND FLOOR PLAN FOR AN INEXPENSIVE FARMHOUSE

The Highways of California

Second Paper

By NATHANIEL ELLERY, C. E.

WITH the State Highways Act and with four counties improving their roads under the Savage Act, California came into prominence in the vital public work of road making. Eighteen million dollars for state highways sounds big, but it really pales before the fact that we had spent about sixty million dollars on our roads before the present activity, and that the state of New York is spending one hundred million dollars for a system of state roads.

Our state, with its much greater area but smaller road mileage, sought to make a beginning and perhaps eventually complete a skeleton system of state roads which, with laterals and feeders and county systems, might bring our good road mileage and improvement to a worthy position among the states.

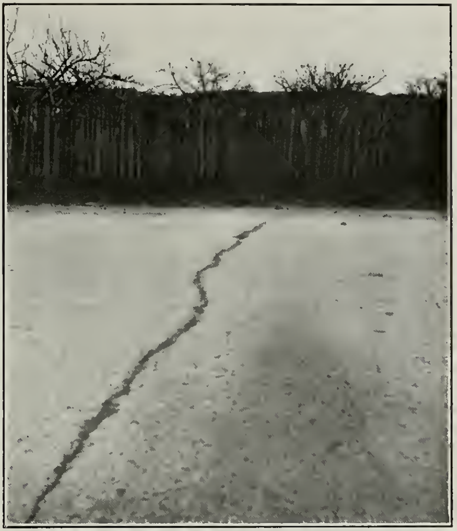
The construction of our highways by the state is proceeding under a plan by the so-called California Highway Commission to give our people 2,700 miles of improved roads for the bond issue of $18,000,000. The prevailing impression abroad seems to be that such mileage is essential to meet the demands of the statute and comply with the intent of that law. Where in the State Highways Act is there specified or stipulated any road mileage? Presumably the answer will be the route or routes imply the mileage, but as a matter of fact such is partially discretionary with the State Department of Engineering.

Let us examine the intent of the law and ascertain as nearly as we can from this source an answer to this vexed question of mileage. As many of my readers know, much of the statutory law is made up in fact from original acts not cenceived or framed by the legislators themselves, but by outside persons interested in the different matters. The California highway scheme was conceived by Governor J. N. Gillett, and the bill was handed members of the legislature for introduction and passage. This is a known fact. Personally I appeared before the Senate road committee in connection with this measure and held several conferences with Governor Gillett on the purport of this law. He remarked to me that the two main roads traversing the state from north to south, one along the coast and the other through the Sacramento and San Joaquin valleys, should form the basis of a system, and then laterals to the county seats could be attached. But in all events, he said, let the money be used to build the two main north and south roads and then the laterals as far as the bond issue would permit.

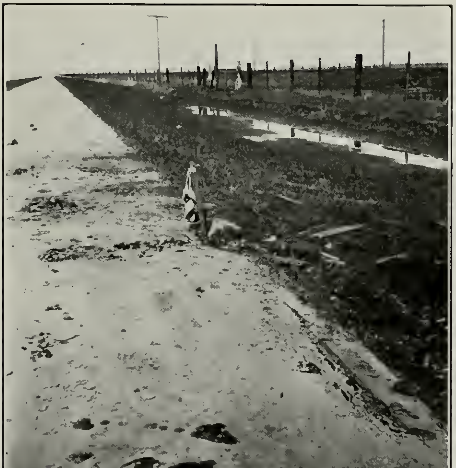
In my previous article mention was made of the associate bill to the State Highways Act appropriating $70,000 for investigation of routes, cost data, etc., but which was killed at its inception. Under this law the State Department of Engineering would have determined the route or routes, mileage, etc., and then the bonds would have definitely covered certain matters. But the thought that some towns or counties would be left out of the plan seemed by legislators too much of a burden for any referendum measure. Mr. Reader, if it were to be largely discretionary with the Department of Engineering under this law, surely the same intent applies under the main act, for they were of unquestioned harmony of purpose.

Mr. Fletcher, the present state highway engineer, during the early part of 1911 came to me and desired information on the intent of the State Highways Act, as did also Governor Johnson later at an advisory board meeting in his office. My version and understanding of it was given them.

Let me quote the Attorney General in an opinion to the Governor dated August 22, 1912: "I consider that the main purpose of the statute was to create a state highway system, running north and south through the state as a means of communication for the entire state, in order that the people of the north might be in touch with the people of the south and the denizens of all the country between be brought in contact, and, for this reason, I consider that portion of the statute which provides for the construction of such highways in such manner as to 'constitute a continuous and connected state highway system running north and south through the state, traversing the Sacramento and San Joaquin valleys and along the Pacific Coast by the most direct and practicable routes,' as the portion of the statute which we are to treat as mandatory, and for the purpose of effecting the object displayed we must treat the balance of the statute as subordinate thereto."



STATE ROAD NEAR HEALDSBURG
Concrete base not surfaced. Shrinkage crack breaking away



OILED MACADAM STATE ROAD SOUTH OF MARYSVILLE
Showing where team pulled off road and stuck

The system selected by the officials was within their power, but it is not mandatory to construct 2,700 miles. Take, for instance, the roads on either side of the Sacramento river. One extends from near Red Bluff to Sacramento on the east side of the river, and the other extends from near Red Bluff to Woodland and through Solano county on the west side of the same river. Where, under the statute, do you find this requirement or where do you find both of those roads contemplated? Again, the road through Lake county and Napa county to Vallejo parallels for about one hundred miles the coast state highway. Where in the fine points of law do you find this contemplated? If California is to build these branches why not build to all county seats of the state and take in all the eastern tier of counties? We know the amount of money avail-

STATE ROAD NEAR SAN JOSE
Shrinkage crack

able is insufficient for such a layout and properly give improved road service, and we know by stretching the mileage we must reduce the quality of road. It is not necessary to accuse the State Highways Act of demanding too much mileage. Certainly each county seat wants a state highway if it can get it, but is it good road business to extend the system to the detriment of the work?

STATE ROAD NEAR LINCOLN
Flood waters caused destruction

The cry in California has been for good permanent construction — build well as far as the money goes. How little attention has been given to the maintenance of our improved roads is known to everyone who has given the matter any thought. Roads cannot be built and left to the elements and traffic without a system of upkeep to maintain them. No matter how well built, without proper attention the investment becomes of little value.

OILED MACADAM ROAD NEAR MARYSVILLE
Surface breaking away

The construction of our improved roads is of deep concern to all who use and pay for the work. In the first place, a knowledge and study of the state is essential to a good road plan, and the more intimate this is, the more likely a good solution of the problem. The topographic features must be known and the location of materials for construction must be determined. The study of the traffic and future traffic so far as practicable should be given profound thought. Grades and alignment should receive careful attention, and in our state the winter overflow of many sections needs be gone into in detail. Soils and their character have a strong bearing on this work. The older roads of California were located without much thought of grade, alignment or soils. They usually followed the contour of the ground and had no surfacing of any consequence. In some localities good gravel roads were made, but deteriorated through lack of care. Oiled roads came to us through the effort to lay the dust, and several million dollars were spent by the counties in the en-

STATE ROAD NEAR HEALDSBURG
Foundation unsurfaced, giving away under traffic

deavor to create good oiled roads. Oils were applied indiscriminately—no test for asphalt—no proper material for mixture with it. It was heralded as the panacea for road ills, and the struggle and hurry to make use of it overcame the good judgment of the users. Those who traveled these roads found how abominable they were when uncared for. Finally many neglected oil roads were evidence of the fact that one of the greatest wastes of road money our state had ever experienced occurred through this work. To be sure, everybody was making roads or knew how. It was a slow and tedious process to make road builders of untrained men who were certain they had the right idea and knew thoroughly the business of road construction. The roads we had surely aired the views of the many builders.

STATE ROAD NEAR SAN JOSE
Showing bituminized top worn out

These roads were made to accommodate horse-drawn traffic, and when the motor-driven vehicle came into greater and greater use the demand for road improvements became intensified. New conditions had arisen. Roads now must undergo a change in construction to offset a new destructive agency. At this time each of the four counties previously mentioned undertook a system of main county roads within its bounds. And now after all this strife in road affairs, the state emerges with a system of 2,700 miles of state highway for consideration. Since 1911 it has adopted the types of road, has located much of the lines and has contracted for and is constructing various units into which the work has been divided. In the law this system called for roads permanent in character and finished with oil or macadam or a combination of both, or of such other materials as the State Department of Engineering shall consider most suitable to the locality. In fact, the officials of this department may use their own judgment in the matter of construction.

Let us now examine the requirements to be heeded and some of the construction already completed or partially completed and note, if we can, the importance of various features. The speed of the horse-drawn vehicle was limited to about eight or ten miles per hour for light rigs and much less for heavier teams and wagons. The steel tires of the wagons and buggies cut into the surface or ground the surface materials, while the horses with toe clips and caulks (aids to their foothold) cut into the surface. With the motor vehicle the suction created by the tires tears out a road in accordance

STATE ROAD NEAR HEALDSBURG
Concrete torn up for about 700 feet—too thin.
Photo taken March 1, 1914

with the speed and the tractive force also helps tear away the surface beneath the tire. Undoubtedly both classes of vehicles will be used on our highways, and we may further look for freight hauls by motor trucks over our improved roads. There seems but little question about the haulage of farm products by motors when the highways are improved to permit of uninterrupted service.

So far as practicable, grades should be a minimum, curves made easy and crossings with car tracks obviated where possible. In the lower lands, subject to overflow, grades should be raised above the flood plane, and above all a complete and sufficient drainage plan devised in order to give permanency. The foundation of the road should be well laid and protected, while the finish or top should be smooth, resistant to wear and not slippery. The road crown should be slight when the best constructive materials are used, and the width should be sufficient to allow of passage of vehicles without too much travel on the berm or shoulder of the road. The edge of the main part of the road must receive close attention or else it may be gradually eaten away by the travel.

Generally writing, the state has adopted the Portland cement concrete foundation for the main thoroughfares with a minimum thickness of four inches with allowable increase in places. This material for foundation use, when properly protected, gives splendid service and is the best foundation material we now have for roads. The views presented herewith of the cement concrete foundation work on incomplete roads show distinctly the shrinkage cracks of concrete subjected to air during part or all of the time of curing. Where the travel has used this concrete, evidence of wear is shown, and in places such as the road between Healdsburg and Santa Rosa the worn condition is sufficient to cause trouble. Patching set concrete in air is one of the difficult problems we have to contend with, and where thin slabs unreinforced with metal are used it becomes extremely difficult. The samples of the concrete taken from this work appear of good, sound quality, but when travel is allowed to cross the shrinkage cracks of cement concrete it naturally breaks the edges away. Although much has been said and written of the Wayne County (Michigan) roads of concrete base and wearing surface, I cannot consider this brittle material for a wearing surface. It is out of place in this position. It has practically no resiliency and will dust with earthy materials blown or otherwise deposited on the surface, and it will wear under the impact of the travel.

Again, the state has adopted the thin bituminized surface on the concrete base in many instances. Although this is recommended by the National Cement Users' Association, I cannot but condemn its use. A layer of about three-eighths inch thick of heavy asphaltic oil and sand or rock chips cannot cushion the base sufficiently and will wear rapidly under heavy motor trucks. The view shown of the state road north of San Jose and taken in the early part of 1914 by the writer clearly shows the insufficiency of this top or wearing surface. The concrete should receive a better protection than this if it is to perform its best service. The argument for its cheapness of first cost and ease and cheapness of replacement is scarcely correct when it wears out so soon that travel will be everlastingly hindered by replacements, and if the base be narrow the inconvenience to the public and possible damage to the slab foundation will warrant more permanent work.

The type "A" adopted by the state seems more nearly to fill the requirements of a high-class country road. It is 24 feet wide, concrete 5 inches thick and 1½ inches of asphalt or asphaltic concrete.

If cement concrete is to be used for a base it should be of sufficient width that there need be no additional width made at some later date. To place an addition to a slab of thin concrete at the shoulder of the road is next to impossible and get a good job. How are we to knit the concretes together? I saw where some of the concrete base had been wrecked on the state road below the town of Lincoln and carefully noted the patch of the slab. It was cracked loose from the body of the road slab. Fifteen feet in width of cement concrete is too narrow, as it never can be widened satisfactorily, and in winter how can two large teams or fast-moving automobiles pass on this width?

