SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyrighted, 1890, by Munn & Co.]

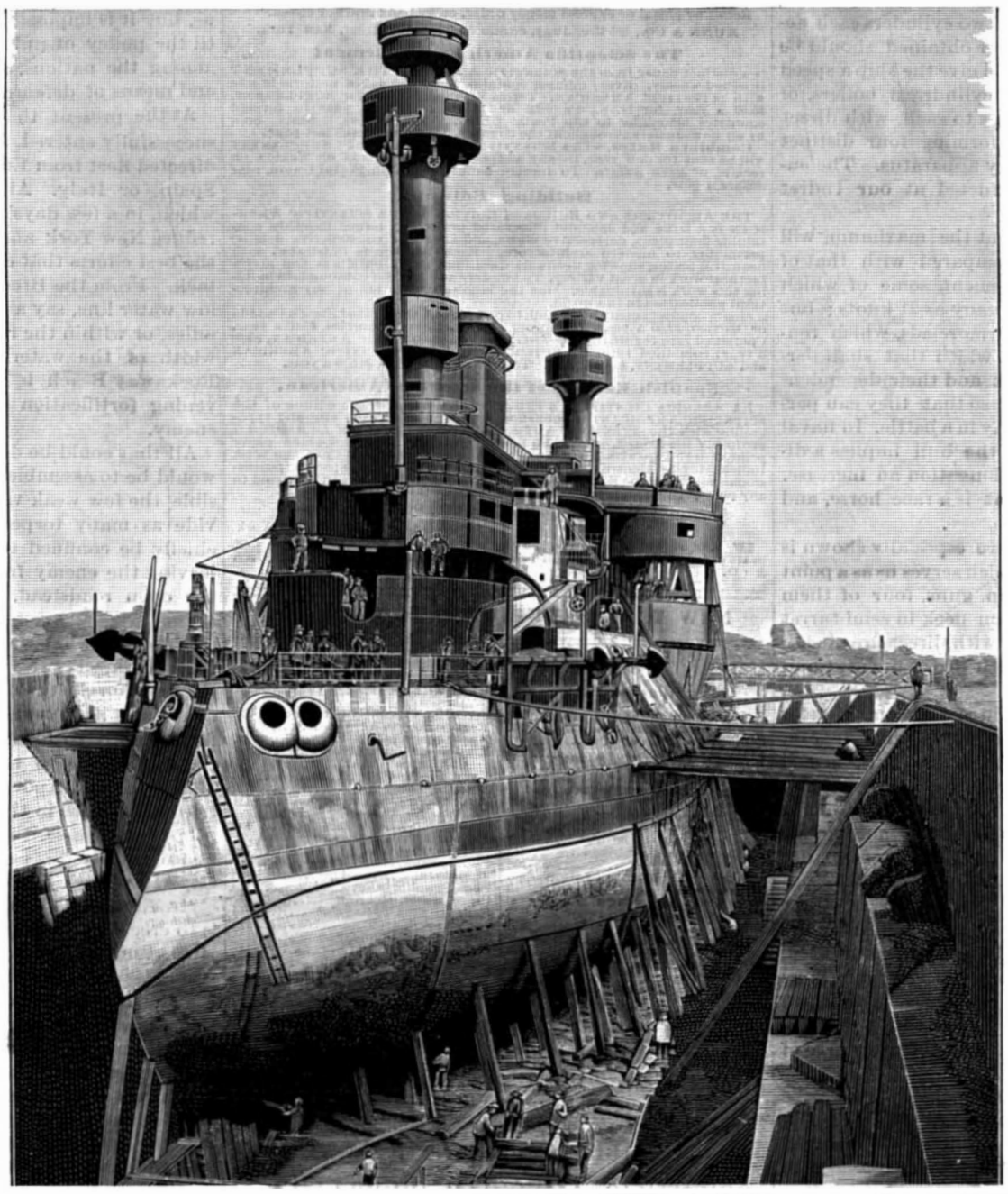
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXIII.—No. 8. ESTABLISHED 1845. NEW YORK, AUGUST 23, 1890. [$3.00 A YEAR. WEEKLY.

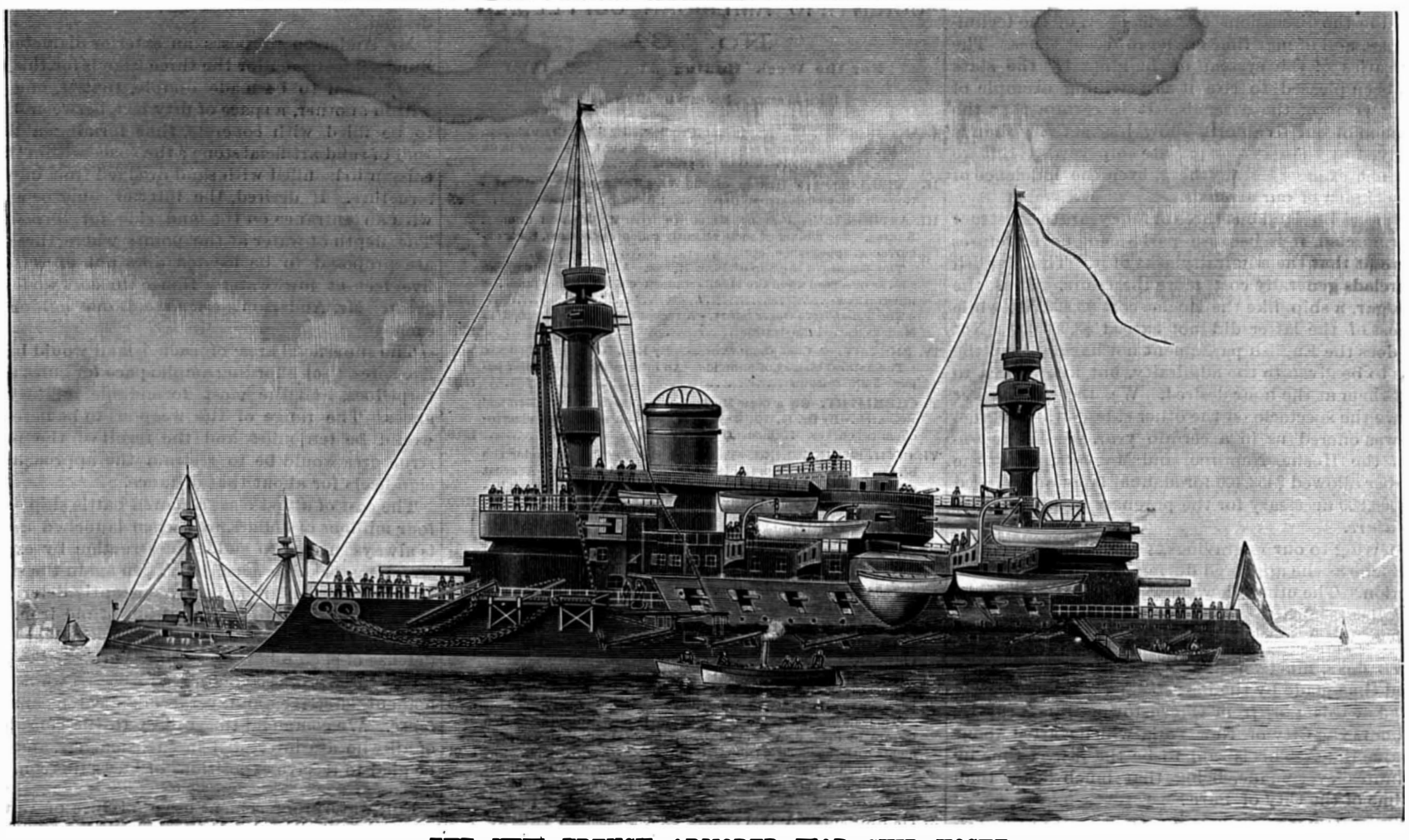
THE NEW FRENCH ARMORED WAR SHIP HOCHE.

On the 15th of July, 1889, the Hoche received her armament at Lorient, where she had just successfully made her preliminary trial trips. The final trials will be made at Brest, as the port of Lorient is not well adapted for operations of this kind on account of the difficulties that its entrance presents.

The Hoche is one of the finest specimens of modern naval architecture, and, we may add, one of the most interesting ones, by reason of the differences between it and our old war ships, and even our most recent vessels. Is that as much as to say that it is the definitive type of the armorclad? No; for in that incessant transformation of which the Gloire was the origin, in 1859, every new ship is a new work, differing from its predecessors. The marine exposition, although it was very meager, demonstrated this with eloquence. In the pavilion that was devoted to it, there was on exhibition a series of models on a scale of 15 millimeters to the meter, through which the progress made during the last fifteen years could be easily seen. Thus, alongside of the Hoche, put upon the stocks in 1880, there might be seen, for example, the Formidable (launched in 1885) and the Trident (launched in 1876),



and the differences at once attracted attention. The most striking of these are found in the upper works, which, on the Trident and the types of its time, embrace an armorclad citadal and spacious and tall batteries. Upon the Formidable they perceptibly diminish, and upon the Hoche are reduced to two stories of narrow and light superstructures, containing nothing but rooms that must disappear at the first shot. The armor here is thicker and of less extent. It is reduced to a very strong belt around the load water line, 18 in. amidships, 16 in. forward, and 14 in. aft (9, 9, and 11 in. on the Trident). It rests against a deck protected with 3 in. armor plate situated beneath the load water line, and that renders the submerged part of the ship impenetrable, and affords a sure protection to the motive apparatus and the ammunition. Above the deck, there are turrets for the large guns. The plates of these are 16 in. in thickness. The two vessels have nearly the same length, but are of different widths. The Hoche is 336 ft. in length and 65 in width, and the Trident is 314 ft. in length and 58 in width. The depth at the main deck is 43 ft. on the Hoche and but 35 on the Trident. The draughts of water, center and aft, differ but



THE NEW FRENCH ARMORED WAR SHIP HOCHE.

little—25 and 27 ft. on the Hoche, and 25 and 28 on the Trident. The first displaces 10,581 tons, and the second 8,456. Finally, the Trident is of wood, and the Hoche of iron and steel.

If, now, we descend to the engines, and compare those of the ship of 1876 with those of the armorclad of 1880, the progress is found to be still more perceptible. On the Trident, the engine, with three horizontal cylinders, is of the Wolff system. It is placed in the vessel's axis and actuates one screw. It is of 4,882 H. P., and gives the vessel a speed of 14·17 knots an hour. The evaporatory apparatus consists of eight rectangular boilers of the high type, with four furnaces to each. They are registered at 33 lb. to the square inch.

The Hoche's apparatus consists of two independent compound vertical engines with two cylinders each actuating a screw. The total power obtained should be that of 12,000 horses, which would give the ship a speed of from 16 to 17½ knots. Eight cylindrical boilers, of a special type, with three furnaces to each, with direct flame, registered at 85 lb., and forming four distinct groups, compose the evaporatory apparatus. The engines of both ships were constructed at our Indret works.

A speed of 16 knots, or 17½ at the maximum, will doubtless not appear great if compared with that of steamships of an equal displacement, some of which (like the City of Paris) make as many as 21 knots; but we must not forget the role of armorclads, which renders it obligatory to give them a width that shall permit of the installation of turrets and their dependencies, and to make them shorter,* so that they can perform their evolutions more rapidly in a battle. In naval construction every widening of the hull implies a diminution in speed, and every elongation an increase. Upon the whole, the packet boat is a race horse, and the armorclad is a draught horse.

But where the dissimilarities are especially shown is in the artillery. The Trident, which serves us as a point of comparison, carries six 10½ in. guns, four of them in the central citadel and two on deck in semi-turret barbettes; two 9½ in. guns, one with direct fire ahead, upon the poop, and the other with direct fire aft; and six 5½ in. guns in battery.

The Hoche has four turrets in a bow and quarter line; two barbettes in the center armed with 10½ in. guns; one in front and one aft, in the axis, armed with 13 in. guns. There are more than eighteen 5½ in. guns in the battery, twelve revolving guns, eight rapid-firing guns, and six tubes for firing automobile torpedoes. It will be seen that the 13 in. guns do not exist upon the Trident.

Upon the ships of the Hoche type, which are three in number (the Magenta, Marceau, and Neptune), the 10½ in. guns are suppressed, and are replaced by 13 in. ones, the field of fire of which is much greater. They throw 770 and 530 lb. projectiles to a distance of 27,230 ft. with a charge of 300 and 330 lb. and with a velocity of 1,820 and 1,800 ft. The 10½ in. guns have a range of but 20,800 ft.

As the Hoche was put on the stocks with its three similars, the latter have not escaped that law of progress of which we have spoken. They have received quite important improvements in detail, especially in their armament. The name of the Hoche has often echoed in the discussions of parliament, of the technical press, and of maritime circles in recent times. The adversaries of the system of building by the state have been pleased to cite it as a striking example of the slowness of the arsenals. It is certain that the workmen of our five ports show less activity than is displayed by those of our private ship yards. But we must not exaggerate anything, even the indolence of the workmen of our arsenals.

If it takes England but three or four years to construct an armorclad, it is because parliament never refuses the credit that the admiralty asks of it. The English armorclads generally cost more than ours. Thus, the Trafalgar, a ship like the Hoche, cost $3,400,000, while the cost of the latter did not exceed $3,000,000. Not only does the English parliament not haggle about the funds to be given to the admiralty, but knows how to grant them at the hour desired. We, therefore, never observe the spectacle on the other side of the channel that was offered us in a certain year, precisely *apropos* of the Hoche, Neptune, and Magenta, when the chamber allowed $453,400 for manual labor and refused the $906,800 necessary for the purchase of materials.—*La Nature.*

[Referring to our engravings, the upper one shows the Hoche as she appeared during the process of construction. The other view shows the great ship as she now appears afloat.]

FIVE days, nineteen hours, five minutes is the reported time made by the new steamer Teutonic, lately arrived at this port from Queenstown. She beat by two hours the City of New York, which started about the same time. This is said to be the fastest time by 13 minutes ever made, being that much faster than the time of the City of Paris.

* The City of Paris is 580 feet in length.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico..... $3 00
One copy, six months, for the U. S., Canada or Mexico..... 1 50
One copy, one year, to any foreign country belonging to Postal Union. 4 00
Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, for U. S., Canada or Mexico. $6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country. See prospectus last page.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U. S., Canada or Mexico, on receipt of *seven dollars.* To foreign countries within Postal Union, *nine dollars a year.*

Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, perspective views, and sheets of constructive details, pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To builders and all who contemplate building this work is invaluable. Has the largest circulation of any architectural publication in the world.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, $2.50 a year. To foreign Postal Union countries, $3.00 a year. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, $5.00 a year; combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN and SUPPLEMENT, $9.00 a year. To foreign countries, $11.50 a year.

Spanish Edition of the Scientific American.

LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of *La America* is profusely illustrated. It is the finest scientific, industrial trade paper printed in the Spanish language. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. $3.00 a year, post paid to any part of the world. Single copies 25 cents. See prospectus.

MUNN & CO., Publishers,
361 Broadway, New York.

☞ The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO.

NEW YORK, SATURDAY, AUGUST 23, 1890.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 764.

For the Week Ending August 23, 1890.

Price 10 cents. For sale by all newsdealers.

SEAPORT DEFENSES.

The exposed and comparatively defenseless condition of our most important seaboard cities, in respect to foreign naval attack, has for years been the subject for talk in Congress, but up to the present time little of a practical nature has been done in the line of protection. It is true a few vessels of war have been ordered and some preliminary steps taken toward the manufacture of heavy guns for fortifications. But in regard to the systematic and permanent defense and safety of such important harbors and cities as Portland, Boston, New York, we believe no definite plan has been fixed upon, no material steps as yet taken.

It is, of course, to be hoped that no foreign nation will ever have the temerity to make an attack upon us, but it is impossibl to foresee the future; and, until the policy of universal peace becomes established among the nations, we must not neglect the science and means of defense.

At the present time most of our harbors might be successfully entered and cities burned by a skillfully directed fleet from England, France, Russia, Germany, Spain, or Italy. All thes powers have ships afloat which, in a few days' time, might reach our shores and reduce New York and Brooklyn to ashes, in spite of the best efforts that could be made to beat off an attack. From the Brooklyn Navy Yard to the 24 foot low water line, say a mile off Coney Island, it is nine miles, or within the range of modern heavy guns. The width of the waterway between Sandy Hook and Rockaway Beach is about eight miles, with no intervening fortification to check the approach of an enemy.

All that could be done in the event of sudden attack would be to assemble in the harbor as rapidly as possible the few weak vessels we have on hand, and provide as many torpedoes as we could. These would chiefly be confined to the inner parts of the harbor, leaving the enemy free to select his own positions in the open roadstead, and within range of our great cities.

Obviously what we greatly need for the defense of New York, likewise for Boston and other cities, is the erection in the outer roadsteads of the harbors, out at sea as it were, of suitable fortifications or artificial islands, so located as to command and protect the approaches to the harbors. This is a suggestion of Mr. John F. Anderson, of this city, an engineer of tried experience in the construction of works such as proposed. He is the contractor for the new lighthouse shortly to be erected upon Diamond Shoal, Cape Hatteras.

Mr. Anderson's plan for New York harbor defense is to erect three islands out in the sea, between Sandy Hook and Rockaway Beach, the islands to be about two miles distant from each other and from the shores. For the construction and formation of the fortifications, Mr. Anderson proposes to adopt the same simple and effective means he has heretofore used in erecting lighthouses in exposed situations, namely, construct on shore a large caisson or cylinder of iron, float it to the desired spot, fill with concrete and sink it, excavate the bottom through the interior, and continue to sink the caisson until the required firm foundation is reached; the walls to be built as far above water as desired.

Mr. Anderson proposes an exterior diameter of five hundred feet each for the three islands for this harbor, the caisson to be made double, that is, one caisson within another, a space of fifty feet between the two, to be filled with concrete, thus forming a fifty foot wall of solid artificial stone; the space within the inner caisson to be filled with sand dredged from outside the structure. If desired, the interior could be left open, with an entrance on the land side for torpedo boats. The depth of water at the points where these islands are proposed to be located does not exceed twenty-five feet at low water. Hence the cost would not be great. Mr. Anderson's estimate is one million dollars each.

The superficial area of each island would be about five acres, thus affording ample space for guns, mortars, torpedoes, and the most formidable military appliances. The range of the weapons to be here located would be ten miles, and the result of the proposed structures would be to restrain the approach of foreign fleets for about that distance.

The cost of a first class armored battle ship is about four millions of dollars, and when launched the vessel is always subject to sudden destruction by explosion, wrecking, or other accident. Then again the ship is in frequent need of repairs, is constantly deteriorating, and soon passes into the condition of old iron. Moreover, several such ships would be required for the sure defense of such a harbor as New York.

But these proposed outer sea fortresses would be permanent, effective, and yet economical means of defense. We commend the subject to the consideration of all who are interested in such matters, and should be glad to receive expositions of views thereon.

FOR waterproof cement use a mixture of Burgundy pitch or asphalt and gutta percha melted together.

Gradual Exhaustion of Natural Gas.

That which comes easily is not regarded with the same favor nor held in similar esteem to that which is more difficult to secure, even though both have equal value for the results sought. And so it is with natural gas for fuel purposes. Thousands of millions of cubic feet were worse than wasted; prodigality was the rule in its use; in fact, forming an opinion from the practices of those who supplied it and those who used it, the idea was to see which could outdo the other in recklessness. It seemed as if both suppliers and users had joined in the belief that there could be no end to the good thing that was thrown out in vast volumes from Nature's storehouse. The change came, however, and with it the time for paying up for past transgressions. Weakening pressures and diminished volume aroused the suppliers, who, with as much intemperance in their schemes for metering and increased payments as formerly characterized their lavishness and wastefulness, awoke to the fact that to keep in the swim they must regulate the flow of the tide. Their regulations grew so "pronounced" that the price was finally placed at a point where the larger manufacturing concerns "looked backward" at their old servant, coal, which, it would seem, is again in a fair way to assume its sway in Pittsburg. While we do not wish to be understood as saying that "King Coal" is to at once regain his supremacy in the "Smoky City," it is nevertheless true that his return is certain, although the immediate rate of progress may be slow. These remarks were brought out by advices received the other day from Pittsburg, to the following effect: "The Pennsylvania Tube Company is preparing to abandon the use of natural gas in its works, and return to the use of coal for fuel purposes. At the present time thirteen regenerator gas producer furnaces are being put in the works by the Smythe & Laughlin Company, some of which will be ready to use in about thirty days. The company has had this in contemplation ever since the price of natural gas began to go upward, or to the point where it was a question whether its use was more economical than that of coal. Slack coal will be used for making gas in the regenerators. This is the first industrial institution in Pittsburg to abandon natural gas entirely and to start to using manufactured gas for fuel purposes. Some other firms have the question under consideration." In the meantime there can be no doubt that the makers of artificial gas are under great obligations to the suppliers of natural gas, in that the prodigality of the latter taught the housekeepers of the natural gas districts much in respect to the intrinsic merits of gas as a domestic aid. And it may be accepted as an assured fact that when nature's produce gives out, the artificial gas manufacturer will have rich fields to glean in.—*Gas Light Journal.*

Electric Lighting of Trains.

From a paper on "Electric Lighting in Train Service," read by M. B. Leonard, superintendent of telegraph of the Chesapeake & Ohio Railway, before the recent convention of railway telegraph superintendents, we extract the following concerning the electric lighting of passenger trains:

The Boston & Albany Railroad Company, after two and a half years' trial, recently abandoned electricity on the two trains that were so lighted, and substituted the Pintsch gas system.

The Pennsylvania Company, however, still continues to light cars from storage batteries, using a low voltage lamp.

The Intercolonial Railway Company of Canada has adopted the accumulator system alone on the trains between Halifax and Quebec, and now has more than 40 cars fitted up with electric lamps, which are of 10 candle power, and vary from 11 to 22 to a car. The accumulators are charged at four different points on the line, running about 500 miles with the one charge, and the results thus far obtained are very satisfactory, but to provide for emergencies oil lamps have been retained in each car.

The combination of dynamo and storage battery first adopted by the Pullman Company is gradually being extended in this country, and is giving great satisfaction in the East and West, but, it appears, at a large expense for maintenance. The Chesapeake & Ohio vestibule train, "Fast Flying Virginian," running between New York and Cincinnati with six cars, is supplied with 118 lamps divided up thus: two Pullman coaches with 30 lamps each, dining car with 26, day coach 16, combination car 13, and the baggage car three. Up to May 1, 1890, the average cost per lamp for maintenance and renewals was $1.10 per month; yet where the exhaust steam is utilized for heating the train, the cost can be very materially decreased.

With this object in view, the Chicago, Milwaukee & St. Paul Railway Company has recently added to its equipment two independent light and heat tenders, which carry their own boilers for steam heating and for running a Westinghouse automatic engine attached to a No. 4 Edison compound-wound dynamo, supplying the current direct for lighting all the cars in the train, thus doing away with the dynamo on the baggage car and storage battery combination.

The results have been very favorable, and during more than six months of constant service there has not been a single failure. This company has four trains covering about 45 cars lighted by electricity, and expects to adopt this system of illumination on all of its through trains. It is stated that the expense of building and equipping these tenders is not much greater than the cost of the storage battery-dynamo combination, with the expensive wiring required in that system.

It is confidently believed that the cost of lighting trains by electricity in the United States can be greatly reduced by adopting the method so largely used abroad of gettting power from the axle. Mr. Houghton, the telegraph superintendent of the London, Brighton & South Coast Railway Company, one of the patentees of the system, advises me that there are sixteen trains running on that road which are so lighted—thirteen of them local trains and three express. The speed of the express trains reaches 70 miles an hour, while that of the locals runs from 20 to 60 miles per hour. The express trains are wired for an average of 70 lamps, and the others 40. The candle power of these lamps varies from 8 to 16, according to the speed of the train. The dynamo furnishing current for these lamps is placed in the baggage car and has a pulley at each end connected by belts direct with the axle of the car, no intermediate shafting being used. The slack is taken up by loose pulleys that can be pressed upon the belts.

In the same car with the dynamo, 22 accumulators weighing about 4,000 pounds are placed in parallel with the dynamo, for use whenever the train stops.

Connected by a belt from the dynamo is a centrifugal governor which joins up the circuit at any desired speed, causing the dynamo to charge the accumulators. When the lamps are not lighted, the governor introduces resistance into the dynamo field, reducing the output to about 40 amperes, in order not to damage the accumulator plates. When, however, it is necessary to light the lamps, the dynamo makes the full current, of which about 35 amperes pass into the lamps, the balance being stored in the accumulators.

