Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 261 BROADWAY, NEW YORK.

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

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included..... $3 20
One copy, six months postage included 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each: additional copies at same proportionate rate. Postage prepaid.
Remit by postal order. Address

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

The Scientific American Supplement

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

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of *seven dollars*. Both papers to one address or different addresses as desired.
The safest way to remit is by draft, postal order, or registered letter.
Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.
The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, SEPTEMBER 9, 1882.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 349,

For the Week ending September 9, 1882.

Price 10 cents. For sale by all newsdealers.

AN ELECTRICAL YARN.

Some of our city newspapers lately manufactured a sensational story about the wonderful pranks of Edison's electricity, as exhibited at the corner of Ann and Nassau streets. The New York *Sun* produced the longest yarn on the subject, and even illustrated the locality of the pretended electrical disturbance by a diagram. The *Sun's* story went on to relate how passing horses, when they touched their feet on a particular spot in the pavement, instantly received an electrical shock which made them cut up all sorts of shines and didoes. Amusing details were given: the strong cart horse would rear and plunge; the peddler's old hack would rush off on a gallop, etc. It was stated that none of the crowd of spectators, nor the policemen, nor the learned reporter himself, were able to account for the remarkable occurrence. So the indefatigable liner hastened away to Mr. Eaton, the Vice President and Manager of the Edison Light Company, and interviewed him, but got little satisfaction. He told the reporter that the electrical wires were two or three feet below the surface of the ground, and that it would be impossible for a current to come up from them into any horse on the surface. But our penman was not to be put off by so plain and sensible a statement; so he rushed around some more, until at last his perseverance was rewarded by obtaining new and startling information from another employe of the Edison Company, who evidently knows more about electricity, or thinks he does, than Manager Eaton or even Mr. Edison himself. The *Sun* gives the following:

"Mr. Edward H. Johnson, of the Edison Company, said yesterday that Mr. Edison and his assistants had spent the night in an investigation of the wires about the neighborhood of the disturbance, and that the cause of the peculiar effect worked upon the horses which passed through Nassau street had been discovered. At the time of the disturbance Mr. Johnson was engaged at the light in Drexel & Morgan's building at Broad and Wall streets, and a wire reaching from one of the chandeliers to a gas pipe caused the wire supplying one of the currents to become grounded. At the same time a loose cap at Nassau and Ann streets, working intermittently upon the wire supplying the other current, caused that to be grounded also, and an earth circuit was established. It was a mild current, and part of it was appropriated by the horses that passed a certain point, because at that point the ground was not so good a conductor as the horses. It was a mistake to say, as was said on Thursday, that the direct current from the Edison dynamic machine could not be felt. It pricked and tingled very perceptibly, and was enough to make a horse kick up. The current that passed, Mr. Johnson said, was the direct current, and not an induced current. As soon as connection with the loose cap was closed the phenomenon ceased, and buildings were lighted all about the neighborhood yesterday, including one at 88 Nassau street, next door to the house in which the loose cap was found."

It is almost unnecessary to say that this stuff about a chandelier wire and an "intermittent cap" half a mile apart producing an earth circuit and a "mild current," underground, and so making the horses kick up on the pavement, is the silliest of bosh. If this is a fair specimen of the electrical intelligence of the people that the Edison Company sends around to lay their wires, they should be looked after; for good work cannot be expected at the hands of know-nothings.

AMERICAN INVENTIONS IN THE EGYPTIAN WAR.

Among the supplies for the British army in Egypt mention is made of driving apparatus, tubing, and pumps for two hundred "Abyssinian wells," by which name American drive wells are known in England, from the circumstance that they were first used by the British army in the Abyssinian war. It is estimated that two hundred wells of the capacity ordered will furnish from two to three million gallons of water a day, and make the army independent of the surface water sources of the country. Seeing that the fresh water canals are largely in the control of Arabi, the success of the invasion may be largely contingent upon the ability which drive wells give of obtaining water anywhere in the desert.

This, however, does not exhaust the indebtednesss of the British forces to American inventors. The great war ships of England are supplied with the Brush electric lamps invented at Cleveland; and, as every reader will recall, it was by means of the powerful lights of the fleet that Arabi's attempts to strengthen the forts about Alexandria, under cover of night and contrary to agreement, were detected and frustrated. After the bombardment began the electric lights played a not less important part in directing the movements of the ships at night, in guarding against surprises, and in watching the movements of the enemy on shore.

During the bombardment the most effective service was done by turreted vessels; and the revolving turret is an American invention.