Take, for instance, motor trucks, some of which are 8 feet outside to outside of wheel hubs—two make 16 feet in width. Surely they cannot pass on a roadway 15 feet wide. Another item of concern is these 15-ton trucks running close to the edge of a 4-inch concrete slab. When the subsoil is soft they would certainly damage it, for they have 5-inch tires upon which the load rests and is transmitted to the road. If the State is going into the cement concrete road construction the part of wisdom seems to demand a 6-inch concrete base not less than 20 feet wide and topped with at least 1½ inches of good covering. At the time this spring I made the examination of the 15-feet wide oiled macadam road south of Marysville, built by the state, the shoulders were saturated with water and many teams and wagons had pulled off the edge in passage and torn it down. The accompanying view shows one spot on this highway where a team was stuck on the shoulder of the road and was pried out.

The views presented with this article were taken by the writer this year and truly represent the conditions at various points. In the succeeding articles the subject of construction and maintenance will be discussed.

Vacuum Cleaners

San Francisco and Oakland architects and property owners have been having some very trying experiences with vacuum cleaning plants. It is a well-known fact that there are a lot of machines on the market that are little better than toys—not worth the powder to blow them up—as one architect put it. And there are some that would eat up the income of a Rockefeller to operate. On the other hand, there are cleaners that answer every purpose and accomplish results in a most satisfactory manner These machines are easily installed and more easily operated, and the first cost may be said to be practically the last cost.

It is not the purpose of this and succeeding articles to go into any extended criticism of the various types of machines on the market, but an effort will be made to acquaint the reader with those cleaners that have proved the most practical and economical. The architect, the engineer, the contractor and finally the owner, are entitled to have these facts, for to install a poor machine and then to be obliged to tear it out and replace it with another type is as great an injury to the architect's reputation as it is a drain upon the owner's pocketbook.—Editor.

THE GIANT SUCTION MACHINE

By FREDERICK JENNINGS

THE Giant Suction Cleaner is a home product. That fact, in itself, should at least enlist the attention of the local building fraternity. I don't mean to infer that home-made goods shall be given preference to foreign products when they are an inferior article. Not by any means. The point is that if a machine is made right here in California it is entitled to at least as much consideration as the machine manufactured in the East.

The main factory of the Giant Cleaner is at Third and Jefferson streets, Oakland. It is a two-story brick building filled with enough high-class machinery to turn out hundreds of vacuum cleaners annually. The officers of the company are N. Alper, president; A. Alper, vice-president, and S. H. Rowland, secretary-treasurer. E. L. B. Zimmer is general manager.

The Giant Cleaner will do the work of ten hand sweepers, while the time it saves as compared to other suction cleaners is at least two to one. The suction is stronger and the width of the cleaning tools are much wider than those used by other cleaners, and, being much lighter, can be handled more expeditiously. It saves in the amount of electrical energy required to operate it, and it saves in dollars and cents, because it is the simplest suction cleaner now on the market.

In sympathy with the modern idea of hygienics, the application of the principles embodied in the suction cleaner are now recognized throughout the world, not only by the medical fraternity and men of scientific research, but all people possessing common sense and reasonable understanding. The old method of cleaning was simply to displace or remove dirt from one object to another; or, in other words, to stir up the dust in the carpet only to find it again settled upon the furniture. But one result can be obtained from an operation of that character—more dirt. It is stoutly proclaimed by men of understanding that more disease germs enter the human system through inhalation than by any other means. Hence it follows that the more completely we can eradicate and destroy these germs of disease the more sanitary become the conditions in which we move and live.

Now, the logic of the Giant Cleaner is found in this principal fact—it cleans. It does not stir up the dirt and dust in its operation, simply to allow it to settle elsewhere, but it consumes it through the air tube, and all of the dirt, disease germs, fleas and other small insects with which the cleaning tool comes in contact are drawn into the automatic self-cleaner. All of this substance immediately drops to the bottom of the machine and the air is carried away through the exhaust into the chimney or out into the open air. Thus the object is cleaned, the dirt and dust is removed and the air which we breathe is made sanitary and wholesome.

HOTEL OAKLAND, OAKLAND, CAL. *Bliss & Faville, Architects*

It would seem that the long-looked-for problem has been solved, combining the three elements in one machine, i. e., medium, low and high vacuum, which can be positively obtained in the new Giant Model "A."

The government specifications for the United States Sub-Treasury building in San Francisco call for 6 inches of mercury, or practically 80 inches of water, which cannot be obtained by a rotary fan type machine; and for a high-vacuum machine not to exceed 12 inches of mercury, or 172 inches of water. Either more or less vacuum can be had by the Model "A" air-cleaning device.

The machine is absolutely noiseless, traveling in an inexpensive nonrusting compound, which lasts for years, and sprays itself automatically from muffler back to pump without any energy on the part of the propellers.

H. C. CAPWELL DEPARTMENT STORE BUILDING, OAKLAND
C. W. Dickey, Architect

ST. REGIS HOTEL, SAN FRANCISCO — *Washington Miller, Architect*

The machine can be had motor direct connected or belt driven. The latter being preferred by most users, as the motor can be converted and used to drive laundry machinery, water pumps, or such other machinery as one wishes to operate.

The machine can be converted into a compressor, which can be used to a great advantage in cleaning automobiles, dynamos, elevator lattice work and such other parts too numerous to mention.

Among the important installations of Giant Cleaners recently made are the following: A three-horsepower two-sweeper plant in the Capwell department store building in place of a Rotrex machine of six and one-half horsepower. The Giant plant is operated by what is termed the dry system—the cost of operation being merely the expense of a three-horse-power current consumption and about a teaspoonful of oil every hour. In the new Hotel Oakland a Rotrex plant has been replaced with a six-sweeper, fifteen-horsepower machine of the Model "A" type. Other installations include the St. Regis Hotel, Fourth and Mission streets, San Francisco; the Emerson school—one of the best vacuum cleaning equipments in the city of Oakland, by the way; also the high and grammar schools of Centerville, the College avenue school, Oakland; the Hester school, San Jose, and the new Union high school at Lodi.

BUILDING FOR VINCENT ASTOR, NEW YORK CITY
HERMAN LEE MEADER, ARCHITECT

Vincent Astor's New Building*

THE Waldorf building is at the very heart of that marvelous half-square mile between the Metropolitan Tower and Times Square, wherein is crowded New York City's most important hotels, theaters and stores. Macy's, Sak's, Gimbel's, McCreery's, Altman's Gorman's, Best's, Lord & Taylor's, Vantine's and Tiffany's are within two hundred yards. The Hotel McAlpin, the Imperial, the Martinique, the Grand, the Breslin, the Vanderbilt, the Park Avenue and the Holland House are within one hundred and fifty yards.

The Waldorf building is directly across the street from the Waldorf-Astoria, which, regardless of competition by more recently built hotels, is still the rendezvous for the smartest people in New York and a mecca for the most exclusive visitors from out of town. The Waldorf-Astoria is more than a hotel; it is an institution about which social New York pivots and the Waldorf building maintains the same prestige among uptown business buildings. It will contain shops on the ground floor, and these are so planned as to cater to the most exclusive patronage. Each shop will have a basement for storage, and a well-lighted mezzanine balcony for office purposes and a rear entrance for general service. With all goods received and delivered at the rear, wagons will not interfere with carriages and automobiles and the sidewalk will be as attractive to shoppers as it is along the Rue de Rivoli.

Show rooms of various sizes will be provided on the second and third floors, the entire fronts of which are plate glass. The fourth, fifth and sixth floors will provide lofts approximately 20,000 square feet in area, which will be subdivided to suit tenants. The upper floors are divided into offices, having unobstructed light on all sides and a view far over the city and out onto Long Island.

The Waldorf building presents an unique exterior appearance. Except for the end piers, which are of richly sculptured stone, the structural supports through the lower three stores are masked by a veneer of mirrors permitting a facade of plate glass for its entire 200 feet of length and 40 feet in height, broken only by slender mullions and narrow panels of ornamental iron. This great field of glass will be illuminated with tungsten lamps and mirrored reflectors at night, affording an opportunity to display merchandise, which for extent and artistic effect has not been equaled.

Under the contract between the owner and the Astor estate the Waldorf building cannot be sold, and therefore is not a speculative building operation, but an investment proposition, and every provision has been made for the comfort and safety of its occupants. There are four continuous lines of stairways leading to exits on two streets. The building is served by seven elevators, four high-speed passenger cars and three heavy service freight cars. There are two men's and two women's toilets on each floor. The building is so favorably rated by the board of fire underwriters that an exceedingly low rate of insurance is available for the tenants.

By agreement with the Astor estate this building will permit no manufacturing on the premises and will enforce the most rigid restrictions against any sort of objectionable occupancy. In every way it will be maintained as the building de luxe of uptown New York.

The Waldorf building was designed by Herman Lee Meader, architect.

*Full-page illustration by courtesy of the Real Estate Magazine.

MERRIAM APARTMENTS, SACRAMENTO
Faced with cream-colored brick manufactured by Sacramento Sandstone Brick Co.
Cuff & Diggs, Architects

Salt Water Said to Preserve Wood Piles

IN REPLACING a railroad trestle recently burned along the north shore of Great Salt Lake, engineers have just found that the piles are still perfectly sound after 43 years of service. Looking for the cause, since these were only of local pine and fir, they found the timbers impregnated throughout with salt from the lake.

At another point on the lake, 18-inch piles, set 29 years, are similarly preserved with salt, which has penetrated to their very center. Timbers in the Southern Pacific trestles across Salt Lake, placed in 1902, appeared to be as good as on the day when the piles were driven. They have been preserved well above the water line by the salt dashed onto them by the waves, a fact apparently anticipated by the engineers who built the trestles.

It is pointed out that the reason why the waters of Salt Lake act as a strong preservative, as distinguished from ocean waters, is because the lake water is so much more salty—being practically a saturate solution. Preservation with salt is of no use in ocean piling against the attacks of teredoes and other marine borers.

Experts in the forest service who have been investigating the preservative treatment of timber offer the suggestion that ties and poles which have been immersed for some time in the waters of the lake ought to be impervious to decay if the salt is not leached out by the action of the elements. It has been suggested that this can be guarded against, for example, by painting the butt of the pole with a coat of creosote which will keep out the moisture and keep in the salt.

More Anent Grooved Redwood Boards

Editor The Architect and Engineer:—My attention has been drawn to an article which appeared in the January issue of your publication condemning in a very vigorous way the use of grooved redwood boards for cement plaster work.

I do not know where your informant got his facts, but our company has in the last three or four years furnished a great deal of material for this purpose, and we never yet have seen an instance where the conditions existed about which you speak. It is possible that in some isolated case where a wall was green, with the roof not yet completed and was exposed to such heavy rains as we have had recently, such a condition might come about as you describe. From an extensive observation, however, this condition we know is a most unusual one, and we think it only fair to ask you to make inquiry and retract the statements made in the article to which we refer. *Yours truly,*

LITTLE REDWOOD LUMBER CO.,
H. W. COLE.

Our complaint was based upon personal experience over in Berkeley. We would like to show Mr. Cole and any other doubting Thomas what happened to some of our plastered homes across the bay. We want to say right here that redwood is a mighty good material for some things—we have in mind a shingle roof and background for white enamel finish—but as a substitute for metal lath—never again.—The Editor.

*
* *

Big Engineering Feats of 1913.

UNDER modern conditions the perpetual cry of all who handle tools is power, more power. The year of 1913 will be famous in the annals of engineering history as witnessing the practical completion of the Panama Canal, but two other engineering feats must not be forgotten in the glamor of this great enterprise. The year has seen the completion of two of the greatest power plants in the world. The Mississippi and the Tennessee rivers have been harnessed and will in future supply light, heat and power to thousands of people. A bridle has been put on the Mississippi at Keokuk, and at Hale's Bar the Tennessee river feels for the first time the restraining hand of the dam. The Tennessee power station is a mere baby compared with the vast project of supplying St. Louis with 231,000 kw. of power from the great Keokuk dam. A work second only to the Nile dam at Assouan, but the finishing of both projects this year is noteworthy. The question must strike everyone, how long will it be before every river has its power station, every town its cheap power and light.—American Machinist.

