

THE ATLANTA EXPOSITION-THE WOMAN'S BUILDING.-[See page 376.]

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ESTABLISHED 1845.
MUNN \& CO., Editors and Proprietors. published weekly at
No. 361 BROADWAY, NEW YORK.
O. D. MUNN. A. E. BEACH.

|  One copy. one year, to any foreign country belonging to Postal Union. 4 UU Remit by postal or express money order, or by bank draft or checs. |
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 Export Edition of the -cientific American.


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NEW YORK, SATURDAY, DECEMBER 14, 1895.


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## THE MOTOCYCLE AWARD.

We learn from the Chicago. Times-Herald that the udges made the following a wards on $\mathbf{D}$ acember 5 : Gold medal won by Morris \& Salow. Points-safety ease of control, absence of noise, vibration, heat, odor cleanliness, and general excellence of design and workmanship. Duryea, $\$ 2.000$ (prize), first in race and compactness in design. Mueller, $\$ 1,500$, second in race and economy. Sturges, $\$ 500$; Macy, $\$ 500$; Lewis, $\$ 200$; Haynes \& Apperson, $\$ 150$; Max Hertel, $\$ 100$; De la Vergne, $\$ 50$
The Morris \& 'Salom "electrobat," which received the gold wedal, is an electric carriage and was illus trated in the Scientific American for November 16, 1895. Oniy the Duryea and Benz-Mueller carriages went over the course. They are both propelled by gasoline. The Sturges machine is electrical, the Macy, Lewis, Haynes \& Apperson, and the De la Vergae car riages are all run by gasoline. The Macy machine is more properly called the Roger machine. The Duryea, the Benz-Mueller, and the De la Vergne motocycles all carried modified Benz motors. The gold medal is very handsome. On the obverse side the medal bears typical representation of a herald of the days of chivalry. Around the figure surrounding a background of rays is the inscription, "The Chicago Times-Herald Motocycle Contest, 1895." On the reverse, and surrounded by a wreath of bay leaves, is a winged figure of Victory, with pinions extended and holding on her left arm an oval shield, upon which will be inseribed the name of the winner. The medal is composed of 100 pennyweights of fine gold and is valued at $\$ 250$. The judges of the contest were Prof. Barrett, C. F Kimball, J. Lundie, and L. L. Summers. The pre liminary arrangements were made by Mr. F. U. Adams, the manager of the motocycle contest.
Although the number of contestants in the race was small, still the contest has scientific value, on account of the elaborate tests to which the carriages were sub jected, speed not being the only factor which was taken inter consideration.
strikes in the dnited states and europe.
We have before us the first number of the Bulle tin of the Department of Labor, which is to be issued bimonthly in accordance with the law of March 2 1895. In the preface the editor, Commissioner Carrol D. Wright, sets forth the ain and scope of this publi cation, as compared with the already existing Annual and Special Reports. It will contain "such matters as cannot in the nature of things find a place in the Annual or Special Reports; but it is confidently ex pected that, through the Bulletin, the department will be able to bring much of its work closer home to the people." Its aim will be "to furnish to the pub lic" curient "facts and information relating to indus trial affairs which cannot readily be secured in any ot'er way."
The first number, among other topics, deals statistically with the question of strikes and lockouts in the United States and in certain European countries.
These statistics cover a period of thirteen and one half years, from 1881 to 1894 . During this time ther occurred 14,390 strikes, involving 69,167 establishments, and throwing out of employment no less than 3,714406 employes. The quietest year was 1884, when there were 443 strikes affecting 2,367 establishments and 147,054 employes ; the most disturbed year was 1886, when 10,053 establishments were involved and
508.044 employes thrown out of work as the result of 508:044 employes thrown out of work as the result of 1,432 strikes.
The greatest number of strikes, 18,787, occurred in New York State ; then come Illinois, with 12,828, and Pennsylvania. with 10.661

Out of 69,167 establishments affected, about 90 per cent were in the following industries: Building trades, 26.860 ; coal and coke, 8,018 ; tobacco, 5.465 ; clothing 4,769; food preparations. 3.817 ; metals 3.454 ; transpor tation. 2,805 ; stone quarrying and cutting, 2,461; and five others in proportions under 1,000 .
During these thirteen and one-half years, 32 per cent of the whole number of people thrown out of em ployment by strikes succeeded in gaining what they asked; 1246 per cent only partly succeeded; and 55.50 failed altogether
From the table marked "Leading causes of strikes" we learn that $42 \cdot 32$ per cent struck for increase of wages; $19 \cdot 48$ per cent for reduction of hours; 777 against reduction of wages : 759 for increase of wages and reduction of hours ; the remaining 22 per cent of the strikes occurring for minor and very varied causes. The tables from which the above figures are taken to very starting, and they will come as a mich. But the most sensational tigures are thos thirteen and one-half years of strikes and lockouts. The thirteen and one-half years of strikes and lockouts. The actual wage loss of employes was
cost the various labor organizations to assist the strikers $\$ 10,914,406$. The loss to employers was $\$ 82$, 590.386. The corresponding losses due to lockouts were: Employes, \$26.685,516; assistance br labor or ranizations, $\$ 2,524,298$; employers, $\$ 12,235,451$.
Summing up these figures, we find that the various
labor disputes of the past thirteen and one-half years ave cost the country no less than $\$ 298,757,923$
Statistics may be dry reading; but thes are often, as in this case, very eloquent.
lt is pretty well understood, both by capital and labor, that strikes and lockouts are a crude and costly means for the adjustment of employer's profit and employe's wage-but just how costly can only be realized when we look at the appalling loss that is spelled out by the nine figures given above.
The statistics for Great Britain and Ireland cover the five years from 1889 to 1893 inclusive. Of the 4,526 strikes which occurred, 3,428 were reported in detail They affected $1,852,193$ persons. The successful strikes affected $44 \cdot 5$ per cent of this total number ; the partial ly successful $32 \cdot 9$ per cent and the unsuccessful 20.7 per cent. These figures would seem to indicate either that labor is less under the control of capital or that its organization is stronger in those countries than it is in the United States. This would seem to be further proved by the fact that in the three years 1891 to 1893 proved by the fact that in the three years 1891 to 183 there were only 35 lockouts
the five years 1889 to 1893 .
In France du:ing the years 1890 to 1894 there were 1,866 strikes, affecting 7,698 establishments and 500.475 employes. The average of successful strikes was 25.24 per cent; of partly successful, $29 \cdot 26$; and of failures, 44.64 per cent.

In Italy from 1878 to 1891 there were 1,075 strikes, affecting 254,668 employes. Of these, 24 per cent were successful ; 47 per cent partly successful, and 29 per cent failed.
In Austria, during the year 1891 there were 104 strikes, affecting 1,916 establishments and 40,486 employes. Of the 104 strikes, 23 succeeded; 26 succeeded partly ; and 51 failed.

## Population of Canton.

The following particulars are taken from the North China Herald:
In a recent census taken by order of the viceroy at Canton, the inner and outer cities are shown to contain 481 streets and lanes, 24,962 houses, 233 temples, 107,035 males, and 53,975 females. The eastern suburb has 123 streets, etc., 7.627 houses, 61 temples, 23,738 males, and 14,812 females. The western suburb contains 875 streets and lanes, 43,942 houses, 226 temples, 192,249 streets and lanes, 43,942 houses, 226 temples, 192,249
males, and 87,355 females. The southern suburb connales, and 87,355 females. 65 streets. 3,476 houses, 33 temples, 13,372 males, tains 65 streets. 3 ,
and 6,402 females.
Altogether there are 336,754 males and $162,544 \mathrm{fe}$ nales, 80,007 houses and 553 temples. There is also the boat population, which, sisty years ago, numbered 80,000, giving, at three persons per boat-much too low an average-a population then of 252,000 . This number mast be now largely increased, and 350,000 to 400,000 would probably be nearer the mark-children are not included probably. This brings up the popuation to $1,000,000$ In sixty years this population should nearly have doubled itself, and the estimate now given by foreign observers is $1,800,000$. A poll tax is levied on persons without house property, and ther a tendency to underrate the number of persons avoiding taxation. The great discrepancy between nale and female population is noticeable. It is as cribed to the fact that the wives and families of most of the workers live in the neighboring country villages. The women live in cheap houses in the country, and the girls stay with their mothers till they are betrothed, and then co to their mothers.in-law. While men abound in cities, the village populations are men abound in cities, the vilage populations are
chiefly female. Representative male heads of families chiefly female. Representative male heads of families
live in the villages, and there is sufficient adult male abor to cultivate the fields. The brothers and sons go to the city.
Canton is a city of workshops, printers, carpenters, workers in lacquer ware, sailmakers, silversmiths, braziers, workers in ivory and tortoise shell. painters on glass, on paper, and on silk; glassblowers, firework makers, mat weavers, cloth weavers, embroid erers, paper makers, sugar refiners, fan makers, carpet weavers, makers of china ware, of grass cloth ; and jade stone turners. Of all these trades, women only are engaged in embroidery. In addition, men in China cook, run errands, sweep floors, and wait at table Women only do the washing; hence the marked pre ponderance of males over females in the city. It way be added that life in the country is much more moral than in the cities, chiefly owing to the family institution being in full operation in the villages.

A car lcad of red wood for use in making lead pen cils was recently shipped from Sanger, Cal., for Nu remberg, Germany. Some time ago, experts from Germany investigated the timber resources of the Pacific coast in an effort to find a substitute for cedar the forests in Europe from which the supply of that wood for lead pencils has hitherto been obtained hav $n g$ become almost exhausted. It is said that the red wood from the east slope of the Sierras is the only wood besides cedar with a sufficiently straight grain to make it suitable for pencils.

## Trolley Improvements Required.

We abstract the following from a recent address by Captain William Brophy, the veteran electrical inspector, before the Electric Potential Club :
I hold that all high potential circuits should be supported on wooden poles and cross arms, and the wires of all low potential circuits excluded from such poles; and I do not believe it best to place such wires on fixtures placed on roofs or other portions of buildings, tures placed on roofs or other portions of buildings,
but if they are so placed, they should be beyond the but if they are so placed, they should be beyond
reach of persons standing or working on the roofs. reach of persons standing or working on the roofs.
I believe the so-called insulating covering in use the present time for high potential overhead circuits to be worse than a delusion and a snare. I believe it would be better to hang out the danger signal at once, by using bare copper wire, than to continue the use of this fiimsy fraud that affords no protection to human life or property, but lures innocent people on to injury and death. Knowing the worthlessness of the material, it becomes necessary to use the best form of insulating supports. The present style of glass insulators is not what is required. Many of these insulators are only so in name. The very best grade of glass or porcelain should be used, and the double or single petticoat pattern, the form best suited to the purpose being that which will offer the greatest amount of dry surface between the wire and supporting pin. These insulators should be supported on wooden pins.
Iron poles on any part of high potential circuits should not be tolerated in any civilized community. They are a relic of barbarism that should be relegated to the scrap heap. and any attempt to patch them up only serves as a thin disguise to the danger that lurks within them. Twenty five to 40 feet of wood between the iron and the ground means that much insulation, while 100 feet of irononly means what the glass insulator, wooden pin and cross arm afford. The waste of energy due to the iron poles on the long circuits on which are placed 125 iron lamp poles is simply enor-mous-so great that in rainy weather such circuits have to be cut in halves in order to send sufficient current through the lamps. Where such circuits are placed on the modern iron and steel structures, they become a source of danger to persons who have occa-
sion to handle these or other wires on the same or sion to handle these or other wires on the same or
other fixtures. Such circuits should not be run beother fixtures. Such circuits should not be run be-
tween the branches or through the foliage of trees, but tween the branches or through the foliage of trees, but
when it cannot be avoided the highest class of insulawhen it cannot be avoided the highest class of insulairon. Any attempt at protecting this insulation from abrasion by covering it with tape or cotton braid is useless.
All that I have said up to this time applies with equal force to direct and alternating current circuits; but there are certain features of the latter that require separate treatment.
As you know, a difference of potential of one, two or more thousand volts exists throughout the entire length of the primary circuit and between it and the earth, so that the danger from derived circuits to ground or from one side to the other is the same at a point one or more miles distant from the dynamo as it is at the brushes. Again, it is necessary for electrical and other reasons to run the wires in parallel and close together, in order that no other wires can be placed between them, and for convenience in making connections to the different transformers. Workmen and others can hardly pass between them without coming in contact with both of them, and for this reason I consider them far more dangerous than high potential series arc light circuits. As before stated, the covering of these wires affords little or no protection to those persons in dry weather, and none whatever during or immediately after rain storms.
If these circuits are to remain above ground, they should be separated so that both cannot be reached at the same time by any person; but this would involve the changing of nearly every existing circuit and a considerable increase in the cost of constructing new ones. Rather than adopt this plan a high grade of lead-covered insulated wire should be used, and when that is done the proper place for them is underground.

What Happens to the Carbon in the Arc Light The electric arc light, with its intense, steady brilliancy, is now so familiar an object that few stop to think how wonderful a thing it really is. Here is light enough to illumine many square yards nearly as well as daylight does, proceeding from the points of two little carbon rods as large as one's little finger. What is the state of the carbon in that small spot? Prof. S. P. Thompson, in a recent Cantor lecture before the Suciety of Arts in London, tells us that it bas actually melted there, something that was until recently thought impossible. Moreover, he says that when the facts that lead him to these conclusions are quoted be low from the report of his lecture that appears in Industries and Iron (London, November 1), condensed for the Literary Digest:
"Captain Abney had found the white surface of the luminous crater to be always of an equal degree of whiteness, which obviously means that it is always of
an equal degree of temperature. . . . The only thing that could account for there being a fixed temperature for the crater surface was the fact that carbon
is at the surface in a state of volatilization; that the carbon is evaporating off from the positive carbon into the are or flame. At that surface you necessarily must have the temperature at which carbon évaporates, just as you cannot have the surface of ice under ordinary conditions either hotter or colder than the temperature which is taken as zero of the Centigrade scale.

