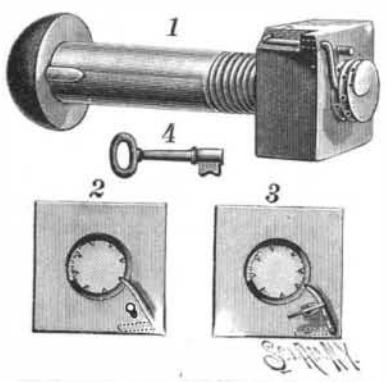
AN IMPROVED NUT LOCK.

This nut lock is especially adapted for securing the fish plates upon railroad rails and other similar uses. It has been patented by Messrs. Joseph Harmon and George W. Faber, of Fergus Falls, Minn. Fig. 1 shows the application of the device, Fig. 2 being an end view representing the nut engaging the bolt, and Fig. 3 showing it disengaged, while Fig. 4 is a key used to release the lock. In one corner of the nut is secured one end of a piece of spring wire, as shown in Fig. 1, the other end of the wire being bent at a right angle to lie against the outer side of the nut and form a locking limb, pointed and slightly curved near its end. In the bottom of the spiral track of the bolt thread are a number of cupped indentations, adapted to be readily engaged by the pointed end of the locking limb, the latter springing sufficiently to permit the nut to move freely as it is screwed upon the bolt body, but preventing backward movement of the nut by its engagement with one of the indentations. To disengage the spring locking limb from the bolt, the key is placed on an adjacent post in the end wall of the nut, and the turning of the key springs the locking limb away from the bolt, one key serving for use with any number of similar nut locks.



HARMON & FABER'S NUT LOCK.

A Successful Storage Battery Electric Car.

At Oneida, N. Y., they have a street car propelled by storage batteries made by the Syracuse Storage Battery Company. The total run on one charge of the batteries was 125 miles. The car makes daily from 64 to 90 miles without a break in the service. The 125 mile run was made on a seven hour charge. There are 96 cells used in the car. The motor is a single 30 horse power Rae type, with truck made by the McGuire Company, of Chicago. The motor and truck were purchased of the Detroit Electrical Company. The motor is wound for 190 volts. The voltage of the 96 cells at the start of the 117 mile trip was 204; at the end, 192 volts, a loss of only 12 volts in a day's trip. The car is lighted from a bank of 24 cells with 48 volt incandescent lamps.

A PNEUMATIC VENTILATOR.

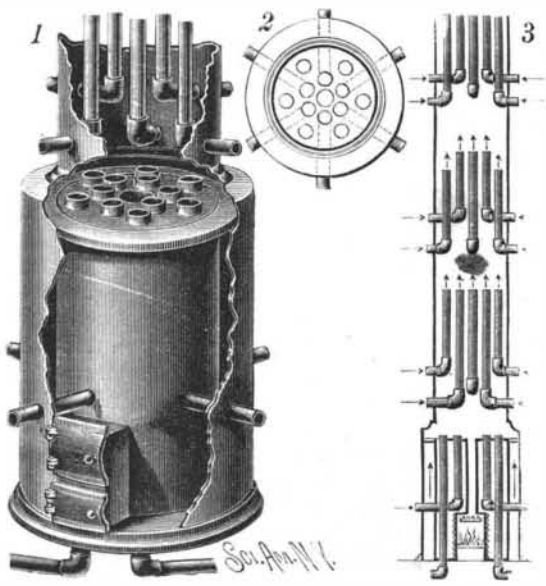
This improvement, patented by Mr. William R. Macdonald, of Allegheny, Pa., comprises a main ventilating flue containing within itself auxiliary vertical tubes, having elbows at right angle connections at various levels, forming inlets for the tubes at the sides of the main flue, there being a heater within or contiguous to the main flue. Fig. 1 shows the lower part of such a main flue, provided with a heater and firebox, Fig. 2 being a plain view, and Fig. 3 a sectional side elevation representing the air inlets as the apparatus would be arranged for the different floors of a building. The lower tubes, from the hot air generator, discharge a powerful upward blast of heated air against and around the tubes projecting into the main flue next above it, the second set of tubes in like manner discharging just below the tubes entering the main flue at a higher level, as shown in Fig. 3, the arrows indicating the direction of the air currents. With this arrangement all air entering the main flue is heated before its discharge into the flue, thus adding to the velocity of the upward current, and creating a draught which forms a most efficient means of ventilation, the inlets for the exhausts being placed where it may be most convenient, or in proximity to any particular location, where it may be most necessary to insure a constant circulation of air.