In each lamp circuit a regulator is placed in order to keep the light in the lamps at the same power regardless of the speed of the train, and shunt any surplus current into the accumulators; so that 42 volt lamps may be used with a dynamo of any E. M. F. above that voltage without any variation in the light of the lamps.

The connections between the cars are made by coupling two cables together, and when the dynamo runs below a certain speed, a cut-out breaks the circuit of the armature, preventing the cells from discharging themselves through and burning it out. Should the current not furnish enough current for the lamps, the accumulators supply the balance, and in doing so strengthen the field magnets, and thereby cause an increase of current in the dynamos.

One arrangement of the circuits of these trains has the field magnets of the dynamo wound with two wires in opposite directions, one of which is shunt to the armature as if the dynamo was an ordinary shunt machine; the other is wound in the reverse direction as if the dynamo were a compound machine, and the accumulators are in series with the wire. The lamps are also in shunt with the armature.

The trains on which this system is used consist mostly of ten cars which run solid, that is, are not broken up, and average 40 12-candle power lamps to a train. By using accumulators in each car, however, no difficulty would be found in splitting up the train at various points.

The figures given by Mr. Houghton are as follows:

Total weight of the plant on each train, three tons; cost of plant on each train, £400 sterling; cost of maintenance per annum, £65 sterling.

The only attention given trains is at each terminus, where one man inspects the apparatus, oils the pulley bearings, etc., before the train pulls out. One of these trains has been running since December 19, 1883, without a single failure being reported. During the first eleven months of its use, it made 2,352 trips, and ran 27,322 miles.

The Midland Railroad Company, of England, is running three trains lighted by electricity, and has recently fitted up two others. Two of these are short trains always run solid, and the others main line trains made up at various points. The dynamo is placed in the baggage car, and is also driven from the axle with about the same electrical arrangements as are used on the London and Brighton Road. The short trains have eighty-five lamps run from one set of storage batteries, in the baggage car. On one train the batteries are in series, but on the others in parallel. This seems to be the most satisfactory. Eight candle power lamps are used on this road, two to each compartment, which can be turned down, and this feature is found to be very convenient to through passengers.

This system of illuminating passenger trains is becoming very popular in England, and it is believed that all such trains on the important roads of the kingdom will shortly be equipped in this way. The expense as shown by seven years' experience on the London and Brighton Road is certainly not greater than where common oil is used, and seems to corroborate the report made by Sartiaux and Weissenbruch to the International Railroad Congress at Paris a year or two ago, in which it was stated that for lights of the same candle power, gas supplied by the Pintsch system would cost about 11·3 centimes and coal oil about 16·9 centimes per lamp hour as against 5·6 centimes for the electric light.

Compared with the practice on American roads, the economy of this method of generating this current is remarkable. It has been stated, however, by various authorities that it is impossible to secure even fair results in train lighting in this country where the power is supplied by the car axle, owing to the numerous curves on American roads, around which the wheels will often slide without turning the axle a single revolution, thus seriously damaging belts and armature, and the constant changes in speed, while English roads are almost always tangents, and a high and constant rate of speed is maintained. The experiments made here some years ago seem to corroborate these statements.

In 1886 or 1887, Mr. Barrett, of Springfield, Mass., fitted up a train on the Connecticut River Railroad to be lighted with electric lamps run from a dynamo obtaining its power from the car axle. A countershaft was used, and a peculiar arrangement of a friction clamp transmitted the power to a pulley on the shaft. This clamp was governed by centrifugal weights balanced by stiff springs. When the dynamo ran at its normal speed, these springs just balanced the friction of the clamp, and there was no slip; any increase of speed then caused the friction to diminish and the pulley slipped upon the shaft until the equilibrium was restored; 24 accumulators were connected with the circuit as a regulator, keeping the lamps lighted when the train stopped, and a centrifugal governor broke the accumulator circuit when the train slackened its speed. The brushes were attached to a rocking arm or lever, which was tilted by magnets in either direction in accordance with the forward or backward movement of the train.

Owing to the arrangement of the car trucks, it was found very difficult to obtain the proper speed of the dynamo, and after successive trials with belts, ropes, and chains it was finally abandoned. Since that time there have been no further experiments of this character in the United States, but it is said that such improvements are now being made in the driving gear as will obviate the difficulties heretofore encountered, and that further trials in this direction may be looked for within the next six months.

Coffee Cochineal.

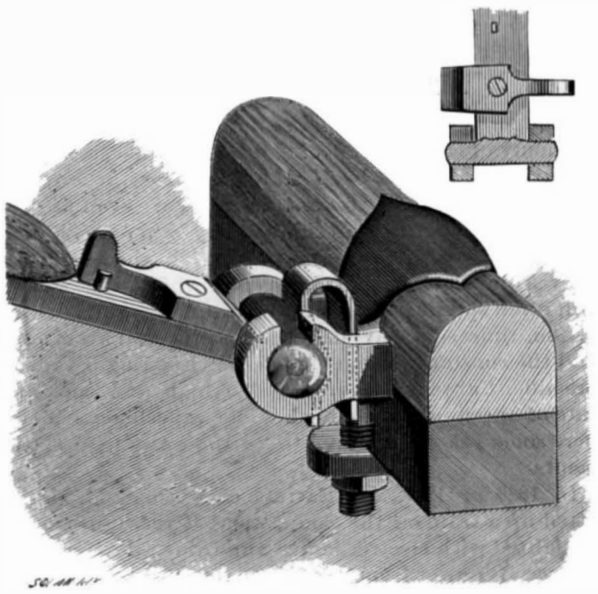
The coffee plantations in the department of Amatitlan, Guatemala, have lately been ravaged by a peculiar insect, which M. Adolf Vendrell has ascertained to be a new species of cochineal (*Coccus coffea*). The principal industry in this district formerly was the cultivation of cochineal. When examined microscopically, one of the insects is seen to contain a yellowish liquid with thousands of little eggs. As the development of the eggs continues they become larger, and the liquid diminishes, so that a dry insect contains no liquid, but innumerable eggs of a reddish yellow color, which look like very fine powder, and are transported by the wind as easily as the pollen of flowers. In December the insects are in the former condition, and about February and March the female insect reaches the stage of full development and ejects the eggs, covering them with its body. The insects are only noticed on the coffee plants when the females are fecundated; but by this time the plant has become sickly and yellow; it is imperfectly nutrified, and, should it reach the fruiting stage, the berries are small and of little value. M. Vendrell thinks that this is because the insects extract nitrogen from the plants, and he consequently advises manuring with nitrate of soda.

A Monster Piece of Granite.

Vinalhaven, Maine, claims to have produced the largest stone ever brought to light. The Bodwell Granite Company recently quarried a shaft of granite which is the largest piece of stone ever quarried anywhere, and, if erected, will be the highest, largest, and heaviest single piece of solid stone standing, or that ever stood, so far as any record can be found. In height it considerably exceeds any of the Egyptian obelisks. The tallest of these, which was brought from Heliopolis to Alexandria by Emperor Constantine, and afterward taken to Rome, where it is still standing, is 105 feet 7 inches high, while the Vinalhaven shaft is 115 feet long, 10 feet square at the base, and weighs 850 tons. It is understood, says *Stone*, that the company quarried this immense monolith of their own account, not having an order for anything of the kind, and they suggest that it would be a fitting contribution from Maine for the monument to be erected in honor of General Grant.

IMPROVED THILL COUPLING.

In the engraving is shown a simple and effective coupling for attaching thills or poles to vehicles in such a way that they cannot be accidentally loosened. The clip which is attached to the axle is provided with apertured ears, one of which is slotted from the aperture outward. The thill iron is provided at its extremity with a cylindrical cross bar adapted to fit into the apertures of the ears. To the thill iron is pivoted a latch, the motion of which is limited in one direction by a stud projecting from the iron, the latch being capable of swinging in the opposite direction, as shown in the detailed view. The latch and the thill iron taken together are thicker than the slot in the ear of the clip.



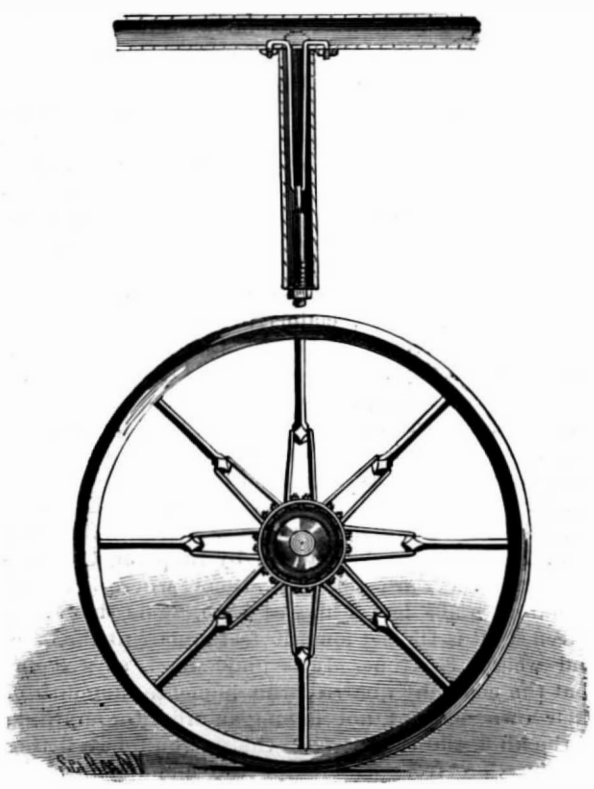
MASON'S THILL COUPLING.

When the iron is raised to a vertical position, it cannot be drawn out through the slot without first turning the latch as shown in the small figure. The thill iron can then be moved forward and drawn out laterally from the clip. To prevent rattling, a U-shaped spring is inserted between the end of the thill iron and the clip.

This useful invention has been patented by Mr. William Mason, of Clifton, Hamilton, Victoria, Australia.

A METALLIC JOINT OR COUPLING FOR WHEELS AND OTHER USES.

The engraving illustrates an improved joint or coupling, patented by Mr. John Wood, more particularly adapted to serve as a spoke for wheels of all kinds, and in consequence of its lightness and strength especially fitted for use on bicycles and similar devices. One view in the cut represents this joint employed in a wheel spoke, the other one showing its use in connection with tubular structures. The essential parts of the improvement are: a straight rod, with one end screw-threaded and the other end provided with an eye, and, passing through this eye, a smaller rod bent back upon itself to form two spring arms, bent at right angles near their ends, the ends being again bent at right angles and screw-threaded. In the application of the device to a wheel, as shown, the screw-threaded end of the straight rod is secured to the felly or tire, and the spring arms passed through the eye at its other end, the hooked ends of these arms being passed through suitable openings in the hub, to which they are secured by nuts. The eyes of the straight rods are angular in cross section, and the rods of the spring arms are shaped to conform to the angularity of the eyes, which may be lozenge shaped, triangular, or any shape that will present a series of shoulders to bind the two parts and prevent looseness and vibration. The relative position of the rods may be changed, if desired, so that the straight rod will have its threaded end secured in the hub, when the ends of the spring arms will be attached to the felly, their hooked and threaded terminals then passing back through suitable openings and being secured by nuts. In inserting the rod and its spring arms in tubular structures, one end of the smaller rod is passed through the eye of the other until the bend is reached, when the two parts are pressed together and passed along the upright to the transverse section, when they spring apart slightly, and their threaded ends pass through the openings, where they are secured by nuts, the threaded end of the straight rod being extended through a suitable opening in the other closed end of the tube or hollow column, and a nut applied to bring the two sections together and unite them firmly. In a modified structure the outer ends of the spring arms are simply bent at a right angle, and rest along the interior of the tube, making a fastening in which there are no protruding ends of rods or nuts to interfere with the symmetry of the framework. This improvement is also designed for use in awning frames, show cases, tree boxes, fences, bridges, saw frames, turn buckles, and for a wide variety of other purposes.

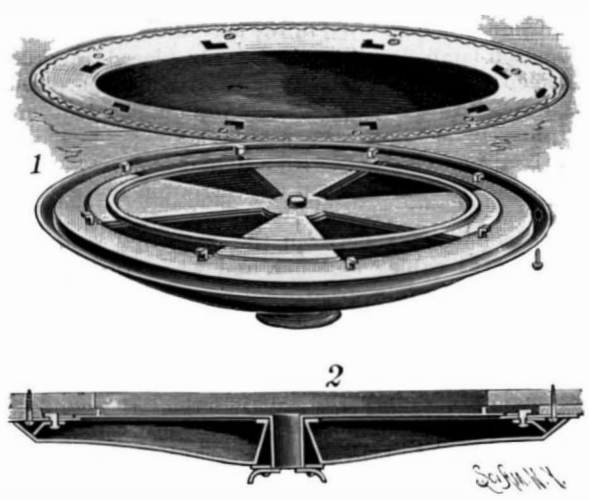


WOOD'S WHEEL AND METALLIC FRAME JOINT.

For further information address O. T. Thompson, Central National Bank, room No. 1, 631 Pennsylvania Avenue, Washington, D. C.

A CEILING CENTER-PIECE AND VENTILATOR.

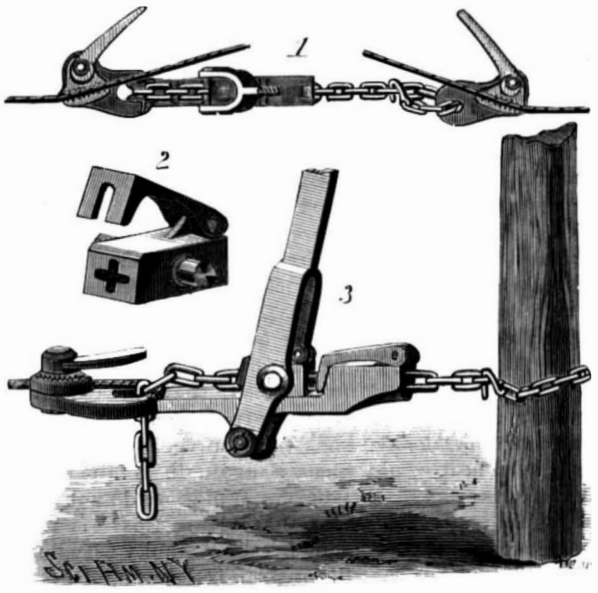
Our illustration shows a combined ceiling center-piece and ventilator, and ceiling trap door, Fig. 1 being a top and Fig. 2 a sectional view. It is designed for new or old ceilings, and consists of a ceiling plate having L-shaped slots, shown in the top view, and of a dished ornamental and perforated body having a register, and an indicator to turn the register and show its position, and also having L-shaped lugs to engage in the slots in the ceiling plate. By taking out a screw, the body may be readily detached from the ceiling, and the opening in the ceiling plate used as a trap door. This invention was patented February 4, 1890, by D. O'Leary, of Winchester, Cal.



O'LEARY'S CEILING CENTER-PIECE AND VENTILATOR.

AN IMPROVED WIRE OR CABLE TIGHTENER.

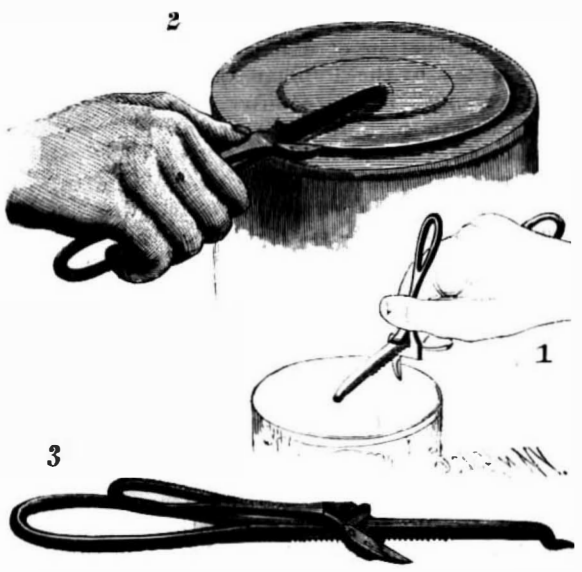
The illustration represents a device for stretching or tightening fence wires, or ropes or cables on shipboard or elsewhere, prior to making them fast or to joining and splicing them when broken. It has been patented by Mr. William Mason, of Clifton, Hamilton, Victoria, Australia. Fig. 1 is a plan view, and Fig. 3 a side elevation, showing applications of the device, Fig. 2 showing the movable pawl block, which in use is connected to the main operating lever of the tightener. The stock is preferably of cast malleable iron, to which is pivoted a forked main operating lever engaging the side trunnions of a metal block movable backward and forward on the stock. This block has a central lengthwise opening in cross form to receive the vertical and horizontal links of a tightening chain, which also passes through an opening in the stock, and to the back end of the block is pivoted a pawl which has a notch in its free end to slip down over a vertical link and catch a horizontal one. At the back end of the stock is a box with a central lengthwise slot and a similar pawl pivoted to the back end of the box. The latter pawl is automatically lifted by successive horizontal links of the pulling chain, and locks behind them after they pass forward, while the vertical links pass freely through the vertical slot in the free end of the pawl, the pawl thus retaining the chain against backward movement while the lever with the other block and pawl are moved to engage with or behind another flat link of the pulling chain. At its forward end the stock has a lug which forms a fixed jaw of the wire or cable clamp, with a movable jaw fitted on an eccentric block bearing having a fixed handle, the eccentric bearing being held to turn loosely on a pin or stud fixed in the stock. The edge of the movable jaw is preferably serrated, and it is tightened to the wire by swinging its handle. This description of the device covers its application in stretching one end of a wire or cable while the chain is hitched to a post or other fixed object; but when a broken cable is to be pieced or joined, an auxiliary clamp is employed for one end of the broken wire or cable. Whichever way the device is used, it may be worked by one man, who may also easily secure the wire or cable stretched by it.



MASON'S WIRE OR CABLE TIGHTENER.

AN IMPROVED CAN OPENER.

This device is so constructed that a fulcrum for a lever purchase is secured in the center of top of can, and a knife, which may be easily and quickly adjusted and locked to any size of can, is set, when cutting, at three distinct angles, for securing a shearing cut. This reduces the exertion required to a minimum, and causes the blade to retain its relative position while cutting without effort. It has been patented by Hasbrouck Alliger, of Rondout, N. Y. (New York office, 125 Chambers Street). The device is shown in perspective in Fig. 1, and consists of a main bar with a handle at one end and an angled pivot pin at the other end, and having a toothed surface or ratchet along its under face, combined with a knife carrier with an opening similar to the cross section of the main bar, whereby the carrier may be passed over the pivot pin and slide along the main bar. The blade is attached to the carrier at one side of the opening therein, and the handle of the carrier extends rearward at an angle thereto. The cutting edge of the blade is slightly inclined toward the outer edge of the can, the blade being also inclined transversely in the direction of the main bar, or pointed forward, whereby all liability of the knife to work upward or out of its kerf is avoided. By grasping opener as shown in Fig. 1, the pivot pin is easily pushed through the center of the can, and the blade, being held rigidly at right angles to the main bar, is easily pushed through the can where desired by pressing down on the main bar. The handle of the knife carrier is then dropped on to or parallel with main bar, as shown in Fig. 2, and by grasping the tool with the right hand over both handles, as far back from the can as possible, the top of the can may be quickly and easily removed. Should the blade become dulled, it may be sharpened in the same manner as any knife blade.

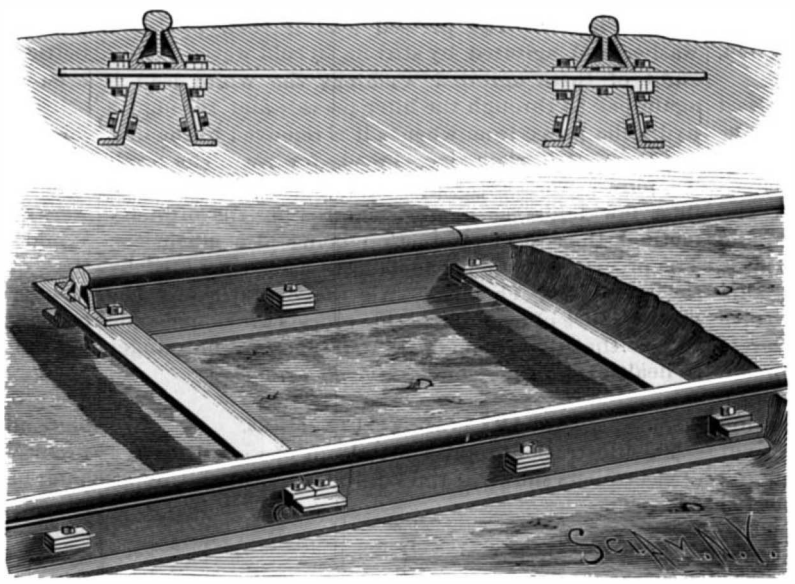


ALLIGER'S "BEST YET" CAN OPENER.

PROF. HAZEN suggests that the force of a tornado may be largely diminished by the explosion of gunpowder or dynamite, just as the waterspout at sea is diverted and broken by a like discharge of explosives.

AN IMPROVED RAILROAD TRACK.

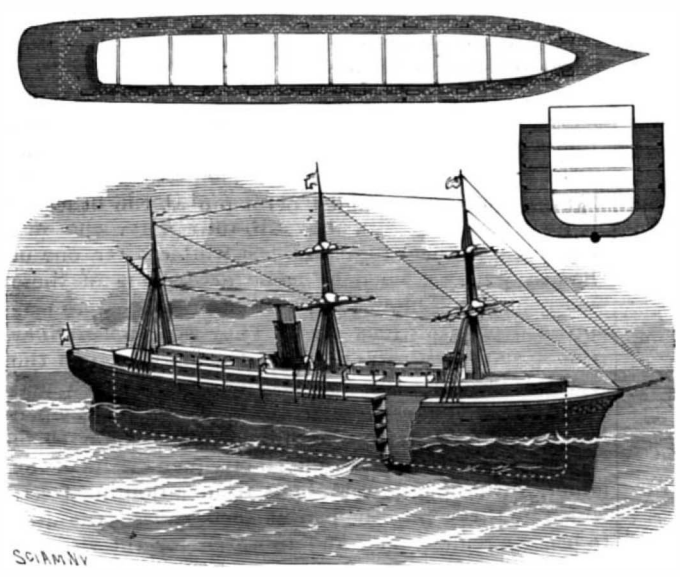
The accompanying illustration represents a railroad track which is designed to be easily laid and repaired, and is so constructed as to prevent the spreading of the rails. It has been patented by Mr. Stewart J. Morse, of St. James, La. The track is wholly of metal, and has two longitudinal sleepers supporting the rails, the heads of which only project above the sleepers. Each of the sleepers, as shown in the sectional view, is made of two upright plates slightly inclined toward each other to form a narrow slot, and to engage the under side of the head of the rail, the lower edges of the plates having outwardly bent flanges or feet. At suitable distances apart in each sleeper are transverse openings to admit a key plate having downwardly extending bosses on its outer ends abutting against the outside of the sleeper plates. On this key plate rests the tie, projecting beyond the sleepers, lugs being formed on each of the sleeper plates directly above the lugs or bosses of the key plate, and the tie being secured in position by bolts passing through the top and bottom lugs and the tie. To further hold the sleeper plates in position, short plates and key-plates are employed between the ties, and secured by bolts, by which means the ties can be placed farther apart. At the junction of two sleeper sections a tie is used preferably double the width of the others and fitting into slots formed in the adjacent ends of the sleeper plates. Tracks thus made are designed also to prevent the easy tearing up or misplacing of the rail by mischievous persons, as to do this it would first be necessary to remove the earth in which the sleepers and ties are embedded.



MORSE'S RAILROAD TRACK.

A PROPOSED PLAN FOR NON-SINKABLE SHIPS.

The illustration represents a plan of building vessels with practically two hulls, one within the other, the space between the inner and outer hull being sufficient to receive a portion of the cargo, but so proportioned to the whole capacity of the vessel that the total filling of the outer hull with water, as it might be in case of collision, would not cause the vessel to sink. It is a patented invention of Mr. George Shone, of East St. Louis, Ill., and our engraving shows plan, sectional, and perspective views. In a 10,000 ton boat the difference in beam from present standards is designed to be about twenty feet, ten feet on each side separating the inner from the outer hull, while in length the difference would be from thirty-five to forty feet, the greater portion of this intervening space being at the bow. The bottom of the central hull is also raised above that of the outer one, and its top is carried above it. Bulkheads are used partly to strengthen the ship and partly to divide it into compartments, these bulkheads also extending across the space between the hulls, but here they are preferably not made water-tight, but have small openings by which the side compartments will be connected with each other, so that any water admitted into one of these compartments may flow gradually, not rapidly, into all the others. This provision is made so that the ship, if the hull is stove in, will not be dangerously depressed at the point where damaged, but may be kept trim. By means of suitable water-tight decks the space between the hulls can be divided horizontally, freight being introduced thereto by means of suitable water-tight hatchways. The decks are braced with diagonal beams, by means of which the structure is considerably strengthened, and in war vessels the sides would be strengthened on the truss plan all around the ship, the construction being thus designed as a protection against torpedoes and ramming. It is claimed that with this construction the capacity of the ship will not be materially diminished, while, should the vessel become waterlogged throughout its whole outer chamber, it would still be kept afloat.