My present view of the physical state of the arc crater is that the solid carbon below is covered with a layer or film of liquid carbon just boiling or evaporating off.

When hissing takes place, a new state of things is set up. If you watch a short, hissing arc, you will see a column of light concentrating itself on a narrow spot, and the spot keeps moving about, and is very unstable in position as well as in the amount of light it gives out. The contracted spot from which light seems to start pits deeper into the carbon.

Mrs. Ayrton
made the observation that the crater surface, after the are has been hissing, is found to be literally honeycombed. When the arc is hissing you can see little bits erupted out, and the hissing seems to be comparable to the hissing which takes place in water just when it is beginning to boil. If you have some water being heated in such a way that there is not more than a certain quantity of heat given off from the surface, you have the water evaporating quietly, but you cannot get more than a certain quantity of heat given off per square inch of top surface of the water in that quiet way. If you force more than a certain quantity of heat to pass off per top square inch of the water, you find the water begins to break up internally, and you have bubbles formed below the surface; the surface breaks up, the bubbles are thrown out, and you have a noisy phenomenon. I think you will find there is exactly the same kind of difference bet ween the silent arc and the hissing are as between quiet evaporation and a noisy boiling. There is a sort of decrepitation, as though solid particles were being torn asurder to make way for something coming out, when the are is hissing."

## Car Coupler Patents.

The Railroad Gazette gives the following: "A de ision of some importance was recently rendered in the United States Circuit Court, Northern District of New York (Judge Coxe), in the case of the Gould Coupler Company against Pascal C. Pratt and others (Pratt \& Letch worth). The suit was for infringement of the Browning \& Barnes patents (owned by the Gould Company) by Pratt \& Letchworth in manufacturing the Pooley coupler. The Browning claim in question was for the means of automatically opening the hook (knuckle) and holding it open, in proper position for coupling. The decision is that the Brown ing patent is valid in the broad claim not only of the
specific means described but of any means for au tomatically opening the knuckle and retaining it open in the coupling position. The Pooley device is clearly an equivalent for the means described in the Browning patent. Browning used a spring and Pooley used a lever, but it is quite immaterial whether the knockle was opened by a spring, or a lever, or a spiral incline.
"The point is that the Browning patent is good for any means which accomplish the results; but it wil be observed that these results are automatically open ing the knuckle and keeping it open, and it must be kept open by some other force than inertia or friction. Therefore, the judge says specifically that a device which will automatically open the coupler but does not keep it open may be used without infringing. The court does not define strictly what would constitut automatic opening. It will be seen, therefore, that
the Browning clain is pretty strictly limited. The the Browning clain is pretty strictly limited. The
court says that it would not have been so limited if Browning had had the assistance of an experienced solicitor; that is, he would probably not have coupled the opening and the retaining features together and made them vital parts of one claim. Thus it becomes impossible for the court to give the patentee the full benefit of his invention. In the matter of the Barnes patent, it is held that the Pooley couple. does not in fringe. The complainant is entitled to a decree for an injunction and an accounting, based upon the claiu of the Browning patent; but as the claim under the Barnes patent is not sustained, the decree does not carry costs. We should suppose that this decision would have one very important result-to spread the idea that there are some coupler patents that are worth something.

The St. Lonis Car Coupler Company brought suit in a United States Circuit Court against the Schickle, Harrison \& Howard Iron Company, and the suit has just been decided in favor of the complainant, the decision being written by District Judge Adams. The
complainant employed the defendant to make about 1,000 couplers nuder patents owned by the complain ant. The order was filled and then the defendant con tinued to make and sell knuckles of the same form The Schickle, Harrison \& Howard Company claims
that it can lawfully make and sell these knuckles to purchasers of the complete coupler who may need them for repairs. The decision is that the patent is a combination patent, including the drawhead, the knuckle and the locking pin, and that the knuckle is the important feature of the combination.
"'There is no question as to the validity of the patent; the only question is whether or not knuckles made and sold as has been done by the defendant are repairs within the meaning of the rule which entitles the purchaser of a patented article to repair it when worn out. It is held that a purchaser of a patented article may use it until it is worn out and repair and improve it as he pleases, provided the repair and improvement do not amount to a reconstruction. In the present case the court holds that the knuckle is the chief element in the patented combination and that the use of it to supply the place of worn-out knuckles amounts to reconstruction and is not repair. The decision then is that the defendant infringes and an order may issue for an injunction and accounting.'

## Enican Soc

The sixteenth annual convention of the American Society of Mechanical Engineers was opened December 3 in the society's rooms at 12 West Thirty-first Street, New York City. A large gathering of members greeted Mr. C. E. Billings, the president, when he called the meeting to order. Papers were read on "The Recent Improvement of the Drop Hammer for Forging" and "The Best Material for Filtering Oil, Either for One Operation or in a Series, and the Best Method for the Extraction of Oil from Condensed Steam Where it is Desirable to Use the Exhaust Steam for Boiler Feed Purposes." On the morning session of December 4 the following officers were elected - President, John Fritz, of Bethlehem, Pa.; vice-presidents : F. H. Ball, of this city; Jesse M. Suith, of Detroit ; M. L. Holman, of St. Louis; George W. Melville, of Washington; Charles H. Manning, of Manchester, N. H., and Francis W. Dean, of Boston ; managers: John B. Herreshoff, of Bristol, R, I.; L. B. Miller, of Elizabeth, N. J.; W. S. Russel, of Detroit ; John C. Kafer, of this city ; Charles A. Bauer, of Springfield, Ohio; A. C. Walworth, of Boston ; Norman C. Stiles, of Middletown, Conn., and George W. Dickie, of San Francisco ; treasurer, Wil liam H. Wiley, of New York City.
The officers were elected unanimously.
The committee on testing the resistance of fireproofing materials reported progress. The comwittee intends to build a furnace a bout the size of a room in an office building, and to lead into the furnare hot burn ing gas, so as to determine the effect of these tempera tures on the various materials which are used to fire proof the iron and steel put in modern buildings. The furnace will be erected on the ground of the Conti nental Iron Works, at Greenpoint, L. I. A petition to the Paris Exposition of 1900 addressed to Congress was also read, as well as the report on the Zurich Conference upon the unification of methods of testing the materials of construction. Various other papers were read. The closing session was well attended and was mostly devoted to the reading of papers and to discussions. A picture of Ericsson, the inventor of the Monitor, was presented to the society by Prof. F. R. Hutton, the secretary. Mr. Hutton discovered the picture in an auction room on Fifth A venue. A member of the society said he had seen it hanging on the walls of Ericsson's home when the inventor was alive. The drawings of the steamboat Fulton, made by Robert Fulton in 1813, which, for many years, were in the possession of the Schuyler fanily of New York, were offered to the society by Miss Louisa E. Schuyler, of Gramercy Park, New York City, and were placed to the right of the president's desk. There is also in the society's room a picture of Robert Fulton, painted by himself. with the aid of a mirror. The society has also a Colonial mahogany table which was owned by him, and on which he is believed to have made the draw ings of his steamboat.
A reception and supper at Delmonico's was held on Thursday, December 5. At the closing session, held on December 6, it was decided to hold the summer meeting of 1896 in the city of St. Louis. Mo. Part of each day of the convention was devoted to an inspec tion of various objects of interest in the city and im mediate neighborhood.

## Colored Glass Plates

Glass is cast upon a table and a second layer of glas of a different color then cast upon the first, the thick ness of each element of the compound sheet being determined by the vertical height of its allotted roller by the traverse of which the plastic mass is spread. Deigns may be impressed upon the glass through one or more of the several layers forming the compound sheet. The designs are produced by the use of a descend ing plate bearing the device desired and moving with it lower face strictly parallel to the table. The designs may extend completely through the sheet of glass and the recesses produced may be filled in with colored enamels.-T. Lefévre and L. Michau, Paris, France.
a mondment to ericsson, filipstad, sweden.
In the little town of Filipstad, thirty-five miles northeast of Carlstad, Sweden, in the mountainous country bordering on Norway, was recently unveiled a monument to John Ericsson, forming the subject of our illustration. The imposing ceremonial with which, in August, 1890, the remains of this


BODE'S CLOTHES RACK.

A CLOTHES RACK FOR HOUSEHOLD USE.
The illustration represents, in folded and open po sition, a light and strongly made clothes horse or rack, designed tooccupy in either position the least space necessary for a thoroughly practical article. It has been patented by William A. Bode, of Orange, N. J Within the central post slides a rod conveniently ad justable at the desired height, and carrying on its upper end a series of pivotally connected umbrella-like clothes-supporting arms, each arm being separately adjustable to an outwardly extended position. Pivotally connected to the central post are also folding frames with horizontal bars, forming a clothes horse or rack at each side for supporting large pieces of clothing. Each side frame is inpendent of the other, so that either one or both of them may be used at a time, or both of them may be hooked up and held in raised position, using only the umbrella-like clothes-supporting arms at the top, and leaving a clear space all around to the floor, these features render ing the device very advantageously ad justable where it is desirable to econo mize space and where large pieces have also to be handled.

## Remedy for Nosebleed

Dr. T. A. Hall writes as follows: 1 read an account in the Petersburg Index Appeal of the death of a young man, a stu dent at the University School (McCabe's) from epistaxis, who had eminent medi distinguished engineer were transferred from America|cal attention, but death ensued in spite of all that was to Sweden will be at once recalled, with thoughts of done
the splendid achievements which have associated his I write only to say that during a practice of fifty-one name with so much that has been accomplished dur- years I have had much experience in such trouble ing the present generation. The body was conveyed from the land of his adoption to that of his birth by the United States war ship Baltimore in a way befit ting the illustrious dead, and Sweden received the dust of her distinguished dead with all possible honor, erecting over it a mortuary chapel of unusual beauty the emblewatic design of which gives the key to the life of him who rests beneath.
For the photograph illustrating the scene of the unveiling we are indebted to the Illustrated American, and in the accompanying article by Florida Stephenson Sharpe, it is stated that "the memorial is built the vicinity of decaying oak stumps, growing flat on terrace is surrounded by granite pillars that are strung with heavy iron chains. Broad steps lead up the ter race to the portals. Crowning the monument is a globe of cop per on which a great eagle stands, the claws clutching America the wings outspread, while the beak is offering an oaken branch to Swe den. This design is very conspicuous. Below the globe the granite roof is built in severa buttresses, The west ern wall is almost en tirely taken up by the broad portal, surround ing which is a shield This a grea shield. This shield is copper, a propeller in bass-relief thereon, oaken leaves and fir branches surrounding the shield. The corner pillars are emblázoned with the arms of 'Ivea with the arms of Ivea' and Gota respectively Over the arch runs th inscription, 'Th Fatherland to John Ericsson.' 'The interior is rich in sculptured de sign and unique orna mentations. The sarco phagus proper, occupy ing the center of the cha pel, is of green marble pel, is of green marble, in which the cofin placed. Over the en trance of the interior o the chapel one reads thi inscription sharply chis eled in the stone: 'This structure was erected in the year 1895. in mem ory of John Ericsson."


UNVEILING A MONUMENT TO JOHN ERICSSON AT FILIPSTAD SWEDEN.
dozen in a small space about the size of a walnut. In the fall it begins to dry, and when dry, you may tread upon it and a profuse cloud of dark brown snuff is pufred up from the top of the fungus.
I have known of this plant all my life, but never hought to write about it till I read about the death of the young man alluded to above. I do not know the why, but do know the fact as stated.-Virginia Medi cal Monthly.

## AN IMPROVED LAWN MOWER.

The machine shown in the illustration is adjustable to travel longitudinally of a terrace as well as trans versely, evenly cutting grass of any height with one cut, and the driving mechanism of the mower is pro tected from dust. The improvement has been pat ented by William J. Rusk and Chester L. Holloway, of Hunter, N. Y. The ground wheels are loosely mominted on the axle, but a clutch causes the axle to turn with the wheels when the machine is pushed orward, the axle not revolving when the machine is


RUSK AND HOLLOWAY'S LAWN MOWER.
drawn back ward. A sectional frame incloses the axle and a forwardly extending drive shaft, the latter being connected by a gear with the axle within a centra casing, and a hanger at the forward end of the frame carries in horizontal position a fixed knife with pointed teeth, the knife being strengthened by an arched base. Directly upon the upper face of the fixed knife a second knife is held to be reciprocated by means of a cam on the forward end of the drive shaft, the cam engaging a groove in the rear face of a centra standard on the knife Connected with the central casing on the axle by a ball on the a telescopic socket whose outer arm, to whose outer end is con nected, also by a ball socket, an auxiliary axle having at its outer end a smail ground wheel, this device being detachable from the body of the machine, but being designed to adapt it especially for use in it especially for use in
mowing longitudinally upon a terrace, as shown in the illustration. Arms projected rearwardly from the axle frame carry a roller, and the handle by which the machine is propelled is connected by a yoke with these arms.

Eruption of Mount
Vesuvius.
A dispatch from Naples dated Dєc. 3 says that Mount Vesuvius is in a state of eruption. Three disinct torrents of lava are flowing from Atrio del Cavallo burning chestnut groves along heir path and falling into the Vand falling ipice cipice, between Monte
Somma and Colline del Salvatore.

