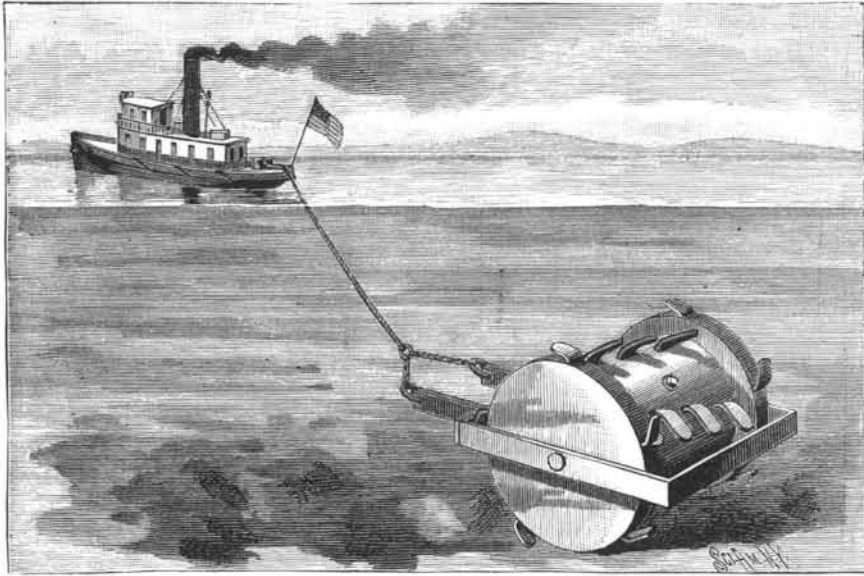


scend through a simple difference of level into a gallery 10 feet in diameter, calculated to discharge double the present production of Paris in liquid manure. It is from this gallery that branches the derivation designed to fertilize the plain of Acheres. It crosses the Seine at Herblay through a siphon, 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 $\frac{3}{4}$ inch in thick-



BENTINCK & RENNER'S DIGGING MACHINE.

ness, spaced externally 20 inches apart and connected at every 10 feet by inerties. 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.

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 instru-



INSTRUMENT COMPLETE.

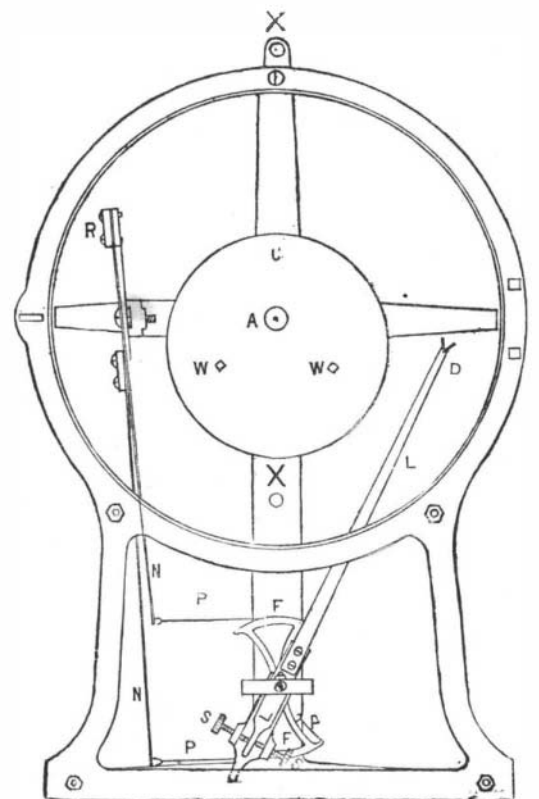


DIAGRAM SHOWING PARTS.

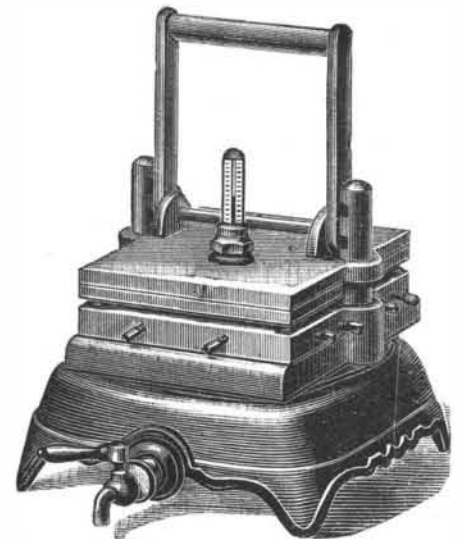
DRAPER'S RECORDING THERMOMETER

ments, 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.

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 vulcanized 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