The machine gun, another American invention, has proved an extremely efficient arm for the invading forces. One vessel fired 6,000 pounds of shot from Gatling guns the first day of the bombardment. A handful of marines, with guns of this type, were able to disperse the Alexandrian "looters" and restore order in the afflicted city, where many times their number would have failed without such aid.

In the subsequent skirmishing with Arabi's troops about Alexandria, and later in the capture of Shaluf and other fortified places along the Suez Canal, the same guns on the gunboats and on shore have been in constant use.

It is not so well known that the small arms of the British soldiers are but slightly modified American guns, made with machinery patterned after that developed in the shops of Springfield, Mass. The system of fixed ammunition for small arms also, and the machines by which such cartridges are made, are all of American origin.

DUTY OF THE LOCOMOTIVE ENGINEER.

A railway man predicts that before many years every locomotive drawing a passenger train on a busy railroad will have a pilot whose sole business will be to watch the signals, switches, bridges, crossings, and so on, while the care and control of the engine will be the exclusive work of the engineer. At present, he says, the engineer may be trying his water gauge or doing any one of half a hundred necessary things, when he ought to be looking at a signal. When trains were fewer and the speed less, an engineer was all that was needed; as the speed is increased and the demands upon the engineer's attention are multiplied, he has more than he can do. He must be relieved by a new man, in front of or over the engine, who will have nothing to do with the engine, but will watch the road and direct the engineer, as the pilot of a steamer does, by a system of signals.

Any suggestion calculated to increase the safety of railway traveling cannot fail to receive consideration. It is safe to predict, however, that the foregoing prediction will never be fulfilled, for the sufficient reason that to place a second personality between the observation of a signal and the manipulation of the engine would be to delay action and invite disaster. With his hand upon the throttle the engineer can do the thing required in any emergency in less time than it would take to tell another to do it, however perfect the system of signaling; and with a train running a hundred feet a second, a fraction of a second's delay may be fatal to a hundred passengers.

On well regulated roads the engineer's assistant now does substantially everything required in the care of the engine, leaving the engineer free to keep constant watch of the road. The proposed pilot could do no more, and would be less fitly placed to secure the instant performance of the duty the occasion might demand.

Cameo Cutting.

One of the best examples of adroit manipulation under the simple microscope is the operation of cameo cutting as described in an article in *Our Home and Science Gossip:*

A visit to a cameo cutter's workshop found him seated at a table covered with tools, varying from a triangular-pointed steel instrument to the most delicate pointed bits of steel wire fastened in handles. Very fine files and knitting needles, set in wooden grips and ground to infinitesimal points, figured in the lot. On a pad of leather, before the cameo cutter, was a block of wood just big enough to be grasped with his hand, and cemented to the middle of it was an oval object that looked like a piece of alabaster, just big enough to make a seal for the finger of a man who did not object to wearing large rings. Upon this the artist was just finishing a copy, with a pencil pointed to needle fineness, of a photograph in profile of a gentleman, which was leaned against a little photograph easel before him. Having finished the outline, he laid his pencil by, and taking up a fine wire tool he scratched the pencil mark around with it. Then he took a darning needle with a sharp point and scratched the line deeper. He worked with a magnifying glass at his eye, and stopped continually to inspect the progress of his work with critical minuteness. Then he went at it again, working slowly, scratching over the same line again and again, and always examining after each scratch. He changed his tools as he went on, and from the darning needle descended to a trifling little fragment of steel wire, not as thick as an ordinary sewing needle, set in a slender handle.

With this he scratched and rescratched, until the lines he had drawn with his pencil had quite vanished, and a thin, fine streak of a dark color had marked the outline of the head he had been tracing his way around. Next he took one of his burin-like tools and commenced again. This time he worked on the outside of the outline, cutting and scraping at the surface until the white turned gray, then brown, and finally vanished, leaving the face in relief, surrounded by a black ground—that is, the portrait remained intact in the white substance which formed the outer layer of the cameo, while it had been cut away around it to the lower or dark layer. The portrait or figure is then modulated upon its surface until it assumes the roundness of nature. The edges are left square to the dark ground.

This is necessary, as, if they are gradually rounded down, the outline becomes undefined toward its juncture with the relieving surface, owing to the white of the raised portion being partially transparent and permitting the dark to show through it when it is thinned down. Care is taken to finish this dark surface as much as possible with the cutting tools and so separate the white from it as to leave it smooth and unscratched. A final polish is given it, however, with putty powder applied dry with a stiff brush, but the utmost care is necessary in this operation, as the slightest slip will ruin the work. This is the cameo cutter's work, the mountings being the jeweler's work. The cameos sell, unmounted, for about twenty-five dollars.

THE first telegraph line in this country is believed to have been established on Long Island, by Harrison A. Dyar.