A HOLDER TO FACILITATE WORK ON BOOTS OR SHOES
The tedious and tiresome work of cleaning and polishing boots and shoes may be greatly facilitated, and the task rendered much easier, by the simple and novel apparatus shown in the accompanying illustration. For this improvement patents have been granted in the United States and Canada, and in the principal European countries, to Richard Lundqvist, of Laguna de Terminos, Mexico. Itconsists of a stand carrying a post on whose upper end is a rubber-faced block shaped somewhat similar to a foot, on which may be placed a shoe with a last inside, there being in the top of the last a longitudinal recess or slit adapted to be engaged by the overhanging upper end of a pivoted lever, whose lowar end passes through an opening in the post. A spiral spring normally holds the lever out of contact with the last, but when the lever is moved into engagement with the top of the last, it is thus held in locked position by means of a wedge, holding the shoe firmly against the block and permitting the operator to use both hands in his work. The operator is also thus enabled to employ his strength to the best advantage with the brushes or for the after polishing with the woolen cloth, the heat generated by the friction of which is designed to soften the hardened fatty matter in the leather and contribute to its durability and the comfort of the wearer. A sualler block is placed on top of the larger one when ladies' and children's shoes are to be polished. It is not designed that the last shall fit very snugly in the boot or shoe, so that a large and a small last will answer for a considerable range of sizes, the boot or shoe, where necessary, being partially stuffed with rags, paper, or other soft material to make a sufficiently good fit. Upon the post is also fixed a box with hinged covers, in which may be kept the lasts, blacking, brushes, cloths, etc

## THE ART OF HORSEBACK RIDING.

Capt. J. B. Dumas, at our request, has been kind enough to send us a very interesting note upon the method that he employs in his teaching at the High Riding School. We reproduce it :
"My object," says he, "has been to realize by a succession of images that photography renders indisputable a monograph annotated, figure by figure and point by point, with all the gaits and all the paces of the High School. Placed in the center of the arena with my pupil, I secure by photography the precise time that his inexperienced or powerless eye has not completely seized. I make him see it ; I explain it to him (1) from the view point of quadrupedal locomotion and (2) from the more important view point; of the use of the horse for riding. These lessons do not go with out a com lete revision of all the existing works upon locomotion passed through the sieve of a very long
experience with the horse and completed by entirely new researches. I wish to say that I was the first to study and point out the influence that declivities exert upon the gait of the horse that moves thereon. I have deduced therefrom two rules: tendency to a lateralization of the gait in descents and a tendency to diagonalization in ascents. The conclusions are
 LUNDQVIST'S BOOT OR SHOE HOLDER.
deduced of themselves to the end of improving the gaits of lateral form and those of diagonal form. I have, in fact, made a thorough comparison of the pace and the gallop, and concluded that, as regards forms and the kind of equilibrium engendered, these two gaits are sisters, and, all other things in time and space being equal, produce identical results in the emphasizing of the supercharge of the shoulders and the bearing down of the horse. These are the gaits of lateral form. On the contrary, I have found that the gaits of diagonal form, such as the trot, ease and raise the horse by facilitating the transfer of the weight to the hind quarters. These are two points to be noted and borne in mind in training, according to the individualities considered (man or horse) and the necessities to be satisfied
"Finally, the beginning and end of all my system of training is summed up in one rule of the simplest chartraining is summed up in one rule of the simplest char-
acter, in one sole principle for the rider : Act with the


Fig. 1.-Synchronots motion of fore and hind LEGS DIAGONALLY WITHOUT ADVANCING.


Fig. 5.-UPHILL WORK.


Fig. 2.-INSTANTANEOUS HALT IN PARADE.

leg on the same side and at the same time as the anterior of the animal that is posing, the end of the horse's nose pointing in the direction of the motion to be begun. This is as much as to say: require of the animal an oblique or lateral motion only when his anterior, raised in the direction of the motion to be begun, permits him to execute it. This corresponds to the instruction given the foot soldier : turn on the side of the anterior raised or carry the weight of the body upon the leg that does not begin the motion, and carry it afterward in the direction of such motion, in order to extend and amplify it. This simple rule leads to cor rect turns without resistance or revolt, to the Spanish pace, to the prance, to starts at a correct gallop, etc., and, in a word, to correct riding in all the gaits and paces of the High School, and to the rapid training of paces of th
the horse."
We accompany this interesting dissertation with Some accompany this interesting dissertation with some specime Album de la Haute Ecole, recently pub-
trate the Albur lished by Captain Dumas and Viscount Ponton d'Amercourt. Figs. 1 and 2 reproduce exercises tbat are very difficult of execution, and which denote great skill upon the part of the rider. Figs. 3 and 4 show times of the great elongated trot and the racing gallop. Fig. 5 gives the work upon a declivity, useful to Alpine hunters. Fig. 6 shows the cabriole, an exercise that can be performed only by firstclass riders.
We shall now examine with the authors one question, and that is the utility that these documents present from the view point of the artistic reproduc tion of animals in motion.
An experienced eye succeeds in seizing the impres sion of an action whose duration is not less than one-sixth of a second. Further, in order to succeed in this right along, it is necessary for it to have recourse to the utilization of the luminous impression upon the retina
The observer should attentively follow with his eye the horse in motion at a distance of 100 or 150 neters, and then, immediately after the rapid execu tion of the time of the motion that he desires to study, he should abruptly close the eyes. The or gans of external sight, had he not thus momentarily arrested their operation, would have continued to register the different periods of the acts of locomotion in measure as they were executed while rendering account of themselves to the mind, so to speak, only every sixth of a second; that is to say, in grouping them more or less. It would, therefore, have been able to succeed in seizing a clear image of the de composition of the motion; but the retina, owing to the persistence of the luminous impression, momen


Fig. 3.- GREAT ELONGATED TROT.


Fig. 6.-THE CABRIOLE.
tarily preserves the interior registering of the last act that strikes it, and the observer will be easily able to find this vision there.
At the same distances of observation, or at distances that may be less, photography, on the contrary, very exactly retains the definition of a movement that is executed in less than one twenty-five thousandth of a second, if need be. It results that, with respect to the latter, the human mind scarcely conceives of anything more than a union of motions-a synthesis, because the instrument at its service, the eye, permits it to see merely a grouping and not to decompose them babitually. Besides, the education of the eye by the works of the majority of painters and sculptors, almost all of whom still work upon conventional types as yet little studied, causes it to retain and understand mere ly conventions as destitute of tr alphabetical character could be.
Photography, on its side, registers an analysis that takes from the imagination all idea of a motion in course of execution, since the exact conception of the latter can result only from a limited succession of true positions, fused by art into a single image.
As regards the definition of the motion by the image, the eye and photography, therefore, see equally false; the first, the eye, the tool of synthesis, because, in the first place, it sees badly for want of education and training, and, second, because it sees at once too large a number of successive phases in the series of a same motion, and mixes them with each other; the second, the analyst. that is to say, photography, because it sees too quickly, and conse quentiy seizes at once too little of the series of thi same motion to allow the human mind to afterward see in these images a close relation with what the eye has made it see.
It will be concluded from this that the representa tion of very rapid motions, which our eye sees badly, should, in order to be true from the view point of the human mind, take account of the manner of seeing and the eye's capacity for registering, as well as of the precise data furnished by photographic analysis. A fusion between these documents, under the dominant idea that they are destined to be appreciated by the human eye, is therefore necessary, and it is here that art must intervene. Photography will furnish the latter simply, with documents of exploitation, data whose strict reproduction would be as false from the view point of the eye as ugly from the view point o art. But we must hasten to add that the human eye imbrued for centuries by the works of artists and by itself, if it preserves a just feeling of what is adapted to it, has not yet obtained its education. It now likes and appreciates only the illusions concordant with the conventions that it knows, that it has alone re tained and that it believes in good faith to see and to find again in reality.
It is therefore necessary to train it and exercise it to see more accurately, more truly, and art must impose its rule, so that new and true synthetic con ventions shall finally replace the ancient and false ones. The reproduction, by quadrupeds in motion of the figures that the latter have engendered wil always, in fact, present for the majority of them the capital defect of corresponding to none of the time of any motion whatever and of being materially irreal izable.
It may therefore be foreseen that the simple types that art will retain for the representation of gaits will result from complete knowledge, and then from the fusion of the images in series furnished by pho tography. In its study of nature, it will take them as guides for better interpreting the acts of motion.La Nature.

## Fires in 'sky Scrapers."

At a recent fire the Chicago firemen demonstrated at the Masonic Temple their ability to cope with fires in the upper stories of the tallest buildings. Engine No. 1 of the city fire department pumped a stream of water through 500 feet of hose and standpipes to the roof of the building, where there was sufficient force to drench the roofs of neighboring buildings. The water pressure at the engine was 240 pounds. On the roof at the same time the pressure was 54 pounds to the inch.
The length of the standpipe from the ground to the root of the Masonic Temple is 323 fcet. The sight o an engine and firemen at this sky scraper attracted a crowd of people who were well soaked for their curi osity.
The result of the test was gratifying to Chief Sweni of the Fire Department and to the insurance men present.

## Cracked by Earthquake.

One effect of the recent earthquake in Cincinnat and the surrounding country is just coming to light. Notwithstanding the recent heavy rains, it has been discovered that many cisterns are still as empty as during the long dry spell. Investigation shows that the cement was cracked in hundreds of cisterns, ren dering them practically worthless.

## A REINFORCED ENVELOPE

An envelope having a reinforce or attachment ap plied at its back, for the securing of money or valua ble papers in the envelope, and to facilitate opening it, is shown in the accompanying illustration. The improvement has been patented by John F. Forsyth and is being introduced by Forsyth, Fields \& Company of Bloomington, Ind. The body or main part of the envelope is made in the usual way, but the side flaps fold and are gummed over the bottom flap, and a reinforce of similar form to the bottom flap is made inte gral therewith, folding back from its top edge, as shown in the larger view, and adapted to be sealed down upon the side flaps. In the reinforce is a trans verse slot which receives a tongue projected through it from the inner flap, this tongue constituting a pul


## ORSYTH'S ENVELOPE

piece for tearing open the envelope on lines of per foration indicated by the dotted lines. A small gummed fap at the middle of the reinforce is adapted to re ceive and be sealed upon the tied ends of a tape or string with which money or papers in the envelop may be bound.

## oil Prospectors on the Jordan.

According to consular reports, it is the intention of the Turkish authorities, at Jerusalem, to establish teamship line on the Dead Sea. The existence of asphalt in that region has been ascertained, and it is upposed that petroleum will be found also. A ational development of the Jordan Valley from Lake Tiberias down, and especially the opening up of the rich mineral resources of the Dead Sea basin, is con sidered a very profitable undertaking, for which, how ever, foreign capital will hardly be found, as the lega tatus of property holders in those regions is very un safe.

## AN IMPROVED TELEPHONE TRANSMITTER

The illustration represents different forms of tele phone transmitters for which two patents have re cently been granted to Ignatius Lucas, of Passaic N. J. The improvements are desigued to soften the ounds for transmission, and render them uniform and perfect, even if the transmitter is located in a building where there is much noise and jar. As shown in Figs. 1 and 2, the transmitter has the usual casiug and the diaphragm bas a point engaging the uppe contact disk, made of carbon, and placed opposite


LUCAS' TELEPHONE TRANSMITTER.
lower disk, but both disks are embedded in a filling of oose material, preferably of sliver, or wool as it leaves the carding machine and previous to being felted. The filling is preferably held on a false bottom plate adapted to be adjusted until the desired sound quality is obtained. As shown in Fig. 3, the disks or buttons are similarly embedded, but between them are placed a doubled up sheet of conductive material, such as wire netting. coated on its surface with granulated carbon, the carbon surface being in contact with the inner surfaces of the buttons. Fig. 4 shows a sheet o this material, the granulated carbon being attached in an even layer by a suitable adhesive, such as collo in an
dion.

Mr. Chauncey M. Depew lately visited the Mechani al Department of Cornell University. He found at the head of it Professor Morris. The latter claimed him as an old acquaintance.
"How's that?" said Mr. Depew.
"I used to work for the New York Central Rail road," was the professor's answer.
"Indeed! in what department?"
"Oh, just in the ranks."
"How did you get on there?" asked Depew.
"I was first a fireman on an engine. That was a tough job, but it led up to the position of engineer. I made up my mind to get an education. I studied at night and fitted myself for Union College, running all the time with my locomotive. I procured books and attended as far as possible the lectures and recitations I kept up with my class, and on the day of graduation I left my locomotive, washed up, put on the gown and cap, delivered my thesis, and received my diploma put the gown and cap in the closet, put on my work ing shirt, got on my engine, and made my usual run that day."
"Then," said Depew, "I knew how he became Professor Morris."
That spirit will cause a man to rise in any calling. It is ambition, but it is ambition wisely directed, seeking to make one's self fitted for higher work. When this is accomplished, the opportunity for higher work is sure to come.

