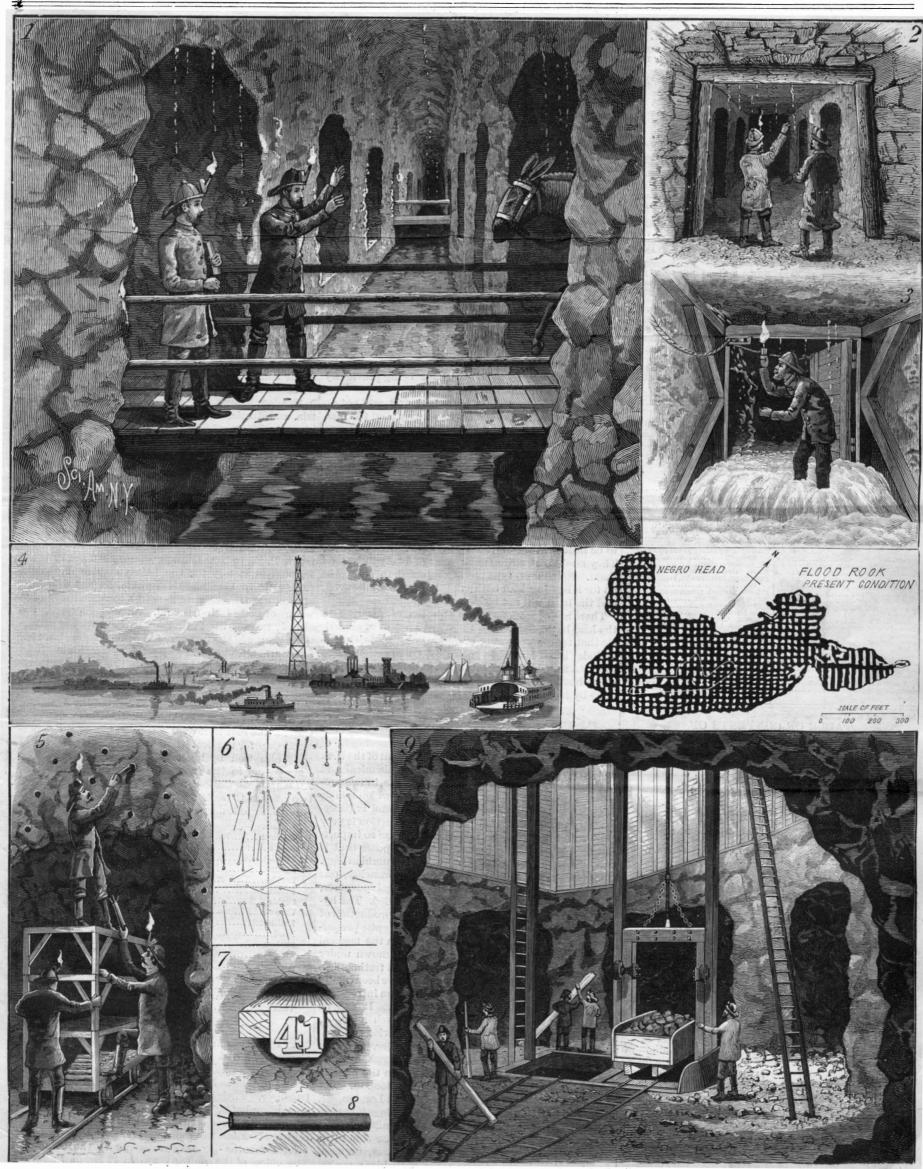
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LIII.--No. 4.]

NEW YORK, JULY 25, 1885.

\$3.20 per Annum. [POSTAGE PREPAID.]



FINAL OPERATIONS FOR THE REMOVAL OF FLOOD ROCK HELL GATE N. Y .. - [See page 53.]

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, six months, postage included.....

Clubs.—One extra copy of The Scientific American will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid. Remit by postal order. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The Scientific American and will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 381 Broadway, corner of Franklin Street, New York.

Scientific American Export Edition,

The Scientific American Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates es of the four preceding weekly issues of the Scientific Ameri CAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the wor.d. Single copies, 50 cents. Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The Scientific American Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, JULY 25, 1885.

Contents

(Illustrated articles are marked with an asterisk.)

Alaska, glacier, great 57	Lemons, eating	52
Architecture, crazy quilt 49	Lubricator, improved*	51
Ashes, coal, for heavy soils 54	Lubricator, improved*	52
Bath, lead, the	Microscope in the mechanic arts*	54
Boiler cleaner, improved*	Mole, structure of	
Business and personal	Naphthol	
Carriage by electric wire 49	Notes and queries	59
Chair, rail, improved*	Oregon, the	57
Climatology of the Puget Sound	Ourselves as others see us	50
country 40	Photography thirty years ago and	04.
country	to-day	56
Colors in sealing wax, meaning of 50	Photometer, alarm	59
Electric measurements, appara-	Piano, silex, Baudre's*	
tus for, Lippmann's.* 50	Poisoning, rattlesnake, treatment	
Flood rock, removal of, final oper-	of	56
ations for*	Printing, calico, progress in	59
Ghetto of Rome	Race, yacht, steam	
Glacier of Alaska, a great	Railway economy	5
Hammock, covered, portable* 55	Rein holder*	59
Iguana and how it is caught* 57	Science. American Association	04
Interiod of the forman and the state of the	for the Advancement of	59
Ink, indelible, for paper	Shoes, old, remade	
	Steam for extinguishing fires	61
Inventions, mechanical, influence	Toads, new use for	50
of	Tomb, violation of after six hun-	9
Inventions, agricultural 58	drod wooms	5.0
Inventions, engineering 58	dred years	50
Inventions, index of	Torpedo, skyrocket	40
Inventions, miscellaneous 58	Tricycles, motive power for	#
Iron as fire resisting	Vat, liming, improved* Yachts, steam, remarkable race of	7
Lamp, incandescent, new 54	raches, steam, remarkable race of	40

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT.

No. 499.

For the Week Ending July 25, 1885.

Price 10 cents. For sale by all newsdealers.	j	
PA	GE	
I. ENGINEERING.—The International Bridge over the River Mino.		
—With engraving	7959	
What is the Best Material for Street Railway Rails?-By A. W.	1	
WRIGHT		
A Torpedo Boat at Paris.—2 figures.		
New Bridge over the Kennet River, Reading.—5 figures	1901	
Nordenfelt Machine Guns at the International Inventions Exhibition, London.—9 figures	7061	
II. TECHNOLOGY.—Waste in Cotton Mills		
Canned Food	7964	
On the Employment of Gas for Cooking.—By W. I. MACADAM.—Advantages of gas over coal.—Cost.—Composition of coal gas.—		
Heat of combustion.—Gas from cannel coal and from ordinary		
	7966	
HI. ELECTRICITY, HEAT, ETC.—The "Bassano-Slater" Improved		
Telephone.—3 figures	7069	
The Hydrodynamic Researches of Prof. Bjerknes.—By C. W.		
COOKE	7968	
On the Conversion of Heat into Useful WorkBy WM. ANDER-	- 1	
SON.—An interesting lecture delivered before the Society of Arts.		
-5 figures	7969	
IV. ARCHITECTURERousdon Observatory, DevonWith en-	- 1	
graving	7967	
St. Paul's Vicarage, Forest Hill. Kent.—An engraving	7967	
V. GEOLOGYThe Eroding Power of IceBy Prof. J. S. NEWBER-	- 1	
RYGlacial topographyThe drift depositsThe excavation of	i	
lake basins.—Mode of glacial erosion	7971	
VI. NATURAL HISTORYLife at the Bottom of the SeaWhy	. [
deep sea fish have eyes.—Eyeless fish of caves.—2 engravings	7974	
VII. BOTANY.—North American Ferns.—With engraving	7972	
Anchomanes Dubius.—With engraving	7972	
VIII. PHYSIOLOGY, HYGIENE, ETCLactic Acid in the Stomach.	7965	
On a Variation in the Size of an Image on the Retina according		
to the Distance of the Background on which it is seen.—By ALFRED		
BROTHERS.	7966	

THE LEAD BATH.

Melted lead for heating steel articles to be hardened thickness, so that the part to be hardened could be heated; while that to be left annealed need not be greatly warmed; but it has been proved that a more even heat can be obtained on articles of even size, as well as on those of varying dimensions, by the lead bath, and that the heating can also be done quicker than over a charcoal fire. There is another advantage in the lead bath heating, one of great convenience at times, and that is that the article to be heated may be kept an indefinite time in the hot lead without being burned; it will not get beyond the proper heat for hardening.

There is an improper use of the lead bath in the attempt to employ it for drawing to temper; the bath will do its absolute will, and as evenly and indiscriminately reduce the hardness as it heated the steel. This uniform drawing is not always desirable; there are tools and other pieces that require careful management and much humoring to bring them to their proper degrees of temper. This cannot be done in the evenly heating lead bath; the proper drawing is either over a clean charcoal fire or in a bath of heated sand. Whenever the last can be used, it is preferable on all

Of course, such drawing must be done to color, and this is one of the advantages of the lead bath for heating for hardening; the steel does not contract an oxide so thick or so discolored that the steel itself may not be seen. In heating for hardening in a fire the surface of the steel is burned, so that it contracts a coating that must be removed by direct abrasion, before the true surface of the steel can be seen. But in lead heating the lead appears to be a defense against the oxygen of the air, and the steel comes out clean. The writer has made tests that prove that the surface of machine polished steel coming from the lead bath, and being of the Swedish Army and Physician in Ordinary to the chilled in a pickle or in water, will show every grada- King, etc., Surgeon-Major H. W. Hulphers, Physician tion of color as to temper without being previously scoured or brightened.

The lead bath must be of pure lead. It will not do to use the sheet lead of old eaves, gutters, and the pipe of old drains from sinks, eaten half through with at-himself with one of Stockholm's most prominent firms, mospheric acids and the worst corrosives of the kitchen: the lead must be chemically pure. Buy known house, Mr. C. M. Ohrnell, is now here in New lead in pigs from the mines—the Galena brand is reliable-or buy the somewhat higher priced bar lead. Both are as nearly absolutely pure as is possible. Melt in a plumbago crucible or an iron pot. Heat the lead to a cherry red and keep it so. Cover the surface with charcoal dust. Suspend or immerse the articles to be heated in the bath until they are heated through. They need no attention until you are ready to harden them. No pewter, type metal, or junkshop stuff will do for a heating lead bath; the heat cannot be even, and the bath will not be clean.

There are exceptions to the objection of drawing in the lead bath. Sometimes there are portions of an article that require softening or annealing, while the remainder is left hard. In such a case the portion to be softened may be immersed in the bath and be annealed without affecting the other portions, as would be done by radiant heat.

A New Swedish Invention.

The Swedish civil engineer A. F. Westerlund, of Stockholm, has lately obtained letters patent of the U.S. for a very useful invention within the chemical and technical branches of science. It consists in the production of an almost incombustible coal, which stands between the graphite and the diamond, and is consequently named diamond coal. Its production is very simple and inexpensive, and the invention so important for both hygienic and technical purposes that it can almost be looked upon as the Columbian egg. This invention can be divided into two branches, one for hygienic and the other for technical purposes, which latter have not yet been fully compiled. The hygienic part is based principally upon the production of oal in felt form, which through its antiseptic properties has created quite a sensation within the medical fraternity, both here and abroad. It is known under the name of carbon wadding. The highest testimonials of the first military surgeons of Sweden have been gladly given to the carbon wadding, and it has been introduced into the principal hospitals in London. It can be made from any vegetable substance, such as moss, hay, straw, cotton, paper, cork, wood shavings, etc.

Prof. Esmark, Surgeon-General of Germany, has given the invention the very best recommendations, and the carbon wadding is now in use in the English navy. A large shipment has gone to the Soudan. The Samaritan Society's most active member in London, Mr. Macleer, considers it one of the best dressings for exter- ores, phosphates, etc., are the first ever constructed nal injuries, to be applied as the first bandage in any where the material crushes and grinds itself, and recase of necessity, and says that no home should be cent testimonials from various parties using them for without it. Every conductor, police officer, fireman, several months are very gratifying to the company. and traveler should always carry with him a pocket The offices of the company are at 89 Mason Building,

occupy more room in the pocket than a small cigar case. In the United States the carbon wadding has has become quite common in shop use. There was a met with favorable results, considering the short time time when it was employed only for articles of varying it has been here. Prof. Lewis A. Sayre, Dr. Pihlgren, Dr. Hazelton, Dr Phelps, Dr. Theel, and others speak of it in the highest terms. For disinfectant purposes the diamond coal is said to stand alone, unrivaled.

It would be impossible in a small space to state all the particular advantages of this invention for technical purposes, but we shall mention a few of the principal ones. It is one of the best insulators for cold or heat, and has as such caused considerable attention both in Europe and here. For steam packings it is said to be without a rival, because it is an excellent nonconductor of heat, and is very light. It is stated to be the best filling for safes, refrigerators, etc., and for this purpose only it may be considered of inestimable value. For producing fireproof roof coverings, mortar, painting woodwork, railroad bridges, etc., to prevent them from destruction by fire or rot, the diamond coal has a very promising field.

Extensive experiments have been made with the diamond coal in the electrical field, and it has shown even here its real value, and promises, so we are told, to be the best material for the carbons in the electric light. Other uses for this invention are in the manufacture of dynamite and gunpowder, for, by a very simple chemical process, it can be completely converted into charcoal of the purest quality. Several other uses can be made of this coal, and it is alleged that Mr. Westerlund, by his invention, has given the world a new material, which will most forcibly make its headway into the different branches of industrial interests.

This invention has been shown and recommended by the principal chemists and physiologists, and such eminent men as Professor A. E. Nordenskiold, Professor Erick Edlund, of the Academy of Sciences, etc., Professor V. Eggerts, of the College for the Sciences of Mining, etc., Professor E. M. Edholm, Chief Surgeon to the King, and many others.

Patents have been obtained, besides the United States, in Sweden, France, England, Germany, Belgium, Austria, and Russia. Engineer Westerlund has associated Elfwing & Co., and one of the principals of this well York, where he has opened an exhibition of this new invention at Cooper Institute, room 25.

----Remarkable Race of Steam Yachts.

The second annual regatta of the American Yacht Club, on the 16th of July, over the course from Larchmont, N. Y., to New London, Conn., distance 92 miles, resulted in victory for the Stiletto. The day could scarcely have been more favorable, for not a breath of wind was stirring strong enough to ruffle the smooth waters of Long Island Sound. As was expected, the already famous little Stiletto was the center of attraction: she made the run over the course in 4h. 49m. 54s., coming in ahead of all competitors. Mr. Gould's well known yacht, the Atalanta, made the second best record, having taken but four minutes more than the Stiletto. Cramp's new yacht, No. 246, also did remarkably well, being only 13 minutes behind the Atalanta. Two prizes were awarded the Stiletto—the Commodore Cup for the best time over the course, and the Isherwood Cup for the best time in her class. Other cups were also won by boats in different classes. Emery Cup in the first class was not won, as the Atalanta was the only eligible boat, and it required two starters to make a race. Seventeen steamers were entered, as follows:

,		•
Name.	Draught.	Owner.
Lagonda	118 ft	J. C. Hoagland.
Radha		J. M. Seymour.
Promise	90 ft	A. De Cordova.
Stiletto	91 ft	John B. Herreshoff.
Lucille	63 ft. 9 in	John B. Herreshoff.
Norma	131 ft	Norman L. Munro.
Sophia	100 ft. 1 in	C. H. Osgood.
Utowana	122 ft	W. E. Connor.
Lucille	88 ft. 3 in	Jas. N. Waterbury.
Rival	87 ft. 8 in	J. A. Baker.
Skylark	74 ft. 3 in	A. E. Bateman.
Aida	90 ft	W. P. Douglas.
Atalanta		Jay Gould
		Cyrus W. Field, Jr.
Cramp's		Cramp & Co.
Hornet	37 ft	F. A. Mitchell.
Viola	52 ft. 9 in	J. P. Kennedy.

AT the last annual meeting of the Sturtevant Mill Company, Mr. E. C. Huxley, of Boston, was elected president, and has assumed the general management of the business. Mr. T. L. Sturtevant was re-elected treasurer. Their machines for crushing and grinding

Carriage by Electric Wire.

This is a wire line for carrying freight or passengers by electricity through the air. The wires or cables in double line, and about eight feet above the other, are are much more local, or are land breezes. corne upon stout posts about the same as the electric light cables are, and the cars or crates for carrying passengers or freight are suspended from the upper cable and supported or borne upon and guided by the under cable as if it was a rail. The lines are adapted to loads of a few hundred pounds each up to a ton weight, including the car, and, as in the case first mentioned, the in any desired number. The driving power is electricity, supplied by steam engines and dynamos at the termini of the line, the carrying cables serving as conductors, just as telegraph wires or cables do, the current being passed by means of the car wheel axles and intervening wires through an electrical motor, which operates under or at the side of the car and travels along with it. We have seen a model of this in operation, the model being large enough to carry a load | a large amount of the snow is wafted by these winds to of about one hundredweight over a line of about one hundred feet in length. The electrical motor used to in copious rains in the vicinity of our last named work this model was an Edgerton of the size employed to drive a sewing machine. So far as smooth movement and speed are concerned, and to all other appearance, the device works in a satisfactory way; but in ington Territory, and British Columbia. Their temthis as in all other matters of the kind, as the readers of the Ledger have been frequently advised, no safe judgment can be made until the machine has been in actual operation for a fair length of time, doing its work day in and day out.—Phila. Ledger.

Climatology of the Puget Sound Country,

The inland waters of Washington Territory, Puget Sound, and its tributaries are frequently called the Mediterranean of the Pacific Coast, and justly so, for they are equally exempt from equinoctial storms. Since the Weather Bureau was established on this coast, the highest wind has reached a speed of only about forty miles an hour. During an observation of thirty-one years, the lowest temperature ever recorded was 10° above zero. The highest for the same length of time was below 90°. But in the interior and nearer the mountains, even but a little above the sea level, there are greater extremes of heat and cold.

On this northwestern coast there are no extremes of cold in winter or of heat in summer.

The "Kurosewo" are Japanese currents that set over to the northeast from Japan as they pass to the south of the Aleutian Islands, and strike the coast of Alaska about 60° north latitude, are deflected, or turned to the south-southeast along the coast of Alaska, British Columbia, the United States, and Southern California, to Cape St. Lucas in latitude 22° N. This body of water has a current along the coast of one mile an hour. It is nearly five hundred miles off the coast and nearly one thousand fathoms deep. The year round this body of water is one-half a degree warmer off the coast of Sitka, Alaska, 57° N., than it is off the coast of Cape St. Lucas, which is 22° N.

This body of water all along this coast has a temperature of 55°, and does not vary from these figures more than 3° the year round; but increases some 10° as it passes to the westward.

Now, this body of water has lost one-half of one degree in traversing three thousand miles to the southquite one-half the distance from the North Pole to the equator. Probably the true cause of our mild winters is this vast body of water giving up its specific heat, and the aqueous vapor of the atmosphere giving up its latent heat by condensation, and vice versa for the Wear thinks, contains more truth than fiction: summer months.

with the warm current of water flowing along the coast, may be another cause for our mild winters.

From April 15 to Oct. 15 the prevailing air currents architecture. are from north to northwest. The atmosphere has given up its moisture by condensation in a cold climate. On its passage to the south it is dry and conheat as it moves toward the south. The dryness of during the summer months, which in Seattle, for exam- is time that we had a better understanding. ple (about 47° north latitude), never varies much from 60° Fahr. at night, when at midday the thermometer has run up to 84°. A fall of 24° in two or three hours is not uncommon.

Prof. Tyndall relates an instance in one of his ascents of Mt. Blanc where the heat of the sun was oppressive an amanuensis. Imagine the sensation that one of compressing pumps, the gaseous mixture for conwhile traveling over snow and ice, and by getting under these modern, sawed-off cottages would create a hunthe shelving bench of rocks the cold was severe. This dred years from now, if it should survive. But that is compressing pumps affixed to the frame of the vehicle he attributed to the dryness of the atmosphere at this impossible. The only cheering feature of the whole in front of the driving wheels and seat. The ignialtitude. He also says: "If it were not for latent heat matter is that these creatures of a disordered imagination necessary for the expansion of the gaseous mixthat is stored up in the aqueous vapor of our atmo- tion must soon pass away, and the bright sunlight of ture is effected by means of sparks from a tiny electric sphere, a single night would leave us in a frigid zone that hard horse-sense shine in through the shattered dor-machine, as in the Eteve engine, at the early part of would freeze vegetation from the face of the earth."

This phenomenon frequently presents itself here. The average summer resort. A friend of mine, a few days cranks on driving wheels shaft.

cirrus or upper clouds will be moving from the north to the south, when the cumulus are moving in an opposite direction. This shows that the summer winds

Another feature of the winters on this coast is the Chinook," or hot wind, which is a brisk breeze of thirty or more miles an hour. It will cut and melt eighteen inches of snow from the earth's surface probably quicker than a tropical sun.

It is not uncommon along the coast of California and Southern Oregon for three inches of water to precipitate cars are designed to be sent with great frequency and in twenty-four hours, and this with a driving south wind. The large amount of latent heat that is stored up in the aqueous vapors becomes specific by condensa tion in the warm or "Chinook" winds.

> These copious rains of California are a thousand miles south from Seattle, but the "Chinook" winds reach us unaccompanied by rain in twenty-four hours. In these "Chinook" winds the cumulus or lower clouds are passing very high in our atmosphere. Probably British Columbia and Alaska, to be again precipitated neighbors. These winds are not of a local nature; they extend over a vast area of the northwest on both sides of the Cascade Mountains, over Oregon, Idaho, Washperature in the vicinity of Seattle is nearly 70°.

CONSTANT READER.

Iron as Fire Resisting.

Some interesting and instructive experiments have been lately undertaken by Professor Bauschinger, of Munich, in reference to the safety of cast iron columns when exposed to the action of great heat. The Professor, having arranged some cast and wrought iron columns heavily weighted, exactly as they would be if supporting a building, had them gradually heated, first to three hundred degrees, next to six hundred degrees, and finally to red heat; then suddenly cooled them by a jet of water, just as might happen when water is applied to extinguish a fire. The experiments showed that the cast iron columns, although they were bent by the red heat, and exhibited transverse cracks when the cold water was applied, yet they supported the weight resting on them: while the wrought iron columns were bent before ar riving at the state of red heat, and were afterward so much distorted by the water, that restraightening of them was out of the question. In fact, if supporting a real building, they would have ntterly collapsed under the weight they had to sustain. The Professor therefore concludes, as the result of his experiments, that cast iron columns, notwithstanding cracks and bends, would continue to support the weights imposed upon them; while wrought iron columns would not. In experimenting on pillars of stone, brick, and cement concrete, the last was found to be the best. Cement concrete pillars withstood the fierce action of the fire for periods varying from one to three hours; brick pillars, as well as those of clinkers set in cement mortar, displayed great resistance; while natural stonegranite, limestone, and sandstone—were not fireproof. It would therefore appear that, of the several materials for pillars supporting weights, the best for fire resisting purposes were the cast iron and cement concrete.

Crazy Quilt Architecture.

The following from the pen of Bill Nye, in the Chattanooga Times, The American Architect and Building

It may be premature, perhaps, but I desire to sug-From Oct. 15 to April 15 the prevailing winds of this gest to any one who may be contemplating the erection northern coast are southerly, bringing air from a of a summer residence for me, as a slight testimonial of warm, tropical climate into a colder one, making the his high regard for my sterling worth and symmetrical rainfall, as you go north, about one and a half inches escutcheon—a testimonial more suggestive of earnest more to every degree of latitude. This southerly wind admiration and warm personal friendship than of causing rain, and a damp atmosphere, and together great intrinsic value, etc.—that I hope he will not construct it on the modern plan of mental hallucination and morbid delirium tremens peculiar to recent

Of course a man ought not to look a gift house in the gable end, but if my friends don't know me any better into this country, but of which we now hear nothing than to build me a summer house, and throw in odd This principle, says the *Electrical Review*, has been stantly picking up or restoring the aqueous vapor and windows that nobody else wanted, and then daub it applied to the propulsion of tricycles, and such a vehiup with colors they have bought at auction, and ap- cle may be seen in the Inventions Exhibition. It is the atmosphere is the probable cause of our cool nights | plied to the house after dark with a shotgun, I think it | stated that by the consumption of from three to five

> Such a structure does not come within either of the three classes of Renaissance. It is neither Florentine, Roman, nor Venetian. Any man can originate a to 15 miles per hour. The generator contains a supwhisky long enough, and then describe his feelings to hours, from which is evolved, by the aid of two small mers and gables of gnawed off architecture of the the outgoing strokes of the pistons in connection with

ago, showed me his new house with much pride. He ask me what I thought of it. I told him I liked it first rate. Then I went home and wept all night. It was my first falsehood.

The house taken as a whole looked to me like a skating rink that had started out to make money, and then suddenly changed its mind, and resolved to become a tannery. Then ten feet higher it had lost all self-respect, and blossomed into a full-blown " drunk and disorderly," surmounted by the smoke stack of a foundry, and with the bright future of thirty days ahead with the chain gang. That's the way it looked

The roofs were made of little odds and ends of misfit rafters and distorted shingles that somebody had purchased at sheriff's sale, and the rooms and stairs were giddy in the extreme. I went in and rambled around among the cross-eved staircases and other nightmares till reason tottered on her throne. Then I came out and stood on the architectural wart called the side porch, to get fresh air. This porch was painted a dull red, and it had wooden rosettes at the corners that looked like a brand new carbuncle on the nose of a social wreck. Farther up on the demoralized lumber pile I saw now and then places where the workman's mind had wandered, and he had nailed on his clapboards wrong side up, and then painted them with the Paris green that he had intended to use on something else. It was an odd-looking structure indeed. If my friend got all the materials for nothing from people who had fragments of paint and lumber left over after they failed, and then if the workmen constructed it nights for mental relaxation and intellectual repose, without charge, of course the scheme was a financial success, but architecturally the house is a gross violation of the statutes in such cases made and provided, and against the peace and dignity of the State.

There is a look of extreme poverty about the struccure which a man might struggle for years to acquire and then fail. No one could look upon it without feeling a heartache for the man who built that house, and probably struggled on year after year, building a little of it at a time as he could steal the lumber, getting a new workman each year, building a knob here and a protuberance there, putting in a three cornered window at one point and a yellow tile or a wad of broken glass or other debris at another, patiently filling in around the ranch with any old rubbish that other people had got through with, and painting it as he went along, taking what was left in the bottom of the pot after his neighbors had painted their bob sleds or their tree boxes little favors thankfully received—and then surmounting the whole pile with a potpourri of roof, a grand farewell incubus of bumps and hollows for the rain to wander through and seek out the different cells where the lunatics live who inhabit it.

I did tell my friend of one thing that I thought would improve the looks of his house. He asked me eagerly what it could be. I said it would take a man of great courage to do it for him. He said he didn't care for that. He would do it himself. If it only needed one thing, he would never rest until he had it, whatever that might be. Then I told him that if he had a friend -one that he could trust-who would steal in there some night when the family were away, and scratch a match on the leg of his breeches, or on the breeches of any other gentleman that was present, and hold it where it would ignite the alleged house, and then remain to see that the fire department did not meddle with it, he would confer a great favor on one who would cheerfully retaliate in kind at call.

