[Entered at the Post Office of New York. N. Y., as Second Class Matter.]

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

Vol. XLVII.—No. 23. [NEW SERIES.]

NEW YORK, DECEMBER 2, 1882.

\$3.20 per Aunum. [POSTAGE PREPAID.]

Explosives from Coal Tar.

That coal tar is susceptible of becoming a very deadly explosive in combination with certain acids was proved two years ago by Herr Hellhof, of Berlin, who at this time patented a process for making fulminating compounds from crude coal tar oils by direct nitration with strong nitric acid. Continued experiments in manufacture by the aid of steam have shown that the separate fractions of these oils, even those having the highest boiling point, are capable of nitration, and give a satisfactory yield of nitro-derivatives. So marked is this property, that the treatment of coal tar itself with strong nitric acid is a very dangerous operation, and could not be carried on largely without great difficulty and loss. In later experiments, therefore, a weaker acid is employed to cover the surface of the tar to be treated, the two being gradually stirred together. The pasty mass thus obtained is washed with excess of water, and the acid remaining in its pores is presed out. The purified product is then mixed with certain oxygen yielding compounds, such as chlorate of potash, the alkaline nitrates, etc. All of these mixtures give new explosive compounds of different degrees of violence. The power of a concentrated nitric acid solution of one of these new nitroderivatives is shown by the fact that a small quantity, when exploded by a percussion fuse, was able to shatter an iron shell. The great advantages of the new process for obtaining explosives from coal tar, by the direct use of weak nitric acid, are the cheapness of the raw material and of the light acid employed, and also the quiet and regular manner in which the operation of reduction is performed. Explosive nitro-compounds may also be made from the paraffins and similar mineral and wood oils and spirits. The Deutsche Industrie Zeitung observes that this branch of production is the more important since the value of tar may be expected to rise with every fresh use that is found for it.

IMPROVED FLOATING ELEVATOR.

We give engravings of a novel arrangement of floating elevator for grain, coal, etc., constructed by James Rigg, of Chester, Eng., who has for some years past devoted considerable attention to the design and construction of appliances for the mechanical handling of coal. The objects attained by this apparatus are the more rapid and economical transfer of certain classes of materials from barges to steamers or to a quay side than has been hitherto possible by cranes or manual labor.

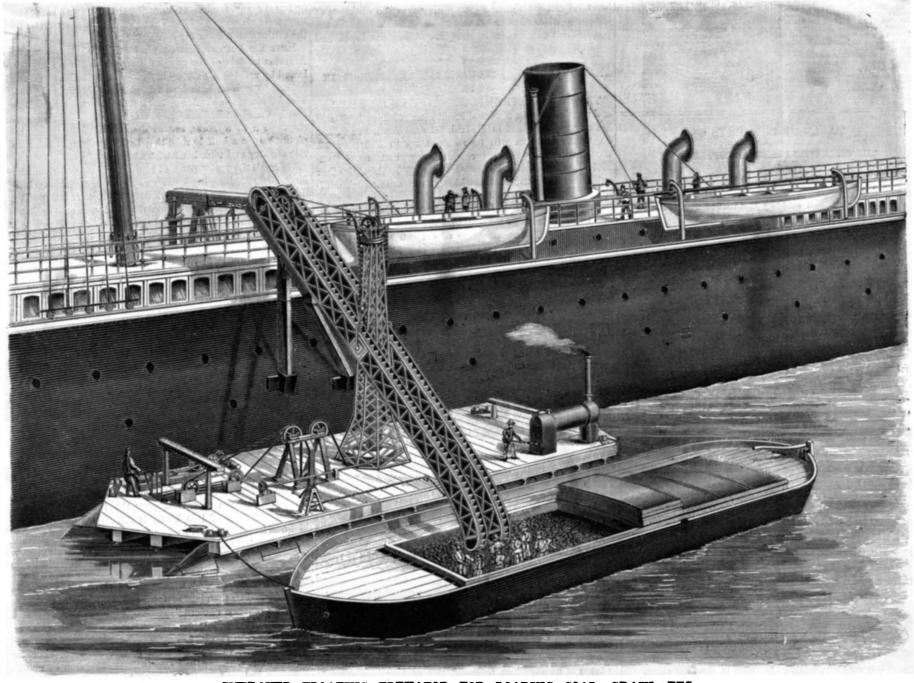
For sectional details of construction, see page 354

The perspective view represents the elevator as used in the coaling of steamers, but it is equally applicable to the other matter. The necessity for some improvement on the present most general method of coaling steamers by hand has long been acknowledged, the system, if it may be so termed, being to place gangs of men in the barges, and others above them upon suspended platforms against the ship's side in sufficient numbers to enable them, by passing | taut. the baskets containing the coal from one gang to the next, ultimately to reach the ship's bunker. The expense and inconvenience attending such operations are considerable, and, moreover, are not under such ready control as steam or other power.

It is essential that any apparatus intended for this purpose should be so arranged as to be easily removable from place to place, and to meet this requirement the elevator now under notice is capable of being stowed away fore and aft of the pontoons upon which it is carried, as shown in Figs. 2, 3, and 4, page 354, thus avoiding any risk due to instability. The perspective view illustrates it in operation athwart and coaling a large ocean mail steamer through side bunkers, and the various movements effecting this change are so arranged as to be performed by steam power.

The six pontoons are 6 ft. in diameter by 20 ft. long, independently of their conical ends, and on the saddles riveted upon these are placed rolled wrought-iron beams, carrying the deck. A semi-portable boiler, F, provides steam for the pair of winding engines, which are used for three purposes, viz. : First, for driving the endless steel wire rope which actuates the two chains of elevator buckets or scoops; secondly, for raising and lowering the elevator arms; and, thirdly, for revolving them, that they may be stowed away fore and aft as shown in Figs. 2, 3, and 4. The hollow lattice tower, A, carries at its head a circular roller path, upon which a casting, B, is capable of revolving through the quadrant traversed between the two positions, and below loading under similar circumstances of salt, grain, and this casting is attached a cast iron column in three parts, within which pass the driving and return lengths of an endless steel rope; this rope being driven by the V-pulley on the first motion shaft, passes over and under the six grooved oulleys, Figs. 2 and 3, and a balance weight passes through the deck between guides, always maintaining the rope

On the first motion shaft at the head of the elevator is a clip pulley driven by this rope, and a pinion upon this shaft is geared into a spur-wheel upon the drum shaft, thus giving motion to the double continuous chains of scoops (Fig. 9); and these scoops, which are of steel, are connected through malleable iron links to round steel spindles (Fig. 8), upon either end of which are small flanged pulleys traveling in double-angle steel guides forming part of the main suspended frames. The lower ends of these frames being concave, they will dip through the hatchways as deeply as the holds of the lighters or barges. Inasmuch as buckets cannot be so constructed as to pick up the coal, this is done by manual labor, and the buckets are formed as trays or scoops (Fig. 9), their capacity being about double that which can be (Continued on page 354.)



IMPROVED FLOATING ELEVATOR FOR LOADING COAL, GRAIN, ETC.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT

No. 261 BROADWAY, NEW YORK.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN. One copy, one year postage included.. One copy, six months postage included

Clubs .- One extra copy of The Scientific American will be supplied gratis for every cub of five subscribers at \$3.20 each: additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 261 Broadway, corner of Warren street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with Scientific American. Terms of subscription for Supplement. \$5 00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country

Combined Rates. - The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free on receipt of seven dollars. Both papers to one address or different addresses as desired.

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

Address MUNN & CO., 261 Broadway, corner of Warren street, New York

Scientific American Export Edition.

The SCHENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information: (2.) Commercial, trade, and manufacturing announcements of leading hou Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ** Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed an-

nouncements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN EXPORT Edition has a large guarantee lation in all commercial places throughout the world. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, DECEMBER 2, 1882.

Contents.

(Illustrated articles are marked with an asterisk.)

Explosion of an accumulator... 361 Fire escape, new*... 358 Floating elevator, improved*... 351 Fresh water from the sea ... 360 Hydrated oxide of cop. on sugars. 357

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 361,

For the Week ending December 2, 1882.

Price 10 cents. For sale by all newsdealers.

I. ENGINEERING AND MECHANICS.—Aerial Navigation.—Mr. W.
H. Lynch's views of the balloon as a means of travel.
Improved Life Boat.—3 figures
Iron-clads in Battle
German Railway Signals.—2 figures.—Siemens' apparatus for proflucing the electric current.—Arrangement of bell and signal II. TECHNOLOGY AND CHEMISTRY.—The Late Dr. D. Van Monckhoven.—His work in connection with photography Argand Lamps.

On Coal Tar.—Its components.—Coal tar products.—Development of coal tar dyes.—Antiseptics and disinfectants.—Color matter from gas Testing the Commercial Value of Carbolic Acid. By Dr. O. | Indulosa | Species of Huila | Indulosa | I ▼II. ARCHITECTURE, ETC.—Suggestions in Architecture.—1figure.

-A country residence 5751
The Plagioscope.—I figure. 5751

HENRY DRAPER.

Professor Henry Draper, M.D., LL.D., died, after a brief illness, at his residence in this city, November 20. Although Professor Draper's scientific labors have been many and of great value, he was yet comparatively young, and there was every reason to anticipate for him great and brilliant successes in riper life. He had inherited much of his illustrious father's ability and love for scientific investigation, and was able to carry on his chosen work under the most favorable of material conditions.

He was born in Virginia, in 1837, and was removed to this city three years later, when his father, Professor John W. Draper, accepted the chair of Chemistry in the University of the city of New York. He was graduated in the Medical Department of the University in 1858, and after spending some months in scientific observations and travel in Europe, he joined the medical staff of Bellevue Hospital. In 1860 he was elected to the chair of Physiology in the Academic Department of the University, which position he filled until last winter, when he succeeded his father in the chair of Chemistry.

While yet in school, he began to develop the possibilities of microphotography, and discovered the value of the proto chloride of palladium in darkening collodion negatives. On his return from Europe he constructed a 15½-inch reflecting telescope, devising important improvements in methods of grinding, polishing, and testing reflectors. With this telescope he carried on the pioneer work of lunar photography. He subsequently constructed the telescope of 28-inch aperture, which he put to such successful use in photographing the spectra of stars. His beautiful diffraction spectrum, obtained in 1872, remains unexcelled. His admirable work as superintendent of the photographic department of the commission created in 1874 to observe the transit of Venus, was rewarded by a special gold medal, struck in his honor by order of Congress.

Among the later achievements of Professor Draper in the department of spectro-photography, are those leading to the discovery of oxygen in the sun, in 1877, and his studies of the great comet of 1881. Meantime he had added to his list of brilliant successes in celestial photography by photographing the great nebula in Orion.

His observatory at Hastings on the Hudson, and his laboratory in this city, are accounted the best equipped private scientific establishments in the country if not in the world. A fortunate marriage early placed at his command almost unbounded facilities for gratifying his taste for difficult and costly investigations, and the world has reaped the benefit.

Professor Draper's social relations were wide and exceedingly happy. A characteristic illustration of his method in social entertainment was shown on the evening preceding his fatal attack, when he gave a dinner to the members of the National Academy. It was a splendid exhibition of the possibilities of electric lighting artistically developed and

NATIONAL AND INTERNATIONAL EXHIBITIONS IN 1883.

The government of Spain has announced the conditions and regulations of a National Exhibition of Mineralogy and Metallurgy to be held in Madrid, between April 1 and June 30, 1883. Exhibits will be received up to February 15. Applications for space for machinery and special exhibits must be made before October 31, 1882. All other exhibitors, save those of machinery, are granted an additional month for filing applications for space in the main gallery. The exhibition is to include all machinery, utensils, and tools (Spanish or foreign) that are used in mining and metallurgy, in the manufacture of earthen and glass ware, and in the utilization of mineral waters; also all foreign manufactures from Spanish minerals. There is to be no charge for space, and water for hydraulic and steam engines will also be free for machines not exceeding five horse power. Liberal arrangements have been made for transporting and handling exhibits, and for the passage of goods in bond through the custom houses for exhibition purposes.

The increasing value of the markets of Spain and her colonies gives to this exhibition especial interest to a large class of American inventors and manufacturers. As an efficient though indirect mode of reacting on Spanish America, the exhibition may be worth considering.

The general agent for the United States for the interna-Amsterdam, Holland, from May 1 to October 31, 1883, has smitten with chicken cholera, and of this number only 11 issued a circular, presenting the inducements which the exhibition holds out to American farmers, merchants, manufacturers, railway companies, and land and mine owners. This is the first international exhibition in the kingdom of the Netherlands, and is expected to draw many visitors from northern France, Belgium, Germany, and the Scandinavian

The kingdom, with its colonies, embraces a population of nearly 40,000,000 people, and Amsterdam is one of the richest as well as most progressive commercial centers in Europe. Our trade with Holland and its dependencies has more than trebled during the past seven years, and the coming exhibition should be taken advantage of to greatly extend that trade.

At a meeting of bankers and merchants, held in this city November 21, the general agent, Mr. S. A. Wheelwright, reported favorable indications of State and national interest in favor of an abundant representation of American natural and artificial products at this exhibition.

Venezuela proposes to celebrate the centenary of the birth of Simon Bolivar, the South American liberator, by opening a national exhibition at Caracas, July 24, 1883. The Venezuelan Chargé d'Affaires in this city announces that he is authorized to extend a welcome to all authors, inventors, manufacturers, and artisans who may wish to make their productions known in Venezuela. He adds:

"Considering that Venezuela exports \$6,000,000 every year to the United States and only imports some \$2,000,000 from them, it will be readily perceived that the commerce of this enterprising nation with our country is far behind what is due to its gigantic production and inventive genius; or. in other words, that there is a market in South America for the products of this country not sought for by its commerce to the extent that it might advantageously do so. The exposition at Caracas offers a favorable opportunity to all who may desire to obtain a new and profitable outlet for their

ROMANCE AND REALITY OF ANIMAL MOTION.

Mr. E. Muybridge, whose success in catching and fixing by instantaneous photography the attitudes of animals in motion is so well known to our readers, gave an illustrated lecture upon the romance and reality of animal motion in this city, November 16. By means of a zoopraxiscope the instantaneous views were thrown upon a screen singly, in rapid succession, and in combinations, giving startlingly life like representations of the postures and movements of live animals.

Though the principal attention was given to the horse, the motions of other animals and men were also reproduced and described. After explaining the method by which series of instantaneous views of moving animals were obtained. Mr. Muybridge showed how greatly the reality of animal positions varied from the positions represented in sculpture and painting. Photographs of famous sculptures and paintings were thrown upon the screen, and the impossible attitudes represented were contrasted with views of live horses under the conditions which the artists intended to represent. When describing the walking motion of a horse, Egyptian, Assyrian, and Roman pictures were shown to demonstrate that an erroneous idea of this motion prevailed in the earliest attempts at art. It was perpetuated in the famous statue of Marcus Aurelius, which has been the model of almost all equestrian statues to the present day, and is as conspicuous in the equestrian statues of Washington in Boston and in Union Square as in any of the old Egyptian or Assyrian pictures. It is not possible for a horse to walk in the way there depicted. Meissonier had a correct idea of a horse's walk when he painted his great picture of Napoleon in 1814, but the critics ridiculed it and pronounced it incorrect. Now he has the satisfaction of knowing that he was right and they were all wrong. Miss Thompson also was correct, and the critics derided her for being so.

Later the lecturer showed photographs of Egyptian and Assyrian models of the running horse-models blindly followed by artists ever since—in which the animal is presented poising himself on both hind feet extended far behind, with his fore feet stretched far out ahead of him together. The North American Indians had a much more correct idea of the motion of a horse, as was demonstrated by their rude pictures upon a buffalo robe that Lafayette bought when in this country and took back with him to Paris.

When all the varied paces of horses had been described and illustrated, the jumping horse was shown in a series of brilliant and sometimes comical views. These were followed by illustrations of the gaits of oxen, a bull a Newfoundland dog, a hound, deer, a goat, and the hog.

The goat runs like a horse and the deer like the bound, bounding rather than running. In one part of the deer's stride its attitude was very near to that which artists have so long inaccurately made as that of the running horse.

Views were given of the walking, running, and jumping attitudes of Hazael, whose unrivaled ungracefulness proved a surprise even to the champion himself. Other athletes were shown boxing and tumbling.

The lecture closed with a beautiful series of pictures of pigeons and sea-gulls in flight. But two peoples—the Egyptians and the Japanese-ever represented birds as seen in some of the photographs with the wings down.

"Vaccination" for Chicken Cholera.

Mr. W. H. Griffith, of Zanesville, O., says that during the tional, colonial, and general export exhibition to be held in past two years he has vaccinated 2,000 fowls in yards badly died. Of fowls in the same yards not vaccinated all died. The proper procedure in such cases is as follows:

"Vaccinate a hen, and in eight days her system will be thoroughly inoculated: then cut off her head and catch all the blood in some vessel, then pour the blood on paper to dry; a half drop of this blood is sufficient to vaccinate a fowl, and the blood of one hen will vaccinate your whole flock. Catch the fowl you wish to vaccinate, and with a pin or knife make a little scratch on the thigh (just enough to draw blood), then moisten a little piece of the paper with the dried blood one and stick it on the chicken's leg where you scratched it, then let the fowl run, and you need have no fear of chicken cholera."

In the course of his experiments Mr. Griffith has dried enough blood to vaccinate 10,000 fowls. He offers to send, free of charge, to such as wish to try the cure, enough blood to start with. All he asks is that application be made soon (as the blood loses its virtue by long keeping), and that experimenters report results.

History and Cost of a Tunnel.

The recent opening of the St. Gothard Railway through the Alps has moved Consul Byers, of Zurich, to write a electrical disturbances, which culminated in intensity Nosketch of the great tunnel. The pass of that name is over the highest mountain chain in Europe. The New York Times condenses from Mr. Byers' article the following inter-

The old post road, commenced in 1820, 7,000 feet above the sea in places, was 181/2 feet wide; it crossed gorges, clung dizzily to steep mountain sides, and was roofed over where most threatened by avalanches. When the first railway was opened, in 1846, from Baden to Zurich, it was proposed to ask concessions to enable the company to attack one of the high passes, and in 1863 a union or society for the purpose was effected, upon the basis of an estimated cost of \$37,400,000. In December, 1871, the St. Gothard Railway Company was organized, \$6,800,000 stock and \$13,600,000 of bonds were issued, a contract was made calling for completion in eight years, with a forfeit of \$1,000 for each additional day and a bonus of \$1,000 for each day gained upon the contract time. Work began in the summer of 1872, and it was soon discovered that the estimates were wrong, and that \$57,800,000 would be needed to carry out the plan; a crisis followed, and the enterprise seems to have been saved only by what had already been invested in it, leaving no way out but to push ahead. The railway proper extends 113 miles from Immensee, in Switzerland, to Chiasso, in Italy, and more than one fifth of the whole line is in tunnels-fifty-six in number; many of these are not straight, but actually spiral, accomplishing heavy ascents in short distances, and there are also many lofty viaducts, bridges, and complicated galleries. The total length of tunneling is 23 miles. The main or great tunnel is 914 miles long, although others, exceeding 6,000 feet, might be thought noticeable elsewhere. The great tunnel is 26 feet wide and 19 high. The modern boring machines were worked by air compressed by large turbine wheels driven by the rapid river Reuss. The air was carried from the compressors outside to the sky was clear on that and subsequent nights. borers within the tunnel in iron pipes of six inches diameter, and the escaping air served an indispensable purpose in ventilation; 3,500,000 feet of compressed air were daily thus delivered and set free, pushing back and out of the tunnel the bad natural gases, with those set free by the dynamite and thrown off from animals and workmen. Fifty drills were worked; the usual daily advance was 21 feet, working from both ends, and the whole excavation was lined as fast as made with a circular tube of masonry, 18 to 30 inches thick. The workmen were principally Italians, who worked eight hours a day, receiving 60 cents to \$1 20 per day (mostly the former), boarding themselves, and living chiefly on meal porridge; yet most of them are reported to have saved and sent home to their families a part of this pittance. The tunnel cost 310 of their lives, and wounds were inflicted upon 877. The final actual cost of the tunnel and railway, exclusive of rolling stock, is now reported at something over \$40,000,000.

----Live Worm in a Horse's Eye.

A case of parasitism somewhat rare in this country is attracting attention in Jersey City. About three months ago a driver in the employ of Dodge & Bliss noticed a worm in the eye of one of his horses. It was then about one inch long, and black. Now it is three inches long, and white.

Mr. W. H. Arrowsmith, of the American Veterinary College, tells the Sun:

The disease is one seldom seen here. It is called in the books filariæ oculi, and is very prevalent in warm climates, in India, Australia, and in Arabia. It is supposed to be due to germs taken into the body when the animal is feeding upon grass in low, marshy ground. The germs or eggs of the parasite are developed into the active life of a worm, and that worm penetrates to different parts of the body, sometimes to the eve sometimes to the brain, sometimes interior organs. But it has been so seldom seen either in Europe or here that comparatively little is know of its progress, development, or results. There have been, I believe, but four or five cases reported in both Europe and this country. When fully developed, as it is in the eye of the horse of Dodge & Bliss, it is a parasitic white worm, varying from one to three inches in length, and about as thick as an ordinary pin. While in the aqueous humors of the eye it is in continual motion. When I examined it this morning by means of the ophthalmoscope, I found it in the anterior or aqueous chamber of the eye. It was very active. The cornea of the eye was somewhat opaque, and the iris somewhat distended. By careful observation we could discern a granular surface upon the anterior face of the crystalline lens. The horse otherwise was in perfect health. He works, and does not show any apparent inconvenience, with the exception of a certain nervousness during examination of the eve The activity of the parasite is such at present that it is impossible to say whether it has a head or tail, or what its internal construction may be. But, from microscopic observation, we will probably be able to discover head, tail, and alimentary canal. According to Percival's 'Hippo-pathology' and Williams' 'Veterinary Surgeon,' even the sex of these parasites is clearly discernible under the microscope. I do not believe that this parasite is ever found in human beings, but only in grass-eating animals that have grazed in low, marshy ground; and that it is in the eye is only a matter of accident in the course of its penetration of the body of the horse."

An Electric Storm.

The past ten days have been characterized by wide-spread vember 17. On that day telegraphic communication was more or less interrupted over the northern half of the United States, and much damage was done to switch boards and other telegraphic apparatus. The disturbance extended across the sea, interfering seriously with the work of the cables, and made itself felt in many parts of the European continent.

The manager of the operating room of the Western Union telegraph building pronounced the disturbance the most serious he had ever encountered. The storm was the severest between 5 o'clock A.M. and noon. It seemed to be centered along the valley of the Mississippi, and at its greatest severity in those parts of the country north of the latitude of Washington. The only wires that could be used at all were those on the metallic circuits. All the cables and wires that touched the ground circuits were absolutely useless. Shortly after 1 o'clock the storm very suddenly disappeared, and work was resumed on all the wires.

It is said that various experiments were tried by telegraphers during the prevalence of the storm to work the wires and dispose of the great accumulation of business, but with little success, until it was discovered that by taking two wires from the ground between any two given points and joining their ends a metallic circuit was formed that could be operated. In this way eight wires between Buffalo and Chicago were made to do service as four. Electricians seem to agree that the disturbance was unlike any heretofore experienced, as it appeared in some cases to act upon the wires in strong waves, causing a constant changing of the polarity of the current.

In other places the sending of messages was possible, as in previous electric storms, without using a battery. A dispatch is said to have been transmitted from Bangor, Maine, to North Sydney, Cape Breton, a distance of 700 miles, in this way. Brilliant auroras were generally seen where the

The appearance of exceptionally large sun spots is believed to have more than an accidental connection with these disturbances of the earth's electric equilibrum.

----The Laws of Breeding.

In a note to John L. Hayes, LL.D., editor of the Bulletin of the National Association of Wool Manufacturers, Mr. William H. Brewer, an authority on the laws of breeding, says he knows of no case where a new breed has been made of two well-defined breeds, the new breed having the excellences of the others, or even the excellences of a first cross. It is a common experience, he continues, that while the first or earlier crosses are reasonably uniform, successive crosses vary greatly. On the other hand, numerous examples may be given of new breeds being formed from the crosses of several, and then, by long-continued selection of animals having the desired qualities, from three several breeds. Mr. Brewer further says:

"Again, it is a common experience, particularly in breeding for flesh (but it is true of all characters), that in crossbred animals for one or two generations the cross breeds may be better as animals of use than either of the parent stocks. But this excellence cannot be maintained with a sufficient uniformity to insure profit. In truth, the whole and sole reason of the enormous prices which thoroughbred animals of various kinds bring, of a long proved pedigree, is not because of the superior excellences of those animals themselves as animals of use, but simply because their characters are transmitted, and those of equally good mongrels are not. The crossing of different breeds of sheep for mutton or for particular grades of wool will long be continued, and is very profitable in many directions; but it is only profitable, so far as I have been able to hear, where these rules are obeyed, and we frequently go back to the pure breed, on one side or the other, for keeping up the excellence.

Beer Glasses in Berlin.