## A Fire Ball

A recent number of Nature gives the following
In compliance with a wish expressed by severa scientific friends, I place on record an instance of damage done by a fire ball or globular lightning About five weeks ago, when I was in Londonderry, the circumstances were related to me by Mr. James Harvey, of Northland Road in that city. Mr. Harvey was stay ing during the month of August at Cuidaff, on the north coast of Donegal ; and on the 24th of that month, at about 4 P. M., a little boy named Robert Alcorn, whose parents occupied a house near Mr. Harvey's was desired by his father to go into the yard and drive away some fowls from the door. On going out of the house, the boy saw a large bright object in the sky about the size of the table in his bed room (I give his own account, leaving out necessary considerations of distances, etc.), or apparently about six square feet in area. The object came toward his house from the west or northwest; and when it came close, it partly burst with a report like that of a gun. He put his hands over his face to shield himself from "the spark," and after the explosion the bulk of the ball appeared to continue its course toward the east, low down When it burst, however, it struck him, shattering the thumb and the first and second fingers of the left hand. cutting, scratching and blackening the right hand and left cheek, and shattering into fragments several bone buttons on his coat. Very soon afterward, Dr. R Young, of Culdaff, and Dr. Newell, of Moville, attended the boy, and amputated the fingers and a portion of the thumb.
No one near the place saw the ball (except the boy of course), but the parents and several others heard the report, and the boy's father rushed out immediately and caught his son as he was falling. Mr. Harvey oon afterward examined the place, and could find no urther trace of the fire ball, except that a piece of bark had been knocked off a small tree within a few feet of the place where the boy was struck. The loca police made exhaustive inquiry as regards the possibil ty of any one's having fired a gun at the boy, or of his having had any explosive in his possession; but nothing of the kind transpired.
It is well to add that at Redcastle (about eight miles away), one of the residents saw, on the same day, bright object in the sky, which object he took to be a fire ball. 'I'he day was stormy, with heavy showers, but no thunder.
M. Jamin relates ("Cours de Physique," tome premier, p. 470) several instances of globular lightning, and from these I select the following as bearing, per haps, the greatest resemblance to the above case as re gards atmospheric conditions:
"A la suite d'un violent orage observé près de Wakefield, le 1er mars 1774, lorsqu'il ne restait plus dans tout le ciel que deux nuages peu elevés au-dessus de 'horizon, M. Nicholson voyait à chaque instant des météores semblables à des étoiles filantes descendre du October 28.

George M. Minchin.
The Fastest Regular Train in the World.
The Empire State express now holds the world's ecord as the fastest regular passenger train. 'The speed of the best trains of foreign nations is: England, 51.75 miles per hour; Germany, $51 \cdot 25$; France, 9.88 ; Belgium, 45.04; Holland, 44.73 ; Italy, 42.34 ; Austria-Hungary, 4175 . America now heads the list with 53.33 miies per hour to the credit of the Empire State express. This is the speed now made between New York and Buffalo.
the woman's building, atlanta, ga. The building represented in our illustration is by far the prettiest structure in the Cctton Exposition grounds. Classic in its design, the Woman's building is the one object that attracts the attention from any point of riew taken from the terraced heights. It is unlike the larger structures in that it is divided into stories; the first or ground floor being used as an emergency hospital and kindergarten, the main floor with broad hall and stairways leading to a third floor above. The three stories or floors are subdivided into rooms, and in these are displayed the handiwork of women, in painting, etching, architectural designs, embroidery and many works requiring delicacy of touch united with skill and taste in execution.
The building is 150 feet by 128 feet and was designed by Elise Mercur of Pittsburg, Pa. Our illustration was taken from the landing of a flight of steps leading to the Plaza; statues of heroic size ornamenting the balustrades.

Science Notes.
New Process of Tanning.-In order to hasten the process of tanning, says the Revue Scientifique, Messrs. Bake and Leverett pass a current of hydrogen gas or a current of some gaseous compound of hydrogen containing a certain quantity of arsenic through the liquid in which the hides are imwersed. They obtain the hydrogen either from the action of commercial sulphuric arid upon zinc or iron or from that of steam upon iron. They calculate, in fact, that in this case the hydrogen obtained will contain a sufficient quantity of arsenic. The gas, collected under pressure in a gasometer, is introduced into the bottom of the tanning vat through a pipe provided with a series of apertures. After bubbling up through the liquid it flows out through, another pipe affixed to the cover of the vat. Vats of very large dimensionsare employed, and the tanning proceeds very rapidly
A New Asphalt Beton.-The Austrian Militair-Comite has been testing a new asphalt beton introduced under the name of "Lavoid beton," and recommended principally because it hardens quickly. It is an earthy brown powder, which has a slight odor of tar and consists mainly of sulphur and iron slag. The analysis made in military laboratories yielded : Sulphur, 33.53 per cent; tar, 8.21 ; iron slag, 57.83 ; and water, 0.43 . The iron slag coutained : Silica, 43.01 per cent; ferrous oxide, $22 \cdot 42$ : alumina, 309 ; and lime, $4 \cdot 16$. The hardening is ascribed chiefly to the formation of an iron sulphide, the tar acting as a reducing agent. From this point of view, the silica, clay, and lime would be useless, though they might combine at a slower rate the committee, however, styles them impurities sim-
ply. For the tests, plates of from 3 to 6 inches square were formed by pouring the melted lavoid over heated small granite. The material proved quite brittle and not able to resist blows, but was found to withstand high pressures.
Induced Draught.-The "induced draught" trials of the Magnificent, says the Broad Arrow, have proved beyond question the superiority of the system to that of "forced draught." Induced draught is simply this: Fans are placed in the uptakes or funnels and draw the air through the furnaces, so that the more air that gets into the engine rooms and stokeholes, the better There is no rushing of air, no unpleasant air pressure whereas in the forced draught system everything is battened down and air is forced into the furnaces under pressure, generally with disastrous effects, such as fused fire bars and overheated furnaces. At no time during the four hours' trial did the temperature in the engine rooms or stokeholes rise above $78^{\circ}$, although it was an exceptionally hot day. Mr. Penn and the Admiralty officials, who were on board, were more than satisfied with the results. The engines worked without the slightest hitch from beginning to end, making 105 revolutions and working up to 1,200 horse power. The speed obtained was $17 \cdot 63 \mathrm{knots}$, or 20.25 miles per hour. By the time the four hours' trial had finished the Magnificent had passed Hastings, having skirted the coast from the Nore, passing close to Ramsgate, Margate, Walner, and Dover. The great test having concluded, Lord Charles Beresford, who was in command, and never left the bridge until he dropped anchor again at the Nore, tried the ship's turning powers with both engines full ahead, the cir cle being completed with a diameter of about 340 yards. He then stopped dead, and went full speed astern, re versed engines at full speed in opposite direction and
did his utmost to find a weak spot; finally this splendid his utmost to find a weak spot; finally this splen did ship returned to her anchorage under natura draught, making 16 knots easily.
The Present Status of Walnut.-As a fancy wood, either for furniture or house finishing, says an exchange, walnut has yielded most of its prestige to nak and the bulk of our American walnut wood now goes
abroad, the greater portion of it being taken by Ger abroad, the greater portion of it being taken by Ger
many. At least 80 per cent of it is shipped to London, Liverpool, and Hamburg. There is no reason why it should have fallen into disfavor, but the fact remains that it is unfashionable in this country and it must go. The foreign shipments run along between three and a
half and four and a half million feet, and the bulk of it comes from Kentucky, Tennessee, Ohio, Indiana, Texas, Arkansas, Missouri, Iowa, Illinois, and Pennsylvania. The finest shipments of the present year have been from Texas, but, as a rule, Indiana walnut is the best. Kentucky has more than any other State, but it does not average as high as Indiana. Walnut is graded into "firsts," "seconds," "rejects," and "culls," and the price varies from $\$ 18$ to $\$ 20$ for culls and $\$ 35$ to $\$ 40$ for rejects to $\$ 70$ per thousand for firsts and seconds. The best grade of walnut is forest growth, what is known as "cornfield walnut." This growth, what is known as "cornfield walnut." This Walnut trees are worth from one dollar up, according to their accessibility, and there is no rule for finding them. A tree should be at least 16 inches in diameter, while some trees go up to over 50 inches; and a log over 60 feet in length is occasionally found. As a rule, however, walnut branches low, and short logs prevail. Figured walnut is a specialty and is used for veneer ing. Its price varies from six cents to a dollar a foot. One man in West Virginia is said to own a figured tree that cost him a thousand dollars, for which he asks four thousand, having refused three thousand. There are over six thousand feet in it. A walnut tree is at its best at about fifty years of age, or rather it
should live that long before it is cut down for the market.
Our competitors in the European markets are Italy and Circassia, the latter furnishing "Black Sea walnut. The so-called "French burls" that are shipped to this country to some extent are not French at all, but Circassian, shipped to Marseilles and reshipped from there. The Italian walnut is small and not of as good quality as the others.
As might be suspected, New York is the leading point of consumption in America. and the largest amount is shipped abroad from there, though some goes from Baltimore and Norfolk.
Carbide of Glucinium.--Glucina, as well known, has up to the present been placed among the oxides irre ducible by carbon. Now the recent labors of Mr . Moissan have considerably diminished the number of such oxides and shown that, in many cases, the reduction can be effected with the aid of a sufficiently in tense source of heat. In following the same order of ideas, Mr. P. Lebeau has undertaken some researches upon glucinium and its compounds. The pure glucina that he used was obtained from the emerald, which is its principal mineral. Then, by heating in the electric furnace a mixture of oxide of glucinium and carbon, he obtained, not the metal, but a definite carbide, pure and crystallized, the preparation and properties of which he recently made known to the Acadeny of Sciences.

His conclusions are as follows: (1) The properties of pure, crystallized carbide of glucinium, and, more par ticularly, the action of water, which decomposes it cold with the disengagement of methane, make it so closely reseuble carbide of aluminum, $\mathrm{C}^{3} \mathrm{Al}^{4}$, that Mr. Lebeau has been led to attribute to it the formula $\mathbf{C}^{3} \mathrm{Gl}^{4}$. (2) Under such circumstances, the atomic weight of glucinium would be, say, 14, and glucina would become a sesquioxide with the formula $\mathrm{Gl}^{2} \mathrm{O}^{3}$.

## The Vanderbilt Arboretum.

All those Americans who are interested in the mate rial welfare of their country will watch with interest what Mr. George W. Vanderbilt is doing on his North Carolina estate. Mr. Vanderbilt, as is well known, is making on his estate a sort of model forest, where sci entific forestry is to be practiced, and experiments made in acclimating valuable foreign trees, and in the most profitable management of the native species; but every one does not know that his plan includes horticulture and agriculture as well as forestry, and that he wishes and hopes to make his experience valuable to American farmers and land owners everywhere. With his view, he proposes to build on his property a little village, including not only a hotel, but houses and stores, where people interested in agriculture. who
come properly introduced, may rent rooms or houses or themselves and their families, for such time as they may desire to study the work going on upon the estate. There can be no doubt that there will be plenty of applicants, for nowhere else in this country can such opportunities for advanced study of the sort be found. Fortunately for his countrymen, Mr. Vanderbilt is not only able. but willing, to expend large sums of money in experiments which may return, for the present nothing but advances in scientific knowledge; and it is just these experiments which are perha ps, in the
end, most valuable to the country.-Amer. Architect.

Those who hold that no man can avoid his fate may find support for their doctrine in the experience o Charles J. Weller, of Elkhart. Ind. He was employed in grinding at an emery wheel. but, regarding the po sition as dangerous, handed in his resignation. Five minutes before the time for ending his last day at the Ledger.

## ©orrespondence

## The Strangest Insect in the World.

To the Editor of the Scientific American
With reference to the article on the above subject in No. 1, Vol. Ixxiii, of the Scifntific American, will you permit me in the interests of scientific pursuit to remark that up to the present the moth which produces the caterpillar attacked by the fungus Sphaeria Robertsii is not known to scientists, though it is surmised to be a member of the genus Hepialus or swift moths of Europe? It was formerly thought to be Hepialus virescens, the giant green moth of New Zealand, called by the Maoris pepe, but that cannot be, as virescens is a wood borer and undergoes all its transformations chiefly in the lower parts of the trunk of the New Zealand currant or wine berry tree, Aristotelia racemosa, and occasionally in other trees, such as manuka, leptospermum, the black maire, Olea apetela, etc.
The vegetable caterpillar, hotete (Maori), evidently pupates in the ground, and some must escape the at tacks of the fungus spores to perpetuate the species, though the pupa has yet to be satisfactorily accounted for. From information obtained by my eldest son, G. H. Grapes, from the Maoris at Otaki, North Island, it appears that the grub or caterpillar pepeaweto (Maori) which begets this curiosity is dark olive green, about 3 inches long and found an inch or so beneath the surface of the soil, but, so far as I can ascertain, has never been seen by an entomologist. Specimens in my possession prove that the head is not the sole point of attack, but that both extremities are attacked indifferently; indeed, my experience tends to the belief that the anal extremity is the oftener selected by this singular and mysterious parasitical growth The twig-like woody appendage is sometimes forked, and in one of my specimens exceeds 9 inches in length. The attacks of Robertsii seem altogether confined to the extremities of the caterpillar, unlike an allied British species, Isaria farinosa, which attacks the larvæ of the cabbage moth, Mamestra brassicx. on the anal, dorsal, and abdominal regions indiscrimin ately. Parasitic fungi are met with in Australia and other countries which attack living and dead larve pupæ, etc., consisting of upward of twenty-five re corded species, but none are so conspicuous or so re markable, that I am aware of, as Sphaeria (formerly Torrubia) Robertsii, examples of which may be seen in many museums. Finally, I would observe that "Aweto" is the Maori appellation for the larva of tie New Zealand convolvulus hawk moth, Sphinx convolvuli, frequently seen feeding on the kumara o sweet potato, Convolvulus chrysorrhizus.

George J. Grapfs.
Caerbroi Paraparaumu, North Island, New Zealand.