WORK ON THE SEWERS OF PARIS.

The administration is at this moment putting in execution with great activity the realization of the programme of the cleansing of the city of Paris through the application of the *tout a l'egout*. After long studies of various systems, it is, as well known, the one recommended by the late Mr. Durand-Claye that finally triumphed. It consists in purifying the sewage water by the action of a permeable soil combined with the vegetation. The sewage water begins by filtering completely in traversing the superficial strata of the soil. Then the dissolved organic matter descends through the strata of the subsoil, where it comes into intimate contact with the oxygen of the air, which fills the interstices between the solid molecules.

It was at Gennevilliers, near Paris, that the first experiments were made, and pursued upon quite a vast scale. It was found therein that 15 grains of sewage water contain 20,000 microgerms, while the same 15 grains of water making its exit from the drains of the irrigation grounds contain no more than 12. This encouraging result served as a base for the generalization of the system that is operating at this moment. The grounds of the peninsula of Gennevilliers comprise 1,600 acres of irrigatable and absorbent superficies. They are receiving and purifying at present 5,280,000 cubic feet of water a day, that is to say, a little more than a third of the production of the city of Paris, which is about 14,784,000 cubic feet a day. The 9,504,000 cubic feet excess are thrown into the Seine, and this figure can only increase. It, therefore, became necessary to seek new absorbing grounds in the vicinity of the capital. After a profound geological and agricultural inquiry, they were found at Acheres, at Mery-sur-Oise and at Meulon.

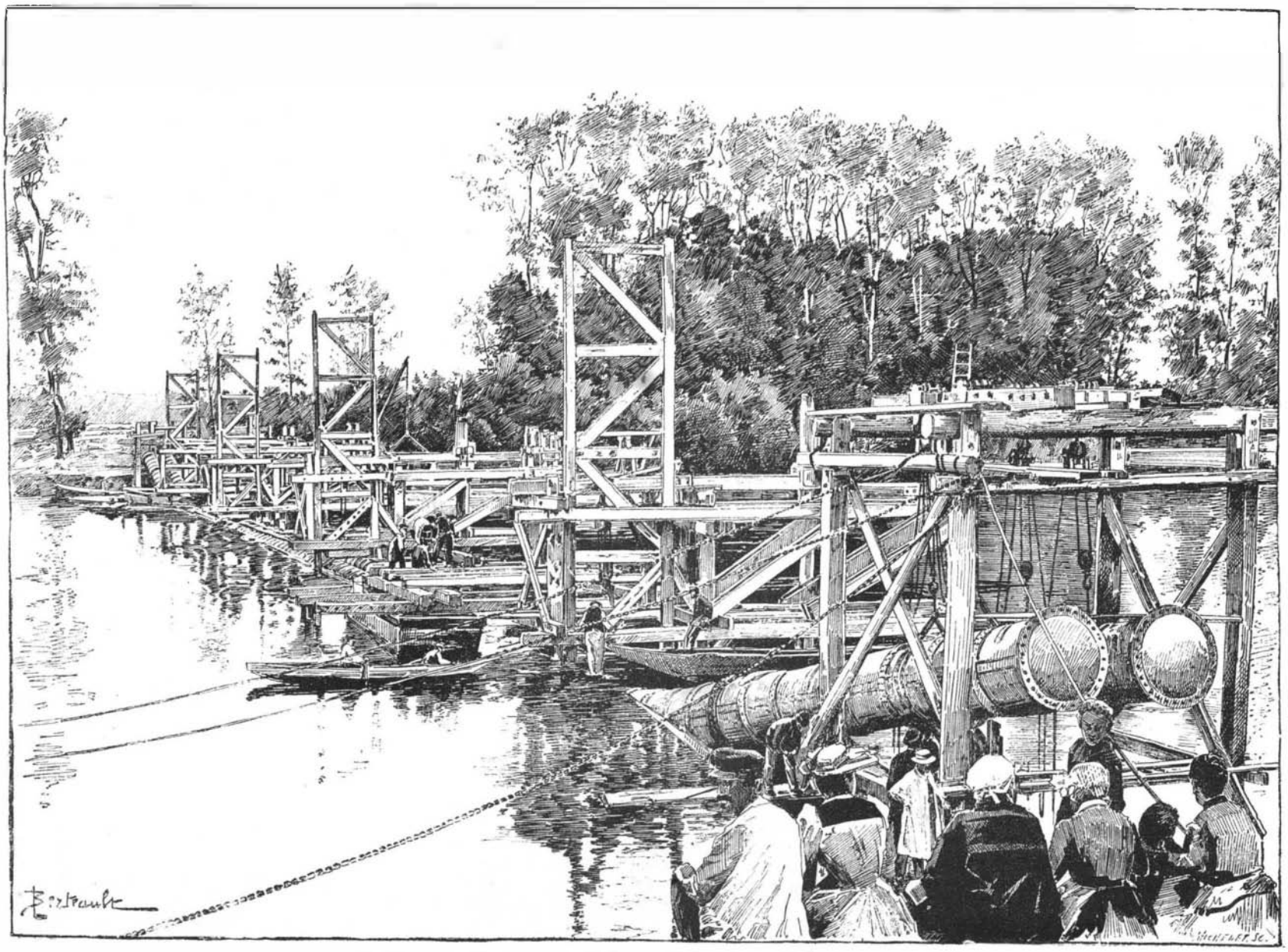
The absorbing grounds of Acheres have a surface of