The large breweries that surround Berlin sell a considerable quantity of beer on draught, each brewery being provided with a large garden or saloon, not unlike Lion Park, at One-hundred-and-tenth street and Ninth avenue, in this city. On Sundays and holidays, a great concourse of people, ket; there remains yet for us to add a stock of not less than many of them whole families, assemble there to quaff the 50,000,000 of old watches, which makes a total of 86,000,000 national beverage fresh from the rock cellars. Of course it requires a large number of beer glasses (Seidel) to supply them. The Moabit brewery uses 11,000 glasses; an export brewery there, 22,500; the Union, Friedrichshain, New World, and Spandauer Bock, each use 12,000, while 10,000 are used in the "Zelten." Beer is also sold at the zoological garden, where 25,000 Seidel are in use. About 75,000 more are in use at the large breweries on the south side of Berlin, where the Tivoli Society, Hasenhaide, and Bock breweries are situated. This total of nearly 200,000 glasses. glasses does not include smaller establishments like Belle Alliance, Walhalla, and hundreds of other gardens, hence the total number used annually is estimated, says the Amerikanischer Bierbrauer, at 5,000,000, or four glasses to each man, woman, and child. What may seem more surprising to our readers is that 10 per cent of the glasses used in Berlin are imported from this country, mostly from Wheeling, West Virginia. Many of the other glasses are "imitation American," and come from Schlesia, the rest from the Rhein. About one-third of the whole number pass through the hands of a single house in Berlin.

Purification of Sulphuric Acid by Crystallization.

In the Zeitschrift für Analytische Chemie, Tjaden Moddermann remarks that he has for some time been accustomed to prepare pure sulphuric acid by recrystallization of the hydrate $(H_2SO_4H_2O)$, and finds this seldom adopted method of purification to be really an excellent one. The author has experimented in this way upon acids containing considerable quantities of lead and arsenious and nitric acids, etc., and by protracted recrystallization has in all cases obtained a pure acid from them. The method is very simple. The acid is mixed with sufficient water, and, in bottles two-thirds full, exposed to the cold in the open air on a frosty night. If the mixture has been properly made, it is generally frozen throughout the next morning. The chief thing then is to carefully separate the crystals from the mother liquor, and for this purpose the author employs a centrifugal apparatus, so constructed that the acid only comes in contact with glass. The separation is very easily effected, and, except in cases where an acid is strongly contaminated with the different oxides of nitrogen, one recrystallization is generally sufficient.

A Town and the Cholera Blown Away by a Hurricane.

The Captain-General of the Philippine Islands telegraphs from Manila, October 21, that a tremendous hurricane had almost entirely destroyed that town. In less than an hour from its commencement not a single native souse and not a single wooden house was left standing. Almost all the stone buildings, even those having iron rafters, were unroofed and made uninhabitable. Comparatively few casualties had taken place among the population. In a later telegram the Captain-General says that the authorities of Balacan and the interior of the island report a similar destruction as caused by the hurricane, and fifteen thousand more persons are houseless. Singularly enough, on the first day after the hurricane not a single case of cholera occurred in Manila or the island. The tornado not only swept over the entire archipelago, but was felt many hundred miles out at sea, especially to the south and west. It is believed that more lives have been lost by shipwreck than on land.

The Meat we Eat.

According to statistics compiled by the Agricultural Bureau, the annual meat product of the United States is in round numbers:

	Number.	Pounds.
Dressed hogs	29,000,000	5,120,000,000
Beeves		3,124,000,000
Veals	3,000,000	275,0 0,000
Muttons	7,000,000	350,000,060
Lambs	5,000,000	100,000,000

About one-fourth of the pork and one-twelfth of the beef are exported, leaving for home consumption about seven thousand six hundred and fifty million pounds of the above meats, mostly beef and pork; or an average of almost half a pound a day for every man, woman, and child in the country. We think this must be erroneous, and the above figures probably need correction.

Preservation of Lemon Juice.

A correspondent in Mém. de Méd. et de Pharm. Milit. says, after various experiments and the test of eight months' exposure to the sun and heat of summer, he has come to the following conclusion: "Heating the juice or adding alcohol to the same would appear to be superfluous, as it is only necessary to filter it and keep it in sealed bottles; however, since filtration proceeds so very slowly, the best way is perhaps to add 10 per cent of alcohol to the fresh juice, and

The Pharmaceutical Journal observes that it may be preserved without the addition of alcohol by heating it to 150° F., and then excluding it from the air by carefully closing the full bottles at this temperature. The operation should be carried out in winter.

Consumption of Watch Glasses.

According to the Revue Chronometrique, there are annually manufactured 2,500,000 watches, and during the last fifty years more than 70,000,000 have been put on the marto 87,000,000 watches requiring glasses. The new watches consume nearly 4,000,000, which makes an annual consump tion of not less than 47,000,000 of glasses. But we must add that every watchmaker away from a town sees the necessity of always having on hand an assortment responding to the wants of his customers. Then if we take into account children's watches, lockets, compasses, etc., one finds one's self with astonishment in the face of an annual consumption which cannot be less than 100,000,000 of

Subterranean Scenery.

Mr. H. C. Hovey, perhaps the only man who has ever made a special study of all our great American caverns, lectured in the Hall of the Academy of Sciences, New York, Nov. 20, upon subterranean scenery. He gave descriptions of the Mammoth, Luray, and Wyandotte Caves, and the ice grottoes of Niagara, and illustrated the marvelous scenery found in them by means of lantern views. This is a new field for lecture enterprise, and one that cannot fail to be as popular as it is interesting.

IMPROVED FLOATING ELEVATOR,

(Continued from first page.)

filled by the number of men intended to be employed, thus insuring at all times receptacles for the coal to be loaded .into. Payment for the work being made by the ton and not by the day or hour, the importance of this margin of capacity will be apparent.

For the purpose of raising and lowering the elevator arms, a large double cast-iron drum is provided, from which two chains are passed over the deck and led round sheaves into and up the steel lattice tower, and over the cast-iron head to the blocks from which the two elevator arms are suspended The drum is provided with a brake-wheel, brake, pawl, and ratchet-wheel, and the engines have reversing motion. The third set of gearing consists of a powerful worm-wheel, keyed on to the lower end of the cast-iron column within the lattice tower, the worm driving this being connected by means of bevel gearing to the second-motion shaft of the engine, these three distinct sets of gearing being set in and out of motion by independent clutches, the handles of which are conveniently placed with regard to the engine. A warping drum is also placed on the end of the third-motion shaft. Two hand winches, EE1 (Fig.

3), enable the angle of the elevator arms to be accurately adjusted and varied to suit the steamer's hatch and the load in the lighter. In addition to the fourtings at the ends of pontoons, four towing-bits are attached to the deck for mooring. It should also be added that the six cylinders or pontoons, three on either side, are totally separate and distinct from each other, all the plates being riveted to welded angleiron rings.

For coaling the bunkers on that side of the steamer which is next the elevator, a return chute (see cuts) is provided with an adjustable double metal trunk which can be set to suit steamers of various beams, and to the mouths of these pipes flexible trunks are attached, which lead the coal into portable hoppers placed in the bunker holes. A conveyer or belt is erected upon portable trestles, readily placed for the purpose upon the steamer's deck, the gearing at the head of the elevator driving this.

As regards the performance of the elevator above described, Mr. Rigg gives in Engineering, from which we take our engravings, the following as a fair estimate of the economy resulting from its use in the purpose for which it is mainly intended, viz., the coaling of steamers, and, to avoid any appearance of exaggeration, a liberal amount is allowed for working charges, and it is assumed to be in active operation for three days in the week only; a crew of four is sufficient to discharge the duties on board the pontoons and in making the connections to bunkers. The rate for filling the passing trays on the continuous chains is taken at the same amount as

man connecting the barge and bunker, as previously de- ence in favor of the patent elevator over manual labor, known that if a carbureted gas is traversed by the elecscribed. The labor of trimming in the bunkers being the and that an ample margin remains for profit for the coal tric discharge from a Holtz machine deprived of conden-

same in each case, these charges also are alike.
Cost of Bunkering Coal with Patent Elevator
Engineer per week
Stoker 1 7 0
Additional labor (two men) 2 10 0
5 17 0
Depreciation:
Elevator, including en-
gines, boilers, gearing, £
and pontoons 2400
Coal distributing troughs, 100
2500
10 per cent per annum for one
week on £2 500 4 16 2
Coals and stores per week (3
working days) 3 5 0

13 18 2

ruing:	
Eight men, each 7 tons per	
hour = 56 tons per hour or	
560 tons in 10 hours (1 day)	
= 1,680 tons in 3 days at £ s. d .	
$1\frac{1}{4}d$. per ton	
Trimming 1,680 tons in bunk-	
ers at $2\frac{1}{2}d$	
Royalty on 1,680 tons, at $\frac{1}{2}d$ 3 10 0	
per ton.	
43 13 $2 = 0$ $6\frac{1}{4}$	
Present average charge 1,680	
tons at 1s. $6d$ 126 0 0 = 1 6	
82 6 10 0 113/4	
Assuming a steamer taking 1,000 tons in her bunkers,	, tl
ollowing would be the application of the above figures	:
T 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

Loading by patent elevator 1,000 tons, at $6\frac{1}{4}d.....$ 26 0 10 Present charge by stevedores for manual

IMPROVED FLOATING ELEVATOR.—[See first page.]

stevedore.

These figures are interesting, and clearly point to the great economy which may be obtained in the coaling of steamships, and the importance of this subject to their owners and the stevedores who now have the work performed by manual labor. The machinery being constructed of a capacity equal to double that of the eight men represented as loading, this number may under pressure be increased.

One of the secondary advantages is, that whereas coal barges must now be placed at each side of the steamer, the introduction of this elevator enables them to be used on one side only, leaving the other at liberty for loading cargo. The same apparatus is also available for loading salt and any other material, which is now similarly dealt with by hand. Suitably constructed buckets render the elevator also available as a dredger, the hand winches E E1, Fig. 3, affording the ready adjustment of the elevator frames which is so essential.

The general dimensions of this elevator are as follows: | year from fires and other accidents were \$104,631.

Six pontoons, each 20 ft. long by 6 ft. diameter; length of pontoons over all, 71 ft. 4 in. length of deck over all, 74 ft.; beam, 24 ft.; height of central; lattice tower from deck, 28 ft.; length of suspended elevator girders or frames, 68 ft. 3 inches; pair of winding engines, 7 in. cylinders and 14 in. stroke; total weight, 66 tons.

This one has recently been constructed by Mr. Rigg for a foreign grain port, the buckets being of the form shown in Figs. 5 and 7, suited to grain, and it will be readily seen that a flow, which is practically continuous from two endless chains of buckets, will transfer more grain in a given time than steam or hydraulic cranes, which from their nature must be intermittent in their operation. For working grain a pair of timber bonnets are placed over the head of the elevator, and to these are attached flexible tubes for leading the grain into the hold. As a protection from the weather the troughs also, along which the buckets travel, are covered by removable waterproof sheets.

What is the Comet made of?

MM. Thollon and Gouy have communicated to the French Academy of Sciences the results of their spectroscopic ob-

servations on the large comet

now visible. It appears from these, says Engineering, that at the observatory of Nice, on the 18th of September, they detected very brilliant rays of sodium, which were slightly displaced toward the red. On the 9th of October the sodium lines had disappeared, leaving only four ordinary bands of carbon, of which the violet band was very distinct, but feeble, while the others were bright, especially in the head. This gave at the same time a continuous spectrum, in which could be seen a great number of black and bright rays. On the 16th of October the spectrum was much the same, except that the violet band had almost disappeared, and the continuous spectrum had become feebler. The spectrum. in fact, showed a striking resemblance to that of the flame of alcohol. Of course this does not imply that alcohol is present in the comet, since it is known that all compounds of carbon give the same bands, and of these alcohol was only chosen because it was most convenient for comparison. The "integral spectrum" taken by a direct vision spectroscope, showed that the major portion of the comet's light was white, and probably reflected sunlight. The vanishment of the sodium lines and other brilliant rays would seem to prove that the spectroscope cannot give a complete analysis of cometary matter. It is probable that this matter is similar to that of aerolites; and if the temperature of the comet is sufficient to produce an emission spectrum from the compounds of carbon, it ought also to give a spectrum of sodium: but this, as found by MM. Thollon and Gouy, is not always the case. They are, there-

is paid for loading the baskets now passed from man to | It will be seen that the above figures show a great differ | fore, led back to the electric theory of comets. It is sers, the gas kindles and gives the carbon bands; and if it hold metal dust in suspension, it will give the bands without showing the lines of the metals. Something of the same kind possibly takes place in comets.

Petroleum Manufactures.

A census bulletin of statistics of the manufacture of petroleum during the year ending May 31, 1880, shows there were 86 firms and corporations in the trade, with an aggregate capital of \$2,739,746, and giving employment to an average of 9,869 hands, 25 of them women and 346 children. The annual wages paid amounted to \$4,381,572. The value of the raw materials used was \$35,000,000, and the value of the manufactured products was close upon \$44,000,000. There were in use 374 boilers of 12,744 horse power; 385 engines, 200 pumps; buildings to the value of \$1,899,288, and machinery valued at \$3,737,998. The losses for the

Free Canals and Canal Improvements.

One of the notable features of the recent election in this State was the enormous vote in favor of entirely abolishing tolls on the State canals. For a long time the great food staples and some other commodities have been on the free list, and latterly all the West bound freight has been exempt from tolls. Under the new law the Erie Canal and its tributaries will constitute a free waterway the whole length of ber, f, in which moves a piston, k, actuated by a screw, l, the State, from the Hudson River to the Great Lakes, for eight months of the year. The canals give employment to about 6,000 boats.

The object of the abolition of tolls is to increase the traffic of the canals, so as to make them a more potent factor in solving transportation problems, and in helping to maintain the commercial supremacy of New York. How far the end

The inability of the canals to be the dominant factor in controlling the charge for transportation across the State, and in determining the course of trade in competition with railways however. would appear to be due less to the amount of tolls hitherto demanded, than to the inability of the canals to meet promptly and parallel the improvements in transportation introduced by the railways. In carrying capacity and economy in transportation the railways are progressive, while the canals are, or have been, practically stationary.

As Mr. Robert Taylor, of this city, has pointed out, the Erie canal boat, towed by two horses, and the 20-car wheat train hauled by a 30-ton locomotive, were for many years equivalent units in wheat transporting capacity, with the advantage of greater economy in favor of the

"So long as this continued, the canal was the regulator of grain freight rates, but as the volume of grain transportation increased, railway improvement was stimulated, and the advent of

Mogul locomotives, which could fairly fly with forty cars, each containing 500 bushels of wheat-a train load of 20,000 bushels—when the railroad became the regulator of pushed in, so that the water shall rise above the tubes, b and prices than the canal could possibly carry at, even at 21/2 so that the apparatus is entirely full of water. The two cents, if necessary, and make money.'

To raise the canals to their old commercial rank two things are proposed. One is to make the Erie Canal throughout a ship canal, a costly undertaking, and one that might prove the reverse of beneficial either to New York or to the cities along the line of the canal, as the actual benefit of the change would fall rather to the producers and shippers of the far West than to the people of New York.

Another and more reasonable proposition is to increase the carrying capacity of the canal by improving the existing taken to place the cock, c and d, properly, an almost perlock gates. The old fashioned, slow moving swinging gates are still used. By a change to lift gates, which could be done without great expense, the available length of the locks would be increased by 35 feet, and the canal boats might be made 130 feet long instead of 97 feet as now, with a proportional increase in their carrying capacity, or from eight thousand to ten or eleven thousand bushels of wheat. The

cost of operating the larger boats would be little, if any, greater than for the boats now in use. With improved lock gates, it is further claimed, the carrying capacity of the canal might be five times what it ever has been.

Touching the proposition to abandon the canals entirely as having outlived, their period of economical usefulness, it is urged that water carriage remains, and is likely always to remain an important commercial factor, even where railroads are most abundantly developed. Proof of this is seen in the large use of the great canals of England and Scotland, and in the efforts which the more advanced European states are making to extend their facilities for water carriage. Thus in France 74 $per\,cent\,of\,the\,domestic\,commerce\,of$ the country goes over the canals, and efforts are making to largely increase the capacity of such artificial waterways. Germany, likewise, has entered upon the work of enlarging and improving the 2,000 miles of

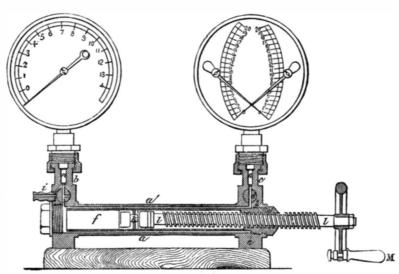
other states are spending large sums for a like purpose.

A FLAGEOLET player charmed all his hearers by his musical performances at Neuilly, near Paris. He had formerly suffered from diphtheria. Tracheotomy was performed, and the silver tube which was introduced at the time of the operation, and kept stationary by means of a circular pad, now serves the musician of Neuilly as a natural aperture through which he breathes, and so successfully that his flageolet playing was enthusiastically applauded by all present.—British Medical Journal.

APPARATUS FOR TESTING PRESSURE GAUGES.

The accompanying cut represents a small portable apparatus designed to test pressure gauges, and which is the invention of Mr. C. D. Gäbler, of Hamburg.

It consists of a brass cylinder, a, with tubes, b and c, provided with cocks, d and e. In the interior of this cylinder there is fixed, by means of a screw, g, a small pump chamwith winch, M. When it is desired to use the apparatus, the gauge to be tested and a standard apparatus are connected with the cocks, d and e, as shown in the cut. But the apparatus must first be prepared by adapting to the tube, i, a piece of rubber tubing whose other extremity dips into a glass of water. The conduits, n and m, are then closed by level by means of the leveling screws passing through nuts means of the cocks, d and e, the latter, which is a three-way aimed at will be furthered by the change remains to be seen. one, being turned so as to admit water through the tube, i. the surface on which the wheels rest.



APPARATUS FOR TESTING PRESSURE GAUGES.

heavy steel rails suggested better ballasting of the road bed [The piston, k, is afterward led, by means of the screw, l, to and heavier and closer laid ties. Then came the 70-ton the extremity of its travel, and the inner cylinder is filled with water. Then the cocks, d and e, are opened so as to allow the air to be disengaged, and the piston is gradually grain freight rates, being able to carry at much lower c. The cocks are then closed, and the piston is withdrawn, gauges can now be fixed to the apparatus. It is evident that | means of escape. Further information may be obtained by adon driving the piston forward the two gauges will be submitted to pressure, and that they may be easily compared in measure as the pressure rises.

For testing barometers, the operations are the same, save that the piston must be driven into the cylinder when the barometers are affixed to the apparatus. When the piston on maneuvering the piston twice in succession, care being fect vacuum may be produced.

This apparatus has been devised for shops, and, as it is very portable, and takes up but little room, it is capable of rendering service to inspectors of boilers.

CATAPULT FOR THROWING LIFE LINES.

This apparatus is designed for affording a sure, speedy, hold on the ordinary building mind to be given up. Some



CLAYPOOL'S CATAPULT FOR THROWING LIFE LINES

canals within the limits of the empire, and Holland and and and safe means of escape from the interior of burning build-known to be injurious in harboring the germs of infection, wheels like an ordinary wagon. It is provided with a very are moved by a pinion on the crank shaft, to adjust the elevation of the powerful compound springs mounted on a frame of which the sector wheels form a part. These springs are fixed at their larger ends to the frame near the pivot of the sector wheels, and their free ends are connected attached to the line to be thrown.

On the lower part of the bar to which the cup is attached is fixed a hook which is caught by nippers attached to a rope wound on a windlass journaled on the lower arms of the sector wheels. The rope is wound through a funnel which serves to trip the nippers and release the springs when it is desired to project the ball.

That part of the frame not occupied by the gearing, sector wheels and springs is floored over, and at convenient places thereon are placed coils of lines or ropes with balls attached in light movable cans with flaring sides, the line to be first thrown being placed on the rear of the frame in the center. In diagonally opposite corners of the frame are embedded four levels, two in each corner, and its frame can be made in each corner of the frame, whatever be the inequalities of

> In practice the apparatus is kept in readiness for removal at an instant's notice, with the sector wheels elevated as far as possible and made stationary, the nippers caught on the hook at the end of the springs, and the rope held taut by the windlass. Having been rapidly hauled to the scene of operations, the apparatus is turned with the rear toward the place where the danger is. The apparatus can be then turned or aimed in any direction by simply backing the horses. The direction having been obtained, the frame is rapidly leveled by means of the leveling screws, the desired elevation obtained by the gearing operating in the sector wheels, the ball to which the line is attached placed in the cup, and the springs brought down by the rope and windlass till they are loosed by the nippers being drawn into the funnel, when the ball carrying the line will be thrown to the desired place.

> Should it be desired to reach more than one point, any number of lines which may be prepared could be thrown by removing the can containing the line first thrown and replacing it by another.

Seats may be arranged on the frame for the entire crew needed to manage the apparatus, three men being all that is required—one driver and two to manage the apparatus. Such a crew, with practice, would become so skillful that within a few minutes of its arrival at the scene of danger it could throw a line into any specified window or aperture of any building, or over any building or vessel, and thus provide a dressing the inventor, Philip W. Claypool, Summitville, Col.

Absorption of Moisture by Building Materials.

Every one connected with buildings of brick and stone knows the absorbent nature of those materials under the most favorable circumstances. It would astonish most people, adds is withdrawn, a vacuum is created. It has been found that the Building News (London), to be told what a large quantity of water is stored in the brick walls of an ordinary house after a heavy rainfall; the drying or evaporation of which must take place inside in cold weather, unless proper precautions are taken to render the walls impenetrable. The plea for hollow walls has been raised again and again in this journal, and though the system is coming to be adopted more generally in some districts, the idea of solidity of wall structure seems to have taken too deep a

> time ago a suggestion was made that colliery owners, and others who have large quantities of slag, might with profit utilize this material for building cottages and other purposes. We are not sure whether the hint was taken, but in some parts of the country the material furnishes an admirable aggregate for concrete. Where good aggregates exist like slag, broken brick, sandstone, or furnace ashes, concrete building ought to be much cheaper than brick, as no skilled labor is required.

There is another consideration besides cost which tells in favor of concrete, and that is the non-porosity of walls so constructed. Not only does brick absorb moisture in wet weather, but it is now known to absorb animal gases as well; and here we have a condition which builders of our hospitals and infirmaries ought to be reminded of. We are not sure if concrete has been applied to any buildings in England of this kind on a large scale, but as absorbent walls are

ings, from sinking vessels, and other places of danger. As the value of walls constructed of concrete, made of burnt shown in the engraving, the apparatus is supported by four aggregates, cannot be coverrated. Slag-made concrete has the great advantage of being fire resisting, the material in its strong frame, upon which is mounted sector wheels, which rough state having been subjected to intense heat. There is nothing in it to "kill" the cement, and the rough surface of walls built with it becomes an excellent "key" for the plastering. In the construction of walls of this material, three sizes of the slag may be used; the larger lumps being packed in layers in the middle of the wall, and the other by a cross bar carrying a cup which receives the ball two sizes, the larger of the size of walnuts, run in with cement on each face in the proportion of eight to one.

Slate is a metamorphic clay rock, frequently fossiliferous. It is readily divisible into thin plates, and being easily worked and smoothed, is much employed for roofing and in the manufacture of mantels, billiard tables, and other similar objects. In the quarry, the direction of these cleavage planes ends, which are inserted into holes in the side and end is usually vertical, or nearly so, but never coincident with pieces. those of the beds and joints. The masses are, therefore, removed by cutting trenches in the side of the hill and splitting the rock in vertical layers. As the perpendicular breast becomes too high for convenient working, say 40 feet, a second trench is cut above the first; then a third, and so on.

In the great slate quarries of Ybron, six miles southeast of Bangor, in North Wales, sixteen of these stages are in progress together, the lower ones being gradually widened by the getting of the slates as the upper ones are advanced. In the upper part of the quarry the slates are removed with crowbars; but the slates become harder as they are lower from the surface, and require the use of gunpowder to detach the main masses. The miners engaged in drilling the holes for the powder are suspended by ropes from the upper parts of the rock, and are liable to many and severe accidents. After the slates are detached by powder or otherwise, they consume considerable labor in splitting them with wedges and mallets into marketable sizes and reducing them to the several grades required for roofing and other purposes.

Slate adapted for ordinary economic purposes is not very common. A number of varieties are, however, found in Cornwall, Wales, Scotland, and Ireland, and also on the continent of Europe. Those from the Ardennes, from Angers on the Loire, and from Nassau are largely exported.

In this country, according to the Glassware Reporter, Vermont furnishes slates of unsurpassed quality and beauty. Their quarrying and manufacture are beginning to constitute an important feature of national industry, promising large vicinity of Bangor, Maine; Washington county, New York; Hartford county, Maryland; the Huron Mountains, Michigan; and Pike county, Georgia, also furnish supplies of slate.