*
* *

Ballad of the Bungalow

This is a song of the bungalow, with a buffet built in the wall and a disappearing bed beneath that won't disappear at all; a song of the folding Morris chair that never will fold until you plant your weary carcass there and sprawl in a sudden spill; the song of the dinky writing desk that hangs from a sliding door which sends you kiting galley west, until you write no more; the song of the pretty porcelain tub, with a flour bin below, and a leak that springs on the bread-to-be while on the floor runs liquid dough; a song of the handy kitchenette that is almost two feet square and all undefiled by the sordid job of cooking dinner there; a song of the lidded window seat, where no one could ever sit, and of plate racks that come crashing down, and of shelves no books will fit; a song of pantry and bureau drawers that will never go in, or out—oh, a song for all "built-in features" that we read so much about. Kind friend, if you capture a bungalow, keep it, and your soul, unmarred, by taking a kit and a sleeping bag and living right out in the yard.

THE
Architect and Engineer
OF CALIFORNIA

Published Monthly in the interests of the Architects, Structural Engineers, Contractors and the Allied Trades of the Pacific Coast by the Architect and Engineer Co.

BUSINESS OFFICE AND EDITORIAL ROOMS
617-619 Monadnock Building, San Francisco
Telephone Douglas 1828

TERMS OF SUBSCRIPTION
(Including postage) to all parts of the United States $1.50 per annum; to Canada 50c additional; to all Foreign points $1 additional.

Vol. XXXVI. April, 1914 No. 3.

DO ARCHITECTS OF TASTE CROSS THE ALLEGHENYS?

Among the stories illustrating the temperamental peculiarities of certain well-known members of the profession is one in which the sardonic humor of one architect is as great as the other's self-esteem. Said one to his brother professional: "Mr. Blank, I have been trying to decide who are the three greatest architects in the United States, and would like your opinion." The accommodating architect took a pad and wrote his own name at the top of the sheet. Then after ruminating mentally (and physically on the pencil end) for a few minutes, threw down the pencil and shoved the pad across the desk. He could not decide upon the other two.

This little anecdote, says Western Architect, is culled from the unwritten folklore of the profession because it is a good story and also because it bears a strong similarity to a recent attempt to name the public buildings that represent the "best architectural work in this country." In this laudable endeavor the American Federation of Arts sent a circular ballot to members of the Federation and also to "prominent supervisors and teachers of drawing, artists, sculptors and others having a reputation for taste." In answer seventy (count them, seventy) responded, and as we are informed, these included "some of the best informed people in the United States." Twenty buildings were included in this selection, only one, the Capitol of Minnesota, being located west of New York and Washington. One is curious to know how these seventy persons "of taste" learned of the architectural excellencies of the Minnesota capitol. Of such architectural achievements the Year Book of the Encyclopaedia Britannica says in part:

> The public and monumental architecture of the United States increasingly tends to become a mere reflection of the official architecture of France. This tendency has been produced by the increasing number of Americans who have made their professional studies at the

San Francisco Society of Architects

Regular Meetings Second Wednesday of Each Month

Parisian school of fine arts. Returning home to practice, these graduates have, by their ability, zeal and close and efficient organization, practically extruded all competition, so far as public architecture is concerned. It would at present be hopeless for any architect, in competition for any public building, to submit a design in any other than the authorized version of the antique or of the Italian revival of the antique."

Like the architect who "couldn't think of the other two," neither critics or reviewer seem to realize that in the west has developed a movement in design that is absorbing the best talent, the most progressive thought and indicates the most certain tendency toward a practical American architecture that has been known to architectural history, and in its rejection of academicism is already confining "the antique, or the Italian revival of the antique" to the east, where the selected "best buildings" and those "reviewed" are located.

THE MODERN ARCHITECT

The Engineering Record, in a recent issue, discussing the complex duties of the practice of architecture today, states editorially as follows:

Before passing hasty judgment upon the architect of our own times, think a moment of the evil days upon which he has fallen. In the medieval times he must perforce know only the technique of masonry—the rest was his art. If he were building a church the fine stimulus of the Gothic was his inspiration and his medium was craftsmanship in stone. Today he must know masonry and concrete, structural steel and sanitary plumbing, lighting and heating, electric wiring and acoustics. The old congregation did not need to read and mostly couldn't, expected to be cold and generally was, could not understand the Latin of the service even if it chanced to hear it.

His predecessor did not have to plan for buying his stone from one source, his steel from another and his woodwork from a third; he was not hounded by agents of patented devices nor pestered by circulars of supplies offering his "the usual architect's commission of —per cent." All these things the architect of today has to endure, besides being called a slavish copyist if he turns to the best in antiquity and a commonplace innovator if he does not.

His chief hope is in suiting himself as best he may to new conditions, calling in technical advisers on the details which he cannot in the nature of things have time to master, even if he has the ability, standing the more firmly by the interests of his client as he confronts a regiment of sub-contractors, and remembering that he must be artist before being engineer or contractor. Originality and resourcefulness are much more difficult to find than technical or constructional skill, and if the architect is to be more than a master mason or boss concrete mixer it must be by the possession of these attributes. Art did not die with the Gothic nor perish with the Romanesque. The times have changed and the architect must change with them.

Examinations for Draftsmen

The California State Civil Service Commission will hold examinations for the position of engineering draftsman, in Sacramento, San Francisco and Los Angeles, May 8 and 9. The entrance salaries are from $1,200 to $1,800 a year.

The State Highway Commission and other engineering departments of the State offer good openings to qualified men. Applications must be filed by May 2.

With the Architects and Engineers

American Institute of Architects

(ORGANIZED 1857)

OFFICERS FOR 1914-15

President..........R. Clipston Sturgis, Boston
First Vice-President....Thos. R. Kimball, Omaha, Neb.
Second Vice-President....Frank C. Baldwin, Washington
Secretary..........D. Knickerbacker Boyd, Washington, D. C.
Treasurer .... J. L. Manran, St. Louis
Auditor......T. J. T. Fuller, Washington, D. C.

Board of Directors

For One Year—Irving K. Pond, Chicago; John M. Donaldson, Detroit; Edward A. Crane, Philadelphia.

For Two Years—C. Grant La Farge, New York; Burt L. Fenner, New York; H. Van Buren Magonigle, New York.

For Three Years—W. R. B. Willcox, Seattle, Wash.; Octavius Morgan, Los Angeles; Walter Cook, New York.

San Francisco Chapter

President ....George B. McDougall
Vice-President..............Edgar A. Mathews
Secretary-Treasurer....Sylvain Schnaittacher
Trustees.................. Geo. B. McDougall, Henry G. Schulze

Southern California Chapter

Vice-President..............Albert C. Martin
Secretary ....Fernand Parmentier
Treasurer.................August Wackerbarth

Board of Directors

Octavius Morgan — J. J. Blick
H. M. Patterson

Portland, Ore., Chapter

President ....Morris H. Whitehouse
Vice-President................Albert E. Doyle
Secretary................ ..Ellis F. Lawrence
Treasurer ....Folger Johnson
Council Members .... Edgar M. Lazarus, Frank Logan

Washington State Chapter

President ....Charles H. Alden
Vice-Presidents .... J. F. Everett, George Gove, Albert Held
Secretary ....Arthur L. Loveless
Treasurer ....A. C. P. Willatzen
Additional Members of Council.............. D. J. Myers, D. R. Huntington, W. R. B. Willcox

California State Board of Architecture

NORTHERN DISTRICT.

President...................John Bakewell, Jr.
Secretary and Treasurer.Sylvain Schnaittacher

Members

Jno. Bakewell, Jr. — Edgar A. Mathews
Joseph C. Newsome

SOUTHERN DISTRICT.

President.....................John P. Krempel
Secretary-Treasurer..........Fred H. Roehrig
Members.................... Octavius Morgan, Sumner P. Hunt, Wm. S. Hebbard

San Francisco Architectural Club

OFFICERS FOR 1913-14

President ....Geo. E. Greenwood
Vice-President..............Chas. Peter Weeks
Secretary......................A. L. Williams
Treasurer ....Wm. D. Sherman

Directors

Henry A. Thomsen — James A. Magee

Los Angeles Architectural Club

President..............Arthur Rolland Kelly
Vice-President...............Harry F. Withey
Secretary-Treasurer .... Henry E. Bean

Chairman Educational Committee

John T. Vawter

Chairman House and Entertainment Committees, Massier of Atelier

Gilbert Stanley Underwood

San Diego Architectural Association

President.........................J. B. Lyman
Vice-President.....................F. C. Cressy
Secretary.....................Robt. Halley, Jr.
Treasurer.......................G. A. Haussen

Portland Architectural Club

OFFICERS FOR 1913

President.........................Frank Logan
Vice-President.................Jno. M. Hatton
Secretary....................Wm. H. Flanigan
Treasurer..................William P. Dawson

Architectural League of the Pacific Coast

President........Carl F. Gould, Seattle, Wash.
Vice-President.......Myron Hunt, Los Angeles
Secretary.............J. S. Cote, Seattle, Wash.
Treasurer...........W. C. Hays, San Francisco
Next Convention City—Seattle.

Temple of Fraternity

Fifty-five fraternal organizations of the United States, representing a combined membership of 5,000 000 persons, will contribute to a great fraternal building to cost $100 000 or more, and to be erected on the grounds of the Panama-Pacific Exposition, San Francisco.

Report of Standing Committee of San Francisco Chapter Upon Quantity Surveying

The Quantity Surveying Committee recently reported to the San Francisco Chapter, A. I. A., as follows:

First—That in our opinion the present method of estimating the cost of buildings, taking figures and the letting of contracts is crude and inefficient. It is not only unadapted to modern work, in view of the immense progress of recent years in construction, materials and constructive methods, but the figuring practices of today (and which many architects condone and encourage) are now generally admitted to be inaccurate and conducive to enormous waste of time and energy, uncertainties, difficulties, disputes, liens and even suits at law.

Further, present estimating methods are also undoubtedly largely responsible for embarrassing situations arising from unsatisfactory work and delays, etc., quite apart from the gambling methods thereby encouraged, and which are injurious to the best interests of all concerned. These same methods promote and encourage certain objectionable practices in contracting, such as peddling of bids and similar juggling of figures to recoup either actual or anticipated losses on contract work.

Second—We submit that most of the difficulties which architects experience in carrying out work arise not from a contractor's effort to make an illegitimate profit, but through attempts to keep his financial loss within the smallest possible limit. Further, it is our belief that of late years estimating conditions and competition have become so bad among general contractors, especially contractors and sub-bidders, that many accept work at or below cost, trusting to luck, taking chances, bulldozing, anything almost, including the expectation of favors, even from the architect, to help them come out even or ahead of the game, all of which we regard as demoralizing, opposed to square dealing, and detrimental to the interests of the owner, architect, the contractor and to the detriment of our profession.

Third—Existing estimating practices are, in our judgment, primarily and largely responsible for the differences which arise between the general contractor and the specialty contractor. That a more equitable and up-to-date method of taking bids can, and should be, devised, embracing such conditions which can, and will, guarantee to every contractor original or "sub" prompt payment according to the actual quantity of work he has properly performed. We believe this to be both practicable and essential in the interests of both contractor and owner. It is our further opinion that such a change will relieve the situation which prompts the increasing demands which are ever being made upon the architect for segregation of almost every trade in a building, and which your committee suggests is not contemplated by the present minimum fee to the architect.

Fourth—Your committee believes that the time has arrived when mechanical work in all trades (with perhaps one or two exceptions) is capable of being accurately measured and described according to practical and well defined standards, which should be agreed upon after consultation with representatives from the different trades involved, and that such standards should be followed in all specifications, and that unit measurements should become the basis of building contracts.

