

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

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.

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.

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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, DECEMBER 6, 1890.

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BIG GUNS FOR COAST DEFENSE.

The chief of the bureau of ordnance, Gen. S. V. Benet, in his recently submitted annual report, notes that a twelve inch breech-loading steel rifle is now nearing completion at the Watervliet Arsenal, and will probably be ready for trial in February. This is the largest size of modern gun we have yet attempted to manufacture, but the Watervliet plant is being put in shape by the government to turn out, also, sixteen inch steel guns. These guns will be fifty feet long and weigh 125 tons each, requiring a full firing charge of 1,000 pounds of powder of the description at present used, and throwing a projectile over a ton in weight. It is expected that these guns will have a maximum range of about fifteen miles, and a muzzle power equal to the penetration of three feet of iron. The plans of the fortifications board call for forty-four of these guns for the defense of ports of the first importance, with the idea of manning our future coast defenses with guns of heavier caliber than are now made for the largest iron-clads, and which the highest authorities declare it is impracticable for them to carry and work. The proposed artificial island forts at the entrance to New York harbor, shown in our first page illustration, would afford admirable positions in which to place a few such guns, which, according to the plans of the ordnance department, are to be "mounted in pairs in turrets occupying low and exposed sites, and commanding the principal water approaches" to the port, where they will have "an offensive power commensurate with the importance of the position they will occupy." It is altogether probable, too, that before these guns are completed, or the forts in which they are to be placed will be ready for them, we shall have found and adopted a practicable smokeless powder, affording much greater penetrative force than the explosive agent at present employed, and giving the defense an immense superiority to any means of attack at present known.

PROGRESS OF ALUMINUM.

Since 1885 the efforts made to cheapen the cost of aluminum have been especially earnest among the metallurgists and chemists, both in this country and abroad. In this work Mr. H. Y. Castner, of New York, and Messrs. Cowles, of the Cowles Electric Smelting and Aluminum Company, of Cleveland, O., and Lockport, N. Y., have been especially active, a 500 horse power dynamo having been erected at the latter place for the aluminum manufacture in 1886. And yet so difficult has been its production that five years ago its price was quoted in troy ounces at from 75 cents to \$1.25 per ounce, although within the past year or two it has been sold at \$3 to \$4 50 per pound. Now, however, Mr. Eugene H. Cowles claims to have discovered a new process for the cheap extraction of this metal from common clay. According to the New York Times he says:

"We now expect to offer a pure metal made by a new process that is radically different from anything yet known to metallurgists—a process that is ridiculously simple in operation and almost theoretically perfect. By reason of two chemical discoveries it is found that the pure metal can be extracted direct from the clay. This can be done without the use of electrical heat. When operated on as large a scale as that on which iron is produced, aluminum will be produced at a cost permitting it to sell at \$200 per ton, a price less than the present price of copper. Alterations will be made immediately in our works at Lockport to make the metal on a large scale. Capitalists in New York are preparing to build immense new works of probably twenty times the capacity of the Lockport works. One of the large plants will undoubtedly be at Niagara Falls, where 10,000 to 12,000 horse power will be required to operate it."

It is to be hoped these expectations will be realized, and if so aluminum is likely soon to occupy a highly important position in the arts, some of which it probably will revolutionize.

The metal has a specific gravity of 2.58, a cubic foot of silver weighing four times as much, and a cubic foot of iron or steel three times as much as a cubic foot of aluminum. It is of sensibly the same color as silver, oxidizes but slightly in air, water has no action on it, nor is it attacked by nitric acid or dilute sulphuric acid or sulphureted hydrogen. From its extreme lightness, strength, and resistance to tarnish, it is used to a considerable extent in the manufacture of dental, surgical, optical, electrical and scientific instruments of various kinds. It is very malleable and ductile, and may be readily beaten and rolled into thin sheets or drawn into fine wire. It melts at a temperature higher than that of zinc and lower than that of silver, has a tensile strength of 25,000 to 30,000 pounds per square inch. Among its uses heretofore have been as an alloy of copper, making aluminum bronze, also in small percentages as an alloy of iron and steel, with remarkable advantages.