Of the various kinds of slate, aluminous yields alum; adhesive slate is porous and adheres readily to the tongue; bituminous slate yields coal oil; whet slate has a fine grain and makes hones; hornblende slate, a tough kind, is used for flagging and sidewalks; drawing or graphic slate, a soft kind containing carbon, is used for pencils; polishing slate, which has a peculiarly fine grain, and is found in Bohemia, is used in slips and powder; and clay slate, consisting of alumina and silica, makes a refractory fire brick, from the absence of fluxes.

The slate used in roofing is a thin, riven slab. The upper surface of a slate is called its back, the under surface the bed, the lower edge the tail, and the upper edge the head. The duction of good poultry; and, on the whole, our advice to part of each course of slates exposed to view is called the margin of the course, and the width of the margin is called the gauge. The portion hidden from view is called the cover. The bond or lap is the distance which the lower edge of any course overlaps the slates of the second course below, measuring from the nail hole, and may be from two to four

In preparing slates for use, the sides and bottom edges are trimmed, and the nail holes punched as near the head as can be done without risk of breaking the slate, and at a uniform distance from the tail, regard being had to the spring of the laths. Slates are laid on laths, battens, or sheathing, and ovarian capacities, have been sadly disappointed, and have must break joint. The nails are of copper, zinc, or tinned iron. In England 1,200 slates constitute a thousand, and they vary in size from 1 foot 1 inch in length by 6 inches in both scientific knowledge and artistic skill. The main thing breadth to 3 feet in length by 2 feet in breadth. A "thousand" will cover from two to tifteen squares, according to cracked corn, wheat screenings, Indian meal, and wheaten the size of the slates, and will weigh from three-quarters of a ton to six tons on the same basis. Four hundred and of green food, and in summer, grass, and in winter, boiled eighty of the smallest size will cover a square, and 127 potatoes and other vegetables, are indispensable to the of the medium size (Duchesses) will do the same. The number of nails required to a square varies, the smallest size proportion of flesh meat suitably cooked; and in this way requiring the most. The smallest size will take 480 nails, and the largest about 250. There are still other sizes sometimes enumerated, such as "small," "plantation," etc.; these range from 11 x 7 inches to 22 x 12. The general them drink on which the sun has shed his full force in July dimensions of American roofing slates are from 14 x 7 inches to 24 x 16 inches. The thickness of slates ranges from threesixteenths to five-sixteenths of an inch, and their weight from 2.6 to 4.53 pounds per square foot.

A square of slate or slating is 100 superficial feet, that should not be less than 1 in height to 4 of length.

Slate is superior to most other articles for roofing purposes, both as to durability, appearance, and capability of resisting moisture. It will imbibe only about one two-hundredth part of its weight of water, while glazed tiles will imbibe oneseventh their weight. Slates are also much lighter. They cannot, of course, be used for flat roofs, or those of very low pitch; they are irreparably injured by fire, and they will not allow of much harsh usage in the shape of heavy treading on them by mechanics or other who require access to roofs on which they are used. They are also more easily displaced by high winds than tin and some other roofing materials, in these young men and to all our other readers is, pay as you consequence of the readiness with which the wind can gain entrance at the joints. But from their fine appearance and effectiveness when well laid they have long been and will continue to be extremely popular for roofing purposes.

School slates are made from a fine and soft quality of slate. The great demand for them has led to various improvements cold and dry superstratum.

in the manner of making and uniting the frames, and to the invention of special machines for this purpose. Slate frames are now generally made with rounded angles, and one invention consists in securing the parts together more firmly by wires entering grooves at the corners, and having bent

Artificial slates are prepared by coating the surface of wood or cardboard with a gritty substance, as pulverized emery or pumice, mixed with black size or paint, or the surface is painted black, and dusted with the powder before it becomes dry.

About Poultry.

Among the multifarious letters which we receive daily, the following appeals peculiarly to our sympathies:

Sir: Having several times noticed in your columns advice given to young men who are about to embark in some business enterprise, and having always appreciated the good and sound judgment you have evinced, we apply to you in our own behalf.

Having sufficient capital to go into business of the produce nature, we come to you for counsel concerning the raising of poultry. Which, in your judgment, would be better adapted for the poultry business on a good sized scale -New Jersey or Long Island? Also, what part of either would be best to start in?

Our aim is to raise poultry and send it to this market ready for sale by city dealers. Yours respectfully,

New York, November 10. POULTRY.

No doubt the poultry business is capable of being made a source of profit, though for our own part we confess we have not found it so. We embarked in it on a pretty large scale five or six years ago, and having made careful prepara tions, we raised the first year about 1,000 first class white increase in the future. Northampton county, Pa.; the Brahma fowls. But just as they had gained perfection, and while the eye was delighted with their beauty and the financial mind calculated that they would sell promptly for about \$3 apiece, some egoistic wretch or wretches broke into our yards, took off the hinges and hasps of the great gate, and when the sun rose in the morning, shedding his glorious light over the whole face of nature, some 500 or 600 of our choicest pullets had disappeared, whither we knew not and thus the profits of the year were much reduced.

All this happened on Long Island, and therefore our advice to our correspondents would be either to avoid that locality altogether, or at any rate not to plant their poultry breeding establishment too near the Sound, where a swift sail boat or steam launch may afford facility for the escape of plunderers with their booty.

And yet the soil, the air, the sunshine, the grass, and the water of Long Island are exceedingly favorable to the proour friends would be rather to take Plymouth Rocks instead of Brahmas, Langshans, Crèvecœurs, or any other fancy variety. Game fowls are very good to eat, but there is not much flesh on their slender and steely bones, and at the the same time Mr. Bergh, with his vigilant care of the public morals, will not tolerate any of the profits which might be derived from cock fighting. Leghorns are undoubtedly very productive of eggs; but the mischief of it is that they do not lay their eggs at times when eggs are most wanted, and some of our friends who have been led into the cultivation of Leghorns, through a mistaken faith in their got neither eggs nor chickens. Alas, alas!

The feeding of poultry is an important matter, requiring in a proper gallinaceous diet is undoubtedly grain; and bran are eminently useful. But there must also be a supply health of fowls. At the same time they must have a due pork scraps are convenient. Their drinking water must be good and clean, not icy cold in winter, nor heated by the direct rays of the sun in summer. It is dangerous to give

New Jersey is also a pretty good country for poultry breeding. There are some parts of Monmouth County where the soil is easy of culture, and the presence of great supplies the women 130.87 pounds. The averages for 20,000 men of marl enables the farmer to make his land exceedingly a surface 10 lineal feet each way. The pitch of a slate roof productive. On the other hand, Bergen County is more picturesque, and the lover of mountain scenery will find there much to interest his mind and lift his imagination above the monotony of common life. But in one respect poultry breeding is like virtue-it makes comparatively little difference where it is practiced. The point is to practice it with judgment and perseverance; and, as we have no doubt that our correspondents will exercise these qualities in their new business, we wish them all the success that their industry and their skill may deserve. The same intellectual gifts which make a man a great statesman or a great poet will also make him a great poultry breeder. Our final advice to go!-New York Sun.

> M. Spring (Belgian Academy of Sciences) concludes that the seat of the electricity of storms is not, as generally admitted, in the moist region of the atmosphere, but in the localities were more likely than their weaker neighbors to

Transmission of Work to a Great Distance on an Ordinary Telegraph Wire.

The Electrotechnical Committee of the Exhibition of Electricity at Munich, having requested me to repeat upon a telegraph line the experiments on the transmission of power which I had previously made over great distances, I forwarded to Munich and Miesbach the fine wire machines which I had made use of in my laboratory experiments.

The telegraph line placed at my disposal by the administration of the German telegraphic system had a length of 57 kilometers. It is of galvanized wire 45 millimeters in diameter, and since, as a matter of precaution, I did not think fit to make use of the earth, I requested permission to employ a return wire identical with the former. The total length of the line traversed by the current is, therefore, 114 kilometers, and its resistance, on measurement, 950 ohms. The insulation is good, but differs in nothing from that universally employed on all telegraph lines. The two machines, situate the one at Miesbach and the other at Munich, are absolutely identical, and have each a resistance of 470

The total resistance of the circuit is, therefore, close upor 1.900 ohms. In the first experiment which was made there was immediatety obtained at Munich a work of 38 kilogrammeters per second (or about one half horse power), at a speed of 1,500 revolutions per minute.

The generating machine, situate at Miesbach, turned at the rate of 2,200. The two machines being identical, the proportion of the work recovered at Munich to the work expended at Miesbach was, setting aside passive resistance of every kind, $\frac{1500}{2200}$, or more than 60 per cent. The machines employed are of Gramme's "atelier" type, modified according to my calculations.

A heavy rain fell during almost the whole duration of the experiments.

The receiving machine serves at present to feed a waterfall of one meter in width and three in height, by means of a centrifugal pump.

Sparks are scarcely visible on the collectors of the two machines. The heating of the machine is scarcely appreciable after two hours' work.—M. M. Deprez, in Comptes Rendus.

Timber for Railroad Uses.

The moisture of the soils in the South, says the National Car Builder, is very destructive to woods employed as the bed for railway track, and managers have been troubled to know what is the most economical method for obviating loss resulting from this cause. Creosoting has been resorted to. Several works with large capital have been established in St. Louis for the treatment of wood by the creosote process, and in Texas the treatment has been applied along the lines as construction was pushed forward. This method, however, is considered rather too expensive. Some railway men have concluded that the ailantus and catalpa will prove to be the cheapest and most durable wood for tie and bridge timbers. One company, whose road extends chiefly over prairie lands, is having a large plantation seeded for these trees in equal proportions. Both the catalpa and ailantus are readily propagated from the seed, and bear seed pods abundantly. Another company, whose road enters Texas, is arranging to plant several hundred acres of these trees in that State. Even the Iron Mountain Company, that probably owns more heavily timbered land than any other in the country, has contracted for the cultivation of a catalpa farm near one of its stations in Missouri. On this road are catalpa ties that were laid nearly fifteen years ago and are apparently as sound as ever. It is authenticated that in southern Ohio, where one species of catalpa is indigenous, there are posts and timbers of this wood that have been in the ground a full century and yet show no signs of decay. Although the ailantus is an importation from China, still it and the catalpa seem to find in soils of Missouri, Arkansas, and Texas just what they require to thrive upon.

Weight of Western Men and Women.

During the tenth annual Exhibition of Art and Industry in Cincinnati, which closed October 7, the department of Scientific and Educational Appliances employed a clerk to record the weights of men and women visiting the exhibit of the Howe Scale Company. There were weighed 7,467 men and 14,688 women, the men averaging 154:02 pounds and and women weighed in Boston, in 1864, were: for men 1411/2 pounds, for women 1241/2 pounds—or 12 52 pounds and 6 37 pounds less than the corresponding Western averages.

By keeping a special account of the weights of the members of excursion parties from outlying towns in Ohio, Kentucky, Indiana, and Illinois, it was possible to compare the weights of visitors from the country with the averages of the men and women forming the whole number weighed. About nine hundred excursionists in all were weighed. The visitors from Ohio averaged-men 157:38 pounds, women 133:26 pounds; from Southern Indiana and Illinois-men 158 52 pounds, women 183:55 pounds; from Kentucky-men 158 43 pounds, women 133 76 pounds. It will be noticed that the country people considerably exceeded the average weights, the men by about four pounds, the women over two and a half pounds. It would not be safe, however to infer that the country people as a whole were thus above the average weight, since the more vigorous in their respective join in such excursions.

Correspondence.

The Copyright Act Amendment.

To the Editor of the Scientific American:

Permit me to offer a suggestion in reference to your construction of the Amendatory Copyright Act approved August

Judging simply from the act and collateral legislation, and without having had the advantages of Mr. Clarke in hearing the pro and con arguments before the Patent Committee, I believe that Congress did not contemplate to depart from the interpretation of the words "engraving, cut, and print," embodied in section 3 of the "Act Relating to Patents, Trade Marks, and Copyrights," approved June 18, 1874 (18 Statutes at Large, p. 78), and that the true understanding of to copyright." Although some of the articles mentioned may be protected under the act of 1874, yet it is obvious that there may be "designs for moulded decorative articles, tiles, plaques, or articles of pottery or metal subject to copyright," that is, whose sole purpose is use in the fine arts.

The discriminating power lodged with the Librarian of Congress under the act of 1874 is neither abridged nor altered, and designs for articles of manufacture not within the purview of the Copyright Act are to be treated under the jurisdiction of the Commissioner of Patents.

J. H. ADRIAANS.

Washington, D. C., November 15, 1882.

How to Take Portraits of Burglars.

To the Editor of the Scientific American:

We have evidently entered the age of electricity; and I offer the suggestion of a detective trap for burglars as among the important possibilities.

The burglar alarm now in use, true to its name, alarms the burglar, and he is away.

Instead of ringing the alarm, let it be set to turn on momentarily the full glare of the electric light, and at the same instant have it expose a plate in a camera all ready to take an instantaneous picture. The burglar of course will take to flight, but will leave his photograph behind. The same blaze of light which has alarmed him will awaken the sleeping inmates, who can proceed at once to the camera and secure the negative. In order, however, that the camera should be set at the right focus the alarm used should be an electric mat set in a certain place on the floor, that spot being covered by the focus of the camera.

In case of banks and safety deposit companies, the electric mats should be in front of the iron safes.

E. S. Brown.

Rutherford, N. J.

Milk and Oil in Disease.

To the Editor of the Scientific American:

I notice in your paper of the 14th of October an article taken from the statements of Dr. Benj. Clark and Dr. Alexander Yale in favor of the use of milk as a diet in dysentery and typhoid fever. They give no dates as to when they commenced to use it. I am now in my seventy-fifth year, and have witnessed several epidemics of dysentery, typhoid, have used milk in every case coming under my care for near "specifics." Milk is the natural food of all mammalians. It not only sustains life, but promotes the growth of every part of the system. No other article contains all those ingredients. It is the recuperative power of nature that performs the cure; and he who studies how to assist it by sustaining the system is the best physician, and milk is one of the best agents that can be used. In dysentery I prefer fresh butterall irritating cathartics and purgatives. Mercury in any of its preparations is poison in dysentery or scarlet fever, and will add that in smallpox and scarlet fever I anoint the quietude, preventing congestion of the capillary circulation, transit did not recommend any further use of photography. and obviating the necessity of anodynes. I have practiced the greasing for thirty-five years, and was sneered at by my medical brethren for it and the milk treatment. Now, I believe, it is in general use with the best results.

W. W. TOWNSEND, M.D.

Philadelphia, Pa., November, 1882.

The Coming Transit of Venus

BY PROF. C. A. YOUNG.

The planet Venus, which all the summer has been conspicuous in the evening sky, reached her greatest distance from the sun upon the 26th of September, and, returning the transit, and eight parties are to be put into the fieldupon her course, is now fast approaching the sun again. On the 6th of December she will pass across the southern portion of the solar disk as a small, black spot, easily visible to the naked eye. The transit, as it is called, will begin in the neighborhood of Boston at about nine o'clock, and will end at about half-past three.

The interest of the event lies not very much in the phenomena presented, but mainly in the fact that transits of $\overline{\mathbf{V}}$ enus are exceedingly rare, and that until recently they were sup- (Texas), Washington, and Cedar Keys (Florida).

posed to furnish the most accurate data for determining the distance of the sun. The only transits thus far observed occurred in 1639, in 1761, and 1769, and a few years ago, in 1874. The two next transits, after that of next December, will not take place until the years 2005 and 2013.

It is obvious, of course, that when Venus is between the earth and sun she will look like a black dot upon the sun. and, moreover, that observers at different stations on the earth will see this dot in slightly different positions on the disk. Now, without going into details or explanations as to the why and how, it is enough for our present purpose to say that if observers at widely separated stations of known geographical position will furnish accurate data which determine the precise places on the solar disk occupied by the planet at some definite instant, then we can also compute easily the parallax and distance of the sun. But-and here the act at issue is, to place emphasis on the words "subject is trouble—if the data are not extremely accurate, our final result will be widely incorrect. Its value all turns upon the degree of accuracy attainable in the observations.

> The observational data may be of three kinds: they may consist of observations of the precise moment at which the disk of the planet touches the disk of the sun-"contacts," technically so called; or of measurements, made during the transit (with a heliometer), of the distance between the planet and the sun's disk; or, finally, of photographic pictures taken at known instants. These pictures are "measured up" afterward, and show autographically, so to speak, where the planet was each moment.

> When Halley, about 1680, secured the attention of astronomers to the value of these transits, he supposed, and so did every one, that the moment of contact could be observed with an error not to exceed a second or two. Were this so, the observations of a single transit, by a reasonable number of observers, ought to have settled the parallax of the sun within one one-thousandth of its value, and determined its distance within 190,000 miles.

> In fact, however, it appears that from the whole body of contact observations made in 1761 and 1769, more than a hundred in number, nothing further can be certainly concluded than that the sun's parallax lies somewhere between 8.6" and 8.9"; its distance between ninety-five and ninetytwo millions of miles. It was hoped that a century of improvement in telescopes would have made this sort of observation more accurate by this time. But the gain, though real, has been comparatively small. From the contact observations of the English parties in 1874 the most eminent calculators deduce results ranging from 8.76" to 8.88", and the difference means a million and a quarter miles in the sun's distance.

> The discrepancies are due to slight differences of interpretation put by the computers upon the language used by the observers in describing what they saw; the question being which one precisely of the different phases of the phenomena was really that of the true contact.

The atmosphere of the planet, the so-called "diffraction," and the optical imperfections of the telescope and eye, all conspire to produce uncertainty. The writer himself observed the transit of 1874, and most vividly remembers how gradual, elusive, and perplexing were the phenomena, which endured for at least a minute at each internal contact, and made it quite impossible to fix upon any single second as scarlet, and relapsing fevers, smallpox, measles, etc., and the true one. While this is true, however, it may perhaps still be possible for practiced observers, with similar teleforty years, in every stage of the disease. I will not say it scopes, to come to some reasonably close agreement as to is a cure, for I do not believe in the so-called "cures" and the instants of certain phases in the slow progress of the event.

> The method of heliometric measures was employed by the German parties in 1874; but no results of their work have yet been published, so that it is hitherto impossible to compare its accuracy with that of the other methods.

Photography was pretty thoroughly tried at the last transit by nearly all the parties, and in several different ways. milk, and all the patient wants is perfect rest, and discard The English and Germans used telescopes mounted in the ordinary way, while the French and Americans used long stationary horizontal telescopes, and directed the light the physician who gives them will never be very successful. through the lens by means of a mirror. So far as can be If his patient recovers it will be despite his treatment. I judged at present, however, these photographic operations were mostly unsuccessful. The pictures were not found to patient from head to feet with olive oil by means of a badger permit of sufficiently accurate measurement to be of any brush, and repeat as often as it disappears, thereby allaying use, and the commission of European astronomers which sat the heat, keeping open the pores of the skin, producing in Paris last spring to discuss the observation of the coming

> The American photographs, however, turned out better, as did those taken by one of the Russian parties (at Port Possiet); indeed, to say the least, their results seem to be quite as much to be depended on as those of the contact observations.. In this state of the case the American astronomers have felt that, all things considered, the photographic apparatus which was prepared for the transit of 1874 should be used again, and a fresh and most careful attempt should be made to "run the thing for all it is worth," as a college boy would say. Near the close of the last session of Congress an appropriation of \$75,000 was accordingly made for four in the Southern hemisphere, and four in the United States. Professor Newcomb's party goes to the Cape of Good Hope; Professor Boss to Santiago, Chili; Lieutenant Very to Santa Cruz, Patagonia; and Assistant Smith, of the Coast and Geodetic Survey, to New Zealand. In the United States, Assistant Davidson will observe at Fort Thorn, New Mexico; and the Naval Observatory professors (Hall, Harkness, and Eastman) will observe respectively at San Antonio,

The different observatories throughout the country will also co-operate as far as their means will allow. Princeton will photograph the transit with an apparatus precisely similar to that of the Government parties, and perhaps Harvard may do the same. Yale will use her new heliometer (the only one in the country) to make observations on the German plan. All possessors of telescopes will of course observe the contacts, and on the day of the transit Washington time will be telegraphed to every observer who desires it. A few foreign parties will observe in the United States, especially two German parties—one at Aiken, S. C., the other at Hartford, Conn. For the most part, however, the European astronomers go to the Southern hemisphere, leaving "America for the Americans."

It is not to be disguised that at present it looks as if more accurate determinations of the solar parallax are to be got by other means than by transit observations; as if this old method would prove to be inferior to newer ones, and must finally be superseded. At the same time, this is not quite certain yet; and although some of the leading astronomers have been rather disposed to give the event the "go by," still the prevailing sentiment has been overwhelmingly in favor of making all that is possible out of an opportunity which will not recur for more than a hundred years.—Boston Journal of Chemistry.

Action of Hydrated Oxide of Copper on Sugars.

A German with the suggestive name of Hönig (Honey) has been studying sugars in connection with Habermann, and their results are published in a Vienna journal.

Hydrated oxide of copper was prepared by Boettger's method, and in its perfectly pure state was found to be far more permanent than the ordinary hydrate. It would keep for months under water in closed bottles without suffering any change.

The experiments were performed by putting an aqueous solution of the sugar in a flask with a return cooler, the hydrated oxide of copper added, and then gently boiled: after each reduction of the oxide a fresh quantity was added, and so on until the reduction was much slower, which required unequal times for different sugars.

Cane Sugar.—Ordinary white rock candy of the stores was employed in this experiment. A perceptible reduction of the hydrate did not begin until the boiling had continued several hours and there began to be an evolution of carbonic acid. The reduction, which went on rathar largely at first, was much more rapid after the addition of a second and third portion of hydrates. The evolution of carbonic acid became more lively and then subsequently slackened considerably. There is no doubt that in the early part of the process the cane sugar was inverted, when the rest of the process can be readily understood from what follows. The concentration of the sugar solution seemed to exert no special influence on the whole operation.

Invert Sugar.-White rock candy was dissolved in water and inverted by boiling with about two per cent of sulphuric acid. In some cases the sulphtric acid was removed and then hydrated oxide of copper added, and in other cases the latter was added without previously precipitating the acid. The reduction of the hydrate began a short time after the liquid began to boil, and was completed much sooner in an alkaline than in a neutral solution.

Grave Sugar.-The sugar used was a pure preparation made by the Schwarz-Neubauer process. In neutral solutions the reduction was quite slow to begin and went on slowly. Here, too, an evolution of carbonic acid began simultaneously with the reduction. But in solutions to which caustic baryta and potassic hydrate had been added, the reduction began as soon as the hydrated oxide of copper was introduced into the warm solution, and it also proceeded much more rapidly.

Fruit Sugar.—This was prepared from inulin by the wellknown method. In neutral solutions the reduction of the copper compound began much sooner than in dextrose solution; scarcely any further increase of activity was noticeable in the alkaline solutions of fruit sugar. In alkaline solution it began at the ordinary temperature with considerable rapidity and ran on to completion.

Boettger's method, referred to above, consists in adding ammonia to a boiling solution of copper sulphate until the precipitate begins to turn blue; this granular crystalline basic salt is then treated with moderately dilute potash or soda. It forms a beautiful sky blue hydrate, easy to wash and dry, and keeps a long time even when moist.

Tea and Coffee Extracts.

An aqueous extract of tea, coffee, cocoa, or ginger, is made by boiling it for fifteen minutes in water containing sulphate of lime in solution, then cooling to 60°, when a solution of tannic acid, previously boiled till nearly devoid of smell, is added. A precipitate occurs and is filtered out. It is then left_to stand for a day, and an aqueous gelatine solution of three or four grains to the ounce of water is added in quantity nearly sufficient to precipitate all the tannic acid. The liquor still containing a little tannic acid is strained and

"Present evidence," says Prof. Owen, in Longman's Magazine, "concurs in concluding that the modes of life and grades of thought of the men who have left evidences of their existence at the earliest periods, hitherto discovered and determined, were such as are now observable in 'savages,' or the human races which are commonly so called."

NEW FIRE ESCAPE.

The necessity of a permanent and efficient fire escape as a fixture on all buildings not absolutely fireproof throughout, is manifested at every conflagration in cities or large towns or in high isolated buildings, and authorities are recognizing the fact that the only fire escapes thoroughly reliable under all circumstances are those of the class applicable to buildings as permanent fixtures.

We illustrate a fire escape which is probably the simplest, handiest, and safest of this class. It is composed of a vertical iron ladder placed about 18 inches from the wall of the building, supported by side stays. One end of the stay is secured to the building, the other end of the stay being secured to the ladder. Persons can descend on the inside of the ladder with their backs supported by the wall, allowing the free use of their hands, while the side stays prevent them from falling sidewise.

This simple fire escape enables more persons to descend in a given time than any other fire escape now in use. They may descend on the inside of the ladder, on the outside of the ladder, and on the side stays—allowing three persons to

Balconies are erected on either side of the ladder, at the windows, ready for escape. The floors of the balconies are made of wire mesh work, to prevent the feet of the person from slipping and to prevent the accumulation of ice and

We are informed that this fire escape has been approved by the fire commissioners. It certainly requires very little examination to enable one to see that nothing could be simpler, safer, or cheaper. Many of them have been applied to prominent buildings in Philadelphia, where it is found to fulfill every requirement and is found to not mar the appearance of the buildings to which it is applied.