---Motive Power for Tricycles.

Several attempts have been made to utilize electrical energy through the medium of secondary batteries for propelling tricycles and light vehicles, but so far we have not seen anything beyond the experimental stage. Many inventors have also striven, with more or less success, to produce a mechanical motor depending for its movement upon the explosion of a gaseous mixture composed of petroleum and compressed air. The most practical of these is, we think, that of Mr. Eteve, which was introduced last year pints of common petroleum oil per hour, in the "velocycle," as it is called, sufficient power is generated to give to the vehicle with its rider a speed of from 10 style of architecture if he will drink the right kind of ply of petroleum, enough for a run of three or four sumption in the two engines, in combination with the

LIPPMANN'S APPARATUS FOR ELECTRIC MEASURE-MENTS

Measurement of the intensity of electric currents is daily becoming an affair of more and more importance. Although there exists a large number of apparatus designed for this purpose, very few of them present all the qualities that are required for their practical employment. Most of these apparatus are based upon purely galvanometric actions. The type of the genus is the well known apparatus of Marcel Deprez, in which a soft iron needle is placed in the intense magnetic field formed by the two branches of a U-shaped magnet. The current to be measured traverses a bobbin and de-

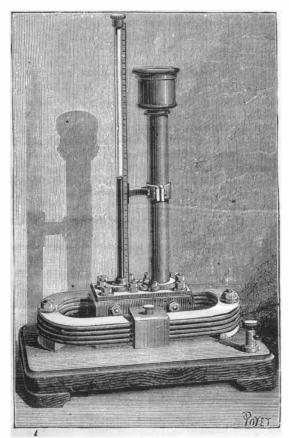


Fig. 1.-LIPPMANN'S AMPEREMETER.

velops a inagnetic field whose lines of force are directed at right angles with those of the magnet.

Under the action of these two fields the needle assumes an intermediate position that depends upon the intensity of the magnet's magnetization and the form of its polar pieces, upon the form and dimensions of the needle, upon the form, dimensions, and number of a constant magnetic field that the unipolar machine coils of the bobbins, and upon the intensity of the cur-

There is, then, a priori, no simple relation between the deflections and the corresponding intensities, and it is only by artifices of construction that we succeed in obtaining a perceptible proportionality between these upon a certain fraction of the scale. In reality, each apparatus requires a particular graduation and a determination of a certain number of points, whence are deduced the rest through interpolation.

Lippmann's galvanometers, or amperemeters, present the peculiarity that their indications are indefinitely proportional on the entire length of the scale, and that it is only necessary to know the indication furnished by a given intensity in order to at once deduce therefrom all the rest.

The new principle applied by Mr. Lippmann in his action of the current to be measured by a hydrostatic | the total circuit traversed by the current of intensity,

zontal leg of the gauge. Pieces of iron, with ends in the form of truncated cones, serve as armatures to the magnets, and permit of concentrating the field at B, so as to render it as intense as possible at this point.

The current to be measured is led to the mercury from the horizontal leg of the gauge, and traverses it vertically. It comes in through the strip of platinum. D, and makes its exit through the second strip, E.

That portion of the mercurial column which is traversed by the current represents a movable current element, which, placed in the magnetic field constituted by the magnets, K, tends to move toward the right or the left. The stress exerted upon this current element is proportional to its intensity, and it therefore produces a hydrostatic action, which exhibits itself in a change of level of the mercury, which latter rises in one of the legs of the gauge until the hydrostatic pressure balances the electro-magnetic stress.

The theory of the apparatus shows that its sensitiveness is proportional to the intensity of the field, and inversely proportional to the thickness of the column of mercury. It is in order to obtain great sensitiveness that the chamber, B, is very thin and that the field is concentrated at this point by polar appendages of conical form.

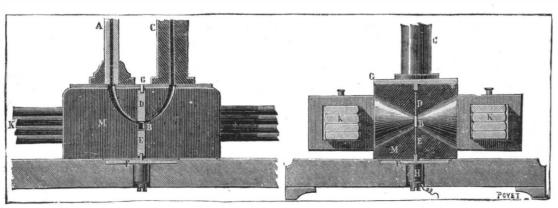
In order that the reading of differences in level may be dispensed with, there is arranged upon one of the legs a reservoir of wide surface in such a way that the level in this leg shall remain constant, whatever be the change in the other leg, which is of glass of small section. The constant level leg is given a certain height in order that all the readings may be made, whatever be the direction of the current. In practice, it is convenient to so arrange the magnets that a current ascending in the horizontal leg of the gauge shall produce an ascent of the mercury in the glass leg, and a descending current produce a depression of the mercury's

When still greater sensitiveness is desired, it suffices to incline the glass tube slightly, when a slight change of level will produce considerable of a movement in the column of mercury. Mr. Lippmann's amperemeter is aperiodic, in that it reaches its position of equilibrium slowly, and stops there without going beyond it. And it is reversible, too; that is to say, if the mercury be set in motion by means of an external mechanical force, and the two strips, D and E, be united by a circuit, the latter will be traversed by a continuous circuit that will last as long as the flow of the mercury does.

It is a true unipolar machine that might perhaps some day be applied either as a mechanical generator of electricity, which should give little electro-motive force, but considerable intensity, on account of its feeble internal resistance, or as a standard of constant electro-motive force, in assuring of a constant flow, and would itself produce.

The principle of this apparatus has been applied by its inventor to several other apparatus, and, in particular, to an electro-dynamometer and a wattmeter, which figured at the Exhibition of Electricity at the Observatory last March, in the interesting collection of measures presented by Breguet. In the electro-dynamometer, a bobbin traversed by the current to be measured is substituted for the permanent magnet. Under such circumstances the magnetic field is no longer constant, but is proportional to the intensity. The result is that the changes of level in the mercury are proportional to the square of the intensity.

In the wattmeter a long, very fine-wired, and resistant bobbin is substituted for the coarse wire one, and is placed between those two points of the circuit at which it is desired to measure the expenditure of elecapparatus consists in balancing the electro-magnetic tric energy, while the mercury is, as usual, placed in



Figs. 2 and 3.-LONGITUDINAL AND TRANSVERSE SECTIONS.

stress which, at every instant, is proportional to the in- | I. The fine wire bobbin, mounted in derived circuit, tensity of the current. It suffices to know one in order to at once know the other.

Fig. 1 gives a general view of Mr. Lippmann's amperemeter, and Figs. 2 and 3 are sections that will permit its principle and mode of operating to be under-

A mercurial pressure gauge, A B C (Fig. 2), is placed between the branches of a permanent magnet in such a way that the two poles are on each side of the hori-

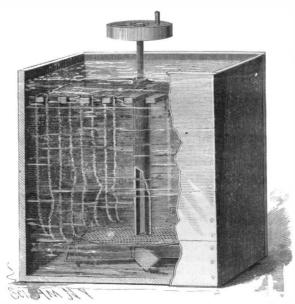
produces a magnetic field that is at every instant proportional to the difference of potential, E, of the two in 10 seconds, the line of firing being almost perfectly points where it is fixed. The changes of level in the straight across a current of over two knots an hour. mercury are consequently proportional at every instant | This torpedo is discharged out of a tube, and is propelled to the product, E I; that is to say, proportional at by a rocket composition which is held in an iron tube every instant to the number of watts expended in the sixteen inches in diameter and forty-two inches long. part of the circuit considered.

Lippmann's apparatus, they all present the valuable plosion underneath the armor of a vessel.

feature of furnishing indications which are accurately proportional to the extents to be measured, and this obliges us to use them in a large number of cases in which we could not rely upon measuring by points, a method in which so many causes of error intervene to destroy accuracy.—F. Hospitalier, in La Nature.

----IMPROVED LIMING VAT.

The accompanying engraving shows a vat in which hides may be evenly, thoroughly, and quickly limed, so that the hair can be easily and rapidly removed, and without damage to the hides by too long exposure in the liming liquid. The hides are hung from a rack formed of bars fitted across the tank. In the center of the middle rack timber is fitted the end of a tube which hangs nearly to the bottom of the tank, and has on its lower end a screen frame made of wire netting or wooden slats. In this timber and in a step bearing at the bottom of the tank is journaled an upright shaft, which passes inside of the tube and is rotated by means of a crank or pulley. Upon the lower end of the shaft, beneath the screen, are radial arms or paddles made with inclined blades, so as to induce



JOHNSTONBAUGH'S IMPROVED LIMING VAT.

strong upward currents in the liquid when the shaft is revolved, thus carrying the lime particles tending to settle at the bottom of the vat upward into contact with every part of each hide hung from the rack. Attached to the shaft at a point a little below the surface of the liquid is a paddle, which prevents the accumulation of lime at the surface and the undue settling of lime upon the hides at the rack. The screen frame prevents the shanks and tails of the hides from catching in the lower stirrer, and the tube prevents the entanglement of the hides with the shaft.

This invention has been patented by Mr. Thomas Johnstonbaugh, of Clearfield. Pa.

Meaning of Colors in Sealing Wax.

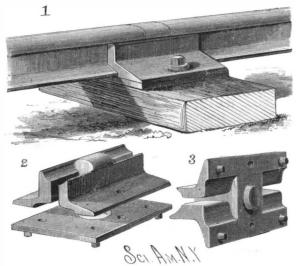
The language of flowers is supposed to be known by every educated person, at least those capable of blushing. But who knows the language of the colors in sealing wax? We are indebted to the Philadelphia Times for the following information: "Flirtations in sealing wax are the latest racket," said a stationer. "The ordinary red wax signifies business, and is supposed to be used only for business letters. Black is, of course, used for mourning and condolence. Blue means love, and as we make four or five tints of this color, each stage of the tender passion can be accurately portrayed. When pink is used, congratulation is intended. An invitation to a wedding or other festivity is sealed with white wax. Variegated colors are supposed to show conflicting emotions. Do you know that thimbles are being utilized to bear seals? Fact. The designs of that sort are mild just now, but are developing. We'll work the idea up, and think it will become fashionable. The odors used in the wax are ravishing in their delicacy—that is, the expensive sort. The cheaper grades are as bad as the pomatum of a five cent barber shop. The perfumery is the element of cost in the wax. A Paris firm makes the finest imported article. The perfume of burning wax fills an ordinary sized apartment, and lingers about the envelope for hours.

Sky Rocket Torpedo.

Recent experiments with an improved torpedo at the Washington Navy Yard, says a special from that city, have resulted in the attainment of a velocity of 100 feet The explosive charge is so arranged as to be detached Aside from the originality of the principle of Mr. upon contact, and shot forward and downward for ex-

IMPROVED RAIL CHAIR.

The engraving shows a rail chair that prevents spreading and creeping of the rails, and forms good joints. The chair is formed of two side pieces, having their inner sides curved and shaped to fit snugly against the sides of the rail. These pieces are united at the middle by a cross piece extending from top to bottom, and having its top shaped the same as the head of the rail. The recesses between the plates are so shaped that an end of a rail can be passed in between them, the ends of the rails abutting against the outside plate is slightly higher than the inside one (Figs. 2 and 3), to form a flange for carrying the wheel over the joint. Tenons project downward from the under side of the cross piece and from each end of each side piece, and an aperture is formed in the middle of the lower part of each side piece; the tenons fit in apertures in a bottom plate. Tenons on the under side of



JAQUES' IMPROVED RAIL CHAIR.

this plate fit in holes in the tie. This plate is also provided with apertures corresponding with those in the side pieces, and through which the bolts holding both parts to the tie are passed. The lower ends of the bolts are countersunk in the ties, and elastic washers are placed under the nuts. It will be seen that the chair forms an even joint, holds the rails securely, and cannot creep or give laterally.

This invention has been patented by Mr. George W Jaques, of Burton, Ohio.

Old Shoes Remade.

It may be a surprise to some people to learn that the old shoes cast into the ash barrels are liable to reappear in the boudoir and parlor. A New York reporter who saw a couple of rag pickers quarreling over a lot of worn out and seemingly worthless foot gear interviewed one of the chiffonniers, and found that they sold them to the manufacturers of wall paper. He followed up the clew, and on questioning the foreman of one of these establishments elicited the following bits of information.

shoes that the scavengers can bring us. We pay dif- very small blow suffices to clear everything out, as all enters through the closed bottom of this tube, which is ferent prices for the different qualities of leather. A | the substance to be discharged is located in one place, | of such size as to leave an oil space surrounding it. By

We don't buy cowhide boots. The boots and shoes are first soaked in several waters to get the dirt off them. Then the nails and threads are removed, the leather ground up into a fine pulp, and is ready to use.

"The embossed leather paperings which have come into fashion lately, and the stamped leather fire screens, are really nothing but thick paper covered with a layer of this pressed leather pulp. The finer the quality of the leather, the better it takes the bronze and old gold and other expensive colors in the designs painted on them. Fashionable people think they are going away back to the mediæval times when they have the walls of their libraries and dining rooms covered with embossed leather. They don't know

that the shoes and boots which their neighbors threw sary for the protection of the iron, a small portion of A good formula is the following: Gelatine 2 grs., biful material on their walls and on the screens which protect their eyes from the fire.

for the competition from carriage houses and bookbinders and picture frame makers. I don't know how many other trades use old shoes and boots, but the tops of carriages are largely made of them, ground up and pressed into sheets. Bookbinders use them in or from the patentee, Mr. D. D. Wass, same address.

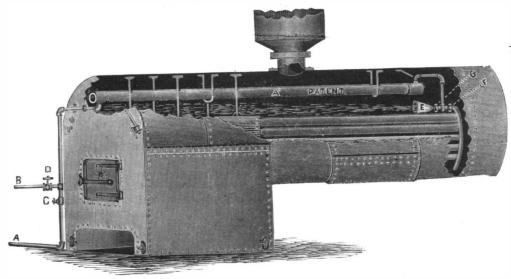
making the cheaper forms of leather bindings, and the new style of leather frames with leather mats in them are entirely made of the cast-off covering of our feet."

Steam for Extinguishing Fires.

The New York Steam Heating Company, who have had their pipes laid under the streets and furnished steam for heating and power for operating all kinds of machinery, in the lower part of this city, are now extending their pipes further up Broadway, and in time they expect to compass the entire city with their ends of the center cross piece, as shown in Fig. 1. The | heating system. The editor of the Fireman's Journal, in a conversation some months ago with the secretary of the steam heating company, was informed that before long the company would be prepared to put out fires in that portion of the city covered by their mains. Recently W. C. Andrews, president of the company, explained definitely the plan they propose to adopt in the dry goods district for putting out fires. He said: "The use of steam for putting out fires is not new. It is in operation in a great many large factories all over the world. There has never been any public system, because the conditions have never existed before under which it could be put in operation. The steam drives out the air and smothers the fire, and does not damage the goods as water does. By putting stand pipes in each building, with four or five inch nozzles on each floor, which could be turned on from the street, the steam could be turned on in any part of the structure. It would be so light adraught on our boilers that I doubt if it would lower the pressure to put out any ordinary fire The dry goods district contains more inflammable material than any similar territory in the world. It is inadequately protected at present." This might do well enough in confined spaces, but where the air has full access to the flames firemen are of the opinion that the fire would beat the steam every time. Still, we hope the experiment will be tried, for it may be made a valuable auxiliary to the fire department.

IMPROVED BOILER CLEANSER.

The engraving shows a simple and effective scale or sediment remover and preventer, which, being purely mechanical in its operation, does not require the use of any chemicals. The feed pipe, A, is continued in the boiler, either in an annular or plain form, as required, and is fitted with a branch having two check valves, F and G, the former opening with the line of feed, and the latter, which is connected to a skimmer, E, placed at the ordinary water level, opening against it; the feed pipe is continued from the valve, F, to discharge at whatever point (H) required. On entering the boiler the water in the feed pipe begins at once to rise in temperature, and as deposit and precipitation confmence at about 250° Fah., all salts and other impurities are gradually deposited on the bottom of the pipe -the feed water, with all light, non-depositable matter, keeping its flow to the discharge point. Then, every twelve, eight, four, or two hours, according to the quality of the water or the rate of evaporation, the blow-off valve. D. is opened for a minute or two, thus causing the check valve, F, to close by the internal pressure of the boiler, and the check valve, G, to open, when the surface scum, oil, and water, rushing back, carry all deposit out of the feed pipe, through the blow-off pipe, We buy," said the foreman, "all the boots and B, into tank drain or heater, as may be required. A pair of fine calfskin boots will bring as high as 15 cents. ready to be blown out. When a slight scale is neces this arrangement the outer glass simply contains oil,



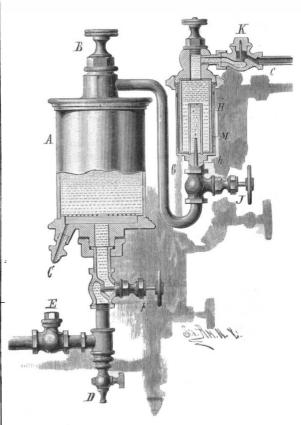
WASS' IMPROVED BOILER CLEANSER.

into the ash barrel a month before form the beauti- the feed water may be permitted to go to the boiler di- chromate of potash 2 grs., nigrosine 10 grs., water 1 fl. rect through a branch placed between the feed pump and the valve, C. This "cleanser" keeps the water in "We could buy the old shoes cheaper if it were not the boiler pure, separates the foreign matter, and discharges it by means of the oil, scum, and other matter too light to settle.

Further information can be obtained from Mr. J. C. Henderson, agent, 313 Bush St., San Francisco, Cal.

IMPROVED LUBRICATOR.

In this lubricator, designed for locomotive, marine, and other steam engines, the oil is supplied by the pressure of the steam, and is fed in a fine stream, or drop by drop, by its passage through a fluid of different specific gravity to it within a glass chamber, which admits of the amount of supply being seen and readily



BARCLAY'S IMPROVED LUBRICATOR.

controlled as required. Near the bottom of the cup, A, is a perforated diaphragm with solid center, by which a general pressure on the oil may be obtained. Attached to the cup are a filling cup, B, a cup drain, C, a lower pipe drain cock, D, a check valve, E, in a branch by which steam is admitted from the boiler, a hand valve, F, for regulating the supply of steam to the cup, a pipe, G, for supplying oil from the cup to the indicator or receiver, H, through a small discharge pipe, b, a cap, I, on top of the receiver, a hand regulating valve, J, and a check valve, K, in the pipe, c, which conveys the oil to the engine. The inventor of this lubricator found that by supplying the transparent indicator with a liquid of greater specific gravity than water, preferably an acidulous liquid—such as vinegar, citric, acetic, or sulphuric acid—the feed of the oil in drops was more perfect, and the glass of the indicatorretained its transparency for a much longer period, than could be obtained with water, the oil not settling on the glass to the same extent when an acidulous liquid was used. The glass indicator is not supplied direct with the liquid medium, which is held in a glass tube, M, of about two-thirds the height of the outer glass of the indicator. The small oil discharge pipe, b,

> while the inner contains the denser fluid, and a good working capacity is obtained without interfering with the transparency of the indicator. This lubricator may be easily adjusted to feed any desired quantity, is accurate and reliable, and those which have been in constant use many months present as clear a view of the oil as when first set up.

> This invention has been patented by Mr. Peter Barclay, whose address is Cunard Wharf, East Boston, Mass

Indelible Ink for Paper.

Its indelibility depends on the fact that when bichromate of potassium and gelatine come together, particularly in the form of a thin film, in the presence of daylight, the film becomes insoluble in hot or cold water.

oz. Dissolve the gelatine and nigrosine in most of the water, and the bichromate of potassium in the remainder. Mix the two solutions in an amber colored bottle. If it is found that the ink "gums" in the pen, the quantity of gelatine and bichromate may be somewhat reduced. But the ink, when properly made, and dry, cannot be entirely removed from paper by hot or cold water, acids, or alkalies.

The American Association for the Advancement of Science.

The thirty-fourth meeting of the American Association for the Advancement of Science will be held at Ann Arbor, Michigan, from August 26 to September 1. Bar Harbor, Maine, was the locality originally chosen, but as suitable accommodations could not be secured, it was changed by invitation to the University of Michigan. The absence of the students during the summer leaves their quarters available, and no difficulty will be experienced in obtaining ample ac-Reduced fares have been obtained, commodation. and a special through train will be run from Buffalo on the 25th, allowing two hours at Niagara. A complimentary excursion to the Saginaw Valley will be given during the session. The retiring President, Professor J. P. Lesley, of Philadelphia, will deliver his address on the evening of the 26th. The President-elect is Professor H. A. Newton, of New Haven; Permanent Secretary, F. W. Putnam, Salem, Mass.

Progress in Calico Printing.

Dr. Otto N. Witt, a gentleman well known in the world of color chemistry, has been delivering an address to the Society for the Development of Industry in Berlin, and we select some of the most salient points of his paper, thinking that they will be perused with interest by our readers. The most important improvements have taken place in the field of chemistry applied to calico printing, and the Alsatian industry can be taken as the first brilliant example of what has been accomplished.

To begin with, it is necessary to mention the study of the changes undergone by the cotton, or rather the sellulose, when exposed to certain influences, and to note the observations of Witz, and then of Messrs. Cross and Bevan, on the formation of oxycellulose, with which our readers are well acquainted. The introduction of the alkaline chrome mordant is also of recent date, and so is the alkaline iron solution in glycerine, of which also our readers have not failed to take notice when we published accounts on same some time ago. The manganese styles are not so much used as they used to be; and the manganese brown is now principally used as a kind of mordant for fixing deep shades, by means of sulphate of aniline or naphthylamine or other organic aromatic amines, to obtain a ground on which white or colored discharges are produced. The colors produced by this means are all fast against light, air, and soap. Great variety of shades can be produced by employing the amines on goods previously prepared with manganese brown; for instance, if the goods are treated with sulphate of aniline, a black can be formed, while sulphate of naphthylamine produces a red brown color, which has not been as yet well studied, but which is accepted as being similar to aniline black. Beta-naphthylamine, under the same circumstances, produces a brown which is not easily distinguished from the original manganese bister brown, but which has the advantage that it cannot be altered by reducing agents. Other basic products have been tried for the same purpose, and it is likely that some of them are used, although their employment is kept secret. The employment of indigo in printing is next mentioned, and the well known methods of producing patterns by resisting and discharging are shortly described, and special reference is made to Koechlin's method of discharging by printing a thickened solution of a neutral chromate and afterward passing through a weak, warm bath of sulphuric and oxalic acids, the latter being employed in order to decompose the free chromic acid which is formed, and which, after having destroyed the indigotine, if not removed would tender the cloth; this is of course for white discharges, while light blues are produced by employ ing a weaker chromate color, and colored discharges by printing principally, along with the latter, any pigment in connection with albumen, which is coagulated by the acid bath and the colors thus fixed on the fiber, while at the same time the indigo is discharged. The discharging by means of chlorate of alumina is useful for fixing at the same time the alumina mordant on the cloth, which is then capable of taking up alizarin and thus produce blue and red designs

The now well known process of printing with natural indigo by the Schlieper and Baum process is brought under notice, and its advantage described. Of course alizarin blue is also mentioned; as also indophenol, which has found very little employment in calico printing, while it has been found very useful in woolen printing for producing red and blue patterns in connection with the azo reds. For this purpose the reduced indophenol blue has the property of destroying the azo scarlets, and of this discharging power of the blue paste it is taken advantage in order to produce red and blue effects, which are very much liked on woolen goods. Of the other indigo substitutes employed in calico printing the author mentions the one derived from logwood, and about which there still seems to be very much mystery in the minds of some chemists, although it is produced by a very simple pro-

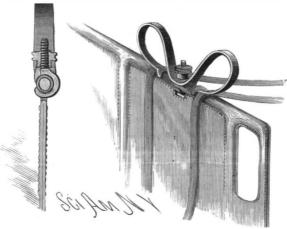
Gallocyanine has been found pretty useful in print-

ing and in connection with Persian berries, as another of the many and yet unsuccessful competitors as substitutes for indigo. Galleine and ceruleine are next rate of consumption of candles used in photometrical passed in review, and induline, which latter is now printed in paste form by means of methyltartaric acid. By steaming, the methyltartaric acid is decomposed, the free alcohol produced dissolves the induline, and fixes it on the fiber as a pigment. Of the red coloring matters the author mentions, besides alizarin, the newbisulphite derivative of azo scarlets, the so-called azurin, which, he states, yields pretty fast shades by means of acetate of alumina, and for the production of yellower tone the employment of a new yellow azo color is recommended, the flavophenin, which goes on cotton in a simple soap bath and yet produces shades which are stated to be fast.

In late years great attention has been paid to such coloring matters as can be fixed on cotton without any preparation, and canarin and Congo red belong to this class. In conclusion the author mentions the formation of the cadmium yellow and the chrome vellow, which stand sulphur fumes, as well as the steam chrome yellow in connection with citrate of ammonia. -Tex. Mfr.

REIN HOLDER.

This simple device for holding the reins on the edge of the dashboard has been patented by Mr. George O. Teeter, of Teeterville, Ontario, Canada. A steel strip is bent upward from the middle to form two open spring loops, the free ends of which are brought back to near the middle of the strip, the ends being formed with flanges bent to fit on the top rod of the dashboard. The middle of the strip is apertured to receive the threaded shank of a hook on which a thumb nut, resting on the upper surface of the strip, is screwed. The strip being placed upon the rod of the dashboard (the hook catching the rod as shown in the sectional view),



TEETER'S REIN HOLDER.

the nut is drawn up tight, whereby the middle of the strip and free ends of the loops are pressed firmly on the top of the dashboard. The flanges prevent the ends of the loops from slipping off the top edge. The reins are pulled in between the bottom free parts of the loops and the top edge of the dashboard, where they are securely held.

Naphthol.

The extraordinary power of naphthol as an antiseptic and disinfecting agent has been known for a long time, but its disagreeable smell and the difficulty of preparing it in a purified state, with the occasional toxic action of the crude naphthol, have been a bar to its use as a remedial and antiseptic agent. Justus Wolff, a chemist interested in coal tar products, has recently succeeded in producing it in a pure and odorless state in well defined crystals, and claims its antiseptical action is much greater than that of carbolic acid. Recent research has demonstrated that the toxic effects of crude naphthol were due to the impurities it contained. Dr. Shoemaker, of Philadelphia, in a paper read before the Philadelphia County Medical Association, on the Medical Use and Value of Naphthol, conclusively proved the non-poisonous character of the purified or odorless naphthol by taking large doses internally. It breakfast, but few know that it is more than doubled has no corrosive action on the skin, and will not injure textile fabrics.

As a remedial agent it acts with greater efficiency. and has many advantages over carbolic acid; the fact of its being absolutely odorless will make it a desirable substitute. It is expected that it will shortly be produced on a manufacturing scale as a substitute for car-

his duties at the South Kensington Museum. Mr. Huxley has seriously overtaxed himself, and his malady is nervous prostration, from which it is hoped by his friends that he may be speedily relieved. If the complete rest which he now consents to take should fail to presidency of the Royal Society next November.

Alarm Photometer.