THE newest street-cleaning wagon works on the principle of a patent parlor broom—dustless, and gathers up the dirt as it goes.

PIGEONS AS DISPATCH CARRIERS.

The wonderful instinct which leads homing pigeons to return to their cotes, though liberated many miles away, has been taken advantage of by sportsmen and many persons, who enter with great zest into the work of breeding and training these birds and entering them for races. There is a federation of homing pigeon fanciers, consisting of upward of three hundred members. The secretary's office is at Philadelphia, and upon his books is entered a description of each bird belonging to a member of the federation participating in a contest. A piece of metal is attached to the leg of the bird taking part in a race, and upon this is inscribed a mark or number which serves to identify it, should it stray from its course or be driven by wind or storm. The organization of pigeon fanciers has also arranged a series of stations at various distances extending toward the south from New York, and birds when trained are sent by express to these stations, and are there released by a member or a representative of the federation. During the racing season many birds are constantly being started, and occasionally items like the following appear in the daily prints:

"On the last cruise of the New York pilot boat Edmund Blunt, when it was seventy miles southeast of Sandy Hook lightship, a carrier pigeon settled on the foremast rigging. The boat keeper climbed up and brought the almost exhausted bird to the deck, where it was fed and afterward revived. It had a metal band on its leg upon which was engraved 27-29 H."

"A carrier pigeon bearing a message written on some vessel by A. Ross to Mrs. A. Ross, Annapolis, Md., under date June 26, flew on board the schooner Fleur de Lis, Captain Duffy, at 4 P. M., July 11, when the vessel was twenty-seven miles off No Man's Land. The bird appeared to be nearly dead, but recovered."

Such excellent results were attained by the pigeon fanciers, so unerringly did the birds come back to their lofts—only a small proportion of failures occurring—it was not to be wondered at that their marvelous abilities as carriers of messages should have been turned to practical account. During the siege of Paris, 1870-71, pigeons were frequently made use of, and since that date the French government has put forth continuous efforts to develop their use in both the military and naval service. A series of experiments were initiated at Toulon, looking to the introduction of the birds into the naval service. They were conducted by Vice Admiral Bergasse du Petit Thouars and the Societe Forteresse. The first effort was directed toward domesticating the birds on board the St. Louis, the artillery practice ship. Considerable difficulty was experienced from the birds becoming frightened by the guns on board ship, but by rearing them near the guns they soon became accustomed to the sound, and when liberated from the various vessels during target exercise, would form groups above the smoke, sometimes mingling together, but never losing their own ship. France is the only country which has made careful experiments and adopted a system connecting the fleet and the shore. Germany, Austria, Russia, Italy, Spain, and Portugal each has a military pigeon service. Germany has the most complete military system in the world. Lieutenant Richard Wainwright, U. S. N., in speaking of it, says: "The whole of the northern coast is studded with pigeon stations, which are under the control of the minister of marine. Experiments have been made by the German naval authorities on homing pigeons on board men-of-war, so that messages may be sent to the ship from the shore. It is said that the birds experience no difficulty in recognizing their own ship among a number of others."

From 1855 until the laying of the Atlantic cable, homing pigeons were employed to take the news from transatlantic steamers to the Sandy Hook telegraph stations to be transmitted to New York. A bird liberated from the steamer Waesland at one o'clock in the afternoon, when three hundred and fifteen miles from Sandy Hook, was at its loft in the evening. Another let go from the Circassia at nine in the morning, when two hundred and fifty miles out, brought a message in the afternoon.

Canada has quite recently established an organized system of messenger pigeon stations throughout the dominion, extending from Halifax to Windsor and connecting her principal seaports with the interior. Gen. D. R. Cameron, director of the Messenger Pigeon Association, in speaking of the utility of the service, says: "I am of opinion that a most important branch of the pigeon service will be connected with the coast service. The evidence that these birds can be relied upon to cross 400 miles of the ocean is apparently thoroughly reliable." A report from Halifax states that it is proposed to put Sable Island in communication with the mainland by means of carrier pigeons. This locality has always been regarded as one of the most dangerous points on the coast, and wrecked mariners have sometimes been stranded on the island for weeks without being able to communicate with those who might rescue them.