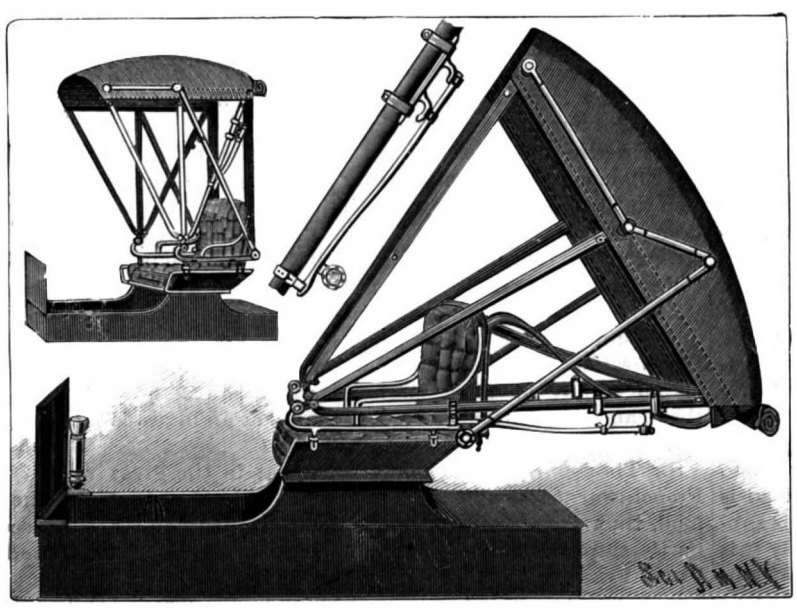
SHONE'S DOUBLE HULLED VESSEL.

Labyrinthine Deafness.

Mr. G. P. Field, M.R.C.S., Aural Surgeon to St. Mary's Hospital, communicates to the *British Medical Journal* a paper on the treatment of this form of deafness with hypodermic injections of pilocarpine. The results (told in most cases in the patient's own words) are of a remarkable character. Persons who had been deaf for long periods, 20 years and even more, and had to rely upon ear trumpets for anything they did hear, gradually, under the influence of the pilocarpine, recovered their hearing, and that in so marked a manner as to cause comment by those who were unaware of their being treated. Mr. Field hesitates to explain how the pilocarpine acts, but there seems to be little doubt of the correctness of his suggestion that it stimulates secretion by the membrane, and maintains this so well as to help the absorption of any solid waxy matter which may be lodging in the ear cavity.

AN IMPROVED VEHICLE TOP SUPPORT.

In ordinarily constructed vehicles, when the buggy top is down, its weight is all far back from the bearing or prop, causing great strain on the back bow and also on the whole top and seat, which frequently bends and breaks the bow. The accompanying illustration represents the application of a top support, which has been patented by Mr. Samuel Sanders, of Montezuma, Iowa, designed to obviate this difficulty, and afford a good, easy rest for the top when down, and, even if the joints are thrown so that the top drops down hard, it will not be damaged in the least. Our view represents the improvement applied upon a carriage when the top is up, and when it is partly laid back, while the small figure is an enlarged view of the attachment in place upon the back bow. A shoe, preferably of malleable iron, is secured to the back bow by means of clips and a screw, and this shoe has depending arms, the lower ends of which are bent forwardly. A slightly curved yielding rod or spring, adapted to be supported by the rest or prop, is attached thereto at the forward end of the spring by a strap and buckle, the strap passing through an elongated slot in the spring. The rear end of the spring is attached to the depending arms of the shoe by means of ferrules or clips. This device, as will be seen, can be readily attached to any back bow, and by its use the weight of the top is thrown so far back as to entirely prevent damage to any of the parts when the top is thrown down. The device also improves the looks of the carriage, particularly when the top is down. Although the improvement has been but recently patented, it is said that some large orders have been already received for sets of these supports.



SANDERS' VEHICLE TOP SUPPORT.

IMPROVED STEAM FOOD COOKER.

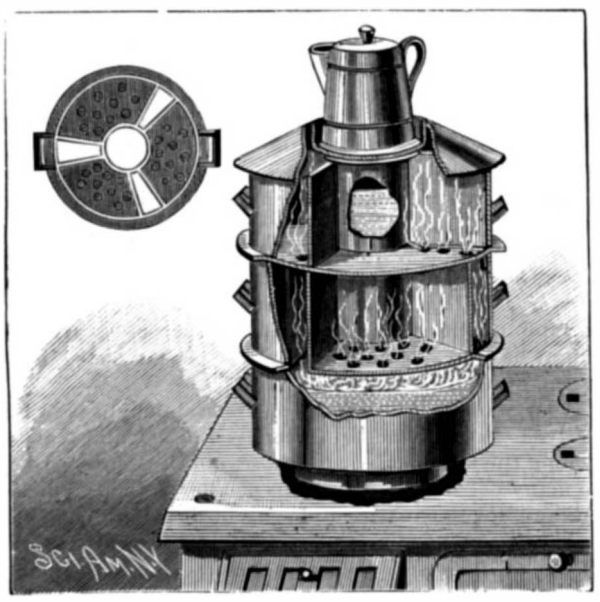
We give an engraving of a new steam food cooker recently patented by Olive C. Christin, of Bodie, California.

In the engraving portions are broken away to show the interior construction. This invention is designed to cook several different varieties of food at one operation, without imparting the flavor of one to another.

The invention consists of a boiler and two or more cooking sections arranged one above the other on the top of the boiler. The lower section is provided with passages leading through it and arranged to deliver steam to the upper section without communicating with the lower section. Each section is divided into compartments, the steam entering the lower compartment separately through the perforated bottom. Steam is admitted to the compartments of the upper section through the passages referred to and through apertures in the bottom.

The central compartment, which extends downward through the sections and projects a short distance into the boiler at the bottom, forms a soup vessel. The cover of the soup vessel is made flat and adapted to receive a coffee pot or other cooking vessel. By means of the conical cover the steam of the upper section is deflected so as to strike the coffee pot resting on the cover of the soup vessel. The passages leading through the lower cooking section are clearly shown in the detail plan view.

By means of this improved cooking vessel, six or eight different kinds of food may be cooked at once without interfering one with the other, thus greatly economizing space, time and labor.



CHRISTIN'S STEAM FOOD COOKER.

Mortuary Gold.

The French scientist, Mr. Victor Mennier, as the result of careful inquiries, asserts that the American dentists insert in American teeth, each year, the enormous amount of 800 kilogrammes (about 1,800 pounds) of the precious metal, which represents nearly $450,000. This gold is never recovered, of course, but is buried with the person in whose mouth it is placed. Making allowance for the rapid increase of the population of the United States and for the continued deterioration of American teeth, it appears that in less than one hundred years the American cemeteries will contain a larger amount of gold than now exists in France.

CHIMNEYS, to be safe from fire and draw well, should be not less than sixteen inches square inside and built up from the cellar. Use good brick with clay, instead of mortar, up to the comb. Plaster it inside with clay mixed with salt. Top with the best brick well wet and laid in cement. Do not let wood come too close to the brick, and don't let the stovepipe come nearer than eighteen inches to the ceiling.

Making an Attractive Home.

A farmer, whose years have scarcely reached middle life, and who owns a farm of moderate value, asks for a statement of the attractions of a useful character which he may connect with his home, which will make it a real home for his growing children, and without incurring heavy expense. He proposes to effect his object by planning, planting, and pleasing cultivation, and in-door allurements.

A proper answer to this request would fill at least one volume. But we may briefly allude to a few points. Of the out-door attractions, and among the best, are the elements which constitute a neat, well managed farm—neat fences, good crops, absence of weeds, and general success. Young persons have quick eyes, and they draw ready conclusions, and they at once appreciate the difference between pleasing success and slipshod failure. Those who see disorder around them through the year, and from year to year, will rarely find pleasure in the business that pervades the premises. On the other hand, neatness and skill, in connection with the growth of handsome crops, fruit-bearing orchards, and a few luxuriant shade trees, will present strong attractions. A well-selected, well-planted, and properly cultivated fruit garden should be connected with every country residence. Hardy and productive varieties, which can be relied on to give fine fruit throughout the entire year—the small berries in early summer, followed by late summer and early autumn stone fruit, and the abundant throng of the many larger ones in autumn, lasting through winter and into spring—constitute all together some of the strong charms of living in the country.

Among ornamental attractions are the well kept lawn and shrubs which more immediately surround the dwelling. While adding much to the beauty of the place, they need cost but little. The selection of shrubs may take in those only which are vigorous and hardy, and which will require but little care after planting, except an occasional training into proper shape. The hand mower will give the lawn the beauty of a green carpet. The cultivation of flowers in a few circular beds cut in the turf will depend on the taste and preference of the occupants. Some young people will have a strong predilection for botany—for a collection of native plants—and whenever this is the case, every facility should be afforded. Many native plants possess surpassing beauty, and have strong attractions to the mere florist. Others will be drawn to the culture of early bulbs, some of which will bloom annually year after year with little or no care, such as the crocus, snowdrop, Siberian squill, and early tulips.

All these plantings may be used at small expense to render country homes attractive, and by properly grouping all together, the residence which otherwise might be a very plain home, might be converted into a gem of neatness.

A large opportunity for pleasure and delight is to be derived from domestic animals—horses and cattle among the larger ones, and those not less interesting to many persons in the various smaller animals, chickens and doves, canaries and song birds generally.

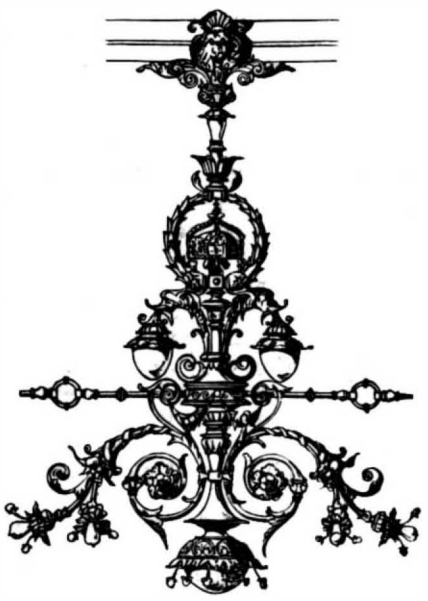
Another point of great importance is the cultivation of the sciences and everything connected with them. Where young people are growing up, they should be provided with a room specially for this purpose, which might be termed a museum or library, for books, study, and reading; for drawing and sketching by those who desire; for minerals and plants, and specimens in entomology for young naturalists; for apparatus in chemistry and physics—all of which would be infinitely better than frequenting vapid parties. There is no difficulty in accomplishing all these, if the owner himself has a taste for them, and the expense will be comparatively trifling.—*Country Gentleman.*

A New White Lead Process.

The evils attending the manufacture of white lead by the Dutch or stack process are too well known to require insisting on. They may be summed up as expensiveness, tediousness, and serious danger to health. Attempts have been made from time to time to introduce other methods of manufacture, which have been recorded by us. These, for the most part, have proved failures. Another process for attaining the desired end inexpensively, quickly, and safely has just been brought under our notice. This process is the invention of Professor McIvor, F.I.C., and has been in operation for the past nine months at the experimental works, 47 Clapham Road, London. In this process of manufacture, which was recently inspected, the litharge is first made from lead ore and then thoroughly purified by washing. It is then put in a vat which is fitted with stirring apparatus, and a solution of acetate of ammonia is run into the vat upon the litharge. The mixture is then agitated for six hours, so that the lead is absorbed into the solution, and it is allowed to settle. The supernatant liquor containing the lead is then pumped over into a second vat, in which it is submitted to the action of carbonic acid gas. By this means the lead is precipitated and the acetate of ammonia recovered for use over again. If the litharge is very pure, the carbonic acid gas is introduced into the first vat, with the result that the white lead is produced direct and the acetate of ammonia separated at the same time for re-use as before. In either case, after the white lead has been precipitated, the mother liquor is drawn off and the unwashed white lead is passed through filter presses to extract from it all the mother liquor. The pressed lead is then put in a washer and agitated by stirrers in cold water. After eight of these agitated washings, the white lead is again passed through the filter presses and through a hydraulic press, from whence it is removed to the drying room, and, when dry, is ready for use. The result is a pure white lead, free from crystals and produced in a few hours, as against months by the ordinary method, the cost of production being also much less. The process and the products have been examined by several leading chemists. All the operations in the manufacture of lead under this process are done in the wet, so that there is no dust, and therefore no danger to health from that source.—*Chem. Tr. Jour.*

ORNAMENTAL ELECTROLIERS.

The illustrations represent two out of a great variety of electroliers shown at the Edinburgh, Scotland, exposition. They are represented as showing the qualities and characteristics of Continental rather than English designs, and are in the Renaissance style. Both are handsomely done in gold lacquer, and the smaller one has, in addition, a ruby center, which shows up well against the gold.



The English Navy.

Sir Thomas Symonds urges on the prime minister the weakness of our fleet, and its entire incapability of performing the duties which would fall on it in time of war, namely, the blockading of ports, the protection of our commerce, and the supply of coal to fleets and coaling stations, duties out of all proportion to those arising in war in former times, when our commerce was about one-twentieth part of its present dimensions, and when sailing vessels only were employed. In those days interruption of commerce meant commercial ruin. Now it means absolute starvation, if complete even for a few successive weeks.

Our desire is to indorse the general position taken by Sir Thomas Symonds, and, as far as we can, to support him in the most necessary and important work he has done and is still doing in pressing for increased strength in our navy, and increased protection to "England," for it is England herself rather than "English commerce" which is concerned. Half a dozen ships on one side or the other would not affect the question. England depends for her existence, her actual supply of food, on her trading ships. Stop them, and she must be starved, as surely as an invested fortress.

Sir Thomas Symonds points out that in the great French war it was only our commerce, not our actual food, that was at stake; and yet Britain then had 206 battle ships to 180 possessed by the rest of Europe, of which France had 60. Now we have 501, while France has 357; Russia 227—together, 584; while France and Italy have together 570; France and Germany, 556. As to armorclads, England has 77; France, 48; Russia, 45 of some kind; and Germany, 40.

These actual numbers show England by no means equal to a combination of France and one other. But, even supposing it is urged that useless small vessels have been included in the lists of the foreign powers, and that in tonnage England stands far better than is here represented; suppose it were even conceded that she is equal or superior to any two others, is there any guarantee in this fact that we might not be starved? To attack commerce distributed over the world is far easier than to defend it. Are we to risk so great a danger without any guarantee? If we were starved into an ignominious, ruinous peace, it would be very little consolation to have it proved to us that our fleet, reckoned up in the proper and most scientific way, was more than as strong as any two powers, which was all that we had aimed at. Why do we aim at any such arbitrary standard, which has no particular meaning in it, unless we suppose the whole fleets of both belligerent sides to be drawn up complete and then and there to fight it out?—a proceeding which would no doubt simplify the question for England, but would be the last thing to be desired by her enemies. It may be asked, then, what standard can be taken? To this we should reply, that this must entirely depend on the task to be performed. Lord Charles Beresford gave us clearly to understand that not very long since—in fact, during the time of the present government—there was no settled plan as to what should be done if war broke out. This state of things is intolerable—it is madness.—*The Engineer, London.*

How Deer Act in a Snow Storm.

From a gentleman recently down from the mountains, the Marysville *Appeal* learns of the strange experiences of various sorts of wild animals during the winter. "Deer, when caught in a blinding snow storm, huddle together and tramp round and round in a circle, beating down the soft snow, so that when a very heavy fall occurs during say twelve hours, they find themselves in a snow pen, with walls above them; and if they commence to tramp on top of several feet of snow during a storm, they often find themselves in a corral of snow, with a wall surrounding them to a height of ten or twelve feet when the storm clears off, being virtually imprisoned in a snowy prison pen, from which escape is impossible until the spring thaw of the season.

"There lives an old miner on Cañon Creek, in Sierra County, several miles above Brandy City, who was taking a stroll near his cabin last winter after one of the heavy snows, when he came across one of these deer pens in the snow, and there imprisoned were seventeen deer of various sizes. They were in a circular pen of snow, with walls fifteen feet high. Upon the man's appearance the deer became quite excited, and huddled together and dodged from one side of the pen to the other. However, as hunger came upon them they became more docile, and the frequent visits of the miner, with boughs and buds from adjoining trees, which he threw into the pen as food, caused the deer to become regular pets, and to watch for the visits of their protector. After a while the man placed a ladder in the pit, and spent a great deal of time in handling his pets. Occasionally he would take one out for food, as meat became scarce, and in this way used several of the deer, but he had most of the deer yet in a state of domestication. It is said he has a deer ranch in his mountain home, much after the fashion of a cattle ranch on a small scale."

The *Appeal* is also informed that a similar band of deer was found in one of those deadly snow pits near Washington, Nevada County, and was likewise rescued. The streets of Downieville were enlivened last winter by the appearance of deer which were driven from the mountains down to the river towns by starvation, and domesticated by kindness and food. As the snow has been disappearing, many carcasses of deer have been found where they have perished in the deadly snow corral. The heavy and sudden snows of the past winter have caused fearful mortality among the deer which did not escape the lower altitude.—*Marysville (Cal.) Appeal.*

The Phonograph as a Disseminator of Disease.

It is reported that the Philadelphia park commissioners have ordered the disuse of the public phonographs heretofore in use in Fairmount Park, on account of the danger of their serving to disseminate disease. This danger is doubtless very slight, like that of injury to the ear, and probably neither danger is worth consideration if the instrument is kept reasonably clean and used properly; but its promiscuous use in a public park does not seem to admit of perfect security in this respect, and the announcement that the phonograph company intends to substitute a plate ear piece for the penetrating one now in use, avowedly for the reason that there are persons who object to the present form, goes to show that the Philadelphia commissioners are not the only people who entertain the idea of danger in the phonograph.—*N. Y. Med. Jour.*

Correspondence.

Clearing Waste Pipes.

To the Editor of the Scientific American:

The last issue of the SCIENTIFIC AMERICAN, under the caption "Valuable Points by a Plumber," gives directions for clearing waste pipes by the use of soda lye. Experience prompts me to suggest the use of potash lye instead. The saponifying effect is more complete, and the result more easily washed away than if the less energetic soda lye be used. LOUIS DERR.

Pottsville, Pa., August 11, 1890.

How Snakes Climb.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of August 2, 1890, page 69, Mr. John E. Garside describes the black snake's manner of tree climbing, yet he does not state *how* the snake with its smooth and highly polished abdominal plates holds on to the bark. It is not by simply pressing its body close to the bark, but by turning its abdominal plates to a certain angle, so that their sharp edges catch upon every little ridge or prominence in the bark, thus giving many points of support. The plates or scutellæ on the under surface—the black snake has 170 to 200 of them—and the ribs, are to the snake what the feet are to the millepede.

When a snake glides through grass or over rough ground, it propels itself forward by pressing the curves of its body against resisting objects, the same as in the act of swimming. A snake cannot climb the trunk of a tree with the same rapidity with which it moves on the ground through grass and bushes, because it has no lateral support with which to propel itself. On the ground it has a double mode of propulsion, while on the tree but one. I have sometimes seen snakes in climbing move in the manner of an earth worm, that is, by alternately lengthening and contracting the body. The posterior abdominal plates having been firmly fixed, the anterior portion of the snake is stretched upward, takes a firm hold with its plates, when the posterior portion quits its hold and is drawn upward and again anchored, and the movement repeated.

Mr. Garside is wrong in his supposition that the black snake climbed the tree "to get in a position to *catch flies*, in which the place abounded." The black snake never wastes its time at fly catching; it is not insectivorous. It feeds upon young and old birds, rodents, frogs, and small snakes. The snake probably was on the watch for certain birds that were likely to be attracted by the numerous flies. C. FEW SEISS.

Philadelphia, Pa., August, 1890.

Further Reports from Amateur Electricians.

To the Editor of the Scientific American:

I have had splendid success in making induction coils as described in Mr. Hopkins' superb work on such subjects. My method, which is a slight modification of Hopkins', is as follows:

The spool is placed in a screw-cutting lathe, geared to cut a very fine thread. No. 36 B. and S. *bare* wire is arranged to feed from the spool it is shipped on, through a hole in a piece of hard wood placed in the tool post, on to the spool in the lathe. When all is made ready, a thin coat of shellac varnish is put on the spool and the wire wound as rapidly as one wishes, the whole length of the spool. If the spool is a long one, the varnish may be fed just ahead of the wire as you proceed with the winding, and as the last few turns are put on, the entire winding is covered generously with shellac. After waiting a few minutes for the varnish to set, the layer is covered with writing paper, the gear reversed and the process repeated until the desired number of layers have been wound. I have just finished a spool containing 9,000 turns of wire, which was wound in a part of one forenoon, and much other work done while the varnish was drying. The lathe was run as rapidly as I could make it go, which would be out of the question if silk-covered wire had been used. These points, together with the fact that bare wire is so very much less expensive than covered, make the above an admirable method of winding coils of fine wire, and for which I, for one, am very grateful to G. M. H. HAROLD PLOWE.

Peoria, Ill., August 2, 1890.

To the Editor of the Scientific American:

I noticed in your valuable paper of July 19 an article headed "Electrical Workers will Please Report," and take this liberty to advise you as to a number of experiments which I underwent in testing the eight-light dynamo, which I made per the instructions contained in SUPPLEMENT, No. 600. The dynamo was made by myself during my two years' study at the Rose Polytechnic Institute, at Terre Haute, Ind. I completed the working drawings, blue prints and patterns during the freshman year. I made everything, with the exception of the socket and lamp and oil cups. I might here mention that the wrought iron rings which I used in the armature can be purchased at any hardware store, but the diameter of bore was smaller than given in the instructions, thus increasing the weight of the armature. I used good, well seasoned maple on the shaft as an insulator, and the rings were firmly held together by long brass rods previously insulated, before inserting them in the holes. The field weighed 90 lb. before wire was wound on, and was made of soft gray iron. The armature rings were insulated from each other by paper as per Hopkins' suggestion, but to insure a good distribution of magnetism, I shellacked each disk of paper as I put it on ring; 12 lb. of No. 18 wire were used on the fields, a wrapping of shellacked paper being put around each layer, and wire thoroughly shellacked; 3 lb. No. 20 were used on armature, and thoroughly shellacked, held down to avoid centrifugal force by fine brass wire and adhesive tape. I put an incandescent lamp on top of machine, and lighted it by a shunt from the main current. A wooden cap was screwed on top of fields, under which the fine taped wire (such as used as hangers for incandescent lamps) was laid, terminals connected to the two binding posts which you see on top of machine, and other terminals connected to lamp socket. I believe this is all of any importance which is necessary for me to mention. The machine runs excellently as a motor, and requires a pressure of about 70 to 80 volts to run it. I made a large fan 16 in. in diameter and keyed it to pulley, and it is now being used as a motor in the Express Publishing Co., Terre Haute.

Something which might be well to note is the speed of the machine when a pressure of 130 volts is put into it. It speeds up to the enormous rate of 7,500 revolutions per second. I soon found this was far too fast, and cut the speed down to 2,500 by making a rheostat of 15 lb. of small galvanized iron, which I made into small coils or spring, and put it in the field magnet circuit, that is, the current went in at commutator, thence to one pole, thence through rheostat, thence through second pole (or field), thence back to dynamo (or generating machine at electric light station). I have made several bells, spark coils, etc., but not as per your suggestion. Am lighting house burners by an 8 lb. No. 14 copper wire spark coil. I am now employed at the Brush Electric Company, this city, and will probably find some time to experiment on Mr. Hopkins' suggestions in his "Experimental Science," and should you wish any of my tests, I will gladly furnish you with report. EDWARD S. ALLEN.

Cleveland, Ohio, August 2, 1890.

Career of a Billiard Ball.

There are few men or things that are called upon to roll into more close corners or queer situations than is a billiard ball. That is, of course after it has become a full-fledged billiard ball. Its career prior to this is, of course, rather monotonous. An elephant, either in Africa or Asia, carries it with him in his wanderings, very near to his trunk. It is then known as a tusk, and has been the cause of some tall lying in the way of elephant stories told by various persons, of whom Rider Haggard is now the foremost representative.