An ingenious automatic method for signifying the work has been devised by Dr. Hugo Kruss, of Hamburg, for the gas examiners of St. Petersburg, and has been recently described and illustrated in the Journal fur Gasbeleuchtung. The arrangement is very simple. The candleholder is hung in an unequal arm balance, as in the Sugg-Letheby photometer, in the position required for making an observation. The beam of the balance has a long pointer hanging down from the fulcrum, which marks the position of the balance on a vernier scale at the foot of the pillar. There are, as usual, two metallic pins at the two opposite ends of this scale; and in the middle a movable pin which is in electrical connection with a battery and a bell. Directly the pointer comes into contact with this pin, the circuit is completed and the bell rings. The method of using the balance is readily understood. The candles, being lighted and fixed in position, are weighed until the pointer just swings clear of one stud of the vernier, when any desired weight may be placed in the pan provided for the purpose underneath the candles, the clock being started at the same moment. Observations may then be taken while the candle burns; and the instant the weight placed in the pan is lifted by the consumption of the candles and the weight in the opposite pan, the pointer swings back and touches the pin, which completes the circuit and so rings the bell. This, of course, indicates, in conjunction with a glance at the clock, the precise rate of consumption of the candles, without touching or in any way interfering with them. The arrangement is a very neat one; the battery, electro-magnet, and bell being mounted on the balance stand, and all contacts being so placed as to be readily removed out of the way when not required. For this a special form of cell is used, with an arrangement for preventing waste when not required for the purpose specified.

Hints for Buyers of Machinery.

Messrs. R. Hoe & Co., the well known printing press builders, give the following practical suggestions, intended without doubt to apply to the purchaser of printing presses, but their hints are equally pertinent to other classes of machines:

"In buying a machine see that, whether new or second hand, it is strong and well made. Consider the standing of the maker, both as mechanician and machinist. A light framed or shakily fitted machine will be dear at any price. Do not be deceived by any beauty of paint or finish on exposed work, which adds nothing to the usefulness of the machine, and which may draw the eye from an examination of the working parts. Uncover the boxes, and see whether the finish of shafts in their bearings, of journals, is as smooth and true as the white and brass work of more exposed pieces. Take out, here and there, screws and bolts; see if the threads are deep, sharp, and well fitted. Look closely at the fitting of all toothed or pinion wheels: note whether they have been cast and filed to fit, or whether they have been accurately cut by automatic machinery, so that they will fit in any position. Slowly turn pinion wheels, and note whether there is any rattling or lost motion, or whether the teeth fit snugly, yet freely, so as to give even, steady motion. Closely examine all castings for pin holes or air bubbles, which may be most easily detected in work that has been planed. See that castings are heavy as well as solid. Look after oil holes and provisions for oiling. See that the castings are neatly fitted; that they do not show the marks of the hammer or file, which must be used to connect them if they have been forced or badly put together. Pay attention to the noise made by the machine when in motion; if fairly fitted, the noise will be uniform; if badly fitted, it will be variable or grating."

Eating Lemons.

A good deal has been said through the papers about the healthfulness of lemons. The latest advice is how to use them so that they will do the most good, as follows: Most people know the benefit of lemonade before by taking another at night also. The way to get the better of the bilious system without blue pills or quinine is to take the juice of one, two, or three lemons, as appetite craves, in as much ice water as makes it pleasant to drink without sugar before going to bed. In the morning, on rising, at least a half hour before breakfast, take the juice of one lemon in a goblet of water. This will clear the system of humor and bile with efficiency, without any of the weakening effects PROF. HUXLEY, who has been ill for several months of calomel or Congress water. People should not irripast, is about to retire on a well earned pension from tate the stomach by eating lemons clear; the powerful acid of the juice, which is always most corrosive, invariably produces inflammation after a while, but, properly diluted, so that it does not burn or draw the throat, it does its medical work without harm, and, when the stomach is clear of food, has abundant oprestore his impaired health, he will also retire from the portunity to work over the system thoroughly, says a medical authority.

FINAL OPERATIONS FOR THE REMOVAL OF FLOOD ROCK.

Flood Rock, a ledge of gneiss situated about onequarter of a mile from Hallet's Point, Astoria, L. I., is one of the most formidable of the many obstructions | The track consists of two movable sections, about 15 by which all the commerce passing through Hell Gate has been menaced. This rock forms a very irregular obtuse cone, only a small portion of the apex of which comes above water. This formation and its location in the bend of the river almost in the center of a swift current at each change of the tide make it an object of great dread to pilots. The work of removing this rock was begun in 1875, and after unnecessary and costly delays caused by the failure of Congress to appropriate sufficient money from year to year the entire excavation has been completed, all the drill holes have been north of the shaft. The longitudinal galleries cross bored, and all that remains to be done is the charging of the holes with explosives, removing the plant, and dredging the broken rock after the firing. The total cost of the improvement will be about \$1,000,000.

The method pursued may be briefly described, the familiarity of our readers with the undertaking rendering a detailed account uncalled for. A shaft was sunk at the highest point of the rock to a depth of 60 feet below water level, and from this shaft galleries were extended parallel with and at right angles to the current. These galleries are 25 feet between centers, and extendunder all the rock to be removed. It was not the design to remove the rock as much as possible by means of these tunnels—owing to serve as passageways honeycombing the rock and of examining the mine, and for data. through which access could be had to all parts in order to place the powder. Absolute regularity in the spacing of the galleries could not be maintained owing to inequality in the texture and formation of the rock. The plan view in the accompanying illustrations shows the present condition of the excavation, and, being drawn to scale, it presents a good idea of the magnitude of the work.

Thus was formed an immense chamber, averaging about 10 feet from floor to ceiling, having a stone roof averaging about 15 feet in thickness and supported by 467 rugged and massive columns. In this chamber. running parallel with the East River, are 24 galleries the longest measuring 1,200 feet, and running at right angles to the stream are 46 galleries, the longest of which is 625 feet. The area covered by the chamber is about 9 acres. The aggregate length of the galleries is 21,670 feet.

The mining operations were not attended with unusual risk either to the men or the work; the main danger was from the flooding of the mine through the opening of a fissure, or the meeting with a rock "keyed the wrong way," which would admit the water in quantities too great to be handled by the pumps. Fissures -were frequently encountered, but fortunately none of excessive size; the large holes were plugged with wood, loose filling, such as cement, being unavailable because of the great pressure of water, some 26 pounds to the square inch. To escape the drippings and in some cases the pourings from the roof, and to enable the visitor to walk dry shod through the small brooks running down some of the galleries, he is, through the kindness of those in charge of the work encased in rubber from head to foot.

The northeastern portion of the excavation, having an area of about one acre, was through rock very irregularly fissured, and as the roof approached closer to the bed of the river great care was exercised in driving the headings; in some places it was found expedient to support the roof and sides with heavy timbers, as shown in Fig. 2. In order that the caving in of any part of this section should not flood the main work a strong door (Fig. 3) was early built in the gallery connecting the two sections. Attached to the outer edges of this door is a rope, leading over a pulley in the casing and along the gallery to the shaft; the door can thus be easily and quickly closed, should it become necessary at any time to shut off the weak portion of the work.

Thirteen thousand two hundred and eighty-six holes have been drilled in the columns and roof, the holes from broken rails would diminish as steel rails are being 3 inches in diameter and having an average depth of 9 feet; these holes, if placed end to end, would reach over 22 miles. During the progress of the work an accurate plan was kept, showing the location and number (Fig. 7) of each hole, together with its inclination and depth. Fig. 6 shows this hole plan for one column-the shaded portion-and the adjoining galleries, the centers of which are represented by the dotted lines. The holes in the columns are about 5 feet apart, and extend upward at an angle of about 45 degrees; the holes in the roof are about 4 feet apart, and are at an angle of 60 or 65 degrees. No holes were drilled near the floor. Each hole will be filled partly with "rackarock" powder and partly with No. 1 dynamite. The form of the cartridge is shown in Fig. 8, the projecting wires shown at one end being intended to hold the cartridge in position in the hole. Fig. 5 shows the method of charging the holes. A small car is provided with several frames, made to fit on top of the car, and each being about the

size of the car; the frames can be placed as needed, one on top of the other, thus furnishing a platform from and get his pay for them, and the quality correwhich the holes in the highest galleries can be reached. feet long. Should no delay occur, it is expected to complete the charging of the holes by the first of October.

The next operation will be to remove all the machinery and buildings, and the top of theislanddown to the water's edge. Of course, much of this work can be done during the time of charging. The mine will then be flooded and the charge exploded by means of electricity.

The engraving, Fig. 1, shows the drainage ditch or deep gallery, extending across the mine a short distance this ditch, which at the point shown in the cut is some 35 feet from the floor to the roof, by wooden bridges. Extending around the southern part of the mine and along the eastern extremity is a second ditch, connecting with the first; a third ditch leads from the eastern side to the sump, just east of the main shaft (Fig. 9), where pumping engines having a capacity of 4,000 gallons per minute are located. This plan of draining the mine by means of a ditch around the extremity was made necessary by the slope of the river bed; in order to leave sufficient rock in the roof, the galleries slope downward from the center.

The work was planned and has been carried forward by Gen. John Newton, Chief of Engineers U.S.A. the fact that it would be cheaper to dredge the broken | We are indebted to the courtesy of Lieut G. McC. rock after the explosion—which were only expected to Derby, superintendent of the work, for the privilege

Railway Economy.*

There is little risk in saying that there is nothing in this world less understood than the true inwardness of economy. It is not economy to save a dollar when it costs \$1.50 to accomplish this saving, and yet this is the method that is practiced to a great extent by individuals and corporations. To a certain degree a little false economy is admissible, but this applies to individuals who undertake to do business with limited means and with a hope to make things more substantial and safe in the near future. It is vastly different with a corporation that has unlimited means, and uses inferior material because it can be bought for a merely nominal sum as a matter of economy. economy has been the death of more people than were destroyed in Buddensiek's buildings, and some of our American railways have been great sufferers

Some years ago it was considered economy to use teel rails in place of iron, and that was true. For a time we had good, honest steel rails, and they were durable and safe, and notwithstanding their excessive cost, it was considered economy to use them. But after a time the ingenious rail maker discovered a way to work in slag and cinders, and make a steel rail much cheaper than a good iron rail could be made for. The rail makers could hardly be blamed for this, inasmuch as railway officials refused to pay a good price for a good article, but gave contracts to the low est bidder regardless of quality. Not long ago a gentleman was negotiating for a position as superintendent of a rail mill, when he was questioned very closely as to the amount of slag he could work into a steel rail. The desire to manufacture shoddy railway material did not originate with the manufacturers The railway officials, by their refusal to pay fair prices for honest, good material, have forced manufacturers to make use of all the tricks known to the trade and to invent new ones, and this has been practiced to such an extent that the steel rails now coming into general use are far inferor to third class iron rails.

Steel rails are put forth in all the railway advertisements as an element of safety, and people embark on a steel rail track with a feeling of security; whereas if they knew they were riding on an iron rail track, they would feel decidedly uneasy and unsafe. The truth is, broken rails are becoming more frequent, while we should reasonably expect that accidents put in use. A poor steel rail is not as good as any kind of an iron rail, and the economy that supplies them is very thin. It is rather expensive to provide good, honest rails, but it does not cost nearly as much to lay a track with good rails as it does to fish a train out of a ditch every few days.

And aside from rails, there are other fixtures and appliances that are of very inferior quality purchased under the same false economy that inspired the purchase of shoddy rails. I have examined piles of broken rails, links, pins, wheels, and axles, and have never been able to discover a fracture in good, honest material. It is true that defects will escape the watchfulness of the most vigilant inspectors, but the failures of good, honest appliances are rare. I have seen piles of new links and pins that were made on contract at ruinous prices for good material. I have taken links and pins out of these piles, and with a single stroke aross an anvil broken them like a piece of cast iron.

* Wm. S. Huntington, in the American Railroad Journal.

The business of the manufacturer was to deliver them sponded with the price.

Some railway officials plead poverty as an excuse for providing cheap material. This reminds me of what Horace Greeley said in a speech at an agricultural fair. He said that a wealthy farmer could afford to do some very slovenly farming, but a poor man could not. The idea was that the wealthy man would not suffer by his indiscretion, whereas a poor man would get poorer by reason of his slack attention to business and slipshod way of doing it. When we find a successful business man, we naturally think that he gets the best the market affords. Why do not corporations do the same, and get the best? The motto should be with every railway official, "Get the best."

There is no place where folly is more exemplified than in the purchase of railway supplies. Too much legislation is not good, but we, the people of the United States, wish to have it enacted that no railway or other corporation shall build or operate any road unless constructed with good, honest material. The worst economy in this world is buying poor railway material, and the most successful roads are those that have always been thorough in their equipment and repairs.

There is nothing that will put a railway into the hands of a receiver sooner than a thorough practice of the kind of economy under consideration. Look into a keg of spikes bought at less than bottom prices, and you will see many of them without heads and more without points; many of them burned in two, and but very few in a keg will stand driving, and if they do, the heads soon break off, and they become worse than useless. Splice bar and bolts of inferior quality are purchased at low rates, while cheap and dirty lubricants cause hot boxes, cutting of expensive bearings, and trouble generally; cheap wheels, cheap axles, cheap running gear and brakes, cheap fuel, cheap bridges, cheap ties and drainage, cheap pegs and switch fixtures, cheap and overworked employes and operatives, and cheap everything, all of which have, combined, produced nearly all the serious railway accidents on record. "Failure of track and equipment" is the verdict in a large share of the accidents that are recorded, and it is safe to say that 90 per cent of all railway accidents are the result of too much so-called

Not long since the writer was in conversation with a railway official, and the former mentioned the fact that some roads which he named rarely met with an accident, while others were always in trouble. "Yes," said he, "the roads you mention are abundantly able to use first class material and keep everything in first class condition, which prevents accidents." Now, the fact in the matter is that the roads named as free from accidents were as poor in their early days as any roads in the country, but the managers thereof made it a rule to get the best, and preferred to pay liberally for safety appliances rather than drain their treasury on damage accounts. It is not the amount of traffic that fills the till so much as the amount saved by preventing acci-

Any one who will take the pains to look into the financial condition of American railways and get a correct history of their management, will not fail to notice that those that are the most popular, and pocket the largest percentage of earnings, are those that have been kept in the best possible condition for safe traffic regardless of expense. He will also notice that the roads that furnish shoddy material, and are impovershed by the disasters resulting therefrom, have a weakness for costly private palace cars for the officials, and thus, with railways as with individuals, poverty and style go hand in hand. It is time a reform was inaugurated in this matter, and some genuine economy practiced. We have had too much false economy, and want a change.

A New Use for Toads.

The latest and most ingenious way of getting rid of roaches and water bugs we have heard of, is related of a citizen of Schenectady fested with them.

A servant, hearing that toads were an antidote, caught three ordinary hop toads, and put them in the kitchen. Not a roach or water bug, it is stated, can now be found in the house. The toads have become domesticated, never wander about the house, and are so cleanly and inoffensive that there is no objection to their presence.

Another use for toads is to employ them for insect destroyers in the garden. • They are determined enemies of all kinds of snails and slugs, which it is well known can in a single night destroy a vast quantity of lettuce, carrots, asparagus, etc. Toads are also kept in vineyards, where they devour during the night millions of insects that escape the pursuit of nocturnal birds, and might commit incalculable havoc on the buds and young shoots of the vine. In Paris toads are an article of merchandise. They are kept in tubs, and sold at the rate of 2 francs a dozen.

Chemical Colors.

There is nothing to which chemistry has been applied which is more wonderful than the results which have followed the utilization of common gas or coal tar.

Thirty years ago the refuse of the retorts in gas works was utterly useless, and manufacturers did not know what to do with the material. Practical chemists were then applied to, and one of their first achievements was to discover that naphtha could be extracted from this | than its mere utilitarian application. refuse. After the naphtha was extracted, the tar was

left, in the form of a heavy oil, and this was still more of a nuisance than the original compound. Faraday next awoke interest in coal tar by his discovery of benzine as a product of the tar oil.

In the year 1857, however, Perkins made a wonderful discovery. He found that it had aniline properties, and this discovery has almost revolutionized the trade in dyestuffs. These he found were capable of producing, under a different chemical reaction, the most brilliant and gorgeous This discovery made the long

detested coal tar a most desirable product of the retorts, and then a valuable solvent for India rubber was made out of the material.

After these properties were extracted from the tar there were left heavy oils, and a residuum for which chemistry was puzzled to find a practical use. It was not until 1869 that any satisfactory result was obtained by experimenting on this refuse, and then the great discovery of alizarine was made. The importance of this discovery may be understood when it is known that in the first ten years following the introduction of the artificial alizarine into the dyestuff trade it exceeded the have been made, so that the highest perfection can be total amount of natural alizarine, or madder root Thousands of acres of land that had been used for growing madder were saved for corn and other

This material is shown in many forms at the Inventions Exhibition, and there is no more instructive part of the display than that which contains the stands of the various manufacturers who are producing this composition. In one part may be seen a mass of black, filthy-looking rubbish, and close by tubes of the most brilliant dyes, which are extracted from this refuse. A diagram is made to show in a graphic manner most of the products which this system of utilization is capable of giving. We have an idea that alizarine may be adopted with great results in the manufacture of printing inks, and would advise any one with a turn for chemistry to

the discovery of a cheap oil completely revolutionized the printing ink trade, and gave us good inks at prices previously unheard of. Similar changes may still be in store, and if this useful product could be thus utilized, a fortune would await the successful experi-

We have adduced this instance simply to show that all kinds of scientific knowledge can be made of use to the practical man. If space permitted, we might draw illustrations from the circle of all the sciences. No more useful result could follow the extremely successful exhibition at South Kensington than the drawing attention of artisans to inventions outside their own particular craft, and to show them that every species of knowledge may be brought to bear on their everyday vocation.—Printer and Stationer.

A New Incandescent Lamp.

Mr. Max Muthel has patented in Germany an incandescent lamp which possesses the advantage of requiring no vacuum in the globe. He has very ingeniously overcome one danger that experiments of this kind have hitherto presented, and that is the fusion of the incandescent wire. The wire used by him consists of a mixture of bodies that are conductors and non-conduct ors of electricity.

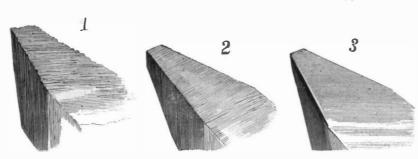
He takes magnesia, silicate of magnesia, etc., and porcelain clay, and forms a fine thread of them which he heats to incandescence and saturates with a solution of platino-iridium salts and afterward rais times to incandescence in order to reduced the absorb ed salts to a metallic state. Instead of the foregoing mixture, filaments of clay may be taken and saturated with a solution of a metallic salt, which is then reduced to a metallic state through incandescence and the use of oil of lavender or some other organic substance, or through an electric current. With wires thus prepared fusion is absolutely overcome, the presence of the non-conducting substances preventing the metallic parts from melting. Mr. Muthel supposes that the electric spark jumps, so to speak, from one particle to another. and in this way causes a heating of the other substances, which, brought to incandescence, emit a more intense

In order to make the filaments stronger, they may be covered with chrome, the melting point of which is still higher than that of platinum. To effect this, the tempered, and ground in apparently the same manner, chromium.-La Lumiere Electrique.

THE MICROSCOPE IN THE MECHANIC ARTS.

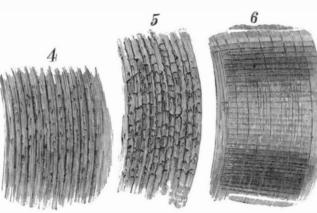
BY GEO. M. HOPKINS

Without, for the present, taking into consideration the pleasures springing from the use of the microscope in its application to the study of the exquisite works of nature, let us see how the microscope may be applied its usefulness here may finally lead to something higher



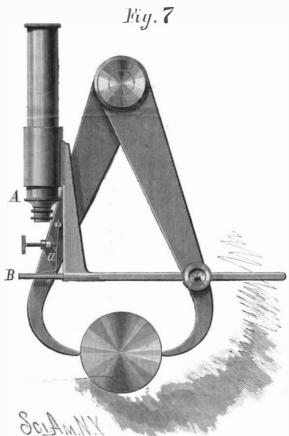
with wooden or iron wedges or keys, and when other machinery was made in an equally crude way, and an eighth of an inch was considered a minute quantity, to have talked of the application of the microscope to mechanical work would have been as inappropriate as would be the application of the microscope of a few years ago to the high class of work of which the recent instruments are capable.

But in mechanics, and in optics, and in every other branch of scientific and practical work, great advances



investigate this subject. It is only a few years since reached only by the employment of all available means material. for securing that perfection, and the use of instruments capable of revealing the minutest defects. The microscope has its application in mechanics not only to the finer measurements, and to the inspection of the quality of work, but its most useful application, perhaps, is to the selection of materials and the study of their behavior under different conditions.

> Beginning with metal working tools and their action upon materials; while every machinist is supposed to



know how to grind his tools and put them in the best condition for use, yet, for one reason or another, even the best mechanic will find that of two tools forged, filament is placed as an anode in a bath of chloride of one tool will work much freer, will cut cleaner, and do better work than the other.

Now, it must be admitted that the portion of the tool that really does the work is microscopic in its dimensions, and a comparison of two such tools by the aid of a microscope will reveal the cause of inferior work with one tool, and the reason of good work with the other tool. The character of the cutting edge depends to advantage in the mechanic arts, with the hope that altogether upon the temper of the tool and the means and methods employed for sharpening it. A tool ground upon a coarse emery wheel or grindstone will

> happens to be out of truth, the cutting edge is liable to be rounded. If the cutting edge is produced by a true wheel, and finished by means of a fine oilstone so that a clean, sharp edge is secured, the tool will not only turn out better work, but its edge will be found very much more durable than one of a serrated

> These peculiarities of the cutting edge can be seen to some extent with the unaided eye, but of course the microscope reveals their defects or their perfections to

agonal or octagonal in form, with unbored wheels fitted a far greater extent. The microscope for this purpose need not be necessarily one of the expensive sort; such a microscope or magnifier as any machinist may carry in his vest pocket will answer the purpose, although a larger and better instrument will often be found very useful.

Fig. 1 shows the edge of a diamond pointed tool as it appears under a magnifying power of about 20 diameters, showing the serrations produced by an ordinary coarse emery wheel.

Fig. 2 shows the same tool ground upon an emery wheel which is out of truth.

Fig. 3 shows a tool of the same form under the same magnifying power, the edge of which has been properly sharpened with a fine oilstone after grinding.

Fig. 4 represents the action of the tool shown in Fig. 1 upon its work; the surface of the steel turned with such tool is there shown covered with many grooves and needle-like projections.

Fig. 5 represents a piece of work under the same magnifying power, which has been done with the tool shown in Fig. 2. The microscope clearly shows that the metal, instead of being cut off, is simply bruised off.

Fig. 6 represents a piece of work done with the properly ground tool. The surface of this work needs no further finish; it is absolutely true and perfect, and would not be benefited in the least by the application to it of a file or any abrading

What has been said with regard to the diamond pointed tool shown in Figs. 1, 2, 3, may be said with equal propriety about tools of other forms.

Every foreman or superintendent of mechanical work knows how difficult it is to find a workman who is competent to perform the apparently very simple operation of calipering. It is not common to find ordinary machinists who are sufficiently accurate in this matter to carry on their own work by calipering merely, and it is entirely out of the question for one machinist to adjust calipers for another machinist to work by. The difference of touch between the two workmen may result in a difference of between the 1-5000 and the 1-100 of an inch.

To render the operation of calipering more positive, and to establish uniformity in calipering, the microscope, A, together with a micrometric scale, B, graduated to 5000ths, may be applied to calipers as illustrated in Fig. 7. When the workman has calipered his work in the usual manner, his personal equation, if such an expression may be used in this connection, may be discovered by noting the amount of spring of the calipers as indicated by the adjustable index, a, carried by one leg of the calipers over the scale, B, carried together with the microscope by the other leg, and other workmen using the same calipers will, of course, reduce his work to such size as will give the same indications under the magnifier. This will permit of great accuracy in the calipering or the measurement of work

Coal Ashes for Heavy Soils.

A writer in one of our agricultural contemporaries says that for the purpose of making stiff soil friable, sifted coal ashes, where they can be readily had, are better than sand. They are more easily disseminated through the mass, and contain a small proportion of mineral salts likewise, though their merit is principally mechanical. I had a patch of clay over trap rock that, after a rain, took on the consistence of putty. I could do nothing with it. Vegetable manure it scorned, and the spade cut in it as though it was skim milk cheese. The place was made the receptacle of the winter's ashes. Two years after, it was dug up through a mistaken order in the fall. Next spring I manured it, and had it dug over. Then I planted it, of all things in the world, with melons. They were a striking success. More than that, the friability of the soil remained permanent.

A PORTABLE COVERED HAMMOCK.

The very comfortable looking provision for the siesta, shown in illustrations, is a device of Italian invention, It possesses considerable merit as a piece of camp equipment with a most desirable compactness and portability. The end supports, as best shown in the enlarged cut, are pivoted to each other, and when the hammock is occupied, are prevented from collapsing by the longitudinal bar uniting their upper ends. This gives a good, solid support for the hammock, keeping it at an easy dis-

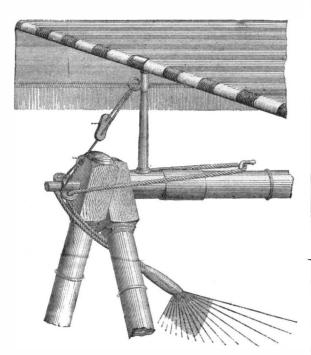


Fig. 2.-PORTABLE COVERED HAMMOCK.

tance above the ground, and making it possible to bivouac at any desired point without the necessity of searching for tree or post. The supporting rope, passing under the angle of the legs, and through the metallic eye pieces at the outer extremity of the pivot, is attached to a hook on the upper side of the longitudinal bar. This arrangement makes the device easy to erect, avoiding the continual tying and untying of ropes, which under certain circumstances may make a hammock more of a bother than a comfort, and at the same time gives an admirable distribution of the strains. The greater the weight in the hammock, the more firmly are the legs and bar united.

Not less important to the comfort of the device is the wide spreading awning, which throws its grateful missionary in the village of Chaffa, in the center of the shadow over hammock and occupant. Its end rods are balanced on short uprights extending from the longitudinal bar, and the desired inclination and stability are secured by the cords attached to the pivoted legs. Perhaps the greatest merit of the invention is illustrated in the figure which shows it packed and ready for shipment. The supporting frame taken apart, and

wrapped in hammock and awning, forms a bundle easily gathered into a shawl strap, and a desirable addition to the outfit of invalid or tourist.

The Ghetto of Rome.

We learn from the Building News that the demolition of the Ghetto of Rome, the oldest Jewish quarter in Europe, dating it is said, from before Cæsar's time, is proceeding rapidly. The archæological commission which is charged with the explora tion and protection of ancient monuments has applied to the Italian Government that measures shall be taken for clearing the temple of Jupiter and the portico of Octavia from the buildings which have grown up around them, and also for putting them in such a state of repair as is necessary for their preservation. The commission also requests that the new streets which are to be laid down over the cleared area shall be so

crypt of the Emperor Balbus, and the porticoes of the list of ancient monuments.