Efforts are now being made to introduce a carrier pigeon service into the United States navy. Professor

H. Marion, of the Naval Academy, at Annapolis, has given considerable attention to the subject, and in a communication to the writer, dated October 6, says: "The United States have no organized service yet, but it is to be hoped that it will soon be established, as numerous experiments have proved that homing pigeons can fly several hundred miles at sea—if liberated in the morning of course; that birds can be bred and trained on board ship, that they can be accustomed to the noise of the ships, that they can recognize their own ship among others, that they can be relied upon to carry news from the fleet to the shore and under favorable circumstances from the shore to the fleet and from one vessel to another. A service of carrier pigeons for naval purposes could not be improvised at short notice as the birds would require long and careful training before they would be of any use as bearers of dispatches. In war time serious derangement of plans, loss, and discomfiture may be involved by the absence of previously organized provision for the rapid transmission of news. We, therefore, advocate the speedy establishment of a permanent system of naval messenger pigeon lofts at the principal navy yards and stations along the Atlantic coast."

Some very interesting experiments have already been made with homing pigeons at the United States training station at Newport, R. I. One of the birds, according to the report of Commander T. J. Higginson, U. S. N., flew from the Hen and Chickens lightship to the cote at Newport, a distance of twelve miles, in 16 minutes and 35 seconds. Another bird flew from Washington to Fall River, a distance of 365 miles, in 11 hours and 7 minutes. A number of the birds were taken to New York on the Juniata last year, with the intention of liberating them along the coast, but the weather was unfavorable, and they were not flown. While at Brooklyn one of the pigeons escaped from the Juniata, and it was considered lost, as it had never flown a greater distance than from Point Judith, but in a few days the bird arrived at its home safely and in good condition.

War vessels employed in defending a coast are often without the means of transmitting information of the utmost importance to the mainland. By means of carrier pigeons they could send communications ashore over a distance of several hundred miles, signal the approach of the enemy's fleet, and report all his movements.

It would hardly be supposed that homing pigeons would have been called into requisition to aid operations in Wall Street, though such is the case. A well known stock broker purchased a farm in Somerset County, New Jersey; and finding that the telegraph service in the vicinity did not give satisfaction, especially when an excited stock market necessitated quick communication with New York, the broker decided to establish a messenger pigeon service of his own. The distance from his office in New York to his farm is forty-three miles. A hamper with several birds in it is kept in his office, and when the broker is spending a day or two at his farm, and his manager wishes to communicate the condition of the market, it is very quickly done by means of one of the birds. This gentleman went to an isolated point in Buzzard's Bay, Mass., on a fishing excursion, the only communication with the mainland being by a small steamer which arrived about twelve, noon, and departed at one o'clock. One day after the steamer had left the broker opened his mail and found that the stock market had taken an unexpected turn which necessitated immediate communication with his office. There was no telegraph or other means of communicating with the mainland, but fortunately he had brought with him the hamper containing the pigeons. A message was quickly written and attached to a tail feather of one of the birds, while to insure absolute safety a duplicate was attached to another bird. They were released at 3 o'clock in the afternoon, and arrived at the broker's farm early the next morning, so that the order which they transmitted was acted upon at the opening of the Stock Exchange, and resulted in saving a very considerable sum of money for the owner of the pigeons.

A MOUNTAIN RAILWAY NEAR NEW YORK CITY.

Thirty-nine miles above New York, on the west shore of the Hudson, the Dunderberg Mountain rises eleven hundred feet into the clouds, towering above all the other elevations in its neighborhood, and affording from its summit views of such grandeur and magnificence as are hardly to be surpassed anywhere in the world. On the extreme top of this mountain is to be built a great hotel, to be surrounded by a beautifully laid out park, and access thereto is to be provided for by means of a cable railway, whereby the cars will be drawn up in eleven minutes. The enterprise was conceived by Messrs. T. L. and J. H. Mumford, the controllers of the Mauch Chunk switchback railroad, and is being carried out by the Hudson River Improvement Company, of which Mr. James Morgan is president, at an estimated cost of \$800,000. The trip to the top of the mountain, however, and the view to be obtained therefrom, will be by no means the principal attraction, for the return journey is to be made by a

gravity spiral road, winding in, out, and around the various inequalities of the mountain and adjacent country for a distance of twelve miles, affording a noble panorama of constantly changing views to surprise the passenger at every turn.