Fifth—Your committee, therefore, recommends that as clearly as practicable, and in the interests of good practice, there shall be adopted the principle of payment to contractors according to standardized "measurement;" in short, what is known as the "Quantity System of Estimating," and that the details involved in bringing about and perfecting such a system, adapted to local requirements, be taken up and considered by the Chapter as a whole, and as a special order of business, and that this work be continued until such time as the Chapter deems it advisable to take some definite action. (Signed)

FRANK T. SHEA,
W. H. CRIM, JR.,
G. ALEXANDER WRIGHT.
Chairman.

Architects Too Modest

Washington Chapter of the American Institute of Architects held its regular monthly meeting on the evening of March 4 at the Seattle Athletic Club, where a dinner was served.

At the suggestion of the chairman, Mr. Wilcox made a few brief remarks concerning architectural impressions on his recent trip east. He called attention to the fact that Seattle has no such architectural opportunity as is afforded by Michigan avenue, Chicago, and the streets in several other eastern cities of similar nature.

The chairman introduced R. C. Erskine, who presented to the Chapter his view of the work of architects in Seattle and certain possible extensions of their field along useful lines, suggesting among other things that they take up the matter of constructing as well as the designing of buildings. He suggested that buildings should be so designed that they would not "go out of style," and called attention to the lightness of the structure coupled with heaviness of ornament, which he observed in a good many buildings which had come under his notice.

A. B. Lord who was also present as a guest, gave some ideas as to the laying out and developing of certain city districts surrounding prominent buildings

An interesting discussion followed these two addresses, especially along the lines suggested by Mr. Erskine that architects were entirely too modest and should advertise in some form or other much more than they did at present.

A Letter from Mr. Schulze

The publishers of The Architect and Engineer hold a very high regard for the professional standing of Mr. Henry A. Schulze, and his letter to the editor, in acknowledgment of an editorial in the March issue, entering a plea for harmony in the San Francisco Chapter, while not entirely in accord with the magazine's views, is nevertheless so fairly and conscientiously put that we take the liberty to reprint the note in full:

The California Architect and Engineer,
Monadnock Bldg., San Francisco.

Enclosing herewith my check covering subscription for current year, permit me to say that it is not done perfunctorily by any means—considerable gratification is in the thought that I renew with pleasure, due to your attitude regarding San Francisco Chapter matters during the past year. While I am of the opinion you have not the right viewpoint regarding the Chapter, I am sure your intentions are right, and, that being so, you will ultimately aid the Chapter in its higher ideals and endeavors—you will then see them as they are. The motive and purpose of your March editorial was good, but you started from a wrong hypothesis; there is no sentiment of revenge, no antagonism, no animosity. The Chapter is only holding certain fundamentals in reverence, and it feels that this will ultimately result in better—in right—application of the Golden Rule.

Yours truly,
HENRY A. SCHULZE.

Honor for Two Popular Architects

Architect William H. Weeks of San Francisco has been commissioned to prepare the plans for two new school buildings at Santa Cruz. One will be a high school to replace the structure burned last fall, and the other building will be a grade school. The two will represent an outlay of about $200,000. Mr. Weeks was offered the office of supervising architect of the new school buildings to be built in Fresno, but he declined to give more than one day a week to the position and the city authorities wanted a man who would devote his entire time, establishing a permanent office in the Raisin City. The position was finally given to Architect W. D. Coates, Jr., of the firm of Coates & Traver of San Francisco, and who for a time held the position of state architect. Coates is a clever young man, and while in the employ of the state assisted in turning out plans for some of California's best buildings. Coates is a graduate of the Fresno high school. He will receive $10 000 for his services, which are expected to cover a period of two years.

Recognition for E. L. Frick

Word received from Paris brings the good news that E. L. Frick, the brilliant young San Francisco architect, has passed his final examination for admission to L'Ecole des Beaux Arts, standing second in the class of 700 competitors.

Mr. Frick, who is only 22 years old, plans to complete the full course in this the most famous school in the world. Before going to Paris he had already begun what promises to be a brilliant career. In 1912 he won the $1,000 traveling prize awarded by the Architectural League of the Pacific Coast. Frick was formerly a draftsman in the San Francisco office of Architects Bakewell & Brown.

More Women Architects

Women architects are no longer a novelty. San Francisco has two very good ones, with early prospects of more. The New York papers recently announced the co-partnership of two young lady architects in the big Eastern metropolis:

"Mead & Schenck, architects."

It sounds business-like and up to date, doesn't it? One thinks at once of either two young men starting out in their careers or of possibly two well-established elderly, bewhiskered gentlemen.

Wrong this time.

For Mead & Schenck are Miss Anna P. Schenk and Miss Marcia Mead. They have opened their offices, which are situated in a modern office building uptown.

"We are especially interested in the problem of housing the poor," said Miss Schenk. "We hope to design some kind of a model tenement that will be practical."

The young women are at present busily engaged on plans for a church.

How Much Does the Boy Get?

Frederic Thompson, producer of the Toyland Grown Up concession at the Panama-Pacific International Exposition, tried scores of engineers of world-wide fame in an effort to find one who could work out a design for a mechanical man, sixty feet high. All failed. Thompson, in a whimsical mood, told his idea to his twelve-year-old office boy and ordered the lad—in jest—to go home and make a working model. The boy, believing Thompson was in earnest, got busy and his model was so successful that the sixty-foot man will be made from the lad's original drawing.

A Twenty-Three Story Hotel

Architects Rousseau & Rousseau, who have been rapidly advancing to the front as designers of important commercial structures in San Francisco and the Bay cities, have recently been commissioned to prepare plans for the tallest hotel building west of Chicago and the tallest building of any kind in San Francisco. The structure will be 23 stories high. It will be erected at the northwest corner of Pine and Stockton streets—the highest point of the hill above the Stockton street tunnel. The owner is Fred C. Finkle of Los Angeles, and the estimated cost is $1,000 000.

Would Send This Architect to Jail

That the architect has his troubles, like the rest of us, one need only to read the following note which a member of the San Francisco profession received in his mail the other day from the agent of an owner for whom the architect recently completed a five-story building:

As the representative of the owner, which you, as his architect ought to be, I don't see how you can, with the proper consideration for his interests, accept this building from the contractors. The wire clothes hooks installed in this building are so poor that they would not ordinarily be used in a basement. Another entire lot must not have cost more than $1.00. The acceptance of these is criminal, and a man so accepting them should be punished.

Want Contracts Let on One Bid

Segregation in the letting of contracts, rather than seeking a single bid for the whole building, is demanded from the San Francisco Board of Works in letters recently received from the Masons and Builders' Association and from the Master Plasterers' Association.

One of the changes made in the early part of Mayor Rolph's administration was in seeking one bid for any piece of contract work. It is this policy to which the masons and plasterers now object. They say that by parceling out the work in separate contracts a middleman's profit will be eliminated.

The theory of the change was that a single contract would concentrate responsibility and secure prompt execution.

Written in an Apartment House

By THOMAS NUNAN in the Examiner

In long and free and ringing lines
  The muse would take delight;
But my apartment is so small,
  There's little room to write.

Should longer verse I now compose,
  In wild, ecstatic bliss,
I'd have to run it up the wall, as, per example, this.

Apartments of the modern style
  Are made so very small,
The furniture, the beds and things, all slip inside the wall.

It's awkward, being crowded so,
  And still my woes to crown.
When I am writing up a thing I have to write it down.

My garden is a window box,
  And further I declare
The flowers that I grow therein
  Are something very rare.

It's wonderful how many things
  Apartment houses hold.
Chairs, tables, desks and kitchen stoves are built so they will fold.

A fine piano seems to grace
  This living room—and yet,
One-half is but a place for clothes,
  The rest a kitchenette.

Still other things I'd like to tell,
  Of ceiling, wall and floor;
But we must dine upon my desk,
  So I can write no more.

A Competition for Sculptors

It is proposed to erect a memorial in Philadelphia to Robert Morris, under the joint auspices of a City Commission, Pennsylvania Bankers' Association and the Fairmount Park Art Association of Philadelphia.

There has been issued a program for the preliminary competition, under which all designs submitted shall be deposited with the committee between May 1 and May 31, 1914.

The cost of the memorial, placed in position and complete, is not to exceed $28,000, and this sum shall include the erection of a full-size model in staff, at the side indicated.

Copies of the program and all particulars of the competition may be had by addressing Mr. John W. Ford, secretary, 618 East Girard avenue, Philadelphia, Pa.

Two Apartment Houses

Architect William A. Beasley has prepared plans for a five-story reinforced concrete apartment house to be erected on Leavenworth street, near Post, for Mrs. Annie Gallagher. There will be ten apartments, also a gymnasium, billiard hall, garage, etc. The same architect has completed plans for a three-story frame apartment house at Howard and Rausch streets for D. Coleman.

Berkeley Architect Busy

Architect Jas. W. Plachek, who recently opened offices in the Atcheson building, Berkeley, is quite busy with residence work. He has several fine homes under way for university professors in the Berkeley hills, also a house for Dr. E. A. Kruse and an office building for the Byron Jackson Iron Works.

Carnegie Library and Residence Work

Architects W. Garden Mitchell and Charles E. Hodges of San Francisco have completed plans for a Carnegie library at San Anselmo. The same architects have also completed drawings for a handsome colonial house for Mr. Arno Mereen at Claremont Court and a mission home for Henry Scott at San Anselmo.

State Harbor Work

During March the California Harbor Commissioners let a contract for two railroad ferry slips for $110,700 to be located on a line westerly from the easterly line of Powell street to the easterly line of Taylor street; cost of creosoting piles to be additional.

On March 25th plans and specifications for pier No. 41 at the foot of Stockton street were approved at Sacramento by the State Engineering Advisory Board. This wharf will involve an expenditure of about $300,000.

The contract has been let for the Fort Mason tunnel and the trestle to connect it with the belt line railroad terminal at Mason and Jefferson streets and the transport docks and the exposition grounds. The tunnel is to be 1500 feet in length, equipped with single track and will be faced with concrete. The trestle will be of creosoted pile construction 1400 feet in length, built along the line of Jefferson street. It will cost $220,000 for driving the tunnel and laying the tracks.

Recognition for Architect Hobart

Mrs. W. K. Vanderbilt, Jr., who was Virginia Fair, has engaged Architect Lewis P. Hobart of San Francisco to design a $250,000 residence to replace the house recently burned on her Long Island estate.

Mrs. Vanderbilt retained Hobart after having been impressed with the beauty of the George Washington Newhall home at 2340 Pacific avenue, desgined by him.

Honor for Smith O'Brien

The plans of Architect Smith O'Brien of San Francisco have been selected by the judges in the competition for the Weber memorial at Stockton. The jury was composed of Willis Polk, Arthur Brown, Jr., and Clarence R. Ward, all well-known San Francisco architects. The memorial is to he a monumental municipal music stand.

County Surveyor Praises State Highways

The California Highway Commission has sent out the following bulletin:

A thorough investigation by a disinterested authority as to the character of work on the state highway has resulted in a favorable report very gratifying to the California Highway Commission. The report was made to the Supervisors of Tehama county by W. L. Luning, who has been county surveyor of that county for a quarter of a century and who is well known in Northern California as an authority on road building. The Tehama county board has heard reports circulated adverse to the construction of the state highway, and they desired first-hand information prior to considering the sale of highway bonds sufficient to construct the route through their county.

County Surveyor Luning accordingly made a personal investigation of state highway work already under way, and his report commended the construction in the following language: "The specifications for the construction of the state highway are good. I myself thought the 4-inch concrete base was too thin but I saw the road in places constructed on high fills which have been thoroughly watersoaked this winter, and the paved roadbed has withstood it all and is in fine condition! I met John McBain, a supervisor of San Mateo county, whose postoffice address is Menlo Park. I told him my mission; in conversation with him, he stated there was not a particle of constructed state highway in San Mateo county that was bad. I found his statement to be true."

Following County Surveyor Luning's report the Tehama county supervisors voted to provide for the sale of $350,000 in bonds to cover state highway construction in that county.

City Engineers vs. Private Engineers

An engineer of wide experience both in municipal work on salary and in private practice raises a question of engineering ethics. Should engineers on city payrolls at presumably full-time salaries, and with no private offices and no personal staff, compete for outside work with engineers who have to maintain both?

In such cases the public official or employe has no office rent to pay, and if he has sufficient energy and executive ability he can call to his aid his fellow employes and thus carry on a business of considerable magnitude practically clear of all charges except those for strictly personal services.