The transition from being an elephant's tusk to being a billiard ball in good standing is not sudden. It takes time to effect it. In the first place it is not every tusk that is suitable to make a billiard ball from. There are several factories in New York City, and they say that it takes a good while to turn out a perfect ball. The firms here, however, have to do but part of the work, for they get the tusks that are of the proper quality sent to them cut into sections, each section being large enough to allow of the turning of a single ball out of it. Most of this material comes from Hamburg. The ivory is so marked that the turners here know what part of the tusk each piece comes from, and in this way can calculate as to the grain and quality of the article.

It requires skilled labor to turn out a billiard ball. One-half of it is first turned, an instrument of the finest steel being used for the work. Then the half-turned ball is hung up in a net and is allowed to hang there for a year to dry. Then the second half is turned, and then comes the polishing. Whiting and water and a good deal of rubbing are necessary for this. It is necessary in the end that the ball shall to the veriest fraction of a grain be of a certain weight.

It is after being placed on the billiard table that the real life of the billiard ball commences. There are pores in ivory just as there are in the epidermis. These may close, and then, if in a hot room, the ball is likely to crack, or it may crack by reason of concussion with other balls. During the first stage the billiard ball may mix in almost any society. It may gyrate under the magic cue of a Slosson, a Schaefer, a Vignaux, or some other champion, or it may be toyed with by fair dames in private billiard rooms in swell houses on Murray Hill.

When it cracks it drops a step lower. It is sent to a factory and a small fraction of a nick is shaved off from it. You next see it in some some second-rate billiard room on Sixth Avenue. Finally it rolls even lower and into some second-hand shop, and thence into a Bowery saloon, where "crooks" manipulate it to the dismay and discomfiture of visitors from the rural districts. The rest is soon told. The balls become cracked, decrepit, and practically useless for the purpose for which they were made. Then they are bought up by dealers, are cut up and made into smaller articles. If the worst comes to the worst, they can be burned and used in the making of ivory black. A checkered life enough is that of a billiard ball.—*Mail and Express.*

Meat Preservatives.

According to Mr. E. Polenske, the composition of some of the preparations employed in commerce for the preservation of meat is as follows:

SOZOLITHE.

Sulphite of ammonia	37·3 per cent.
Sulphurous acid	39·7 " "
Soda	21 " "
Water	2 " "

CONCENTRATED BERLINITE.

Crystallized borax	82·7 per cent.
Boric acid	9·8 " "
Chloride of sodium	7·5 " "

PORCHEL BERLINITE.

Chloride of sodium	45·9 per cent.
Nitrate of potash	32·3 " "
Boric acid	19·3 " "
Water	2·5 " "

THE "MINERVA" CHINESE PRESERVATIVE POWDER.

Chloride of sodium	25 per cent.
Boric acid	17·7 " "
Sulphate of soda	35·8 " "
Sulphite " "	9·2 " "
Water	9·3 " "

AUSTRALIAN SALT.

Crystallized borax	94 per cent.
Chloride of sodium	5·5 " "

With 0·5 per cent of some hydrocarburet.

RUGER'S BARMENITE.

Boric acid	50 per cent.
Chloride of sodium	50 " "

THE TRUE AUSTRALIAN MEAT PRESERVATIVE.

According to analyses of three specimens from different sources, this is bisulphite of lime. This is what is unwittingly employed in solutions by butchers, on summer afternoons, for painting their meat. It is sold to them under various fantastic names. The liquid is nothing but a solution of lime in sulphurous acid, and is used every day in brewing, as a disinfecting agent. The bisulphite of lime, applied to meat, preserves it from the attack of flies and keeps it looking well. There is no danger attending the use of it, since a portion of the sulphurous acid volatilizes, and the sulphite changes into sulphate of lime, or plaster, which, as well known, is innocuous. A simple washing, moreover, suffices to remove the sulphite completely at the moment of preparing the meat. This preservative agent is particularly valuable during the heat of summer, and the use of it can be very safely recommended. In commerce, it is found in a more or less concentrated solution containing:

	No. 1.	No. 2.
Sulphite of lime	36·73	11·04 per cent.
Sulphurous acid	20·46	30·04 " "

—*Chronique Industrielle.*

Production of Slate.

The statistics gathered by William C. Day, for the new census, place the total value of all slate produced in the United States in 1889 at $3,444,863. Of this amount, $2,775,271 is the value of 828,990 squares of roofing slate, and $669,592 is the value of slate for all other purposes besides roofing.

As compared with the statements of the tenth census report of 1880 on stone, the roofing slate product of 1889 is nearly twice as great in number of squares and in value.

Twelve States at present produce slate. A line drawn on the map from Piscataquis County, Maine, to Polk County, Georgia, and approximately following the coast outline, passes through all the important slate-producing localities. According to amount and value of product, the most important States are, in the order named, Pennsylvania, Vermont, Maine, New York, Maryland, and Virginia. In the remaining six States productive operations are of limited extent, and in the case of Arkansas, California, and Utah, of very recent date.

The twelve States referred to do not include all those in which merchantable slate is known to exist, since discoveries promising good results for the future have been made in a number of other States, among which may be specially mentioned Tennessee, where operations of production are beginning.

The slate quarrymen of the country, and to a considerable extent the firms operating the quarries, are either Welsh or of Welsh descent, many of them having learned the methods of quarrying slate in the celebrated quarries of Wales.

The quarries are operated on an average of about 220 days in the year. The idle days are the result of rainy weather and holidays. The first day of every month is regarded as a holiday by the Welsh quarrymen, and no work is ever done by them on Saturday afternoons.

The average wages for the entire country paid to foremen or overseers is $2.48 per day, for quarrymen and millmen $1.56, for mechanics $1.64, for laborers $1.27, and for boys 76 cents.

THE EARLY MISSION ESTABLISHMENTS IN CALIFORNIA.

We present herewith, from photographs taken by Mr. W. J. Rea, of Santa Barbara, views of some of the old mission houses established in California by the Catholic missionaries in the last century.

The California mission began at about the period of the American revolution, and attained a wonderful degree of prosperity, but is now as much a matter of the past as are the Iroquois or Huron missions of the North. Generally speaking, a rectangular building of eighty or ninety yards frontage, and about as deep, composed the mission. In one end was the church and parsonage. The interior formed a large and beautiful court, adorned with trees and fountains, and surrounded by galleries, on which opened the rooms of the missionaries, stewards, and travelers, the shops, the schools, store rooms, etc., and the granary. A part, separated off and called the monastery, was reserved for the Indian girls, and here they were taught by native women to spin and weave, and received such other instruction as was suited to their sex. The boys learned trades, and those who excelled were promoted to the rank of chiefs, a dignity being thus given to labor that impelled all to

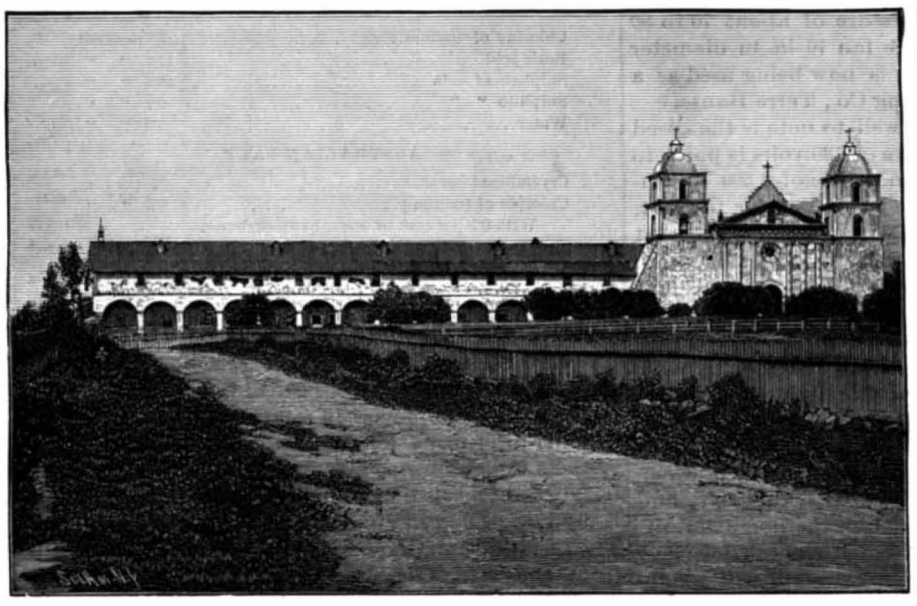


Fig. 1.—SANTA BARBARA MISSION—FRONT VIEW.

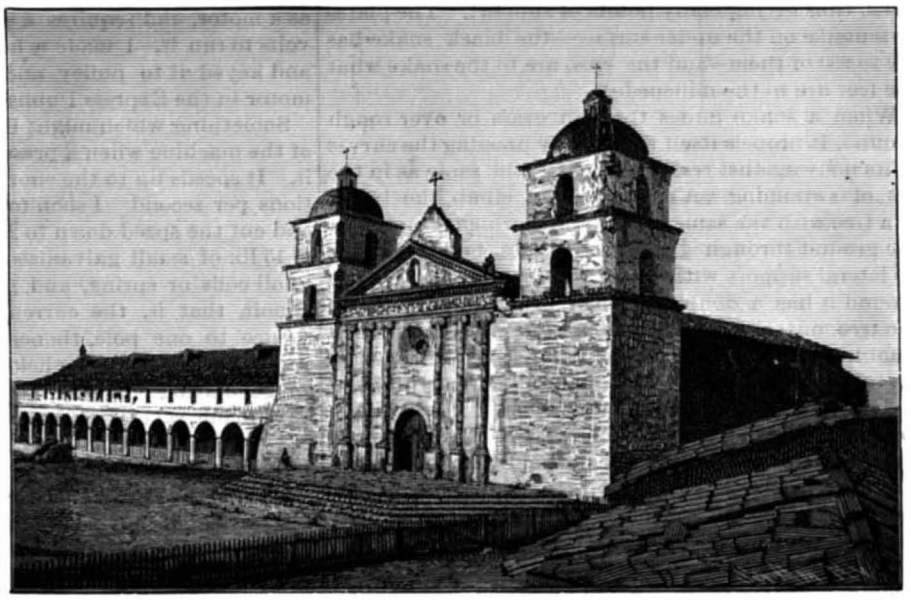


Fig. 2.—SANTA BARBARA MISSION—PERSPECTIVE VIEW.

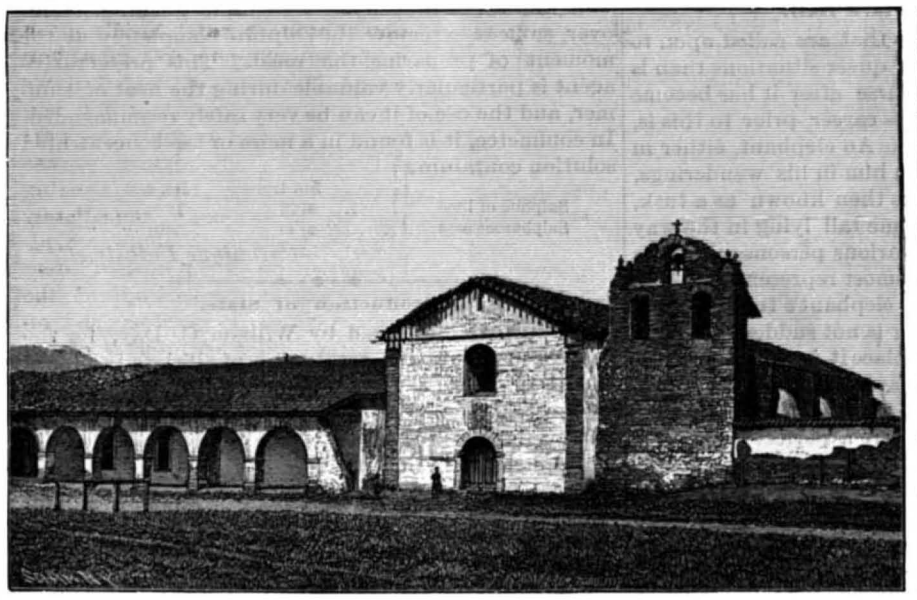


Fig. 3.—MISSION OF SANTA INEZ.

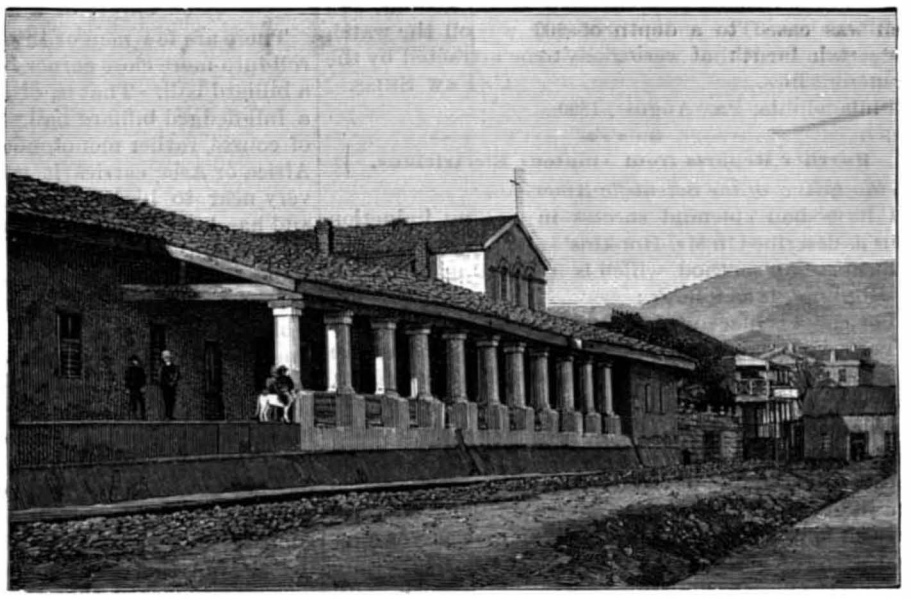


Fig. 4.—MISSION OF SAN LUIS OBISPO.

EARLY MISSION ESTABLISHMENTS IN CALIFORNIA.

embrace it. Each mission was directed by two friars, one of whom superintended the mission building and the religious instruction, while the other superintended the field labors, in which he always took part, teaching by advice and example. The discipline was severe, and the whole establishment was conducted like some vast factory. This, in modern times, has excited great outcry; but the missions have been abolished, and the Indians left to the "enlightened" men of our day, under whose care they have disappeared like smoke before the wind.

Around the mission building rose the houses of the Indians and of a few white settlers, and at various distances were ranches or hamlets, each with its succursal chapel. In a little building by the mission was a picket of five horsemen acting as soldiers and couriers. The Indians of a mission were not all of the same tribe, but perfect harmony prevailed, and when the season of work was over, many paid visits to their countrymen, and seldom returned alone. In this way, the missions constantly received new accessions, for the good friars had the art of making labor attractive. When the crops were harvested, each mission sold or shipped its breadstuffs, wine, oil, hemp and cordage, hides and tallow, and from the returns distributed to the Indians clothes, handkerchiefs, tobacco, and other articles. The surplus was spent in the purchase of necessaries for the mission.

The mission of Santa Barbara, shown from two points of view in Figs. 1 and 2, was founded by Father Palou, in 1786, at the foot of a chain of arid mountains. The church is of stone, with two towers and an extensive wing, tiled roofs and arched corridor.

The mission of Santa Inez (Fig. 3) was founded in 1797, on a beautiful prairie embosomed in the hills, a perfect garden of fertility. The building is similar to that of Santa Barbara, but differs in the appearance of the church. In front there was a large brick inclosure where the females bathed and washed. To the right were the gardens, filled with choice fruit trees; and, on the left, a few clusters of Indian huts and tiled houses.

The mission of San Luis Obispo (Fig. 4) was founded by Father Serra, and the church and barracks were begun in 1772. It is built near the extremity of a small pass through the hill, where the sun casts its burning heat in a degree almost insufferable. The mission, though formerly wealthy, is now of little importance. The buildings are in a decayed state, and everything about them bears the appearance of neglect. It is surrounded by high and rocky hills.

International Exhibition of Mining and Metallurgy.

This exhibition, lately opened at the Crystal Palace, London, contains many objects of interest. Prominent in importance, says the *Engineer*, is the contribution from New South Wales, which occupies an area of about 15,000 square feet. Among its contents are the coals and bituminous minerals, especially the white cannel—kerosene shale or petroleum cannel—which, since the exhaustion of the boghead mineral, is probably the richest gas-producing mineral in the world, yielding over 15,000 ft. of 48 candle gas or 150 gallons of oil per ton. This, however, is only a subordinate product, the output of ordinary coal, mainly of a coking character, having attained to 3,655,000 tons in 1889, the area covered by coal-bearing rocks being estimated at nearly 24,000 square miles. Gold mining, though still of importance, is less productive than formerly, owing to the exhaustion of the richer alluvial deposits, while the deep vein mines yield refractory minerals, which can only be reduced with difficulty. The most important of the newer mineral developments is that of the silver lead ore deposits in the Barrier ranges, near the western boundary of the colony, where, during the past four years, over 16,000,000 oz. of silver have been produced from the Broken Hill Proprietary Mine—a record nearly or even exceeding that of the most famous of the Leadville mines.

The European and American exhibits are of a less systematic character than those of the colonies, being confined to comparatively few localities. The Harney Peak tin district in the Black Hills of Dakota shows a large series of specimens of the coarse, tin-bearing granite which represents the most considerable find of the ore of that metal made as yet in the United States. This is very unlike the tin stuff of the older districts of Cornwall, but a similar condition appears to prevail in many of the Australian tin mines. The quicksilver mines at Avala in Servia—a comparatively new find of that metal—are exceedingly well represented, the specimens of crystallized cinnabar being of the highest beauty and interest. The great Bolivian silver mine of Huanchaca is, or rather is to be, represented by a characteristic series of specimens of the rich ores from which from eighteen to twenty-two tons of silver are produced monthly. This is one of the most valuable mines in the world, and is in the comfortable position of having about 1,000 tons of silver in its reserves underground, besides undressed ores and tailings of considerable value at the surface. The chief drawback, namely, the extremely inaccessible position, the mine being situated in the Cordillera of Bolivia, about 14,000 ft. above the sea level, has now been in great part overcome by a railway, 400 miles long, connecting it with the Pacific coast at Autofagasta, where very large reduction works have lately been started.

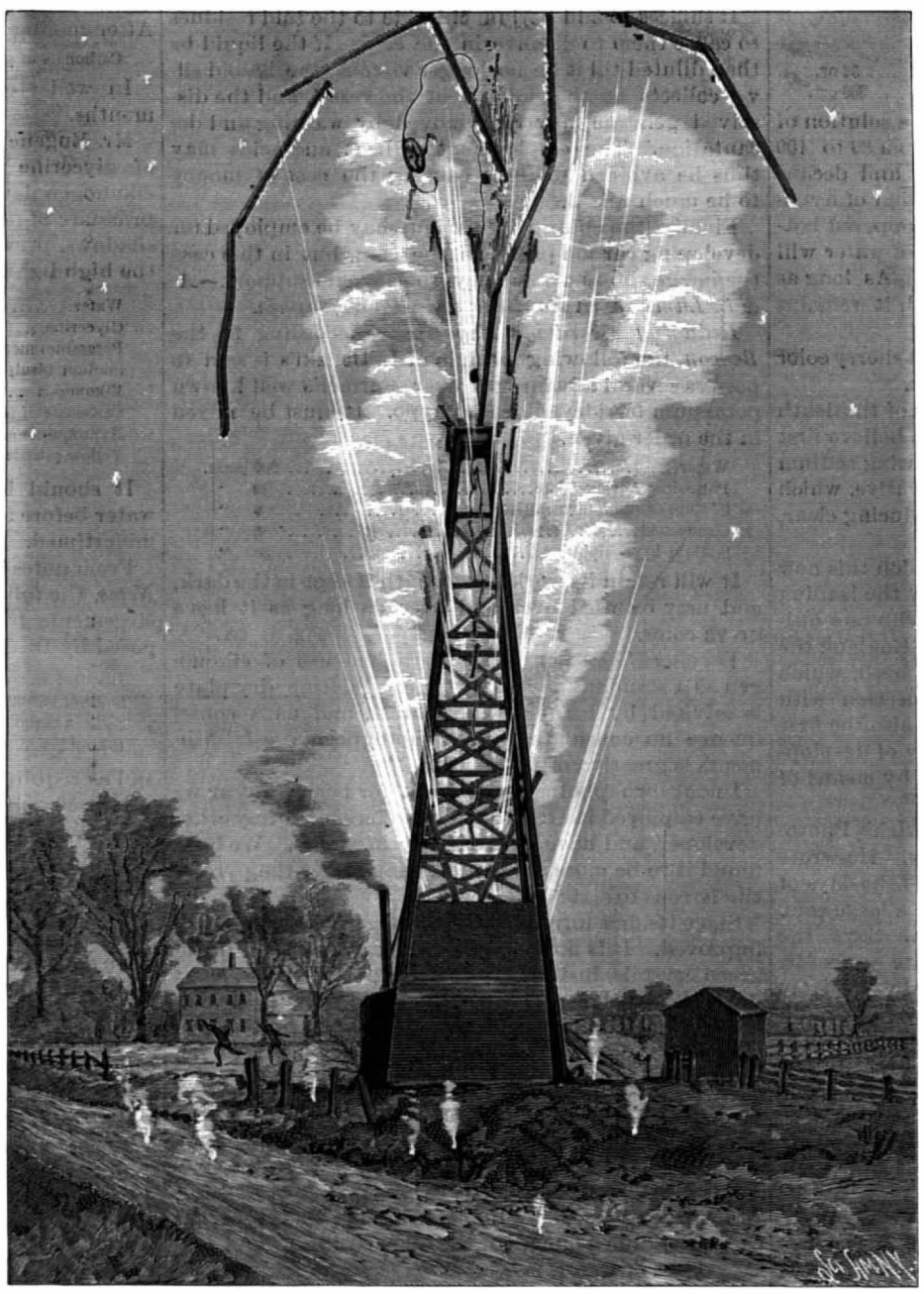
A Phonograph to Record on Two Cylinders.

A phonograph to record on two cylinders simultaneously, so that one may be retained as a file, or so that a message may be repeated from one cylinder to another, is one of the most recent improvements in this line. The construction is said to permit of listening to the record on one cylinder and simultaneously therewith dictating a reply to the other cylinder, or to allow two persons to dictate at the same time. It will also reproduce two like messages simultaneously, thereby greatly increasing the volume of sound, or a cylinder bearing a record may be placed in the phonograph with one having no record, and the record be reproduced on the plain cylinder while the operator listens. This phonograph is a patented invention of Mr. James P. Magenis, of North Adams, Mass.

A GAS WELL BLOW-OUT AT PULASKI, N. Y.

Our illustration represents a gas well blow-out which occurred at Pulaski, N. Y., in May last, and presented some remarkable characteristics. The blow-out took place at 12 o'clock at night, when only two men were at work, but, notwithstanding its violence, no one was injured, and as one of the workmen had the presence of mind to extinguish his lamp, the gas did not take fire. The well was then 913 feet deep, when the principal workman noticed the kinking of the rope, showing that the tools, weighing 2,000 pounds, were rising, indicating great pressure. He and his assistant immediately fled, and, as described by the Pulaski *Democrat*, in an instant the roar became terrific, the air was filled with gas, causing a dense fog, and stones and sticks and timbers flew in every direction. The flooring to the derrick was blown into the finest kindlings. The crown pulley at the top of the derrick was blown off, and the casing, solidly anchored down in the hole for 640 feet, was blown hundreds of feet into the air. Some of it was thrown about 300 feet southeast of the well, while other lengths struck the highway and plowed a ditch a foot deep right across street. The cap head buried itself by the side of the road, two feet underground, while the temper screw and rigging was embedded in the ground close by, but twisted all up like a rope. One length of the casing was nicely balanced on the walking beam. The roar is said to have sounded to those who lived near by like the explosion of a cannon.

The next day it was found that the well had 913 feet of water, through which the gas boiled up with great force, and all around the well through the soft ground the gas bubbles came up freely. The wash of the boiling gas and water covered the mouth of the well with stones, some of which fell in and thus added to the difficulties of the workmen in their subsequent efforts to "fish out" the tools at the bottom of the well—a work which was immediately commenced, although the flow of gas has since become quite small. The well was cased to a depth of 600 feet, each length of casing being twenty feet, and weighing ten pounds to the foot. All of this was blown up through the derrick, and it has ever since been a problem among the local authorities of the place as to what amount of actual pressure was developed in the well to produce such effects.