Much of the work on this enterprise has already been done, the roadbed being now about ready for the rails, and the machinery and cars in a forward state of construction, so that it is expected the road will be opened to the public early next season. At the main station at the base of the mountain, convenient of access to passengers both by rail and boat, besides the car and engine houses, etc., there will be a large hotel and seven acres of ground to be used as a park for the accommodation of passengers waiting for trains or steamers. From this station runs a double plane about twenty-five hundred feet long, having at its top hauling engines and an electric light and pumping plant. A second double plane runs from this station to the summit. The hoisting machinery and engines, being built especially for this work, will embody all the best features hitherto known in such construction, as well as original plans for the safety of the drawing cables and safety ropes. The lower plane will have a maximum grade of 31 per cent, and the upper one a maximum grade of 28½ per cent. The back or gravity track will have an average grade of 1½ per cent, with a minimum of 1 per cent, and a maximum, on 40 degree curves, of 3 per cent. About one-quarter of the distance down, a dam across a deep gorge forms a beautiful lake or reservoir for the use of the hotels, cottages, and works of the company, and at three different points on the down track will be stations surrounded by grounds laid out for picnic purposes. It is intended to keep the road and grounds open from May until late in October. It seems difficult to make a really conservative estimate of the immense patronage which this most picturesque resort for summer excursionists is likely to attract, it being so easy of access by the great population of New York City and vicinity.

Collapse of a Standpipe at Temple, Texas.

The *Sun* of Temple, Texas, gives a thrilling account of the sudden collapse of the new standpipe pertaining to the water works in that town, which took place at 2½ A. M., in October last, when the inhabitants were wrapped in peaceful slumber. No danger was feared, when all at once, with a shock that shook the town, the 280,000 gallons of water went seething, foaming, and hissing over the doomed portion of the city, and immense sheets of boiler steel, hundreds of pieces of scaffolding, houses, barns, fences, and all the debris of the surrounding neighborhood went floating and crashing in all directions.

Everybody was awakened. The people in the houses near were almost frightened to death. The houses swayed with the rush of waters, and two of the nearest were taken away, one crushed and the other twisted and washed off its blocks.

There were sixteen sections of the pipe, a great hollow cylinder, 20 feet in diameter and of the heaviest boiler steel. Eight sections, or 40 feet, the lower tiers of the pipe, were thrown in a different direction, seven going east and one twisted and torn sheet going north and all lodging from twenty to fifty feet away. They were torn as the power of man might tear tin foil, twisted and crumpled as a seamstress would handle her cloth.

The standpipe was 120 feet high and 20 feet in diameter. It was built recently at a cost of \$10,000, by Thomas & Gorman, of Houston, experienced contractors in this kind of structures. The material was the best sheet steel supplied by Ripley & Bronson, St. Louis, Mo.

The failure of this standpipe brings to mind the collapse of a similar pipe, which occurred at Sheephead Bay, near New York, on October 7, 1886, and which was illustrated in the *SCIENTIFIC AMERICAN* of December 25, 1886.

Nickel-in-the-Slot Gas Meter.

A new penny-in-the-slot contrivance has been adopted by the gas department of the corporation of Birmingham, for the benefit of small consumers, and, incidentally, its own. The price of gas in Birmingham, as everywhere else in England, is, according to our ideas, low, the regular rate being sixty cents per thousand feet. Small householders, however, often like to enjoy a definite amount of such luxuries, without being bound to any regular contract; while the gas company is glad to make sure of its pay from such consumers, by getting it in advance. To meet the wants of both parties, a sort of meter has been constructed, which, on dropping a penny in a slot, will deliver twenty-five cubic feet of gas. This is at the rate of eighty cents a thousand feet instead of sixty; but the company feels justified in charging a rather higher rate to such small customers. If any of the latter wish for a larger supply, they may drop nine penny pieces at once into the slot, and 225 feet will then be delivered before the valve closes. The accumulated pennies are collected once a week by an official of the gas company. The burners

on the house fixtures are regulated to burn five feet per hour, but, of course, they can be turned down, so as to hurr more slowly. No direct charge is made for the measuring apparatus, the extra price of the gas delivered through it covering the expense.