The invention has been patented by Mr. J. B. Wickersham, of 505 Cherry street, Philadelphia, Pa.

NEW WOOD-WORKING MACHINE.

Among the new and useful inventions we find R. H. Andrews' Complete Wood-Worker, which is shown in the annexed illustration. This machine is a group of general tools, and cannot be called a combination, as all of the eight machines work independently of each other, and are thrown into and out of power by shifting belts and other appliances arranged for that purpose. The machine is light running, owing to the entire absence of cog gear, and the inventor claims that there is no other machine within the reach of the mechanic of moderate means and limited business facilities that will do the same amount and variety of work, considering the amount of floor room required to operate it, and the price at which it can be bought. The cross-cut circular is the ordinary railway saw (saw and table partly shown), with miter attachment, operated through the table

in the engraving, is operated above this table and under the lathe head, a guard or back support for the work being bolted on to the table. The chisel bar can be raised, low ered, and reversed without stopping the machine.

The lathe has fast and slow speed for wood and metal turning, and is similar to the ordinary lathe, except that the bed, when not in use, is pushed back through the support of the lathe head. The lathe mandrel is hollow to admit of a dowel cutter attachment. The lathe as shown in the illustration is rigged for metal turning. The gig saw has no springs, getting its tension by raising the center pulley or ratchet arm or the crane. The crane is pivoted at the back, and when not in use can be swung quarter round out of the way. The circular rip saw

below the table by a screw at the end of the machine. This natural flow lines of water from the surface. In addition it tion and a selection of European cereals. Mr. Stanley, who frame carries a ten-inch saw, but when raised will take a sixteen-inch saw for special work. The upright shaper or moulder spindle is screwed on the upright shaft, and can takes it to a point ten miles below the city and there be removed when not in use. The shaper is reversible and gets its lines for work by adjusting the table. The mandrel for boring bit is also used for a butting up saw for work that is too wide for the regular cross-cut.

The tenon cutter gets its lower line for work from the table, upon which is placed a sliding guard or work holder. the main drainage sewers are capable of taking some rain

place by set bolts. The table is on double inclines, and can ley line sewers into which the intercepting sewers discharge be raised or lowered at either end of the machine, and their surplus during storms. stopped at any point up to four inches. The emery wheels for grinding tools are a simple attachment for convenience. The attachments for sawing dovetails, carving, and a rotary planer for facing up wide stuff, are not shown.

Further information may be obtained by addressing the



WICKERSHAM'S FIRE ESCAPE.

patentee, Mr. R. H. Andrews, of Washington, D. C.; also see advertisement in another column.

The Disposal of Sewage in European Cities.

In an elaborate report on the sewerage systems of European cities, with special reference to the needs of Philadelunder the lathe head. The mortiser, which is partly shown | phia, Mr. Rudolph Hering notes that London has a com- tion. Berlin has but a small river flowing by it, which

The general alignment in Paris is partially an intercepting and partially a valley line system, owing to the topography. The sewage is discharged into the river below the city. The irrigation fields, now in preparation, receive about onefifth of the whole amount. A small portion reaches them by gravity, the rest is lifted nearly thirty feet. The sewage from the higher grounds is intercepted so that it will not flood the lower ones during heavy storms. The sewers along the banks of the Seine are also intercepting.

Berlin has a peculiar system, due to its flat position and the necessity for purifying the entire sewage. The latter is to be collected at twelve different points, to which the sewers converge radially, and from each of which it will be pumped directly to the farms.

Vienna has a natural valley line system, except two intercepting sewers, along the banks of the Wien Creek flowing through the city.

In Liverpool, the sewers partly follow the natural slopes, and partly cross them where it is necessary to intercept the storm water. The sewers finally discharge directly into the Mersey, in front of the city.

In Hamburg, intercepting sewers predominate on account of the necessity of keeping the sewers out of the numerous canals and the Alster lakes. The sewers discharge finally into the Elbe, in front of the city.

In Frankfort, the low grounds near the river made an intercepting system preferable, and it has been carried out in a consistent manner over the whole city. Rain water overflows, however, lead to the river directly from many points. The intercepting sewers discharge below the city.

From a study of the alignments in these cities, it will be noticed that the system of interception is made use of, partially to prevent an undue accumulation of rain water at the foot of slopes, partially to prevent sewage or rain water from flooding low districts, and partially to prevent sewage from flowing into the rivers in front of the cities.

A more detailed study will further reveal that an early concentration of sewage into a few larger sewers is preferable to keeping it more uniformly distributed over the area in a number of smaller ones, and a calculation will show the economy of this.

Finally, it will be clear that the manner of disposal of the sewage depends on the body of water flowing by or near the city. The Thames is capable of receiving the London sewage without injurious effects. The Seine, being much smaller and very far from the sea, is objectionably polluted, and the sewage is therefore to be purified on the sandy plains of Gennevilliers below the city.

Vienna discharges its sewage at present into the Danube canal, but is preparing to lead it into the Danube itself, the capacity of which is sufficiently large to prevent any pollu-

> makes purification of all the sewage a neces sity.

> Hamburg and Liverpool are situated along large bodies of water. and discharge into them without objection.

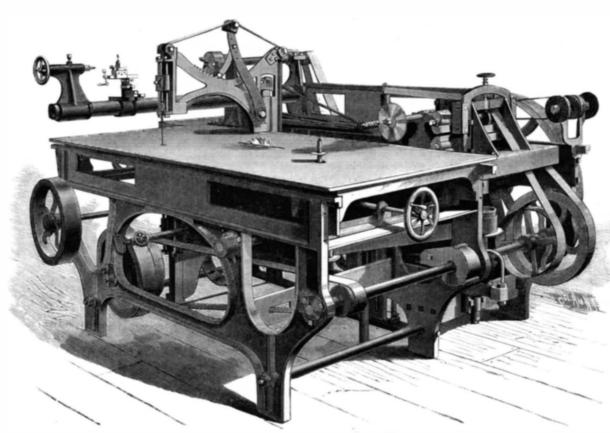
Frankfort discharges into the Main, but steps are now being taken to purify the sewage, as the danger of pollution by the rapidly growing city is fast approaching.

Commerce on the Congo

November 12, 1882, is likely to prove an important date in the commercial history of the Congo country, Central Africa. On that day the steamer Harkaway sailed from Antwerp for the Congo River, carrying an assortment of goods for the establishment of trade with the natives of the interior by the International Association, whose agent is Henry M. Stanley.

is in Nice recruiting his health, will return to Africa early

MALLEABLE BRASS -A German periodical is responsible for the following method of making malleable brass: Thirtythree parts of copper and twenty-five of zinc are alloyed, the copper being first put into the crucible, which is loosely covered. As soon as the copper is melted, zinc, purified by sulphur, is added. The alloy is then cast into moulding



ANDREWS' WOOD-WORKER.

is fast in its frame, and when not in use can be lowered plete system of valley line sewers, which follow closely the The steamer carried also a number of sheep for acclimahas main drainage works, a system of intercepting sewers which prevents the sewage from entering the Thames, and in 1883, discharges it into the river at outgoing tides. A portion of the sewage thus intercepted flows off entirely by gravity.

A greater part requires to be pumped; a small portion is even lifted twice before it reaches the outfall. Although The upper cutter is put in line by a screw, and is held in water, most of it reaches the river directly through the val- sand in the shape of bars.

THE GREAT TUMBLE WEED OF THE PRAIRIES. (Cycloloma platyphyllum.)

JOHN R. CORYELL.

During his wanderings in the great West, Mr. Daniel C. Beard, the well-known artist and naturalist, came upon a curious vegetable growth known popularly as the tumble time he was unable to secure a specimen of the weed, but self, and he may not comprehend the necessity for the exlately, through the kindness of Mr. Henry Worrall, of the Department of Agriculture, Topeka, Kansas, he was enabled thing there seems to be inherent a continual effort to propto obtain photographs of some of the finest specimens of the agate its kind. Examples of the working of this spirit great weed preserved in the buildings of the department. cannot be necessary, for even in the cities, the trees—the The genial gentleman referred to was even courteous enough ailantus, for example, with its winged seeds—give evidence diseases common to the lot of all, was not sufficient, the

A startling story is told by the veracious Western man of a party of English tourists who were out on the plains on a shooting excursion. They had been out the greater part of the day without meeting with any game, and were repeating for the hundredth time that their luck was "beastly," when one of them noticed a large animal some distance away, which was approaching them in a leisurely but apparently inquisitive manner, for it paused occasionally as if to study them.

The Englishman pointed the animal out to his companions, and they agreed among themselves that it must be a bison, though its movements were different from those of any four-legged creature they had ever seen before. However, they did not make much of that fact, as a breeze that had sprung up had raised considerable dust and made it impossible to see very clearly.

It was so evident that the bison—if such it were—was attracted by curiosity, that

had heard spoken of as very successful with the antelope. Accordingly he lay upon his back and kicked his heels in the air, while the crack shot of the party prepared to shoot when the proper time came. The creature was so far away and approached so slowly that the decoy grew tired and had to be relieved. It was so evident that they were drawing the creature toward them, however, that each in turn cheerfully and even enthusiastically kicked himself tired.

The breeze had grown momentarily stronger, and though it was fortunately blowing toward them, it created so much dust that it was not easy to get good aim. However, the animal had increased its pace, and with an occasional bound into the air was rapidly approaching them. It was impossible to make out which was his head and which his side, so the appointed hunter, with as careful aim as the strange character of the game rendered possible, fired.

The animal had been hit, for they could see the furfly, but it paid no attention to the shot, unless it was to bound into the air and increase its speed so much that in a few that this deadly agent is as rampant as some writers would tenia to the discomfort of his alimentary canal. In infancy

moments it was near enough to be easily distinguished. It was an uncouth monster of huge proportions, and progressed not in the usual way, but by a series of prodigious leaps. The hunters were greatly startled by the appearance of this unknown animal, but they realized that they must lose no time in shooting if they hoped to keep it from them. They all fired at once; but whether wounded or not, the monster only sped the swifter.

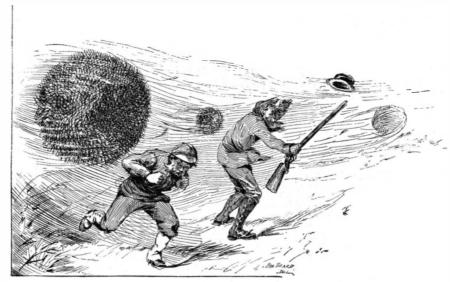
They paused in amazement for a moment, but were roused into sudden activity when one of their number shouted that a whole herd of the monsters was upon them. True enough all over the plain they came with frightful rapidity, making such tremendous leaps that there seemed as many in the air as on the ground. The hunters lingered no longer, but with the haste of terror threw everything from them, and ran to such purpose that they distanced their pursuers and found shelter late in the afternoon in the from which they had started. story caused a great sensation, but not of precisely the kind they had expected. The next morning it was found that the tourists had left for San Francisco.

The story, if not true, at least serves well to illustrate the peculiar habit of the great tumble weed. have us believe. "In fact," it says, "we are confident that This strange growth, which belongs to the pig weed family. is very abundant in the great Arkansas valley, and varies in size from the huge specimen shown in the illustration to one foot or less in diameter. It grows upon a disproportionately small stem, which, however, is of sufficient stoutness to sustain the mass until it has ripened and dried, when a slight gust of wind will suffice to blow it over and snap the brittle

It now rolls over and over at every puff of wind, and over any impeding bowlders or bushes. In a high wind the fantastic spectacle produced by a number of these balls of varying sizes can easily be imagined. And as the English hydrogen, or sewer gas proper, attacks the lead and turns it torpedo.

tourist with his store of wonder adjectives and odd expletives is the stock butt of the Western man, it is not strange that he should be brought into service to illustrate the most striking feature of the tumble weed.

Aside from its spectacular phase, this habit of the tumble weed may be viewed in an even more interesting light. weed and scientifically as Cycloloma platyphyllum. At the Man sees everything from the standpoint of utility to himistence of the tumble weed at all; but in every created to permit himself to be used as a medium for comparison. of it. The fantastic and seemingly senseless whirling, roll-



THE GREAT TUMBLE WEED OF THE PRAIRIES,

one of the hunters determined to beguile it by a device he ing, and bounding of the tumble weed, when understood, into hay fever, the Bacillus typhosus gnaws at his tell the story of a unique plan for distributing seed.

The Plumbers in Luck.

The sanitary boards in cities and towns, a class of persons denominating themselves sanitary engineers, and a few weekly and monthly journals devoted ostensibly to sanitary subjects but really conducted in the interest of plumbers and dealers in plumbers' supplies, seem to be creating unnecessary alarm in the public mind by their frightful reports of defective plumbing, and the consequent danger to health. There is no doubt but much good will result from the awakened interest in the subject, but there is a likelihood that a great many will go to great expense, and subject themselves to a great deal of annoyance, in having their plumbing arrangements changed when there is no real necessity for it. A recent number of the Builder and Wood Worker, referring thick, ropy, and unpalatable. to sewer gas, while admitting its poisonous qualities, and that it spreads disease and death in our dwellings, does not believe

black almost at once. When painted work in a room turns black or gets a leaden color, then beware, for a deadly foe is at hand, and the sooner you annihilate it the better for your peace of mind. A little watching will soon convince you whether sewer gas is present or no. If it is, discoloration of painted work will rapidly take place and hoist the signal of danger; if not, then the paint will retain its original color, subject only to the darkening process which comes of usage and exposure."

The Pestered Man of Earth.

As if the actual suffering of mankind from the various Hahnemannian Monthly, of Philadelphia, enumerates the

following possible cause for many mysterious complaints which baffle the skill of the most experienced physicians to cure, and enough in number to frighten a well person into a nervous fever: Commencing at the mouth, the virulence of human saliva seems to have been proved. It is supposed to be due to micrococci. The human mouth is a culture chamber, which is maintained at a constant temperature, and is furnished with a constant supply of pabulum, namely, saliva. These circumstances are highly favorable to the sustenance and multiplication of the micrococcus. If, now, it is asked why every man does not suffer from auto-inoculation, it may be answered that micrococci may kill an herbivorous animal, a rabbit for instance; but cannot destroy a carnivorous or omnivorous animal as man. (See Philadelphia Medical Times, September 9, 1882.) Most earnestly do we urge vegetarians to take timely warning! But what is to become of the genus homo, anyhow? Vibriones tickle his nose

bowels, the micrococcus diphtheriæ swells up his throat or clogs his larynx with fatal croup, sarcinæ invade his stomach, and micrococci envenom his saliva. If he eats a bunch of grapes, he must needs crunch the parasitic saccharomyces adhering to the skins; and if he inadvertently exposes the contents of his pantry to the open air, a blue green mould from the Penicillium glaucum spreads itself over the best preserves; bubbles line the glass jars, and wriggling organisms and motionless forms looking like beads on a string, sour his milk. The greed of the yeast plant for oxygen is the cause of the raising of his bread, and the same craving on the part of the Mycoderma vini, supplies him with wine. But if he does not carefully watch these results of fermentation, mould gathers on one, and the other falls a victim to the spores of the viscous ferment and becomes

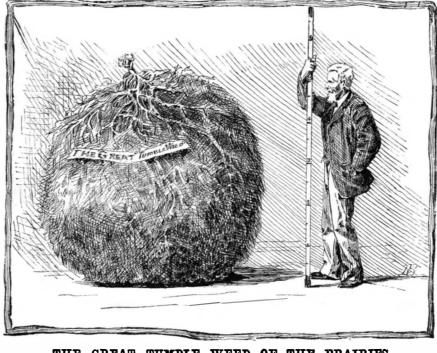
If he indulges in pork, trichinæ nestle cosily in his tissues, or the Cysticercus cellulosus develops into twenty feet of

> and childhood, thread worms and lumbricoides disturb his sleep and torture him with colicky pains. Disease germs expose him to whooping cough and mumps, and threaten him with a long line of exanthemata; and when, the gauntlet run, he comes into youth, that fell destroyer, consumption, fed, if Koch is to be believed, by bacilli, leaves him but six out of seven chances of ever reaching the period of maturity.

> If, by good fortune, he escapes this danger, others meet him at every step. Through the parsimony and dishonesty of city officials, streets are filthy and sewers are imperfect. If he flies to the country, perchance a dry summer and an open winter permit the generation of miasmata. And even if he seeks the salubrious atmosphere of a sea resort, defective sanitation poisons his bedroom or permits the discharges from a drain to empty a few yards from his bathing place.

> And finally, when he falls a victim to or, happily escaping isease fungi dies of good old age, his mortal remains are no sooner consigned to the grave than a host of maggots and kindred scavengers complete the work of devastation, and thus does the man of earth become con-

verted into the numerous bodies of his numerous destroyers.



THE GREAT TUMBLE WEED OF THE PRAIRIES.

half the ailments attributed to this source do not result from it at all, but from other causes. While we admit that the evil is great, and that thousands suffer from the effects, we are disposed to the opinion that the terms 'sewer gas' and 'malaria' are employed to cover the inability of the M.D. to properly diagnose his patient's complaint, and that attributing the ailment to the mysterious agency of this subtile gas serves the dual purpose of giving an air of smartness being both light and elastic will perform a series of bounds he is unable to cope with. The presence of sewer gas may always be detected in an office, room, or bath if the wood-

W. H. Mallory.

Colonel W. H. Mallory, inventor of the screw steering propeller which bears his name, died in Bridgeport, Conn.. November 8. He was born in 1840, was graduated at Trinity College, Hartford, Conn., in 1860, and earned his military title in active service with Duryea's famous Zouaves. to the physician and covers his retreat from a position which Besides the steering propeller, which is employed on the United States torpedo ram Alarm, Colonel Mallory made several inventions which brought him considerable profit; work has been painted with white lead, as the sulphureted and at the time of his death was engaged in perfecting a

How Cable Messages are Received.

Until the forepart of November the French cable, having its terminus at North Eastham, Mass., employed the flash system of signaling. Now the cable is worked duple ${\bf x}$ on the Sterns system, using an automatic recorder by which the messages are received in ink on a narrow strip of paper.

By the system which has been displaced the messages were spelled out by flashing a ray of light back and forth across a standard line, the right and left flashes corresponding with the dots and dashes of the ordinary telegraphic alphabet.

In this system the light is flashed by reflection from an extremely light mirror which is turned to right and left by the opposing influences of positive and negative impulses. This system has the advantage of being operated with very no permanent record.

To secure the latter very important end the recording instrument has been adopted. The press dispatch announcing the change states that in the new recorder the ink is discharged by the agency of electricity and "not by capillary attraction as in other cable recorders." This statement is incorrect, electricity being now similarly employed in the recording instruments used at Heart's Content, the Newfoundland station of the Anglo American Company's cables.

A recent visitor to Heart's Content describes as follows the method of receiving messages at that point. The recorder is a horseshoe magnet, electrified by the usual circles of fine wire, and attracting a small metallic coil. The coil and a thread almost as fine as the strand of a cobweb, is connected with a delicate siphon hung in a little reservoir of ink. The ink is electrified, so as to produce a repulsion of the particles, making it flow more readily through the end of the siphon rests against a paper tape playing perelectric strain necessary for working the cable.

Let us imagine now that a coming message has been signaled from far across the ocean at Valentia. The operator at first opens the simple machinery that works the brass rollers, the siphon at first marks only a straight line. Suddenly the line swerves to the right or left. The message has started, and the end of the siphon has begun its record. Worked by two keys, and positively or negatively electrified, the coil swings the siphon point now to one side, now to the other, along the tape. Responsive to the trained hand of the operator, the filament of ink marks out one notch, two notches, three notches; then suddenly it may be a high elevation or depression until the delicate line traced on the tape looks like the tiny outline of a mountain range. But it is a range whose every hilltop, peak, and valley means an alphabetical symbol to the telegrapher's eye. The recorder is the invention of the famous electrician Sir William Thomson. How delicate an interpreter it is may be inferred from the fact that ten jars work 1,800 miles of cable between Valentia and Heart's Content, while twenty-five jars of the same electric power would be needed to work 350 miles of land wire; in other words, the recorder is more than twelve times as efficient for its purpose as the ordinary Morse instrument. The recorder traces its characters on the tape about as fast as a slow penman copies a letter. Besides its delicacy of work, the recorder, as its name imports, has the merit of leaving the record of the message.

Dyeing Leather.

In the glove trade the leather has hitherto always been dyed by brushing on the dyes by hand. The defects of this method are: its slowness, the occurrence of large, soiled edges on the fleshy side, and, notwithstanding every care being taken, the uneven character of the dye produced. To avoid these, Joseph Kristen, of Brünn, has a process in which even dyeing is obtained by the application of centrifugal force. The skin to be dyed is fixed on the center of a horizontally rotating disk; the color is also fed on to the center, and by the rapid revolution of the disk, is spread equally over the whole surface. The color is forced on to the disk by means of a pump, or it merely flows from a reservoir standing at a higher level. The excess of color driven off at the edges of the revolving disk is collected and used over again, until the skin is fully dyed. To dye one skin by this method takes from ten to fifteen minutes. A single color pump may serve for at least five machines, which would require only one attendant, so that, by the above arrangement, one man could, in twelve hours, easily dye 150 skins, possessing great evenness of dye and free from spotting.

Large Sailing Ships.

The Cyrus Wakefield, one of a number of large wooden ships lately built in Maine, was in this port recently. The vessel is handsome as well as large-about 265 feet long over all; 44 feet beam; draught when loaded, about 24 feet; and tained). Two donkeys had to be fitted for feeding the capacity for about 3,000 tons dead weight. She is 2,013 boilers, each having a 3½ inch plunger and 7-inch stroke. tons register.

A still larger ship is now in process of building in Maine. It is to be 2,400 tons register. The largest sailing 11/2-inch pipes being fitted to take the steam from each of the plosion men were killed by such missiles. vessel afloat is the American ship Three Brothers, formerly the steamer Vanderbilt. She is 2,935 tons, 320 feet long, and 48 feet beam.

Fresh Water from the Sea.

Egypt, and to the fact that it lay practically at the mercy of the enemy, extensive preparations had to be made for the condensing of salt water, in order that there might be no danger of a serious want of this necessity of life. The London Times gives a memorandum which was drawn up by an officer of the fleet on the subject of the arrangements which were made at Alexandria for condensing and supplying but the result was disappointing. Only about 45 tons of the condensed water, from which we make the following abstract:

It was decided to fit the large premises of the Alexandria Cotton Pressing Company, at Gabari, as the principal condensing establishment, with another in the Arsenal, utilizing there the boilers of some engines which had been emslight electric impulses, but also the disadvantage of leaving | ployed for pumping out a dock now filled with water and no longer used. The Gabari establishment was very conveniently situated as all the troops landed there, and close round it were grouped barracks, the headquarters of the Transport, the Commissariat, and Military Hospital. 1t was about 300 yards from the harbor, and about 35 feet above the water level. The premises were very large, with broad streets on two sides and a courtvard. It was two stories high, and had a convenient fitting shop in the building. There were five large boilers in excellent condition. To enable these premises to be adapted to their new purpose the following work was done: Four out of the five boilers were disconnected from the engines, and pipes were fitted to conduct the steam to two iron reservoirs already on the is hung between the magnetic poles, and by a light lever | premises, which were fitted as condensers. The fifth boiler was reserved for working the lathes, etc., in the fitting shop, and the auxiliary engines, feeds, etc. These condensers were iron tanks of about ten tons capacity. In one of these was placed three coils of 1-inch iron piping, 600 ft. in total siphon, which outside is about the size of a darning needle, length; in the other two coils of 2-inch piping, total length and the interior tube scarcely larger than a hair. The lower 240 ft. The circulating water was thrown up from the harbor by a 4-inch centrifugal pump worked by an 8-horse pendicularly through rollers. The whole machine is almost power portable driving engine, 2½-inch iron gas piping being of gossamer fineness and flexibility, so as to minimize the used. On trial it was found that owing to the length of piping the centrifugal was unable to throw a sufficient quantity of water to the required height on upper floor of the building. It was accordingly led into a tank placed in a cellar, and a donkey engine, already there, was utilized to rollers. On the center of the tape, as it passes between the throw the water the required height. This was found to answer, a sufficient quantity of circulating water (about 40 tons an hour) being obtained; and the condensers were able to supply 30 and 40 tons of water respectively per diem, the larger piping giving the best results. It was found, however, that the boilers were capable of generating a larger quantity of steam, and accordingly, a third condenser was built of wood by the carpenters of the fleet, and in it were placed two coils of 2-inch piping of a total length of 416 ft. An independent supply of circulating water was obtained by means of a 6-inch centrifugal pump driven by an 8-horse power portable engine and 4-inch iron piping. An ample supply of circulating water was thus obtained from near the locks at the entrance of the canal, a distance of 220 yards. This condenser was never used to its utmost capacity, which was certainly at least 60 tons per diem (or Bittern, was in charge of the whole work. 360 barrels, or 1,500 gallons).