## How to Make a million

A sprightly little sheet call Results, published in Chi cago, devoted to advertising, gives an account of a meeting of prominent business men in St. Louis. It was in fact, a meeting of commercial clubs of several cities, and among those present were a number of millinnaires who were interviewed with the question, ' How can a nan make a million dollars?" and these are some of the brief replies
George M. Pullman: "Could not tell you-really, I could not. I did not come down here to be interview ed, and, anyway, this is too short notice to give a comprehensive opinion."
Marshall Field: "Oh, pshaw! What do you ask such a question for? There is no general recipe that I know of, unless it be industry, economy and a cheer ful disposition."
P. D. Armour: "Oh, my gracious, what a question! have lost my patent for making money, and now don't know any more about it than anybody else. Go ask Marshall Field. He is making lots of money now."
Lyman J. Gage: "I did not come here to talk about money making. It occurs to me that men who want to make money will know how and where to proceed. Charles Fargo: "What do you ask me for? I've go Coney. Pullman could tell you, if he would."
N. K. Fairbank: "I could not give you a rule, for here is no such thing in money making."
Marvin Hughitt: "Work like the devil, and hold on to what you make. A man must solve his own prob-em-nobody can do that for him."
Franklin MacVeagh: "Well, that is a poser. I will ndorse all that Mr. Hughitt has said, however." E. M. Phelps: "Go talk with those men who know-I don't."
Which all goes to show, adds Results. that the eporter went to the wrong people. He should hare interviewed the "financial experts." It is clear that this reporter never did any interview inc for an advertising journal.
What does a millionaire know about making money a successful advertiser know about advertising?
The men who have really done anything never want to tell how they did it.

## BATTLESHIPS NOS. 5 AND

On November 30, bids were opened at the Navy De partment for the construction of two new battleships authorized by act of the last Congress, and prospectively, at least, our line of battle is thus augmented to six first-class ships of this type and of American de-sign-the Texas, a second-class battleship, being from English plans.
In the Kearsarge, a namesake of the historic craft, and her sister ship, No. 6, as yet unnamed, we have the highest examples of their type. Their general dimensions and principal features are : Length on load water line, 368 feet; beam, extreme, 72 feet 2.5 inches ; freeboard forward, 14 feet 3.0 inches; freeboard aft, 12 feet 3.0 inches; normal displacement, 11,500 tons; corresponding draught, 23 feet 6.0 inches; indicated horse power, estimated, 10,000 ; corresponding speed, 16 knots; coal supply on normal displacement, 410 tons ; coal supply at 25 foot draught, 1,210 tons. Batteries: Main, four 13 inch breech loading rifles, four 8 inch breech loading rifles; secondary, fourteen 5 inch

The general practice abroad of recent years, regarding the size of big guns, has been to restrict their heaviest armaments to calibers not exceeding 12 inches, apportioning the weight thus saved among more rapid fire guns or a wider or heavier distribution of armor protection. This matter was pretty thor oughly discussed anent the new ships, the Chief of Ordnance holding that the 13 inch gun would make our ships many degrees superior to our European neighbors, in fact, preponderously so; and, housed in two double-decked turrets, the four 13 inch and four 3 inch rifles would be more effective and better pro tected than could be the other guns in separate tur rets of independent action, and this scheme wa adopted.
The double-decked turret is essentially novel. Rest ing upon the protective deck, 3 feet 6 inches above the water line, the barbettes of 15 inch steel rise up to a height of three feet above the main deck, and within the protection of these heavy walls the turning, load
the distribution of others of similar caliber on the berth deck forward and aft, give promise of very effect ve service against torpedo boat attack, while the 1 pounders and Gatlings in the tops will sweep the decks andother exposed positions of an enemy
Offensively, the ships are extremely formidable, and defensively are exceptional in the thickness and distribution of armor protection about the guns and vital parts.
From the after barbette forward to the stem the water line region will be protected by a belt of armor $1 / 2$ feet wide, 4 feet of it being below water at normal draught. From the after barbette to the forward bar bette this belt will have a maximum thickness of $161 / 2$ inches, tapering to $91 / 2$ inches at the edge below water, and from the forward barbette to the stem this armor will gradually diminish to 4 inches. At each end of the thickest part of this belt there will be an ath wart ship bulkhead, 10 inches thick forward and 12 inches thick aft, to oppose an enemy's raking fire. On top of the four walls thus formed will rest a flat steel pro


OUR NEW BATTLESHIPS NOS. 5 AND 6.
rapid fire brepch loading rifles; auxiliary, twenty 6 pounder rapid firers, six 1 pounder rapid firers, four machine guns. The torpedo tubes, of which there are five, will be disposed one in the stem and two on each broadside amidships, and all will be of the above water type; the bow tube firing directly ahead and the broadside tubes discharging through an arc of fifty degrees toward the end of the ship nearest them. The character of our coast and the generally shallow waters about manv of our wealthiest seaports made a comparatively light draught an indispensable prerequisite in these new ships; in fact, the secretary insisted that they should draw less water than any other first-class battleship either here or abroad. The largest of European ships of this sort usually draw about 28 feet when fully laden, and our own Iowa and Indiana class draw something over 24 feet under normal conditions. The Kearsarge and No. 6, however, with all weights on board ready for sea and with 410 tons of coal in their bunkers, will draw but $231 / 2$ feet of water, and with 1.210 tons of coal dumped loosely into their bunkers, without packing or further handling, will have an even keel draught of 25 feet.
he 13 inch guns will be as thick as their supporting barbettes, except where augmented two inches about the ports through which the guns peer out. The turrets for the 8 inch guns, rigidly fixed to the more ponderous one below and incapable of independent latera movement, are 9 inches thick generally, except for a similar thickening of 2 inches about the face. The primary' features of advantage possessed by this un common type of turret are the concentration of motive mechanisms and the unusual protection given the ammunition hoists for the 8 inch guns above.
The guns in the turrets fire each through an arc of $270^{\circ}$, and in that have a pretty effectual sweep. In the broadside hatteries of 5 inch rapid fire guns, seven on each side, firing through an arc of $90^{\circ}$, these vessels are unique, and may be said to bear directly the impress of lessons learned in the late Chino-Japanese conflicts, the 2 inch steel splinter bulkhead between each gun station and the side protection of 6 inches of solid teel armor being features of unusual safeguard for the rapid fire guns of any ships of this description. The battery above, of 6 pounder rapid fire guns, and
tective deck $23 / 4$ inches thick, completely roofing over and compassing the spaces occupied by the "vitals," as the engines, boilers, and magazines are called Forward and aft of the boiler, engine and magazine paces, this protective deck will slant to below the water line at the extremities, backing up the ram bow, and|will be increased to 3 and 5 inches on the sloping sides of these parts of this armor deck.
A complete belt of corn pith cellulose will be worked fro $n$ stem to stern, augmenting the protection of many feet of coal, and the 6 inches of armor extend ing from the top of the water-line belt up to the main deck and running in a fore and aft direction from barbette to barbette. A double bottom, reaching from the keel up to the lower edge of the armor belt, 4 feet below the water line, will protect the vessel from injury in grounding and minor damage frow torpedoes. Within this heavy steel box of Harveyized material below the water and beneath many feet of coal. are the two sets of triple-expansion engines, one on each haft, having cylinders of $331 / 2$ inch, 51 inch and 78 inch diameters, and a common stroke of 48 inches. which will drive the twin screws, while the five boil-
ers-three double ended and two single ended-having a total grate surface of 685 square feet and a heating surface of half an acre-in four separate watertight compartments, will supply, at a working pressure 180 pounds, the steam needful to revolve the 16 foot propellers 120 times a minute when making the maximum contract speed of 16 knots an hour. Large fans will induce the needful forced draught, and pumps of thousands of gallons minute capacity will induce a circulation of water, feed the boilers, and clear the bilges.
Just under the pilot house there will be a conning tower ten inches thick, connected by a complex system of call bells, speaking tubes, mechanical telegraphs, and electrical telltales with every important center in the ship, bringing the captain, in action, in immediate ouch with every department essential to complete control and knowledge of his ship's condition.
The least possible amount of wood will be used, light metal work being the general substitute, and where wood material is used and needful, it will be subjected to an electrical fireproofing process of established efficacy. Cork sheeting will cover the metal bulkheads in the staterooms and living spaces, to reduce the possibility of unhealthful condensation. The ships will be lighted by electricity, ventilated by natural and fan-induced ventilation, and pumped and drained in the most approved manner by steam and hand appliances; and every consideration has been studied to make the vessels comfortable and healthful nabitations for their flagship complements of 520 persons.
Compared with the old time craft, this complement seems inadequate; but hundreds of mechanical devices and numerous auxiliary and nume have lessent engine have the mur the tax upon the muscular energies of the crew, and narrowed their duties to the simple direction of those conveniences which have made manifold the output of every man's efforts and given the vessels possibilities 'and facilities undreamed of twenty years ago.
With 1,210 tons of coal on board, at a cruising speed of 10 knots, the vessels will be able to cover 6.000 knots, and at a speed of 13 knots will be able to cross the Atlantic and then have coal enough left to trav coal enough left to trav el a thousand knots far ther. There will be no
speed premiums. A $\begin{array}{ll}\text { speed premiums. } & \text { A } \\ \text { penalty, } & \text { however, of }\end{array}$ penalty, however, of
$\$ 100,000$ a knot is imposed for failure to reach the contract speed of 16 knots. The cost of these vessels, ex clusive of armor and armament, is limited to
$\$ 4,000,000$ each, and the time of construction specified as three years from the time of signing of contract.

## Trial of a New Torpedo

The new Howell torpedo, commonly called the "Baby Howell," was tried officially December 4, at Newport, R. I., before Commodore Sampson, Chief of the Bureau of Ordnance, and Lieuts. Roy C. Smith and Brown, of the Torpedo Board of the navy. Three shots were fired from the testing station of the Hotchkiss Gun Company in the Seaconnet River. For a range of 600 yards, about all the government cares for, an average of between 27 and 28 knots was made, the torpedo being submerged $41 / 2$ feet. It appeared to hold this depth throughout its entire run of about 1,100 yards.
Each time the torpedo came to the surface at about the same spot, and the time of the several runs did not vary $31 / 2$ seconds. This regularity was as pleasing to the officials as was the speed attained. The projectile, in more favorable weather, has made more than 29 knots, and the company say that they will show 32 for 600 vards, with their regular powder charge of 200 pounds.

All the copper tubes in the English torpedo boat destroyers of the reserve fleet at Portsmouth are to be taken out and galvanized steel tubes substituted. The copper fittings have broken down in a number of the boats that have been tested.

## THE DE LA VERGNE MOTOR DRAG.

We have given illustrations of several of the horse less vehicles which took part in the Times-Herald motocycle race on November 28, and we now present an engraving of the De la Vergne Refrigerating Machine Company's motor drag, one of which also took part in the race. The De la Vergne machine won the fifth prize in the Paris-Bordeaux race of last June, so that it would undoubtedly have made an excellent showing in the Thanksgiving Day contest, if the rubber tires had not slipped, so that the race was abandoned at Sixteenth Street, Chicago. The horseless car riages of the De la Vergne Company are of two kinds, the hunting traps which are built to accommodate four people and the drags which accommodate six people. These carriages are not on the market at present.
The drag which we illustrate weighs about 1,800 pounds and has three seats. The frame is of iron. Around this the carriage maker has constructed the vehicle. In the drags two gasoline motors, of four horse power each, are used, each motor being distinct. The engines weigh about 375 pounds each. The two cylinders are balanced so that the vibration is noticeable only when standing still. The tank for gasoline is under the front seat, and the carbureter, which is used to prepare the gas, is in the extreme rear of the vehicle. The gasoline tank holds enough for a three days' ruri. The motor is a modification of the


## THE DE LA VERGNE MOTOR DRAG

well known Benz motor. The explosion is produced by a spark. the battery being also in the front of the vehicle. The cylinders are conled by means of water jackets connected with a tank having a, capacity of 250 pounds of water, which is sufficient for a run of six hours.

The noise of the exhaust is stifled by a muffler, in which is also placed a condenser, which condenses the unburned gas and products of combustion which are expelled at the bottom of the vehicle, thus prevent ing disagreeable odors. The power from the motors is transmitted to the driving wheels through the medium of belts and chains and sprocket wheels. The power is transmitted to the rear wheels by means of chains and sprocket wheels. Part of the spokes are secured directly to the large sprocket wheels, thus giving great strength. In the smaller vehicle the motocycle is stopped and started by shifting of the belts, which run to a countershaft. In the larger motocycles a friction clutch is used, which also controls the speed. The motor can be stopped, if necessary, by simply turning a lever, and the wagon can be reversed without stopping the engine. The limit of speed is said to be from 3 to 25 miles an hour. A powerful brake of the ordinary kind is provided. The steering wheels are pivoted at the hub, the ordinary fifth wheel is also used; the steering rod runs up to the seat. Equalizing springs serve to hold the steering connections in place 36 and 48 inches in diameter. and are fitted with
solid rubber tires of the Rubber Tire Wheel Company.
In the improved machine the lamps will be lighted F. ectricity, which is generated by the motor. James . Bate, the umpire on the De la Vergne Refrigerating Machine Company's gasoline motor wagon on the day of the race, made the following report:
"Half a gallon of gasoline was used in the trip of the De la Vergne wagon from the starting point to the testing room, at 1557 Wabash Avenue. The start was made at 8:56 o'clock, but the wagon had not gone far before the wheels began to stick in the snow. The stretch from the starting point to Fifty-fifth Street and Michigan Boulevard was especially rough, and several times the Benz motor was unable to drive the wheels forward. The rubber tires slipped in the snow, and before Cottage Grove A venue was reached Frederick C. Haas, who was operating the machine, decided not to attempt the race. Then the wagon was pushed over the bad stretch of snow-laden road. When the motocycle reached Michigan Avenue, it went along smoothly, but not at a great rate of speed. At sixteenth Street Mr. Haas turned the vehicle from the course and stored it at the testing room. The run was made in one hour and a half.
The De la Vergne Company, of New York City, in addition to making their large refrigerating plants, are now also making the $H$ rnsby-Akroyd oil engine. They regard their motor carriages as experimental at present.