Electricity in Paper.

How to control the electricity in stock, or which develops about a press in working, is a problem that still bothers many pressmen. We have given remedies for this trouble several times, and, as far as we have learned, all of them proved efficient.

For those who are only recent readers of the *Art Printer*, and indeed for older ones as well, let us say that the most thoroughly effective method is the use of a copper wire connected at one end with the zinc-covered fly board, and by a second wire with the feed board, and at the other end with the gas pipe at the ceiling or elsewhere, thus establishing electrical communication with the earth, to which the lower end of the gas pipe conducts.

Here is the *modus operandi*: As we have said, the fly board is covered with zinc. Under one side of this zinc, near the press, is thrust a piece of brass about two inches long, half to three-quarters of an inch wide, and an eighth of an inch thick. A thick piece of brass rule would do nicely. In the outer end of this brass rule a hole is made through which one end of the copper wire is passed and fastened. This wire is carried to the framework of the press, wound about the corner post of the framework, then carried along the entire foundation, winding about a pillar to keep it up. Reaching the corner post of the frame at the farther end, the wire winds about it and is then passed up and fastened to the gas piping at the ceiling.

A second wire connects with the first one at the center of the foundation frame, and runs winding round the central post directly under the lower end of the feed board, near the gripper line. Having reached the feed board it is passed through the hole of another piece of brass similar to the one at fly board. This second piece of brass is attached to the iron framework of the gripper or guide motion.

The point is to establish a conducting line between the paper and press, wherein electricity is either stored or generated, and the earth, along which line the fluid has a chance to escape or be drawn. This done, there is no more worry about electricity around a press.

Some pressmen cover the feed board with zinc—or the lower part of it—as well as the fly board, in order to insure the action of the two metals, zinc and copper, upon the electricity in the paper; but the experience of the majority who use the wires is that if the connection is properly made with the metal of the gripper motion, contact is certain, and the electricity is absolutely drawn off and sent through the gas piping.

The wires being wound about the press, as well as being brought into contact with the paper, catch all the electricity generated by the rapid motion of the machine and send it off in the same way.—*Amer. Art Printer*.

Edison Toy Manufacturing Company.

The annual meeting of the Edison Toy Manufacturing Company was held at Clarence Hale's office in Portland, Me., October 30. Mr. Edison was represented by his secretary, Mr. Tate. This was the treasurer's exhibit September 30:

LIABILITIES.	
Capital stock.....	\$1,000,000.00
Working capital.....	62,871.37
Total	\$1,062,871.37
ASSETS.	
Treasury stock....	\$160,000.00
Licenses and patents.....	846,894.84
Cash.....	2,973.08
Cost of dolls' parts and merchandise.....	35,384.23
Edgar S. Allen, general manager.....	69,025.00
European expense account	5,699.84
Thomas A. Edison.....	1,000.00
Office furniture.....	1,229.15
Total.....	\$1,062,871.37

These officers were elected: Directors, Benjamin F. Stevens, Daniel Weld, John W. Mackintosh, Winfield S. Hutchinson, Thomas A. Edison, George Borgfeldt, Oscar E. Madden; clerk, Clarence Hale; treasurer and secretary, Daniel Weld.—*Electric Review*.

A RATHER handsome compliment has recently been paid to the *SCIENTIFIC AMERICAN* by the well known jewelers Messrs. Benedict Bros., of 171 Broadway, N. Y., who have designed a novel and beautiful match box representing a copy of a newspaper folded in a wrapper. The ends of the paper extend beyond the wrapper and display the familiar heading of the *SCIENTIFIC AMERICAN*. The wrapper has a blue enameled penny postage stamp and bears the New York postmark, while a blank space is left for the name and address of the owner to be enameled in black on its surface. It was found desirable to select some representative non-political journal, and the *SCIENTIFIC AMERICAN* was chosen as most appropriately filling the requirement.

We take pleasure in acknowledging the compliment that has been offered us.