Two main points are more or less deeply involved: (1) The two-thousand-year-old question, "Can a man serve two masters?" with its well-known and generally accepted answers; and (2) fairness of competition with engineers in private practice who must meet office rent and other overhead charges. The chief danger as regards unfair competition lies in the temptation to take advantage of lack of overhead charges and to offer to work for lower fees in order to get more engagements or engagements more easily. This danger could be obviated by charging a standard fee—if there is such a thing that can be adjusted to various degrees of education, experience and ability.—Engineering News.

Building Eighty-Five Foot Chimney in Seven Days

(Engineering News)

This quite unusual feat was recently accomplished by a St. Louis construction firm.

The chimney was built on the company's system of reinforced tile concrete with a reinforced concrete foundation. The company informs us that the chimney was actually built, including its foundation, in seven days' working time and was completed and put in service just 16 days after the receipt of the order. During its construction there occurred, moreover, the heaviest snowfall recorded in ten years in St. Louis, and the temperatures were at no time higher than 20 degrees F. when work was started in the morning. The sand was heated before mixing and the tile was heated before placing. Fires were kept in the chimney constantly with all openings closed. The chimney has a total height of 85 feet and is three feet in inside diameter.

Day Labor and Contract

"Saving the contractor's profit" by carrying out a municipal undertaking by day labor is often an expensive proceeding. A Pacific Coast city projecting extensive harbor developments began deepening the waterway with a municipally operated dredge. The result was unsatisfactory; in fact, it is stated that a good part of the fund was used up before the dredging had scarcely been started. The same city also undertook to construct a bridge by day labor. It is reported that this structure cost $50,000 more than it would if the work had been done by contract. These unfortunate happenings have had one good effect, for the advisory committee in charge of improving the water system has recommended that this improvement be carried out by contract. Experience is a good teacher; so is common sense. By a judicious use of the latter almost any city councilman should be able to see the fallacy of the day labor system of doing public work.—Engineering-Contracting.

Heating and Lighting

Plumbing and Electrical Work

Lighting a Bank Building

ONE of the features of the new building of the First National Bank of Los Angeles, designed by Architects Morgan, Walls & Morgan, is the lighting equipment in the banking rooms, the interior of which was planned and furnished by Messrs. Weary & Alford, the well-known specialists in bank work of this character. The lighting system is particularly pleasing and is also unique, says the Journal of Electricity, Power and Gas.

From the inception of indirect systems, especially as applied to bank lighting, these decorators have paid especial attention to the scientific principles involved, which gives this article compiled from data supplied by them, an added value.

The success or failure of any installation of an indirect system of illumination depends principally upon the reflector and also upon the general color scheme of the room to be illuminated. As a light colored ceiling is the reflecting surface which diffuses the light throughout the interior, the intensity of illumination produced in a room, using a given amount of wattage, depends upon how much light really reaches and is reflected from the ceiling. The way to direct the maximum amount of light to the ceiling is to use the most powerful type of reflector obtainable, and in this instance mirror reflectors have been used exclusively.

A certain fixed intensity of light is necessary for agreeable and efficient illumination, and the problem lies in producing that intensity which will distribute the light on a horizontal plane about 36 inches from the floor. In this particular installation there were a great many different rooms and spaces to be illuminated and the intensities had to be adjusted to suit the requirements of the occupants of the rooms. The illustration shown is a photograph taken in the bank with a 45-minute exposure without the aid of flashlights of any character, and illustrates especially the even distribution of light which has been obtained. Particular attention is called to the clearness in which the tessarae in the mosaic floor have been brought out, as well as certain discolorations in the marble.

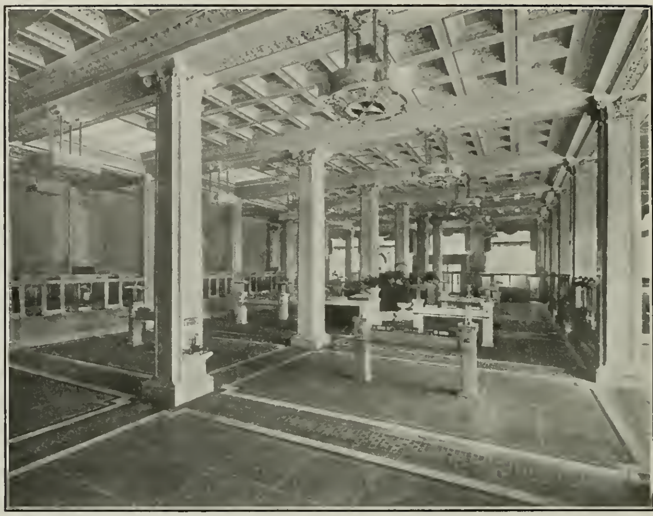
The following is a description of the lighting equipment used in this main concourse:

There are twelve outlets in the center bays of the room and fourteen in the bays at the windows. In each case an intensity of 4.0 ft. candles was figured upon, the room being 128x92 feet in size and 22 feet from floor to ceiling. In the twelve larger fixtures six 100 watt lamps with the E-100 type reflector were used, and in the 14 other outlets five 100 watt lamps with the same type of reflector, in both instances the top edge of the reflector bowl being placed six feet from the ceiling. These values of foot candles are based upon the 1913 rating of clear bulb Mazda lamps, 25 per cent being allowed for depreciation for dust on lamps and reflectors and the blackening of lamp bulbs due to age.

General engineering data for the entire equipment of the first and mezzanine floors will indicate how the type and size of reflector is arrived at after the intensity in foot candles is determined upon, and will prove valuable for reference:

ENGINEERING DATA FIRST NATIONAL BANK, LOS ANGELES

Room.	Height of Ceiling. Ft.	Size. Ft.	Area. Sq. Ft.	Foot Candles. Est.	Outlets.	Madza Lamps per Fixture.	Reflector.	To Ceiling. In.
First Floor	12							
Auditor		17x19	323	4.	1	5-100	E-100	30
Stenographer		10x12	120	5.	1	4-60	E-60	36
Cashier		8x11	88	4.5	1	3-60	E-60	36
Women's retiring		11x9	99	2.5	1	2-60	E-60	36
Women's toilet		17x10	170	1.5	1	2-60	E-60	36
Filing		16x18	288	3.5	1	4-100	E-100	30
Directors'		28x17	476	3.5	2	3-100	E-100	30
Directors' toilet		11x11	121	2.0	1	1-100	E-100	30
Clearing house		26x18	468	4.5	2	4-100	E-100	30



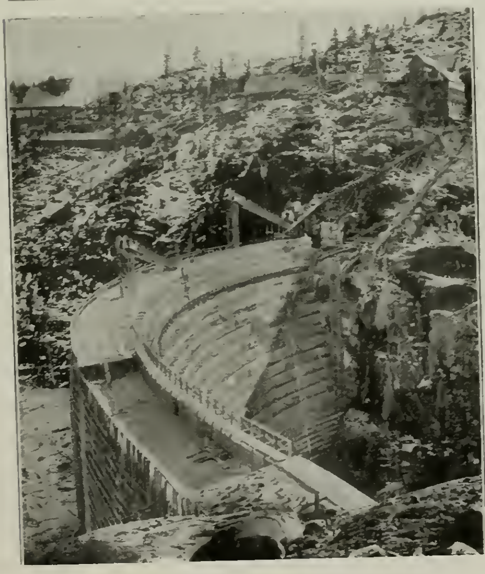
INTERIOR BANKING ROOM, VAN NUYS BUILDING, LOS ANGELES
This Picture Taken at Night Without the Aid of a Flashlight

Room.	Height of Ceiling. Ft.	Size. Ft.	Area. Sq. Ft.	Foot Candles. Est.	Outlets.	Madza Lamps per fixture.	Reflector.	To Ceiling. In.
Court—								
1 bay		16x19	304	3.5	1	4-100	E-100	30
2 bays		28x19	532	3.5	2	4-100	E-100	30
1 bay		19x19	361	3.5	1	4-100	E-100	30
Foot of stairs		17x8	136	2.0	1	2-60	E-60	36
Main Floor—								
Court	22	128x92	11778	4.0	12	6-100	E-100	72
Ceiling				11.	14	5-100	E-100	72
7th St. entrance		7x14	98	2.0	1	1-100	E-100	36
Mezzanine	9							
Statements		24x12	288	4.0	2	4-60	E-60	24
		19x12	228	4.0	2	3-60	E-60	24
Stationery		17x11	187	2.3	1	3-60	E-60	24
Women's retiring		17x18	305	2.0	1	4-60	E-60	24
S. W. corner		36x18	648	4.0	3	5-60	E-60	24
S. E. corner		48x16	768	4.0	3	6-60	E-60	24
Center		47x22	1034	4.5	6	5-60	E-60	24
Telephone		8x8	64	2.5	1	2-40	E-60	24

Water-Hammer in Steam Pipes

THE precise cause of water-hammer in steam pipes is not always fully understood. What, for example, is the approximate cause of the clicking in steam pipes? This is due either to the blows at pipe bends or valves of plugs of water in rapid movement or to collision of plugs of water upon water at rest, or to the collision of plugs meeting from opposite directions. This is all easy to understand, but one does not visualize that these crackings over the length of a long piece of pipe arise from collisions of plugs traveling perhaps many feet, the rapid crackling simply indicating the rapidity of the movements involved. We have to discover how the water is put into such rapid movement. To do this the motive power must be discovered. This may be steam, or it may be, secondarily, air. Steam is approximately gaseous. Like all gaseous bodies it can be liquefied. But unlike the so-called permanent gases it will liquefy at such comparatively high temperatures as 212 degrees when at atmospheric pressures. According to the kinetic theory, a gas is merely an aggregation of extremely small molecules which are endowed by heat with the power of automobilism. Different gases possess different molecular velocities; for steam it is of the order of 1,800 feet more or less per second, and the velocity of a mass of such molecules will depend upon the resistance against which they must make their way. In any cloud of steam surrounded by other gas at the same temperature the steam molecules are moving amongst each other, and those on the borders of the cloud are making their way slowly into the other surrounding gases. But if it be conceived that from one side of the cloud of steam all other gas be removed, then the steam molecules would have no molecules from which to rebound on that one side and would all rush down the empty lane.

This is what happens in a steam pipe: At some portion of the pipe there is water, cold relatively to the steam. Steam is admitted to the pipe and some of it condenses on the surface of the water, heating up the surface layer, which ceases to condense further steam. A valve is then opened in the course of the pipe; it is a valve against which, let us say, the water is lodging. The opening of the valve, allowing some water to pass, causes a disturbance of the surface, admits steam to the cold water, which promptly condenses so much steam as to produce a vacuum, into which steam rushes so violently that it piles up the water before it, and the wall of water is violently thrust forward by the steam and becomes a traveling plug of such energy that it is possible for great shocks to be set up which will readily burst or



fracture cast-iron valves and other junction pieces.

The sequence of events above outlined is merely illustrative of what may happen, for the variations are as numerous as the ways of putting up steam pipes wrongly. One error formerly very common was to place a stop valve close to the boiler, taking off the steam by a vertical pipe to several feet high, when the pipe proceeded horizontally. This vertical pipe would be liable to become full of water if any steam could leak up into it from the boiler or condense into it from other boilers on the main. The correct position of the stop valve is at the top of the vertical pipe, and from it the main ought to slope all the way to engine separator. If there must be dips in between the terminals they must be drained, and the drain must act. Expansion bends, unless they project horizontally from a steam pipe, will block the flow of water and provide water to form a flying plug.

In designing any line of pipes or a system, all the possible combinations of opening, shut and leaking valves should be thought out to find if it is possible for water to collect. It is particularly desirable that the number of valves be a minimum. Numerous valves and ring mains are productive of danger points.

Where both air and water are present in a pipe it is possible for the air to be compressed at one end of the pipe, and for the compressing water to be flung back by the air into the steam end and do damage. Thus in a faulty arrangement the steam valve might first be opened slightly and promptly shut upon indication of trouble. And this very closing might produce a water-hammer by air rebound. Probably one of the more frequent hammer-causing faults is a slight slope of a pipe towards an obstruction with the formation of a long surface of water in a half-full pipe. This condition is one which might happen in a pipe which had been particularly vacuous and nearly full of water. On admitting steam the traps would begin to lower the water and produce the above conditions of a long surface to be broken into waves to set up rapid condensation.—Domestic Engineer.