MACDONALD'S PNEUMATIC VENTILATOR.

about 1,600 acres. It was a question in the first place of forcing to them the 9,504,000 cubic feet of sewage water that the Gennevilliers peninsula cannot absorb. To this effect there is under construction at the present moment a lifting plant, comprising four engines of 1,000 horse power as a whole, which will be doubled in the future when it becomes a question of the irrigation of Mery-sur-Oise and Meulon.

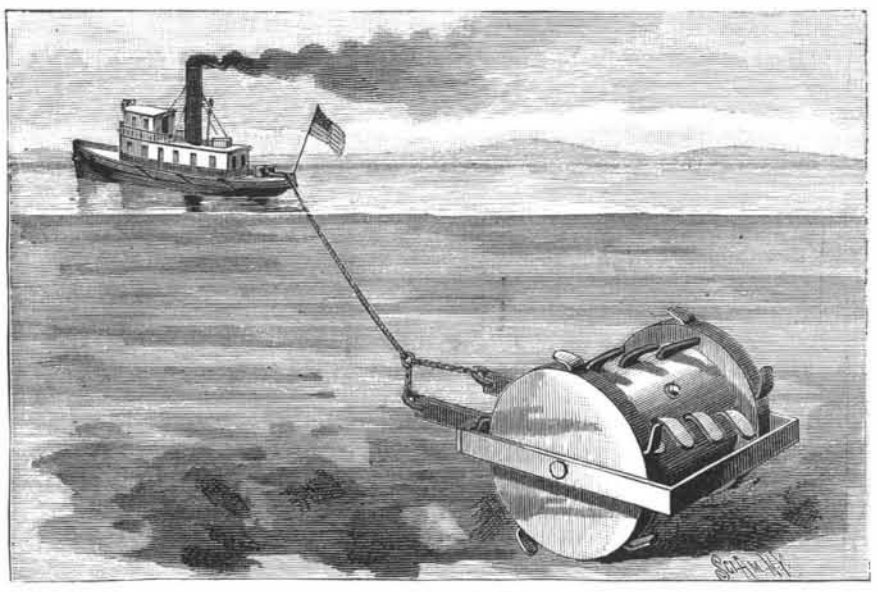
The sewage water, lifted to a height of 16 feet, will be forced into a siphon passing to Asnieres under the bed of the Seine, at the issue of which an aqueduct will lead it to the relay works of Colombes, near Paris. There a large plant comprising four engines and developing 6,000 horse power will lift the water to the summit of the hill of Argenteuil. Here they will empty into two conduits six feet in diameter crossing the Seine at Argenteuil upon an aqueduct bridge. Starting from Argenteuil, the sewage water will de-



PARIS SEWERAGE—SUBMERSION OF A SIPHON AT HERBLAY.

scend through a simple difference of level into a gallery 10 feet in diameter, calculated to discharge double the present production of Paris in liquid manure. It is from this gallery that branches the derivation designed to fertilize the plain of Acheres. It crosses the Seine at Herblay through a siphon, whose construction and putting in place we shall describe. This siphon, for which a series of timberpiers was previously constructed, was submerged during the first week of October.

It consists of two iron plate pipes ¾ inch in thickness, spaced externally 20 inches apart and connected at every 10 feet by interties. Each pipe consists of two oblique parts and of a straight part 520 feet in length. The total length between perpendiculars of the siphon thus constituted is 660 feet.