A GAS WELL BLOW-OUT AT PULASKI, N. Y.

Ancient Lake Cliffs and Terraces.

The facility and certainty with which the vestiges of ancient water margins are recognized and traced depend on local conditions. The small waves engendered in ponds and sheltered estuaries are far less efficient in the carving of cliffs and the construction of embankments than are the large waves of larger water bodies. The element of time, too, is an important factor. A system of shore topography from which the parent lake has receded is immediately exposed to the obliterating influence of land erosion and gradually loses its character and definition.

The wave-built terrace is distinct from the wave-cut terrace in that it is a work of construction, being composed entirely of shore drift, while the wave-cut terrace is the result of excavation and consists of the preexistent terrane of the locality. The wave-cut terrace is overlooked by a cliff rising from its upper margin, and only appears on the margin of an open basin broad enough for the propagation of efficient waves.

The great Lake Bonneville (of the Quaternary period), in the division of the Great Basin of Utah, is known by the records on its ancient shore lines. All about the Great Basin of Utah the lower slopes of the mountains are skirted by level tracings—not a single line merely at a single level, as in the Coast Range of California, but a series of lines at many levels, testifying to a system of oscillation of an ancient lake. The highest water line is 1,000 feet above the level of the Great Salt Lake, and over every foot of the intervening profile can be traced evidence of the action of waves. The point of outlet of this ancient lake was at the northern extremity of Cache valley. The sill over which the water at first discharged was soft, and yielded easily to the wear of running water, permitting the lake level to be rapidly lowered, but eventually a reef of limestone was reached, by which the erosion was checked and held at a nearly constant level until the outflow was finally stopped by climatic changes which diminished the water supply.

The history of this great lake is written by wave-sculptured topography and by lacustrine deposits. The Bonneville basin is surrounded by and interspersed with mountains. Form and substance conspire to prove that the lake had a beginning as well as an end, and before its inception the lake basin was for a long time subjected to the ordinary laws of sculpture by the action of rain. Nevertheless, the Bonneville shores are almost unmodified.—*Min. and Sci. Press.*

Bismarck's Regimen.

The details of Prince Bismarck's present dietetic regimen, says the *British Medical Journal*, may be interesting to those interested in the treatment of obesity. He says: "I am only allowed to drink thrice a day, a quarter of an hour after each meal, and each time not more than half a bottle of red sparkling Moselle, of a very light and dry character. Burgundy and beer, of both of which I am extremely fond, are strictly forbidden to me; so are all the strong Rhenish and Spanish wines, and even claret. For some years past I have been a total abstainer from all these generous liquors, much to the advantage of my health and my 'condition,' in the sporting sense of the word. Formerly I used to weigh over seventeen stone. By observing this regimen I brought myself down to under fourteen, and without any loss of strength—indeed, with gain. My normal weight now is one hundred and eighty-five pounds. I am weighed once a day, by my doctor's orders, and any excess of that figure I at once set to work to get rid of, by exercise and special regimen. I ride a good deal, as well as walk. Cigar smoking I have given up altogether; it is debilitating and bad for the nerves. I am restricted to a long pipe, happily with a deep bowl, one after each meal, and I smoke nothing in it but Dutch Knaster tobacco, which is light, mild, and soothing. Water makes me fat, so I must not drink it. However, the present arrangements suit me very well."

Meat Cooked in a New Tin Pail.

At Elizabeth, N. J., Everett Gordon, an engineer on the Jersey Central, his wife and son lately were poisoned by eating some food which had been cooked in a new tin pail. They were attacked with severe cramps and vomiting. Prompt medical attendance saved their lives. An investigation showed that the victims were suffering from lead poisoning.

The Little Toe.

The small toe in man has recently (*Nature* learns from *Humboldt*) been made a subject of study by Herr Pfitzner. It is well known that thumbs and great toes are two-jointed, and the other fingers and toes generally three-jointed. In many human skeletons, however, the small toe is found to be two-jointed, the middle and end phalanges being fused into one piece, though still distinguishable. This variety occurs in about 36 per cent of cases, and, as a rule, in both toes simultaneously; and there are more instances among women (41·5 per cent) than among men (31·0 per cent). One naturally thinks here of shoe pressure causing union of two bones originally separate. But it appears that in children, from birth to the seventh year, and in embryos from the fifth month, the fusion occurs about as often as in adults. Further, the material of examination was not from a class of people who wear tight shoes. Herr Pfitzner concludes that the small toe in man is in course of degeneration (*Ruckbildung*), and that without apparent adaptation to external mechanical influences. Processes of reduction are also observed in the connected muscular system. The question arises, has the tendency reached its limit, or have we merely the first act of a total degeneration of the fifth toe? The author inclines to the latter view, but desires an extension of these researches among peoples who do not wear shoes or sandals, or have only of late begun to wear them. In living persons, it is not difficult to determine, by stretching and bending, whether the small toe is two or three jointed; and in this way adequate data might be had for determining any percentage differences in occurrence of the old and new form in different races; also for investigating the inheritance of acquired characters, members of several successive generations being examined.

Luminous Water.

Ernest Fahrig, in the *Chemical Trade Journal*, narrates that, being in a dark room, having in his hand a sealed bottle partly full of a solution of ozone in water, he idly shook it up; whereupon a soft phosphorescent glow of light floated above the surface of the water and pervaded the space in the upper part of the bottle. The appearance was only momentary; but on shaking up the liquid again immediately afterward, the light reappeared, although in much diminished intensity. Further repetitions of the shaking failed to produce any results; but after an interval of ten days, the liquid had apparently regenerated its luminous power, for the same effects could be produced with it, although weaker. The phenomenon was afterward observed in another way, and some specially remarkable results were obtained by pouring a small quantity of an ozone solution into a glass beaker containing ordinary water. At first the cone-like projection of the solution, where it falls into the water, becomes luminous; and then the light suffuses the whole mass as the liquids become thoroughly mixed, finally dying away. It is described as a soft phosphorescent glow, which quickly spreads over the mass of fluid or gas, as the case may be, and as quickly disappears.

A CORRESPONDENT of the *Building News* (London, England) writes to that paper asking for information as to how best to get stains out of granite. Several correspondents reply. "Elbow Grease" says, "You have a troublesome job before you in attempting to get smoke and soot stains out of granite. Try this: A paste of 1 ounce oxgall, 1 gill of strong solution of caustic soda, 1½ tablespoonful of turpentine, with enough pipe clay to make it thick and consistent, scour well." "A Mason" is of opinion that "Washing is about as useful in getting stains of soot out of granite as tickling with a feather or fixing an electric belt round the window sill. Pick out a place where the stain is worst, and as a sample apply the following: Mix together ¼ pound whiting, ¼ pound soft soap, 1 ounce washing soda, and a piece of sulphate of soda as big as a walnut. Rub it over the surface you propose to treat, let it stand four and twenty hours, and then wash off. If it succeeds, try another portion." "G. D. M." replies that "Smoke and soot stains can be removed with a hard scrubbing brush and fine sharp sand, to which add a little potash."

PHOTOGRAPHIC NOTES.

Cleaning Negatives.—By the use of sodium sulphite in the developer, the staining of negatives from the pyrogallic acid is generally avoided. When such stain does appear, it is easily removed in a few minutes, sometimes in less time, by immersion in a bath of alum and citric acid.

Alum	2 oz.
Citric acid	1 "
Water	10 "

Should a yellow stain appear in a negative after fixing and washing, it is due to the insufficient fixing out of the unacted-on silver, and is very difficult to remove. Negatives thus stained may be cleared by immersion in a weak solution of cyanide of potassium, ten grains to the ounce of water. Care must be taken not to let the action be too prolonged, otherwise the density of the negative will be reduced too much.

Removing Hypo from Gelatine Films.—In all the operations of intensifying or reducing negatives it is very essential that every trace of the fixing salt, hyposulphite of soda, be removed from the film if a harmonious result is to be obtained. Belitzki's method, as described in the *American Annual of Photography*, is recommended.

Water	32 oz.
Chloride of lime	300 grs.

Add to the milky liquid thus formed a solution of sulphite of zinc (600 grains dissolved in from 80 to 100 ounces of water), shake the mixture well and decant the clear solution. This supernatant solution of hypochlorite of zinc should be kept in glass stoppered bottles. One ounce mixed with sixty ounces of water will remove the last traces of the fixing soda. As long as the solution smells of hypochlorous acid, it remains active.

A solution of bromine in water of a light sherry color is said to destroy hypo in the gelatine film.

Herbert B. Berkeley.—We regret to learn of the death of Mr. H. B. Berkeley in England, who we believe first proposed the idea, about 1880 or 1881, of using sodium sulphite in the pyro developer as a preservative, which also rendered the developer capable of producing clear, stainless negatives.

We well remember the slowness with which this new addition to the developer was adopted by the leading dry plate manufacturers of this country, who now universally use it. Mr. Berkeley patented in England the addition of bisulphite of soda to the fixing bath, which has recently been recommended in connection with eikonogen-developed negatives. He was also the first to practically demonstrate the possibility of developing successful images on chloride of silver by means of the ordinary alkaline developer.

Rev. T. F. Hardwich, author of "Hardwich's Photographic Chemistry," has also passed away. He wrote a very concise practical book applicable to the days of wet plate photography, which met with a large sale, and has now reached its ninth edition. Says the *British Journal of Photography:* "Of late years Mr. Hardwich's contributions have been almost exclusively confined to the improvement of the optical lantern, in which he continued to feel a deep interest. He looked upon the lantern as a great means of education, and he employed it extensively in his parochial work. The rough Durham miners, with their wives and families, used to crowd to hear him, and the Vicar of Shotton was looked upon as a sunbeam who illumined the many dark shadows in their pathway."

Toning Aristotype Paper.—According to Mr. T. C. Porter, in the *British Journal of Photography*, a very pleasant brown tint may be given to the prints by immersing them after the first washing (which should be moderate) for a second or two in a solution made as follows:

Hyposulphite soda	4 oz.
Water	16 "

to which add four or five drops of a saturated solution of potassium ferricyanide, then washing in running water for three or four minutes, and toning and fixing as usual in combined toning and fixing bath for such paper. Prints so treated should be in the first place considerably over-printed, as the ferricyanide bath much reduces their intensity. An accidentally over-printed print may be made into a satisfactory picture. After the ferricyanide bath, the prints seem to tone more readily than without it.

A New Property of Gelatine.—While studying the action of metallic chlorides on bromide of silver gelatine, we have made the discovery that gelatine will dissolve cold in a solution of barium chloride. The consequences for photography which may arise from this peculiar property have induced us to examine into the matter further. Other bodies which present a similarity from a chemical point of view, such as the chlorides of potassium, sodium, calcium, etc., do not display this capacity for dissolving gelatine, nor do their iodides or bromides. The chloride of strontium is, however, an exception, and possesses the same property as the chloride of barium, though in a much smaller degree.

With a solution of fifteen per cent of barium chloride the solubility is so great that sufficient gelatine may be dissolved to render the solution sirupy. The liquid keeps well and does not decompose under the action of the air. Allowed to evaporate spontaneously, it leaves behind a solid white substance, which, when examined under the microscope, shows itself to be composed of an amorphous mass of filaments mixed with chloride of barium, but it does not appear that any combination has taken place between the two substances. This solid substance dissolves in water without leaving any sediment behind. When the barium salt is precipitated by means of sodium sulphate, chloride of sodium is obtained in solution, and the gelatine does not then solidify in the cold.

From these observations we have drawn two conclusions which may be of practical use in photography. These are:

1. The presence of barium chloride in gelatine emulsions should be avoided. We have sometimes found traces of this compound in chloride of silver gelatine, and have then observed that the films have a tendency to detach themselves from the plate.

2. The property we have observed might be employed in treating emulsion residues.

It suffices to add barium chloride to the said residues to cause them to dissolve in the cold. If the liquid be then diluted till it be no longer viscous, the haloid silver collects at the bottom of the vessel, and the dissolved gelatine may be removed by washing and decantation. The employment of heat and acids may thus be avoided without causing the cost of money to be much raised.

Finally, the chloride of barium may be employed for developing carbon prints in the cold, but in this case the image shows a tendency to leave its support.—*A. & L. Lumiere, in Moniteur de la Photographie.*

Reducing Overdense Negatives.—According to the *Beacon*, the following formula of L. Belizki's is said to possess several advantages over Farmer's well known potassium ferridcyanide and hypo. It must be mixed in the order given.

Water	200 parts.
Potassium ferric-oxalate	10 "
Sodium sulphite (neutral)	8 "
Oxalic acid	3 "
Sodium hyposulphite	50 "

It will retain its working strength if kept in the dark, and may be used over and over, so long as it has a green color.

Various Eikonogen Developers.—The use of eikonogen as a standard developer for the gelatine dry plate is advised by many manufacturers, and as a consequence its consumption in photographic establishments is greatly on the increase.

In our own photographic work for nearly a year we have employed it exclusively in preference to any other developer, and have secured uniform results. We have found it to be more economical than either the pyro or the ferrous oxalate developer.

Since its first introduction eikonogen has been much improved. It is now supplied in clear, pale, yellowish-green crystals, instead of the dark green powder, as at first. When the crystals are dissolved with the proper amount of sodium sulphite, a clear, light yellow solution is obtained. The formula we now use is as follows, based on 437 grains to the ounce:

No. 1.

Sodium sulphite (Merck's c. p. crystals)	2 ounces.
Eikonogen	1 ounce.
Water (distilled or rain water preferred)	4 ounces.

To develop an 8 by 10 plate, having had a proper exposure, take 4 ounces of the above solution and add 1½ ounces of water.

Then apply to the plate and continue it in the developer until the picture acquires sufficient density. Six or eight plates may be developed successively in the same solution.

It will be observed that no alkali is necessary, which is one of the latest improvements. In case the picture should appear too slow, or the plate be underexposed, then half a drachm at a time of the following solution may be added until the desired detail is brought out:

No. 2.

Carbonate of potash	160 grains.
Water	1 ounce.

After two or three plates have been developed with the No. 1 solution alone, it is advisable to add a half drachm of the potash solution, since it will overcome the slowing effect of the bromine given off from the plate during development.

It is also advisable to preserve some of the old developer in a small bottle, and when starting with a fresh solution of No. 1, add to it 1 drachm of the old developer.

Another formula advised by the *Beacon*, based on 437 grains to the ounce, is as follows:

A.

Eikonogen	1 ounce.
Sodium sulphite	2 ounces.
Water	22 "

Dissolve the sulphite in the water, warm it, if in a hurry, and add the eikonogen, shaking till dissolved.

B.

Sodium carbonate	2 ounces.
Water	22 "

For plates that have had an ordinary fair exposure use 1 ounce of A and B, and add 1 ounce of water. The developer leaves nothing to be desired, giving perfect detail and full density, within a reasonable time, while the deposit is of such a nature as not to lose much in the fixing solution.

That the keeping qualities of solutions of eikonogen with sodium carbonate, after use, are greater than is generally understood may be known by the fact that we have recently developed a technically excellent negative with a solution that has been used over and over again, some part of which had been made for eight months.

H. E. Gunther, in the *Photo. News*, recommends the following mixed hydroquinone and eikonogen developer. It acts as powerfully as eikonogen without fogging the shadows, and yields the characteristic intensity of hydroquinone:

Sodium sulphite	100 grammes.
Eikonogen	15 "
Hydroquinone	5 "

These are dissolved in—

Hot water	1,000 c. c.

After cooling down, add—

Carbonate of potassium	50 grammes.

In well stoppered bottles the developer keeps for months.

Mr. Eugene Himly has ascertained that the addition of glycerine improves the keeping qualities of the eikonogen developer, while the addition also of yellow prussiate of potash acts as a preservative, gives clearer shadows, prevents fog, and produces more contrast in the high lights. His developer is made as follows:

Water	1,000 c. c.
Glycerine	100 "
Potassium meta-bisulphite	2 grammes.
Sodium bisulphite	75 "
Eikonogen	12 "
Carbonate of potassium	60 "
Hydroquinone	4 "
Yellow prussiate of potash	40 "

It should be diluted with one or two volumes of water before applying to the plate, unless the plate is undertimed.

From notes by Colonel J. Waterhouse, in the *Photo. News*, the following developer for bromide paper enlargements is stated to answer very well. It is proposed by Dr. Krugener:

Distilled water	20 oz.
Sodium sulphite	320 grs.
Sodium carbonate (crystals)	240 "
Eikonogen	80 "

and as required according to exposure, add 10 drops of a 1 to 50 solution of bromide of potassium to each 1,000 c. c. of developer.

The brown coloring of eikonogen crystals which has been noticeable of late results from oxidation, and has a staining action on the gelatine film it is well to avoid.

To clean the crystals it is only necessary to wash them once or twice with very little water. This removes the color, then the remaining clean crystals may be dissolved in distilled water, which will make a clear developing solution.

Keeping Qualities of Dry Plates.—As to how long gelatine plates will keep when properly packed, is stated by the *Beacon* to be thirteen years. Plates were coated in 1877, and when dry packed in pairs film to film, each pair being separately wrapped in yellow paper and then placed in specially good wood boxes. The boxes were tied up in brown wrapper paper, and in that condition, eight years after being made, the plates were taken across the Atlantic Ocean. Negatives made on them to-day are almost faultless, there being on one edge only a faint trace of the well known metallic appearance which some plates assume even within a few months of manufacture.

Panoramic Instantaneous Camera.—This new invention, designed by Stirn & Lyon, of this city, is a compact and simple camera, arranged to take a panoramic photograph instantaneously on the rollable transparent film. It is so arranged that when the camera is rotated in a circle by pulling downward on a string, the film is carried in an opposite direction over a slit one-sixteenth of an inch wide behind the lens, the exposed film being simultaneously wound up on another spool. Some very curious results are obtained, and as it may be regulated to operate in one-fourth, one-half, three-fourths, or a whole circle, the angle embraced exceeds that of any wide angle lens. We have been shown a few interesting views of the East River Bridge and street scenes in New York, taken with this small instrument.

Long Distance Electrical Power.

The *Elektrotechnischer Anzeiger* states that the Allgemeine Elektricitats Gesellschaft have announced their willingness, in conjunction with the Oerlikon Company, to transmit 300 horse power from the Neckar at Lauffen to the Frankfort exhibition, a distance of 175 km. (about 109 miles), on condition that an ordinary overhead cable, 5 mm. in diameter, connecting the two places, is provided free of cost.

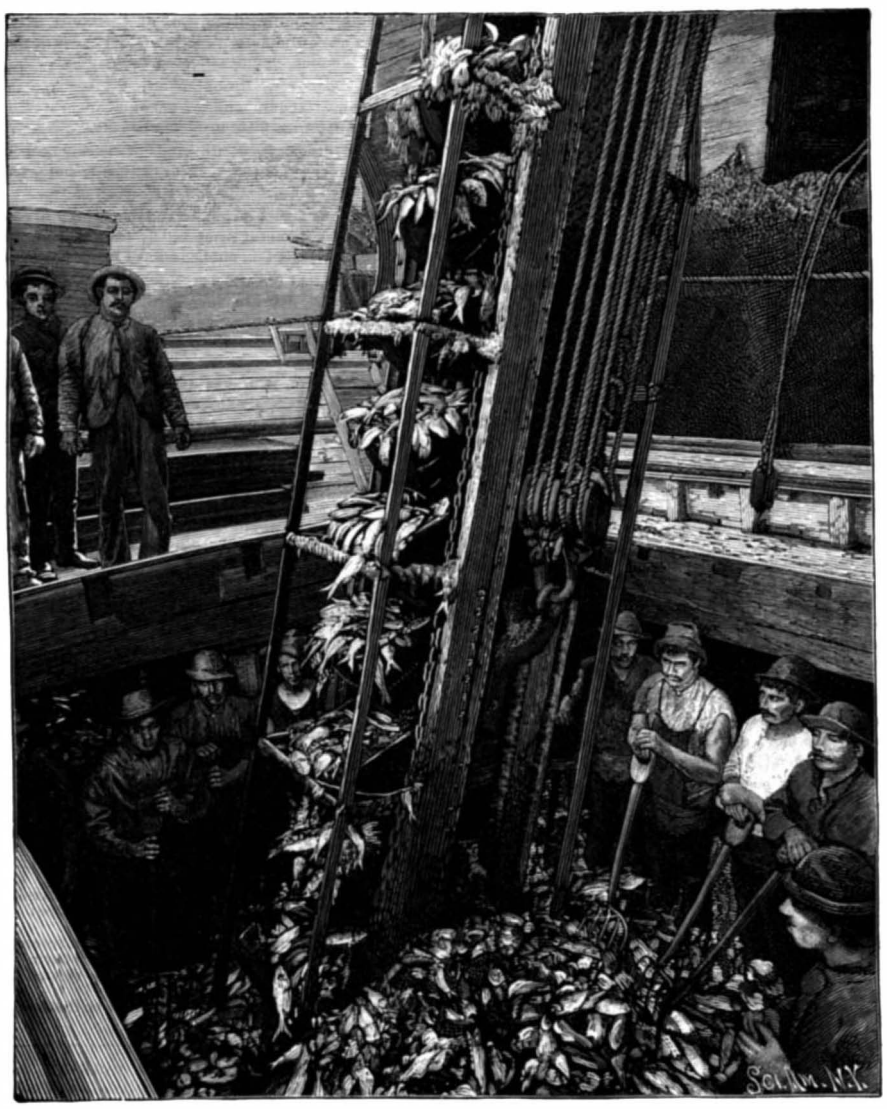
HANDLING FISH TO MAKE FERTILIZERS.

In the SCIENTIFIC AMERICAN of June 7, 1890, the Chase elevator was described as applied to the handling of coal. The same apparatus has found a new application in the handling of "menhaden fertilizers," at the factory of Joseph Church & Co., Tiverton, R. I. It is, perhaps, unnecessary to again go into minute details in the description of this elevator, as the construction of the one used in this case does not differ materially from that employed in handling coal.

Possibly some of our readers are not aware of the magnitude of the menhaden fertilizer industry. There are on the Atlantic coast no less than fifty establishments for catching menhaden and converting these fish into fertilizers. The firm of Joseph Church & Co. was the first to introduce steamers especially adapted for menhaden fishing. This enterprising firm was also the first to introduce the Chase elevator for discharging their fishing vessels, and so far as we are aware they are the only users of machinery of this class for this purpose.

Our engraving shows one of these elevators conveying fish from the hold of the fishing vessel. They find that by the use of this elevator the entire fleet of steamers may be discharged in succession without being obliged to wait one for another, whereas under the old system some of the vessels were obliged to lie up for two or three days at a time to wait for their cargoes to be discharged by the old hand method. During the height of the season it is found that by the use of this modern appliance for handling the materials, the vessels may be continuously upon the fishing ground, and they frequently succeed in bringing in two loads in a day. The largest vessel of the fleet of Joseph Church & Co. has taken over 500 tons of fish within twelve hours and delivered the same to the factory. This fact is mentioned to show the activity which prevails in this important industry.

The fish season extends from May to November of each year. The fish are caught along the coast from Cape Hatteras to Eastport, Me. The United States Committee on American Fisheries, in its report, mentions that in 1881 seventeen thousand tons of fish guano were used as the active ammoniacal matter in 284,000 tons of fertilizer used in raising 2,272,000 bales of cotton. This gives an idea of what is done in one branch of agriculture, leaving entirely out of account the use of fertilizer for corn, wheat, and other cereals.



TAKING FISH FROM THE HOLD OF A VESSEL WITH AN ELEVATOR.

American Inventions in Foreign Countries.

The demand for American machinery is constantly growing, and the exports attest this fact. American textile machinery is being largely bought because, according to London *Engineering*, of the numerous patented improvements which are being made in this line of mechanical construction. In the case of the American loom this is especially true, for it is generally thought that for speed and good workmanship combined it is superior to all its foreign rivals. As a result it is being gradually introduced in many English factories, where practical test has demonstrated its value.

The American steam fire engine is being introduced into Germany. Certain officials of Berlin have been in the United States, studying our system of fire-extinguishing apparatus, with the result stated. American railway engines and various other details of railway plant find buyers in different countries. American printing presses and wood-working machinery are in demand everywhere, and our manufacturers in these lines find a constant increase in their export orders. The same thing may be said of steam engines, boilers, pumps, agricultural machinery and tools, mining machinery, electric light plants and electrical appliances, and in short the whole range of labor-saving machines is included in the list.