Causes of Steam Plant Troubles

One reason why some purchasers of power plant machinery are always in trouble, says Power, is that they assume that they know more about the operation of the machine than do the manufacturers. Because of this assumption, impossible operating conditions are imposed upon the machine, and economical results are then expected.

A defective engine may be an instrument of danger because of the absence of effective safety stop, or having none at all. Hundreds of patched engine frames now in use are more fit for the scrap pile than for withstanding the strains produced by the power strokes of the piston. The owners take a chance that the engine will hold together for a few days, weeks or months longer, and the chance turns against them.

The most dangerous thing, however, is the second-hand boiler, which has been subjected to ignorant abuse for years, or the boiler that is carrying a higher steam pressure than safety warrants. In case of accident the owner of such apparatus has no excuse behind which to hide. If machinery is operated in defiance of the advice of men who know their business, the blame for resulting troubles must rest on the unwise owner. Advice freely given is seldom heeded. If paid for it is taken at a greater value; but it is useless and silly to pay for advice if it is not to be followed in putting in the work contemplated, or in operating the equipment after it has been installed.

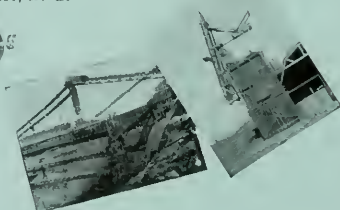
Need for the Consulting Engineer

The constantly increasing cost of fuel is the main cause for the growing disposition of managers of office buildings and owners of power plants to subject their properties to scientific examination by specialists to discover if it is possible to effect economy and increase efficiency. The fact that the operating engineer has been able to make tests, compile figures and originate some improvements himself will not, in many instances, prevent the inspection of the plant by a consulting engineer. If the operating engineer is up to date he will welcome the expert investigation, because it will vindicate him and strengthen him in his position. For this reason, if he is wise, he will assume the most friendly and helpful attitude toward the consultng engineer and aid him in every way possible in his work. The interloper is in no sense a rival to the operator, but a colleague with superior advantages that will help to make successful the efforts to remove weaknesses in the plant and add strength and efficiency to it, and the operator who best serves his own interests and those of his employer, says Power, will take the greatest possible advantage of this co-operation. Meeting the outsider half way will result in benefit to the operator and probably render the examination of the plant more successful than it would be without his cordial assistance. Logically the services of the two engineers are not competitive, but complimentary.

Heating and Ventilating Costs

THE following costs of plants for heating and ventilating have been figured out by keeping an accurate account of the costs of the various items of plants, most of which are installed in New England. Allowances, of course, should be made for other localities, based on the difference in cost of labor and material.

The estimated cost of radiators is classified under five headings. Cast-iron radiators cost from 19 to 27 cents per square foot of surface. Cast-iron indirect radiators of the type for gravity work cost from 16 to 18 cents per square foot, and for fan systems 25 cents. Pipe coils for direct radiation cost 30 cents, and pipe heaters for fan systems 45 to 50



By the Way

Some Industrial Information Worth the While

Infringement of Patent—Bed Manufacturers in Various Parts of Country Must Render an Accounting

Judge Wellborn of the United States District Court, in the action brought by the Murphy Wall Bed Company of San Francisco, and the Hughes Manufacturing Company of Los Angeles, licensees under the Murphy patent, against John G. Cushing, doing business as the Pacific Wall Bed Company of Los Angeles, has found for the plaintiffs.

It was alleged that the bed being manufactured by the defendant corporation was an infringement of the patent granted Murphy, and an injunction and an accounting was sought. The Hughes Manufacturing Company is paying a royalty to the Murphy Wall Bed Company for the right to manufacture and sell beds under this patent.

The validity of the Murphy patent was proven to the satisfaction of the court. Other alleged infringing concerns are the American Disappearing Bed Company of Los Angeles, Pacific Spring Bed Company and the Pacific Wall Bed Company of San Francisco, Robert H. Anderson of San Diego and a number of others, including dealers and manufacturers in Salt Lake, Utah, and various eastern points. It is claimed that the opinion of Judge Wellborn means the collection of about $70,000 in accounting from the various firms who, under the opinion of the court, have infringed the Murphy patent.

Experimenting with Creosoted Piles

In an effort to determine the results which may be obtained from using creosoted piles for fenders, instead of the green wood, the Board of State Harbor Commissioners have decided to place the creosoted timbers at one or two wharves in the immediate future. The experiment will be conducted by Jerome Newman, chief engineer of the board.

It is believed that, unless the creosoted pile is smashed through accident, it will last from ten to twelve years. The green pile lasts on an average about twelve months. The average cost to the state of the regulation green fender pile is about $14. This includes the work of placing. The cost of a creosoted pile will be about $32. If the experiment proves a success, the saving to the state will be 500 per cent. Newman hopes to show a big saving, even if the creosoted pile lasts but five years.

Sheet Metal in Architectural Design

The architect and designer are ever on the alert to discover that which is new, artistic, quaint or even foreign in appearance. Even now the exteriors of buildings, both business and residential, including apartment houses for city erection, are taking on new and improved forms. The moment any architectural feature becomes hackneyed, even though it has in former years been surrounded by an atmosphere of romance and elegance, an active and fertile brain is already seeking something new or yet untried. Houses of the Mexican or Spanish type, having wire cornices, tile roofs and ornamental balconies, have been built in California and other sunny climates, and are now finding their way into the East. Roofing tile of quaint design can be made of copper as well as of terra cotta; small detail for exterior work can be beautifully rendered in either copper or zinc, and crestings and finials of copper look as well as if of tile or solid bronze. Much copper is being used now, says Sheet Metal. It oxidizes beautifully and the color desired can be attained by chemical means. Of course, when a new structure of any character is to be erected, the architect is looked to in the matter of design, but in many cases the architect does not always know the possibilities of sheet metal or keep them in mind.

It is not without reason to say that it is within the field of the sheet metal contractor, not only to note the trend of things in building matters, but to make it his business to see that the architect is kept posted on the utility and beauty of sheet metal, not alone by suggestions, but by keeping his showroom well supplied with the most recent creations and seeing that it is visited frequently by architects.

Credit for the Journal of Electricity, Power & Gas

The short article by Romaine W. Myers on "School Room Lighting," in the March issue of the Architect and Engineer should have been credited to the Journal of Electricity, Power & Gas. Failure to give credit was an oversight and the publishers of this magazine wish it made plain that they are quite as anxious to extend to other journals the same courtesy as they expect to receive from them

Union to Fight Concrete Construction

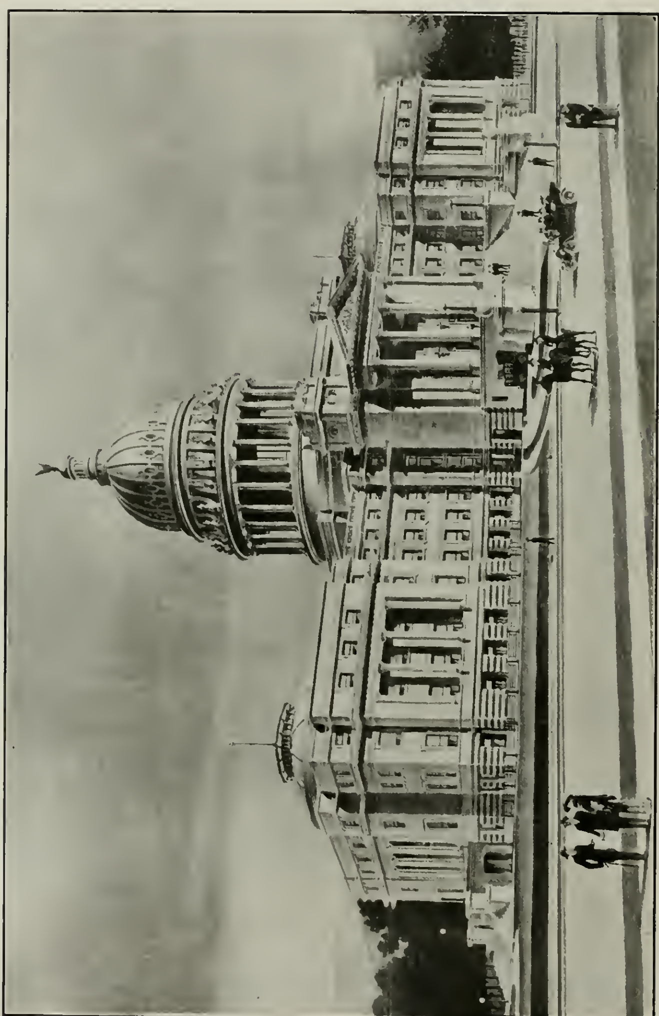
Members of the International Bricklayers' and Stonemasons' Union of America declare that many hundreds of thousands of dollars will be spent by the union to promote brick construction instead of concrete masonry where either type would answer the purpose. A large fund is said to have been set aside for this use. Part of the plan of the campaign proposed is to help finance clay product manufacturing plants wherever there is a strong tendency toward the use of concrete instead. It is proposed to erect the first plant of this kind at El Paso, Tex. It is claimed that $250,000 has already been voted by the international union for this purpose.—Engineering Record.

Another Kawneer Victory

The Kawneer Manufacturing Co., makers of store fronts, has been given a decision in their suit against the Cook-Van Waters Co. of Portland, Ore., agents for the Hester system. This last-named concern forthwith retires from the field. The Kawneer Manufacturing Co. celebrate their success by announcing that they will erect a $200,000 factory building and plant in San Francisco or vicinity for the supplying of the Pacific coast market. The Kawneer Co. is under the able management here of W. D. Fairhaven.

Still Another New Ferry Boat

In preparation for handling the great volume of traffic in 1915, when the Panama-Pacific International Exposition is to be held in San Francisco, the Southern Pacific has decided to construct a new ferry steamer, the "San Mateo," for service between San Francisco and Oakland. This vessel will be a sister ship to the new ferry steamers "Alameda" and "Santa Clara," and will cost approximately $500,000.



IDAHO STATE CAPITOL,
BUILT OF BOISE SANDSTONE

Something About Boise Sandstone

By HARRY K. FRITCHMANN

IT WILL be good news for San Francisco and Los Angeles architects to learn that Boise sandstone is to be shipped into the local market and that arrangements have been made with the leading stone contractors in every large city on the coast to handle the material. Some of the stone that has been used on San Francisco buildings in the past is positively a disgrace to the men who quarried it and an injury to the architect who specified it. In several instances this stone has changed color, while in other instances—at the time of the fire—it cracked and crumbled so badly that it had to be entirely replaced.

Boise sandstone will not crack or crumble, neither will it change color. It is everlasting, fast-cutting, fireproof and inexpensive. In Boise are to be found many beautiful structures built of this stone. The Federal building, which was erected twelve years ago, is a splendid illustration. So is the Idaho state capitol, a picture of which accompanies this article. The color of this stone is a soft, delicate buff. According to sculptors, Boise sandstone carves as well as the best quality of the celebrated Bedford limestone, and it is a much faster stone to carve.

As proof of its fireproof qualities, the Soldiers' Home near Boise was destroyed by fire, but every piece of stone in the building remained intact and was used without any additional pieces when the Home was rebuilt. Everything burned up but the stone, and that is still just as good as the day it was erected.

Special reference is made to the Boise City National Bank building. One section of this building was erected twenty-two years ago, and to this an addition was built fifteen years later. The fact that it now requires the closest observation to locate the point of contact between the two sections demonstrates the permanency of the color of the stone.

The quality of sandstone when used as a building material must have in addition to a color that is satisfactory, durability. This depends largely upon its capacity to resist the action of the weather. Hence corrosion, freezing and impact tests tend to show what may be expected from stone treated in this way, but observations of the behavior of stone under conditions of actual use are of infinitely more value than the determination of its crushing strength in a testing machine, as the strength of a stone pier is ordinarily only about one-fourth of that of the stone itself on account of the failure of the mortar joints, as the one-to-three cement mortar made under usual conditions will not exceed a crushing strength of about 1350 pounds.