BAUDRE'S SILEX PIANO.

Among the flint stones that are met with in the chalk formation there are some that when struck with another flint emit sounds of great purity. The tones that are thus obtained with different musical flints are out of all proportion to the bulk and weight of the stone. This is a very curious phenomenon, the explanation of which is not furnished by the fundamental laws of acoustics, and which surely merits being studied by physicists.

As long ago as 1873, I spoke of musical stones as a curiosity worthy of attracting attention. I then promised to return to this interesting subject, but the years passed by, and the singing stones were forgotten. Upon recently visiting the new electric lighting of the Grevin Museum, however, they were casually brought to mind again. After examining this interesting installation, I was walking through the great hall of the museum looking at the wax figures mounted therein, when I heard some delightful music that attracted my attention. Approaching the spot where these harmonious and pure sounds were being produced, I saw a musician, who, holding two flints, was playing upon a stone piano with wonderful agility, by striking other flints of all shapes suspended by two wires at a few fractions of an inch above a sounding board. I at once made the acquaintance of the player, who was Mr. H. Baudre, a distinguished musician, and a zealous collector of musical stones.

"How did you procure these flints that render so delightful sounds, and from which you get so remarkable music?" said I.

"Ah, sir, it required much time and many trips to collect the 26 stones which you see before you, and which form the two chromatic octaves. It took me more than thirty years (from 1852 to 1883), to search for them in the chalk beds of Haute-Marne, Perigord, Eure, and the Paris basin."

"Are such flints found in all chalk formations?" "I believe not; the innumerable quantities of English flint have yielded me nothing acceptable." "Are there any works that treat of this interesting subject of singing stones?" "I do not know; but I have letters from numerous scientists, who have been pleased to congratulate me, or to give me their opinion."

"Would you communicate a few of them to me? I should like to publish them in La Nature." "Very willingly, sir; I will send you my file to-morrow."

The following are a few of the notes that appear to me to give some new information in regard to singing stones:

Mr. Cartailhac, director of the Toulouse Museum, reports that three musical flints were once noticed by a plain of Thumazana, Abyssinia. These stones were hung by threads from a horizontal wooden rod, and were used for calling the faithful to prayers or to battle. They were struck with another flint, and their sounds, which were very intense, were heard from some

In an interesting letter to Mr. Baudre from Mr. J.

stones being different when they are struck in two neighboring places. I should not be surprised if there were a sort of obliqueness in the structure, which would explain the impossibility of preserving the sound when a singing stone is cut or broken.

"There is here an interruption of the sonorous waves that are passing through the body. The great difference in the sounds that two bodies of nearly equal bulk are capable of producing is probably due to a difference in the arrangement of the molecule, which govern the mode of vibrating. I am sorry that I am unable to say more on this subject."

I reproduce a very pleasant letter from Mr. C. Sainte Claire Deville, of the Institute, the learned geologist, whom death robbed science of a few years ago:

"A feeling of remorse seizes me when I reflect upon the incalculable number of stones that I have broken -of flints broken in order to discover in them the traces of a shell, an echinus, or a polyp. And, when I consider all the sacrifices of this kind that my geologi-

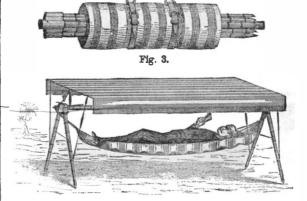


Fig. 1.-PORTABLE COVERED HAMMUCK.

cal confreres are every day making, how many reasons have we not for thinking that we have destroyed speci. mens which might now be figuring among your sonorous keys! A vain search has been made for the mandrake that sings, but you have done better; you have found the stone that sings-you have discovered the singing soul of the stone! How many such souls, alas, have we sacrificed! You, on the contrary, less barbarous, instead of immolating them to a vain scientific curiosity, have approached them as a friend, have questioned them feelingly, and, when one out of a hundred thousand of them had the vocation, you offered it an asylum, opened the doors of your conservatory to it, and made a virtuoso of it! What superiority! And how much more crushing does such superiority become when we are obliged to recognize that your keyboard of stone offers a true paradox that geologists and physicists do not yet seem able to fully explain."

Mr. Baudre calls his singing stones "prehistoric music." It is not impossible, in fact, that analogous keys were used by our ancestors of the Stone Age. This was Abbot Moigno's opinion.

> "Who knows," says the old editor of Cosmos, "whether, in eagerly excavating in search of relics of the Stone Age, we shall not find a series of attuned flints? Why may not the flint, which was the first arm, the first tool, of prehistoric man, have also been his first musical instrument?"

Mr. Baudre thinks that the reason no musical instruments have been found in prehistoric strata is that searchers have not occupied themselves with native flints, but only carved

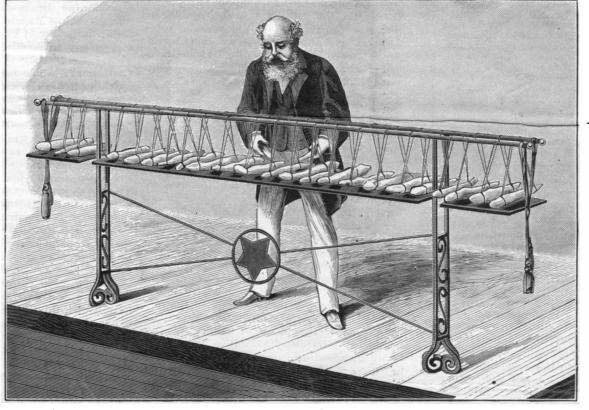
The following are some of the peculiarities of these attuned stones: The stone that emits the greatest tone weighs 4½ pounds, while the one that gives the half tone of this weighs 9. This large flint is immediately followed by one of one ounce, that finds its similar in weight only at the end of the series, although the difference in sound is considerable. A 3 ounce stone gives exactly the same note

with the following ancient buildings, which are now learned scientist treats of the sonorousness of singing that we have surprising anomalies here to puzzle phy-

within the Ghetto: The theater of Marcellus, the stones. "We know not up to the present," says he, "whether the sonorousness is affected by the form, Flavian Emperors and of the Emperor Philip. It is bulk, chemical mass, or molecular constitution. It is proposed that these buildings shall be placed on the very probable that these stones have internal structures that differ from each other—the sound of the Massachusetts to introduce electric light.

planned that their points of intersection shall coincide Ellis, member of the Royal Society of London, this as another that weighs but 6,000 grains. It will be seen sicists.—G. Tissandier, in La Nature.

Holyoke claims the honor of being the first town in



BAUDRE'S SILEX PIANO.

Ourselves as Others See Us.

The following notices, appearing in newspapers printed in places remote from each other, represent a our contemporaries welcome the weekly receipt of the successive issues of the SCIENTIFIC AMERICAN. To tractive and the description of scientific discoveries those of our readers who have been with us for a generation or work of which our subscription lists show ration or more, of which our subscription lists show large numbers, the reprinting of such comments may seem superfluous; but the young are all the time coming forward to fill places on life's stage, and with them such words may aid an introduction to a life acquaintance. If it would be in good taste we might, likewise, quote from the many good things patentees say of us, in their correspondence, relative to our methods of doing this class of business-in preparing their appli- tween the present and earlier modes of posing the cations, and our success in taking care of their cases before the Patent Office—but the confidential nature of such services precludes reference thereto.

The Streator (Ill.) Monitor says: The Scientific AMERICAN is one of the papers which are necessary to every one who expects to keep up with the times. To be deprived of this journal after once getting accustomed to receiving it, is like moving to a country where science and invention are unknown. It keeps its readers posted on all things appertaining to the mechanic arts, new discoveries, and appliances in science, and the problems and theories receiving the attention of the foremost workers in the fields of discovery. It is published weekly at \$3.20 per year, and is worth to every intelligent person many times the cost.

The SCIENTIFIC AMERICAN is without a peer in its realm, says *The Capital*, published at Frankfort, Ky. It is not only a journal of arts, sciences, and mechanics, but it is the greatest of all journals of that class. Its pages are weekly filled with the most entertaining as well as the most instructive of matter, relating not only to really scientific matters, but to subjects that are intimately connected with everyday life. No family able to pay for it should be without this remarkable weekly.

The Dallas (Texas) Machine Journal says: The Scientific American, in our judgment, is indispensable to those operating machinery, as the valuable information contained in its columns if heeded would prevent many mishaps, and errors committed by ignorant approximation. plications in and about a plant of machinery. We notice in every number sufficient mechanical information to pay for its year's subscription. Operators of machinery dispense with a good and reliable assistant in not taking the SCIENTIFIC AMERICAN regularly.

THE SCIENTIFIC AMERICAN.—An examination of this paper, says The Methodist Protestant (Baltimore), will satisfy any person that it should find a place not only with every engineer and mechanic, but with every citizen of average intelligence, so varied and interesting are its contributions and illustrations. While it makes special record of new inventions, it covers the whole field of theoretical and applied science in all its departments. It is one of few of our exchanges uniformly read through.

TRASH READING.—How deplorable the fact people spend precious time and money for trashy literature in this age of progress! If one-tenth part, says The Mineral Wells Pilot (Texas), was spent for such publications as the SCIENTIFIC AMERICAN that is spent and wasted for trash literature, ignorance and poverty would almost be banished from this fair land of liberty in a few years. Every number of the SCIENTIFIC AMERICAN contains 16 pages, beautifully printed and elegantly illustrated; it shows the progress of the world, and abounds with fresh, interesting subjects for all classes. No intelligent person, after reading it two or three months, would miss one single number for the subscription price, \$3.20 per annum. We mention it with the hope of turning the minds of some of our readers from poisonous, fictitious, trashy, and unprofitable literature to something ennobling, full of knowledge, and elevating in its tendency.

The Wesleyan Christian Advocate says: That old estabished and popular journal, the SCIENTIFIC AMERICAN, published by Munn & Co., New York, maintains with increasing interest and usefulness its high character for art and science. Those interested in the mechanic and manufacturing arts, and inventions, and discoveries in science, cannot well do without it. It seeks specially to popularize knowledge and science, and it does this needed work in such a plain and interesting way as to adapt it to the easy comprehension of the masses of readers, as well as the savants and scientists of the whole coun-We cordially recommend it to all who desire useful knowledge and practical information upon every day topics and subjects of invention, education, and

The Messenger, published at Minneapolis, Kan., suggests that if a person wishes to know about the great improvements that are continually being made in machinery, and learn of those things that the inventive mind of the American is bringing to light, he should be a subscriber of the Scientific American, one of the best periodicals of that kind in the world—beautiful clear print, good paper, and most interesting ng. One who takes the SCIENTIFIC AMERICAN reading. once will always remain a subscriber.

The Republican, published at St. Clair, Mich., says: Of all the scientific papers published in this country, there is none which for the ordinary reader in any way compares favorably with the SCIENTIFIC AMERICAN. In fact, although a professedly scientific paper, its articles are so thoroughly free from all technical words and view is secured. There is no trouble; scarcely any expressions that they are as well adapted to the general | mechanical skill is exercised. Practically, the operaexpressions that they are as well adapted to the general reader as to the pure scientist. It is a paper which no one can afford to be without who desires to keep posted in regard to the great progress which is now being made in the scientific world, because it contains a com-

plete record of this progress expressed in the most interesting way. One of its best features is its illustra-tions, which represent the highest attainment in the line of artistic engraving. We believe there is no paper small proportion of the approving comment with which which is capable of exerting a more healthful influence jects which are of a practical character.

Photography Thirty Years Ago and To-day.

Referring to the progress the amateur photographer is making in England, The British and Colonial Printer tells us that not only the Princess of Wales, but other members of the royal family, have become familiar with the camera. The same paper draws a contrast besitter, and the process of taking pictures and the improvements made in all departments of the photographic art, which the older readers of the Scientific AMERICAN will recognize as truthful, and all admit to

The torture to the sitter of old was something very real. If the fussy "artist" would only have permitted his victim to sit as he sat at home, there would have been little to complain of. Evidently, however, there was one look for everyday life and another for the "studio." The man who never opened a book from one year's end to the other stood bolt upright, close by a marble column, with his finger inside a copy of "Locke on the Human Understanding." The mother of a family, in terror lest her heated face should "come out frightful," or agonized by the amblings of a fly across her nose, sat glaring at a spot on the wall, her countenance rigid with a wooden smile only seen in photographs, while the man of science waited, watch in hand, for the fatal moment when the cap was to descend, and all was over. People dressed to be photographed, and dressed, especially in the humbler walks of life, so fearfully unlike nature, that when their doppelgangers" appeared in the photographer's case, it was regarded by their acquaintances as a sign of superior acuteness to recognize the prototype. The blacksmith, with whom half the country side were familiar in his leather apron and his shirt sleeves, looked extremely stiff and unhappy as he stood by the regulation marble pillar-of painted fir-in his Sunday clothes, with his forefinger in the property copy of Mr. Locke's erudite treatise.

The photographer of the old school fixed the person to be taken in front of a bull's eye, and requested him to look "as he usually did." Then-with a view to secure this end—an implement of torture called a "head rest" was fixed on his occiput, evidently under the impression that this curve of iron was the usual appendage of an arm chair. A second or two later, the artist declared with well feigned resignation that he must "pose you again," and posing in his vocabulary always meant pulling down your shirt cuffs, laying your right hand in an unnatural position over a shaky little table, propping up a lock of your hair to make it resemble the typical portrait of Byron. Then after one or two final pulls and pushes, and easings of the bust backward and forward and sideways, as sculptors manipulate their clay models, the "sitter," heated, irritable, and perspiring, was requested to "look pleasant." At last the cap was taken off, the watch produced, and a minute of torture, it seemed hours, inflicted on the man who, in a moment of good nature and ambition, resolved to be taken." The result we all know.

A portrait taken in a dentist's chair would have been as pleasing. The only satisfaction a cynic got out of the business was that the fellow with the lens did not get off scot-free. Before he poured the collodion on the plate which had to be so laboriously cleaned. and then dipped it in the mysterious bath, and retreated into the dark room with it, and dipped it again, he generally managed to leave some trace of the operation on his person. A photographer of the wet process times could always be known by his fingers. for the rare amateur, this rash man, at least during the early stages of his novitiate, had to seclude himself from society, as his hands were stained beyond the power of chemicals to cleanse them.

All this is now very ancient history. It seems as out of date to hear people talking of the collodion process as it is to read of Niepce experimenting with the bitumen of Judea, or Daguerre rendering his silver plates sensitive by aid of the power of iodine. The dry plates rendered miraculously sensitive by gelatine mixed with bichromate of potash have revolutionized the whole art. It is no longer photography, but photoglyphy. A supply of plates is bought from the dealer ready for use, without the operator requiring to touch them, and, indeed, so sensitive that if touched they are injured, and if exposed to the faintest ray of light they are spoiled. Then, at the fitting moment, one is slipped into the camera, a little catch is raised, a click is heard, and quick as the twinkling of an eye a tion is instantaneous, since a passing train, a galloping horse, or a bird in flight can be pictorially fixed.

part of the tourist's kit as his guide book. explorer no longer requires to paint the scenes, or the ruins, or the savages he visits, as Bruce did so laboriously, and at such a tremendous cost of priceless time. A dry plate, a click, and in two minutes there is secured a view, the accuracy of which even the skeptic regarding traveler's tales cannot dispute. It is in truth hard for any one to escape the modern photographer. There is apparatus as small as an opera glass and shaped quite like one. The size of the picture taken is immaterial. It can be enlarged to any extent. Amanuscript can be copied as easily as the building in which it is preserved, or the librarian who so cautiously uncovers it can be "taken." This, indeed, is the present condition of affairs. But now that the Princess has become a "photographrix" we may expect to see a portable camera in every carriage, on the front of every tricycle, or even on the pommel of many a saddle. .

Treatment of Rattlesnake Poisoning.

On the 11th of May, my little boy (aged eight years) while playing near the house, was bitten on the great toe by a rattlesnake. I saw him within a few minutes, ligated his ankle, and applied the following freely:

B. Potash iodide.....gr. xv. Iodine.....gr. xxx. Aqua pura..... 3j. M.

Although the swelling was controlled, he suffered intensely from 5 P.M., the time he was bitten, until 10 P.M., when he became quiet and slept for two hours. when he awoke suddenly, screaming, starting about wildly, and complaining of excruciating pain in his limbs and jaws. I commenced giving him the tinctures of gelseminum and lobelia (two parts of the first to one of the latter) in half teaspoonful doses every five minutes, which was kept up for an hour before any effects were visible; relaxation having been ob tained, all the tetanic symptoms subsided, and the cure was complete.

I was once called to a case where a large rattlesnake had bitten a little boy on!the inside of the ankle—a very bad bite. I used the above prescription freely, and with like results as before. So far as the swelling was concerned, and by the early use of gelseminum and lobelia, cure was effected in five hours, i. e., the active symptoms were subdued within that time, requiring no further professional attention. The iodine and iodide of potash have gained a great reputation in this country as an antidote to the poison of the rattlesnake, and is used when needed with the same results on cattle and horses as on man.

In the case of my little boy, I am satisfied that if I had given him freely of gelseminum and lobelia until it relaxed him, the trouble would have been at an end; indeed, I proved it on the case I had since, and hereafter I shall think of no other treatment, unless it should fail me.-J. W. Holmes, M.D., in Medical Sum-

Violation of a Tomb after Six Hundred Years.

The Stampa, a prominent Italian liberal journal, tells the following strange story: On the night between the 19th and 20th of May, the old church of Sta. Maria de' Gradi, in the city of Viterbo, was entered by the secretary to the municipality, the city engineer, and a band of workmen. They proceeded to the tomb of Pope Clement IV., whose body had lain in a marble sarcophagus in the church since his death in 1268. The sarcophagus was opened, and an inner coffin of wood was found. Upon opening this they found the remains in a fair state of preservation, and clad in the vestments suitable to the papal rank. They did not touch anything, but closed both coffin and sarcophagus. Next morning they returned, accompanied by the sindico of the city and the sub-prefect of the district. The corpse was then taken out of the coffin; the ring, in which there was a precious stone, was taken from the finger; the richly embroidered silk gloves and sandals were torn off; the agraffe which fastened the cope on the breast, and which was richly mounted with precious stones, was cut out; and those portions of the cope, which was of gorgeous workmanship and in good preservation, were cut away. The remains were then huddled into a box and sent off to the municipal buildings; the articles that had been removed were, according to the sindico, to be placed in the museum of Viterbo. The Stampa observes that if a poor man's grave were thus violated, the law would give some months' imprisonment to the criminals. Will not the same measure be given to the disturbers of a Pope's tomb which is one of Italy's historic monuments? And it calls on all the newspapers of the peninsula to publish the outrage, and bring public opinion to demand the punishment of the principals, whoever they may be.

MESSRS. GEO. H. HULL & Co., of Louisville, Ky., are supplying what they term Dresden sand, which is of such quality that the fine iron castings are made without facing, either in the sand or mould. Foundry-They are becoming almost as indispensable a men will appreciate the value of the new sand.

THE IGUANA AND HOW IT IS CAUGHT.

BY DANIEL C. BEARD

One can scarcely imagine a more terrible looking discouraged, however, by its looks the animal seems to delight in its ugliness, and to a great extent rely upon its formidable appearance for protection. When alarmed, it will puff itself up, erect the spine upon its back, and expect by this means to frighten away its enemies; and if its harmless nature were not well known it would seldom be molested, but might bask in the sun for centuries to come, instead of becoming a comparative rarity by gradual extermination.

The common iguana (I. tuberculata, Lan.) is from three to five and even six feet long when full grown. It inhabits the West Indies and tropical America, and belongs to an exceedingly numerous family of lizards. As a rule, all of these relatives have broad, flat heads, often ornamented with comb-like ridges or membranous lobes; similar appendages usually continue along the dorsal region. The throat is almost invariably furnished with a dewlap or membranous expansion of some kind. Their eyes are always furnished with lids which may be completely closed; their tongues are short, thick, and only free at the end, and their ears are freely exposed.

The iguanidæ are an ancient race, but the modern representatives may be divided into two great groups. based upon the character of their teeth.

In the American species, or true iguana, there is a deep furrow in all the jaws. The teeth are curiously flattened and toothed, and are attached to the inner surface of the jaw bone.

In the Old World species, comprising the sub-family of agamidæ, the teeth always grow upon the edge of

Although the common iguana cannot, with propriety, be termed an aquatic lizard, it displays no fear of the outward, and backward, so water, but will ofttimes escape from pursuers by taking to the water and swimming rapidly away, with its fore is nearly horizontal. The feet held, after the manner of a frog, motionless along movement is almost preits sides, and propelling itself by a serpentine movement of its long tail, or, diving, will remainunderwater the act of swimming, and until its enemies abandon the chase. According to the simile is still closer

Wood, the iguana has been known to remain under water for an hour at a time, and at the end of that period to emerge in perfect vigor.

The female iguana will lay from four to six dozen eggs, which are hatched by the heat of the sun, in the same manner as turtles.

It is almost incredible that the meat of this repulsive reptile is used as an article of food by the inhabitants of the country in which it is found. Not only is this so, but it is, further, considered a great deli-

The eggs of this animal are also in as high repute as its meat, although both are said to disagree with some persons. The iguanas are vegetarians, their food consisting, as far as is known, of fruit and other vegetable substances.

There can be little doubt that the white population of tropical America

Indians. In Mr. Bryan Edwards' "History of the West | hands together in carrying them forward, always keep-Indies," published some hundred years ago, he says: ing the palmar surface outward and the thumbs below. "I believe it seldom happens that they (the iguana) Indeed, when taken from the earth and placed upon a were served at any English table, but their French and hard floor, it does not tread upon the palmar aspect Spanish neighbors still devour them with exquisiterelish."

Mr. Edwards also says that he has been "assured by a lady of great beauty and elegance, who spoke from experience, that the iguana is equal in flavor and wholesomeness to the finest green turtle."

The old time priests evidently enjoyed the flesh of this lizard as well as the sport of its capture, if we may judge from the following extract from the writings of Father Labat, which appeared in the Sporting Magazine for September, 1794:

"We were attended," says he, "by a negro, who card a long rod, at one end of which was a piece of whip cord with a running knot. After beating the bushes some time, the negro discovered our game basking in the sun, on a dry limb of a tree; hereupon he began whistling with all his might, to which the iguana was wonderfully attentive, stretching out his head and turning his neck, as if to enjoy it more fully. The negro now approached, still whistling, and, advancing his rod gently, began tickling with the end of it the sides and throat of the iguana, who seemed mightily pleased with the operation, for he turned on his back and stretched himself out like a cat before a fire, and at length fairly fell asleep; which the negro perceiving, dextercusly slipt the noose over his head, and with a jerk brought him to the ground. Good sport it afforded (continues the reverend historian) to see the creature swell like a turkey cock at finding himself entrapped. We caught others in the same way, and kept one of them alive seven or eight days, but it grieved me to the heart that he thereby lost much delicious fat."

Structure of the Mole.

Doctor Merriam, in his work on the mammals of the Adirondack region, describes the mole and its remarkacreature than a full grown iguana. Instead of being ble construction for digging, and says: "The modification of structure that adapts this animal to its peculiar mode of life affords a most remarkable example of animal specialization. The conical head, terminating in a flexible cartilaginous snout, and unencumbered with external ears or eyes to catch the dirt, constitutes an effective wedge in forcing its way through narrow apertures; the broad and powerful hands, whose fingers are united nearly to their very tips and armed with long and stout claws, supply the means by which the motive power is applied, and serve to force the earth away laterally to admit the wedge-like head; while the apparent absence of neck, due to the enormous development of muscles in connection with the shoulder girdle, the retention of the entire arm and forearm within the skin, the short and compact body, and the covering of soft, short, and glossy fur tend to decrease to a minimum the frictional resistance against the solid medium through which it moves. In fact, it presents a most extraordinary model of a machine adapted for rapid and continued progress through the

> "The mole does not, and cannot, dig a hole in the same sense as other mammals that engage in this occupation, either in the construction of burrows or in the pursuit of prey. When a fox or a woodchuck digs into the ground, the anterior extremities are

brought forward, downward, and backward, the plane of motion being almost vertical; while the mole, on the other hand, in making its excavations carries its hand forward, that the plane of motion cisely like that of a man in



learned to eat the flesh of the iguana from the ancient from the fact that the mole brings the backs of his been as follows: A continuous reduction in the hours of its forefeet as other animals do, but runs along on the sides of its thumbs, with the broad hands turned up edgewise."

The Great Glacier of Alaska.

According to the San Francisco Courier, the great glacier of Alaska is moving at the rate of a quarter of a mile per annum. The front presents a wall of ice 500 feet in thickness; its breadth varies from three to ten miles, and its length is about 150 miles. Almost every quarter of an hour hundreds of tons of ice in large blocks fall into the sea, which they agitate in the most violent manner. The waves are said to be such that toss about the largest vessels which approach the glacier as if they were small boats. The ice is extremely pure and dazzling to the eye; it has tints of the lightest blue as well as of the deepest indigo. The top is very rough and broken, forming small hills, and even chains of mountains in miniature. This immense mass of ice, said to be more than an average of a thousand feet thick, advances daily toward the sea.

The Oregon.

The Cunard steamer Oregon, which is now armed as a swift cruiser, was the flagship of Admiral Hoskins during the recent maneuvers of British war ships in Bantry Bay. Besides her ten guns-four Vavasseurs and six muzzle loading sixty-four pounders—the Oregon has eight steam launches of high speed, capable of being effectively used as torpedo boats. She will also receive several Gatling guns.

Influence of Mechanical Invention.

In a recent issue of Bradstreet's the subject of "Progress in Manufacturing" is touched upon, and it is shown by reference to researches of Mr. Edward Atkinson to what extent the world is indebted to mechanical invention for the great abundance of useful commodi-The result is shown in a clear manner by the aid of charts. For the purpose of illustrating his argument or theory, Mr. Atkinson selected, among other industries, the manufacture of cotton sheetings, comparing the prices and other figures of 1840 with those of 1883 and 1885. The data were obtained from two mills which have always been successful.

In 1840 the product of cotton sheetings per hand per year was 9,600 yards, while in 1883 it was 28,032 yards, an absolute increase of 190 per cent in efficiency of labor growing out of improvements in machinery.

In 1840 the number of spindles was 12,500; in 1883 it has increased to 30,800, an *increase* of 146 per cent.

The value of product per hand in 1840 was \$868; in 1883 it was \$1,973, an *increase* of 127 per cent.

The rate of wages per hour in 1840 was 4:49 cents. In 1883 it was 8.80 cents, an increase of 96 per cent.

The rate of wages per year was \$175 in 1840, and in 1883, \$287, an increase of 64 per cent.

The number of operatives in 1840 was 530, in 1883, 527; remaining about the same, while the increase in machinery was about 186 per cent.

The hours of labor were 13 in 1840 and 11 in 1883, being a reduction of about 15 per cent. In 1840 the price

of cloth was about 9 cents. while in 1883 it had been reduced to about 7 cents, being a reduction of about 22 per cent.