For storing the water three large open wooden tanks were made by the carpenters of the fleet, each capable of holding 12 tons of water and ten old wooded tanks that had been used in Abyssinia, of a capacity of about 41/2 tons each, were sent from Malta. These were raised well above the floor of the building and connected with each other. Pipes were led from the condensers along the floor overhead and discharged their water into a zinc-lined box thickly perforated and placed over one of the open tanks; the water while falling into the reservoir was thus broken up, cooled, and aerated. These reservoirs (containing an aggregate of about 80 tons of water) were connected by pipes with two large iron troughs outside the building, placed high enough to discharge the water into the military water carts, and were fitted so that twelve or thirteen carts could be filled at the same time. Pipes were also led from the reservoir to fill wooden horse troughs, placed round the courtyard before mentioned, at which about forty horses could be watered together. Some iron tanks of a total capacity of 22 tons were also placed on the ground floor in immediate communication with the condensers, from which the men were to draw their drinking, cooking, etc., water in kettles. The work in this establishment was in charge of Mr. Welch, engineer of the Helicon, and the great success attained was largely due to his great zeal, ability, and intelligence. It was an exceptionally economical condenser, nine tons of water being made for a ton of coal, without including the driving engines (including everything, about eight tons of water was made per ton of coals), or eight pounds of fresh water per pound of fuel. An entirely different plan was carried out at the arsenal dock condenser. In this case the boilers were about twenty-five yards from the dock which was used as a condenser, the steam being conveyed thither from the boilers by three 3-inch iron pipes (a single large pipe would have been better probably, but it could not at the time be ob-The arrangements for condensing the steam were as follows: On reaching the dock the steam was again subdivided, three three main steam pipes. These smaller pipes were bent, and laid about, on an average, five feet under water along

water into an iron receiving tank placed at the side of the Owing to the peculiar nature of the fresh water supply in | dock, the total length of piping being 900 ft. This receiving tank was placed in connection with five other iron tanks, fitted with cocks for drawing off the water and connected with large iron troughs for filling carts ten at a time, as at Gabari, an overflow pipe being led into an iron lighter capable of holding about 120 tons of water, and fitted as a tank. At first three coils instead of nine separate pipes were tried, water could be made per diem, and a considerable pressure of steam was required, which was objectionable, as the boilers were old, and no one could be found who knew anything about them. The alteration above described increased the output of water to about 70 tons and required only a very low pressure. It was never an economical condenser, 5½ tons of water only being made to a ton of coal; or 5½ pounds of fresh water per pound of coal; but on the other hand, having no auxiliary or driving engines, less supervision was required. The large consumption of coal was due entirely to the boilers being of very old pattern. This establishment and all the work done there was under the personal superintendence of Mr. Swinney, engineer of the Tamar, and I cannot speak too highly of his services there.

The Malta condenser was put together on the Arsenal jetty by Mr. Rigler, engineer of the Invincible. It requires careful watching and is fairly economical, seven tons of water being made with one ton of coal. Being quite complete in itself it would be most useful in any out-of-the-way place. It took about a week to remove it from the vessel that brought it and to get it erected and in working order. The arrangement for supply of the water was similar to that at the Arsenal Dock condenser. A vessel that had been originally chartered to take refugees to Malta, called the Maulkins Tower, being available, I had her surface condensers fitted for distilling water for issue, and placed her in a convenient position alongside a wharf near the native quarter. She has ballast tanks capable of holding over 300 tons of water. These were thoroughly cleaned and then filled with fresh water, which could be supplied by her pumps directly into tanks alongside. She was capable of distilling at least 70 tons of water per diem at a cost of a ton of coal for about 6½ to 7 tons of water. She was originally intended to supply the native population, but as they never felt the scarcity of water she was very useful in completing the transports and supplying the troops stationed at Meks. I made arrangements with His Highness the Khedive that his splendid yacht, the Mahroussa, should supply with her surface condensers all the water required at the palace, where a very large number of people (2,500) were constantly maintained. The yacht, with her numerous boilers, was capable of turning out 250 tons a day, but it was not intended to draw on her for the public unless required by urgent necessity. The sum of all these arrangements, it will be seen, provided for a supply of fresh water of 330 tons per diem, or nearly 70,000 gallons, without counting the Khedive's yacht. This would have fully met the requirements of the population estimated to be in Alexandria when the scarcity of water seemed imminent. Mr. Felix Foreman, chief engineer of the

The Utilization of Smoke.

A company at Elk Rapids, Mich., which manufactures fifty tons of charcoal iron a day, formerly allowed the smoke made in burning the coal to go to waste. Now the smoke as it is formed is delivered into stills charged with lime and surrounded by cold water, the result of the condensation being, first, acetate of lime; second, alcohol; third, tar; the fourth part produces gas, which is consumed under the boilers. A thousand cords of wood are converted into charcoal daily, yielding 2,800,000 cubic feet of smoke, from which are obtained 12,000 pounds of acetate of lime, 200 gallons of alcohol, and 25 pounds of tar. The alcohol has been contracted to a firm in Buffalo, N. Y., the Trade Review says, for five years, they furnishing the packages and receiving it at the works at 80 cents per gallon.

The gases usually wasted when iron is produced with stone coal or coke are now, in some European establishments, made to give up the tar, ammonia, etc., which they contain. Engineering reports that this is effected at the Gartsherrie Works without disturbing the smelting process and without materially lessening the value of the gases for heating boilers and similar work. A similar process has lately been introduced in the coke trade of South Durham, and at some of the coking collieries of France, the waste gases being used in the production of commercial ammonia.

Boiler Explosion in Cincinnati.

If the press reports are true, the disastrous boiler explosion which occurred in the Forest City Iron Works, Cincinnati, Ohio. November 13, cannot properly be called an accident. The boiler, 28 feet long and 41/2 feet in diameter, stood in

the center of a large brick building in which three hundred and fifty men were employed. The boiler was old, patched. and is said to have exploded once before.

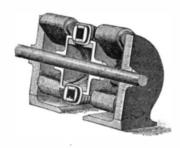
That such a boiler should be the occasion of a great disaster is less remarkable than that the number of killed should be limited to half a dozen and the wounded to perhaps a score. The building was wrecked, and fragments of iron work, masonry, and human bodies were scattered over a wide area. At long distances from the center of the ex-

Disasters of this character are not accidents; they are crimes. And owners of the building destroyed should be dock and raised at the other end so as to discharge their held to rigid responsibility.

RECENT INVENTIONS.

Dynamo Electric Machine.

The object of the invention shown in the annexed engraving is to produce dynamo electric machines so constructed that the current induced in the armature will be without wide breaks, and nearly continuous. The invention has been patented by Mr. Henry B. Sheridan, of Cleveland, O.



The machine has fieldmagnets oblong in cross section and arranged in two series in a circle around the armature shaft, with the poles of the opposing series facing each other, and arranged a sufficient distance apart to receive the armature between

them, the poles of each series nearly overlapping each other laterally and forming a nearly continuous magnetic field. With this arrangement the face of the pole of each magnet is arranged diagonally across the path of the armature ring, in the plane of its rotation. This brings the magnets into such positions that each section coil of the armature will pass upon the pole of each magnet at the instant it leaves the pole of the preceding magnet, so that the current induced in the armature will be nearly continuous.

Milk Can Lock.

This invention is designed to prevent unauthorized persons from taking milk from the cans. The lock consists of a small, compact casing secured to the neck of the can and

containing a socket for receiving a ratchet bar which is inserted through a hole in the can cover and pressed down into the lock casing, where the teeth of its ratchet are engaged by a spring pressed bolt. The can cannot be opened except by using the proper key to withdraw the spring bolt from the teeth of the ratchet bar. The engraving shows the construction of the lock and the manner



of applying it to the can. This invention was recently patented by Mr. Seymour Horton 622 Sixth avenue, New York city.

Extension Handle for Paint Brushes.

In painting surfaces, such as the roofs and outer walls of buildings, the painter often finds it convenient to use an extension handle to his brush, so that he can, while painting a horizontal surface, apply the paint while standing, or when painting a vertical surface extend the space over which he

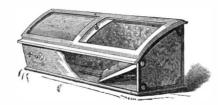
can apply the paint without moving his support. The engraving shows a cheap and efficient device for connecting brushes of various sizes to an extension handle, and is capable of holding the brush either in a vertical or horizontal position as may be desired. The device consists of a socket adapted to receive the brush handle in one end and the extension handle in the



other. There is also a socket for receiving the brush handle, which is provided with a side shank adapted to the socket at the end of the extension handle. This useful invention has been patented by Mr. George W. Smith, of 81 Middagh St., Brooklyn, N. Y.

Improved Burial Casket.

This invention consists in a coffin or burial casket in which provision is made for raising or arranging in a more or less elevated position the head and upper portion of the dead body, and of adjusting its inclination, so as to give



the corpse a more natural and life-like position. The body may be laid on its side, and will have the appearance of reclining in an attitude of repose, as if on a couch or sofa, and may be readily viewed from a considerable distance. This invention has been patented by Mr. John J. Tickner, of Sand Beach, Mich.

M. ZENGER ("Ciel et Terre") maintains that the hurricanes of the West Indies and the typhoons of the Chinese Sea have a period of twelve days, equal to that of the rotation of the sun.

Explosion of an Accumulator.

An accident lately occurred at the Locan Shaft of the accumulator of the new pumping machinery bursting into fragments and doing considerable damage to property, but injuring no one.

These pumping works are on the hydraulic system, now so successfully operating at the Combination Shaft, on the Comstock. The new machinery has only been in operation a couple of months and was working smoothly. It was started up and kept running some time under the personal supervision of Mr. Joseph Moore, Superintendent of the Risdon Iron Works, acknowledged to be one of the very best necessary and bridges built, and the road has, by means of mechanics on the coast.

The explosion is a very curious one and deserves more in the hydraulic system of pumping, and as it may be thought that this accident is due to a fault of the system, a brief exdeep, and that the water is to be raised that distance. Upon the 1,000 feet level is erected a pair of hydraulic pumping engines, which receive their pressure water through supply pipes from the surface. By these two pumps the drain water in doing the pumping is sent back through the return pipe to the reservoir on the surface. On the surface is a cast iron accumulator partly filled with water, the remainder of the space being filled with air. This air is kept constantly at a certain pressure by means of plunger pumps, which in turn accumulator with water and keep it on a pressure great is the principle.

It was this accumulator which exploded. The accumulathe Eureka Sentinel, we take the following concerning the disaster:

The accumulator burst about 30 feet below the cap, two sections of 10 feet each and the base below remaining intact. The theory is that the explosion took place at the line where the air and water met. About 20 feet of the accumulator went into pieces, varying in weight from some 1,800 pounds to an ounce or half ounce avoirdupois. The eastern portion of the works, as mentioned, was broken down, and completely wrecked. Eight large missiles went through the building, the two principal of which through the south and east ends. The loss to the wood work is estimated at \$3,000. The cost to replace the part of the accumulator destroyed will be river throughout its navigable length is the almost untamaprobably somewhat between \$10,000 and \$15,000. The total | ble cannibal tribes who inhabit the upper reaches between loss, to put everything back in smooth running order again, will not exceed, and will not be likely to reach \$20,000.

The cause of the explosion is totally unaccountable; it is a mystery. Each separate section of the accumulator had been tested up to 2,000 pounds to the square inch. It had been run before for weeks at a time under a pressure varying from 1,150 to 1,200 pounds, and it has been subjected to a pressure of 1,400 pounds. At the time of the explosion the pressure was 1,030 pounds, according to the testimony of the Mill, Alleghany, operated by the Messrs. A. C. and C. H. engineer, Mr. Boston, who is a remarkably carefulman, and Kloman, of that city. This was performed at the first his statement is doubtless correct, for there was no occasion for any greater pressure than was on. As mentioned, the point of explosion was in the second and third sections from the top, above the water line. This is evident from the fact that these were torn to pieces and hurled to great distances, while the four lower sections and the top section merely fell tion Company, of Philadelphia, to furnish them with an unoff, and were found near the base of the accumulator. What | limited number of these steel springs, which are designed to renders the explosion difficult to account for is that the material of which the accumulator was manufactured was of blooms of 0.55 per cent carbon open hearth steel, were made the very best-cast out of 25 per cent steel and 75 per cent by the Spang Steel and Iron Company, and measured six of the first quality of pig iron, the breaking strain of which mixture was 33,000 pounds to the square inch.

tion to be of the best quality, without defect or flaw anywhere. Tested with the chisel, the mixture cuts as wrought one-half inch in thickness and one hundred and fifty long. iron, and being struck with the hammer, leaves a smooth. This strip was then taken back to the heating furnace and polished impression. The only defective place discovered by successive heating and rolling operations, involving the was near one of the flanges, and was not broken by the ex- use of the hydraulic attachment to the Kloman universal plosion, but the fall. This accumulator, according to rela-mill, was reduced in sections of thirty feet of the one half tive pressure, is 25 per cent stronger than the one in use at | inch strip to one-quarter inch in thickness, and thus in five the Combination Shaft on the Comstock, the latter being of reheating and rerolling operations was finally rolled out to iron entirely. This statement makes it clear that the explo-the desired length and thickness. It was then taken back sion was caused by some unknown force, the agency of to the furnace, and slowly drawn through the same and which is yet to be determined.—Min. and Sci. Press.

Mr. Stanley's Discoveries.

A correspondent of the London Globe who has interviewed Mr. H. M. Stanley, says that gentleman has had practically unlimited means at his command, through the generosity of the King of the Belgians, who, moreover, has been the main supporter of several of the so-called International African Expeditions; as Mr. Stanley puts it, he has been in a position to pay for every cubic inch of air he and his men breathed, and every square foot of ground they trod upon. The object of the King of the Belgians appears to have been entirely disinterested-simply to do what he could to render accessible to commerce and civilization, and thereby develop the resources of the great interior of Africa. For He states that already he has carried a well made road, 15 Ellerbeck, in British Journal of Photography.

feet wide on an average, from below the cataracts, 230 miles along the north bank of the river, far beyond Stanley Pool, Eureka Consolidated Mining Company, Eureka, Nev., the and therefore well into the navigable upper waters. To assist him in this undertaking he has not only had native workers, but relays of young Europeans as superintendents; and for this work he finds Englishmen better than any others, and would be glad to have a fresh supply to send out. So substantially has this road been constructed, that it has stood the deluges of rain that break down upon it from the mountain sides, and has borne the heavy traffic which the transport of engineering plant to the upper reaches has rendered necessary. Causeways have been laid where excavations, embankments of stone, and layers of earth, been carried right round the face of a mountain which comes than passing mention. As the mining community is interested | sheer down to the river at one place. On rounding the mountain, Mr. Stanley states that the road enters an avenue of exquisite beauty and coolness which has been cleared planation will be necessary. Suppose the mine is 1,000 feet through the forest. So thickly timbered is the country in some parts that thousands of trees have had to be felled, and their roots either grubbed up or leveled. At intervals along the road, stations have been planted, and already there is a regular service of couriers between the stations, and by them is raised through the discharge column, and the water used a growing trade is being established. As to what are the possibilities of commerce along this route, he states that during the progress of his work a million yards of Manchester goods have been distributed through the country in payment for labor and other services performed by the natives. One of the articles of transport along the new road was a fine are operated by a steam engine. These pumps supply the steam launch, with which Mr. Stanley has done some good exploring work some 400 miles above Stanley Pool, quite 700 enough to move the two underground pumps. This in brief | miles above the mouth of the river. When he feels at liberty to publish an account of his work (at present his first duty is to his employer, the King of the Belgians), it will be tor had been tested up to 2,000 pounds to the inch, but was shown, the correspondent believes, that some first rate exonly carrying 1,150 when it exploded. From the local paper, | ploring work has been done. The launch, for example, was taken up a new river, opening from the south bank of the Congo, some distance above Stanley Pool, and which, it was found, led into a fine lake. The lake was covered with fishermen's canoes, whose occupants looked aghast at the snorting monster puffing out smoke, and fled in dismay. One, however, was caught, and after being soothed down and kindly treated, was sent off loaded with presents to his wondering fellows peering from among the bushes on the shore. In Mr. Stanley's opinion, the soil is capable of unlimited development for crops of all kinds, and, by judicious use, the supply of caoutchouc in the forests is inexhaustible. The greatest difficulty to the utilization of the Stanley's furthest point and the neighborhood of Nyanginé.

The Longest Coil Spring in the World.

Probably the greatest feat in metal working ever performed, says the American Manufacturer, was that of the rolling of a steel strip six inches wide, one-quarter inch thick, and three hundred and ten feet long, at the Superior effort, and the product, coiled and tempered, was, on October 25, exhibited in the Penn Bicentennial parade. Philadelphia, and was much admired and wondered at by the masses there assembled. The Messrs. Kloman have contracted with the United States Spring Car Motor Construcenter into the construction of their new car motor. The inches wide, four inches thick, and twenty-four feet long, weighing seventeen hundred pounds. They were heated in The fragments thrown off were found upon close inspec- a special heating furnace thirty feet long, built for this purpose, and the blooms were in one operation rolled down to wound on a four-foot drum, thus putting it in shape for shipment on a railroad car.

Local Intensification during Development.

'A plan I have adopted during the development of interiors, and which is equally useful for bringing out the dark shadows of trees, etc., will be acceptable to many, especially to those who invariably under-expose their plates.

While allowing the developer to act, take a solution of ammonia a little stronger than the latter, and, with a brush steeped in this, apply it to the undeveloped portions of the plate, keeping the brush in motion and freshening it with more and stronger ammonia as required. This will frequently bring out details which, under ordinary circumthis purpose the Congo formed a splendid channel of com- stances, would be lost. The body of the developer prevents munication, only unfortunately its lower course for many the formation of hard lines by diffusing the strength of miles is obstructed by impassable cataracts. To surmount ammonia. The same principle can be applied to an overthis obstruction has been the object of Mr. Stanley's work. exposed plate, using pyro instead of ammonia. -J. H. T.

ENGINEERING INVENTIONS

Mr. Lewis Larchar, of Marble Rock, Ia. has patented an improvement in snow plows which consists of top, middle side, and rear side wings in addition to the ordinary front scrapers; also, top chutes back of the front scraper for more effectually throwing off such portions of the snow as fail of being thrown off by the main scrapers, also such as are thrown over and fall back behind the main scrapers.

An improvement in log chutes has been patented by Mr. William Henry Barnum, of Reno, Nev. This improvement relates to chutes for moving saw logs. As usually constructed, they consist of bare poles which have to be kept well greased in order that the logs may be moved. This greasing is expensive especially when the chute is extended a long distance and the labor of keeping the chutes in proper condition is an additional expense. This invention consists in the combination of rollers with the ways of the

An improved interlocking bolt has been patented by Mr. Thomas J. Bush, of Lexington, Ky. These interlocking bolts are adapted to bolt two or more blocks, planks, or pieces of wood, stone, or metal, together, or to secure any object to or upon another, without the holes in which the bolts are placed being made entirely through to the surface opposite to that against which the nuts or bars are screwed upon the bolts, the bolts being formed without heads, and used with only one bar or nut.

An improved balanced slide valve has been patented by Mr. Clarence E. Biddison, of Rock Island, Ill. This invention consists in the combination of a slide valve having opposite partially cylindrical end portions or bonnets constructed to form receiving spaces for the exhaust steam, and a valve chest divided by the valve to form a central exhaust steam chamber and outer end live steam chambers, and sliding packing plates applied to the bonnets, whereby the valve is partially relieved from pressure bearing it down on its seat, and is exposed to equal end pres-

MECHANICAL INVENTIONS.

An improved stump puller has been patented by Mr. Newton P. Merchant, of Blaine, Mich. The invention consists in a frame carying wheels, shafts, and levers for pulling stumps, the frame being mounted on an axle and on a runner

Mr. John D. William, of Rising Sun, Ind. has patented an improvement in bell striking me chanism specially adapted for clocks, and it is designed to cause the striking of a bell capable of being heard miles distant by the action of a clock of small size.

Mr. John Wilber, of Gleason, Pa., has patented an improved churn power in which weights and springs are employed; and it consists in the peculiar construction and arrangement of gearing and levers by which the power given out by the falling weight or unwinding spring is utilized to the best advantage.

Mr. Thomas Donahue, of Terryville, Conn., has patented an improved padlock. This invention consists in certain novel features of construction in the class of locks known as the pin padlocks, the object being to obtain strength and durability.

An improved elastic packing for spinning spindle bolsters has been patented by Mr. Albert R. Sherman, of Pawtucket, R. I. The object of this invention is to prevent the vibration of the spindle and permit it, when revolving, to adjust itself to its true center of gravity; and to provide a more elastic and durable packing than the wool packing commonly in use, the latter being liable to become charred or burned by the friction of the spindle in the bolster.

An improved cotton elevator has been patented by Mr Jordan F. Jones, of Laurel, N. C. This invention relates more particularly to elevators for lifting seed cotton in gin houses to the different floors; and it consists in the construction and combination of devices whereby the cotton may be taken from a wagon while on a pair of scales which weighs it, and be very expeditiously transferred, free from rocks and packing, on to any one or more of the upper floors of the gin

An improved roller bush has been patented by Mr. Patrick Brownley, of St. John, New Brunswick, Canada. This roller bush is formed of a cup-shaped casing containing a series of anti-friction rollers, which are held in the casing by a screw ring screwed into a threaded opening in the cup-shaped casing, which ring is held from unscrewing by tap screws passed into the outer edge of the ring and the inner edge of the casing The axle pintle or pivot is passed through the circular space between the rollers, against which rollers it

A novel index for watch regulators has been patented by Mr. Ferdinand A. Curpen, of Upper Sandusky, O. The object of this invention is to provide for the convenient and precise adjustment of the index hand of watch regulators. Heretofore the index plates have been marked with an arbitrary scale, which is not reliable on account of difference in watches, even in those of the same grade. To obviate the difficulty from such variations this inventor provides indexes specially arranged for each watch, the construction being such that the changes can be readily made.

A machine for planing locomotive links and link blocks, has been patented by Messrs. Ernest Cockfield and John Howe, of St. Joseph, Mo. The invention consists of a combination of devices capable of attachment to an ordinary metal planer, whereby reciprocating motion of the planer table is made to impart a circular or curved motion to the holder that carries the link or block to be planed. This is accomplished by means of a connecting rod and a sliding quadrant lever, arranged for operation between the holder or rocking plate on which the link or link block is carried and the planer bed.

Mr John H. Ferguson, of Dayton, Tenn. has patented an improved dump cart having a third wheel located between the shafts to carry the weight commonly supported on the back of the horse by the shafts, and contrived with hitching devices at the rear

by which to hitch on the horse so as to draw the loaded cart backward to the dumping place, together with hitching devices at the front end for hitching thereat after the cart is dumped to draw it forward to the loading place, and thus avoid the turning of the cart at both ends of the route, effecting considerable economy of labor, besides saving the deep cross ruts formed in the roadway by turning the carts, especially at the dump-

Mr. Patrick Slattery, of Charleston, S. C., has patented a baling press constructed with a frame, a head block, and a follower, with the ends of which are connected by clevises the upper ends of screws. Upon the screws are placed beveled gear wheels having threads in the inner surfaces of their hubs, and mesh ing into gear wheels operated by cranks and pivoted to sleeves placed upon the screws. The gear wheels and sleeves are held from moving up and down by blocks secured to the press frame

AGRICULTURAL INVENTIONS.

Mr. Martin McNitt, of Washington, Kan., nas patented a combined harrow and corn planter. The improvement consists in various details which render the implement very easily managed and efficient

An improved seed dropping attachment for check row corn planters has been patented by Messrs. Louis P. McGonigle and James H. Bigham, of Cato, Kan. This seed dropping attachment for planting corn in check rows has a spoke drive wheel, beveled gears, and a finger chain for tripping the seed valve. It will plant a field accurately in check rows

Mr. Charles Scafe, of Bangor, Wis., has patented a hay loader which consists of a simple and efficient arrangement of guides, revolving rakes, and an adjustable inclined carrier upon a two wheeled hav rake, for attachment to the hind end of a wagon, to gather up the hay as the wagon and loader pass along over it and deliver it upon the end of the wagon to the

An improved sulky plow has been patented by Mr. Axel F. Bergqvist, of Fairfield, Ia. This invention relates to improvements upon the plow covered by Letters Patent, No. 234,743. November 23, 1880, granted to the same inventor, and it consists in certain novel features in the construction of the axle; and, in the combination with the lever for raising the plow out of the ground, of a spring adapted to assist the plow man when using the lever for this purpose; and various other improvements designed to increase the efficiency

An improvement in sulky plows has been patented by Mr. Thomas T. Harrison, of Aubrey, Kan. This improvement in sulky plows consists of a joint in the tongue a little in advance of the axle on which the wheels are mounted, and about where the evener is attached, for allowing the tongue to swing, so that the horses may get about half way around square corners before the plow turns, together with stops by which the movement of the tongue on said pivot is limited to the required amount, the stops being changeable for allowing the tongue to be shifted in like manner on the pivot, either to the right or left hand.