## Destruction of Forests

 in California.In the University of California Magazine Mr. Charles H. Shinn, in writing of the lavish way in which the best parts of the California forests have been cleared away, states that in the Comstock mines alone enough timber has been used to build all the houses needed for a city of 50,000 inhabitants. He has seen the bottom of a cañon crowded for miles with the trunks of pines from each one of which a few flume blocks or a log of butt timber had been cut, while the rest was left to decay. Not to mention the thousands of acres of the most mag nificent coniferous timber known to man de stroyed by fires which have burned out the soil itself into great pits; it is stated that the waste of timber in the redwood districts has been even more appall ing than it has been in the Sierras. More than once the world's record for the number of feet cut in a day has been broken by some one of the sawmills of the coast red woods. So nıuch lumber is still produced by rival mill men that it has not paid for cutting, and some of the large California firms of lumbermen have become bankrupt. Enormous trees that represent from 800 to 1,000 years of symmetrical growth have been sawed up with no profit, or with actual loss, when, if they had been left to stand a few decades longer, the profit might have been a thousand dollars an acre.
At the time of the American occupation of California the forests covered, perhaps, 50,000 square miles. Hal of this has been cut over or is inaccessible or consist of species of less value than those which have hereto fore been cut. It is often asserted that California stil has twenty millions of magnificent forest land, but the truth is that there is left hardly fifteen million acres, and much of this has been cut away.

## Gelatin-Its Saline Digestion.

Gelatin is transformable into a kindred substance, gelatose or protogelatose, characterized by want of the property of forming a jelly and of being precipitated by a standard solution of sodium chloride. In cul tures of liquefactive microbia it is observed in the first moments that the gelatin is changed into gelatose. Gelatin loses the property of jellifying if left in contact with an alkaline chloride or iodide. With the fluorides, the transformation is only partial. The hange may be named saline digestion.-A. Dastre and N. Floresco.

## mandfacture of hat blocis.

A great number of the hats that are manufactured, such as golf, derby, yachting, silk hats, etc., are shaped over wooden blocks made from the whitewood tree. The trees grow principally in the Southern and Western States, and are straight grained, porous. and free of knots. The stock, which costs about $\$ 60$ per thousand feet, comes to the manufacturer in logs, measuring about 12 to 16 feet in length and from 7 to 8 inches in width and thickness. The material before being worked requires from six to twelve months' drying, the logs being cut up into short lengths and piled one on an other in a room for that purpose and dried with steam heat. The blocks over which the yacht and golf hats are formed are made up into five parts, the pieces of wood being first sawed into the proper size, then planed, grooved, and glued. Two of the side pieces of these blocks are grooved out in the center, the groove being about one half of an inch in depth, about one inch in width, and about six inches in length. Glued to two of the sides of the center parts of the blocks are two tongues or strips of wood, which are made larin shape to the other, which is connected to the so as to fit perfectly when the blocks are put end of the shaft of the machine. The machine, when together in the grooves of the side pieces. After the in motion, travels at the rate of about 3,500 revolutions pieces have been grooved and tongued a strip of paper, the width and length of eacb block, is glued between them, which holds the pieces together, so that after it has been ovaled and finished it can be easily broken apart. The grooving is performed by the operator pushing the blocks, which are fastened to a sliding table of the machine, over a revolving knife traveling at the rate of about 3,500 revolutions per minute.
The corners of each block are first sawed off before per minute, the operator holding a fine sheet of sandpaper on the revolving block, which smooths off the surface in about one minute. For derby and silk hats the bottoms of the blocks have to be curved.
This is performed by fastening the blocks in a movble frame which the operator pushes over two revolving 10 inch knives, connected length wise to the shaft of the machine. The frame, containing the block,
to hold the block during the next operation. The peg at one end is square, and is fastened securely in a wooden vise. The operator then places the block on the circular end of the peg and goes over the entire surface with a number of spokeshaves, trimming off the roughness. The block is then sandpapered by

## Gas Engines.

In Germany the first application of gas motors to raising water was made at Duren, near Aachen, in 1884: and in the same year a steam engine was replaced by a gas motor for the same purpose at Quedlinburg. In 1886 Rattwill and Coblenz, in 1887 Furth nd Peine, and in 1888 Karlsruhe and Munster follow ed suit; and these installations are still working with excellent results. Accord

a five part block ing to a recent report of the Quedlinburg Gas and Water Company, the saving in the cost of pumping with gas engines, a compared with steam, taking the las year in which steam was used and the second with gas, was 42 per cent. While the gas motor occupies less space than the steam engine with its boiler and chimney, it has the advantage as regards attendance, for one man can look after several gas engines, while a steam engine plant of any importance requires an en gineman and stoker, and often an addi tional hand to keep up the coal supply. Another advantage of the gas motor is the fact that it can at any time be put to work immediately, so that considerable water pressure may be made available in a few min

din, which is very important in case of ine, while the dimensions of reservoirs may be reduced if the motor be kept constantly running.

By Rall from New York to san
The exact distance and time between New York and San Francisco are not very easy to remember, es pecially for persons like railroad men, who haven't the time, and editors, who haven't the money, to makc the trip very of ten; and it is. therefore, worth noting that since the establishment of the last fast train by
being ovaled. The block and pattern are both securely ironed to a revolving shaft which is connected to a movable frame attached to the machine. The back and forward movement of the frame is caused by the revolving oval-shaped pattern bearing against a re volving wheel. The block to be ovaled, which travels at the same rate of speed as the pattern, comes in contact with another wheel, connected to which are four hook-shaped knives about $11 / 4$ inches in width. The knives are bolted to the wheel at an equal distance apart and travel at the rate of about 4,000 revolutions per minute. The knives make an upward cut, moving
tendant pushes the frame. The knives which come in contact with the bottom of the block cut out the proper curve as the frame passes over the runners. The knives travel at the rate of about 4,000 revolutions per minute, the curving operation taking about onehalf minute. In cutting out hand holes the block is fastened in a lathe, the operator, by means of gouges, scoring out the heles as the block revolves. The hole is scored about from 4 to 6 inches in diameter, according to the size of the block, and about 2 inches in depth, a solid portion for the hand to grasp being left
the Union Pacific the time is almost exactly 100 hours. This is the apparent time. By Eastern time the train arrives at San Francisco at 11:45 P. M., making the actual time consumed on the road $1031 / 4$ hours, the apparent time being 100 hours 15 minutes. The distance s 3,332 miles (New York Central, New York to Buffalo, 440: Michigan Central, Buffalo to Chicago, 535; Chicago \& Northwestern, Chicago to Council Bluffs, 490 ; Union Pacific, Council Bluffs to Ogden, 1,034; Southern Pacific, Ogden to San Francisco, 833). The connecting train east of Chicago is the North Shore Limited, leaving New York at 4:30 P. M., and arriving

and cutting along the block until finished, the operation taking about three minutes. The pattern and tion taking about three minutes. The pattern and
block travel at the rate of about 200 revolutions per block travel at the rate of about 200 revolutions per
minute.
After the ovaling operation has been performed, an inch hole is bored into the center of the block, abont two inches in depth, so that a peg can be placed in

The blocks, when finished, are given a coating of raw linseed oil and paraffine. The finished blocks range in height from about 4 to 10 inches, their diameters being. from $43 / 4 \times 53 / 8$ inches to about $63 / 8 \times 71 / 2$ inches. About 60 blocks daily can be turned out with the labor of about 5 men. The sketches were taken from
in Chicago at 4:30 P. M. the next day. The rate of seed, through, is $33 \cdot 27$ miles an hour, which includes the $11 / 2$ hours' delay in Chicago. The rate of speed from Chicago is $30 \%$ miles an hour.-Railroad Gazette.

MILK is now successfully sterilized by subjecting it tr, an alternating electric current.

## THE BLACKSMITH AND HIS FORGE.

There is now on exhibition in this city a remarkable painting, "The Blacksmith" (Le Forgeron), by the late Hubert E. Delorme, who died in Paris in 1894. Mr. Delorme was born at Givors, in the Rhone district, France, in 1842 . From early life he had the artistic impulse. He went to Paris while still a young man, and through his innate industry and skill soon made himself a place in the world of art. He exhibited at both salons. His works are remarkably realistic. "The Blacksmith," the painting which we reproduce in half tone, is the most notable of his works. It embodies two features, involving very delicate handling and a fine appreciation of the different qualities of light. The sturdy smith stands gazing at the iron in the fire, which is nearing the proper heat. The ruddy glow of the forced fire is seen and the radiated heat is felt by the spectator as it is realized that both the beat and the light are received in full force on the face, neck, and arms of the blacksmith, who patiently waits, tongs in hand, for the iron to heat. The sparks and the color of the fire show that the fuel used is charcoal. Smoke circles around the forge, and dust, cobwebs, cinders, scraps, and tools are in their natural places.
laces
An open door and a dusty window on the left let in bursts of sunlight, while another window-not seen-
graph taken with an ordinary plate, and without a yellow screen, shows the fire dark, and the firelight is shown as a shadow rather than illumination; but with orthochromatic plates and the yellow light sifting screen everything was perfectly rendered excepting a slightly exaggerated illumination on the sunlit por tions and the surfaces illuminated by diffused daylight alone. This slight defect was corrected by flowing on the back of the negative a thin coat of orange lacquer and, after it became dry, removing with alcohol portions opposite the places lit by daylight, thus screening the main part of the negative while the sunlit portions were allowed an increased exposure.
Much difficulty was experienced in securing an angle of illumination which would prevent the reflection of light from the ridges of the brush marks. This was especially true in the case of artificial illumination, in which also uniformity of illumination proved a problem. To avoid the first difficulty, the light was allowed to strike the canvas at a low angle, so as to cause the stray light to be reflected away from the field of the lens, so as not to affect the plate. Uniformity of illumination was secured by burning the magnesium torch on either side of the camera as near the canvas as po
view.
The best results, however, were secured by daylight.
ulllegal tender silver at $\$ 3,439,300,000$, stock of limited tender silver at $\$ 631,200,000$, making a total silver stock in the world of $\$ 4,070,500,000$; the uncovered notes are placed at $\$ 2,469,500,000$

## An Important Patent Decision.

By a decision filed Dec. 2 , in the United States Cir cuit Court of Appeals, third circuit, a previous decision of the New Jersey Circuit Court was reversed, and patents 291,784 and 291,785 of Augustus Schultz, of Brooklyn, N. Y., were sustained. These patents are for a method of tannage of light leathers, styled the chrome tannage, which has become of great importance in the leather trade within the past five years In glazed kid for ladies' shoes, which formerly constituted a considerable item in our imports, the home production of chrome tannage almost entirely supersedes goods made in the old way, the imports now being very small, and our kid finishers having already ob tained considerable export trade. In the production of colored calf and morocco leather this process has also met with success, the chrome tanned leathers be ing of greater toughness and affording better resistance to moisture, and thus having increased wearing capacity. Nearly one thousand printed pages of testimony
were taken on both sides of the case, and it was argued


THE BLACKSMITH AND HIS FORGE.
admits diffused daylight. Here, then, are three kinds of light flooding the shop and illuminating the figure, but still the light is all in perfect harmony. The different lights do not nullify each other, as one might suppose they would, but rather enhance the effect so as to bring out the figure of the blacksmith with wonderful relief against the remote depths of the shop. The flesh and muscles of the man have a texture belonging to a blacksmith. It requires no effort to feel that there is life in the picture. None of the details are slighted; the anril and the hanmer have an appearance which comes from continual use. The scale and cinders upon and around the anvil block show that the day's work is already partly done, and yet nothing in the picture has the appearance of having been overwrought.

Our engraving is a very successful reproduction in half tone of a most difficult subject, and is as faithful as anything in black and white can be. Orthochro matic plates were used and a yellow screen was interposed in the light beam between the lens and plate. The lens employed was a fine Zeis anastigmat, and impressions were made both by daylight and artificial light.

The difficulties in the way of securing correct color values will be appreciated when it is known that the light of the forge fire is orange, with a tendency to red, while the daylight illumination has the true bluish cast characteristic of strong actinic light. A photo

An exposure of thirty minutes was required to bring out all the detail. This necessitated the use of a restrainer in developing.