Estimating the proportion of price to profit on fixed investment at 10 per cent, the profits in 1840 were 1.18 cents, in 1883, 0.43 cent, being a decrease of 80 per cent in the proportion of the product assigned to profit.

Mr. Atkinson has summarized the progress as follows:

"Fifty years ago the average earnings of all the operatives in a large cotton mill, who were worked thirteen hours or more a day, and among whom were comprised a much larger proportion of men than at the present time, while the women were older and there were fewer children, were \$2.50 and \$2.62 per week. The quantity of machinery which each hand could tend was much less; the production of each spindle and loom was less; the cost in money of the mills per spindle or loom was much greater, while the price of cloth was at times more than double the price at which it can now be sold with a reasonable profit. The average earnings of all the female operatives in what purports to be the same factory, at the present time, on the same fabric, working ten or eleven hours a day, are \$5 per week, and in some cases even \$6 or more to the most skillful. That is to say, women now earn about twice as much in ten hours as men and women combined averaged in thirteen hours then. The course of events has

of labor, coupled with an increase in the earnings per hour: a diminution in the ratio of capital to production, coupled with an increase in its productive efficiency; a constant increase in the supply of cotton fabrics per capita, coupled with a decrease in the price: a continuous increase in the purchasing power of gold dollars in respect to almost all articles of necessary sub-

It is pointed out that these facts afford a complete demonstration of the fallacy that high wages and high cost of production are synonymous; that the rate of wages is only one of many elements instead of the single important element in determining the cost of production in any industry; that it is quite possible that the highly paid labor in our best cotton mills costs less per pound or yard of product than the "pauper labor" in English mills, and that if the obstacle of tariff taxes on sundry things which they have to use were cleared away, American manufacturers would be more than able to hold their own.

STATE regulations as to the use of automatic car couplers are likely to give considerable trouble in the matter of exchanging cars in order to make through lines. The laws of one State cannot control the kind of couplings used by the railroad company of another State whose lines do not enter the State where couplings are regulated by law. The cars of such a company might be excluded altogether from the State, but that would interfere with facility of traffic and be a rather costly remedy. Unless all the railroads adopt safety couplers, and unless those adopted work together, one or two or even half a dozen States can do but little by legislation to bring about the desired reform. This is a matter that the railroads should attend to themselves, without waiting for outside pressure.

ENGINEERING INVENTIONS

A rotary engine has been patented by Mr. Frederick H. Crass, of Murfreesborough, Tenn. This invention consists in a peculiar construction and arrangement of a revolving outer casing bearing piston and exhaust ports, combined with a stationary steam chamber and cut-off gates or slides.

A sand feeder for locomotives has been patented by Mr. Hampton R. Campfield, of Susquehanna, Pa. Combined with the sand box and its discharge pipe is a feed box, with a handhole, so arranged that the sand will be delivered regularly and in uniform quantities, and so that pebbles, coarse sand, or refuse will not be liable to clog the outlet groove.

AGRICULTURAL INVENTIONS.

A cornstalk cutter has been patented by Mr. George A. Stone, of Richmond, Mo. Combined with a frame are pivoted levers carrying pivoted chopper bars, with other novel features, making a machine which, as drawn along a row of stalks, will cut them into short lengths, which may be readily plowed under; the machine can also be made narrow to cut a single row of stalks, or wider to cut two rows of stalks at a time

A thrashing machine has been patented by Mr. Thomas J. Widemire, of Grampian Hills, Pa. It is for thrashing grain in such manner that the straw will not be ruined or broken any more than it is by hand thrashing, the grain to be thrashed being placed upon a table of the machine, and beaten by flails, which after striking it slide off, are carried around by a wheel then strike again, and so on.

---MISCELLANEOUS INVENTIONS.

A ribbon and braid holder has been pa tented by Mr. Charles M. Stone, of Belton, Texas. This invention consists of a peculiar shaped wire holder easi ly adjusting itself to the diameter of the roll and ribbon thereon, so the ribbon may be wound smoothly and evenly, and the end will be held to prevent unwinding.

A device for fitting cross cut saws has been patented by Mr. William H. Dessureau, of Otsego Lake, Mich. It is a combination tool, adapted also for use as a screw driver, measure, and hammer, and by which, in connection with a file, a saw can be easily and

A surgical instrument has been patented by Mr. John S. Poynor, of Walnut Springs, Texas. In a headed rod a series of springs is held with their inner ends to turn in such a way as to make an improved device for extracting foreign bodies from different parts of the body, and one which can also be used as a probe

A tag or label has been patented by Mr. Samuel M. Guss, of Reading, Pa. It has a pin secured by a button, the eye passed through the label, with a washer and guard for the point of the pin, making a tag which can be readily carried in the pocket, and, with suitable printing matter, will be convenient to attach to goods, secured seats, etc.

A clasp has been patented by Messrs. Charles F. and William J. Walters, of Prospect, N. Y. It is formed of two flat jaws made integral with a crosspiece uniting them combined with a latch pivoted on one jaw and having a curved slot through which a pin passes from the other jaw, making a device for holding stockings, shirt sleeves, or parts of garments

A nail tongs has been patented by Mr. Woodson Mosley, of Kingsland, Ark. A pair of pivot ed hand tongs has a hook secured to the under side of one of the levers for retaining the handle of a scoop, so that a greater quantity of nails can thus be removed at a time from nail boxes or nail trays and the dropping of the nails prevented.

An end gate fastening has been patent ed by Mr. Duncan W. McKinnon, of North Sydney, Nova Scotia, Canada. Combined with the gate is a rod or shaft with lateral hooks engaging with the braces on the sides of the wagon body, the shaft having a lug acted on by a spring of the gate, making a simple and strong fastening for the end gates of wagon boxes.

A cuff button has been patented by Mr. Elias M. Stewart, of Richmond, Canada. Combined with a hollow head having a tubular shank with a cross piece, a pin is arranged to turn in the shank, with a cross piece on the pin, a sliding rod through the upper end of the pin, and a head on the outer end of the rod, the head having a rib for locking the rod in place.

A milk and water cooler has been patented by Mr. Edward Williams, of Lynn, Mass. It consists of a can with two compartments, separate faucets and covers, with handles and trunnions on the outer side of the can, making a can in which the ice employed for cooling is not brought in contact with the liquid to be cooled.

A water motor has been patented by Mr. Horace L. Walker, of Ottumwa, Iowa. It works in connection with an overshot water wheel, combined with which is a series of double acting pumps, which rotate with it, there being weights attached to levers for working the pumps, and cranks connected to the pump pistons and to the levers.

A vehicle wheel has been patented by Mr. Charles W. Long, of Eaton, O. Combined with circular rim is a frame mounted to turn within it, making a wheel without a hub, which can be used as a master wheel on reapers or for other purposes, making the reapers run more easily, the draught less, and giving more power.

A fence post has been patented by Mr. William H. Gates, of Jesup, Iowa. The invention consists in particular constructions of the posts, combining therewith base plates or ground anchors of peculiar form, and in the connections of the horizontal fence wires or rails with the fence posts, to facilitate the erection and lessen the cost of such structures.

A ladder has been patented by Mr. Robert Furlong, of Saucelito, Cal. It is for house or orchard use, and is adapted to support a platform when desired, the invention consisting in the combination, with two pairs of bars pivoted at or near their middles. of rungs uniting one pair of bars and cross bars, and braces uniting the other pair.

en patented by Mr. Henry P. Drew, of New York city. Combined with chains and swinging arms of a catch on the heads on the rods of the box, the spring bracket are an adjustable guide bar and stops, so the swing of the outer arm will be limited independently of the position of the inner arm, the invention being an improvement on former patented inventions of the same

A sash holder has been patented by Mr. William D. Isett, of Altoona, Pa. Combined with a frame are two friction disks mounted independently and eccentrically on a shaft, with cords and pulleys for turning them, making a device for locking sashes so they cannot be raised or lowered from the inside or outside, the device being readily manipulated from the floor of the room

A strap holder has been patented by Mr. Robert L. Beaumont, of St. Joseph, Mo. It is formed of two sections hinged together at one side, and having catches on their opposite edges, there being also a hinge or joint wire having snap hooks formed on its edges, the device being for holding a strap, cord, or chain when not in use, or as a grip or handle for packages or bundles.

Drafts, checks, and other money orders form the subject of a patent issued to Mr. William T. Doremus, of Flatbush, N. Y. It is made with spaces for the place, date, and name of drawer, order and name of payee, dollar sign, numerals from 0 to 9, fraction signs, etc., so that such checks, when filled out, will gage with the toothed bar, making a locking device as necessitate too many erasures and changes to be sucessfully "raised."

Neckwear forms the subject of a patent ssued to Mr. Edwin D. Smith, of New York city. This invention consists in an embossed scarf, bow, or cravat, made of paper, with devices for holding it in place on the collar button, the goods being capable of being produced in black or colors in imitation of silk, calico, or other fabrics, and so as to simulate the creases and folds of a variety of materials.

A fire escape has been patented by Mr. Isaac S. Smeltzer, of Columbus, Ohio. Two grooved pulleys are mounted on a shaft journaled in brackets projecting from the wall of a building, persons to be escued may take hold of rungs and step on platforms, which will descend while other parts of a cable are rising, or firemen and hose can also be elevated to the uper stories of a building.

A hedge trimmer has been patented by Mr. William McLaughlin, of Auckland, New Zealand It is made with a carriage and a disk having two or more cutters, connected with the drive wheel of the carriage by two pairs of beveled gear wheels and two shafts, whereby the disk will be driven at great speed by the advance of the machine, making a mechanism adapted for cutting brush and trimming hedges.

A hat and bonnet fastener has been patented by Mr. James L. Umbellar, of Kankakee Ill. It consists of a hook or combined hook and elastic cord fastening, designed as a substitute for the ordinary cords or hands usually sewed on ladies' hats and bonnets. making a fastening which is conveniently attached, may be readily renewed, and is adjustable to secure a good fit and hold without sewing on the hat or bonnet

A door bolt has been patented by Mr. John F. Taylor, of West Park, N. Y. It is made with a bar adapted to slide and be turned axially, and with a cam or eccentric lug, and held to the door so its lug may enter a recess for holding the bar, so that the door will be held closely to its casing or seat without regard to variations in size of door or casing caused by changes in temperature or the weather.

An apparatus for purifying water has peen patented by Mr. Robert H. Thurston, of Hoboken, N. J. By this invention air or purifying gas is introduced under pressure into the rising main or delivery side of a pumping system, for aerating the water supply, for oxidizing all substances that are oxidizable, and thus purifying the water supply of cities and towns that are supplied with water under a head or pressure.

A stop attachment for roller skates has been patented by Mr. Josiah P. Geran, of Brooklyn, N. It is made with a curved plate having strengthen ing flanges, a recess, and a flexible block secured in the recess of the curved plate by a clamping plate, making a device by which the advance of skaters can be readily checked, and which will serve as a safeguard to prevent the skater from falling backward.

A wire rod rolling mill has been patented by Messrs. Henry Grey and Richard Bowater, of Beaver Falls, Pa. It is for reducing heated rods to prepare them to be drawn into wire, and provides a special construction and combination of parts to avoid the use of wabbler connections and of gearing between the rollers, as well as to afford means for supplemental heating of the wire rod during the process of rolling.

A life saving apparatus has been patented by Mr. Olney Arnold, of Pawtucket, R. I. Combined with a kite is a small boat, carrying a spool or bobbin with a life line, one end of which is made fast to the ship while the kite is made to drag the boat to the shore, the boat being so made as to adapt it to increased or diminished resistance in the water, and so it can be guided out of alignment with exact direction of the wind.

A nut lock has been patented by Mr. Louis Brandt, of Salina, O. Combined with a fish plate, a screw bolt and nut fitted thereon, and a projection forward of the face of the plate, is a block fitted to an angle of the nut and filling the space between the nut and projection, with another screw nut so placed and weighted as to retain the block between the nut proper and the projection.

A slicer has been patented by Mr. Daniel J. Gilchrist, of Newark, N. J. Combined with a slide carrying a blade is a board held to the slide by links and an angle lever, a rod being connected with the angle lever by means of which the board can be moved a greater or less distance from the edge of the blade, and the device readily adjusted to cut slices of any desired thickness.

A wagon box fastener has been patented by Mr. John A. Jonas, of Reserve, Kan. Combined with a wagon box having bars with heads on the upper ! with other novel features.

A jointed gas and lamp bracket has end of the inner surface is a false box with spring straps provided at their lower ends with hooks which can fastener being tightened by the pressure of the load against the false box.

A two wheeled vehicle has been patented by Messrs. Joseph F. Sanders and Theophilus T. Whitcomb, of Elizabeth City, N. C. Bed plates are fixed at or near each end of the axle, having grooves forming seats for the shafts and the springs or their bed blocks, whereby the height of the shafts may be regulated, and a simple connection is made of the spring and shaft to the axle, making a device especially fitted for the running gear of two wheeled vehicles.

A washing machine has been patented by Mr. Peter Lawson, of Moline, Ill. A washing wheel journaled to revolve in a tub has on its periphery a series of eight-sided rubbing rollers, and against these is held by a board and frame, with a spring, a roller mewhat larger, between which and the smaller rollers the clothes are drawn or made to pass by the turning of a crank, giving a quick and thorough rubbing motion with little liability to a tearing action.

A combined burglar alarm and sash fastener has been patented by Mr. John Brady, of Philadelphia, Pa. A bar with bolt holes is attached to the front of the upper sash, and a toothed bar to the front of the lower sash, and a spring bolt is arranged in the window frame to move parallel to the sash and enwell as an alarm when the window is opened from the outside.

A tricycle has been patented by Messrs. Theodor R. A. Weber, of New York city, and Carl E. E. Hennig and Alfred E. Frommelt, of Paterson, N. J. The main wheels have sprocket wheels connected with sprocket wheels on the forward treadle shaft, in combination with sliding clutch blocks, there being two treadle shafts which work together, but so placed that the treadles of one will be horizontal while the other is vertical, with various other novel features.

A machine for straightening match splints has been patented by Mr. William H. Wyman, of Oshkosh, Wis. Combined with a partition shaker is a partition box held in the bottom of the same whereby the splints are caused to turn and move until they drop lengthwise into compartments formed between the partitions, whereas heretofore the splints were straightened by the machine and then placed by hand in the box.

A vehicle wheel has been patented by Mr. William Gibby, of Rahway, N. J. The hub box has exterior screw threaded and tapered longitudinal grooves, the hub sections sliding upon the hub box and having radial slots in their outer parts to receive the spokes, etc., so that the wheels can be adjusted to cause vehicles to track wider or narrower, to tighten or slack en the rims, and allow part of the wheel only to be re moved and replaced.

A button or stud has been patented by Messrs. Read Benedict, of New Brighton, and Harry M. Scott, of Brooklyn, N. Y. It has a twisted shank with attached plate, whereby the plate or bottom may be easily inserted into a button hole in a garment, the button shank and plate being formed together of a single piece of sheet metal bent into form to be soldered or otherwise secured to the bottom or underside of the button proper.

A shirt has been patented by Mr. Nathan Roggen and Toba Eisenstein, of New York city The yokes extend from the back placket along the neck piece, thence directly over the shoulder seams, and they are each formed with side points, which follow down the shoulder seams front and back, to strengthen and re-enforce the shirt at the shoulder and prevent the seams from giving away from wear of the coat, vest and suspenders.

A welding compound has been patented by Mr. Elisha Watkins, of Portland, Ore. It is made from sal ammoniac, zinc, borax, and iron filings, a specified proportion of each, and made according to certain directions, whereby it is claimed that perfect welds of iron and steel can be made at a low heat with no risk of burning or from repeated heatings while it is stated to be excellent for tempering and

A combined door check and buffer has been patented by Carrie G. Griffin, of Manhattan, Kan. The door check, with a pivoted hook, has a bumper with a pivoted latch or tumbler for engaging the hook, the tumbler being adapted to be turned in one direction to engage the hook, and to allow the hook to pass when turned in the opposite direction, so it may be attached to a door or wall and used either as a bumper or to keep

The setting of real and artificial stones forms the subject of a patent issued to Johann F. Mahla, of Pforzheim, Germany. The setting consists of a metal ring or piece in which hollow heads are formed, terminating in hollow jaws or claws, the latter being drawn out of the metal by punches or stamps, instead of by hand as heretofore, the claws being hollow and much stronger and stiffer than solid

A core for the armatures of dynamo Hartford, Conn electric machines has been patented by Mr. Hans J. Muller, of New York city. It is a formed of a single block of metal with a series of transverse ventilating apertures extending from side to side and dividing the central portion into transverse gridiron bars, the apertures be tween the bars having the same cross section from the outer surface of one side of the armature core to the outer surface of the opposite side, to prevent overheating of a Siemens armature.

A quilting attachment for sewing machines has been patented by Mr. David R. Fraley, of Lexington, N. C. This invention covers a special construction and combination of parts intended to hold quilts extended while traveling to and fro to carry them across the sewing machine, holding and stretching the upper and lower cloths independently, and providing a tension to hold the quilt down on the bed and feeder so that both bottom and top cloths will be held evenly

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line Advertisements must be received at publication office as early as Thursday morning to appear in next issue,

Brewers supplied with Pumps for every service by Valley Machine Works, Easthampton, Mass

Peck's Patent Drop Presses, Blast Forges, Steel and Iron Drop Forgings. Beecher & Peck, New Haven, Conn. The gold medal awarded the Beaudry Power Hammer at New Orleans was given because of its superiority of design, maximum of work, with the minimum of power. Beaudry & Cunningham, Boston, Mass.

Cotton Factory, complete equipment, for sale. Address W. W. Jennings, Harrisburg, Pa.

For Sale at a Bargain.—A new 7-ply Para Rubber Belt. S feet long, 31 inches wide. Made to order by the N. Y. Belting and Packing Co. Address N. T., box 773, N. Y.

Domestic Electricity. Describing all the recent inventions. Illustrated. Price, \$3.00. E. & F. N. Spon,

Patent Elevators with Automatic Hatch Covers. Circular free. Tubbs & Humphreys, Cohoes, N. Y.

Astronomical Telescopes, from 6" to largest size. Obervatory Domes, all sizes. Warner & Swasey, Cleveland, O.

Peerless Leather Belting. Best in the world for swift unning and electric machines. Arny & Son, Phila.

"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 86 John St., N. Y.

The most complete catalogue of Scientific and Mechanical Books ever published will be sent free on application to Munn & Co., 361 Broadway, N. Y.

Shafting, Couplings, Hangers, Pulleys. Edison Shafting Mfg. Co., 86 Goerck St., N.Y. Send for catalogue and prices.

Air Compressors, RockDrills. Jas. Clayton, B'klyn, N.Y. Iron Planer, Lathe, Drill, and other machine tools of odern design. New Haven Mfg. Co., New Haven, Conn.

Every variety of Rubber Belting, Hose, Packing, Gas-tets, Springs, Tubing, Rubber Covered Rollers, Deckle Straps, Printers' Blankets, manufactured by Boston Belting Co., 236 Devonshire St., Boston, and 70 Reade St., New York.

Write to Munn & Co., 361 Broadway, N. Y., for catague of Scientific Books for sale by them

Wanted.—Patented articles or machinery to manufacre and introduce. Lexington Mfg. Co., Lexington, Ky. Mills, Engines, and Boilers for all purposes and of very description. Send for circulars. Newell Universal Mill Co., 10 Barclay Street, N. Y.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. For Power & Economy, Alcott's Turbine, Mt. Holly, N.J.

Send for Monthly Machinery List to the George Place Machinery Company, 121 Chambers and 103 Reade Streets, New York,

If an invention has not been patented in the United tates for more than one year, it may still be patented in Canada. Cost for Canadian patent. \$40. Various other foreign patents may also be obtained. For instructions address Munn & Co., Scientific American patent agency, 361 Broadway, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, Y. Steam Pumping Machinery of every description. Send for catalogue.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

Nickel Plating.-Sole manufacturers cast nickel anles, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson, Van Winkle & Co. Tewark, N. J., and 92 and 94 Liberty, St., New York.

For Steam and Power Pumping Machinery of Single and Duplex Pattern, embracing boiler feed, fire and low pressure pumps, independent condensing outfits, vac-uum, hydraulic, artesian, and deep well pumps, air com-pressers, address Geo. F. Blake Mfg. Co., 44 Washington, St., Boston; 97 Liberty St., N. Y. Send for catalogue.

Supplement Catalogue.—Persons in pursuit of information of any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Knots, Ties, and Splices. By J. T. Burgess. A Handbook for Seafarers and all who use Cordage. 12mo., cloth, illustrated. London, 1884. Sent, postage prepaid, on receipt of 75 cts., by Munn & Co., New York.

Stephens' Patent Bench Vises are the best. See adv.,

Curtis Pressure Regulator and Steam Trap. See p. 12. Send for catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

Wood Working Machinery. Full line. Williamsport Machine Co., "Limited," 110 W. 3d St., Williamsport, Pa. Iron and Steel Drop Forgings of every description. Billings & Spencer Co., Hartford, Conn.

We are sole manufacturers of the Fibrous Asbestos Removable Pine and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co. 419 East 8th Street, New York.

New Portable and Stationary Centering Chucks for apid centering. Send for price list to A. F. Cushman,

Crescent Solidified Oil and Lubricators. Something ew. Crescent Mfg. Co., Cleveland, O.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Emerson's Per Book of Saws free. Reduced prices for 1885. 50,000 Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa.

Barrel, Keg, Hogshead, StaveMach'y. See adv. p. 270.

Nervous, Debilitated Men. You are allowed a free trial of thirty days of the use of Dr. Dye's Celebrated Voltaic Belt with Electric Suspensory Appliances, for the speedy relief and permanent cure of Nervous Debility, loss of Vitality and Manhood, and all kindred troubles. Also for many other diseases. Complete restoration to health, vigor, and manhood guaranteed. No risk is incurred. Illustrated pamphlet, with full information, terms, etc., mailed free by addressing

Voltaic Belt Co. Marshall, Mich.

Fireplace attachment, T. W. Dickinson 321,588

Hoisting Engines, Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., Philadelphia, Pa.

Hull Vapor Cook Stoves.-Best in the world; sell Agents wanted. Send for catalogue and terms. Hull Vapor Stove Co., Cleveland, Ohio.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 398. For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, send for catalogue to Rowley & Hermance, Williamsport, Pa.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.



HINTS TO CORRESPONDENTS.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Information requests on matters of personal rather than general interest, and requests for Prompt Answers by Letter, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration.

Scientific American Supplements referred

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Minerals sent for examination should be distinctly marked or labeled.

- (1) T. H. W. J. desires (1) a paste to clean white leather belts (military), that will not rub off. A. If the belts are of a dull white, stale bread is the best preparation to use in cleaning them. If they have a gloss, use a sponge with tepid water. 2. What to clean white helmets with? A. As for the helmets, we know of no means by which they can be cleaned except by coating the soiled places with ordinary crayon chalk. A little pipe clay mixed with water would probably answer equally as well.
- (2) X. Y. Z. desires a method of making paper tough and flexible. Also, can the tough paper used for flour sacks, etc., be made soft like leather or cloth without too great expense, by a chemical or a me chanical process? Is there any machine for taking out stiffness? A. The character of the paper depends largely upon the material with which it is made and also upon the amount of size worked into the mass The "Technology of the Paper Trade" was the title of a series of articles published in the Scientific Ameri-CAN SUPPLEMENT, Nos. 109, 110, 116, 117, 118, and 123. and we would refer you to these
- (3) E. H. desires a recipe for a muci lage for adhering photographs to convex glasses, for painting what is called ivorytype. The mucilage must be perfectly transparent, and not containeither dextrine or starch, or any chemical that would stain the photo graph. I want a mucilage that will not sour or mould spot or crack, after applied to the photograph. A. This information is given very fully on page 120 of SCIENTIFIC AMERICAN, February 21, 1885, under title of "Practical Method of Transferring and Coloring Photographs on Glass." 2. Would like a recipe for a preparation to be applied to the surface of zinc to kill it or remove the gloss, so that when paint is applied it will adhere firmly and not chip off. A. Use dilute sulphuric acid.
- (4) J. H. N. asks if there is any way of making phosphorus hold its luminous property on paper for a week or more. Also kindly state if von know of any magnetic iron ore being found in paying quantities in western New York, west and south of Rochester? A. We would recommend that luminous paint be substituted for the phosphorus compound. The luminous property of phosphorus is due to the slow oxidation of that element giving rise to an exceedingly poisonous gas; and if the phosphorus is in suffi ciently large quantity, the oxidation will increase until it bursts into flame. The two principal deposits of magnetite in New York State are, 1, those of the Adirondack region and, 2, those located in the southeastern portion of the State. There are no worked de posits of importance in the region mentioned by you.
- (5) L. S. asks (1) how to clarify rosin to render it either transparent or a nice white color. A. You can dissolve rosin in ether or benzol; filter the mixture, and allow the solvent to volatilize, and then you will have the rosin freed from mechanical impurities 2. How to produce wax similar? A. Beeswax is bleached by exposure to sunlight in thin cakes. 3. If there is a compound cheap and good, white or transparent, fusing similar to rosin and setting hard and tough? A 4. How to treat moulds in which rosing is run so that it won't adhere to the mould? A. Covering the contact surfaces in the mould with pure glycerin
- (6) A. C. D. writes: The air saturated with vinegar fumes seems to destroy the strength of the lime in plaster, and it is constantly falling in dust and sand. I wish to use some ingredient in the mortar which will not be susceptible to a vinegar atmosphere. and make the wall permanent. A. Quicklime and linseed oil mixed stiffly together form a hard cement, resisting both heat and acids. A stiffly mixed paste of pipe clay and coal tar is also used. Coating the wall with waterglass or sodium silicate is excellent; the silicate will combine with the lime, and form a calcium silicate which is as hard as stone.
- (7) W. H. writes: I have a large mirror, the back of which has from cause unknown to me become spotted, looks as if was smoked or rubbed; now, where can I have it repaired, or how can I do it myself? A. It may be necessary to resilver the entire mirror. but if the injured localities are not too extensive, the foil about 3 drachms of quicksilver to the square foot of Button or stud, T. W. F. Smitten 321,653 Fire engine, H. Losse 321,510

foil. Rub smartly with a piece of buckskin until the foil becomes brilliant; lay the glass upon a flat table face downward; place the foil upon the damaged por tion of the glass; lay a sheet of paper over the foil, and place upon it a block of wood or a piece of marble with a perfectly flat surface; put upon it sufficien weight to press it down tight; let it remain in this position a few hours. The foil will adhere to the glass

(8) R. T.—The practice for sizes of safety valves varies somewhat to suit the trade sizes of pipe and fittings. One square inch opening in safety valve for each 5 horse power (nominal) is a fair average for stationary boilers. By Act of Congress, for cylindrical boilers, 24 square inches area is required for each 500 square feet of effective heating surface, for marine use. For obtaining the distance of the ball for a given pressure: Divide the weight of the ball by the area of the valve, and divide the required pressure by the quotient. The last quotient will be the distance of the center of the ball in parts of the distance of valve stem from the fulcrum. As in your case