BENTINCK & RENNER'S DIGGING MACHINE.

A complete siphon thus constructed weighs about 250 tons, and the putting of it in place is not easy. It was necessary to effect it in an interval of only three days' stoppage of navigation. Engineer Lannay succeeded in doing it with the co-operation of Messrs. Le Blanc & Marcadet, the contractors.

Our engineers had in truth some previous analogous examples. One of the best known is the siphon of the Isle of Saint Louis, laid in September, 1890, and which empties into the great collector of the right bank of the Seine the sewage water of the left bank which was formerly thrown into the river through nine discharges opening in the two arms that encircle the island. The siphon of the Isle of Saint Louis was but 345 feet in length, and yet the laying of it furnished useful data for the execution of the special work under consideration.

The laying of the Herblay siphon was done in a transverse excavation 13 feet in width, made by a dredger in the bed of the Seine and carefully leveled with beton. The siphon was carefully let down into the excavation and the latter was then covered with beton, so that nothing should interrupt the very busy navigation going on above.

Each branch of the siphon is composed of iron plate sections connected and riveted end to end, at first in groups of four at the works, and then one to the other upon the field of operations.

Before the operation, the tubes as a whole rested upon nine timber piers planted at right angles with the bank. The two extremities having been perfectly closed with plugs, there was thus formed a true float that it sufficed to allow to glide into the water, just as a ship is launched by lifting it with jack screws.

The tubes being afloat, they were led across the river exactly in the transverse direction of the excavation previously marked out. Then they were seized between three frames forming slides and designed to guide them to the bottom. The submersion was effected by charging the two siphons with rails laid upon the cross pieces that connected the two tubes. These rails were removed by divers after the termination of the operation.

It was not until after the putting of the pipes in place that the water was allowed to enter them, for the introduction of it before this would have sufficed to sink them to the bottom, and eddies and displacements might have been produced that would have interfered with the precision of the operation.

Before the siphon was put in place, and while it was still out of water on the field of operations, it was tested in the first place at a pressure of six atmospheres, in order to make sure that it presented no leak or defect.

Such, in brief, is a description of the operation of which the accompanying engraving, from *L'Illustration*, gives the general aspect.

THE Suez Canal, the greatest work of marine engineering, is eighty-eight miles long, and reduces the distance from England to India from 11,379 miles to 7,628 miles.

A DIGGING MACHINE TO DEEPEN CHANNELS, ETC.

This machine, when submerged and dragged along the bottom of a waterway, digs into and carries up the sand, etc., permitting the raised material to be floated away by the current. It has been patented by Eliza J. Bentinck and Julia A. Renner, of Galveston, Texas.

In a suitably made frame, connected by brackets with a chain leading to a boat, or other means of pulling the machine, is journaled a shaft carrying drive wheels and a drum, both the wheels and the drum having shovels arranged about their periphery. The drum is hollow, and when empty floats upon the water, in which condition it is most easily moved to the place where the work is to be done, the device sinking on the removal of a plug, which allows the drum to fill with water. By means of a pinion on the shaft, an idler, and a gear on the inner rim of the drum, the latter is driven in a direction opposite to that in which the drive wheels travel. It is designed that the drum shall be ten feet in diameter and carry about 200 shovels, each capable of lifting about a cubic foot of material, so that each revolution of the drum will carry up some seven to eight cubic yards of sand or mud, thus rapidly and effectively deepening channels or removing sandbars at the mouths of rivers, etc.

AN IMPROVED RECORDING THERMOMETER.

The instrument shown in the illustration indicates and records the slightest variations in temperature. The record is made on a paper chart carried by a disk, the chart containing fourteen divisions divided into hours for each day and night, and the disk being rotated by a fine eight-day spring clock movement. This thermometer is made with the following ranges Fahrenheit, according to the purpose for which the instrument is to be used: From 50° below zero to 80° above; from 20° below zero to 110° above; from + 70° to 200°, and from .0° to 260°. The clock is fastened to an iron frame constituting the backbone of the instrument, A being the clock arbor, C the clock box, and W W winding arbors. D is the ink pen, three or four drops of the prepared ink furnished lasting a week, and L L is the recording lever, S S being adjusting screws. On the arbor that carries the lever are two small arcs, F F, connected by fine platinum wires, P P, with the metallic thermometer strips, N N. These strips are each made according to the recognized method of two metals suitably fastened together, one of the metals expanding more than the other, and causing the compound strip to bend in one direction with an increase of temperature and in the other direction with a decrease of temperature. Being thin and long, they present a large surface to the air, and are, therefore, very sensitive to changes of temperature. X X represent the position of adjusting screws for fastening the instrument in place or in a packing box. These instruments, as manufactured, are standardized and warranted to automatically make a continuous record of temperature without error or omission, and cannot fail to prove of high value in very many places, as in theaters, churches, clubs, dwellings, hotels, hospitals, schools, asylums, greenhouses, breweries, glue works, dry kilns, thread mills, or wherever evenness of temperature is desirable and an effort is made to keep at or near a certain standard. They are especially desirable in the drying rooms of manufactories, in breweries, glass works, glue and varnish factories, etc.