## Gold and siver

The Director of the Min has submitted his report to the Secretary of the Treasury, covering the opera tions of the mints and assay offices of the United tates during the last fiscal year
The value of gold and.silver estimated to have been used in the industrial arts during the calendar year 1894 was approximately $\$ 21,541,652$, of which $\$ 10,658,604$ as gold and $\$ 10,883048$ was silver
The estimated metallic stock in the United States on July 1, 1895, was: Gold, $\$ 636,229,825$; silver, $\$ 625$, 853,949, a total of $\$ 1,262,083,774$. The estimated product of gold and silver in the United States during the calendar year 1894 was: Gold, 1,910,813 fine ounces, of the value of $\$ 39,500,000$; silver, $49,500.000$ fine ounces of the commercial value of $\$ 31,422,000$ and of the coining value of $\$ 64,000,000$
The estimated production of the world for the cal endar year was: Gold, 8,737,888 fine ounces, of the value of $\$ 180.626 .100$; silver. 167.732 .565 fine ounces, of the coining value of $\$ 216,892,200$, of the commercial value of $\$ 106,522,900$.
Mr. Preston gives an estimate of the approximate tock of money in the principal countries of the world. He places the gold stock at $\$ 4,086,800,000$; the stock of
before the Circuit Court at Trenton, N. J., in the pring of 1894. The principal defense raised in the suit was the alleged insufficiency of Mr. Schultz's specifications, and certain prior patents and publications, which were said to descrike the same invention. Afte holding the case under consideration for nearly a year, Judge Green handed down a decision in favor of the defendant, holding that the Schultz patents were an ticipated, and therefore invalid. An appeal to the Circuit Court of Appeals was at once taken, and the appeal was argued before Judges Acheson, Dallas, and Butler, in Philadelphia, last September. The points dis cussed in the appeal were similar to those in the Circuit Court. On the 2d inst..the Circuit Court of Appeal handed down its decision, which was written by Judge Dallas for the court, reversing Judge Green's decision and deciding in favor of the patents, both as to the alleged insufficiency of specifications and as to antici pation by prior published processes. The claim that the decision is unappealable and irreversible is based on the statute which invests in the Circuit Court of Appeals the final jurisdiction in patent cases
Thousands of dollars have, according to the Shoe and Leather Reporter, been spent in this litigation. Expert testimony has been given by such conspicuous cientists as Dr. C. F. Chandler, of Columbia College New York ; Prof. Samuel P. Sadtler, of the University of Pennsylvania; Arthur D. Little, chemist, Boston Dr. Henry Morton, of Stevens Institute, Hoboken.

Bleaching Cotton Piece Goods.
Cotton piece goods are bleached in different ways, according to the use to which they are to be put. The operation is generally performed in such a way that the singed and washed piece is first passed through a lime bath of 5 lb . of lime to 100 lb . of goods. The material is next washed, acidulated with hydrochloric acid, $3 / 4$ to $11 /{ }^{\circ}$ B., then boiled -4 lb . soda, 2 lb . resin, and 1 lb . caustic soda being used per 100 lb . of goods; and 1 lb . caustic soda being used per 100 lb . of goods;
washed again, and treated in a chloride of lime l,ath of $11 / 2$ to 2 lb . chloride of lime per 100 lb . of material; acidulated with hydrochloric acid, $11 / 2^{\circ} \mathrm{B}$.; again washed, and then dried. Attempts have often been made to combine the processes of chloring and acidulating, but without satisfactory results, the pieces so bleached having a yellow tinge after washing. In wany bleaching establishments the liming process and the boiling are united, the cotton pieces being boiled in a lime and soda solution.
In large cloth printing houses the cotton pieces are singed first. then washed, limed, acidulated, washed again, and afterward boiled out twice with soda, caustic soda, and resin. The quantity of ingredients to be used for the boiling operation depends on whether the cloth is to be treated in the open or closed vat, under pressure, and, if the latter, the quantity of caustic soda is decreased. After boiling from 6 to 12 hours, the pieces are washed in the washing machine, then entered into the chloride of lime bath, next taken out and entered direct into the acid bath, in which they remain for a short time, after which they are washed again and dried. All these operations are performed by the continuous process-that is to say, the pieces are stitched together at the ends and are passed in rope form through the different baths in succession. To remove any remaining chlorine, the washed pieces are passed through a cold solution of bisulphite of soda, must be taken to pass the washed cloth through a vessel containing diluted spirits of hartshorn, in order vessel containing diluted spirits of hartshorn, in order
to remove every trace of free acid. To bleach 100 to remove every trace of free acid. To bleach 100
lb. cotton cloth, a lye consisting of 10 lb . lime and 10 lb . calcined soda is prepared, allowed to settle, and the clear fluid is poured into the boiling-out vat. The cloth is then entered into the suitably diluted lye, and boiled from 6 to 8 hours, after which the liquor is allowed to run off, and the cloth is cooled with cold water. Next, the goods are thoroughly acidulated with hydrochloric acid, 16 to $1^{\circ}$ B., and washed in the
washing machine. For 100 lb . cloth, the chlorin liquid is prepared from $1 \frac{1}{2}$ to 2 lb . chloride of lim ubbed in water, in a perforated drum, into a fine milk, then strained, and the cleared liquid is used for bleaching. The chloride of lime bath is started with fro?a 6 to 8 hours, after which it is taken out and acid ulated in a cold bath with hvdrochloric acid of $1^{\circ} \mathbf{B}$ 1 washed and dried.
The addition of a little petroleum naphtha to the boiling-out bath has been recommended, in order to insrease the cleansing effect, which process has proved quite efficient; in this case, however, the boiling water must not contain lime, but only caustic soda, resin, and soda. If this mode of cleansing is adopted, the cotton cloth is first treated in the lime bath, then acidulated and washed, and afterward entered into the boiling-out bath.
It is necessary in bleaching cotton cloth to distinguish between the so-called market bleach and the printing bleach. The first does not require the addition of resin soap, although when it is used the white obtained is always clearer and brighter, but the second bleach does. It is well known that print cloth bleached without resin soap or not sufficiently boiled out prints badly and that a clear white on it is impossible, but the co-operation of the dissolving resin is indispensable for the print bleach, because, besides the natural impurities of the cotton that remain in the cloth, there are those resulting from the weaving, etc., which are emoved by the resin soap
Experiments for bleaching cotton cloth with per xide of hydrogen have been quite successful, but it has been found that this method is too expensive. It has, therefore, not been generally employed, except for very fine cotton cloths, the price of which can include a suitable charge for bleaching.
The electrolytical bleaching methods have lately been regarded more favorably; the Hermite mode, the oldest, has had to stand many attacks, and it is still doubted whether it can be used on a large scale. The more recent methods by electrolysis are all based upon decomposing a solution by electrolysis and bleaching the cloth with it, but it is not yet known what would be the result in actual practice, as such a plant requires the outlay of much capital. The latest bleach method-Siemens-i. e., by the use of ozone, is still too much a matter of experiment only to be able to express an opinion here, the views regarding its practicability differing most widely. It is stated, how
ever, that by the use of the Siemens apparatus, it is possible to generate 20 grammes ozone per horse power per hour. This is a very small quantity, but when one considers what an immense effect can be produced by it, one is almost forced to conclude that, in the will beture, the bleaching of cotton cloth with ozone ber Zeitung.


#### Abstract

The Maximum Depth of the ocean. A sounding has recently been taken in the Pacific Ocean, near the coast of Japan, which showed a depth of 29,400 feet, or approximately $5 \frac{1}{2}$ miles. This is a little more than the height of the loftiest mountain, Mount Everest, which is situated in the Himalaya range, to the north of India. How much deeper the Pacific is than this it is impossible to tell; the wire having broken, presumably through its inability to sustain its own weight. In a previous attempt to reach the floor of the ocean at this spot, the wire broke at a depth of 25,800 feet. It has been suggested, as one theory of the formation of mountain ranges, that they represent the crumpling up, or buckling, of the earth's crust under the severe contraction strains that were set up as the surface of the globe solidified. If this be true, the deep ocean valleys or gorges, such as this off the coast of Japan, must be the result of the same action. Taken in connection with the loftiest mountain, this sounding gives a difference in distance from the earth's center of about twelve miles,


 or $\frac{1}{888}$ of the earth's radius.The Thermophone.
This is an electrical apparatus in which sounds are produced by the changes in the circuit due to variations of temperature. Its use is to measure temperature, particularly the temperature in a distant or inaccessible place ; at the bottom of a pond, for instance. For obtaining deep sea temperatures it is useful, and it may also prove of great service in the ventilation of buildings, for by this instrument the temperature of any room in a building can be registered on a dial placed in the hall. The scientitic uses of the thermophone are obvious, and it will be of great aid to physicists in determining the fluctuations in the temperature of the soil and the difference in temperature between the water at the surface and that at the bottom of ponds or lakes.

RECENTLY PATENTED INVENTIONS. Engineering.
Furnace.-Milton T. J. Ochs, Allentown, Pa . This is a furnace especially designed to utilize
as fuel tan bark, mill refuse. and similar material. A seas fuet of transverse arches is arranged in step-like order above the grate, their adjacent edges overlapping and spaced apart to form latetal openings for the products of combustion to pass between loe arches, there into the ashpit below the grate while their upper ends opeu into the fire box below the arches.

Railuay appliances.
Car Coupling.-Robert T. Dressler, Buchanan, Mich., and Velimir Timitch, Hastings, Neb. According to this improvement the coapler has its drawhead pivotally connected with the draw bar for a is pivotally connected to the car frame and held in engagement with adjusting and locking devices whereby the bar may be adjusted vertically. The coupling is authe uncoupling being effected from the top or sides of the car, and the coupling members being positively held from jumping up when they engage.
Fare Box.-Le Roy C. Godwin, Portsmouth, Va. This is a box adapted to be supported from the body of the conductor by a shoulder strap for the reception of fares, the coin after baving been placed in the box being still visible. There is also a purse or storage chamber for the final reception of the coin, provided with a suitable locking device. The throat or inlet of the box is so made that a coin may
not afterward be fished out.

## Miscellaneous.

Bicycle Driving Gear.-Dan Gregory Bolton, Cooperstown, N. Y. This is a changeable gear, light, strong and simple, for driving a wheel with more power and slower speed up a hill or on rough road,
or at a greater speed on a level. The change from one gearngng to the other is readily made by means of a hand lever, without inconvenience to the rider, and the construction is designed to combine the maximum of trength with the minimum of weight.
Bicycle Bell-1. N. Hopkins, Lockport. N. Y. This improvement combines a bicycle han-
dle and alarm bell, which can be readily placed on the handle bar instead of one of the ordinary handles, and be operated by the thumb of one hand. The handle is tubular, and at its outer end is a metallic ring integral with
a yoke which snpports the bell, whose rim is near but a yoke which sapports the bell, whose rim is near but
not in contact with the end of the handle, the external form of the bell conforming to the curvature of the handle, and forming a properly rounding finish for the handle end.
Wall Tellurian. - Grant B. Nichols, Wapakoneta, Ohio. This is an apparatus adapted to be
folded against a schoolroom wall, to take up but little
space, and comprising an inclined table with apertures
arranged in an ellipse to represent the path of the earth, a second series of apertures representing the path of the poon with respect to the earth, a rod in a central carrying rods represent the earth and moon, these rods to be at any time inserted on the proper date in their repective apertares, to show the relative positions of the sun, earth, and moon. The invention also comprises other valu
teachers.
Index Cutter.-Frederick C. Mehnert, Goshen, Ind. For cutting the index sheets or to be easily operated by an inexperienced person, doing the work with great precision and rapidity. The book
whose leaves are to be cut is placed on an adjustable platform, when the leaves are laid on a die and beneath a presser foot, and, by stepping on a treadle. a cutter be automatically fed to cut the leaves. The platform may be automatically fed
in position to be cut.
Copying Book.-Edwin Fowler, Kan. sas City, Mo. This is a letter press book laving a serie of sheets forming surfaces receptive of copying ink for letters in copying ink, which numbers are transferred to etters copied. By this means copied letters may be conveniently designated and found in the copying book.
Hydrocarbon Burner. - Jacob W. Rees, Cleveland, Ohio. This burner is adapted to burn ither oil or gas, producing the gas from oil, and is proin the fire box of an ordined drıp pan adapted to be set supported on standards above the drip pan to bring the flame to the proper position. Oil burned on the drip pan generates gas in a generator supported above the pan when th
burner.
Typewriter Attachment - William 5. Bigelow, Boston, Mass. This invention provides a simple device by which the key when depressed will be
held down, as when upper case or figure printing is be done, the key being released by a natural and easy movement of the hand and finger, when such printing is finished, to throw the machine into normal position. An independent spring catch is adapted to engage and pro-
ject above the key to hold it depressed, the key being reject above the key to hold it depressed, the key being released by a wiping or drawing movement of the opera-
tor's finger.
Photographic Shutter Releaser. - Arthur M. Boos, Boston, Mass. To automatically release the shutter, in time or instantaneous work, en-
abling the photographer to be away from the camera while the exposore is made, this inventor has provided a device for pressing the shutter-releasing button, the device being normally held out of contact by a fuse
string, the time of burning of which regulates the durastring, the time of burning of which regulates the duration of the exposure.
$\begin{aligned} \text { MUSICAL } & \text { Instrument. - Lewis } \mathbf{E} \text {. } \\ \text { Pyle, Elam, Pa. } & \text { This invention relates to mandolins }\end{aligned}$
guitars, etc., and provides an instrument designed to be
rich in melodious tones, while it is arranged to prevent rich in melodious tones, while it is arranged to prevent body to facilitate executing the music. The body of the instrument is approximately heart-shaped, and the tailpiece is located in the recess at the base of the instrument, being thus protected from contact with any suron which the instrument may be placed.
Fish Pond. - Charles Braaf, New York City. This is primarily an apparatus to afford amuse-
ment, comprising a pond or aquarium inwhich artificial fish may be placed and kept constantly moving to represent life, the water being also in motion. The construcion is such that a single attendant may wait on visitones
and a stand is also provided for the display of prizes, each fish being numbered and the prizes being for cuccessful fishers.
Bedstead. - Andrew Stratton, Augusta, Wis. This is an improvement in bedsteads
which have legs that fold and provided with casters for easy movement. A supplemental frame is arranged to telescope on the bed frame, and prop legs pivoted on one
frame have their ends arranged to engage the othe frame have their ends arranged to engage the other
frame, there being means to hold the prop legs in adframe, there being means to hold the prop legs in ad-
justed position. The bedstead, when not in use, may justed position. The bedstead, when n
be made to take up but little floor space.
Bath Tub.-Elizabeth G. Smith, New York City. This invention provides a tut which may be readily moved from place to place and conveniently set
up, the tub having a collapible frame, the bottom and up, the tub having a collapsible frame, the bottom and
auxiliary sides of which are formed of a sheet of waterproof material, the sheet having stiffened edges adapted to pouring water therefrom, while removable fastening devices hold the sh
edges of the frame.
Stove.-Mark W. Foster, Pecatonica, Ili. In heating stoves which have a horizontal damper or diaphragm dividing its interior into two compartments, this invention provides an improved construction, there being a slidable horizontal damper in the combustion chamber with a central opening directly beneath the pot hole, there being an independently slidable plate for
closing the opening. Special means are also provided for suspending and rocking the grate.
Vehicle Running Gear. - James Duncan, Adelaide, South Australia. This invention provides for the employment of a special spring bed ex of which are lugs or joints which are fitted to and re ceive the shaft ends or pole bracket ends. the joints being above the springs. The improved construction, which is applicable to buggies and other four-wheeled
road vehicles. is designed to obviate a great deal of fricroad vehicles. is design
tion, wear and rattle.