70 lb. weight 90 pressure required

7 sq. in. area = 10 1st quotient

9 times the length of the leverage; then 9x234 inches= 24% inches whole length of lever from fulcrum to center of ball. As 24% inches less 2% inches=22 inches, and as you do not give the weight of the lever and valve, we apprehend that 1 inch may be allowed for their weight, and that your safety valve is set for 90 pounds pressure

- (9) M. K. B.—The sputtering of molten metal is caused by dampness or water. If cast in a metal mould, heat the mould hotter than boiling water.
- (10) E. C. asks how to cut off steam gauge glasses. A. Take a small round file, and break a small piece off the end to give it a sharp edge. Pass the end of the file into the tube, and press the sharp edge of the file on the glass at the place to be cut, turn ing the glass so as to cut entirely around it, when it will be found to break by a gentle pull. If the place to be cut cannot be reached in the first cut, make two cuts. Or you can make a slight cut all around with a file, put ting a little turpentine previously over the place to be
- (11) A. G. S. asks whether it is possible to put iridium on edged tools so as to $\ hold\ the\ edge$ for a longtime without getting dull; also, if it can be done. the address of any concern that can do it. A. Iridium pointed tools will not do to turn hard steel or even cast iron, as it is too brittle, but for pearl, bone, rubber, or celluloid it has been proved to do ten times the amount of work done with a steel tool before it becomes dull. The iridium pointed tool costs about three times that of a steel tool. The tools are made by the American Iridium Company, of Chicago, of which John Holland is manager.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted, July 7, 1885,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.] Advertising mat, S. F. Gibson 321,431

Animal power, Yarbrough & Kyker..... 321,876

imimal power, farbroagn & Ryker	•
Armlet, H. B. Ditwiler 321,4	2
Automatic frogless switch, A. E. Strong 321,9	2
Axes, manufacture of, H. Hammond 321,4	9
Axle box, car, J. P. Garton 321,7	1(
Axle box cover, car, J. Tesseyman 321,6	6
Axle sand band, vehicle, S. Heffley 321,4	3
Bag and satchel frame spring, R. C. Jenkinson 321,5	0
Bag filling, weighing, and registering machine, J.	
R. Campbell	9
Bar. See Grate bar. Horseshoe bar.	
Barrel connection, T. O'Brien 321,5	2(
Battery. See Galvanic battery. Primary or gal-	
vanic battery. Secondary battery.	
Beam heads upon beam barrels, securing, I. E.	
Palmer	
Bed and chair, combined sofa, G. Koenig, Jr 321,8	2
Bed bottom, spring, L. W. Boynton 321,4	ľ
Bed, folding, S. H. Bingham 321,5	
Bed, folding, D. J. Powers321,911, 321,9	1
Bed, invalid, H. Pistorius 321,7	54
Bed, sofa, W. R. Shaber 321,4	4(
Bed, turn-up, L. W. Boynton 321,4	18
Bedstead, A. F. Miller	
Bedstead guard, L. J. Shelley	49
Bell, door, C. D. Hughes 321,5	
Bicycle, W. S. Kelley	32
Bicycle, E. G. Latta 321,5	Œ
Bier, S. E. Barrett	31
Binding machine, automatic, G. H. Howe 321,4	38
Bit. See Horse bit.	
Blind slat fastener, P. M. Melick 321,8	
Blind, window, R. B. Ayres 321,4	74
Block. See Carriage block.	
Boats through or above the surf to smooth water,	
marine way and cradle for transferring, J. E.	
Staples 321,3	
Bobbin, Thorwarth & Tunstill 321,7	72
Boiler. See Range boiler. Steam boiler.	
Bolting chest and middlings purifler, J. T. Lee 321.4	41

Block. See Carriage block.
marine way and cradle for transferring, J. E. Staples
Staples. 321,916 Bobbin, Thorwarth & Tunstill 321,772 Boiler. See Range boiler. 321,772 Boiler, See Range boiler. 321,841 Bolting chest and middlings purifier, J. T. Lee. 321,841 Bolts, etc., machine for screw threading, J. 321,841 Book, copy, J. W. C. Gilman. 321,594 Book, sales, C. W. Earnshaw (r). 10,619 Boot or shoe heels, W. W. Wallace. 321,669 Boot or shoe heels, manufacturing and attaching, G. T. Demary. 321,696 Boot or shoe insole, G. S. Brown. 321,577 Boot or shoe stretcher, W. Jones. 321,610 Bottle stopper, S. B. Opdyke. 321,447, 321,448 Bottle stoppers, wiring for, R. L. Howard 321,602 Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Bobbin, Thorwarth & Tunstill
Boiler. See Range boiler. Steam boiler. Boiler. Set Range boiler. 321,441 Bolting chest and middlings purifier, J. T. Lee
Bolting chest and middlings purifier, J. T. Lee
Bolting reel, A. N. Wolf. 321,875
Bolts, etc., machine for screw threading, J. North 321,841 Book, copy, J. W. C. Gilman 321,594 Book, sales, C. W. Earnshaw (r) 10,619 Boot or shoe heel, W. W. Wallace 321,869 Boot or shoe heels, manufacturing and attaching, G. T. Demary 321,696 Boot or shoe insole, G. S. Brown 321,577 Boot or shoe stretcher, W. Jones 321,447 Bottle stopper, S. B. Opdyke 321,447 Bottle stoppers, wiring for, R. L. Howard 321,607 Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
North
Book, copy, J. W. C. Gilman. 321,594 Book, sales, C. W. Earnshaw (r). 10,619 Boot or shoe heel, W. W. Wallace. 321,869 Boot or shoe heels, manufacturing and attaching, G. T. Demary. 321,696 Boot or shoe insole, G. S. Brown. 321,577 Boot or shoe stretcher, W. Jones. 321,610 Bottle stopper, S. B. Opdyke. 321,447, 321,448 Bottle stoppers, wiring for, R. L. Howard 321,607 Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Book, sales, C. W. Earnshaw (r). 10,619 Boot or shoe heel, W. W. Wallace. 321,869 Boot or shoe heels, manufacturing and attaching, G. T. Demary. 321,696 Boot or shoe insole, G. S. Brown. 321,696 Boot or shoe stretcher, W. Jones. 321,610 Bottle stopper, S. B. Opdyke. 321,447, 321,448 Bottle stoppers, wiring for, R. L. Howard 321,607 Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,833
Boot or shoe heel, W. W. Wallace
Boot or shoe heels, manufacturing and attaching, 321,696 G. T. Demary. 321,696 Boot or shoe insole, G. S. Brown. 321,577 Boot or shoe stretcher, W. Jones. 321,610 Bottle stopper, S. B. Opdyke. 321,447, 321,448 Bottle stoppers, wiring for, R. L. Howard 321,608 Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
G. T. Demary. 321,696 Boot or shoe insole, G. S. Brown. 321,570 Boot or shoe stretcher, W. Jones. 321,610 Bottle stopper, S. B. Opdyke. 321,447, 321,448 Bottle stoppers, wiring for, R. L. Howard. 321,607 Box fastener, C. R. Nelson. 321,628 Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston. 321,528 Broom holder, M. B. Brown. 321,883
Boot or shoe insole, G. S. Brown. 321,577 Boot or shoe stretcher, W. Jones. 321,410 Bottle stopper, S. B. Opdyke 321,447, 321,448 Bottle stoppers, wiring for, R. L. Howard 321,607 Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. Brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Boot or shoe stretcher, W. Jones. 321,610 Bottle stopper, S. B. Opdyke 321,447, 321,448 Bottle stoppers, wiring for, R. L. Howard 321,607 Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Bottle stopper, S. B. Opdyke
Bottle stoppers, wiring for, R. L. Howard 321,607 Box fastener, C. R. Nelson 321,628 Bracket See Lamp bracket Brake See Car brake Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Box fastener, C. R. Nelson 321,628 Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Bracket. See Lamp bracket. Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown
Brake. See Car brake. Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Brick moulds, machine for sanding, D. Ralston 321,528 Broom holder, M. B. Brown 321,883
Broom holder, M. B. Brown
Bucket, minnow, W. W. Hough 321,606
Burglar alarm, S. Broichgans 321,679
Burner. See Vapor burner.
Bustle, C. R. Davis
Button, collar, C. M. Sharpe
Button fastener, A. C. Clausen 321,690

e	Can Saa Creeming on Oil can Milk cooling on	1
,	Can. See Creaming can. Oil can. Milk cooling can. Cans, closing, P. Babcock	,
-	Candlestick, miner's, T. Cox	۱,
1	Cane scraper and pea vine harvester, sugar, J. F. Wood	.
е	Canteen, T. F. Kelly 321,730	
t	Car brake, S. Fairman	
-	Car brake, W. Gill	
	Car brake, F. O. Landgrane	
f	Car coupling, G. W. Bolton	
f	Car coupling, J. T. Hammick	
?	Car coupling, E. A. Richards 321,532 Car coupling, D. J. Stevenson 321,918	
-	Car coupling, W. H. Thurmond (r)	
ı	Car coupling, H. C. Trask 321,773	1
9	Car coupling, E. W. & S. C. Woolley	
1	Car coupling link, R. B. Ayres 321,473 Car spring, J. K. Woolley 321,776	
•	Car stock, F. Sell	ı
9	Car wheel, L. R. Faught	1
	Car wheels, anti-friction bearing for, S. E. Men- denhall	١
	Carbon, apparatus for the manufacture of bisul-	
	phide of, E. R. Taylor 321,661	1
	Carbon bisulphide, apparatus for the manufacture of, E. R. Taylor	1
:	Card, fancy, W. Wirths	
r	Carriage block, street, D. H. Blascow	
3	Carriage spring, M. Haughey	1
	Cart, road, A. C. Fish	1
	Case. See Cigar case. Ticket case. Clock case.	ł
	Cash carrier, Perkins & Kelley	١
	Caster, J. W. See 321,859	1
	Casting stove door catches, casing for, C. Vetter 321,549	
	Cement, manufacture of hydraulic, J. Dimelow 321.589 Chains, connecting link for, C. N. Waterhouse 321,554	
	Chair. See Surgical chair. Tilting chair.	
3	Chair, Hubbs & Bygate	
)	Check rower, G. W. Packer 321,449	
•	Cheese press, G. Schutte 321,857	
,	Chimney cap and ventilator, W. J. & C. Kayser 321,729 Chopper. See Cornstalk chopper.	l
	Chuck, lathe, C. R. Mead	ı
٠	Churn, J. M. Champe	١
,	Churn, D. W. Curtis	
	Churn dasher, A. & B. A. Malone	1
	Cigar case and match holder, combined, G. W.	
	Conover	
ı	Clamp. See Foundryman's clamp.	l
	Clasp. See Shoe clasp.	ľ
	Clip. See Wagon clip. Clipping machine, hair, C. Carleton	l
	Clock, P. C. Bensel	
;	Clock, alarm, T. L. Bissell	
	Clock case, A. M. Lane	
1	Clothes pounder, M. Remington 321,914	j
Ì	Clutch, M. Stolterfoht. 321,656 Cock, gauge, L. Shook. 321,761	1
	Coffin, F. C. Goff	
1	Collar pad, horse, E. L. McClain 321,622	
1	Combination table, Overin & Meyers	
	Commode, chair. B. Rubenstein	
1	Cooler. See Milk cooler.	
+	Cornstalk chopper, W. O. Alexander	L
	Corset, M. P. Bray 321,791	Γ
	Cotton and other fibers, machine for opening and	ľ
1	cleaning, J. C. Potter321,851, 321,852	1

Collar pad, horse, E. L. McClain	391 699
Combination table, Overin & Meyers	
Commode, chair. B. Rubenstein	
Cooking and canning apparatus, J. G. Briggs	291 400
Cooler. See Milk cooler.	321,400
Cornstalk chopper, W. O. Alexander	321 566
Cornstalk cutter, G. A. Stone	
Corset, M. P. Bray	291 701
Cotton and other fibers, machine for opening an	021,131
cleaning, J. C. Potter321,8	
Cotton press, J. L. Sheppard	321,542
Coupling. See Car coupling. Thill coupling.	
Creaming can, G. W. Millner	
Cribbage board, C. W. Le Count	
Curtain supporter, A. H. Gerdoni	
Cut-off valve gear, G. Schuhmann	321,538
Cutter. See Mortise cutter.	1
Cutter head, J. Loar	321,828
Cutter head fastening, W. H. Gray	
Dental articulator, G. E. Smith	321,457
Dental instrument, Hood & Reynolds	321,814
Dental plate, Peirce & Russell	321,847
Die. See Screw cutting die.	. 1
Digger. See Potato digger.	i
Distilling lactic acid, C. N. Waite	321 925
Door check, C. A. Schmidt	
Door fixture, sliding, E. Y. Moore.	
Door securer, F. R. Woodward	
Doubling and twisting thread, machine for, J.	
Tyman	
Draught regulator, W. Hunter	
Drawers and pantaloons, S. D. Blake	321,410
Drill. See Rock drill. Well boring drill.	001 850
Drill jar, rope, C. Phillips	321,753
Drinking trough for animals, J. Moore	
Duplex engine, L. B. Carricaburu	
Electric light regulator, W. J. Paine321,84	
Electric light regulator, W. J. & S. P. Paine	
Electric lights, regulating, W. J. Paine321,84	
Electric lights, regulating, W. J. & S. B. Paine	
Electric lighting system, E. Thomson	
Electric machine, dynamo, E. Jones	
Electric switch, E. Thomson	
Electric wires, conduit for underground, J. Te	g-
gart	321,865
Electro-motive force, conveying persons, etc., b	у.
E. W. Siemens	321,934
Elevator, Anderson & Reed	321.567
End gate, wagon, F. F. Everett	
Engine. See Duplex engine. Fire engine. He	
air engine. Valveless engine. Water pressur	
an engine. Varveiess engine. Water pressur	

	Cans, closing, P. Babcock	Fish grapple, E. W. Clark. Fishing reel, H. L. Joslin. Flood gate, W. Donnan.	321,900
e	Wood 321,562 Canteen, T. F. Kelly 321,730	Flour dressing machine, W. H. Williams	321,874 321,437
-	Car brake, S. Fairman 321,428 Car brake, W. Gill 321,432 Car brake, F. O. Landgrane 321,507	Folding machine, rotary, A. Campbell	321,909
f	Car brake, A. Reese. 321,757 Car coupling, G. W. Bolton. 321,677	Fringe reel, C. Rothengatler Fruit bleaching apparatus, A. W. Miller <i>et al</i>	321,454 321,741
7	Car coupling, J. T. Hammick. 321,598 Car coupling, E. A. Richards. 321,532 Car coupling, D. J. Stevenson 321,918	Fruit jar fastener, J. C. Baldwin	
-	Car coupling, W. H. Thurmond (r)	Furnace, J. Neville	321,890
1	Car coupling, E. W. & S. C. Woolley 321,470 Car coupling link, R. B. Ayres 321,473 Car spring, J. K. Woolley 321,776	Furnace, liquid fuel, L. Nobel	321,736
9	Car stock, F. Sell. 321,860 Car wheel, L. R. Faught. 321,590	Galvanic battery, C. P. Orne	321,446 321,648
	Car wheels, anti-friction bearing for, S. E. Mendenhall	Gas, apparatus for washing and scrubbing coal, F. Weck	321,870
	phide of, E. R. Taylor	Gas from sawdust, apparatus for manufacturing, G. Walker	321,868
r	of, E. R. Taylor	Gas regenerating retort furnace, R. H. Smith Gas under pressure, controlling, J. W. Ells Gate. See End gate. Farm gate. Wire gate.	
8	Carriage spring, M. Haughey	Gate, J. F. Hopgood	321,767
	Cart, road, A. C. Fish	Gate roller, D. Gardner	
ı	Cash register and indicator, C. B. Hopkins. 321,815 Caster, J. W. See 321,859	Glass cigar moulds, form or mould for, H. Hilde	321,498
	Casting stove door catches, casing for, C. Vetter. 321,549 Cement, manufacture of hydraulic, J. Dimelow 321,589 Chains, connecting link for, C. N. Waterhouse 321,554	Glove, husking, E. T. Rate	321,497
3	Chair. See Surgical chair. Tilting chair. Chair, Hubbs & Bygate	tine, I. R. McKinneyGrade delineator, automatic, B. Faymonville	321,623 321,591
2	Chandelier, extension, J. Kintz. 321,006 Check rower, G. W. Packer 321,449 Cheese press, G. Schutte 321,857	Grain and the storage thereof, apparatus for transferring, L. Smith	321,769
	Chimney cap and ventilator, W. J. & C. Kayser 321,729 Chopper. See Cornstalk chopper.	Grain binder knot tyer, C. Reeb Grate bar, J. D. McKinnon	321,639 321,442
	Chuck, lathe, C. R. Mead 321,740 Churn, J. M. Champe 321,688 Churn, D. W. Curtis 321,486	Grate for burning anthracite coal, A. W. Decrow. Gravity separator, W. H. Wakeford Grinding mill, roller, W. H. Wakeford	321,552
	Churn attachment, O. Breckenridge. 321,678 Churn dasher, A. & B. A. Malone. 321,831	Guard. See Bedstead guard. Saw guard. Gun, machine, H. S. Maxim321,513,	321,514
	Cigar case and match holder, combined, G. W. Conover	Hair restorative, R. Danner	
t	Clamp. See Foundryman's clamp. Clasp. See Shoe clasp.	Harness attachment, J. Siebel	321,805
	Clip. See Wagon clip. 321,685 Clipping machine, hair, C. Carleton	Harrow, A. J. Sprague	321,676
t	Clock, alarm, T. L. Bissell 321,415 Clock case, A. M. Lane 321,613	Harvester, corn, W. D. Murray	321,908
	Clock winding mechanism, L. F. Portebois321,526 Clothes pounder, M. Remington321,914	Harvester cutting apparatus, D. Michaels Harvester grain binder, C. Wheeler, Jr	321,467
	Clutch, M. Stolterfoht. 321,656 Cock, gauge, L. Shook. 321,761 Coffin, F. C. Goff. 321,433	Harvester, grain binding, Marsh & Blood Hervesting machine, P. F. Hodges Hatchway, A. Ralph	321,813
ĺ	Collar pad, horse, E. L. McClain 321,632 Combination table, Overin & Meyers 321,747	Hats, brushing and finishing felt, E. F. Brown Hay derrick, M. V. B. Kenney	321,680
	Commode, chair. B. Rubenstein	Hay rake and loader, J. Dwigans	321,489 321,472
	Cooler. See Milk cooler. Cornstalk chopper, W. O. Alexander	Head protector, O. Schlemmer	
	Corset, M. P. Bray	Holdback, R. S. Morse	
1	Cotton and other fibers, machine for opening and	Holder. See Broom holder. Lamp holder. Lead	321,838
	cleaning, J. C. Potter 321,851, 321,852 Cotton press, J. L. Sheppard 321,542	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder.	
	cleaning, J. C. Potter .321,851, 321,852 Cotton press, J. L. Sheppard .321,542 Coupling. See Car coupling. Thill coupling. Creaming can, G. W. Millner .321,744 Cribbage board, C. W. Le Count .321,609	Holder. See Broomholder. Lampholder. Lead and crayon holder. Oil cup holder. Pencil	321,737
	cleaning, J. C. Potter .321,851, 321,852 Cotton press, J. L. Sheppard .321,642 Coupling. See Car coupling. Thill coupling. .321,744 Creaming can, G. W. Millner .321,744 Cribbage board, C. W. Le Count .321,592 Curtain supporter, A. H. Gerdom .321,592 Cut-off valve gear, G. Schuhmann .321,533	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,739
	cleaning, J. C. Potter .321,851, 321,852 Cotton press, J. L. Sheppard .321,542 Coupling. See Car coupling. Thill coupling. .321,744 Creaming can, G. W. Millner .321,744 Cribbage board, C. W. Le Count .321,509 Cut-ain supporter, A. H. Gerdom .321,892 Cut-off valve gear, G. Schuhmann .321,538 Cutter. See Mortise cutter .321,828	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown.	321,737 321,420 321,659 321,739 321,832 321,792
	cleaning, J. C. Potter .321,851, 321,852 Cotton press, J. L. Sheppard .321,542 Coupling. See Car coupling. Thill coupling. .321,744 Creaming can, G. W. Millner .321,744 Cribbage board, C. W. Le Count .321,509 Cut-tain supporter, A. H. Gerdom .321,598 Cutter. See Mortise cutter. .321,538 Cutter nead, J. Loar .321,538 Cutter head, J. Loar .321,596 Dental articulator, G. E. Smith .321,457 Dental instrument, Hood & Reynolds .321,814	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,439 321,432 321,792 321,424 321,573
	cleaning, J. C. Potter .321,851, 321,852 Cotton press, J. L. Sheppard .321,642 Coupling. See Car coupling. Thill coupling. .321,744 Cribbage board, C. W. Millner .321,509 Curtain supporter, A. H. Gerdom .321,892 Cut-off valve gear, G. Schuhmann .321,538 Cutter. See Mortise cutter. .321,828 Cutter head, J. Loar .321,828 Cutter head fastening, W. H. Gray .321,856 Dental articulator, G. E. Smith .321,457 Dental linstrument, Hood & Reynolds .321,814 Dental plate, Peirce & Russell .321,847 Die. See Screw cutting die. .321,847	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,789 321,782 321,792 321,424 321,573 321,745 321,712 321,904
	cleaning, J. C. Potter .321,851, 321,852 Cotton press, J. L. Sheppard .321,542 Coupling. See Car coupling. Thill coupling. .321,744 Creaming can, G. W. Millner .321,744 Cribbage board, C. W. Le Count .321,892 Cut-off valve gear, G. Schuhmann .321,538 Cutter. See Mortise cutter. .321,828 Cutter head, J. Loar .321,538 Cutter head fastening, W. H. Gray .321,596 Dental articulator, G. E. Smith .321,457 Dental instrument, Hood & Reynolds .321,814 Dental plate, Peirce & Russell .321,847 Dieger. See Potato digger. Distilling lactic acid, C. N. Waite .321,925	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,789 321,832 321,792 321,424 321,573 321,712 321,712 321,944 321,646 321,693
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,789 321,492 321,573 321,424 321,573 321,745 321,712 321,904 321,693 321,630 321,630 321,671
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,789 321,792 321,424 321,573 321,712 321,904 321,646 321,693 10,620 321,693 10,620 321,593
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,789 321,783 321,792 321,424 321,573 321,712 321,712 321,904 321,673 321,648 10,620 321,671 321,573 321,575
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint.	321,737 321,420 321,659 321,739 321,424 321,792 321,424 321,712 321,712 321,904 321,638 10,620 321,638 321,515 321,515 321,515 321,515 321,515 321,515
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, Goor, B. F. Lidby. Knob door, J. H. Shaw.	321,737 321,420 321,659 321,739 321,424 321,792 321,424 321,712 321,712 321,712 321,693 10,620 321,675 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,789 321,782 321,792 321,424 321,573 321,712 321,904 321,646 321,646 321,671 321,573 321,575 321,565 321,575 321,565
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig Iron, utilizing waste hoop, W. E. Harris (r). Irrigating, movable gate for, J. A. Fry Jar fastening, P. Briody Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple Knob attachment, H. J. P. Whipple Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, J. E. Lee. Lamp support, J. Spillinger	321,737 321,420 321,659 321,789 321,792 321,424 321,573 321,712 321,712 321,904 321,633 10,630 321,651 321,565 321,565 321,565 321,565 321,565 321,565 321,582 321,927 321,818 321,928 321,818 321,928 321,818
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, doer, B. F. Lidoy Knob attachment, doer, B. F. Lidoy Knob to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, B. J. P. Whipple. Laces, display box and package for, J. E. Lee.	321,737 321,420 321,659 321,739 321,732 321,424 321,573 321,712 321,712 321,745 321,712 321,646 321,693 10,620 321,573 321,575 321,575 321,575 321,575 321,583 321,575 321,862 321,818 321,862 321,818 321,927 321,862 321,818 321,927 321,862 321,818 321,927 321,862 321,818 321,927 321,862 321,818 321,927 321,862 321,818
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Irron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, Goor, B. F. Libby. Knob attachment, Goor, B. F. Libby. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching, H. J. P. Whipple. Laces, display box and package for, J. E. Lee. Lamp, C. Pabst. Lamp plobe support, electric, A. Bossard.	321,737 321,420 321,659 321,739 321,424 321,745 321,712 321,745 321,712 321,646 321,693 10,620 321,593 321,575 321,575 321,575 321,575 321,862 321,883 321,827 321,862 321,862 321,873 321,862 321,873 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,657 321,738
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,732 321,424 321,573 321,742 321,904 321,753 321,663 321,653 321,575 321,565 321,565 321,565 321,565 321,565 321,565 321,565 321,565 321,565 321,565 321,565 321,565 321,573 321,733 321,927 331,527 331,527 331,527 331,527 331,527 321,733 321,888 321,928 321,634 321,657 321,788 321,788 321,493 321,493 321,493
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance	321,737 321,420 321,659 321,732 321,424 321,573 321,712 321,904 321,713 321,666 321,633 321,575 321,661 321,661 321,663 321,575 321,661 321,663 321,321 321,818 321,928 321,818 321,928 321,818 321,928 321,818 321,928 321,818 321,928 321,711 321,654 321,634 321,634 321,713 321,887 321,713 321,887 321,7188 321,933 321,933 321,933 321,933 321,936
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, Goot, B. F. Lidby Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching for, J. E. Lee. Lamp support, J. Spillinger. Lamp, C. Pabst. Lamp ploder, electric, A. Bossard. Lamp pholder, electric, A. Haid. Lamp holder, incandescent, H. Pleper. Latch case, H. B. Sargent. Latth sawing machine, J. T. Hall.	321,737 321,420 321,659 321,732 321,424 321,742 321,742 321,743 321,712 321,904 321,638 10,620 321,575 321,561 321,563 321,575 321,561 321,563 321,575 321,861 321,663 321,733 321,927 321,862 321,713 321,863 321,928 321,713 321,864 321,713 321,864 321,713 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863 321,731 321,863
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, Goor, B. F. Lidoy Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, B. F. Lidoy Knob door, J. H. Shaw Knobs to spindles, attaching door, R. M. Keating. Lamp support, J. Spillinger. Lamp support, J. Spillinger. Lamp pholder, electric, A. Haid. Lamp pholder, electric, A. Haid. Lamp holder, incandescent, H. Pieper. Latch case, H. B. Sargent. Lath sawing machine, J. T. Hall. Lathe for turning polygonal forms, Doane & Bugbee. Lathe for turning polygonal forms, Doane & Bugbee. Lathe, wood turning, D. C. & S. E. Smith. Lead and crayon holder, C. W. Boman 321,784,	321,737 321,420 321,659 321,738 321,424 321,742 321,424 321,712 321,904 321,713 321,503 321,503 321,551 321,561 321,563 321,575 321,561 321,563 321,573 321,575 321,862 321,818 321,564 321,634 321,634 321,634 321,634 321,634 321,713 321,857 321,713 321,857 321,716 321,423 321,716
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig Irron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus Irrigating, movable gate for, J. A. Fry. Jack. See Wagon Jack. Joint. See Rail Joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, H. J. P. Whipple. Knob to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching, H. J. P. Whipple. Jaces, display box and package for, J. E. Lee. Lamp, C. Pabst	321,737 321,420 321,659 321,792 321,424 321,792 321,745 321,712 321,745 321,712 321,666 321,693 10,620 321,671 321,565 321,755 321,575 321,575 321,862 321,862 321,862 321,873 321,867 321,713 321,624 321,627 321,713 321,788 321,423 321,788 321,423 321,788 321,788 321,716 321,716 321,716 321,716 321,716 321,716 321,718
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, H. J. P. Whipple. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching, H. J. P. Whipple Laces, display box and package for, J. E. Lee Lamp support, J. Spillinger. Lamp, C. Pabst	321,737 321,420 321,659 321,732 321,424 321,792 321,424 321,712 321,904 321,638 10,620 321,593 321,575 321,561 321,593 321,575 321,513 321,527 321,818 321,928 321,818 321,928 321,818 321,928 321,818 321,928 321,818 321,928 321,818 321,928 321,734 321,645 321,634 321,734 321,864 321,762 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,763 321,764 321,464 321,764
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, Goot, B. F. Lidby Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching, H. J. P. Whipple. Laces, display box and package for, J. E. Lee. Lamp plobe support, J. Spillinger. Lamp, C. Pabst. Lamp, C. Pabst. Lamp ploder, electric, A. Haid. Lamp holder, electric, A. Haid. Lamp holder, incandescent, H. Pleper. Latch case, H. B. Sargent. Lath for turning irregular forms, Doane & Bugbee. Lathe for turning irregular forms, Doane & Bugbee. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lock. See Time lock. Log turner, D. W. Dorrance. Loom for weaving looped or terry fabrics, J. Nugent.	321,737 321,420 321,659 321,738 321,424 321,745 321,771 321,904 321,666 321,693 10,620 321,503 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,575 321,733 321,927 321,575 321,733 321,927 321,733 321,927 321,733 321,928 321,731 321,545 321,731 321,545 321,732 321,733 321,732 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,733 321,734 321,734
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, Goor, B. F. Lidby. Knob attachment, Goor, B. F. Lidby. Knob door, J. H. Shaw. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching, H. J. P. Whipple. Laces, display box and package for, J. E. Lee. Lamp, C. Pabst. Lamp procket, F. J. Cross. Lamp ploder, incandescent, H. Pieper. Lath sawing machine, J. T. Hall. Lathe for turning irregular forms, Doane & Bugbee. Lathe for turning polygonal forms, D. C. & S. E. Smith Lead and crayon holder, C. W. Boman. 321,784, Lever shears, J. W. Douglas. Lightning arrester, E. Thomson. Link bending machine, W. R. Lewis. Look. See Time lock. Loog turner, D. W. Dorrance. Loom for weaving looped or terry fabrics, J.	321,737 321,420 321,659 321,738 321,424 321,742 321,745 321,712 321,946 321,693 10,620 321,593 321,575 321,575 321,575 321,575 321,575 321,862 321,883 321,927 321,862 321,818 321,927 321,862 321,713 321,545 321,732 321,862 321,713 321,545 321,733 321,928 321,731 321,545 321,732 321,733 321,732 321,733 321,732 321,733 321,732 321,733 321,732 321,733 321,732 321,733 321,733 321,733 321,733 321,733 321,733 321,734 321,734
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, Goor, B. F. Libby. Knob attachment, Goor, B. F. Libby. Knob door, J. H. Shaw. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching, H. J. P. Whipple. Jaces, display box and package for, J. E. Lee. Lamp, C. Pabst. Jamp pholder, incandescent, H. Pieper. Lath, P. S. Svenson. Lamp plobe support, electric, A. Bossard. Lamp holder, incandescent, H. Pieper. Lath aswing machine, J. T. Hall. Lathe for turning polygonal forms, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lead and crayon holder, C. W. Boman	321,737 321,420 321,659 321,732 321,424 321,573 321,424 321,573 321,712 321,904 321,636 321,638 10,630 321,575 321,561 321,575 321,561 321,575 321,561 321,575 321,561 321,753 321,861 321,928 321,818 321,928 321,818 321,928 321,716 321,631 321,631 321,631 321,631 321,423 321,763
	Cleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoes ar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub and, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, H. J. P. Whipple. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, B. Lee. Lamp support, J. Spillinger. Lamp, C. Pabst. Lamp, F. S. Svenson. Lamp pad foot warmer, carriage, J. F. Gibson. Lamp bracket, F. J. Cross. Lamp ploder, electric, A. Bossard. Lamp holder, electric, A. Haid. Lamp holder, incandescent, H. Pieper. Latch case, H. B. Sargent. Lath sawing machine, J. T. Hall. Lathe for turning irregular forms, Doane & Bugbee. Lathe, wood turning, D. C. & S. E. Smith. Leath ero turning polygonal forms, D. C. & S. E. Smith. Lathe, wood turning, D. C. & S. E. Smith. Lead and crayon holder, C. W. Boman 321,784, Lever shears, J. W. Douglas. Lightning arrester, E. Thomson. Link bending machine, W. R. Lewis. Look. See Time lock. Loog turner, D. W. Dorrance. Loom for weaving looped or terry fabrics, J. Nugent. Lubricator, J. Gunther.	321,737 321,420 321,659 321,732 321,424 321,573 321,424 321,573 321,712 321,904 321,636 321,638 10,620 321,593 321,575 321,651 321,593 321,575 321,613 321,527 321,818 321,928 321,818 321,928 321,818 321,928 321,818 321,928 321,716 321,423 321,716 321,423 321,716 321,423 321,716 321,423 321,716 321,423 321,762 321,763 321,763 321,423 321,763 321,423 321,631
	Coleaning, J. C. Potter	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, H. J. P. Whipple. Knob attachment, Goor, B. F. Lidoy Knob to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, B. F. Lidoy Knobs to spindles, attaching door, B. F. Lidoy Knobs to spindles, attaching, H. J. P. Whipple. Laces, display box and package for, J. E. Lee. Lamp support, J. Spillinger. Lamp photoe support, electric, A. Bossard. Lamp photoe support, electric, A. Bossard. Lamp photoe, H. B. Sargent. Lath sawing machine, J. T. Hall Lathe for turning polygonal forms, Doane & Bugbee. Lathe for turning irregular forms, Doane & Bugbee. Lathe for turning polygonal forms, D. C. & S. E. Smith. Lead and crayon holder, C. W. Boman	321,737 321,420 321,659 321,732 321,424 321,424 321,424 321,745 321,712 321,712 321,712 321,663 10,620 321,673 321,575 321,513
	Cleaning, J. C. Potter. 321,551, 321,552 Cotton press, J. L. Sheppard 321,542 Coupling. See Car coupling. Thill coupling. See Car coupling. Cresming can, G. W. Millner 321,508 Curtain supporter, A. H. Gerdon 321,592 Cut-off valve gear, G. Schuhmann 321,538 Cutter head, J. Loar 321,592 Cutter head, J. Loar 321,592 Cutter head, J. Loar 321,592 Cutter head fastening, W. H. Gray 321,595 Dental articulator, G. E. Smith 321,457 Dental instrument, Hood & Reynolds 321,814 Dental plate, Peirce & Russell 321,547 Die. See Screw cutting die. 321,947 Die. See Screw cutting die. 321,945 Door check, C. A. Schmidt 321,645 Door check, C. A. Schmidt 321,645 Door securer, F. R. Woodward 321,775 Doubling and twisting thread, machine for, J. E. Tyman 321,924 Draught regulator, W. Hunter 321,525 Drawers and pantaloons, S. D. Blake 321,416 Drier See Tobacco drier. Drill Jar, rope, C. Phillips 321,753 Drinking trough for animals, J. Moore 321,258 Duplex engine, L. B. Carricaburu 321,569 Duplex engine, L. B. Carricaburu 321,569 Electric light regulator, W. J. & S. P. Paine 321,749 Electric lights, regulating, W. J. & S. B. Paine 321,749 Electric lights, regulating, W. J. & S. B. Paine 321,749 Electric wires, conduit for underground, J. Teg- gart 321,843 Electric wires, conduit for underground, J. Teg- gart 321,867 Electric wires, conduit for underground, J. Teg- gart 321,867 Electric wires, conduit for underground, J. Teg- gart 321,843 Electric wires, conduit for underground, J. Teg- prince, See Duplex engine. Fire engine. Hot air engine. Valveless engine. Water pressure engine. Engraving machine, R. Burgess 321,832 Electric wires, conduit for underground, J. Teg- Farm gate, L. T. Akin 321,455 Fann gate, L. T. Akin 321,456 Fann g	Holder. See Broom holder. Lamp holder. Lead and crayon holder. Oil cup holder. Pencil and crayon holder. Shade holder. Horse bit, D. McCance. Horseshoe bar, A. T. Culver. Horseshoes, machine for cutting toe calks for, W. A. Sweet. Hot air engine, J. J. McTighe. Hot air furnace, Oakes & Camp. Hub band, T. Brown. Hub, vehicle, J. Dump. Hydraulic dirt conveyer, A. Boschke. Hydraulic press attachment, O. R. Nelson. Incubator, A. A. Gehman. Inhaler, A. K. Long. Insulator, electric wire, E. T. Schoonmaker. Iron, manufacture of sheet, I. E. Craig. Iron, utilizing waste hoop, W. E. Harris (r). Ironing machine, C. Angus. Irrigating, movable gate for, J. A. Fry. Jar fastening, P. Briody. Jack. See Wagon jack. Joint. See Rail joint. Journal box, S. & W. Shufflebarger. Key, self-locking, T. Young Knitting machine, S. M. Levy. Knob attachment, Gor, B. F. Lidoy Knob attachment, Gor, B. F. Lidoy Knob door, J. H. Shaw. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching door, R. M. Keating. Knobs to spindles, attaching, H. J. P. Whipple. Laces, display box and package for, J. E. Lee. Lamp support, J. Spillinger. Lamp pholder, electric, A. Haid. Lamp holder, electric, A. Haid. Lamp holder, incandescent, H. Pieper. Latch case, H. B. Sargent. Lath sawing machine, J. T. Hall. Lathe for turning polygonal forms, Doane & Bugbee. Lathe south and can be support, electric, A. Bossard. Lath sawing machine, J. T. Hall. Lathe for turning polygonal forms, Doane & Bugbee. Lathe, wood turning, D. C. & S. E. Smith. Lead and crayon holder, C. W. Boman	321,737 321,420 321,659 321,738 321,424 321,424 321,424 321,436 321,667 321,513 321,516 321,516 321,516 321,516 321,516 321,516 321,516 321,516 321,516 321,516 321,517 321,516 321,517 321,516 321,517