Where desired, an electrical attachment is furnished in connection with the thermometer, by means of which an alarm is given at a distance when the temperature rises above or falls below a predetermined point. These instruments are manufactured by the Draper Manufacturing Company, No. 152 Front Street, New York City.

INSTRUMENT COMPLETE.

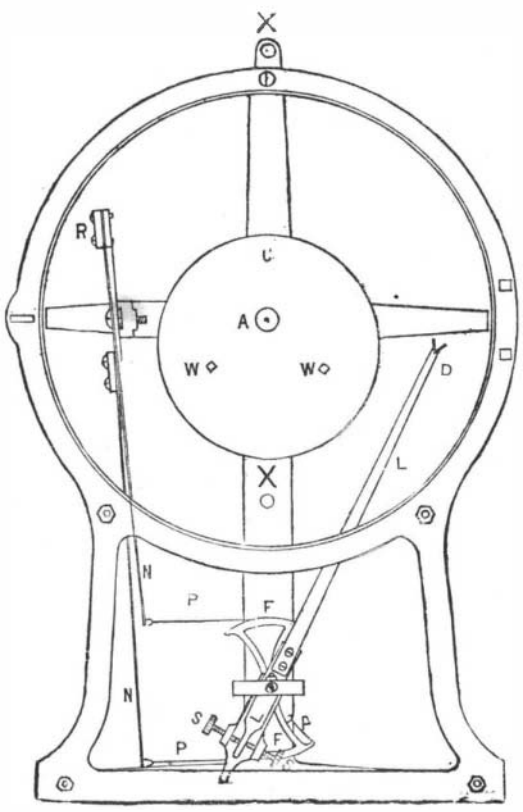
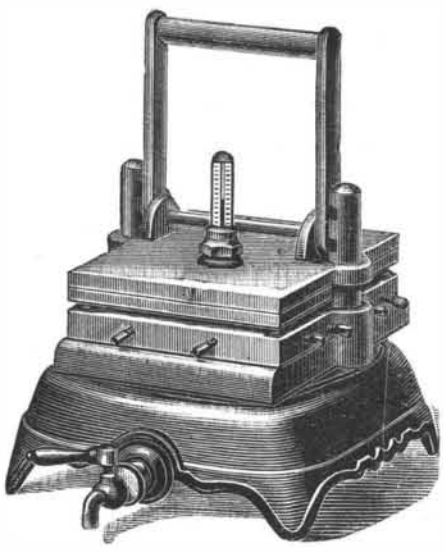


DIAGRAM SHOWING PARTS.

DRAPER'S RECORDING THERMOMETER

A COMBINED RUBBER STAMP VULCANIZER AND PRESS.

With the improved means shown in the illustration, the old, slow screw press movement, in making rubber stamps, is dispensed with, and the quick cutting blow of a die punch with lever movement is substituted, producing a sharper, better face on the letters of the mould, while also doing the work much more rapidly. Any kind of type, electrotypes, etc., used to print from



THE "NEW YORK" RUBBER STAMP VULCANIZER AND MATRIX PRESS.

may be moulded, giving the best results, high spaces, quads, or leads not being needed. The heat is supplied by either a kerosene or gas heater, a high temperature thermometer indicating the proper amount of heat to be applied after the raw rubber has been pressed into the mould, and the vulcanization is then effected in a few minutes. The unvulcanized rubber for making stamps is supplied in sheets about an eighth of an inch thick, as many stamps as will come together in a chase being usually made at once, to be cut apart after removal from the mould and mounted on wooden handles or self-inking frames. The advantage of a rubber stamp outfit as an adjunct to a printing office may also be a very material one, enabling rubber dies to be made from any of the kinds of type in use for the printing of jobs when the surface to be