Vehicle Curtain. - Frank Lane Newark, Ohio. For buggies, phaetons and similar top carriages, this invention provides a curtain arranged to
be easily and quickly operated to open or close the sides of easily and quickly operated to open or close the sides
of the vehicle, the improvement comprising a tubular casing or socket in which $\_$s journaled a spring-pressed roller carrying the curtain.

Thill Coupling.-Frank W. Warner, Angelica, N. Y. This coupling has a clip plate with
transerse the thill iron, screw bolts across the end of the socket bearing on the ends of the shank. The clip plate is formed of a single piece of sheet metal having one end wider than the other, the opposite sides of the wider end having opposite wings oppositely perforated.
Truss. - Joseph Fandrey, Santa Barbara, Cal. This is a device for the support and reduc-
tion of hernia, and designed to be specially adapted for the cure of abdominal ruptures, while being easy to wear and not liable to shift from its position.

## Designs.

Pump Casing.--Aquila B. Marshall, New York City. This design shows a casing especially designed for a bicycle air pump, and having a cylindrical

Badge.-Charles A. Barker, New York City, and Frederick L. Green, Long Island City, N. Y. This design simulates an elephant in profile and in front ,
Christmas Tree Ornament. -Victor A. De Prosse, San Francisco, Cal. This design af-
fords a decoration made to represent a conventional fords a decor
tlower or lily. Nots.-Copies of any of the above patents will be
furniehed by Munn \& Co., for 25 cents each. Please send name of the patentee, title of invention, and date
of this paper. of this paper.

## NEW BOOKS AND PUBLICATIONS

Photography: its Material and $\Lambda$ P. Pliances. With some remarks for the use of non-proficients on their
choice and application. London : choice and application. London: John Birch \& Company, Limited.
1895. Quarto. Pp. 140. Profusely

This work is issued for circulation in foreign countries and especially in the British colonies, and is issued by the well known irm of merchants and engineers, who do a
large commission and manufacturing business. The first part of this work is devoted to descriptions of photographic apparatus and directions and formulas for working various processes. The second part is devoted to a priced catalogue of photographic apparatus. It is rather
extraordinary to make buyers pay for a trade catalogne; extraordinary to make buyers pay for a trade catalogae;
it is, however, an English custom. The reading matter it is, however. an English custom. The reading matter
in the front occupies only 128 pages and is hardly in the front occupies only 128 pages and is hardly
the price charged-seven shillings and sixpence.
American Steam and Hot Water
Heating Practice. New York: Thating Practice. New York 317. Large 8vo. Profusely illustrated. 317. Large 8vo. Prof
No index. Price $\$ 4$.

This is a selected reprint of important articles which
high standing. The present work, which is sure of a
large sale, is intended to supplement "Steam Heating large sale, is intended to supplement "Steam Heating
Problems," which was published in 1888. The new volume includes a description of some of the best expositions of heating and ventilating design as applied to modern structures of the most extensive kind, as well a description of various problems arising in this depart ment of building engineering. The book is profusel illustrated with large scale plans and details of some o the best known installations in the United States, and
includes work done in the ordinary residence up to the includes work done in the ordinary residence up to the buildings and churches. The work can be especiall commended for the excellence of these plans, which seem to leave nothing to be desired. It is to be regretted, how er, that an index was not provided, for even the ver ath of contents does not take the place of an indes provided.

Physiology. By A. Macalister, LL.D. ing Christian K nowledye. 1895. Pp 123. 18mo. 59 illustrations. Price 40 his bok
This book belongs to the "Manuals of Elementary in a simple and concise form some of the elementars principles of the physiology of man. As the space a disposal is small, the author has selected suchiportions of
the subject as are calculated to be of use to the genera ion of the nature of the parsts of the body and their seyeral functions.

How to Study Strangers by Tem PERAMENT, FACE AND HEAd. By Nells Company. 1895. Pp. 380. 8vo 300 inustiation
The author of this work has for more than half a cen tury been engaged in the study of human character, an auced a book the object of which is to teach one how $t$ read the character of the stranger or the friend. It is eminently practical in its teachings, simple and pointed in its language. The three leading features of the book are : I. The. Analysis and Illustration of the Huma emperaments. II. Child Culture III. Character St

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N. H.
1894. Pp. 77, 8vo.

## SCIENTIFLC AMERICAN

BUILDING EDITION
DECEMBER, 1895 .-(No. 122.)
TABLE OF CONTENTS.

1. Elegant plate in colors showing a residence in the at a cost complete of $\$ 11000$. Ther 0, , tive elevations and floor plans, also an interior view. An excellent design well treated. S. W. Whittemore, architect, East Orange, N. J.
2. A Colonial house at Madison, N. J. Perspective ele ation and floor plans. Cost complete $\$ 5,500$ Archit
City.
Coloni
A Colonial dwelling at Montclair, N. J. Two per pective elevations and floor plans. Architect, sign.
3. Two perspective elevations and floor plans of a house recently erected at Brick Church, N. J., at a cost
of $\$ 2, \tilde{i} 00$ complete. A pleasing design. Architect, of $\$ 2, \tilde{0} 00$ complete. A pleasing design. Architect, Mr. F. R. Hassman, Orange, N. J.
4. View of the new City Hall, Philadelphia, which has been erected at a cost of over $\$ 20,000,000$. The half acres. Is absolutely fireproof. The height of this building is 547 feet $31 / 3$ inches, being, with two exceptions, the highest building on the earth. The exceptions being the Washington Monument and the Eiffel Tower. The next highest building on
earth is the cologne Cathedral, which is 510 feet.
5. View of the facade of the magnificent new Boston Public Library, Boston. Architects, Messrs. McKim, Mead \& White. New York City
6. Residence at Bensonhurst-by-the-Sea, L.I. Two per spective elevations and floor plans. Cost complete,
$\$ 8,500$. Architect, S. S. Covert, New York City.
7. Perspective elevations and floor plans of a cottage at Oakwood, S. I., recently erected at a cost of $\$ 2,800$
complete. An atractive 9. Miscellaneous Contents: Testing drains.-A combination bathtub and washstand, illustrated.-The permanence of modern dwellings and public works.-An improved steam and hot water heater, illustrated.-Moving a large factory. -How to fix paper on drawing boards.-A quick fixtures, illustrated. - A single track hanger, illustrated.-An improved furnace door illustrated.-Cements in mason work.-An improved furnace, illustrated.-A regenerative gas heater, illustrated.-Improved woodworking machinery, illustrated.
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## PBusiness and Personal.

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of Mincrals sent for examination should be distinctly
marked or labeled.
(6671) W. B. McP. asks: 1. Is there ny foundation for the theory of getting better health by leeping with the head to the north? If so, why? A It is doubtful if any particular benefit is derived from sleeping with the head to the north. Yet it has been as.
serted by nervous peorle that a difference was noticeable in their temper and composure with changes of leeping position in regard to the magnetic polarity of the earth. 2. Where can I get the glass tubes, retort and other implements necessary for a few simple experiments in chemistry? Is there any firm that manufac tures them that issues a catalogue? A. Address Eimer Amend, Third Avenue and Eighteenth Street, Ne (6672) W. F. C. writes: When steam boilers are full of water, is it possible to raise the temthe water jackets surrounding gas engine cylinders might be filled in a similar way and the necessity of maintaining a continuous circulation of cold water avoided. A There is danger in heating a closed boiler full of water The expansion of the water would rupture the boler if there were no safety valve. It is a common practice to
use an iron open tank filled with water and connected with the water jacket of a gas or gasoline engine in such cylinder jacket takes place, the large surface of the iron tank being sufficient for keeping the water cool.
(6673) J. W. says: I want to know weating and way to keep the windows in a store from off plate glass windows, keep the inside air dry, or inner sash tight, so that the air in window inclosure will be cold, and ventilated from the outside. A partal remedy is to have ventilating openings in the top of the window
casing. A thin coat of pure glycerine applied to both sides of the glass will prevent any moisture forming it cannot be seen through. Surveyors can use it to advantage on their instruments in foggy weather. In fact, it can be used anywhere to prevent moisture from forming on anything, and locomotive engineers will find it particularly useful in preventing the accumulation of weather.
(6674) N. B. W. asks : 1. What is the best proportion of air and gasoline vapor for a gasoline engine? A. 25 to 40 volumes, according to the composiplode? Tlode? A. Ata full red heat, say $2000^{\circ} \mathrm{Fah}$. 3. Describe 692, 944, 1025.
(6675) H. A. W. asks how to make French mustard. A. The following is M. Lenormand reciery
celery and tarragon, of each $1 / 2 \mathrm{oz}$; gariic, 1 clove (or head); 12 salt anchovies (all well chopped); grind well together, add salt, 1 oz.; grape juice or sugar to sweeten, and sufficient water to form the mass into a thin paste by trituration in a mortar. When put into pots a red hot iron momentarily thrust into the contents of each, and a (6676) H. J. 'T. asks how to make gelane capsules. A. Dissolve in a water bath 10 parts of pelatine, 2/2 parts of sugar, $1 / 4$ parts of gum arabic in 10 are pear-shaped and slightly oiled, dip in this solution when it is lukewarm. When the gelatine films are congealed, detach them, and place in holes of the same size in
wooden forms, to dry. The capsules are filled with the wooden forms, to dry. The capsules are filled with the
desired medicine and closed with a drop of the same so-

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## NDEX OF INVENTIONS

For which Letters Patent of th
United States were Granted
December 3, 1895,

## and EACH BEARING THAT DATE

|  | Adding machine, G. H. Rogers. <br> Adbesive from sulpbite liquors, obtaining, c.............. <br>  <br> Advertising match, C. F. Burger..................... Agricultural imple ment fender, Grifith \& Riggs. <br> Alarm. See Low pressure alarm. Alarm attachment, electric time, M. Wolff. <br> Armature, H. G. Reist <br> Armor plates, cementation of, H. Schneider Awning and frame, combined, G. M. Seick.. <br> Awle lubricator, J.' D. Lyon.. Aaling press, P. K. Dederick <br> Bed, folding, F: W. Ratzel <br> Bench. See W ash bench. <br> Bending machine, hydraulic, W. L. Shepard. <br> Bevel gage, C. Byrne. Bicycle, J. E. Lowe.. <br>  <br> Bicycle crankers, machine for forming, P. Forg. <br> Bicycle saddle, $F$. Douglas. Bicycle top Inetrich \& Don <br> Billiard table cushion, B. H. Fogg. <br> Bin, E. J. Walker. <br> Binder, temporary, A.I...Weis. <br> Block. See Paper bulding block. <br> Boiler. See Water tubeboiler. <br> Boiling pan, beater, cooler, etc.i. C. Postranecky Book boarding ap paratus, J. Ring........................ |
| :---: | :---: |
|  | Adjustable washer. F. Hewitt <br>  <br> il arm. See Low pres sure alarm. M. W olff. <br> Armature, H. G. Reist <br> Armor plates cementation of, H. Schneider <br> Axle lubricator, J. D. Lyon. <br> Bed, folding, $\mathbf{F}$. $\mathbf{W}$. Ratzel <br> Bedstead iron. E. F. Tilley Bench. See $\mathbf{W}$ ash bench. <br> Bending machine, hydraulic, W. L. Shepard. <br> Bicycle, J. E. Lowe <br> Bicycle bell-actuating brake, w. A. Hay. <br> Bicycle crank banger, Burnbam \& Alsup........ Bicy cle hangers, machine for forming, $P$. Forg. Bicyce saddle, F. Jouglas. <br> Bicycle top, Dietrich \& Donovan. Billiard table cushion, B. H. Fogg <br> Bin, E. J. Walker.................... <br> Binder, temporary A. I.. Weis. <br> Bird starter. J. J. King in io....... <br> Boiler. See Water tubeboiler. <br>  |
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Box, J. R. Cooke................................ 550
Braket. See Shade roilier bracket.
Brake. See Car brake. Fly wheel brake. Veblce

| Brake beam, F. ${ }^{\text {Brame }}$ Le Lam |
| :---: |
| ake for bicy cles, etc., W. L. Stew |
| Brake wheels, device for cooling, W. H. . |
| Brick drying kil |
| Brick press charger, B. C. White |
| Brushes, manufacturing. J. F. Mu |
| Buggy top attachment, W. W. Kru |
| Bung. vent |
| Button forming macbine, G. Ca |
| Cable roadw |
| Calorimeter, steam. G. Hini |
| Can cover, |
| Car bolst |
| Car brake, E. E. La |
| Car coupling |
| car coupling. J. D. McDonal |
| Car couplin |
| Car |
| Car fender, $A$ |
| Car fender, street, |
| Car lighting apparat |
| Car, railway |
| Car. railway sleeping, J. M. Burton |
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