Several paper-making plants have been sent abroad, notably to Japan, and Japanese buyers are now in this country making selections for the equipment of a paper mill. Only recently there was shipped to Japan a complete plant for the manufacture of camphor.

The list might be extended indefinitely, and indeed it would be difficult to make an enumeration which would not omit some article of American invention or some manufactured product which does not find a market abroad. Textiles, carriages, wagons and articles of everyday domestic use would be included. A correspondent, giving an account of his experience while traveling through Asia, says: "I saw advertisements for the sale of American watches filling whole columns in newspapers and large spaces on the outer walls of buildings in all the great cities of India. I heard the hum of the American sewing machine in the byways and broad streets of Bombay and Calcutta and Rangoon. I saw American lamps for burning American petroleum hawked about the streets on wheelbarrows for sale in Yokohama and Tokio and Shanghai. I heard the clatter of the American typewriter in Chefu and Tientsin and Swatow and Aintab. I saw American tram cars running in the streets of Tokio, and the American windmill pumping water on the bluffs of Yokohama. I was glad when I heard the click of Connecticut clocks keeping good time for Orientals, who are always behind. California canned fruits and Oregon salmon and Boston baked beans in hotels all over the East made me feel that home was not so very far away."—*The American Mail.*

Perils of Icebergs.

The steamer Portia, which lately arrived at New York, reports a marvelous escape from destruction by an iceberg off Fogo Head. Captain Ash says that a berg 150 feet high and 600 feet long broke in three pieces just as the Portia, going at full speed, was passing it. One of the pieces, 200 feet long, which had sunk, came up under the steamer, lifting her. She remained for some minutes resting on the huge cake of ice, when a tremendous sea set her free.

"It was to all appearances a large, solid block from five hundred to six hundred feet long and from eighty to one hundred feet high. I have at times passed near enough to an iceberg to touch it with my hat. I have often, when sealing, tied up to an iceberg for a week at a time. Certainly I never knew one to behave as this one did.

"Just as we got abreast of the first end I saw a few tons of ice fall out of its square face. Then I told the man at the wheel to steer to starboard. In ten seconds there were three bergs instead of one. The break was accompanied by terrible noises.

"The furthest portion ahead of us tipped so that its submerged part arose directly in our course, lifting us almost out of the sea, there being not more than three or four feet of water under us. The propeller began to go around rapidly. I stopped the engines. We had run squarely upon a shelf about one hundred and twenty yards from the main body of the berg. Then the commotion of the waters caused by the plunge of the berg raised a wave that swept onward while we were trying to go ahead. I signaled the engineer to proceed at full speed. That was the critical moment. Had the berg continued to roll, it would have carried us over and under. Had not that wave helped us, our ship would have been high and dry on that mountain of ice.

"We left a broad streak of red paint on that ice dock, and the wave that saved us swept quantities of ice aboard."

Corrosion from Pure Water.

The purest water, according to the *Locomotive*, often is the most active in corroding and pitting plates, and this makes it probable that the active substance, in some cases at least, is air. It is well known that water is capable of dissolving a considerable amount of air; in fact, it is this dissolved air that enables fish to breathe. It is not so widely known, however, that the oxygen of the air is more soluble than the nitrogen. If a small quantity of water be shaken up in a bottle, it dissolves some of the inclosed air, and when this is afterward driven off by boiling, and analyzed, it is found to consist of oxygen and nitrogen in the proportion of 1 to 1·87, instead of 1 to 4, as in the natural air. Thus the dissolved air, being more than twice as rich in oxygen as common air is, and being brought into more intimate contact with the metal by means of the water that holds it in solution, exerts a correspondingly more noticeable effect.

It is probable, too, that water plays some other important action in connection with the oxidation of metals, for it has been found by recent experiments that pure oxygen will not combine with things it has the greatest affinity for, provided it is perfectly dry. Even the metal sodium, which has an intense affinity for oxygen, may be heated in it to a very high temperature without combination, provided sufficient precautions are taken to exclude the slightest trace of moisture. It appears, therefore, that water plays a most important part in the oxidation of metals by air—a part, indeed, that we cannot explain, and that we really know but little about.

Patent Soliciting Profession.

It has been wittily said that the man who undertakes to be his own lawyer has a fool for his client. The same is true in a multitude of situations as well as in the practice of law, and we know of some empty purses and broken ambitions to be the result of men undertaking to transact clerical and professional work which comes within the domain of vigilant and well posted specialties. In the domain of mechanical inventions and the patents with which to protect them this is painfully true, and it is even a matter of record that some of the cleverest inventors of our time have beggared themselves in health, courage, and pocket by trying to secure their rights without the help of such expert intervention. A patent solicitor and attorney is of the first importance to an inventor; he is posted as to the expense of any given proceedings in his specialty, he can insure expedition as well as economy, and by his regular and watchful attention to the Patent Office, he is often enabled to spare his client the trouble of instituting what might prove to be wholly worthless claims, and hence the complete loss of his invention so far as securing protection in exclusive rights is concerned.

It must assuredly behoove inventors and owners of inventions to steer clear of blunders, and the proper thing to do is to place their matters wholly in the hands of some experienced attorney and solicitor of patents.—*Chicago Illustrated Century.*

Sparks from Belts.

An interesting note comes from a correspondent of the *Electrical World* in Woonsocket, R. I. Some time since there was trouble with one of the arc machines in use, and after a careful investigation by Mr. Pierce, the electrician who kindly furnishes the facts, it was found that the static discharge from a belt to the frame, and thence to the armature, perforated the insulation so that the machine current had followed it and burned out the armature coil. The trouble once found, a very simple and effective remedy was employed: Grounded rods were bent from the pulleys so as to take the static discharge from the belt. It is well known that quite a powerful spark can be obtained from belts under certain circumstances, but this is a remarkable instance of its effect.

The Busk-Ivanhoe Tunnel,

cutting the Continental Divide of the Rocky Mountains, on the line of the Colorado Midland Railway, which, when completed, will be the third largest tunnel in the United States, is now likely to be pushed with vigor to an early finish, the contract having been finally let to Mr. M. H. Keefe, of Helena, Montana.

The complete double outfit of tunneling machinery, boilers, air compressors, and rock drills are to be furnished by the Ingersoll-Sergeant Rock Drill Company, No. 10 Park Place, New York.

RECENTLY PATENTED INVENTIONS.

Engineering.

VAPORIZER AND BURNER.—Frank B. Meyers, New York City. This invention is designed to provide a burner specially designed for boilers and like apparatus, to permit of using oil and steam as fuel in a simple and effective manner, and in which the oil supply pipe is located in a nozzle within which outer concentric steam channels discharge.

POWER APPARATUS. — Patrick J. Dalton, New York City. This apparatus consists in general of a main reservoir supplied under a "head" by a flume or conduit, the outlet or exhaust surrounding the reservoir and bracing it, while supporting a series of wheels, preferably turbines supplied from the main tank and discharging into the exhaust chamber, the construction being simple, but designed to afford great power.

DEVICE FOR PROPELLING VESSELS.—Jacob Cochrane, Hill City, South Dakota. A series of buckets, according to this invention, is used in connection with endless chains and wheels, which automatically reverse as the engine is reversed, the buckets having a feathering action, and being readily detachable, so that their number may be lessened as desired.

Railway Appliances.

CAR COUPLING. — Warren Portlock, San Diego, Cal. In this coupler the drawheads are both vertically and horizontally bifurcated, so that the cars may be readily coupled from either end, the device operating automatically and being more especially adapted for application to box or freight cars, although applied to passenger cars without change in their construction.

INDICATOR FOR RAILWAY CARS.—John R. Fletcher, Baltimore, Md. This is a street or station indicator to be applied to horse, steam or electric cars, the indicator casing being arranged high up in one corner of the car, in connection with an annunciator connected to a button or ring on the outside of the car, which when pulled announces the street or station, the indicator wheel being operated from a connection with the car axle, and arranged in correspondence with the distance between stations.

Electrical.

TROLLEY FOR ELECTRIC STREET CARS.—Franklin C. Wheeler, St. Joseph, Mo. This invention provides a trolley in which the jumping of the electric conductor from the trolley is avoided, and which also furnishes means for readily reversing the trolley when it is desired to run the car in the opposite direction.

TELEGRAPH KEY. — John B. Van Deusen, Saratoga, N. Y. This invention provides means for automatically closing a telegraph circuit as the operator releases the key, and for opening the circuit when the key is grasped by the hand, there being combined with anvil contact and key lever a contact spring automatically closing the circuit on the key lever, and an auxiliary lever pivoted to the key lever for pressing the contact spring away therefrom.

Agricultural.

HAY LOADER.—Albert J. and William J. Hughes, Lisbon, North Dakota. This elevator has a receiving chamber, to the main frame of which is connected an elevator board, with endless belts provided with projecting teeth or tongs arranged in triangular shape along the rake and up the elevator board, to deliver the hay on the load in the most compact shape, for more easily stowing it in its proper place, and prevent its being scattered by the wind.

Mechanical.

PLACING BELTS ON PULLEYS.—Henry A. Scheuerle, Philadelphia, Pa. The device provided by the inventor to facilitate such jobs consists of two opposed disks united by a spindle section, a shank projecting from one disk and an arm extending from the shank, whereby the belt may be elevated and placed over the pulley, or in partial contact with it, when the device is turned and lowered until one disk is located at each side of the pulley and the spindle section holds the belt in contact with its periphery.

RIVETING MACHINE. — Reinhold A. Carl, Hearne, Texas. This is a machine by which metal rivets may be rapidly driven through any desired material and the rivets be headed at the same operation, the machine being particularly intended for light sheet metal and other light materials, and the invention covering various novel features and combinations of parts.

WRENCH. — Friedrich W. Kasch, Austin, Texas. This invention is designed to provide a tool especially adapted for a pipe wrench, but also capable of use as a monkey wrench, it having practically also two handles, one of which may be used as a lever to disengage the jaws from the pipe, and adjust the upper jaw to and from the lower jaw.

WRENCH.—George W. Hooks, of Hooks' Switch, Texas. This tool has a rigid jaw on the outer end of its shank, and a movable jaw adjustable on the shank, an eccentrically headed lever bearing on the shank and pivoted to the rear end of the movable jaw, to move the latter, making a combined pipe and nut wrench, and one which can be quickly changed from one to the other.

CALIPERS AND DIVIDERS.—Anders P. Laursen, Passaic, N. J. This invention is designed to provide a rapid, simple and convenient adjustment, while dispensing with any protuberances upon the sides of the legs, whereby the devices may be most effectually employed as inside calipers or dividers, the device being manufactured at a minimum cost and designed to be very durable.

OIL CUP. — Charles L. Burbeck, Fort Bragg, Cal. This cup has a valve with an upwardly extending stem carrying a collar in connection with which is arranged a spring, a cam being mounted beneath the collar, with means for turning it, thus providing for the intermittent delivery of oil to a journal bearing, and also for regulating the amount of oil so delivered.

SHAFT HANGER.—John W. Fisher and Watson A. Kinney, Bridgetown, Nova Scotia, Canada. This invention relates to a combined shaft hanger and an idler or dead pulley support, providing a hanger which will equalize the lateral strain of the shaft and the weight of the pulley and make an essentially universally balanced bearing for the shaft.

COTTON SEED LINTER. — Edward J. O'Brien, Texarkana, Texas. This invention covers an improvement on a former patented invention of the same inventor, designed to prevent the accumulation of lint within the lint chambers, the automatic discharge of lint from the saw teeth, thorough agitation of the seed within the receiving chambers, and the delivery of the stripped seed from the machine.

Miscellaneous.

DIPPER. — Martin L. Schoch, New Berlin, Pa. This is a dipper having a set of scrapers arranged within it, and fitting against its bottom and sides, with means for actuating the scrapers, whereby when the dipper has been emptied of thick or sticky substances, it will be self-cleaning, the adhering portions being scraped from its inside.

TYPE WRITING MACHINE. — William P. Quentell, Kansas City, Mo. Combined with the type carrier and a vertically rocking key board geared thereto are a carriage and hammer, both actuated by depressing the key board, the depression of a particular key serving to stop the movement of the carrier, with other novel features, designed to constitute an inexpensive and durable machine.

BOOK AND INDEX. — Richard R. Vernon, Woodbridge, N. J. This is a device designed to allow of folding the index into the book, and permit of using the book or index each independently of and without disturbing the other, enabling the user to bring the index into a convenient position for inspection or for writing in the names, titles, and page numbers of letters, accounts, etc.

SHOW CASE.--Robert E. Sherlock and Manfred Freeman, Grenfell, Northwest Territories, Canada. This is a simple and convenient case, designed to occupy but little floor room, display conveniently a great variety of goods, and effectually protecting them from dirt and dust, while the case may be adjusted to hold large or small articles.

ADVERTISING DEVICE.—John B. Williamson, Louisville, Ky. This is a portable device, in the form of a cylinder, from which a tape or scroll may be drawn outward and automatically returned when released, upon which scroll or tape any advertising matter or information may be printed.

COIL CLASP.—Calvin Jackson, Jacksonwald, Pa. This clasp consists of two individual parallel oppositely wound coils adapted to be pressed laterally together, and a removable connector to be passed through and removed from the space formed by the overlapping portions of the coils when they are pressed together.

BICYCLE HEAD. — Henry G. Barr, Westborough, Mass. This invention provides for the steering heads compensation for contraction and expansion due to atmospheric changes, thereby avoiding objectionable rattling or binding, the invention being applicable to all kinds of bicycles, having either ball or cone heads.

SHAFT HOLDER FOR VEHICLES. — Augustus H. Davis and Orval E. Byrd, Crawfordsville, Ind. A case or portion is adapted for connection with the shaft, and provided with an endless or continuous groove, a bar having a stud or portion to traverse the groove, while there are means for connecting the bar with the axle, the device holding up the shafts when not in use, and for convenience in hitching the horse thereto.

SHUTTER WORKER. — Abraham Pugsley, Jamestown, R. I. This invention provides a simple and efficient device by which the blind may be operated from the inside of the building, and also for fastening the blind in any desired position, the invention covering various novel features of construction and combinations of parts.

FOLDING CHAIR AND STEP LADDER.—Charles L. Knoeller, New York City. This is a piece of furniture more especially designed for use as a hall or library chair, although it may be used to advantage in other rooms or places where a step ladder is required, being very substantial when set up for either use, and being readily folded into small space for transportation or storage.

PEN HOLDER. — Joshua C. Palmer, Lanham, Texas. This is a holder designed to be easily held between the fingers without cramping them, and support the pen well in sight of the writer, being a curved flat holder with a projecting shank for the pen, the shank being nearly parallel with the straight portion of the holder, and in line with the eye when held in position for writing.

TRACE CARRIER.—Andrew Hartman, Chicago, Ill. This invention covers an improvement applicable to all kinds of harness, team traces included, and which is designed, when applied to a trace, to effectually prevent it from being chafed, as no portion of the harness usually connected to the trace is brought in contact with it.

HANDLE FOR TABLE CUTLERY.—William T. Decker, Rockport, Pa. This is a handle for spoons, forks, and other table or culinary and other articles, and is provided with a hinged guard or hook applied to the under side of the handle, in advance of the back or outer end of it, and adapted to close in front up against the handle.

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.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(2381) R. W. asks: 1. I am making an electric motor according to directions contained in SUPPLEMENT, No. 641, and would like to know what it is that makes the armature revolve when the current is turned on. Does the field magnet repel the wire placed at right angles to it? A. The field magnet poles attract and repel the poles of the armature. The location of these is determined by the winding of the magnet and armature. 2. Why can't a person use a brass armature ring, or does it have to become magnetic in order to operate? A. Because it will not become polarized, *i. e.*, magnetic. 3. Could it be geared to a common sized skiff, and be run with 8 one quart batteries or 2 four quart? A. Your battery would be far too small. 4. I have read where it says that high power in a motor can only be developed by a strong magnetic field. Suppose the armature were connected with 4 quart batteries and the field magnet with another 4, would it be stronger? A. In general terms, the stronger the battery, the stronger would the motor be. 5. Why does Stanley not come to America? Did he not get his start from Gordon Bennett, and has he not spent most of his life here, not counting that spent in Africa? A. In his last African trip he represented England, not America. For his life, etc., we refer you to our SUPPLEMENT, Nos. 505, 581, and 754.

(2382) R. McK. asks: In speaking of a single car in a vestibuled train, should it be called a vestibule or vestibuled car? Also should a solid train of cars be called a vestibule or vestibuled train, both ends of the cars having vestibules? A. We prefer the word "vestibule" to "vestibuled" in all above cases.

(2383) A. W. writes: 1. I have a paper balloon and wish to blow it up with common air to prevent the sides from sticking, so I can varnish it. What can I find to blow it up with, and what is best? A. Blow up your balloon with a bellows. It may first be partially inflated by holding its mouth against the wind or by running with it, holding its mouth forward. 2. Where can flaxen or linen netting be found, such as is used for small balloons? A. Address a dealer in sporting goods and fishermen's supplies. 3. Is there any danger in boiling linseed oil, a small quantity at a time, in a pot containing a pint or so? A. Yes. See our SUPPLEMENT, No. 726.

(2384) A. N. D. wishes to know how to clean photographic negatives so that the glass may be used for other purposes. A. To eight ounces of water add 10 minims of hydrofluoric acid; pour the mixed solution in a rubber tray, immerse in the solution one negative at a time. In about a minute the film will loosen at the edges, and with a flat wood stick may be rolled up off the plate and removed bodily. Negative after negative may be thus easily cleansed. Keep the fingers from touching the solution as much as possible. Another method is to soak the plates in a hot dilute sal soda solution, which will dissolve out the film.

(2385) S. A. A. asks: 1. How can I make a small emery wheel, say 3 or 4 inches diameter? A. Turn out a wooden wheel, put thin glue on its periphery and roll in emery. 2. What is the best acid to etch on zinc plates with? A. Sulphuric acid is the cheapest and gives good results.

(2386) J. W. B. asks (1) the kind of glue size used on paper before applying the oil, resin and molasses for "sticky fly paper." A. None is required. 2. How to prepare the white and colored inks for show card writing? A. Mix the desired pigments, Chinese white, etc., with thick gum arabic water. Apply with a funnel or through a spout.

(2387) L. B. asks for a desirable dressing for the hair of an elderly person who has remarkably pure white hair, but is troubled by the ends of hair splitting and also breaking off. A. We should not advise any dressing. An occasional clipping of the extreme ends by a good hair dresser is the treatment that seems most advisable.

(2388) W. W. W. asks: 1. In making a dry pile, is there anything that I could use instead of peroxide of manganese. I have been unable to get it. A. We know of nothing that will answer so well. You can get it of any dealer in chemicals in this city. 2. How can I construct a dry battery for use with a telephone? A. Dr. Gassner's dry battery is described in the SCIENTIFIC AMERICAN, vol. 61, page 306. Also in Experimental Science.

(2389) B. E. P. writes: Quite a while ago I noticed in this department a method for easily and readily splitting newspaper. Can you refer me to the issue giving such receipt, or can you name a ready method? Could not the paper be swelled with some chemical to enable it to be split perfectly? A. This has been published in Notes and Queries. Some dexterity, or rather judgment, is required in executing it. The paper to be split is pasted between two sheets of compact strong paper. The best flour paste should be used. Mucilage is unreliable. When nearly dry, if the two outer pieces of paper are pulled apart, the central one will split, and one-half of the central piece will adhere to each. By soaking in water they can be removed. Some paper works better than others. If the outer paper is of a loose texture, it may split instead of the desired one.

(2390) T. C. B. asks: Can a rain gauge be strictly accurate and yet have a funnel-shaped mouth? I thought the sides should be perfectly perpendicular. A. A funnel-shaped mouth involves a little inaccuracy, but it compensates for this by magnifying the reading divisions.

(2391) J. W. S. asks: What is the longest piece of carpet, 3 feet wide, that can be placed diagonally on the floor of a rectangular room 10 x 20 feet, and cutting ends of carpet square. A. 19 36-100 feet, approximately.

(2392) E. D. S. asks: Can you give me the formula for the composition for moulds, used in rubber stamp making (dry heat process)? A. Plaster of Paris can be used, or a metallic mould made of zinc, of type metal, or of fusible alloy. Use talc powder to prevent the India rubber adhering to the mould.

(2393) C. A. B. asks: 1. Is there any other practical way of duplicating written matter besides the "copying pad" and the "cyclostyle"? A. Several other methods have been devised; some are photographic, others involve the use of a steel stylus for writing, with a file-cut steel surface for the paper to rest on. This gives a stencil. It has been proposed to rest the paper on a carbon surface and cause sparks from an induction coil to pass from stylus to carbon, thus producing a stencil. Lithographic apparatus is also on sale by stationers. 2. Can you give a recipe to make a good blackboard fluid? A. 4 pints 95 per cent alcohol, 8 ounces shellac, 12 drachms lamp black, 20 drachms ultramarine blue, 4 ounces rottenstone in powder, 6 ounces powdered pumice stone. Many other formulæ are given similar to this.

(2394) C. P. G. writes: I want to make some rubber castings in plaster of Paris moulds, and would like to know of some way (if there is any simple way) in which to treat the rubber so that it will become very firm in the mould without pressure. The rubber that I want to use is that of which car springs are made, and I would like to have it as firm as it is now. A. Use rubber mixed with sulphur, but unvulcanized. Some pressure is required to force it into the crevices of the mould. Then by heating it will become vulcanized. What is sold as pure gum rubber can be treated as above with some success. We refer you to our SUPPLEMENT, Nos. 249, 251, 252, for a valuable paper on India rubber. Possibly the rubber you wish to use is too hard. If so, nothing can be done with it.

(2395) B. E. P. asks: Can you give a description of method and process employed by you in the production of the printed copies of the specifications and drawings of patents, which you furnish for 25 cents? A. The patent copies are printed by the government. The drawings are printed by the lithographic process, the type matter in the usual way.

(2396) J. N. H. asks: 1. Is there any way by which the gold can be recovered from the toning solution used in toning photographs? A. Add solution of ferrous sulphate (copperas). The gold will be precipitated as a metallic powder. 2. If an article is bought for nothing and sold for five dollars, what is the percentage of gain? A. The ratio of gain is infinite; it is not expressible by percentage.

(2397) W. M. asks for a receipt for bleaching clothing. A. Exposure to the sun after washing is the only bleaching that should be used. A little bleaching powder, say one or two spoonfuls to the tub of water, may be used, but this tends to cause decay of the clothes.

(2398) W. A. H. writes: I read in a newspaper that it was now possible to treat wood, ivory, glass, etc., in such a manner that they could be electroplated. Can you give me any information on the subject? A. This can be done by rubbing them over with graphite. By dipping into nitrate of silver solution and exposing to hydrogen gas, the surface can also be prepared for electric deposits. 2. In reply to a question asked by me some weeks ago, you stated that it would be absurd to attempt to obtain heat by electro-decomposition of water. Could it not be done economically and practically on a surplus water power, one that would not otherwise be used, and where the water to be treated was a waste product containing a small proportion of pyroligneous or acetic acid? Coal at the point in mind is dear and heat necessary. A. Your best plan would be to run your dynamo on a closed circuit, with resistance interposed, so as to generate the heat directly, as is done on the small scale in the incandescent lamp. Of course you could do it the other way by producing oxygen and hydrogen gas, but probably with less economy.

(2399) L. W. Z. asks: Will burning sulphur in a room, to exterminate moths, etc., have a deleterious effect upon the keys of a piano or upon furniture? A. If done upon a perfectly dry day it will have little effect, especially if followed by prompt and thorough ventilation. Iron or steel articles, nails, etc., will, however, be almost certain to become rusty and show bad effects.

(2400) C. W. F. asks for a safe method and good receipt for making amalgam for frictional machines, and where it can be purchased. A. Melt together one part zinc and one part tin, remove from fire and stir in two parts mercury. Place in a wooden tray or shallow box well chalked, and shake. Before it is cold, powder in an iron mortar. Keep in a closed bottle. The cushion should be slightly greased before applying the amalgam.

(2401) Dez. writes: Will you kindly inform me how I can get rid of freckles? A. The druggists sell preparations that may be of some efficacy. The really operative ones depend on aqueous extract of the rind of pistachio nuts. Thus applied to the face causes the outer cuticle to come off, leaving the complexion clear. But the freckles immediately form again on exposure.

(2402) F. I. S. asks: Can you tell me of anything that will banish Croton bugs from a house? A. Unfortunately we cannot. Paris green is efficacious, but is highly dangerous on account of its poisonous properties. Powdered borax, buhach or erythium, and Persian powder are all recommended.

NEW BOOKS AND PUBLICATIONS.

THE SCIENCE OF LANGUAGE. By F. Max Muller. Chicago: The Open Court Publishing Co.