00		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	· N
Mill. See Grinding mill. Paint mill. Rolling mill. Sawmill.		Seeder, breadcast, S. Freeman	321,704
Milling spout for conducting granular, pulverized materials, H. Crow	21,888	Service and valve shut-off box, extension, W. A. Barrows	
Mining pit, M. Golding		Sewer gas excluder, I. N. Jackson Sewing machine attachments, attachment holder or means for securing, A. Johnston	
Mole trap, D. H. Payne	321,524 321,853	Sewing machine needle threader, S. R. Wilson Shade holder, W. H. Wible	32 1,4 69
Motion between axes, coupling to communicate rotary, D. R. Cameron	21,579	Shears. See Lever shears. Sheet metal hollow ware, die for the manufacture of, C. Kind	321,822
Music leaf turner, G. G. Benjamin	321,570 321,599	Shirt, J. W. Smith	321,544 321,801
Musical instrument, mechanical, J. McTammany. 3 Musical reed, C. E. Bramhall	321,882	Shoe clasp, J. C. Hammond, Jr	321,640
Net for horses, fly, R. Brownson 3 Nose ring, L. Drais 3 Nut lock, J. H. Comstock 3	21,884 21,889	Skate, roller, O. Hanson	321,443
Nut lock, R. Howarth 3 Nut lock, J. M. Lindsley 3	321,500 321,735	Skate roller, A. G. Wicker	321,873 321,867
Oil can, W. C. F. Schoellkopf	321,618	Sower, broadcast seed, S. & M. Freeman Sower, force feed seed, Amundson & Henrichsen	
Ores, etc., machine for pulverizing, G. Frisbee, 321,429, 3	321,430	Sower, seed, Amundson & Henrichsen Sower, seed, H. J. Foster	321,879
Organ, reed, G. B. Kelly	321,455	Spinning machine, etc., top roll for, Boynton & Stephen	
Packing for oil well tubing, M. Dayhuff		Spring. See Air spring. Bag and satchel frame spring. Car spring. Carriage spring. Vehicle spring.	
Pan. See Evaporating pan. Pants, overalls, and drawers, supporting attach-		Spring jack switch, J. C. Warren Stalls, device for releasing cattle from, R. H. & H.	
ment for, I. Stark	321,654	E. Kline	321,515
Peters		Steam engine crosshead lubricator, A. L. Ide Steam engine crosshead, A. I. Ide	321,726 521,727
other receptacles from, G. M. Peters	321,672	Steam trap, J. B. Erwin	321,556
Pencil and crayon holder, C. W. Boman	321,465	Stopper. See Bottle stopper. Stove, heating, E. L. Calely	
Picket fastening, W. W. Hamilton	321,717 321,425	Stovepipe fastener or clamp. H. W. Goodwin Strainer, liquid, J. L. Abell	321,808
Picture hanger, J. V. R. Towers	1	Stucco, plastic compound to be used as a, E. & E. W. Marsh	32 1 ,621
Planter and fertilizer distributer, combined seed, L. O. Richardson	321,453	M. Newhall	
Planter, potato, J. M. Karr	í	bell	321,683
Plastic composition, J. J. Varley	1	Surgical chair, Gould & Spencer	
Plow attachment, C. W. McCormick	321,906	jack switch. Syringe, G. E. Philbrick	321,850
Poke, animal, W. H. Bosworth	321,543	Table. See Combination table. Table leg, A. F. Mitchell Tag, S. M. Guss	
Power. See Animal power. Press. See Cheese press. Cotton press.		Tag fastener, E. H. Taylor	321,86 <u>4</u> 321,725
Primary or galvanic battery, E. Starr	321,630	Tapping barrels, device for, Darozir & Bouret Telegraph transmitter, printing, G. B. Scott Thill coupling, J. Harriman	321,858
Printing machine fliers, Hyde & Seaman	321,682	Thrashing machine belt winder, P. Olmsted Ticket case, L. J. Blades Tile for walls, woodwork, etc., J. Hines	321,783
Protector. See Head protector. Watch protector.	221,1417	Tile work adapted to hearths, fireplaces, and vestibules, E. F. MacKusick	321,619
Pulp and other fibrous material, bleaching wood, G. H. Pond	821,452	Tilting chair, D. W. Housley	321,894
material to a, G. H. Pond	321,499	Tobacco leaves, machine for crushing and stemming, A. T. Lendrum	321,614
Punch, ticket, W. C. Harden		Toy savings bank, Shepard & Adams, Jr Tobacco drier, S. Collins	321,650
Railway, cable, H. Root (r) Rail chair, T. L. Beaman 3 Rail joint, J. D. Green 5	321,693	Track laying device, G. A. Smith Trap. See Fly trap. Mole trap. Steam trap. Traps, non-siphoning attachment for closet and	
Rail joint, J. Stewart	321,655 321,627	other, Mackley & Ross	321,829
Railway chair, H. J. Gray	321,414	Truck, freight, Dixon & Rhodes Truck, hand, J. C. Deam Truck, hand, G. A. Kollenberg	321,695
Rake. See Hay rake. Range boiler, E. Bourne		Trunk fastening, J. H. Alexander Twist drill socket, G. A. Letter Type writing machine, V. W. Blanchard	321,615
Reel. See Fringe reel. Fishing reel. Refrigerating and ice machine, W. H. Wood 3	321,669	Umbrella and parasol, E. C. Kuhn	321,612 321,561
Refrigerating apparatus, W. T. Forbes	321,602	Umbrella, rib tip shield, W. P. Richards	321,885
Register. See Cash register. Regulator. See Draught regulator. Electric light regulator.		Valve gear, S. E. Crawford	321,913
Rein support, W. S. R. Tarkington		Valve, steam-actuated, A. Horsfield	321,605 321,842
grain, Atwell & Floeter	-	Vapor burner, C. Whittingham et al Vehicle brake, E. Steck Vehicle shifting seat, C. K. Mellinger	321,546
Roasting furnace, rotary, A. Arents	321,780 321,834	Vehicle side bar, E. Depew	321,587 321,663
Rock drill, I. S. Woodbury		Vehicle top, S. M. Chester	321,477
Roller. See Gate roller. Roller mill driving mechanism, J. V. Hecker		Velocipede, W. E. Nye	321,642
Rolling mili, C. F. Elmes	321,427 521,658	Vessels, construction of, A. Belus	321,569
Roof, cement, A. N. D. Delffs	321,722	Pond	321, 533
Rubber bottles, etc., closing the opening in, E. A. Fellows	321,491	Wagon clip, C. A. Gale	321,707 321,810
Sack filler and weigher, H. T. Wiley	321,830	Washing machine, J. S. Beazell	321,782 321,699
Salts, apparatus for drying fusible, R. S. Penniman	321,636	Washing machine, 1. E. Smith	321,766
Sash and frame, window, G. W. Henry	321,603 321,871	Watch case, J. Lamont	321,826 321,886
Saw article, scroll, A. Bernritter	321,823	Watch cases, forming rims on, C. Chabot Watch cases, mechanism for forming beveled rims on, C. Chabot	•
Saw guard, J. A. Comer	321,484 321,617	Watch escapement, Krichevski & Edmonds Watch movement box, N. V. Randolph	321,611 321,854
Scale, grain, A. J. Buie	321,903	Watch plate, G. E. Hart	321,471 321,666
Screen. See Window screen. Screw cutting die, A. J. Polk	321,755	Water pressure engine, J. N. S. Williams Water wheel, turbine, C. R. Sylvester Well boring drill or bit, Williams & Morrell	321,559 321,660
SellonSeed linter, cotton, Koch & Grath		Well point, drive, J. Vosburgh	321,550

merican.		
hip rack, J. A. McPherson		
DESIGNS.		
elt, ornamentation of a, L. Werner. 16,1 ttle stand, F. A. Ohrenschall. 16,1 tain or bracelet, J. F. Imfeld. 16,1 ock stand, W. S. Weiss. 16,3 replace lining, J. A. Page. 16,1 ng, R. P. Hemming 16,147, 16,1 ng, A. Petzold. 16,154 to 16,1 ove, Bascom & Heister. 16,1 nermometer back, C. H. Myers. 16,1 ny bank, H. C. Hart. 16, ray, A. Ledig. 16,		
TRADE MARKS.		
xes, J. C. O. Wetmore. 12, tters, R. Sternsdorff. 12, iffee and tea urns and po's, G. A. Jones. 12, iffee and tea urns and po's, G. A. Jones. 12, itton goods, bleached or unbleached, woven, Massachusetts Cotton Mills. 12, illings, colored, Massachusetts Cotton Mills. 12, avoring extracts and powders, M. Michaelis & Sons. 12, avors, fruit, McMonagle & Rogers. 12, avors, fruit, McMonagle & Rogers. 12, iour, patent, F. A. Johnston. 12, in the standard of the standa		
our, straight, F. A. Johnston		

C 390 Medicine for certain named diseases, H. Knorr.... 12,393 Medicines, certain named, F. A. Richter & Co. . . . 12,388 Mowing and reaping machines and grain binders, W. A. Wood Mowing and Reaping Machine Company 12,399 Remedy for malarial diseases, G. V. Dunn 12,391 Sewing machines and sewing machine attach-ments and supplies, Singer Manufacturing Company.....Sheetings, shirtings, drills, and jeans, gray and & Grasser..... 12,381

A printed copy of the specification and drawing of any patent in the foregoing list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 361 Broadway, New York. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications, not being printed, must be copied by

Canadian Patents may now be obtained by the inventors for any of the inventions named in the foregoing list, at a cost of \$40 each. For full instruction address Munn & Co., 361 Broadway, New York. Other foreign patents may also be obtained.

Advertisements.

Inside Page, each insertion - - - 75 cents a line. Back Page, each insertion - - - \$1.00 a line. (About eight words to a line.)

Engravings may head advertisements at the same rate per line, by measurement, a the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Standard Thermometers



Accurate, Legible. Sizes of Dials 5 and 8 inches. For sale by THE TRADE. Manufactured and Warrant-ed by the Standard Thermometer Co.

Peabody, Mass. General Agents, FAIRBANKS SCALE HOUSES

In all the principal cities of the U. S. and Canada. THE

Most Valuable Invention OF THE CENTURY IS

Accident Insurance

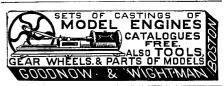
THE TRAVELERS

of hartford, conn.,

IS THE ONLY

Large Company in America Furnishing it. PAID CLAIMANTS \$949,000 IN 1884.





THE SUPERGA RAILWAY.—DESCRIPtion of the new endless rope railway from Turin to the Superga—a work of great in terest to engineers. Contained in SCHENTIFIC AMERICANS UPPLEMENT, No. 461.
Price 10 cents. To be had at this office and from all newsdealers

FRICTION CLUTCH Pulleys and Cut-off Couplings. JAS. HUNTER & SON. North Adams, Mass.



"CAR BUILDERS CAN SECURE EXTREMELY valuable U. S. monopoly by addressing R. HUDSON, Gildersome Foundry, Leeds, England."

A NEW HYDRAULIC MOTOR.—FULL description, with nine illustrative figures, of a novel hydromotor devised by Mr. Yagn for irrigating and other purposes. Contained in Scientific American Supplement, No. 463. Price 10 cents. To be had at this office and from all newsdealers.

ARCHITECTURAL PERSPECTIVE for Beginners, with 11 plates of Practical Examples. Quarto, cloth. By F. A. Wright. This book will be sent to any address, postage prepaid, on receipt of price by MUNN & Co., New York. Price \$3.00.



THOS. KANE & CO., (BOX F.)
137 and 139 Wabash Ave., CHICAGO.

PETROLEUM AS FUEL IN LOCOMO-TELECTION AS FUEL IN LOUOMO-tive Engines. A paper by Thomas Urqubart.—How loco-motives are arranged for burning petroleum. The spray injector. Storage of petroleum. Experimental engines and tenders. Results of comparative trials. Contained in SCIENTIFIC AMERICAN SUPPLEMENT NO. 4555. Price 10 cents. To be had at this office and all newsdealers.

Leffel Water Wheels,

With Important Improvements. 11,000 IN SUCCESSFUL OPERATION 🎜 🎩 FINE NEW PAMPHLET FOR 1885 Sent free to those interested

JAMES LEFFEL & CO.. Springfield, Ohio.

110 Liberty St., N. Y. City.

VOLNEY W. MASON & CO., FRICTION PULLEYS CLUTCHES and ELEVATORS. PROVIDENCE, R. I.

BERG"ELECTRIC FAN 号BATTERY.

"ICEBERG" ELECTRIC FAN, with Battery, \$10.00.
"ICEBERG" BLECTRIC FAN, without Battery, \$7.50,

STOUT, MEADOWCROFT & CO., Electrical Manufacturers and Authorized Agents for Edison Lamp Co., P.O. Box 2411. 21 Ann St., New York.



"VULCAN" Cushioned Hammer. Steel Helve, Rubber Cushions. TRUE SQUARE ELASTIC BLOW Full Line of Sizes.
W. P. DUNCAN & CO.,

Bellefonte, Pa., U. S. A.

AERIAL NAVIGATION. - DESCRIPtion of Messrs. Renard & Krebs' new electric balloon, and an account of the recent trial trips made therewith. With four illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 457. Price 10 cents. To be had at this office and from all newsdealers.

Telegraph and Electrical SUPPLIES
Medical Batteries, Inventors' Models, Expert-

PATIENT OLD ROLLED

The fact that this shafting has 75 per cent. greater strength, a finer finish, and is truer to gauge, than any other in use renders it undoubtedly the most economical We are also the sole manufacturers of the CELEMBLATED COLLINS' PAT.COUPLING, and furnish Pulleys, Hangers, etc., of the most approved styles. Price list mailed on application to JONES & LAUGHLINS, Limited, Try Street, 2d and 3d Avenues, Pittsburg, Pa. Corner Lake and Canal Sts., Chicago, Ill.

Stocks of this shafting in store and for sale by FULLER, DANA & FITZ, Boston, Mass.

Geo. Place Machinery Agency, 121 Chambers St., N. Y.

POWER AND LIGHT.

Electricity for all Manufacturing Purposes.
Motors, Dynamos, Batteries, and Lamps.
ELECTRO DYNAMIC CO., 224 Carter St., Philadelphia.
W. W. GRISCOM, Consulting Electrical Engineer.
Consultation by letter at reasonable rates.

DRAWING INSTRUMENTS.

Illustrated catalogue sent on application to Wm. T. Comstock, 6 Astor Place, New York.



MI LLER'S half round packing especially for Steam Hammers. Sizes: ½, ½, ½, ½, ½, ½, ½, 1, to 3 in. Miller Packing Works, 1338 Buttonwood St., Phila., Pa., U. S. A.



WITHERBY, RUGG & RICHARDSON. Manufacturers of Patent Wood Working Machinery of every description. Facilities unsurpassed. Shop formerly occupied by R. Bail & Co., Worcester, Mass. Send for Catalogue.

STEAM ENGINE.—THE CADET ENgineer; or Steam for the Student. By JOHN H. LONG, Chief Engineer, U. S. Navy, and R. H. Buel, Assistant Engineer, U. S. Navy; cuts, etc. 8vo, cloth, \$2.25. Address MUNN & Co., 361 Broadway, N. Y. City. Send for our special book catalogue, to be had on application.

ATTENTION CAPITALISTS.

I have a diving apparatus that I wish to put in opera-tion, which can be used as a submarine or surface boat. Search sunken vessels; discover hidden and lost articles under water, and can also be used as a submarin et or pedo boat. Would like to hear from some capitalist who would like to invest.

O. S. B., 1739 N. 11th St., St. Louis, Mo.

THE ART OF LEATHER MANUFACture. By A. Watt. Being a Practical Handbook in which the Operations of Tanning, Currying, and Leather Dressing are fully Described, the Principles of Tanning Explained, and many recent Processes Introduced, as also Methods for the Estimation of Tannin, and a Description of the Arts of Glue Boiling, Gut Dressing, etc. With illustrations. 12mo, cloth. London, 1884. Price \$5. Sent, postage prepaid, by MUNN & Co., New York, on receipt of price.

WORK



SHOPS Without Steam Power by usingoutfits of Barnes' Pat. Foot Power machinery can compete with steam power. Saws, Lathes, Mortisers, Tenoners, Formers, Etc. Solp on Trial. Metal and woodworkers send for prices. Illst'd. catalogue free. W. F. & JNO. BARNES CO. Address No. 1999 Ruby St. Rockford, III

PRACTICAL TAXIDERMY AND PRACTICAL TAXIDERMY AND
Home Decoration. An Entirely New and Complete as
well as Authentic Work on Taxidermy. Giving in Detai
full Directions for Collecting and Mounting Animals
Birds, Reptiles, Fish, Insects, and General Object. or
Natural History. By Joseph H. Batty, Taxidermist for
the Government Surveys and many Colleges and Museums in the United States. 125 illustrations. Cloth
12mo. Price \$1.50. This instructive and interesting work
should be in the possession of every naturalist and sportsman. Sent on receipt of price by MUNN & Co., New
York.

DOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS—For grinding Bones, Ores, Sand, Old Crucibles, Fire Clay, Guanos, Oil Cake, Feed, Corn, Corn and Cob, Tobacco, Snuf, Sugar, Salts, Roots, Spices, Coffee, Cocoanut, Flexseed, Asbestos, Mica, etc., and whatever cannot be ground by other mills. Also for Paints, Printers'Inks, Paste, Blacking, etc. J. S. & G. F. SIMPSON, successors to John W. Thomson, 26 to 36 Rodney Street, Brooklyn, E. D., N. Y.

Treated by most of the noted specialists of the day with no benefit. Cured himself in three months, and ce then hundreds of others by same process. A plain, apple, and successful home treatment. Address
T. S. PAGE, 128 East 26th St., New York City.





Manufacturers of Oil Cups for Locomotive. Marine, and Stationary Engine Cylinders, under the Seibert and Gates Patents, with Sight Feed.

TAKE NOTICE.

The "Sight Feed" is owned exclusively by this Company. See Judge Lowell's decision in the United States Circuit Court, District of Massachustis, Feb. 23, 82. All parties, except those duly licensed by us, are hereby notified to desist the use, manufacture, or sale of infringing Cups, as we shall vigorously pursue all infringers.

The Seibert Cylinder Oil Cap Co. 35 Oliver Street, Boston, Mass.

FOR SALE. Patent 269,029, Land Clearer, Grubbing Shears, will do 15 men's work. Apply P. DURHAM, 10 Canton St., Brooklyn, N. Y.

WATER-POWER WITH HIGH PRES-WAILS-TOWER WITH HIGH PRES-sures, and Wrought Iron Water Pipe.—A paper by H. Smith, Jr., C.E.—The problem of utilizing small quanti-ties of water with high heads. The hurdy-gurdy wheel. This Knight, Collins, and Pelton wheels. Methods of conducting water and transmitting power. Texas Creek pipe and aqueduct. With 16 engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 454 and 455. Price 10 cents each. To be had at this office and from all newsdealers.

AIR MEDICATED IIAV FTVFD

manhood, etc. I will send you a valuable treatise upon the above diseases, also directions for self-cure, free of charge. Address Prof. F. C. FOWLER, Moodus, Conn.

PERFORM NERVOUS MEN
Perfect restoration to full manhood, health and vigor witht Stomuch Prugging, assured to all who sufer from
ryous and physical debility, exhausted vitality,
emature decline, Diseases of the Kidneys, Prosco Gland, Bladder, &c., by the Marston Bolus. Varielle cured without surgery. Treatise and testimonials free. DR. H. TRESKOW, 46 W. 14th St., New York

How to QUICK AT FIGURES. Price 21.—All dealers.— Circulars free.—The Woodbury Company, Boston, Mass.—



0

ECONOMIC MOTOR CO.'8 GAS ENGINES.

Best in principle, workmanship, and materials.
An unequaled small Motor adapted to all uses.
Simple, Safe, Economical, Durable.
Four sizes: 1 H. P., ½ H. P., 1 man power, and a Sewing Machine Motor.
Send for Circulars.

ECONOMIC MOTOR CO., 9 CORTLANDT STREET, NEW YORK.

NEW YORK BELTING AND PACKING COMP'Y. Oldest and Largest Manufacturers of the Origina SOLID VULCANITE

Emery Wheels.

All other kinds Imitations and Inferior. Our name is stamped in full upon all our standard BELTING, PACKING, and HOSE. Address

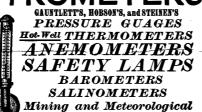
NEW YORK BELTING & PACKING CO.

Warehouse: 15 Park Row, opp. Astor House, New York Branches: 308 Chestnut St., Phila., 167 Lake St., Chicago, 52 Summer St., Boston. Emery Wheel.
OHN H. CHEEVER, Treas.
D. CHEEVER, Dep'y Treas.

GLASS PAINTING. BY FRED MIL-ler. A Course of Instruction in the Various Methods of Painting Glass and the Principles of Design. Illus-trated, Euro, cloth. London, 1885. Price 82.00. This valu-able book sent by mall prepaid by MUNN & Co., New York, on receipt of price.

ਵੈ New Catalogue of Valuable Papers contained in SCIENTIFIC AMERICAN SUPPLEMENT, sent free of charge to any address. MUNN & CO., 361 Broadway, N. Y.

PYROMETERS



Instruments of every description.

List and Description of our Ten Catalogues sent free on application.



THE COPYING PAD.—HOW TO MAKE and how to use; with an engraving. Practical directions how to prepare the gelatine pad, and also the aniline ink by which the copies are made; how to apply the written letter to the pad; how to take off copies of the letter. Contained in Screxvivic American Supply starting to the letter of the page of the letter. For sale at this office and by all newsdealers in all parts of the country.

CAMERA ATTACHMENT.—DESCRIP

FOR SALE. Valuable Patent on an important improvement in an article of large consumption. Address A. GIRARDOT, Newark, N. J.

JAMES W. QUEEN & CO.

924 Chestnut St. Philadelphia

AMERICAN INSTITUTE OF PHRENOLOGY.
Nineteenth Annual Session opens first Tuesday in October. Terms greatly reduced. For full particulars send for "Institute Circular." Address Fowler & Wells Co., 753 Brondway, New York.



tion, with illustration, of an effective camera attachment to support paper photo-negatives, for use on photographic tours. Contained in Scientific American Supplement, No. 460. Price 10 cents. To be and at this office and from all newsdealers.

ENTIRELY NEW

The only nut lock based on Mechanical Principles, Can be used any place where a jam or nut

NORKS WITHOUT ENGINEER OR BOILER, STEAM COAL OR ASH, STARTS AT ONCE AND IS FREE OF DANCER FIRE OR EXPLOSION, 1 to 25 HORSE POWER SCHLEICHER SCHUMM & CO 47 DEY ST. NEW YORK. 214 RANDOLPH & CHICAGO 333 & WALNUT STS. PHILADELPHIA

PATENTED 0





No Ratchets, Pawls, or Friction Devices.

12 styles and sizes for all kinds of work. Fully guaranteed. MANUFACTURED BY THE FOOS M'F'G CO.

Springfield, Ohio. Fairbanks & Co

311 Broadway, New York. 216 Main St., Buffalo, N. Y. | 715 Chestnut St., Phila., Pa 17 Light St., Baltimore, Md. 48 Wood St., Pittsburg, Pa 382 Broadway, Albany, N.Y. | 53 CampSt., New Orleans La





clark's Steel Cased Rubber Wheel, FOR ROLLER SKATES.
For use in dwellings, public halls, stc. Will not chip or injure commoficors, Noiseless, Geo. P. Clark.
(Box L.) Windsor Locks, Ct.



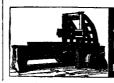
WANTED TO BORROW. Working models of interest to the general public for exhibition in our show windows, and not over five feet square. We have no power. Address with full particu-lars, THE LONDON CLOTHING CO., Columbus, Ohio.





A GREAT MEDICAL WORK ON MANHOOD. Exhausted Vitality, Nervous and Physical Debility, Premature Decline in Man, and the untold miseries fiesh is heir to. A book for every man, young, middle-aged, and old. It contains 125 prescriptions for all acute and chronic diseases, each one of which is invaluable—so found by the author, whose experience for 23 years is such as probably never before fell to the lot of any physician. Three hundred pages, bound in beautiful French muslin, embossed covers, full gilt, guaranteed to be a finer work in every sense—mechanical, literary, and professional—than any other work sold in this country for \$2.50, or the money will be refunded in every instance. Price only \$1.00 by mail, postpaid. Illustrative sample, 6 cents. Send now. Gold medal awarded the author by the National Medical Association, to the officers of which he refers.

Address the Peabody Medical Institute, or Dr. W. H. Parker, No. 4 Builfinch Street, Boston, Mass., who may be consulted on all diseases requiring skill and experience. A GREAT MEDICAL WORK ÔN MANHOOD.



NATIONAL TOOL CO., MANUFACTURERS OF MACHINISTS TOOLS. WILLIAMS PORT, PA PLANERS A SPECIALTY.

MINING AND HOISTING Machinery; also, Stationary Engines, Boilers, and Ventilating Fans. Estimates made and contracts taken for constructing all kinds of Mining Machinery. I. A. FINCH & CO., SCRANTON, PA.

SHAFTING, PULLEYS,



HANGERS. Pat. Steel Shafting. PATENT FRICTION CLUTCH,

Internal Clamp Couplings.

ROOFING for Buildings of every description. Durable, Light, Easily Applied, Inexpensive. Building PAPER—BUILDING PAPER—BUILDING PAPER—Out to Moisture, Water, and Gases. NEW YORK COAL BUILDING PAPER.

Friction Clutch.

A. & F. BROWN, 43 PARK PLACE, NEW YORK.

Scientific American **BOOK LIST**

To Readers of the Scientific American:

By arrangements with the principal publishers, we are now enabled to supply standard books of every description at regular prices.

The subjoined List pertains chiefly to Scientific Works; but we can furnish books on any desired subject, on receipt of author's name and title.

All remittances and all books sent will be at the purchaser's risk.

On receipt of the price, the books ordered will be sent by mail, unless other directions are given. Those who desire to have their packages registered should send the registration fee.

The safest way to remit money is by postal order or bank check to order of Munn & Co.

A catalogue furnished on application.

Address MUNN & CO.,

361 Broadway, New York, Publishers of the "Scientific American"

ers.....\$2.50

De Veitelle.—MERCANTILE DICTIONARY.
By I. De Veitelle. A Vocabulary of Technicalities of Commercial Correspondence......\$1.50

Architect. Wood Engravings. 8vo, cloth..\$2.00

Draper.—ANATOMY. PHYSIOLOGY. AND
HYGIENE. A Text-Book for the Use of Schools
and Families. By John C. Draper, M.D., Prof'ssor of Natural History and Physiology in the
College of the City of New York. and Profesor
of Analytical Chemistry in the University of
New York. Illustrated. 8vo, cloth.....\$2.50

Dredge.—ELECTRIC ILLUMINATION. Illustrated by about 1,500 Figures. By James Dredge,
Dr. M. F. O'Reilly, and H. Vivarez. Edited by
James Dredge. Contains: I.—Electrical Measurements. II.—Photometry. III.—Dynamometers.
IV.—Recent Dynamos and Lamps. With an Appendix by W. Lloyd Wise, containing profusely
illustrated Abstracts of Specifications of English
Patents, January, 1873, to June, 1882, and having reference to Electrical matters. 2 vols.
\$15.60

Dredge (and others).—ELECTRIC ILLUMINA-

ROCK BLASTING. Drinker.—ROCK BLASTING. By Helry S. Drinker. A Treatise on Explosive Compounds, Machine Rock Drills, and Blasting\$5.00

Du Moncel and Geraldy.—ELECTRICITY AS A MOTIVE POWER. By Th. Du Moncel and Frank Geraldy. 110 engravings........\$3.00

Advertisements.

Inside Page, each insertion - - - 75 cents a line. Back Page, each insertion - - - \$1.00 a line. (About eight words to a line.

ringravings may head advertisements at the same rate per line, by measurement, as the letter press. Adver-tisements must be received at publication office as early as Thursday morning to appear in next issue.



Here is something which will not disappoint you. It will cut from as other saws cut wood. One blade, without filing, will saw off a rod of half-inch iron one hundred times. The blade costs five cents. Files to do the same work would cost ten times as much.

Men in every calling will have them as soon as they know about it. We guarantee full satisfaction in all cases. One nickel-plated steel frame and twelve saws sent by mail prepaid on receipt of \$1.50. Hardware dealers will furnish them at the same price.

Millers Falls & Co.,

74 Chambers St., New York.

THE CATALPAS. - BOTANICAL HIS tory and description of the various species of these favorite trees. Illustrated with three engravings. Contained in SCIENTIFIC AMBUGAN SUPPLEMENT, NO. 461. Price 10 cents. To be had at this office and from all newsdealers.



PATENT JACKET KETTLES, Plain or Porcelain Lined. Tested to 100 lb. pressure. Send for Lists. JAMES C. HAND & CO., 614 and 616 Market St., Philadelphia, Pa.

FOOT OR LATHES FOR WOOD OR METAL.

All sizes. Catalogues free. Lathes on trial. SEBASTIAN, MAY & CO., 165 West 2d Street, Cincinnati, 0.



POSITIVE BLAST JRON REVOLVERS, PERFECTLY BALANCED Has Fewer Parts than any other Blower. P. H. & F. M. ROOTS, Manufacturers,

CONNERSVILLE, IND.
S. S. TOWNSEND, Gen. Agt., 2 Cortland St., 9 Dey 5t., COOKE & CO., Selling Agts., 22 Cortland Street, JAS. BEGGS & CO., Selling Agts. 9 Dey Street, NEW YORK.
SEND FOR PRICED CATALOGUE.

MICROSCOPES Telescopes. Spectacles, Bartographic Outfits for Amateur, Opera Glusses, Photographic Outfits for Amateur, Opera Glusses, Obera Glusses, Beck, Philiadelphia. Ilus. Price List fregto any address.



BICYCLES \$8.50. Velocipedes, \$3.50. Tricycles, Standard makes. Send for illus. catalogue of Wheels, Bells, Lamps, Bags, Ollers, &c. Secondard, Wheels handled. GEO. W. ROUSE & SON. hand Wheels handled. GEO. W. ROUSE & SON. 16 G Street, EASY PAYMENTS. Peorin, III.

STATIONARY STEAM ENGINES ESPECIALLY adapted to Electric Lighting Purposes. Treating of the development of Steam Engines; the principles of Construction and Economy; with descriptions of Moderate Speed and High Speed Engines. By Robert H. Thurston, A.M., C.E., with many handsomely executed illustrations. Izmo, cloth, \$1.50. Address, MUNN & CO., 361 Broadway, New York.

PLANING AND MATCHING MACHINES



Special Machines for Car Work, and the latest improved Wood Working Machinery of all kinds.



PATENTS.

eation of the SCIENTIFIC-AMERICAN, continue to amine improvements, and to act as Solicitors of Patents for Inventors

In this line of business they have had forty years' experience, and now have unequaled facilities for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs Munn & Co. also attend to the preparation of Caveats, Copyright for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very reasonable terms.

A pamphlet sent free of charge, on application, containing full information about Patents and how to pro cure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Pa-

We also send, free of charge, a Synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world.

MUNN & CO., Solicitors of Patents,

361 Broadway, New York.

BRANCH OFFICE.-Corner of F and 7th Streets

PATENT RIVETED MONARCH RUBBER BELTING. Best in the World.

Specially adapted for PAPER MILLS, SAW MILLS, and

THRESHING MACHINES. THE GUTTA PERCHA and RUBBER MFG. CO.,

New York, Chicago, San Francisco, Toronto.

Aluminum Bronze, Aluminum Silver, Aluminum Brass,

SILICON BRONZE,

FURNISHED IN INGOTS, CASTINGS, RODS, OR WIRE.

Our Malleable Castings can be made of over 100,000 pounds tensile strength, with extraordinary power to with tand corrosive influences, and unrivaled beauty of color. Send for pamphlet.

THE COWLES ELECTRIC SMELTING AND ALUMINUM CO., CLEVELAND, O.

DISTILLATION UNDER ATMOSPHERIC Pressure.—Description of a simple and perfect arrangement for distillation in laboratories. With four illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 461. Price 10 cents. To be had at this office and from all newsdealers.



THE BEST STEAM PUMP.

THE BEST STEAM PUMP.

Van Duzen's Patent Steam Pump.

Incomparable in cheapness and efficiency. Needs no care or skill; cannot get out of order; has no moving parts.

A Superior Fire Pump.

Instantaneous and po werful, ever ready.

A superior Fire Pump.

Instantaneous and po werful, ever ready.

A superior Fire Pump.

Instantaneous and po werful, ever ready.

A superior Fire Pump.

Instantaneous and po werful, ever ready.

Instantaneous and, impure, etc.). We make ten sizes, prices from \$7 to \$75. Capacities from 100 to 20.000 gallons per hour.

State for what our pumper wanted and send for Catalogue of "Pumps."

SANITARY EXAMINATION OF DRINK ing Water.—By Prof. E. R. Angell. The odor of water, and how to detect it. Tests and their applications. Nitrates and Nitrites. Lead and iron. Test for lead. Tests for organic matter. A you able paper. Contained in SCIENTIFIC AMERICAN SUPPLEMENT. No. 462. Price 10 cents. To be had at this office and from all newsdealers.

THE DESIGNING OF ORDINARY
IRON HIGHWAY BRIDGES.
Illustrated by Numerous Engravings and 7 Folding Plates.
Showing Bridges Actually Constructed, and Giving Their Dimensions; also containing 42 Tables. Price, \$4.00. By
J. A. L. WADDELI, C.E., B.A.S.C., MA.E. The very complete index will prove of great convenience to both students and engineers, using the work as a book of reference. Address, MUNN & CO., 361 Broadway, New York.

With best safety devices for Passenger and Freight Service.—MORSE, WILLIAMS & CO., Propr's.

Morse Elevator Works, Philadelphia, Pa.

WM. A. HARRIS, l'rovidence, R. h. (Park 8t.), Six minutes walk West fro Original and Only Builder of the HARRIS-CORLISS ENGINE With Harris Pat. Improvements, from 10 to 1,000 H. P. Send for copy Engineer's and Steam User's Manual. By J.W. Hill, M.E. Price \$1.25.

WATERS for Drinking, Boiler, and M'f'g Purposet Analyzed and Reported on by Austen & Wilber Analytical and Consulting Chemists, New Brunswick, N. J.

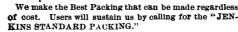
Analytical and Consulting Chemists, New Brunswick, N.J.

I.OCOMOTIVE ENGINE RUNNING AND MANagement. A treatise on Locomotive Engines; showing their performance in running different kinds of trainswith economy and dispatch; also, directions regarding the care, management, and repairs of Locomotives, and all their connections. By ANGUSSINCLAIR. Third edition just issued. The work consists of chapters on Engineers and their Duties; Inspection of Locomotives; Running a Fast Passenger Train; Running a Fast Freight Train; Hard Steaming Engines; Injectors; Accidents to the Valve Motion; Accidents to Cylinder and Steam Connections; The Valve Motion; Laying Out Link Motion; The Indicator; The Westinghouse Air Brake; The Eames Vacuum Brake; Tractionand Speed; and numerous other subjects interesting to those engaged in designing, handling, or repairing the locomotive. The work forms a reliable hand-book for Locomotive Engineers and Firemen. 12mo, neat cloth, \$2.00. Address, MUNN & CO., 361 Broadway, New York.



SWIMMING.—DESCRIPTION OF THE method of teaching swimming employed in France; with 6 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 462. Price 10 cents. To be had at this office and from all newsdealers.

The Best in the World.



Our "Trade Mark" is stamped on every sheet. Non-genuine unless so stamped. To Send for Price List "B." JENKINS BROS.,

71 John Street, N. Y. 79 Kilby Street, Boston.

ALLEABLE CASTINGS FROM SPECIAL FINE TINNING JAPANNING AND THOMAS DEVLIN & CO. FINE TINNING JAPANNING AND THOMAS DEVLIN & CO. FINE TINNING JAPANNING AND THOMAS DEVLIN & CO. FINE TINNING JAPANNING AND THOMAS DEVLINE & AMERICAN ST. PHILA

6(*) TRADE MARK %(书)



Wood Working Machinery

Universal Saw Benches, Buzz Planers, Turning Lathe for Pat-tern, Cabinet, and Wood Working Shops, Single and Double Rotary Bed Surfacers, Stretching Ma-chines, Blind Slat Planers, etc. HERBERT BAKER, Foundry and Machine Works, Toledo, Ohio.

REFRESHING RECREATION. With our unrivaled amateur photographic outfits pictures of the highest degree of excellence may be obtained. Call at our store or write for Manual of Instruction Sent gratis. SCOVILL M'E'G CO. Established in 1802 Salesrooms, 423 Broome Street, New York. W. IRVING ADAMS, Agent.

H.M. JOHNZ,

Roofing, Building Felt, Steam Packings, Boiler Coverings, Fire Proof Paints, Cements, Etc. Samples and Descriptive Price Lists Free. H. W. JOHNS M'F'G CO., 87 MAIDEN LANE, N. Y. 175 Randolph St., Chicago; 170 N. 4th St., Philadelphia.

PERFECT

NEWSPAPER FILE

The Koch Patent File, for preserving newspapers, magazines, and pamphlets, has been recently improved and price reduced. Subscribers to the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT can be applied for the low price of \$1.50 hy mail. or \$1.25 at the office of this paper. Heavy board sides; inscription "SCIENTIFIC AMERICAN," in glt. Necessary for every one who wishes to preserve the paper. MUNN & CO..

Publishers Scie. TIFIC AMERICAN

ENGINEER'S POCKET BOOK. RY

Charles II. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, Architecture, Masonry, Steam Vessels, Mills, Limes, Mortars, Cements, etc. 900 pages, leather, pocket-book form. Price \$4. This valuable work will be sent on receipt of price by MUNN & CO., New York.

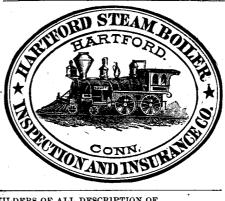
95 MILK ST., BOSTON, MASS.

This Company owns the Letters Patent granted to Alexander Graham Bell, March 7th, 1876, No. 174,465, and January 30th, 1877, No. 186,787.

The transmission of Speech by all known forms of Electric Speaking Telephones infringes the right secured to this Company by the above patents, and renders each individual user of telephones not furnished by it or its licensees responsible for such unlawful use, and all the consequences thereof, and liable to suit therefor.



INJECTORS
STEAM BOILERS.
RUE MFG. Co., FILBERT St.,
Philadelphia, Pa., U. S. A.



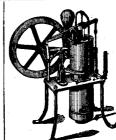
BUILDERS OF ALL DESCRIPTION OF

PUSEY & JONES CO. MACHINERY USED BY MANUFACTURERS OF



ROCK BREAKERS AND ORE CRUSHERS. we manuracture and supply at short notice and lowest rates, Stone and Ore Crushers containing the invention described in Letters Patent. issued to Eli W. Blake. June 15th. 1889, together with New and Valuable Improvements, for which Letters Patent were granted May 11th, and July 20th, 1880 to Mr. S. L. Marsden All Crushers supplied by us are constructed under the superintendence of Mr. Marsden, who, for the past fifteen years, has been connected with the manufacture of Blake Crushers in this country and England.

FARREL FOUNDRY AND MACHINE CO., Manufrs., Ausonia, Conn. COPELAND & BACON, Agents, New York.



ERICSSON'S NEW CALORIC PUMPING ENGINE, FOR

Dwellings & Country Seats Simplest! Cheapest! Economical! Absolutely Safe! Delamater Iron Works, C. H. Delamater & Co., Proprietors,

16 Cortlandt Street, New York, U.S.A., And 40 Dearborn St. Chicago, Ill.





HOLLAND & THOMPSON, Manufacturers 217 RIVER ST., TROY, N. Y.

Prof. Chas. F. Chandler, Ph.D.,

OF THE
SCHOOL OF MINES,
Columbia College,
Has assumed the Editorship of Anthony's Semi-Monthly Photographic

BULLETIN, Which is admitted to be the best Photographic Helper that is published.

Amateurs or Professionals

Who need any advice can obtain it through its Correspondence Column. It will pay you to SUBSCRIBE for it.

Sample Copies Free. Subscription, \$2.00 per Annum.

E. & H. T. ANTHONY & CO., PUBLISHERS, 591 Broadway, New York.

PHOTOGRAPHIC OUTFITS AND SUPPLIES.

The Scientific American.

THE MOST POPULAR SCIENTIFIC PAPER IN THE WORLD.

Published Weekly, \$3.20 a Year; \$1.60 Six Months. This unrivaled periodical, now in its forty-first year, continues to maintain its high reputation for excellence. and enjoys the largest circulation ever attained by any cientific publication.

Every number contains sixteen large pages, beautifully printed, elegantly illustrated; it presents in popu ar style a descriptive record of the most novel interesting, and important advances in Science, Arts, and Manufec tures. It shows the progress of the World in respe New Discoveries and Improvements, embracing Machinery, Mechanical Works, Engineering in all branches, Chemistry, Metallurgy, Electricity, Light, Heat, Architecture, Domestic Economy, Agriculture, Natural History, etc. It abounds with fresh and interesting subjects for discussion, thought, or experiment; furnishes hundreds of useful suggestions for business. It promotes Industry, Progress, Thrift, and Intelligence in every

community where it circulates.

The SCIENTIFIC AMERICAN should have a place in every Dwelling, Shop, Office, School, or Library. Workmen. Foremen. Engineers. Superintendents. Directors. men, Foremen, Engineers, Superintentients, Directors, Presidents, Officials, Merchants, Farmers, Teachers, Lawyers, Physicians, Clergymen, people in every walk and profession in life, will derive benefit from a regular reading of THE SCENTIFIC AMERICAN.

Terms for the United States and Canada, \$3.20 a yesr;

\$1.60 six months. Specimen copies free. Remit by Postal Order or Check. MUNN & CO., Publishers,

361 Broadway, New York.

THE Scientific American Supplement.

THE SCIENTIFIC AMERICAN SUPPLEMENT is a separate and distinct publication from THE SCIENTIFIC AM-Containing sixteen large pages. THE SCIENTIFIC AMcontaining states large pages. This SCINITIFE ARRICAN SUPPLEMENT is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geology, Mineralogy, Natural History, Geography, Archæology. Astronomy, Chemistry, Electricity, Light. Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Techhnology, Manufacturing Industries, Sanitary Engineering, Agriculture, Horticulture, Domestic Economy, Biography, Medicine, etc. A vast amount of fresh and valuable information per-taining to these and allied subjects is given, the whole profusely illustrated with engravings.

The most important Engineering Works, Mechanisms and Manufactures at home and abroad are repr and described in the SUPPLEMENT.

Price for the SUPPLEMENT for the United States and

Canada, \$5.00 a year, or one copy of the SCIENTIFIC AM-ERICAN and one copy of the SUPPLEMENT, both mailed for one year for \$7.00. Address and remit by postal

MUNN & Co.. 361 Broadway, N. Y., Publishers SCIENTIFIC AMERICAN

To Foreign Subscribers.-Under the facilities of the Postal Union the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to subscribers in Great Britain, India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States: Japan, Brazil. Mexico, and all States of Central and South America Ferms, when sent to foreign countries, Canada excepted, \$4, gold, for Scientific American, one year: \$9, gold. for both Scientific American and Suppleme one year. This includes postage, which we pay. Remit

by postal order or draft to order of MUNN & CO., 361 Broadway, New York.

PRINTING INKS.

THE "Scientific American" is printed with CHAS.
ENEU JOHNSON & CO.'S INK. Tenth and Lomberd Ste. Phila., and 47 Rose St., opp. Duane St., N. Y.