Mr. John J. Morris, of Humboldt, Neb. has patented an improvement in cultivators designed for cultivating corn planted in what is known as the "listing process," which consists of plowing a wide fur row with a double mould board plow, subsoiling the furrow, and planting the corn in the furrow of ten or twelve inches deep. The improvement cultivator is divided along the middle longitudinally, and jointed together, so as to allow the sides to rise at an angle of sixty to eighty degrees, according to the inclinations of the sides of the furrows, in which the corn is planted, so that the teeth will straddle the corn and pulverize the sides of the furrows, and provided with a chain for connecting and holding the parts at the angle required.

MISCELLANEOUS INVENTIONS.

Mr. William C. Squier, of Kinmundy, Ill., has patented an eye wash consisting of the sulphate of zinc, oil of wintergreen, laudanum, oil of sassafras, sugar, and soft water.

by Mr. Anthony Ward, of Brooklyn, N. Y. This is a novel and simple device for climbing chains. It is applied to the foot and leg in the same manner as telegraph pole climbers.

An improved car coupling has been patented by Mr. William J. Dawson, of Lawrence, Kan. This is an ingenious automatic coupler applied to the ordinary drawhead and capable of coupling cars of varying

A novel ribbon and lace show cabinet has een patented by Mr. Lucien P. Lowry, of Aurora, Tex. This invention consists of a revolving reel carrying rolls of ribbon. The reel is placed in a case with glass sides and the various rolls of ribbon are brought in sight by turning the reel.

Mr. Johann T. Stoll, of Sacramento City Cal., has patented a buckle for harness, which is efficient, ornamental, and cheap, and will not catch or retain the hair of the horse's tail. The tongue of the buckle is pivoted to the bar and provided with angular upward bend at the free end.

Mr. Joseph A. Widemann, of Basle, Switzerland, has patented a new spring for mattresses, upholstery, etc., which is of simple construction and is strong and durable. It is a one-piece middle coiled wire spring having both ends formed into rectangular or nearly rectangular frames by which they may be applied between the top and bottom slats.

Mr. James C. Titzel, of Allegheny, Pa., has patented a process treating vulcanized India-rubber for the production therefrom of a pure rubber, consist ing in dissolving the rubber in turpentine and linseed oil, then adding sulphuric acid and washing, then adding caustic potash, then precipitating from the soapy mass the pure rubber.

illustrating the rotation of the earth on its axis and milk of lime, then treating with bicarbonate of soda around the sun, the changes of day and night and the or potash, and applying hydrochloric acid.

seasons, and other phenomena connected with the movement of the earth in its path through the heavens. in a manner that can be clearly understood by youngest pupils; has been patented by Mr. John R. McCrery, Jr. of Sulphur Lick, Ky.

An improved device for holding spectacles in front of the eyes or for holding them when not in use, has been patented by Mr. Joseph A. Shone, of Salem, Miss. The invention consists in a hat rim or shade provided on the under side with hooks for holding the bows and lens frames of spectacles, whereby the spectacles can be held to the under side of the shade when not in use, or can be lowered upon the nose when they are to be used.

An improved saddle girth has been patented by Mr. Calvin Williams, of Big Valley, Texas. The advantage of this invention is that as the pad rests on the horse's belly at the usual point occupied by the ordinary girth, and the fastening straps radiate therefrom and connect with four different points near the front and rear of the saddle, the four straps embrace the rotundity of the horse's belly, and thus prevent the saddle from slipping.

An improved organ case has been patented by Mr. Andrew Anderson, of Moline, Ill. This inven tion relates to the pedals of organs, and is designed fo the prevention of injury to the bellows, soundin board, key pins, reed cells, or other parts of the interior of the instrument by the ingress of mice or other ver min, without affecting or injuring the sound or qualit of tone of the instrument, and by means which adlittle or nothing to the cost of it, and are applicable to organs and other like instruments as now constructed

Mr. Cyrus R. Furey, of Logansport, Ind. has patented a device for connecting the pole strap to the breast strap; the improvement consists in a contrivance of the slide by which the connection is fitted on the breast strap, calculated to render it more dura ble of itself and less wearing to the strap, also to retain it better in its proper position on the breast strap whe anging by one hook, also to facilitate the connection of the martingale,

Mr. James Camper, of Saguache, Col., has patented an improvement in that class of spittoo holders in which the spittoon is inclosed in a box o case provided with a hinged lid and means for opening and closing it. The invention consists in the combina tion, with a spittoon box or case having a hinged lid, o a plate or arm attached to said lid and a vertical ro working in a tube or hollow standard attached to the box or case, and provided at its lower end with a latera fork for engagement with the plate or arm.

An improvement in steam generators has been patented by Mr. Harrison Willis, of Brooklyn N.Y. This invention relates to the class of boilers known as "coil boilers;" and it consists essentially in the combination with a coil, of a central pipe arranged to receive the steam and superheat it, the said pipe be ing fixed at its upper end and free to move at its lower end when expanded or contracted by variations of tem perature, the valve and damper connections are controlled and operated by the expansion and contraction of the pipe.

Mr. John H. Seabury, of Hempstead, N. Y. has patented an improvement in faucets, constructed t discharge from the same nozzle either hot or cold water or other fluid, and it embraces a combination, with the barrel of the faucet having a taper seat and elongated o enlarged general delivery opening, the nozzle of the faucet, and hot and cold water inlets, of a taper plus provided with transverse passages through it for supply ing either hot or cold water at different periods, or both hot and cold water at the same time, by simply turning the plug into different positions.

Mr. Artemas L. Dawson, of Elk Point, Dakota Ter., has patented an improvement in lamps As usually constructed, lamp bodies or reservoir are provided with a vertical rim or neck around the opening, and metal collars are secured thereon by means of plaster of Paris or other cement. Such neck increases the difficulty and cost of casting or moulding the lamp body, and the collars are liable to become loose and detached in consequence of the cemen shrinking and falling out. To obviate these defects A novel climbing device has been patented the inventor combines with a neckless lamp body metal collar and elastic packing, the latter two being turned over the edge of the lamp body so as to inclos it between them

> A new stirrup which can be used as a spur has been patented by Mr. Charles E. D. Parker, o Milan, Kan. The stirrup has a wire or strip pivoted to the inner shank, the lower end of this strip or wire be ing provided with prongs and the upper end being bent or inclined and passing into the stirrup loop, whereby when the stirrup is pressed against the side of the animal and the inner side is raised the upper end of the pivoted wire or strip will be depressed by the stirrur loop, and the prongs will be forced out of the guard frame at the side of the stirrup and can be used to speed the animal.

> An improved tuyere has been patented by Mr William H. H. Sheets, of Pittsburg, Pa. The invention consists essentially in providing a doubled walled tuyere with one or more double spiral channels or passages between the walls, said channels being formed by spiral partitions, commencing at the butt of the tuyere. diametrically opposite each other, and communicating with each other at the nose of the tuyere, through which channels a stream or body of water is kept in constant and rapid circulation from the butt to the nose, and then back to the butt and out through a waste pipe, whereby the nose and entire body of the tuyere is kept at a comparatively low temperature

Mr. Edmond L. M. Brochon, of Milan, Italy, has patented a process for extracting glycerine and salts from waters obtained in the manufacture of soap, which consists, first, in treating the cold waters with chloride of sodium, filtering, applying hydrochloric or sulphuric acid, and precipitating the insoluble matter with any of the well known coagulating agents, A simple and inexpensive apparatus for next heating to ebullition the clear liquid and adding

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

November 14, 1882,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications, not being printed, must be copied by hand.

'n		
	Alarm. See Burglar alarm. Feed water alarm. Alum. manufacture of, P. & F. M. Spence	267,610
l	Amalgamator, R. T. Bishop	267,396
r	Ammonia and animal charcoal, process of and apparatus for the manufacture of, J. G. Mac-	
	farlan	267,550
	farlan	267.518
	Auger, post, J. C. & M. A. Branch	267.483
-]	Axle box, car, J. Eisele	
l	Axle, vehicle, O. C. Mehurin	
)	Axles, machine for turning carriage, W. Beers	
۱	Bar. See Saddle bar.	
. {	Battery. See Galvanic battery. Bearings, composition for, R. M. Rose	267 59.1
)	Bed bottom. spring, Field & Reese	
-	Bed clothes fastener, A. Cox	267,498
1	Bed spring, T. O' Brien	
•	Bedstead. wardrobe. I. R. Van Slyke Belt gearing, E. Woolson	
	Belt stretcher. Z. Frost	
	Berth, self-leveling, J. H. Milligan	267.360
1	Bevel and gauge, J. S. Thornburg	
1	Binoxides of barium and calcium, manufacture	967 551
	of, C. Marchand	267,590
	Block signal mechanism for railways, automatic,	
:	J. A. Miliholland	
٠	Board. See Ironing board. Railway time bulletin	
1	board. Boat lowering and detaching apparatus, M.	
1	Bourke	267,322
1	Boiler. See Vertical boiler.	
	Bolt. See Car door bolt. Flour bolt. King bolt.	0.00
1	Book, scrap, G. E. Shepard	
	Boot and shoe strap protector, C. W. Elliott	
	Boot or shoe, J. Popham	
	Bottle locking device, E. P. Bray	
	Bottle stopper, J. M. Lewin	
	Bottling beer under pressure, J. C. G. Hüpfel	
	Box. See Axle box. Music box.	
	Box nailing machine, H. Messer	267,359
1	Bracelet, E. F. Presbrey (r)	
	Herzog	
1	Bracket. See Curtain roller bracket.	401,040
١	Brake. See Wagon brake.	
1	Brick machine, W. Andrus	
1	Brick mould washer, G. Partridge	
	Broiler, meat, C. T. Hurd	
	Broom, M. B. Montgomery	267.444
	Bucket, sap. J. Smead	267,374
	Burglar alarm, R. G. Dudley	267,598
1	Burner. See Lamp burner. Petroleum burner.	
1	Vapor burner.	
١	Butter, manufacture of artificial, H. R. Wright Butter package, J. Tombinson	
	Button attaching machine, A. W. Ham	267.515
.	Button fastening apparatus, L. Goddu	267,340
	Button or stud. G. E. Adams	
	Button to garments, machine for attaching, G. W.	00° *0*
	Prentice	201,081
	Can washing machine, J. O. Hauthorn	267.524
	Candlestick, A. Rix	
	Candy whistle and mould for manufacturing the	
	same, G. M. Mills	
	Car coupling, J. P. Davison	267,645
	Car coupling, D. M. Harris	267,344
,	Car coupling, S. L. Holmes	267.531
-	Car coupling, J. H. McLeary	
ł	Car coupling, W. L. Skelton	267.621
	Car coupling link, A. W. Palmer	267,453
	Car coupling link, A. W. Palmer Car door bolt, sliding, W. Johnson	267,539
1	Car, fruit and produce railway transportation, J.	
1	F. Maxfield	267 220
	Car spring, G. F. Godley	
i		267 530
1	Car unloader, G. W. Rolph	267,593
1	Car wheel and axle, G. W. Fairman	
- 1	Cars, tool holder for, Harnden & Doyle	
1	Cards, etc apparatus for automatically display-	~ 01,01∂
-	ing show, C. W. Johnson	
1	Carpet fastener, J. A. Wilmot	267, 390
1	Carriage motor spring. P. Quin	
	Case. See Show case. Toilet case.	~66.100
1		267 280

Casters, tool for inserting, A. Thompson 267,379

 Check, baggage, E. J. Brooks.
 267,486

 Chimney cowl, W. S. Beebe.
 267,479

 Churn, R. R. Coffey
 267,496

 Churn, R. A. Preston
 267,368

 Clock movement, alarm, W. L. Upson
 267,619

Scientific American.

DECEMBER 2, 1002.]	O V., v.	
Curtain roller bracket, A. Clemons	Milk can lock, S. Horton	
Detergent compound and process of making the same, C. C. Parsons	Milling, method of and apparatus for, C. L. Gratiot	
of, C. Lauga 267,546 Dish. butter, E. C. Westervelt 267,624 Dough mixer, C. S. Fowler et al 267,414	Mining machine, J. W. Harrison	
Draw-bars, manufacture of, J. T. Wilson 267,6:9 Drawers, etc., W. Daub 267,333 Drill. See Ratchet drill. 267,336	Mosaics, machine for manufacturing wood, L. Frank Motor. See Carriage motor. Fluid pressure mo-	
Egg beater, J. T. Carley	tor. Hydraulic motor. Muck bar cradle, W. P. Porter	267,45
W. H. Sawyer	Rickards	
engines for dynamo, S. D. Mott	Music sheets, feed and rewinding apparatus for perforated, R. W. Pain	267,32
Elevator stop. Hawkins & Webster	Office indicator, W. H. Nuding Oil cup, C. J. Pinkney Oiling can, P. Wall	267,58
Fan, mechanical, D. S. Wright	Packing, steam, H. W. Johns Paint G. J. Cline Paper stock, treating, H. Charmichael	267,49
ell. 267,338 Feeder, boiler. J. B. Hyde 267,536 Fence. H. T. Harris 267,523	Parer, corer, and slicer, apple, H. C. Wilder Peach stoner. I. F. Betts Penholder, S. Kraus	267,47 267.32
Fence, D. Long. 267,548 Fence, A. & A. J. Russell. 267,596 Fence barb, J. J. Brinkerhoff. 267,485	Petroleum burner, D. E. Bangs	267,47 267,45
Fifta wheel. J. Meeter	Pitman for double acting presses, J. M. Ellis Planer knife grinder, M. W. Palmer	267,40
Firearm breech-loading, A. Picard	Platform. See Car platform. Plow, P. A. Fominaya Plow attachment, W. H. Witt	
Fire escape, N. H. Borgfeldt 264,399 Fire escape, J. P. Dunn 267,504 Fire escape, Pallett & Mahedy 267,578	Plow handles, attaching, W. A. Miles	267,60
Flour bolt. centrifugal, Holcombe & Heine 267 529 Flour mills, dust collector for, J. R. Smith 267,467 Flue, radiating, F. B. Nichols 267,362	Plumb bob, W. C. Vajen	267,31
Fluid pressure motor, E. M. Butz	Hurd	267,60
Frog, W. J. Morden	ings, collecting the floating, A. E. Jones Protector. See Boot and shoe strap protector. Hose protector. Stocking knee protector.	
Furnaces, mechanism for ejecting tubes from. Wolfe & Schuhmann	Protractor, Ege & Walters Pump, W. P. Field Pump, gas, J. Ring	267,41 267,65
duction of tubes into. E. W. Wolfe 267,633 Galvanic battery, A. Bernstein 267,319 Galvanic battery, G. W. O'Harra 267,577	Pump, hydraulic pressure, Kellogg & Weller Pump spout, wooden, B. C. Stephenson Pump, steam, W. M. Ferry	264,46
Gas, etc., attachment to burners for, I. W. Shaler, 267.466 Gas burner for blast furnaces, etc., hydrocarbon, J. Hoskins	Rail for switch frogs. guard, W. J. Morden Railway crossing, W. J. Morden Railway frog, W. J. Morden	267,56
Gas engines, electrical igniting device for, A. K. Rider	Railway gate, Danner & Kyle Railway rail joint, D. B. Hicks. Railway signal, J. W. Purslow	267,50 267,42
steel. regulating, J. Henderson 267,525 Gate, D. S. Young 267,639 Generator. See Steam generator.	Railway signals, apparatus for operating, D. J. Lindsey	267,43
Gleaner and binder, C. R. Brinckerhoff 267.400 Grain binder, W. P. Hale 267,521	Railway spike, H. Greer	267,56 267,63
Grain binder. G. W. Scott 267,600 Grain separator, H. C. Lott 267.549 Grate basket, C. F. W. Dankers 267.499	Rakes. manufacture of metallic, J. M. Young Range, cooking, J. J. Richardson	267,59 267,57
Grate. fire, Weaver & Norton	Ratchet drill, W. Sandiford	10,24
Hat pouncing roll, J. Nutt	Refrigerator wagon, A. J. Chase (r)	267,46
Head-light, locomotive, F. H. Talbot	Roller mill, A. Mechwart	267,55 $267,45$
don	Saws. mechanism for operating the oscillating slides of gang, R. N. Nixon. Scaffold, R. M. Googe	267,44
Heel trimming machine, King & Strong 267.544 Hide, working raw, Rowe, Jr., & Perkins 267,595	Scale. pendulum, J. Ball	267.39
Hinge for shutters, lock. Müller & Wolf	Screen. See Window screen. Scparator. See Grain separator. Sewing machine perforating attachment, M. S.	
Holder. See Cutter holder. Lead or crayon holder. Pen holder. Tool holder. Hook. See Picture hook. Suspension hook.	Moss Sewing machine tension indicator, R. L. Mitchell, Sewing machines, stop motion for buttonhole, A.	
Hoop dressing machine, N. P. Stevens 267,378 Horse detacher, W. G. Cummins 267,331 Hose protector, G. Westinghouse, Jr 267,473	Felber	267.64
Howel and croze. combined, D. J. Sessoms	Sheet metal can, S. W. Valentine	267,38 267,37
stowing of, W. Gutbrie 267,421 Incubator, A. M. Halsted 267,422 Indicator, See Office indicator Sewing machine	Shoe sole cutting machine, Mundell & Gordon Shoe soles, machine for shaving, condensing, and	267,57
tension indicator. Station indicator. Interlocking switch and signal apparatus, M. N.	Showcase, sectional, P. Henrichs267,426 to Sign, R. E. Ghezzi	
Forney (r)	Signal. See Railway signal. Soldering iron heater, E. Meredith Spark arrester, H. R. Walker	
Ironing board, M. Burlingham 267,323 Jack. See Wagon jack. Joint. See Pipe joint. Railway rail joint.	Spectacles and eyeglasses, R. A. Carter Spinning frames, clearer for lifting rods of, Shaw & Flinn	267,64 267,60
Joist bridging, H. B. Walter 207,885 Jug. T. L. Amphlett 267,641 King bolt, wagon, M. Conrad 267,327	Spoolers, twisters, and doublers, stop motion for, A. G. Brown	
Kitchen cabinet, J. W. Ross. 267,654 Lamp, S. L. Wiegand 267,628 Lamp burner for heavy oils, G. Flower 267,511	Spring, J. B. Armstrong. Square, centering, bevel, and try. C. L. Bellamy. Stalk cutting machine. R. Falconer	267.48
Lamp, electric arc, N. McCarty 267,553 Lamp, electric arc, E. Weston 267,474	Stamp mill. F. A. Huntington	267,43
Lamp, incandescent electric, S. H. Emmens. 267,647 Last, G. W. Day 267,646 Lathe, J. B. Lisle 267,354	Station indicator, electric, J. F. Loughlin Steam generator, J. E. Culver (r) Steam generator, Wheat & Catchpole	10.24
Lathe for turning insulator-pins, etc., J. S. Kurtz, 267,434 Lathe. wood turning, C. A. Curtis	Steering engine, steam and hand, Pattie & Robertson	267,58
Lead or crayon holder. C. W. Boman 267.643 Lead or crayon holder. J. Hoffman 267,528 Light. See Head-light.	Stone or ore crusher, W. H. Baxter	267,39
Lock. See Milk can lock. Nut lock. Lock nut, R. Harrington	Stool, music, E. Calix	267,32
Smith 267,543 Loom shuttle, D. A. Willbanks 267,628	Stopper. See Bottle stopper. Stove ovens, heat indicator and regulator for, C. Murray	267,65
Lubricant for machinery, etc., dry. J. B. Norris. 267,451 Lubricator etachment, R. J. Hoffman 267,430 Mattress, A. Q. Allis 267,316	Stove. vapor, Z. Davis. Straw cutter, J. T. Warren Street sweeping machine, J. G. A. Jacob	267,47 267,43
Mattress, wire, E. T. Wolcott 267,631 Measuring electric currents, S. D. Mott 267,445 Mechanical movement, J. D. Wright 267,638	Suit hanger. Werntz & Lemert Suspension hook, G. W. Woodward Switch. See Interlocking switch.	267,65
Medicines, preparation for masking the nauseous taste of. W. H. McLaughlin	Switch safety device. W. J. Morden. Tea-kettle spout, Raynor & Smith. Telegraph cab'e, C. J. Slafter.	267,37
Metal, device for cutting, turning, and threading, J. H. Steen	Telegraph, printing, G. M. Phelps	267,38 267,38
and straightening, Tasker & Wolfkiel. 267,614 Metallurgic furnace, J. Henderson 267,346 Middlings purifica. C. O. White	vice for, J. C. Richardson	267.45

2	Thrashing machine, Schneider & Christofferson	007 500
٥	Tile or pipe, drain, N. B. Childs	
7	Tobacco fly catcher, J. L. Spears	
'	Toilet case for vehicles, T. Bourdren	
3	Tongue for harvesters, double, J. K. Kepner (r)	
2	Tool holder, J. C. Gray	
1	Toy, automatic, L. S. Burridge	
*	Toy bank, J. M. Keep	
5	Toy, bell, J. Brunner.	
٠,	Traction engine, J. C. Debes	
5	Traction engine, H. S. Saroni.	
1	Trap. See Animal trap.	201,202
	Truck, D. D. McKernan	967 357
3	Truck, car, S. B. Driggs	
1	Truck, car, C. Q. Hayes	
2	Trunk, F. M. Piper	
2	Tubes, machine for bending socket blanks for, E.	201,000
'	W. Wolfe	267 634
ı	Tubing wire, A. Harbison.	
)	Type writer, C. Hilgenberg	
, i	Type writer, J. Pratt	
í	Underground lines, conduit for, W. B. Eltonhead,	
	Valve, balanced slide. L. P. Normandin	
,	Valve gear, R. M. Hunter	267 534
5	Vapor burner, H. S. Belden	
2	Varnish for furniture and other articles of wood,	201,001
5	O. Goodenough	267 419
)	Vault, burglar-proof grave, Huffman & Brooks	
5	Vehicle, spring. G. Delker (r)	
3	Vehicle wheel, M. N. Warren	
9	Velocipede, S. N. Silver.	
ĺ	Vertical boiler, return flue, P. F. Dundon	
3	Wagon brake, Cooper & Johnson	
9	Wagon jack, J. T. Gilbert	
•	Washer. See Brick mould washer.	
3	Washing machine, J. Morris	267.570
)	Weather strip, Lynchard & Saunders	
ś	Wells, driving tube. W. J. Sherman	
2	Wheel. See (ar wheel. Fifth wheel. Vehicle	,
i	wheel.	
5	Wheelbarrow, G. W. Thomas	267.615
3	Windmill gearing, M. R. Martin	
_	Window screen, I.I. Grimshaw	
3	Window sereen, rolling, T. Tribe	
	Wooden package, three-ply cylindrical, J. Tom-	,
ι	linson	267,617
٠,	Wool picking, opening, and mixing machine, S. R.	
	Parkhurst	
3	Wrench, J. Du Shane	
i		,
3	DEGLOXIC	
2	DESIGNS.	,
2	Calendar, C. S. Nathan	. 13.404

Calendar, C. S. Nathan	13,404
Carriage step, J. L. Pope	13,429
Carriage wrench, J. L. Pope	13,431
Chair, H. H. Paine	13,405
Coffin screw, J. B. Sargent	13,437
Dressing comb, J. P. Stepp	13,436
Shaving mug, H. Griebel	13,403
Spring and axle block, J. L. Pope13,432,	13,433
Wear iron, J. L. Pope	13,414
Whiffletree plate, J. L. Pope	13,407
Wrench, J. L. Pope 13,434,	13,435
· · · · · ·	

TRADE MARKS.

į	Boots and shoes, G. C. Courtright	9,800
	Canned goods, A. N. Lewis	9,805
	Cigars. Sanchez & Haya	9,811
	Cotton duck, W. E. Hooper & Sons	9,804
	Dairy supplies, Antitropic Company	9,802
	Door checks, pneumatic, Elliott Pneumatic Door	
	Check Company	9,803
	Dry-goods, certain. R. Z. Cassell	9,799
	Flour, J. Menéndez & Bro	9,806
!	Printed publication. B. M. Wilkerson	9,812
ĺ	Silks, dress. Passavant & Co	9,801
	Watch movements, Elgin National Watch Com-	
	pany 9,807 to	9,810
ĺ		

English Patents Issued to Americans.

From October 20, 1882, to October 27, 1882, inclusive. Cosmie," B. Arentz, New Britain. Conn. Cards, playing, B. Dreyfuss, New York city, Electric light, F. Vanchoate, New York city. Elevator, pneumatic, C. A. Needham, New York city. Friction clutch, D. Frisbie. New Haven, Conn Governor, steam, F. D. Cumnyer, Detroit, Mich. Iron ore. reduction of, L. Durand et al.. New York city. Motor, G. D. Garvie et al.. New York city. Pig metal, casting, G. A. Leishman, Pittsburg. Pa. Ratchet wrench, G. W. Hight et al., Nasnville, Tenn. Razor blades, J. D. Frary, Bridgeport, Conn Sewing machines, Morley Sewing Machine Company

Roston. Mass. Sewing machines, I. W. Miller et al., Elizabeth, N. J. Stench trap, C. Lightbody, Brooklyn, N. Y. Tramway, rope, A. S. Hallidie, San Francisco, Cal. Vise, H. F. Read, New York city. Watches, J. W. Bell, Conowingo, Md. Water purifier, D. Hanna, Ogdensburgh, N. Y.