This little book presents in attractive form the three interesting lectures of Professor Muller delivered before the Oxford University extension meeting in 1889.

SCIENTIFIC AMERICAN BUILDING EDITION.

AUGUST NUMBER.—(No. 58.)

TABLE OF CONTENTS.

The Scientific American Architects and Builders Edition is issued monthly. $2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming, practically, a large and splendid MAGAZINE OF ARCHITECTURE, richly adorned with elegant plates in colors and with fine engravings, illustrating the most interesting examples of Modern Architectural Construction and allied subjects.

The Fullness, Richness, Cheapness, and Convenience of this work have won for it the LARGEST CIRCULATION of any Architectural publication in the world. Sold by all newsdealers.

MUNN & CO., PUBLISHERS,
361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

August 5, 1890.

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Advertising device, J. B. Williamson ... 433,841
Air brake, T. J. Hogan ... 433,594, 433,595
Air brake, W. E. Maher ... 433,737
Alarm. See Fire alarm. Safety alarm.
Alarm lock, J. Ashworth ... 433,640
Auger bit, S. H. Jennings ... 433,683
Automatic sprinkler, V. Lapham ... 433,477
Baling press, J. W. Hunter ... 433,469
Baling press, G. A. Nelson ... 433,629
Baling press for hay, etc., R. G. Ellsworth ... 433,857
Baling presses, power device for, T. M. & N. Cass. 433,887
Ball. See Pipe welding ball.
Bar. See Grate bar.
Barrel, ventilated, A. W. Ballou ... 433,510
Barrels, etc., furnace or appliance for burning or drying, G. A. Oncken ... 433,876
Basin, sink, bathtub, etc., W. Bunting, Jr ... 433,718
Bath. See Blotter bath.
Batteries, [device for unloading, recharging, and reloading electric car storage, J. C. Chamberlain ... 433,851
Battery. See Galvanic battery.
Beading machine rod, T. C. Belding ... 433,437
Bed slat support, F. X. Cote ... 433,767
Bedstead, folding, D. Argerbright ... 433,845
Beer drawing device, F. Batter ... 433,614
Bell, door, C. A. Emme ... 433,724
Belts upon pulleys, device for placing, H. A. Scheuerle ... 433,825
Bicycle head, H. G. Barr ... 433,760
Binder, temporary, J. A. Burke ... 433,559
Bit. See Auger bit.
Block. See Traveling block.
Blotter bath, W. M. & L. H. Levey ... 433,527
Boat. See Ship's boat.
Boiler. See Wash boiler.
Boiler feeder, Marcy & Jones ... 433,576
Boiler furnace, steam, G. G. Vivian ... 433,837
Boiler indicator, steam, C. W. Moore ... 433,872
Boiler or pipe covering, H. W. Johns ... 433,470
Bolt heading machine, B. S. Meader ... 433,483
Bolt or rivet clipper, Stokes & Perrett ... 433,914
Bolting reel, L. Lindsay ... 433,575
Boring machine, H. A. Miner ... 433,577
Bottle cap, R. Whitaker ... 433,840
Box. See Journal box. Letter box. Stuffing box.
Box corner nail, Brown & Bold ... 433,443
Brake. See Air brake. Store service car brake. Vehicle brake. Wagon brake.
Bridge rail joint, R. H. Buckingham ... 433,616
Buffer, pneumatic, L. D. Riegel ... 433,657
Bug trap, C. H. Lawton ... 433,574
Buildings, construction of, H. B. Walbridge ... 433,500
Burner. See Gas burner. Hydrocarbon burner. Oil burner.
Butter, manufacturing, G. H. Hamrick ... 433,729
Buttonhole strip, Haviland & Mitchell ... 433,863
Cable grip, F. A. Yard ... 433,843
Calipers and dividers, A. P. Laursen ... 433,869
Camera. See Photographic camera.
Camera, W. E. Schneider ... 433,746
Camera shutter, W. E. Schneider ... 433,745
Can. See Oil can.
Cant hook crate, F. S. Postal ... 433,817
Car coupling, C. Burpee ... 433,514
Car coupling, P. J. Dockray ... 433,522
Car coupling, G. H. Dougall, Sr ... 433,453
Car coupling, A. Lougheed ... 433,797
Car coupling, H. Marshal ... 433,798
Car coupling, H. E. Moomaw ... 433,902
Car coupling, F. W. Parsons ... 433,695
Car coupling, T. F. Phillips ... 433,487
Car coupling, C. T. Thompson ... 433,664
Car motor support, railway, W. Wharton, Jr ... 433,754
Car trolley, electric motor, F. Bain ... 433,611
Car trolley, electric street, F. C. Wheeler ... 433,839
Cars, means for heating railway, J. Q. C. Searle (r) ... 11,101
Cars, pin and link holder for, J. M. Love ... 433,479
Cars, street indicator for, G. Spoelstra *et al* ... 433,605
Cars, street or station indicator for railway, J. R. Fletcher ... 433,858
Carburetor, A. B. Smith ... 433,495
Card clothing grinding machine, G. O. Wickers ... 433,919
Carding engines, cylinder for, S. W. Goddard ... 433,620
Carpet sweeper, R. H. Eddy ... 433,723
Carrier. See Log carrier. Sheaf carrier.
Cart, ash, N. Robinson ... 433,823
Cart, road, J. Coefield ... 433,517
Cart, road, D. N. Kratzer ... 433,572
Cart, road, J. M. Williams ... 433,607
Case. See Egg case. Show case. Watch case.
Cash indicator and register, W. H. Clark ... 433,888
Cash recording machine, C. E. Hadley ... 433,728
Casting apparatus, stereotyper's, J. R. Cummings 433,449
Casting boxes, clamping device for stereotyper's, J. R. Cummings ... 433,448
Castings, mould and bed for forming, S. J. Adams 433,585
Chair. See Child's chair. Folding chair.
Chair, A. Van Slyke ... 433,836
Chair and table, combined, G. Hunzinger ... 433,623
Check rating and punching machine, E. S. Raff ... 433,541
Child's chair and chair, combined, J. J. Elias ... 433,649
Chopper. See Cotton chopper.
Churn, H. G. Sanders ... 433,909
Churn, J. F. Wilsey ... 433,503
Churn, F. H. Wolfmyer ... 433,507
Cigarette machine, S. Prager ... 433,818
Clamp. See Fabric holding and stretching clamp. Frame clamp.
Clasp. See Coil clasp.
Clasp, J. Drexler ... 433,454
Clasp, C. R. Harris ... 433,466
Clasp or buckle, J. Lambert ... 433,568
Cleaner. See Lamp chimney cleaner. Pen cleaner. Railway track cleaner.
Clipper, hair, W. H. Burman ... 433,513
Cloth board machine, J. W. Jones ... 433,626
Clothes drier, E. A. Foster ... 433,859
Clothes hook, J. H. Templin ... 433,699
Coal breaker, bituminous, Emerson & Skinner ... 433,777
Coal drilling machine, grip, Wages & Armstrong ... 433,556
Cock, gauge, E. F. Landis ... 433,685
Coffee pot, E. J. Colby ... 433,673
Coffin handle, O. McCarthy ... 433,692
Coil clasp, C. Jackson ... 433,791
Commutator, dynamo, J. W. Easton ... 433,523
Cooler. See Water cooler.
Cotter key, spring, F. S. McWhorter ... 433,804
Cotton chopper, J. M. Crews ... 433,520
Cotton mills, picker house for, S. N. Bourne ... 433,642
Coupling. See Car coupling. Thill coupling.
Cup. See Oil cup.
Curling iron, J. H. Bevington ... 433,440
Current converting apparatus, Zipernowsky & Deri ... 433,758
Current motor, alternating, N. Tesla ... 433,701
Curtain fastening, M. Renshaw ... 433,821
Curtain pole ring and pin, combined, L. Weidenfeld ... 433,838
Curtain support, E. E. Arnold ... 433,509
Cut off, automatic water, Bissell & Prescott ... 433,441
Cut-off, fusible, W. J. Jenks ... 433,682
Cutter. See Fodder cutter. Glass tube cutter. Milling cutter. Tobacco cutter.
Dental mallet and pliers, combined, A. O. Corey ... 433,592
Direct-acting engine, A. Ball ... 433,641
Dish, F. A. Oetzmann ... 433,539
Disinfectant, W. F. Simes ... 433,877
Door check, J. M. Brohard ... 433,848
Door hanger, G. A. Colton ... 433,722
Door hanger, sliding, G. A. Colton ... 433,721
Door, sliding, T. J. Gillette ... 433,678
Draught equalizer, R. L. Prestholdt ... 433,579
Drier. See Clothes drier.
Drying kiln, W. S. Mayo ... 433,800
Dye vat, E. Remy ... 433,632
Dyeing, T. Ingham ... 433,790
Egg case, wire, G. E. Raymond ... 433,925
Egg lifter, A. E. Smith ... 433,546
Egg sirup, preparing, P. Thorpe ... 433,832
Electric conductor joint, Wiley & Acheson, 433,920 to 433,922
Electric conductors, manufacturing, E. P. Warner ... 433,917
Electric current controller, M. O. Sargent ... 433,744
Electric machine, dynamo, C. F. Winkler ... 433,557
Electric motor mechanism, S. E. Mower ... 433,903
Electric motor mechanism, Mower & Spencer ... 433,904
Electric wire cleat, L. Furlong ... 433,561
Electric wire support, Halbauer & Hiller ... 433,896
Electrical communication, J. L. Cutler ... 433,619
Electrical transformer or induction device, N. Tesla ... 433,702
Electric-magnetic motor, N. Tesla ... 433,703
Electro-magnetic motor, alternating current, N. Tesla ... 433,700
Electroller, Little & Robb ... 433,687
Elevator, C. A. Case ... 433,762
Elevator shafts, device for operating the doors to, W. E. Marlett ... 433,901
Embroidering machine, F. J. Perry ... 433,815
Emery wheel hopper, J. F. Leonard ... 433,735
End gate, wagon, George & McGinness ... 433,593
Engine. See Direct-acting engine. Gas engine. Gas and steam motor engine. Gas or oil motor engine. Motor engine. Rose engine. Rotary engine. Traction engine.
Engine connection, steam, G. W. Carey ... 433,645
Engines, apparatus for governing gas or petroleum motor, N. A. Otto ... 433,808
Envelope moistening pad, A. Stelzner ... 433,634
Evaporating device, liquid, J. U. Lloyd ... 433,528
Fabric holding and stretching clamp, A. N. Wilson ... 433,756
Fastening device, A. Epple ... 433,890
Fence machine, wire and picket, S. Jarvis ... 433,792
Fences, device for applying tighteners to wire, C. Knopp ... 433,476
Fences, tightener for wire, C. Knopp ... 433,475
Fifth wheel, H. B. Yaryan ... 433,844
Filter, W. D. P. Aims, Jr ... 433,710
Finger rings, forming, W. H. Peckham ... 433,578
Fire alarm and night call, electric, C. J. Vining ... 433,581
Flush tank, siphon, H. H. Craigie ... 433,447
Fodder cutter, J. Dick ... 433,521
Folding chair and step ladder, C. L. Knoeller ... 433,795
Frame. See Picture frame. Umbrella frame.
Frame clamp, J. M. Wilson ... 433,506
Fuel of coal, charcoal, or coke screenings, lump, A. Mayer ... 433,653
Furnace. See Boiler furnace. Hot air furnace. Regenerative furnace.
Furnace grate, R. S. Richards ... 433,491
Fuse and fuse block, J. G. S. Cunnington ... 433,770
Gauge. See Saw gauge.
Galvanic battery, S. W. Maquay ... 433,738
Game apparatus, F. Gammeter ... 433,676
Game apparatus, M. Jacobs ... 433,624
Game apparatus, D. D. Lockwood ... 433,599
Garment stay, L. M. Campbell ... 433,719
Garment supporter, G. D. Cluff ... 433,617
Gas and steam motor engine, combined, H. Haedicke ... 433,563
Gas, apparatus for the manufacture of, J. B. Archer ... 433,926
Gas, apparatus for the manufacture of, K. M. Mitchell ... 433,802
Gas burner, W. Dawson ... 433,675
Gas engine, E. A. Sperry ... 433,551
Gas holder, W. Gadd ... 433,462, 433,463
Gas or oil motor engine, N. A. Otto ... 433,809 to 433,814
Gas, process of and apparatus for manufacturing heating and illuminating, C. F. Hadly ... 433,784
Gate. See End gate.
Gate, F. J. Baxter ... 433,434
Gear, reversing, H. O. Thomas ... 433,499
Generator. See Steam generator. Vapor generator.
Glass-tube-cutter, F. McGar ... 433,597
Glove, M. Neuburger *et al* ... 433,640
Glove fastener, E. Raudnitz ... 433,696
Glove fastening, A. C. Mather ... 433,689
Grader, road J. Fleming ... 433,780
Grain binder, C. Breuscher ... 433,644
Grain elevators, safety cut-off for, J. B. Soule ... 433,550
Grate bar, D. U. Cory ... 433,519
Grinding cutlery handles, machine for, A. Johnston ... 433,526
Guard. See Railway safety guard.
Hair singer, J. H. Bevington ... 433,439
Hammer and scraper, combined, J. B. Mitchell ... 433,740
Handle. See Coffin handle.
Hanger. See Door hanger. Shaft hanger.
Harness blind with connected loop, A. J. Buck ... 433,436
Harrow, C. B. Cook ... 433,518
Harrow, C. La Dow ... 433,573
Harrow, disk, E. Pridmore ... 433,654
Harrow, gang plow, W. A. Zumwalt ... 433,608
Hay loader, A. J. & W. J. Hughes ... 433,865
Hay press, S. H. & C. L. Miller ... 433,584
Hay press, J. H. Williams ... 433,755
Heater, E. F. Trent ... 433,705
Heating water in baths, apparatus for, J. Reilly ... 433,490
Heel beading machine, Leighton & Bailey ... 433,703
Heel gouging machine, S. H. Howland ... 433,468
Hip strap attachment, W. Rottger ... 433,602
Hoisting and conveying machine, E. Nicholson ... 433,805
Hoisting apparatus, J. B. Sweetland ... 433,752
Hoisting machine grip, L. E. Mansfield ... 433,481
Holder. See Gas holder. Pail cover holder. Sash holder. Shaft holder. Splasher holder.
Hook. See Clothes hook.
Horse boot, L. S. Lee ... 433,478
Horse controlling device, C. Turney ... 433,555
Horse detacher, McConnell & Sherman ... 433,873
Hot air furnace, F. L. Sheppard ... 433,749
Hydraulic apparatus, E. T. Robb ... 433,822
Hydrocarbon burner, F. B. Meyers ... 433,871
Ice cutting machine, Bradley & Gallagher ... 433,718
Incubators, thermostat for, F. Saumenig ... 433,910
Indicator. See Boiler indicator. Cash indicator.
Induction motor, C. J. Van Depoele ... 433,834
Inhaler, J. S. Kinnear ... 433,597
Insulating material, J. Fottrell ... 433,893
Iron. See Curling iron. Smoothing iron. Soldering iron.
Ironing machine, G. N. Downs ... 433,646
Ironing machine, G. C. Roberts ... 433,658
Ironing table, adjustable folding, J. W. Bowen ... 433,712
Jack. See Wagon jack.
Joint. See Bridge rail joint. Electric conductor joint. Pipe joint. Rail joint.
Journal box, B. F. James ... 433,525
Key. See Cotter key. Telegraph key.
Kiln. See Drying kiln.
Knife, J. Johnston ... 433,793
Knitting machines, spring supported needle for, R. W. Scott ... 433,747
Knob, door, J. A. Gustabson ... 433,464
Lamp attachment, safety, J. H. Simpson ... 433,911
Lamp chimney cleaner, J. H. Steen ... 433,552
Lamp, electric arc, S. P. Parmly ... 433,908
Lamp socket, incandescent, T. G. Roebuck ... 433,698
Lamps, air heating attachment for, J. J. Johnston ... 433,474
Lamps, ceiling block for incandescent electric, A. T. Tregurtha ... 433,915
Lantern, C. T. Ham ... 433,564
Lantern, L. Henkle ... 433,652
Latch, gate, G. Rohrbach ... 433,492
Lathing, staple bridging or furring for wire, Gilbert & Drendul ... 433,894
Leg, artificial, H. C. Wintermute ... 433,668
Letter box, J. Tregurtha ... 433,665
Letter box, electric alarm, W. B. Detwiller ... 433,566
Level, plumb, N. Jensen ... 433,510
Lid lifter, D. H. Fliehr ... 433,726
Lift lines, pneumatic apparatus for throwing, J. D'Arcy-Irvine ... 433,674
Lifter. See Egg lifter. Lid lifter.
Lightning rod tower, I. M. Ferrell ... 433,459
Limb, artificial, H. S. Swank ... 433,497
Lock. See Alarm lock.
Locomotive spark arrester, F. J. Drake ... 433,647
Log carrier, T. N. Jordan ... 433,627
Marking patterns for dress waists, apparatus for, E. A. Berry ... 433,711
Masquerade suit, F. O. Horstmann ... 433,732
Mattress, T. Muller ... 433,905
Measure, recording liquid, W. M. Fowler ... 433,461
Measuring instrument, electrical, E. Weston ... 433,637
Mechanical motor, J. B. Skeyen ... 433,912
Mechanical movement, H. H. Huntley ... 433,568
Metallic wheel, G. Hannes ... 433,621
Mill. See Ore mill.
Milling cutter, U. & H. E. Eberhardt ... 433,458
Mining machine, N. S. Amstutz ... 433,881
Mining machine, F. Bain ... 433,610, 433,612
Mirror, P. Wiederer ... 433,707
Mirror, folding, P. Widerer ... 433,708
Miter cutting machine, W. R. Fox ... 433,781
Mould. See Ring mould.
Mould for tubular articles, S. J. Adams ... 433,586, 433,590
Moulds, bottom board for sand, S. J. Adams ... 433,587
Motor. See Current motor. Electro-magnetic motor. Induction motor. Mechanical motor. Spring motor.
Motor engine worked by oil vapor, N. A. Otto, 433,806, 433,807
Multiple switch board system, E. P. Warner ... 433,636
Nail. See Box corner nail.
Non-conducting covering, H. W. Johns ... 433,471 to 433,473
Nut, axle, J. T. Harker ... 433,730
Nut chamfering machine, G. H. Webb ... 433,666
Oil burner, E. M. Arnold ... 433,639
Oil can, N. H. Barnes ... 433,613
Oil cup, C. L. Burbeck ... 433,849
Ore concentrating and amalgamating apparatus, O. Campbell ... 433,850
Ore mill, Carl & Paterson ... 433,670
Ore sampler, H. L. Bridgman ... 433,714
Oven, portable, G. W. Walker ... 433,501
Pad. See Envelope moistening pad.
Pail cover holder, dinner, J. Dorsch ... 433,452
Paper cutting machines, stabbing attachment for, A. C. Stouder ... 433,496
Paper, medicated, W. Schultz ... 433,827
Pavement, street, G. W. Parker ... 433,540
Pen cleaner and support, J. J. C. Smith ... 433,878
Pencil sharpener, W. H. Jones ... 433,684
Pencil sharpener, slate, E. F. Montgomery ... 433,683