Boise stone became recognized as among the best building materials in the west years ago, but only recently has it been possible to put it into active competition with the output of other states.

Although having but fairly started its operations the company has shipped stones to all parts of the Pacific coast, and the market for it is constantly growing. The stone has gone to Spokane, to Los Angeles, to Portland, to Vancouver, B. C., and to other outside points.

Possessing the three qualities essential in the view of architects and builders, texture, color and firmness, while yet easily and cheaply cut and trimmed, it has taken the lead wherever it has been exhibited.

The company now has an order for 30 cars for a new college building at Pullman, Wash.

The company's holdings consist of an immense quarry on Table Rock mountain, two miles east of the city of Boise, together with ample ground below and adjoining the railroad for shipping and treatment purposes. It is claimed to be the finest quarry in point of quality, quantity and accessibility in the west. Even if shipments should reach a much higher figure than expected, it is estimated it would require 50 years to work out the quarry.

THE FLOOR QUESTION

The Office Floor

General Offices Louis Sloss & Co., San Francisco
Ward & Blohme, Architects

Nonpareil Cork Tiling is used in these offices primarily because of its silence to the tread and its permanent elasticity. The floor has been treated architecturally to correspond with the artistic character of the balance of the work. As each tile is laid separately and individually, the construction of the floor is obvious, therefore distinctly architectural.

Durable, Soft, Quiet, Sanitary, Non-Absorbent, Artistic and Architectural in Appearance.

Some Prominent Buildings with NONPAREIL CORK TILE FLOORS

Alaska Commercial Building, S. F., Cal.
German Savings & Loan Society, S. F., Cal.
Farmers & Mechanics Bank, Sacramento, Cal.
First National Bank, Los Angeles, Cal.
Solano County Court House, Fairfield, Cal.
Stanford Memorial Chapel, Palo Alto, Cal.
Guarantee Trust Company, New York
National City Bank, New York
Curtis Publishing Co. Building, Philadelphia, Pa.
Peoples Gas Building, Chicago, Ill.

SPECIFICATION—Cork Tiling, like any other material, should be a certain standard. To secure this standard, write us for Standard Cork Tile specifications, or specify *NONPAREIL CORK TILING.*

Nonpareil Cork Tiling—The Ideal Floor

David E. Kennedy, Inc., SHARON BUILDING, SAN FRANCISCO

Distributors for the Armstrong Cork Company

Write our nearest office for Catalog "D" and samples

Boston Philadelphia Cleveland Chicago St. Louis Montreal Atlanta

Novel Type of Concrete Construction

Architects and engineers are manifesting considerable interest in the Physicians' building, now under construction at the northwest corner of Sutter and Powell streets, San Francisco, by McLaren & Peterson, in accordance with plans by Architect Frederick H. Meyer.

The construction is novel, and this building is the first of its type to be erected in San Francisco. The building is Class A with the usual column construction, but the floors, instead of being carried on beams in the ordinary way, are made of concrete slabs six inches thick, carried directly upon the columns. Three-inch tie beams are used between the columns simply to hold them in their correct locations, but not for carrying any load in the completed building. They are used, however, during the construction of the building to support the forms for the reinforced concrete, in order to save time in erection.

The form work in this type of construction is simple, no framing around beams being required, but simply a flat deck for the under side of the slab. The thickness of the floor construction, that is, from finished ceiling to finished floor, is quite small in this building, being less than a foot, so that there is a saving in each story of about one foot of height of building, amounting in an eight-story building, of course, to something like eight feet.

There is also economy from the fact that no floor beams are required, except around the exterior walls, and excepting the small tie beams. As there are no beams or girders used in construction of the floor, no hanging ceiling is required, the plaster being put directly on the bottom of the concrete slab which is level on the bottom throughout. The type of construction exemplified in this building was developed by C. H. Snyder, engineer.

Metal Mouldings and Shapes

A book of sections, reproduced actual size, of drawn metal mouldings and shapes issued by Dahlstrom Metallic Door Co., Jamestown, N. Y., will be found a helpful guide to architects in designing metal finish for interiors.

Efforts of manufacturers have enabled architects to introduce decorative features in all-metal construction, that eliminate that austerity of appearance previously marking the fire-proof interior.

The metal mouldings or trim and the metallic door can now be made to present all those agreeable contours of line and form that heretofore were only possible in wood construction.

This pamphlet, which measures 10 by 14 inches and bound by the loose leaf sytem, will be mailed to architects on request.

A House With Naught but Round Corners

(From The Sacramento Bee)

The new home being built by J. Harry Wygant at 2110 X street recalls the days of early California and ancient Palestine because of the flat roof, when viewed casually, but a closer inspection discloses details of modern construction.

The dwelling is unique in many particulars. Wygant is building it at a cost of about $4,000 out of hollow tile so arranged as to permit a free circulation of air from the basement upward at all times. In this way Wygant hopes to maintain a cool summer temperature in the house.

All the windows are broad, giving unusually good lighting, and the living room, 29x13 feet in size, has a skylight and dome in the flat roof, which gives still better light.

Among the conveniences is a fuel elevator, the shaft for which adjoins the ample fireplace, and is disguised as a book case. The elevator is to be loaded in the basement and then lifted by a small windlass to the level of the first floor.

There is not a square corner in the house, all being rounded to permit easy cleaning. The kitchen and bathroom floors are of German stone, and the breakfast room floor is of cork.

A Paint for Concrete Structural Buildings

(Contributed)

Concrete buildings, while undoubtedly proving the best investment of any building structures in this age, generally present a distasteful appearance on account of the patchy effect of the exterior surface, while the interior of such buildings, although being perhaps as good light reflectors as wood or brick, leaves much to be desired for manufacturing purposes where good and inexpensive light is necessary.

Numerous attempts to remedy these faults have long been made with ordinary oil paint and on account of the natural dampness and the alkalies present the oil paint coating failed in durability and peeled off in sheets.

It will be noted on many concrete structures, especially near the ground, that owing to our changeable climate there is a tendency for the walls to develop cracks. Some authorities attribute this to the action of frost during the first winter before the concrete has had time to harden, but whatever the cause may be, a coating which protects from the weather and dampness answers not only as a preservative, but also, at a small expense, gives a more pleasing effect.

The usual method with the Muralo Company's Concreto Cement Coating is to apply one or two coats of paint of the same shade as the cement on the exterior of the building, and a coat of white Concreto Cement Coating on the interior.

The proportions for mixing the paint for application with a kalsomine brush to a cement surface are about six to seven gallons of benzine or other suitable thinner to 100 pounds of the paste paint; hence 100 pounds of the Muralo Company's Concreto Cement Coating gives about twelve to thirteen gallons of good covering paint, but for application by machine it should be thinned down still further. This paint has wonderful capacity and far reaching properties, forming a compact hard surface without gloss, and in the white gives excellent light-reflecting qualities.

Frank G. Drum Succeeds Wakefield Baker

At a recent meeting of the Pacific Portland Cement Company in San Francisco the following directors were elected: Frank G. Drum, R. D. Robbins, Alexander Hamilton, Fred Reis, Jr., W. F. Detert, John D. McKee and John G. Sutton. Frank G. Drum was elected president to succeed the late Wakefield Baker, with R. D. Robbins as vice-president; F. W. Erlin, secretary, and R. B. Henderson, treasurer and general manager. The annual report showed a prosperous year for 1913.

Book Reviews

THE HOLLOW-TILE HOUSE. By Frederick Squires, A. B., B. S. With 215 illustrations, chosen from foreign and American sources. Cloth; 7½x10 inches. New York: The William T. Comstock Co. Price $2.50.

If hollow-tile houses appear as well when finished as the book which bears their title they must be good indeed. Yet the things that make up the book are pictures of these self-same hollow-tile houses and as far as external appearances go, the architectural treatments possible in stucco and in the new "texture-tile" are most satisfactory. Mr. Squires has applied his architectural talents to book building, and his result is a most harmonious product. His illustrations have been chosen from a vast supply and he has presented the best work of some of our best American designers. Furthermore, the view points from which his pictures are taken show the dwellings to the greatest advantage, and any architect in looking over the work will appreciate the care with which the illustrations have been studied. There may be beauty in a building and a photograph may most appropriately bring this out if thoughtfully taken, or if awkwardly taken prove disastrous. There is art in photography, and this book, if for no other reason, would recommend itself because of the artistic handling of the illustrations.

The author has given us 15 short chapters which tell the whole story of tile, its manufacture, the English and European precedents for the use of stucco in covering its surface, somewhat about design, what architects design for themselves, and for the other fellow, the most recent devices for the treatment and decoration of stucco, and finally the development of tile as an exterior finish in itself. In working up to this point, Mr. Squires has ransacked the realm of architecture and shows us how units in brick work have developed the effect of large scale units in wall surfaces, and finally the "texture-tile."

The utilitarian side of the subject, that is, methods of construction for the walls and floor systems, is graphically presented with several new schemes which have been developed by the author himself. Besides, there is a very interesting plea, backed up by the best of precedent, for the use of flat, easily fireproofed roofs in house construction.

HOW TO FRAME A HOUSE, OR HOUSE AND ROOF FRAMING. By Owen B. Maginnis, author of Bricklaying, Practical Centering, etc. Illustrated and explained by 159 drawings of houses, roofs, etc. Seventh edition, revised and enlarged. Cloth; 6½x9½ inches. New York: The William T. Comstock Co. Price, $1.50.

This latest revised edition of "How to Frame a House" contains all the material that made the previous editions so useful and valuable, and in addition a great deal of new matter which much extends the

scope of the book and furnishes information on many subjects not elsewhere accessible. The main portion, as formerly, consists of a practical treatise on the latest and best methods of laying out, framing and raising wooden houses. The system of roof framing is most simple and can be understood by any practical workman. The method of wood framing in connection with brick buildings is also most practical.

In fact, one of the strongest recommendations for Mr. Maginnis' entire presentation of his subject is his direct and graphic method, explained in simple language. This makes the book useful to the practical man without scientific training, and does not injure it for the use of the expert.

The diagrams are as clear and direct in their instruction as the text. The additional matter covers subjects which are not obtainable in other text books, such as the methods of rustic carpentry and joinery, methods of house moving, and miscellaneous framing, such as the building of review stands, grain elevators, boat houses, wooden bridge work and large wooden trusses.

Glass! Glass!! Glass!!!

More than a thousand tons of glass will be used in the construction of the buildings at the Panama-Pacific International Exposition, 550 tons having already been contracted for to be used on eight of the main exhibit palaces. In the Machinery Palace alone there are 28,000 panes of glass in the facades now installed and 60,000 square feet of glass in the skylights. When it is considered that 1,000 tons of glass in panes of the average thickness would cover an automobile road, eight feet wide, from San Francisco to Los Angeles, a distance of 500 miles, and leave quite a bit over, some idea of the immensity of these figures may be gained.

A Good Appointment

The Stanford University has made a notable appointment in securing the services as business director of W. Vanderlynn Stow, formerly president of the Thomas Day Co. of San Francisco. Mr. Stow made a good record for himself in the lighting fixture business, and his removal from San Francisco will be deeply regretted.

Mr. Chas. Wright

General Contractors' Association New Officers

THE Newly elected Board of Directors of the General Contractors' Association of San Francisco, at their meeting on March 9, elected Mr. Chas. Wright president for the ensuing year; Mr. A. H. Bergstrom, vice-president; Mr. Chas. W. Gompertz, treasurer, and Mr. Wm. E. Hague, secretary. The election of each of these officers was unanimous with the board and undoubtedly the Association will prosper under their management. In electing Mr. Wright to the presidency somewhat of a precedent was established, as the previous vice-president has always been elected to the presidency.

Mr. Wright, some four years ago, was one of the charter members of the Associated General Building Contractors and was largely instrumental in bringing about the formation of an association of general contractors, which has resulted in the large amalgamated organization of today. As a general contractor he stands high in San Francisco building circles.

Fireplace Contract

Eri H. Richardson, Hearst building, San Francisco has been awarded a contract for $11,880 for extensive fireplace work in the San Mateo residence of C. Frederick Kohl, Howard & Hoyt, architects, Lick building, San Francisco.