NEW BOOKS AND PUBLICATIONS.

HYGIENIC AND SANATIVE MEASURES FOR CHRONIC CATARRHAL INFLAMMATION OF THE Nose, Throat, and Ears By Thos. F. Rumbold, M.D. St. Louis: Medical Journal Publishing Company. 1882.

The first edition of this work was favorably noticed about a year ago. The author is more than ever configuration ter. They are revolved quickly with light feed, and dent that the most successful method of eradicating catarrhal inflammation of the respiratory organs is through the enforcement of proper hygienic and sana tive measures; this especially with the young.

TREATISE ON THE METALLURGY OF IRON. By H. Bauerman. No 176, Weale's Rudimentary Series. London: Crosby, Lockwood & Company.

The improvements in this, the fifth edition of Mr. Bauerman's well known treatise are found in a revision of the chemical notation; considerable additions to the chapters on steel making to cover the more important recent advances in the art; and some valuable new mat-North Africa, the oolitic ores of Luxemburg and Lorraine, and the more important ore deposits of America

Dress and Care of the Feet. By Prof.
Peter_Kohler. G. P. Putnam's Sons, Peter Kohler. New York

This is a very short treatise on a very important sub-



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the Scientific American Supple-MENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identi-

- (1) A. F. W. asks: Will you inform us what is the active substance used in the so-called bleaching powders (used for bleaching hair, etc.)? Is it sulphide of barium? Also please explain its action. A. It is the peroxide of barium, to be bought in bulk in the market, and contains a large proportion of loosely combined oxygen gas, which in the peroxide of hydrogen produced has the powerful bleaching action.
- (2) G. C. W. asks: 1. What size propeller must I have to run a skiff 151/2 feet long by 31/2 feet beam, to make six to seven miles per hour? A. 18 inches diameter and 21/2 feet pitch. 2 How many revolutions should the propeller make per minute? A. 300 to 350. 3. Is a two or four bladed propeller best? A. Two bladed. 4. What should the weight be of it? A. About 70 or 80 pounds.
- (3) C. W. G. writes: I recently bought a lot of books at auction that are very badly stamped with blue ink which greatly disfigures them; can you give me a recipe that will remove the blue ink without disfiguring the paper? A. Try a little peroxide of hydrogen solution, and if this fails, diluted hydrochloric acid, 1 part acid to 7 of water.
- (4) E. E. P. asks: 1. Where can I obtain Dr. Henry Draper's paper on silvered glass specula? A. Draper's Method of Silvering Specula, SCIENTIFIC AMER-ICAN SUPPLEMENT 105. SUPPLEMENT 121 has several other methods. 2. How large should the small speculum of a telescope of the Newtonian form of 8¾ inches aperture and 80 inches focal length be, and in what position should it be placed, its shape being oval? A. The size of a small speculum for a Newtonian form of telescope should be one-fifth larger in its lesser diameter than the field glass of your lowest eye piece, and should be an ellipse of the proportions of a cylinder cut at 45°, and may be placed in the optical axis of the telescope for the best effect, although they have been placed in all positions between the center and edge of the tube, with the eye pieces at other positions than at right angles to the tubes, as well as being dispensed with, as in the Herschelian and Ross form with their accompanying distortion of image and increase of light.
- (5) T. H. J. asks for directions for softening or annealing steel sufficiently to admit of cutting letters on the face of block by hand. A. For annealing steel for cutting with a graver by the water process, heat the steel to a full red, let it cool slowly in dry lime or fine ashes until it is biack, then dip in water,
- (6) G. G. asks how bort and carbonado. are attached to drills, and how the drills are worked to prevent fracture of the brittle minerals? A. The setting of bort or carbons in drills is done by boring holes in the iron, where the bort or carbon is required to be placed, and cutting the sides of the holes with small chisels or gravers of the proper shape to receive it to the depth sufficient to allow of the adjoining metal being driven up against the bort with small sets or chasing tools, so as to partially inclose it with a firm metallic border, leaving the carbon projecting just above the surrounding surface. Such drills must be handled very carefully and should never be dropped upon the bottom of the bore. The drills are generally made hollow, or of iron tubing with the carbons set on the outer and inner edge, so as to make a cut that will clear the tube and take out a solid core of rock in the cen-
- (7) I S G asks: 1 Is it unhealthy to pulverized borax in washing the hands and face, say several times a day, for years? It is better and cleaner than soap. A. Borax is an excellent detergent and harmless to the skin, even if used as often as you mention. 2. Are cockroaches not useful from a sanitary point of the question? I know they are disagreeable to have around. A. Cockroaches are probably excellent for removing the filth that brings them to a locality.
- (8) L. R. S. asks how to remove paint spots from a rubber coat? A. Try some aqua ammonia, or if ter with respect to the hematite deposits of Spain and this will not answer, spirits of turpentine rubbed on with a rag.
- (9) C. S. asks: Can you give form of furnace and process for annealing gray iron casting? A. Gray iron work is annealed by packing in iron boxes (cast or wrought) with lime and charcoal, pulverized coke mixed with fine ashes. In fact, any material that does not melt will exclude air or prevent oxidation. ject to most persons The venerable author has treated | Furnaces are made similar to the reverberatory furnace the feet of some of New York's most distinguished citi- for ores and iron or a puddler's furnace. Heat only to a zens for a quarter of a century, and at the end of his cherry red, and continue from one to three hours ac-

- (10) E. T. L. asks how the gloss can be brought back on a marble slab upon which some wine has been spilled? A. Repolish the spots or parts of the slab on which the polish has been destroyed with oxide of tin and water, by rubbing with a rag or cushion of cloth. Use the oxide of tin. or putty powder as the marble polishers call it, about as thick as cream.
- (11) C. P. asks how to put drill and cotton in oil to make them like those sailors' yellow suits and the black horse covers? What kind of paint do you use, and how to fix the oil? A. The materials are first sized and then dipped into oil which has been mixed with yellow ocher for yellow, or fine lamp black for black; only a little color is required. The oil is fixed by dry ing. Sometimes a little patent drier is used with it.
- (12) J. A. F. writes: 1. Wishing to set a pair of return tubular boilers 39" x 14', what height should we have boiler above grates? A. Set the boilers 18 inches above the grate. 2. What size stack? A. Area of chimney or stack, 5 square feet. 3. Where should the bridge wall be, and how close to boilers? A. Bridge wall at back of grate, 6 inches clear from boiler. 4. Should it be filled with dirt back of bridge? A. Do notfill in back of bridge wall. The chamber gathers the heavy ashes, and prevents excessive accumulation in flues. 5. What size of safety valve, either lever or pop valves, should we use? A. Three-inch safety valve of the lever kind. 6. Should we have gauge cocks on one or both boilers? Fuel to be used, hard wood sawdust, with some four-foot slabs? A. Put gauge cocks and water gauges upon both boilers.
- (13) W. F. H. says: Please explain the mystery of a horse hair; why it assumes life when kept under water? A. It does not assume life. The borse hair snake, so called, is a worm which is a parasite of crickets and grasshoppers during most of its life.
- (14) G. L. G. asks: I would like to know how to boil meerschaum pipe in wax to make it color. What kind of wax and bow long to boil it, as well as degree of heat required? A. This is an art that requires considerable skill and is performed as follows: A water bath is filled with pure beeswax in small pieces, and this carefully melted, when the pipe or other article is immersed in it and boiled for from twenty-five minutes to half an hour, when it is removed, the adhering wax wiped off. and the work is finished. The wax must be absolutely pure and is very difficult to find in the market.
- (15) G. F. N. asks as to the difference, if any, between carbolic acid and phenic acid; the color in the latter and a seemingly slight difference in the odor of the two acids make me think they are not the same. A. There is no difference between them.
- (16) X. Y. Z. inquires: What is the substance called "foliated graphite"? It was mentioned to me as being good for packing stuffing boxes. A. Foliated graphite is the flaky form of pumbago and may be readily bought as such from any wholesale druggist.
- (17) C. H. writes: A friend of mine says a planet is a star, and twinkles. I say that a planet is no star, and does not twinkle. Please inform me who is right? A. Planets are not stars. Their light is steadier than that of the stars; but under some conditions of the atmosphere they twinkle.
- (18) E. P. C. writes: On page 4,976, of SCIENTIFIC AMERICAN SUPPLEMENT 312, the author of an article on Electric Light Apparatus states, that "the troughs" (for the battery) "are made of mahogany, put together with brass screws, and well saturated with an in sulating compound which also makes them acid proof." Will you please tell me through your notes and queries column of a suitable insulating compound, and the method of applying it? Would paraffine do? A. Yes.
- (19) J. H. P. writes: During spring and berry time robins were very numerous, but for many weeks I have not heard or seen one, yet almost always just as winter sets in, or after the first snowfall, they ap pear again and are often seen eating frozen apples and mountain ash berries. Where do they spend the long fall vacation? A. Robins are abundant in spring, go ing north. Those that stop to breed scatter, but do not go far from their breeding places. The fall abundance is due to their massing for migration, the flocks being re-enforced by migrants from the north.
- (20) J. L. H. asks: What is the right width amidships and depth forward and aft for a tug boat 56 feet long over all? Also right dimensions of an upright boiler, number and size of tubes, thickness of iron boiler plate and boiler heads. Dimensions of fire box. Also diameter and length of engine cylinder required to drive boat 12 knots per hour. Also diameter and pitch of propeller and number of blades. And diameter of iron shaft? A. 56 feet on water line by 13½, or 13 feet beam by 5 feet 9 inches hold. Engine, 12 x 12 inches. Vertical tubular boiler, 51/2 feet diameter, 7 feet 8 inches high, with 150 2-inch tubes. Propeller, 5 feet diameter and 71/4 feet pitch; 4 blades. Shaft, 41/2 inches
- (21) B. F. B. asks: Is it more economical to heat a private residence with steam than by hot air? If so, is it a better heat and more conducive to health hot sir? What are the objecti purpose of heating private residences by steam heaters? What proportion of private residences in your city are heated by steam heaters to hot air furnaces? I have heard it said that a large proportion of dwellings in the Eastern cities are heated by steam heaters. Is this so? A. It is more economical to heat small houses with hot air furnaces, provided they are of the best kind. There is no economy in purchasing small, cheap heaters Steam apparatus is considered the most healthy, because there is less liability to vitiation of the air by escaping gas, but there is no reason why a well made furnace should not be perfectly healthy. Thousands of private residences in the Eastern and Middle States are heated by steam apparatus with perfect satisfaction and safety, the pressure in the boilers being only from one half to five pounds, seldom beyond ten pounds
- (22) J. B. & B. write: We have put in our store recently some show windows; in the inside we have during the evening lamps burning. In order to let the steam out we have bored six holes in the sash, and yet the steam settles on the window as ever. What is the cause of that ? A. The condensation is due to warmth inside of the window. In order to prevent con-

densation, the air space between the outside and inside windows must be kept cool so that the air inside will have about the same temperature as the air outside By arranging holes of sufficient size top and bottom, you can secure a sufficiently cool temperature to keep the glass always clear.

(23) C. T. S. asks: What is the best way to build an ice house, and which is the best way to pack ice? A. The usual way of building ice houses is to put up a rough frame, so as to make the inside and outside boarding six, eight, or ten inches apart, according to the location and size of house; the thicker the better. Fill in with hay and pack close as the frame is boarded up. The roof should also be double. If the soil is porous or the position such that the floor can be drained, it is sometimes found economical to sink the house below the level of the ground several feet, and bank around with the dirt thrown out of the cellar. In packing the ice, hav, and preferably sawdust if it can be obtained. are used. The main point is to exclude air and heat; keep a thickness of one foot of packing all around next the sides. Batten the outside boarding, or if you can afford it cover the outside of the frame with tar paper or

(24) S. T. M. asks: How are type writer ribbons made? What composition is used? A. The ribbons are moistened with aniline colors dissolved in

COMMUNICATIONS RECEIVED.

How to preserve a safe and its contents from fire and burglary, by G. P. H.

Business and Personal.

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

There a:e forty-four places called Milton in the United States, but only one pen called Esterbrook's Falcon No. 048. It can be procured from all stationers and book-

Andrews' Complete Wood Worker, illustrated and described on another page of this number of the SCIEN-TIFIC AMERICAN, is for sale. Will take in capital or arrange for the manufacture. For full information adthe inventor, R. H. Andrews, U. S. Treasury, Washington, D. C.

For Sale .- Scientific American, forty back volumes cheap. For particulars address Ira F. Wilson, Austin, Ill. Bonhack's Match Splint Setting Machine. Best and quickest in the market. Recipes and advice gratis. Address C. F. Bonhack, patentee, 527 W. 43d St., New York.

Lehigh Emery Wheels rank first for quality, safety, and durability. Compare them with any other make and if you do not flud them better and cheaper we will bear the expense of the trial. Lehigh Valley Emer Wheel Co., Lehighton, Pa.

Wanted .- Patented articles or machinery to make and introduce. Gaynor & Fitzgerald, New Haven. Conn. Solid Cotton Belting, all widths, in lengths to suit. Greene, Tweed & Co., 118 Chambers St., New York.

To stop leaks in Boiler Tubes use Quinn's Patent Ferrules. Address S. M. Co., So. Newmarket, N. H.

Woodworking M'ch'y. Bentel, Margedant & Co., p. 350. Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill. Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Diamond Tools. J. Dickinson, 64 Nassau St., N. Y.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 350. 50,000 Emerson's Hand Book of Saws. New Edition. Free. Address Emerson, Smith & Co., Beaver Falls, Pa For Pat. Safety Elevators, Hoisting Engines, Friction

Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 349. Gould & Eberhardt's Machinists' Tools. See adv., p. 350. For Heavy Punches, etc., see illustrated advertise nent of Hilles & Jones, on page 350.

Barrel, Key, Hogshead, Stave Mach'y. See adv. p.350. Excelsior Metallic and Steel Tapes, the best article made. General Depot, Keuffel & Esser, New York.

Magic Lanterns and Stereopticons of all kinds and prices. Views illustrating every subject for public exment. 116 page illustrated catalogue free. McAllister Manufacturing Optician, 49 Nassau St., New York.

Hand and Power Bolt Cutters, Screw Plates, Taps in great variety. The l'ratt & Whitney Co., Hartford, Ct. Mineral Lands Prospected, Artesian Wells, Bored, by Pa. Diamond Drill Co. Box 423. Pottsville, Pa. See p. 350. C. B. Rogers & Co., Norwich, Conn., Wood Working

Machinery of every kind. See adv., page 350. For best low price Planer and Matcher, and latest improved Sash. Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher Schumm & Co., Philadelphia, Pa. Send for circular.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co.,430 Washington Ave.,Phil.Pa. 4 to 40 H P. Steam Engines. See adv. p. 350.

Wanted -Four miles second-hand T-rail for tramvay. Weight about 30 pounds to yard. G. Gunby Jordan, Columbus. Ga.

To make Violins, write James Roblee, Syracuse, N. Y

Water purified for all purposes, from household supplies to those of largest cities, by the improved filters manufactured by the Newark Filtering Co., 177 Commerce St., Newark, N. J. Drop Forgings. Billings & Spencer Co. See adv., p. 333

Assays and Analyses of ores and all commercial products. Advice given and investigations made in all branches of chemical industry. Send for circular. N. Y. Assay Laboratory, 40 Broadway, New York.

Rolled and Cast Nickel Anodes, Nickel Salts, all Polishers' Supplies. Greene, Tweed & Co., New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every descrip-

Walrus Leather. An extra fine lot of heavy trimmed walrus for polishing metals. Greene, Tweed & Co., N. Y. Wanted .- A second-hand centrifugal machine for liquids. Address, with description and price, P. O. Box 3396, Boston, Mass.

Lubricator, See advt., Detroit Lubricator Co., p. 318. Bostwick's Giant Riding Saw Machine, adv.,page 318. See New American File Co.'s Advertisement, p. 318. Steam Pumps. See adv. Smith, Vaile & Co., p. 316. The Sweetland Chuck. See illus. adv., p. 318.

Knives for Woodworking Machinery, Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J. Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 302.

Sheet and cast brass goods, experimental tools, and fine machinery. Estimates given when models are furnished. H. C. Goodrich, 66 to 72 Ogden Place, Chicago. Improved Skinner Portable Engines. Erie, Pa.

Engines, 10 to 50 horse power, complete, with governor, \$250 to \$550. Satisfaction guaranteed. Nearly seven hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinsville, N. Y.

25" Lathes of the best design. G. A. Ohl & Co.

Combination Roll and Rubber Co., 68 Warren street N. Y. Wringer Rolls and Moulded Goods Specialties. First Class Engine Lathes, 20 inch swing, 8 foot bed

now ready. F. C. & A. E. Rowland, New Haven, Conn.

Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificial Ice Co. (Limited), 142 Greenwich Street. P. O. Box 3083, New York city.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your free book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers (Forward above by postal or letter; mention this paper. Steel Stamps and Pattern Letters. The best made. J F.W.Dorman, 21 German St., Baltimore. Catalogue free For Power & Economy, Alcott's Turbine, Mt.Holly, N. J. Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y

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

Supplement Catalogue.-Persons in pursuit of infor on on any special engineering. mechanical, or scien tific subject, can have catalogue of contents of the SCI-ENTIFIC AMERICAN SUPPLEMENT sent to them free The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y. Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J

Advertisements.

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

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



CURTIS PRESURE RECULATOR, FOR STEAM AND WATER, Is made entirely of Metal. Occupies the same space as a Globe Valve. It has no glands or packing, and is a lock-up valve. CURTIS STEAM TRAP

Has automatic air discharge; has a differential opening, thus discharging all the water as fast as it comes. Is very accessible for cleaning the valve, being on the outside. Send for circular to CI RTIS REGULATOR CO., 54 Beverly St., Boston, Mass

The Flue Fan Patent noticed in Sci. Am., Nov. 4, fer sale cheap. Address D. M. BLISS, Westmoreland Point, N. B., Canada.

HAND SAW MANUFACTURERS, Address JOHN E. TYLER, Roxobel, Bertie Co., N. C.



State in America Use Van Duzen's Patent Steam Jet Pump. Guaranteed superior to any other Jet Pump for practical service. For raising water from Wells, Ponds, or Streams, or to use with hose and nozzle for Fire Pump, it has no equal. All Brass, no valves, no moving parts. Warranted reliable and satisfactory. Ten Sizes— \$7, \$8.50, \$10.50, etc., and capacities 300 to per hour. Send for "Catalogue No. 49."

20,000 gallons per hour. Send for "Catalogue No. 49." VAN DUZEN & TIFT, Cincinnati, O.

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

SEND TO LONDON, BERRY&ORTON · PHILA PA FOR · BEST BAND SAW BLADE

ELECTRICAL GOODS.

Learners' Instruments, Electric Bells, and Medical Machines. The Little Giant Grenet Battery, price \$1. Parts of instruments for amateurs constantly on hand. OTTO RAUDA, 131 William Street, New York.



Only \$3 for complete Electro-Medical Battery. Sent on receipt of price. F. SCHLOSSER, Hoboken, N. J.



NOTICE "STEAM USERS.

CET THE BEST AND CHEAPEST. TRADE & PERIN & MARK.

Silver <u>Finish.</u>

JA.FAY & CO. Cincinnati, Ohio, U. S. A.)

Exclusive Agents and Importers for the United States, of the

CELEBEATED

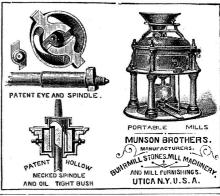
PERIN BAND SAW BLADES, Warranted superforto all others in quality, fin-igh, uniformity of temper, and general during dity. One Perin Saw outwears three ordinary saws.



HOW SEALSKINS ARE DRESSED .-Very interesting account. by H. W. Elliott, of the manner in which the sealskin is tanned plucked, and dyed to fit it for the market. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 345. Price 10 cents. To be had at this office and from all newsdealers.

Steam Fitters' & Plumbers' Supplies. STURTEVANT'S FAN BLOWERS.

JOHN S. URQUHART, Successor to ALBERT BRIDGES, 46 Cortland Street, New York.



WIRE ROPES — BY A. GARCENOT. WHEE ROPES—BY A. GARCENOT:
The breaking strength of round ropes of wire and hemp.
Substitution of wire for hemp rope. Flat fron-wire
rope. Effects of loads and jerks. Cross-stitching wires.
Experiments on the strength of wire. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 34S. Price 10
cents. To be had at this office and from all newsdealers.



NEW FERRYBOAT—ILLUSTRATIONS and descriptions of a new English double twin-screw ferry stemer for navigation across the Mersey. Contained in SCIENTIFIC AMERICAN SUPPLEMENT. No. 348. Price 10 cents. To be had at this office and from all newsdealers.

Patents for Sale.—The Weber and Scovel patents for manufacture of Sugar and Sirup and Glucose out of Sorghum Cane, issued by Canadian Government. Samples of sugar sent. Address J. L. RAY, Champaign, Ill.



Sample and Circular Free by mail. U. S. MINERAL WOOL CO., 22 Courtlandt St., N. Y.

IMPROVED SPONGE FILTER.—
Description and illustration of a new filter designed especially for removing solid materials from the feedwater for steam boilers. Contained in Scientific American Supplement, No. 343. Frice 10 cents. To be had at this office and from all newsdealers.



MESSRS. MUNN & CO.. in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine Improvements, and to act as Solicitors of Patents for Inventors.

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

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

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

MUNN & CO., Solicitors of Patents, 261 Broadway, New York.

BRANCH OFFICE -Corner of F and 7th Streets, Washington, D. C.



SOMETHING NEW, represents the wonderful Webber Singing Doll, just out, and the GRE ATLEST NOVELTY ever ofered in Children's Trys. The Doll itself is of the finest French make, with wax Head is no diliterent in appearance in the control of the finest french make, with wax Head is no diliterent in appearance in the control of the finest french make, with wax Head is no diliterent in appearance in the control of the following airs:

"The Doll itself is of the finest french make, with wax Head is no diliterent in appearance willen," "I want to be an angel," "Theme, sweet home," "Green, willen," "I want to be an angel," "There is a happy land," "Sweet by and bye," "Bonnie Doon," "Hew can I leavetheer" "A B G Song," "America," "The singing attachment. The price is a strict in the same price that toy dealers ask for the same price that toy dealers ask for the same price that toy dealers ask for the singing attachment. Walking and talking doils have been made, but at high prices, and they do not afford the little ones half the enjoyment that our wonderful singing Dol does, and the dol is sold for the same price that toy dealers ask for the singing attachment. Walking and talking doils have been made, but at high prices, and talking dolls have been made, but at high prices, and talking dolls have been made, but at high prices, and talking dolls have been made, but at high prices, and talking dolls have been made, but at high prices, and they do not afford the little ones half the enjoyment that our wonderful singing Dol does, and talking dolls have been made, but at high prices, and talking dolls have been made, but at high prices, complete, \$2.75. No. 1½.—Same as No. 1, but eyes close wonderful singing bol does.

"The services include boards on gracking, sention after a strictly first-class quality fremch Doll. Price, complete, \$2.75. No. 1½.—Same as No. 1, but eyes close wonderful first the make the prices are as low as the anneal man and the town in engraving, spention after the maneal to a child, and will afford mor

CUTLER'S POCKET INHALER



Carbolate of Iodine INHALANT.

INHALANT.

A cure for Catarrh, Bronchitis, Asthma, and all disease of the Throat and Lungs—even Consumptional Lings—even Consumptinhalations will correct the most Offensive Breath. It will break up a Cold at inhalations will correct the most Offensive Breath. It may be carried as handily as a penknife, and is guaranteed to accomplish all that is claimed for it.

This Instrument, charged with the Inhalant, is a Preventive of Disease. It was first tested at Shreveport. La, during the Yellow Fever panic of 1873, and since then in various hospitals and localities infected with Malaria, Small Pox, Diphtheria, etc., and of the great number of persons, including Physicians and Nurses, who used the INHALER as a preventive not one is known to have been attacked with any of the diseases to which they were exposed.

Patented through the agency of the Scientific American in 1/3, this Inhaler has since had a larger and more extensive sale than any Medical Instrument ever invented.

It is approved by physicians of every school, and indorsed by the leading medical source.

ever invented.

It is approved by physicians of every school, and indorsed by the leading medical journals of the world. Over 300,000 in use.

Sold by Druggists for \$1.40. By mail, \$1.25. W. H. SMITH & CO., PROP'S, 410 Michigan St., Buffalo, N. Y.



SCROLL

This beautiful three-shelf Bracket Design, size 13x21, and a large number of miniature designs for scroll sawing, will be sent, post-paid, on receipt of 15 cts.; or send 6 cts. for Ilrustrated Catalogue of 8 croll Saws, Fancy Woods, Mechanic's Tools, Fancy Hinges, Clock Movements, Revolvers, etc. A complete stock and great inducements offered.

A. H. POMEROY Hartford, Conn. Mention this paper.



KNOWLEDGE IS POWER.