Perfume, solidified, G. H. Dubelle 433,455
Photographic camera, G. D. Thompson..... 433,553
Photographic films, roller holder for, G. Eastman 433,775
Photographic films, roller holder for, Eastman & Yawman..... 433,774
Piano protector, J. C. Schleicher 433,826
Pianos, music desk for, D. L. Rice..... 433,655
Picture frame, J. H. Howard, Jr.... 433,864
Pile covering, A. Ames... 433,609
Pipe. See Water conductor pipe.
Pipe ball, S. J. Adams..... 433,585
Pipe joint, C. Shields..... 433,750
Pipe welding ball, S. J. Adams..... 433,589
Pipes, combined union and elbow for, I. B. Potts. 433,489
Plant protector, A. E. Knapp..... 433,898
Planter, check row corn, R. L. Woodling..... 433,757
Plaster, artificial, H. Leichsenring..... 433,899
Plaster, composition of matter for, D. Haigh..... 433,861
Plastering compound, manufacturing, S. S. Ruston *et al*..... 433,743
Plugs, tool for tapering, J. F. Brown..... 433,615
Plumb, builder's, W. J. Workman..... 433,842
Poison distributer, C. L. Bellamy..... 433,438
Pot. See Coffee pot.
Power apparatus, P. J. Dalton..... 433,771
Power transmission device, C. Davidson..... 433,772
Power transmitting mechanism, W. B. Cleveland 433,446
Press. See Baling press. Hay press. Printing press. Screw press.
Press for fruits, vegetables, etc., J. A. Morrell.... 433,691
Printing machine, plate, U. Eberhardt *et al*..... 433,457
Printing machines, paper feeding mechanism for, J. Brooks..... 433,716
Printing machines, rotary paper cutter adjusting device for, J. Brooks..... 433,715
Printing press, D. I. Eckerson..... 433,776
Projectil s in pneumatic guns, delaying the movement of, H. Eichbaum..... 433,648
Protector. See Piano protector. Plant protector.
Pump regulator, W. O. Gunckel..... 433,680
Pulleys, speed regulator for, W. S. Sims..... 433,660
Pulleys, table for balancing, N. P. Bowsher..... 433,643
Puzzle, J. W. Brown..... 433,444
Rail and its fastening, girder, W. C. Wood..... 433,923
Rail joint, A. Klein..... 433,571
Railway conduit system, electric, M. Wheless..... 433,918
Railway crossing, J. Swegles..... 433,662
Railway, electric, Shobe & Embley..... 433,544
Railway safety guard, H. Ewing..... 433,892
Railway signal, S. H. Harrington..... 433,567
Railway spike, Petersen & Closser..... 433,816
Railway switching device, street, R. T. Smith, 433,547, 433,548
Railway tie, Field & Driscoll..... 433,651
Railway tie, T. W. Gilmer 433,524
Railway tie and means for securing rails to the same, J. M. Fellows..... 433,778
Railway time signal, S. H. Harrington.....433,565, 433,566
Railway time signal, O'Brien & Harrington..... 433,906
Railway track, S. J. Morse..... 433,803
Railway track cleaner, E. E. Andrews..... 433,433
Railway trains, electric circuit coupling for, Widdefield & Bowman..... 433,706
Railways, alarm for use on cable, C. M. E. Wendnagel..... 433,667
Railways, chair sleeper for, W. G. Oiperts..... 433,875
Railways, pneumatic signal and gate for, A. J. Griffin..... 433,860
Recorder. See Time recorder.
Reel. See Bolting reel.
Refrigerating attachment for beer barrels, A. B. Kokernot..... 433,867
Refrigerator, C. W. Trotter..... 433,606
Refrigerator, Wiese & Braack..... 433,709
Refrigerator, car, B. F. Adams..... 433,759
Regenerative furnace, S. R. Smythe.....433,603, 433,604
Regulator. See Pump regulator.
Ring. See Curtain pole ring.
Ring mould, J. J. Sullivan..... 433,879
Riveting machine, R. A. Carl..... 433,761
Rod. See Beading machine rod.
Rose engine, automatic, A. C. Bates..... 433,846
Rotary engine, A. Beard..... 433,847
Rotary engine or water wheel, S. B. Goff..... 433,727
Sad iron support, B. C. Gindorff..... 433,679
Safe, floating, J. B. Marshall..... 433,580
Safety alarm for elevator or other belts, J. B. Soule..... 433,549
Sash balance, A. Johnson..... 433,596
Sash fastener, B. Marshall 433,600
Sash holder, A. T. Church..... 433,672
Saw gauge, A. Harman..... 433,465
Sawmill carriage, offsetting, Hinkley & Schofield. 433,681
Saw sharpening machine, J. & H. Knecht..... 433,866
Saw teeth, tool for manipulating insertible, R. P. Smith..... 433,918
Saws, device for brazing, E. B. Rich..... 433,656
Scales, portable frame for stock, Charles & Garrison..... 433,516
Scraper, road, Morel & Lomont..... 433,482
Screw press, R. Cathelineau... 433,763
Seed linter, cotton, E. J. O'Brien..... 433,874
Sewing looped fabrics, machine for, G. Cooper.... 433,766
Sewing looped fabrics, machine for, A. L. Traver. 433,880
Sewing machine, L. Marcy..... 433,900
Sewing machine tension mechanism, W. J. Stewart..... 433,661
Sewing machines, tube support for box, L. L. Miller..... 433,690
Shaft hanger, Fisher & Kinney..... 433,779
Shaft holder, vehicle, Davis & Byrd..... 433,773
Sheaf carrier, C. F. Hiebert..... 433,924
Shelving, adjustable, J. W. Hine..... 433,622
Ship's boat, A. T. Dewar..... 433,854
Shoe upper turning machine, F. D. Walden.. 433,916
Show case, Sherlock & Freeman..... 433,828
Shutter fastener, L. Markey 433,688
Shutter opening device, J. V. V. Booraem..... 433,884
Shutter or blind, rolling, G. A. Ohl..... 433,694
Shutter worker, A. Pugsley..... 433,819
Sign, illuminated, E. F. Gavin..... 433,671
Signal. See Railway signal. Railway time signal.
Signal apparatus, municipal, Wilson & Noyes..... 433,504
Signal system, light, J. C. Wilson..... 433,505
Signal system, municipal, B. J. Noyes.....433,485 433,486
Signature gathering machine, A. I. Jacobs..... 433,569
Sink, kitchen, R. L. Fairchild..... 433,650
Skate, H. Heinze..... 433,467
Slate, T. K. Ewing..... 433,725
Slate and satchel, combined, I. Murdock..... 433,586
Sled, bob, A. Newstrom..... 433,743
Sled propeller, J. Stanford..... 433,829
Sleigh runner for chairs, W. Muller..... 433,585
Smoothing iron, Silberstein & Amos..... 433,545
Soldering iron, electric, C. E. Carpenter..... 433 671
Soldering or brazing torch, F. W. Quitman..... 433,631
Sole and heel trimming machine, J. M. Gimson *et al*..... 433,782
Speed regulating device, M. Maginn..... 433,529
Spinning spindle support, W. Hinchliffe..... 433,897
Splasher holder, H. M. Parks..... 433,907
Sponge, slate, E. C. Hudson..... 433,787
Spool or bobbin, G. O. Boynton..... 433,895
Spring motor, A. Wirth..... 433,668
Sprinkler. See Automatic sprinkler.
Stamps, device for carrying and affixing, B. F. Lantz..... 433,734
Stand. See Tablet or calendar stand.
Steam generator, Bossler & Stauffer..... 433,442
Stencil and stencil plate, G. H. Cunningham..... 433,769
Stone, apparatus for hoisting and manipulating blocks of, N. E. Austin..... 433,669
Store service apparatus, C. A. McKiearnan..... 433,741
Store service car brake, J. J. Busenbenz..... 433,886
Stove oven, cooking, R. MacKellar..... 433,480
Strainer, milk, C. M. Schermerhorn..... 433,659
Street sweeper, J. Newlove..... 433,538
Stuffing box, E. Rund 433,824
Sulphur, apparatus for washing the fumes of, Montgomery & Warnke..... 433,534
Supporter. See Garment supporter.
Surveying and grading ditches, instrument for, E. Reichenbach..... 433,697
Suspenders, l. Brucks..... 433,717
Swing, A. Greaves..... 433,733
Switch, S. Bergmann..... 433,883
Table. See Ironing table. Zither table.
Tablet or calendar stand, F. M. Turck..... 433,635
Tank. See Flush tank.
Target traps, release for, L. L. True..... 433,554
Telegraph key, J. B. Van Deusen..... 433,835
Telephone exchanges, registering system for, J. C. Clark..... 433,445
Textile machinery, covering for rollers used in, J. Shepherd 433,493
Thermo-electric element, E. N. Dickerson. 433,451
Thill coupling, F. A. Wegner..... 433,502
Thrashing machine, R. L. Colby... 433,764
Tie. See Railway tie.
Time recorder, workman's, R. Burk..... 433,512
Tire, wagon, C. F. Skellenger..... 433,494
Tobacco cutter, T. Cote..... 433,768
Tobacco, machine for dressing and sweetening, W. H. Dunn..... 433,456
Toothpick machine, W. F. Hutchinson..... 433,788
Toy savings box, J. F. Lockwood..... 433,736
Track sanding apparatus, H. L. Leach, Sr..... 433,686
Traction engine, G. H. Pond..... 433,488
Trap. See Bug trap.
Traveling block, A. Rewrick..... 433,601
Tubing, machine for making, W. Probert..... 433,580
Tumbling box, E. H. Taylor.. 433,663
Twine from straw, flax, hemp, etc., machine for making, G. H. Ellis..... 433,856
Twine from straw, manufacturing, G. H. Ellis..... 433,855
Typewriter scale, Iddings & Megeath..... 433,789
Typewriting machine, S. Collins..... 433,765
Typewriting machine, W. P. Quentell..... 433,820
Umbrella frame, Jeffery & Simpson. 433,625
Umbrella or parasol, F. James..... 433,733
Valve, W. T. Harris..... 433,731
Valve, automatic relief, F. Schreidt..... 433,543
Valve device, J. Kelly..... 433,628
Valve, float, T. W. Beal..... 433,435
Valve for automatic air brakes, release, P. Grabler..... 433,895
Valve for automatic brake apparatus, triple, E. J. Lewis..... 433,598
Valve, slide, G. W. De Groff..... 433,853
Valve, steam boiler, W. F. Cunningham..... 433,618
Vapor generator and burner, A. H. Calkins..... 433,515
Vaporizer and burner, combined oil and water, F. B. Meyers..... 433,870
Vat. See Dye vat.
Vehicle brake, C. A. Shank..... 433,748
Vehicle, two-wheeled, J. G. Trump..... 433,833
Vehicles, spring gear for, T. J. Storey..... 433,830
Velocipede, W. P. Akers..... 433,508
Velocipede, A. F. Chace..... 433,720
Velocipede, A. E. Claussen..... 433,852
Velocipede, J. N. Clouse..... 433,889
Velocipede, L. B. Gaylor..... 433,562
Velocipede, P. Schaefer..... 433,542
Veneer cutting machine, H. M. Brown..... 433,511
Ventilator. See Window ventilator.
Wagon brake, R. P. Taylor..... 433,753
Wagon, jack, S. C. Hall..... 433,962
Wall plaster, etc., method of and device for ornamenting, J. H. Harding..... 433,785
Wash boiler, Thissell & Bradstreet..... 433,498
Watch bow fastener, F. Mink..... 433,532
Watch case, D. O'Hara..... 433,638
Watch, stem winding and setting, T. F. Sheridan (r)..... 11,100
Water conductor pipe, T. C. Belding..... 433,882
Water cooler, Meyer & Shepherd..... 433,759
Water, purifying, P. Degener... 433,890
Weaner, calf, S. Stearly..... 433,751
Weather strip, Field & Byers..... 433,460
Welding seams of pipes, M. Blakey..... 433,591
Wheel. See Fifth wheel. Metallic wheel.
Wheel, T. J. Thorp..... 433,704
Windmill, S. W. Martin..... 433,531
Window ventilator, J. De Long..... 433,450
Wire netting machine, B. Scarles..... 433,633
Wire or cable tightener, W. Mason..... 433,799
Wool washing machine, F. G. Sargent.....433,581, 433,582
Wool washing machine, F. G. & A. C. Sargent..... 433,583
Wrench, A. T. & A. W. Brann..... 433,558
Wrench, G. W. Hooks..... 433,786
Wrench, F. W. Kasch..... 433,794
Yoke center, neck, S. A. Thomas..... 433,831
Zither table, H. Meyer..... 433,801

DESIGNS.

Book rack, J. Danner..... 20,074
Braid, V. G. Schuck..... 20,081
Cigar lighter case, T. Rectanus..... 20,080
Comb, toilet, F. V. Jones..... 20,071
Curtain, R. Hartley.. 20,070
Fabric, J. Branson..... 20,073
Glass vessel, J. Proeger..... 20,079
Handle for spoons, etc., A. F. Jackson.....20,077, 20,078
Ice cream, receptacle for, W. F. Hunt..... 20,075
Stove, cooking, W. H. Wilkinson..... 20,072
Toy money box, Z. T. Hall..... 20,076

TRADE MARKS.

Augers, C. Whitehouse & Sons 18,276
Boots and shoes, Bemis & Fletcher..... 18,253
Brandy, E. R. Martin & Co.. .....18,258, 18,259
Building materials, certain named, Houston & Harris..... 18,266
Cartridges, shotgun, Standrard Cartridge Company 18,272
Chemical preparation for use in copying documents, Rogers Copying Company..... 18,270
Cigars, J. Hatchwell 18,265
Cigars, F. R. Rice & Co..... 18,279
Cigars, R. Reimers..... 18,254
Cotton fabrics, including cotton printed, dyed, and woven in colors, colored, J. W. Woods..... 18,275
Dress shield , E. C. Blum..... 18,262
Emollient, W. Casler..... 18,261
Fertilizers, ammoniated superphosphate for, Miller, Lippincott & Co..... 18,268
Glue, solid, G. Valette..... 18,280
Lace curtains, Wilkes-Barre Lace Manufacturing Company..... 18,274
Mineral water, natural, Geneva Magnetic Water Company 18,277
Ointment, W. B. Eddy & Co..... 18,262
Peroxide of hydrogen, Drevet Manufacturing Company..... 18,273
Ribbons, Pioneer Silk Company..... 18,269
Seeds, flower and vegetable, W. A. Burp & Co... 18,260
Soap and soap powders for laundry and toilet purposes, T. Ross..... 18,271
Stoves, ranges, and fuel gas burners, Baldwin & Graham 18,256, 18,257
Tobacco and cigars, smoking, Kappler & Becker... 18,278
Tobacco, snuff, cigars, and cigarettes, Gravely & Miller..... 18,264
Watch cases, Metropolitan Watch Company..... 18,267
Whisky, Fishel & Levy..... 18,263
Whisky, rye and Bourbon, J. Beck & Co..... 18,255

A Printed copy of the specification and drawing of any patent in the foregoing list will be furnished from this office for 25 cents. In ordering please state the name and number of the patent desired, and remit to Munn & Co., 361 Broadway, New York.

Canadian Patents may now be obtained by the inventors for any of the inventions named in the foregoing list, provided they are simple, at a cost of $40 each. If complicated, the cost will be a little more. For full instructions address Munn & Co., 361 Broadway, New York. Other foreign patents may also be obtained.

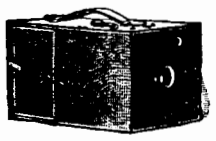
Advertisements.

Inside Page, each insertion - - - 75 cents a line.
Back Page, each insertion - - - $1.00 a line.

The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may head advertisements at the same rate per agate line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

★ ONE STAR HACK SAW WILL DO AS MUCH WORK AS FIVE OF ANY OTHER KIND.—N. B. ★

The Montauk CAMERA



Is compact and neat, covered with seal leather, supplied with double rapid rectilinear lens. Takes snap shots, interiors, exteriors, houses, groups, etc. Size of picture, 4 x 5 inches.

For full description, send to

G. GENNERT,
56 East 10th Street, New York.

Victor Bicycles!

For pleasure, business, recreation, and for anything you could use a bicycle for.

VICTORS ARE BEST!

Send for catalogue.

Overman Wheel Co., Makers,
Chicopee Falls, Mass.

ELECTRICITY, LIGHT AND HEAT.—A lecture by Prof. C. F. Brackett, delivered before the New York Electric Club—Facts about electrical conductors. Production of electric light in the cheapest possible way. The relations between the three vibratory forces and the significance of Herz's recent experiments. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 683 and 684. Price 10 cents each. To be had at this office and from all newsdealers.

The CHANDLER WATER MOTOR

Works well on **Low** and **High** Pressures.

Single, Duplex, Triple, and Quadruple Automatic **PISTON MOTORS,** *adapted to all classes of work.*

Send for Circulars.

WM. H. LOCK, Buffalo, N. Y.

ICE-HOUSE AND COLD ROOM.—BY R. G. Hatfield. With directions for construction. Four engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 59. Price 10 cents. To be had at this office and of all newsdealers.

NEW KODAKS

"You press the button, we do the rest."

Seven New Styles and Sizes

ALL LOADED WITH

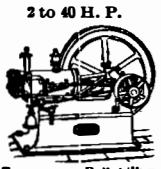
Transparent Films.

For sale by all Photo. Stock Dealers.

THE EASTMAN COMPANY,

Send for Catalogue. *ROCHESTER, N. Y.*

2 to 40 H. P.



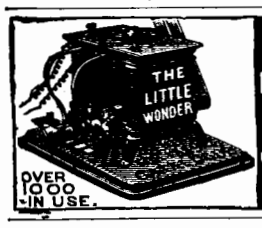
The MOTOR of 19th CENTURY.

Can be used *Any Place*, to do *Any Work*, and by *Any One*. No Boiler! No Fire! No Steam! No Ashes! No Gauges! No Engineer! A perfectly safe Motor for all places and purposes. *Cost of operation about one cent an hour to each indicated horse power.* For circulars, etc., address

Economy, Reliability, Simplicity, Safety.

Charter Gas Engine Co.
P. O. Box 148. **Sterling, Ill.**

THE COPYING PAD.—HOW TO MAKE and how to use; with an engraving. Practical directions how to prepare the gelatine pad, and also the aniline ink by which the copies are made; how to apply the written letter to the pad; how to take off copies of the letter. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 438. Price 10 cents. For sale at this office and by all newsdealers in all parts of the country.



NICKEL AND ELECTRO-PLATING APPARATUS AND MATERIAL
HANSON, VAN WINKLE & CO.
NEWARK, N. J.
92 LIBERTY ST. N. Y.

PATENTS!

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 *forty-one 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 procure 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.

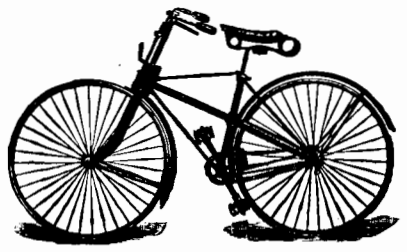
MUNN & CO., Solicitors of Patents,
361 Broadway, New York.

BRANCH OFFICES.—No. 622 and 624 F Street, Patents Building, near 7th Street, Washington, D. C.

TYPEWRITERS.

ALL MAKES. NEW & SECOND HAND BOUGHT, SOLD AND RENTED. EXCHANGED ANYWHERE IN THE U.S. SEE OUR FULL PAGE BEFORE BUYING. NEW CATALOGUE IN APPLICATION.
NATIONAL TYPEWRITER EXCHANGE
200 LA SALLE ST. CHICAGO.

ELECTRO MOTOR, SIMPLE, HOW TO make. By G. M. Hopkins.—Description of a small electro motor devised and constructed with a view to assisting amateurs to make a motor which might be driven with advantage by a current derived from a battery, and which would have sufficient power to operate a foot lathe or any machine requiring not over one man power. With 11 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641. Price 10 cents. To be had at this office and from all newsdealers.



The HARTFORD SAFETY

THE BEST $100 BICYCLE MADE.

Can be adjusted to fit any person, from a boy of 12 to a full-grown man.

Catalogue Free.

HARTFORD CYCLE CO., Hartford, Conn.

$15 LOW-PRICED TYPEWRITER

THE ONLY PRACTICAL

Catalogue free. Address Typewriter Department, **POPE MFG. CO.,** Boston, New York, Chicago.

LEFFEL TURBINE WATER WHEELS

Machine-Molded Gearing.

DRIVING PLANT FOR CABLE RAILWAYS

Shafting, Pulleys, and Hangers.

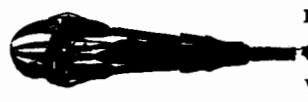
Mixers and General Outfit for Fertilizer Works

N. B.—Special attention given to Heavy Gearing.

Facilities for the heaviest class of work.

Robt. Poole & Son Co., Baltimore, Md.

NATIONAL STEEL TUBE CLEANER



RANKS THE HIGHEST

Endorsed by the best Engineers.

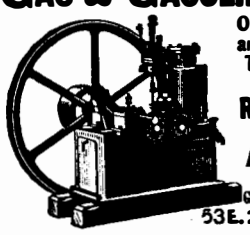
CHALMERS-SPENCE CO.
Office, 59 Liberty Street,
Works, 419-425 E. Eighth St., New York

PULLEYS HANGERS, FRICTION CLUTCHES.

PROGRESS MACHINE WORKS,
A. & F. BROWN,
44 Park Place, N. Y.

SHAPING SHEET METAL.—DESCRIPTION of a method of shaping zinc, copper, and other ductile metals by fluid pressure. With 11 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 695. Price 10 cents. To be had at this office and from all newsdealers.

VAN DUZEN GAS & GASOLINE ENGINE



OPERATED with COAL and OTHER MANUFACTURED GASES AND GASOLINE.

RELIABLE AND ECONOMICAL.

Fully Warranted

VAN DUZEN Gas & Gasoline Engine Co.
53 E. 2d St., Cincinnati, O.

THE AMERICAN BELL TELEPHONE CO.

95 MILK ST., BOSTON, MASS.

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

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

Barrel, Keg, Hogshead AND STAVE MACHINERY.

Over 50 varieties manufactured by

Truss Hoop Driving. **E. & B. Holmes, BUFFALO, N. Y.**

ALSO A FULL LINE OF WOOD WORKING MACHINERY.

METALLIC RAILWAY TIES.—A REview of the various metallic ties that have been devised as a substitute for wooden ones upon European Railways. With 6 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 748. Price 10 cents. To be had at this office and from all newsdealers.

THE GREAT IMPROVEMENT IN

ROOFING

We are now ready to supply the product of entirely new machinery and processes just completed, by aid of which we not only have greatly improved the strength and durability of our well-known **ASBESTOS ROOFING,** but have also secured a degree of uniformity never before attained in any similar fabric. We offer this as the PERFECTED form of the portable Roofing which we have manufactured with continued improvements during the past thirty years, and as the most desirable Roofing for general purposes.

The important features of our recent improvements, for which patents have been allowed and others applied for in this Country and in Europe, are described in our new circular, which, with samples, will be sent free by mail.

Our Asbestos Roofing is now in use upon Factories, Foundries, Cotton Gins, Chemical Works, Railroad Bridges, Cars, Steamboat Decks, etc., in all parts of the world.

It is supplied ready for use, in rolls containing 200 square feet, and weighs, with Asbestos Roof Coating, ready for shipment, about 85 pounds to 100 square feet.

It is adapted for steep or flat roofs in all climates, and can be readily applied by unskilled workmen.

☞ There are inferior imitations of our Asbestos Roofing. Purchasers are cautioned.

Exclusive sale of our IMPROVED ASBESTOS ROOFING will be given to reliable dealers in important towns where we have not already made arrangements.

H. W. JOHNS MANUFACTURING CO.

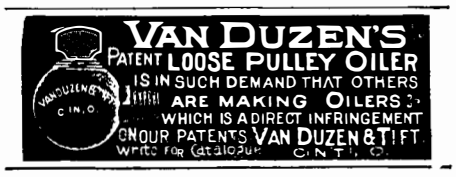
SOLE MANUFACTURERS OF

H. W. Johns' Fire and Water Proof Asbestos Sheathing, Building Felt, etc. Asbestos Boiler Coverings, Steam Packings, Fire-Proof Paints, etc.

Samples and Descriptive Price List Free by Mail.

87 Maiden Lane, New York.

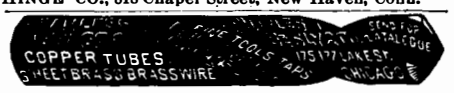
CHICAGO. PHILADELPHIA. BOSTON.



SAWS Wanted 50,000 Sawyers and Lumbermen to send us their full address for a copy of Emerson's Book of **SAWS,** new 1890 edition. We are first to introduce NATURAL GAS for heating and tempering **Saws** with wonderful effect upon improving their quality and toughness, enabling us to reduce prices. Address **EMERSON, SMITH & CO. (Ltd.), Beaver Falls, Pa.** **SAWS**

INVENTORS and others desiring new articles manufactured and introduced, address P. O. Box 86, Cleveland, O.

INVISIBLE HINGES suitable for all kinds of fine work. Send for samples and price list. INVISIBLE HINGE CO., 818 Chapel Street, New Haven, Conn.



THE REFINEMENTS OF MODERN Measurements and Manipulations.—By J. A. Brashear. A very interesting account of the remarkable progress that has been made in modern times in the way of minute and accurate measurements in the various branches of science. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 744. Price 10 cents. To be had at this office and from all newsdealers.

PRESS THE BUTTON, IT LIGHTS!

Burns a bright flame from a minute to 2 hours

The **first practical** self-lighting Pocket Lamp and Cigar Lighter ever introduced. A match safe in appearance, but smaller in size. A marvel of ingenuity. Useful and convenient. Sample, complete with all accessories, expressed, prepaid to any address, on receipt of **$1.00.** Magic Introduction Co., 227 Bway. N. Y. Energetic agents make immense success

OBESITY.—BY WALTER MENDELson, M.D. A very interesting paper, exhaustively treating of the causes of obesity and the proper method of combating it. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 744. Price 10 cents. To be had at this office and from all newsdealers.

Scientific Book Catalogue

RECENTLY PUBLISHED.

Our new catalogue containing over 100 pages, including works on more than fifty different subjects. Will be mailed free to any address on application.

MUNN & CO., Publishers Scientific American,
361 Broadway, New York.

CUTLER DESK.

BEST IN THE WORLD.
A. CUTLER & SON
BUFFALO, N.Y. U.S.A.

SYRACUSE MALLEABLE IRON WORKS

A. B. BURNS, PROP'R

THE PHONOGRAPH.—A DETAILED description of the new and improved form of the phonograph just brought out by Edison. With 8 engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 632. Price 10 cents. To be had at this office and from all newsdealers.

THE GRAVES ELEVATORS.

PASSENGER & FREIGHT
L. S. GRAVES & SON, ROCHESTER, N. Y.

THOMAS ALVA EDISON.—A BIOgraphical sketch of the great inventor, with full-page portrait from a recent photograph. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 746. Price 10 cents To be had at this office and from all newsdealers.

COMPTOMETER

(TRADE MARK.)

ALL ARITHMETICAL PROBLEMS

Solved rapidly and accurately by using the COMPTOMETER. Saves **40** per cent. of time. Entire relief from mental strain. Adapted to all commercial and scientific computations. Send for circular.

FELT & TARRANT MFG. CO., 52-56 Illinois St., Chicago.

JENKINS BROS. VALVES!

JENKINS BROS., 71 John St., N. Y.; 105 Milk St., Boston; 21 North 5th St., Phila.; 54 Dearborn St., Chicago.

MALLEABLE

AND FINE GRAY IRON & CAST STEEL CASTINGS FROM SPECIAL PATTERNS
THOMAS DEVLIN & CO.
LEHIGH AVE. & AMERICAN ST. PHILA.

THE Scientific American

ESTABLISHED 1846.

The Most Popular Scientific Paper in the World.

Only $3.00 a Year, including Postage. Weekly. 52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc. Complete List of Patents each week.

Terms of Subscription.—One copy of the SCIENTIFIC AMERICAN will be sent for *one year*—52 numbers—postage prepaid, to any subscriber in the United States, Canada or Mexico, on receipt of **three dollars** by the publishers; six months, $1.50; three months, $1.00.

Clubs.—Special rates for several names, and to Post Masters. Write for particulars.

The safest way to remit is by Postal Order, Draft, or Express Money Order. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO.,
361 Broadway, New York.

THE Scientific American Supplement.

This is a separate and distinct publication from THE SCIENTIFIC AMERICAN, but is uniform therewith in size, every number containing sixteen large pages full of engravings, many of which are taken from foreign papers, and accompanied with translated descriptions. THE SCIENTIFIC AMERICAN SUPPLEMENT is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geology, Mineralogy, Natural History, Geography, Archæology, Astronomy, Chemistry, Electricity, Light, Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Technology, Manufacturing Industries, Sanitary Engineering, Agriculture, Horticulture, Domestic Economy, Biography, Medicine, etc. A vast amount of fresh and valuable information obtainable in no other publication.

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

Price for the SUPPLEMENT for the United States and Canada, $5.00 a year, or one copy of the SCIENTIFIC AMERICAN and one copy of the SUPPLEMENT, both mailed for one year for $7.00. Single copies 10 cents. Address and remit by postal order, express money order, or check,

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

Building Edition.

THE SCIENTIFIC AMERICAN ARCHITECTS' AND BUILDERS' EDITION is issued monthly. $2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming a large and splendid **Magazine of Architecture,** richly adorned with *elegant plates in colors*, and with other fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

A special feature is the presentation in each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with full Plans, Specifications, Sheets of Details, Estimates, etc.

The elegance and cheapness of this magnificent work have won for it the **Largest Circulation** of any Architectural publication in the world. Sold by all newsdealers. $2.50 a year. Remit to

MUNN & CO., Publishers,
361 Broadway, New York.

PRINTING INKS.

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