FIREPROOF MANUFACTURING PLANT OF THE GURNEY ELECTRIC ELEVATOR COMPANY

New Firm Enters San Francisco Elevator Field

The Pacific Gurney Elevator Company is the name of a new enterprise that recently has entered the San Francisco elevator field. Its personnel should assure the immediate success of the company, comprising as it does men of wide experience in this line. Mr. A. R. McLaren, for more than ten years sales manager for the Otis Elevator Company in San Francisco; Mr. W. A. Monahan, formerly superintendent of repairs for the Otis Elevator Company in San Francisco, and Mr. P. L. Pettigrew, make up the executive force of this new concern. The firm is introducing on the Coast the Gurney Electric Elevator Company's varied line of elevator products, including original and standard types embodying the newest devices in electrically-driven elevators.

Within the past month several important contracts have been signed for the installation of Gurney elevators in San Francisco buildings, including the Young Men's Institute building, now being constructed on Van Ness avenue from plans by Architect William D. Shea, the Cowell building at the corner of East and Market streets, from plans by Architect Henry H. Meyers; also two passenger machines in the State Capitol at Sacramento and a large freight lift in the Sacramento Company's warehouse.

An unusually complete manufacturing plant has just been finished at Honesdale, Pa., for the Gurney Electric Elevator Company. This company was formed in 1905, when H. F. Gurney, the president, purchased the business and plant of the National Elevator Company, which had been manufacturing electric elevators since 1895. Since this reorganization, the business of the company has steadily grown so that increased manufacturing facilities became necessary, resulting in the erection of an entirely new plant.

The general type of construction is steel frame, brick curtain walls, monitor and sawtooth roofs, with steel sash throughout. As the site is situated adjacent to the right-of-way of the Delaware & Hudson Railroad, sidings enter the property and give direct connection with not only the Delaware & Hudson, but also with the Erie Railroad, which operates over the Delaware & Hudson tracks at this point.

The product of the company consists of electric elevators for both passenger and freight service. As it manufactures practically every part of the elevator equipments, it was necessary to provide for the following departments: Gray-iron and brass foundries, pattern shop and pattern storage, light and heavy machine shops, woodworking shop and dry kiln, forge shop, structural shop, electrical department, assembling and shipping departments. These diversified classes of manufacture make the plant unusually complete and of more than ordinary interest.

The Gurney Company has enjoyed special success in the manufacture of traction elevators for high buildings. A brief

history of the progress made in this type of machine will be found interesting:

Among the first was the type with its two motors, small sheaves, excessive rope wear and complicated control, followed by the Hiss-DeBuren, with its intricate roping and counter-weighting. Neither of these types met with success.

Then came the "One to One Traction," a type still used by some manufacturers today which the electric motor is directly connected to the traction, or driving sheave, so that when the motor makes one revolution the driving sheave also makes one revolution—hence the name. In this machine, the car motion is obtained by the traction or friction of the ropes on the driving sheave.

In the One-to-One type, an electric motor which is naturally a high-speed machine, is used operating at a very low speed (a maximum of 63 revolutions per minute for a car speed of 600 feet per minute). This necessitates the use of a 200 h. p. electric motor frame where only 35 h. p. is needed, and such a motor weighs approximately 13,000 pounds as against a weight of 4,000 pounds for the 35 h. p. motor of medium speed. Such a slow speed motor is expensive as to first cost, as well as in the matter of repairs and current consumption. It is of low efficiency, difficult of control, has a poor speed regulation, and there is liability of frequent trouble with brake, armature, commutator, and controlling devices. In order not to be compelled to run this motor at even a slower speed, small traction sheaves must be used, with consequent excessive rope wear.

The use of a 200 h. p. motor frame makes the elevator machine excessively heavy. Most traction machines are located directly over the elevator hatchway, and the great weight of this One-to-One type necessitates extra strength and weight in the steel structure of the building. The motor frame and other parts are so heavy that permanent overhead cranes are usually necessary in order to assemble and dismantle the machines, and, frequently, two or three days are required for making motor repairs. The large brake on these machines, operating on a slow-moving brake shaft, requires frequent adjustment, and in consequence poor stops are made.

In the Gurney Traction machine Helical gears are used in reducing the speed of the motor to a desired speed for the traction sheave. This permits the use of a normal size electric motor operating at its most efficient speed and at once gains a great efficiency over the slow-speed one-to-one type motor.

Speaking about the merits of the machine, a representative of the company said: "Our helical gears are of such high efficiency that, together with the high efficiency of the normal speed motor, we have a machine that has a greater efficiency than any other elevator machine on the market. While our machine is built with greater strength in the working parts, the normal size of the motor makes a completed machine that is less than half the weight of the One-to-One traction machine, and occupies very much less space. It can be placed at the top of the elevator shaft in any battery of elevators without double-decking. The traction sheave can be as large as desired, and consequently undue rope wear is eliminated. We also use the standard brake, such as is used on the drum machine, and this type of brake does not require the frequent and delicate adjustment which is necessary with the brake used on the One-to-One traction machine.

The introduction of traction elevators for high-speed service created a demand for traction elevators for slower speeds, viz.: 200 to 400 feet per minute, and led to the substitution of the traction sheave for the drum, or the worm-gear drum type.

The Gurney Elevator Company builds a worm-gear traction elevator of both the single and double (tandem) worm-gear types for elevators of medium speed and duty.


PACIFIC
BUILDING
MATERIALS
COMPANY
A. S. LILLEY
L. D. WADDELL
F. C. PRICE
E. M. EDDY

Strong Financial Backing Characterizes This New Building Material Corporation

IT MAKES a lot of difference with an architect when specifying a building device or material, if he knows that the distributing agency is a responsible one. If the men behind the gun are familiar with their lines, and if they are backed by good credit, the architect knows he will be given the right kind of service.

In the Pacific Building Materials Company, recently incorporated under the laws of the state of California, with a capital of $500,000, the architect will find just such an organization as he has been want to deal with. The Pacific Building Materials Company is a consolidation of the Waterhouse & Price and Lilley & Thurston Companies, two of the oldest and most reliable manufacturers' agents and jobbing houses in California. The new concern does not assume any of the obligations of the old companies, other than to take over their various agencies and accompanying good will. The Pacific Building Materials Company starts with a clean slate and a financial backing second to no one similar corporation on the Pacific Coast. In the matter of credit it refers to the Crocker National Bank and the Wells Fargo Nevada Bank, both of San Francisco.

The time is past when a building material business means merely having a warehouse and doling out to contractors the various materials as they are asked for. It is now largely a question of "service" to the architectural and engineering profession; furnishing them with details, information and data of the various types of materials to be specified in each particular case. For this reason the caliber and personnel of the men composing the Pacific Building Materials Company, besides the question of financial backing, will be vital factors in the advancement of the business.

The large saving which will be made in consolidating warehouses, clerical forces and overhead expense of various kinds will enable materials to be sold at the lowest possible prices and yet leave that margin which it is imperative to have to cover the "service" mentioned above.

The personnel of the new company includes Mr. L. D. Waddell, manufacturer, formerly of Chicago; Mr. Alexander S. Lilley, president of the Lilley & Thurston Company; Edwin M. Eddy, prominent in the lumber industry on the Pacific Coast, and F. C. Price junior member of the firm of Waterhouse & Price Company. Mr. C. J. Waterhouse, president of the Waterhouse & Price Company, though retiring from active business, will be a stockholder in the new concern.

The engineer for the Pacific Building Materials Company will be O. P. Shelley, Assoc. Mem. Soc. C. E., who has in the past been identified with the Lilley & Thurston Company.

The offices of the Pacific Building Materials Company are at 523 Market street, San Francisco, where architects, engineers and contractors are always welcome. It is the wish of the new company that those out of town may use these offices as their headquarters when in San Francisco.

The Last Word in Paints

(Contributed)

Paint is universally used as a preservative. It is a product invaluable. Any invention that will increase its efficacy is to be welcomed throughout the entire world.

Caementum paint, the agency for which is held by E. M. Wiley, whose office is at 706 Mills building, San Francisco, is the last word that can be said of that product.

The process by which it is manufactured was discovered by Mr. Charles Dopson of Dieppe, France, one of the foremost chemists of Europe.

Through the enterprise of Mr. Wiley the paint is being exploited throughout the west, and the success with which it has been received is an indication of its great merit.

Without going into the technical nature of Caementum paint, suffice it to say that this material is not only dirt proof, germ proof, water proof and fire proof, but is a non-conductor of heat and electricity, and when once dry becomes hard as carbon.

It can be scrubbed with alkali without the slightest damage.

It has been used very successfully by the Trans-Atlantic liners, being used on smoke stacks, boilers and bottoms, and has prevented barnacles, rust and corrosion.

For galvanized iron it absolutely prevents rust and is a perfect preservative.

No invention in the field of domestic industry has caused so much discussion as has this discovery, and it is predicted that the exploitation of Caementum paint will cause a revolution in the paint industry.

Mr. Wiley, the sole agent for the territory west of the Rocky Mountains, imports the paint direct from France.

The remarkable consistency of this paint, together with the enthusiasm with which it has been received by manufacturers, merchants and steamship men of the Pacific Coast assures the company that it has entered a very appreciative field.

Announcement

Mr. C. J. Waterhouse announces that the Waterhouse & Price Co., of which he is President, has disposed of the rights for northern California and northern Nevada in various well-known building specialties for which his firm are Pacific Coast agents, to the Pacific Building Materials Company, a new corporation, which will have the sale of these lines in the territory above mentioned. Waterhouse & Price Company will continue to handle their full lines in all other territory, including southern California, Oregon and Washington.

County Free Library Competition

A prize of $50 is offered for a striking design for the county free library building, a competition conducted by the California Library Association, which will close June 1. Mrs. Frances Burn Linn, chairman, at Santa Barbara, has charge of the prize contest.

Statue of Sheet Metal

Monotti-Larimer Co.
San Francisco

Macdonald & Applegarth
Architect

UNITED SASH

FOR EVERY BUILDING

There is a particular type of UNITED SASH for every building construction of a permanent nature. Standard Sidewall Sash, with pivoted ventilators or vertical sliding with either spring balance or counter-balance. or horizontal sliding; Partition Sash and Doors: Casement Sash for highest class office-building, residences. churches, etc., having a very superior appearance and attention to detail.

UNITED SASH is machine made throughout in powerful 300 ton presses, which insure absolute accuracy of size and finish. The details of construction permit of any size lights and arrangement of ventilation. Various sizes of units combined with expandible mullions will allow wide variation to conform to architectural requirements and lines.

UNITED SASH is permanent, economical, fire-proof construction. We will promptly furnish Sash designs and estimates upon application, covering any building proposition.

TRUSSED CONCRETE STEEL CO.

Spokane Seattle Portland San Francisco Los Angeles San Diego

OLYMPIC CLUB *of* San Francisco

EXTERIOR COATED WITH

GLIDDEN'S STUCOLOR LIQUID CEMENT

After **three year's exposure** to the varying Elements peculiar to San Francisco, it proudly invites the

INSPECTION OF ALL CRITICAL ARCHITECTS

OLYMPIC CLUB, SAN FRANCISCO — JOHN BAUER, Architect

GLIDDEN'S STUCOLOR LIQUID CEMENT COATING is the one satisfactory cement paint to dampproof and render uniform all exterior surfaces of **Concrete, Cement, Stucco, Unglazed Tile, Brick or Stone,** without changing the surface texture. It produces a very decorative effect and dries perfectly flat. Many of the best buildings in San Francisco and Los Angeles bear striking evidence of the great adaptability of this material to fill certain requirements made necessary by the climatic conditions of the Pacific Coast. It is made in 12 popular colors and white, and covers from 100 to 150 square feet per gallon, first coat. On surfaces of close texture, the covering capacity is 30% greater.

Architects' specifications, working samples, color cards, descriptive matter, etc., mailed upon request to the Pacific Coast distributors.

Whittier - Coburn Co.,
301 Howard Street
SAN FRANCISCO

Tibbetts - Oldfield Co.,
908 So. Main Street
LOS ANGELES