The untold miseries that result from indiscretion in early life may be alleviated and cured. Those who doubt this assertion should purchase and read the new medical work published by the Peabody Medical Institute, Boston, entitled the Science of Life: an Nerl Preservation. It is not only a complete and perfect treasies on Membood, Exhausted Vitality, Nervous and Physical Debility, Premature Decline in man. Errors of Youth, etc. but it contains one hundred and twenty-five prescriptions for acute and chronic diseases, each one of which is invaluable, so proved by the author, whose experience for 21 years is such as probably never before fell to the lot of any physician. It contains 300 pages, bound in beaut ful embossed covers, full filt. embellished with the very finest steel engravings, guaranteed to be a finer work in every sense—mechanical literary, or professional—than any other work retailed in this country for \$2.50. or the money will be refunded in every instance. Price only \$1.25. Gold medala warded the author by the National Medical Association. Illustrated sample sent on receipt of six cents. Send now. Address PEABODY MEDICAL INSTITUTE, or Dr. W. H. PARKER, No. 4 Bulfinch Street, Boston, Mass. The author may be consulted on all diseases requiring skill and experience.

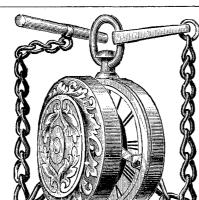




AUTOMATIC DAMPER REGULATORS AND WEIGHTED CAGE COCKS In extensive and successful use by the best concerns in the country. They have no equals. Liberal discounts to the trade. Send for Circulars and Price Lists. MURRILL & KEIZER, 28, 30, 32 Holliday Street, Baltimore, Md

CONTINENTAL WORKS, BROOKLYN, N. Y.

DUC'S MECHANICAL ATOMIZER OR PULVERIZER,
For reducing to an impalpable powder all kinds of hard and brittle substances, such as
OUARTZ. EMERY, CORUNDUM, GOLD AND SILVER ORES, BARYES, COAL, PHOSPHATE ROCK, etc. It is simple in construction and not liable to get out of order. Revolving shell is manufactured of steel, and otherwise It is a durable and well built macnine.
Weight, 5,500 lb.; heaviest piece, 1,500 lb. It will pulverize 7 TO 10 TONS IN TEN
HOURS with 30 H. P. For circulars and full particulars. apply to or address
THOS. F. ROWLAND, Sole Manuf'r, Brooklyn, N. Y.



BOYS, HERE IS A CHANCE!

The SOLAR WATCH, a perfect Timekeeper, and a trial subscription to the COLDEN ARCOSY, A Weekly Paperfor Boys and Girls, FOR ONLY 25 CENTS.

The Solar Watch is the latest wonder. It will denote the time curately AND CAN NEVER GET OUT OF ORDER. It consists of accurately AND CAN EXER GET OUT OF GRIDER. It consists of a compass (worth alone mere than 50 cents), a dial and indicator, the constant of th

FELDSPAR. — THE PHYSICAL AND chemical characteristics of this important mineral, with a description of its varieties—adularia, common feld-spar, compact feldspar, continuous feldspar, and Labra-dor feldspar. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 317. Price 10 cents. To be had at this office and from all newsdealers.

40 New no 2 alike Chromo Visiting Cards, name on, 10 cents. Warranted best pack sold. Agents Wanted. L. JONES & CO., Nassau, N. Y.



FORMULA AND TABLES FOR THE Horse Power of Leather Belts.—A new formula for estimating the horse power of leather belts, as announced by A. F. Nagie, M. E., at the Hartford meeting of the American Society of Mechanical Engineers in 1881. The new formula. Defects of all previous formulas. Strength and tension of belts. Coefficient of friction. Degrees of Contact. Velocity. Table showing velocity of a pulley in feet per second. Tables giving the horse power of a laced leather belt, and of ariveted leather belt, one inch wide. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 331. Price 10 cents. To be had at this office and from all newsdealers.



CLARK'S RUBBER WHEELS.
This Wheel is unrivaled for durability, simplicity, and cheapness. Adapted for Warehouse and Platform Trucks, Scales, Heavy Casters, and all purposes for which wheels are used. Circular and Price List tree. GEO. P. CLARK, Windsor Locks, Ct.

BEATTY'S ORGANS, 27 stops, \$125. Pianos, \$297.50, Factory running day & night. Catalogue free. Address Daniel F. Beatty, Washington, N. J.

40 Lovely chromos, name on, 1 Model love letter, 10 love cards, all 10c.; 6-50c. O. A. Brainard, Higganum, Ct.

APPLICATIONS OF ELECTRICITY TO Railway Trains.—A comprehensive account of some of the most recent electrical devices that have been successfully applied to railway cars and locomotives. Illustrated with eleven figures. Contained in SCIENTIFIC AMESICAN SCIPPLEMINT, NO. 345. Price 10 cents. To be had at this office and from all news dealers.



THE PULLMAN SEWERAGE .-PALL FULLIMAN SEW ERAGE.—A paper by Benezette Williams, descriptive of an interesting system of land sewerage adopted in the town of Pullman, Ill. With an illustration showing the arrangement of the screening tank and accessories. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 351. Price 10 cents. To be had at this office and from all newsdealers.



ROADS, TUNNELS, BRIDGES, AND Canals.—Address by John Fowler, M.Inst.C.E., before the Mechanical Science Section of the British Association, presenting an interesting review of the progress effected in recent times in Civil and Mechanical Engineering. Ratiway Engineering. Tunnel Engineering. The Great Bridge over the Forth. Egypt and the Nile. The Sucz Canal. Early Incidents in Steam Navigation. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 353. Price 10 cents. To be had at this office and from all newsdealers.

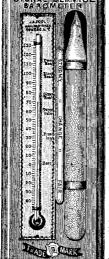


GARDS Send two 3c. stamps to C. Tollner, Jr., Brooklyn, N. Y., for a new set elegant Chromo Cards and Catalogue of Latest Designs for Fall and Winter.

BATTERY AND COPPER PLATE AMAL gamation.—By Prof. R. H. Richards. A paper of great interest to those engaged in gold mining, giving the re-sults in detail of running a small improved test mill for extracting fine particles of gold by the amalgamation process. Contained in SCIENTIFIC AMERICAN SUPPLE-MENT. NO. 346. Price 10 cents. To be had at this office and from all newsdealers.



WHAT WILL THE WEATHER BE TO-MORROW Pool's Signal Service Barometer



OR STORM GLASS AND THERMOMETER COMBINED, WILL TELL YOU!

It will detect and indicate correctly any change in the weather 12 to 48 hours in advance. It will tell what kind of storm is approaching, and from what direction—invaluable to navigators. Farmers can plan their work according to its predictions. Saves 50 times its cost in a single season. Has an accurate thermometer attached, which alone is worth the price of the combination. This great WEATHER INDICATOR is endorsed by the most eminent Physicians, Professors BEST IN THE WORLD. The Thermometer and Barometer are put in a nicely finished walnut frame, with silver plated trimmings, etc., making it a beautiful as well as useful or nament. We will send you a sample one, delivered free, to your place, in good order, on receipt of \$1, or six for \$4. Agents are making from \$5 to \$20 daily selling them. A tria will convince you. Order at once It Sells at SICHT! Just the thing to sell to farmers, merchanis, etc. Invaluable to everybody. U. S. Postage Stamps taken if in good order, but money preferred. Agents wanted everywhere. Send for Circular and temms. Address all orders to OSWEGO THERMOMETER WORKS, (Largestes all shment of the kind in the world) Oswego, Oswego Co., N.Y. We refer to the Mayor, Postmaster, County Clerk, First and Second National Banks, or any business house in Oswego, N. S. Wile your Post Office, County and State plainly, and remit by money-order, draft on Nam York or registered letter, at our risk.

This will make a Beautiful and Very Useful Present.

READ WHAT THE PUBLIO SAY ABOUT IT.

This will make a Beautiful and Very Useful Present.

I find Pool's Barometer works as well as one that costs fifty dollars. You can rely on it every time.

OAPT. Chas. B. Rocers, Ship 'Twilight, 'San Francisco, Barometer received in good order, and must say that the instrument gives perfect satisfaction in every respect. It is neatly made and wonderfully cheap at two dollars. Pool's Barometer has already saved me many times its cost, in fortetiling the weather. It is a wonderful curiosity and works to perfection. F. J. Rocerszos, Miwakee, Wis. BEWARE OF WORTHLESS IMITATIONS. None genuine without our Trade Mark, and Signature of J. A. Pool., on back of Instrument, as below:



ROCK BREAKERS AND ORE CRUSHERS. We manufacture and supply at short notice and lowest rates, Stone and Ore Crushers containing the invention described in Letters Patent. Issued to Eli W. Blake, June 18th. 1858, together with New AND VALUABLE IMPROVEMENTS, for which Letters Patent day IIth and July 20th, 1880. to Mr. S. L. Marsden All Crushers supplied by us are constructed under the superintendence of Mr. Marsden, who, for the past fifteen years, has been connected with the manufacture of Blake Crushers in this country and England.

FARREL FOUNDILY AND MACHINE CO., Manufrs., Ansonia, Conn. COPELAND & BACON, Agents, New York.







POSITIVE BLAST **Iron** revolvers, perfectly balanced, Has Fewer Parts than any other Blower.

P. H. & F. M. ROOTS, Manufacturers,

CONNERSVILLE, IND.
S. S. TOWNSEND, Gen. Agt., 6 Cortland St., 8 Dey St.,
COOKE & CO., Selling Agts., 6 Cortland Street,
JAS. BEGGS & CO., Selling Agts. 8 Dey Street,
NEW YORK.
SEND FOR PRICED CATALOGUE.

MALLEABLE ? CASTINGS FROM SPECIAL THOMAS DEVLIN & CO. FINE TINNING JAPANNING AND THE CHICH AVE & AMERICAN ST. PHILA.

HEAVY TOOLS WANTED.

First-class 30 foot Pit Lathe and 6 or 7 foot Planer. Send lowest prices, with full particulars, and name quickest delivery, to

M. C. BULLOCK M'P'G CO., 80 Market Street, Chicago, Ill.

FOR SALE, at Prince Arthur's Landing Ontario, a full set of Reducing Machinery, Also two Boilers and En-gine, with connections complete. Apply to THOMAS MARKS & BRO., Prince Arthur's Landing, Ontario. Can.



WATCHMAKERS

Before buying lathes, see the "Whitcomb," made by AMERICAN WATCH TOOL CO., Waltham, Mass.

ARTISTIC HOMES.

Just published. 44 Plans, Elevations, and Interiors of QUEEN ANNE and COLONIAL Villas and Cotages, costing from \$700 upward. Inclose 3c. stamp for illustrated circular. Price \$3.50. Agents wanted.

A. W. FULLER, Architect, Albany, N. Y.



50 ELEGANT NEW STYLE CARDS, Gilt Fringe, Chromo, Fan, Ivy Wreath, Gilt Vase of Confesse, ctc., no 2 alike, name on, 10c. Agent's book of samples, 25c. GORDON PR'T'G CO., Northford, Ct.

FARMERS and FARMERS' SONS.

CAN MAKE \$50 to \$150

During the Fall and Winter. For particulars, address,
J. C. McCurdy & Co., Philadelphia, Pa.

Agents Wanted C 45 5 5 8. M. SPENCER Sells Rapidly. Particulars free C 45 5 8 Boston, Mass.

* THE STAR PRINTING CO., Northford Conn., * one of the oldest Card Printing Establishments in the State. one of the oldest Card Printing Establishments in the State continue to give their agents the largest commissions and ser the Choicest Styles of Chromo and Beveled Edge Cards. 10c. for our New pack of Elegant Chromo Cards, P. Beauties. Send 29 cents for Agents' Sample Book at reduced Price List. Blank Cards at Wholesale.



MORPHINE

ECHLORIDE OF GOLD

REMEDIES. 5.000 cures. Books FREE. LESLIE E. KEELEY. M. D., Surgeon C. & A. Railroad. Dwight, Dwight, Ill.

50 Elegant Genuine Chromo Cards, no two alike, with name, 10c. SNOW & CO., Meriden, Ct.

OLD ROLLED

The fact that this shafting has 75 per cent, greater strength, a finer finish, and is truer to gauge, than any other in use renders it undoubtedly the most economical. We are also the sole manufacturers of the CPLEMEATED COLLINS' PAT.COUPLING, and furnish Pulleys, Hangers, etc., of the most approved styles. Price list mailed on application to JONES & LAUGHILINS,

Try Street, 2d and 3d Avenues, Pittsburg, Pa.

Corner Lake and Canal Sts., Chicago, Ill.

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

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

CONSUMPTION

SELECTRIC PADS

A sure preventive of Colds on the Lungs and Pneumonia. Strengthening to a Weak tomach. Covering the Breast and Back with no inconvenience to the wearer. Full directions for making them with one complete for sample, will be mailed to any address, postpaid, on receipt of one dollar. Positive proof of their excellence will be given with the sample. Address

ALLEN'S ELECTRIC PAD CO., 144 West 6th St., Cincinnati, O.

Advertisements.

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

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

at any pressure of water above 15 lb.; at 40 lb. pressure sure has 4-herse power, and capacity up to 10-horse power. Prices from \$15 to \$300. Send for circular to THE BACKUS WATER MOTOR CO., N. wark, N. J.



USE ABSORBENT WIPES for cleaning Machinery and Metals. Permanently adopted by the U. S. Government after a long and careful test. Once introduced you will use nothing else. \$30 per thousand wipes. Special prices to the Trade taking large lots. Sole makers, Brown M'Tg Co., Providence, R. L.

ASBESTOS ROPE PACKING,
ASBESTOS WICK PACKING,
ASBESTOS FLAT PACKING,
ASBESTOS SHEATHINGS,
ASBESTOS GASKETS,
ASBESTOS BUILDING FELT.

Made of strictly pure Asbesto

H. W. JOHNS M'F'G CO.,

87 Maiden Lane, New York, Sole Manufacturers of H.W. Johns' Genuine Descriptive price lists and samples free.



COLUMBIA Bicycles.

Thousands in daily use by doctors, lawyers, ministers, editors, merchants, etc. etc. Send 3c. stamp for elegantly illustrated 36 page catalogue to

THE POPE M'F'G CO., 597Washington Street, Boston, Mass.

THETHE CUEBED WATCH CASE

The "MONITOR." A NEW LIFTING AND NON-LIFTING INJECTOR.



Best Boiler Feeder in the world. Greatest Range yet obtained. Does not Break under Sudden Changes of Steam Pressure.

Also Patent **EJECTORS**

Water Elevators, For Conveying Water and Liquid. Patent Oilers, Lu-

NATHAN & DREYFUS,
Send for catalogue. 92 & 94 Liberty St., New York



Small Engine Castings, Gears, Lathe Tools, Tools for Mechanics, Machinists, and Amateurs, Engraving Tools, Scroll Saws, Photographers' Outlits, Drills, Oil Stones, Steel, etc. The largest stock offine Tools in the U.S. Send son Co., 77 State St.. Chicago.

Stevens' Roller Mills,

GRADUAL REDUCTION OF GRAIN. Manufactured exclusively by THE JOHN T. NOYE MFG. CO., Buffalo, N. Y.



REMINGTON TYPE-WRITER. Warranted. Satisfaction guaranteed.
Type-Writer Supplies. Send for circulars. Address E. REMINGTON &
SONS. Manufacturers, or Wyckoff,
SONS. Manufacturers, or Wyckoff,
San Man & Benedict, Sole Agents,
251 and 283 Broadway, New York.

Steel Castings

From 4 to 15,000 lb. weight, true to pattern, of unequaled strength, toughness, and durability. 20,000 Crank Shafts and 15,000 Gear Wheels of this steel now running prove its superiority over other Steel Castings Send for circular and price list.

CHESTER STEEL CASTINGS CO., 407 Library St., Philadelphia, Pa.



At Low Prices. Large Assorted Stock. A. & F. BROWN, 43 Park Place, New York

PERFECT

NEWSPAPER FILE

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

MUNN & CO.,

Publishers Scientific American P. O. Box 3083.

WIRE ROPE: WIRE ROPE: THE MANUFACTURING CO. HAZARD MANUFACTURING CO. HAZARD MANUFACTURING CO. CHARLES PARRISH PRESIDENT. WIRE ROPE, BRIDGE CABLES, SHIP RIGGING, Tramway Ropes, Champion Barbed Wire, etc.

Office and Works: Send for Office and Warehouse: WILKESBARRE, PA. Price list. 87 LIBERTY ST., NEW YORK.

DOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS—For grinding Bones, Ores, Sand, Old Crucibles, Fire Clay Guanos, Oil Cake, Feed, Corn, Corn and Cob, Tobacco, Snuff, Sugar, Salts, Roots, Spices, Coffee, Cocoanut, Flaxseed, Asbestos, Mica, Also for Paints, Printers' Inks, Paste Blacking, etc., and whatever cannot be ground by other mills, Also for Paints, Printers' Inks, Paste Blacking, etc., JOHN W. THOMSON, successor to JAMES BOGARDUS, corner of White and Elm Sts., New York.



JOHN HOLLAND, 19 W. 4th St., Cincinnati, O., Manufacturer of all styles of Best Quality Gold Pens, Pen and Pencil Cases, Gold Toothpicks, etc. Our pens received the highest award at Philadelphia Exposition "for great elasticity and general excellence." See judges' report, published by Lippincott & Co. For sale by the trade. Illustrated lists mailed free.

Send for Circular & Price List of COPE & MAXWELL M'F'G CO'S STEAM PUMPS -AND-BOILER FEEDERS.
"THE BEST MADE,"
Address HAMILTON, OHIO.

EVAPORATING: FRUIT



Treatise on improved methods SENT FREE. Wonderful results Tables of Yields, Prices, Profits and General Statistics. Address AMERICAN MANUF'G CO.,

Waynesboro, Pa.

Pyrometers, For showing heat of Pyrometers, Ovens, Hot Blast Pipes, Boiler Flues, Superheated Steam, Oil Stills, etc.
HENRY W. BULKLEY, Sole Manufacturer, HENRY W. BULKLEY, Sole Manufacturer, Henry W. Bulkley, New York.



Establ'd EAGLE ANVILS. 1843. Solid CAST STEEL Face and Horn. Are Fully War-

Sole Manufacturers of ders, under the Seibert and Gates Patents, with Sight Feed. TAKE NOTICE.

TAKE NOTICE.

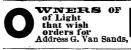
The "Sight Feed" is owned exclusively by this company. See Judge Lowell's decision in the United States Circuit Court, District of Massachusetts, Feb. 23, '82. All parties are hereby notified to desist the use, manufacture, or sale of same, as we shall vigorously pursue and prosecute all infringers.

THE SEIBERT CYLINDER OIL CUP CO., 53 Oliver Street, Boston, Mass.

Best Boiler and Pipe Covering Made

The Celebrated Patent
Air Space
COVERING
For STEAM BOILERS and PIPES, HOT BLAST PIPING, etc., etc. Address CHALMERS SPENCE CO.,
23 John Street, New York.





ATENTS
Hardware,
to place
manufacture,
Middletown,Ct.



The Eclipse Engine Furnishes steam power for all Agricultural purposes, Driving Saw Mills, and for every use where a first-class and economical Engine is required. Eleven first-class premiums awarded, including Centennial, "f6. Refer to No. 7. issue of '77. No. 14. issue of '78. of Scientific American, for Editorial illustrat'ns. Frick & Co., Waynesboro, Franklin Co., Pa.

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



ranted. Retail Price, 10 cts. per lb.

WHEELS.

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

Address NEW YORK BELTING AND PACKING CO...
Emery Wheel.

SPECIAL NOTICE.

Owing to the recent great fire in the "World" Building, our office has been removed as above.

WM. A. HARRIS.
PROVIDENCE, R. I. (PARK STREET),
Six minutes walk West from station. Original and Only builder of the
HARRIS-CORLISS ENGINE

With Harris' Patented Improvements, from 10 to 1.000 H. P.



This cut represents the renowned RED JACKET Adustable Double-acting Lift and Force Pump for general purposes. Highest Prizes awarded wherever exhibited.
Thousands now use throughout the States, giving perfect satisfaction.
Aftited for hand and power. Agents wanted everywhere. For particulars, address CINCLNATI PUMP CO., Cincinnati, Ohio.U.S.A.

SPEAKING TELEPHONES.

THE AMERICAN BELL TELEPHONE COMPANY, W. H. FORBES, W. R. DRIVER, THEO. N. VAIL, President. Treasurer. Gen. Manager.

w. H. FURIES, W. K. DRIVER, THEO. N. VAIL, President. Treaswer: Gen. Manager.

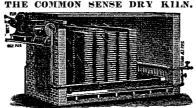
Alexander Graham Bell's patent of March 7, 1876, owned by this company, covers every form of apparatus, including Microphones or Carbon Telephones, in which the voice of the speaker causes electic unduations corresponding to the words spoken, and which articulations produce similar articulate sounds at the receiver. The Commissioner of Patents and the U. S. Circuit Court have decided this to be the true meaning of his claim; the validity of the patent has been sustained in the Circuit on final hearing in a contested case, and many interest of the control of the cont

makers, sellers, and users will be proceeded against.
Information furnished upon application.

Address all communications to the
AMERICAN BELL TELEPHONE COMPANY,
95 Milk Street, Boston, Mass.



W A TCH MA N'S Lamproved Time Detector, with Safety Lock Attachment, Patented 1876-7-84-81. Beware of Infringements. This Instrument is supplied with 12 keys for 12 stations. Invaluable for all concerns employing night retainmen. Send for cir-WATCHMAN'S IMwaccinnen. send for cir-culars to E. IMHAUSER,-P.O.Box 2875. 212 Broadway, New York.



In solving the true principle of seasoning, extracting the sap from the center by suction, rapid circulation of air, with moderate heat, we offer the cheapest kiln in construction, quickest in operation and perfect in results. Prevents checks, warp, or hardened surface. ST. ALBANS M'F'G CO., St. Albans, Vt.

And STEREOPTICONS, all prices. Views illustrating every subject for PUBLIC EXHIBITIONS, etc. McALLISTER, Mfg. Optician, 49 Nassau St., N. Y.



Spark-Arresting Thrashing Engine
has cut 10.000 feet pine lumber in ten hours.
Will burn wood six feet long, coal straw and corn stalks. Send for Price List and Catalogue "A" 2. Box 1207. B. W. PAYNE & SONS, Corning, N. Y.

Leffel Water Wheels, With recent improvements. Prices Greatly Reduced. 8000 in successful operation. FINE NEW PAMPHLET FOR 1879, Sent free to those interested. James Leffel & Co, Springfield, O. 110 Liberty St., N. Y. City.

MAKING MACHINES, ICE

And Machines for Cooling Breweries, Pork Packing Establishments, Cold Storage Warehouses, Hospitals, etc. SEND FOR ILLUSTRATED AND DESCRIPTIVE CIRCULARS.

PICTET ARTIFICIAL ICE CO. (Limited),



NO ADJUSTMENT FOR VARYING STEAM PRESSURE.

WILL LIFT WATER 25 FEET. SEND FOR DESCRIPTIVE CIRCULAR.

OFFICES AND WAREROOMS:

PHILADA, 127H & THOMPON STS.

BOSTON, 7 CLIVER ST.

AUGUSTA, GA., 1028 FENWICK ST.

BOWLER, OCL., 194 FIFTEENTH ST.

RICHMOND, VA., 1419 MAIN ST.

HARTFORD

STEAM BOILER

Inspection & Insurance COMPANY.

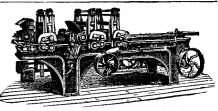
W. B. FRANKLIN.V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE. Sec'y.



ERICSSON'S New Caloric Pumping Engine

FOR
DWELLINGS AND COUNTRY SEATS, Simplest cheapest, and most economical pumping engine for domestic purposes. Any servant girl can operate. Absolutely safe. Send for circulars and price lists.

DELAMATER IRON WORKS C. H. DELAMATER & CO., Proprietor No. 10 Cortlandt Street, New York, N. Y.



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



FREE! FREE!! FREE!!!



In fact, everything for Amateur Theatricals. SAMUEL FRENCH & SON, 38 East 14th St., New York. THE



RIDER COMPRESSION PUMPING ENGINE

(Hot Air), for city or country residences where it is required to raise a supply of water, is the most Perfect Pumping Machine in the market. Its marvelous Simplicity, absolute Safety, great Economy and Effectiveness, render it far superior to all others. Can be run by any inexperienced person. Send for catalogue and price list to CAMM EY ER & SA YER, 33 Liberty St.. New York, and 20 W. Lake St., Chicago. III.

Please mention this Paper.

MACHINISTS' TOOLS.

NEW AND IMPROVED PATTERNS. Send for new illustrated catalogue.

Lathes, Planers, Drills, &c. NEW HAVEN MANUFACTURING CO., New Haven, Coun.



NUT TAPPING **DURRELL'S PATENT.**

No. 1 Machine, 900 lb., 7 spindles. "2" 1,050 "7" "3" " Capacity of 7 Spindles, 8,000 per 10 hours.

Acknowledged to be an indispensable tool Manufactured by HOWARD BROS.

ACHINERY

of every description. 121 Chambers and 103 Reade Sts., New York. The GLORGE PLACE MACHINERY COMPANY.



PRINTING INKS. 142 Greenwich St., New York City, N. Y.

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