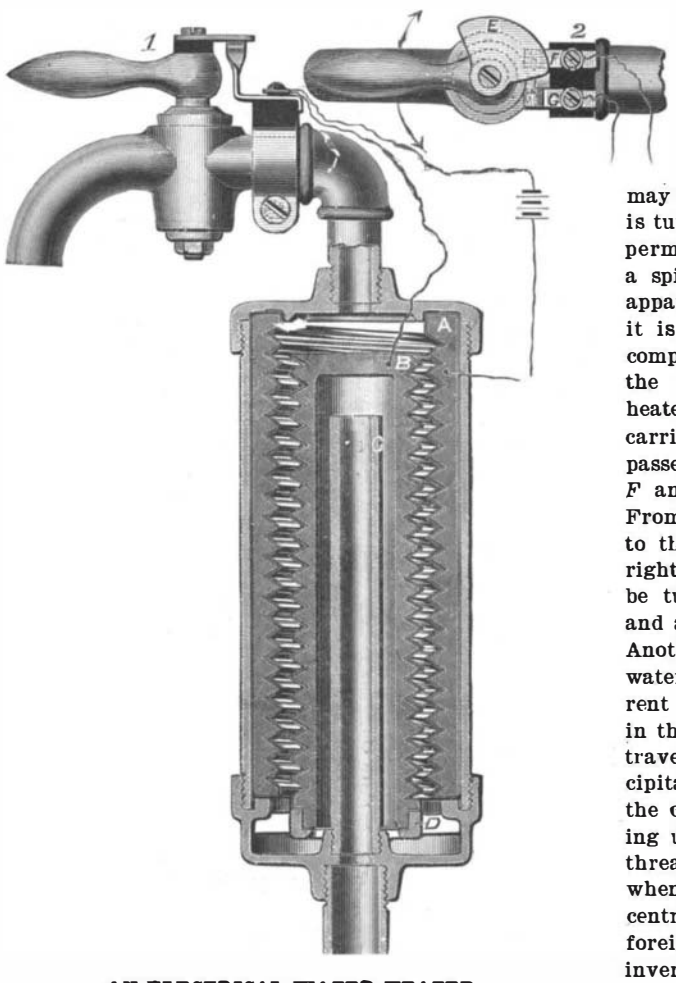
AN ELECTRICAL WATER-HEATER.

There are many occasions when the instantaneous heating of water is rendered necessary. It may be desirable to let the fire which heats the water in the boiler go out, as in summer or at night, and in many places electricity can be obtained where running water does not permit of a hot water system. The



AN ELECTRICAL WATER-HEATER.

device shown in our engraving obviates these difficulties wherever a current of electricity can be obtained.

The top of the device consists of a spigot, the manipulation of the handle of which in one direction sends a current of electricity through the heater so that hot water may be obtained, while by turning the handle in the opposite direction it will result in cold water issuing from the spigot. A core is secured to the supply pipe, which, of course, permits of a water pressure being maintained in the pipe at all times. The water passes up the pipe, *C*, through the surrounding channel and out through the ring-shaped orifice, *D*. The water then passes up the zigzag passages and out through the spigot. The core, *B*, is preferably made of carbon pressed into shape, this inner core and its inclosing cylinder forming electrodes of an electric current. The periphery of the core, *B*, is provided with spiral grooves in the shape of screw threads.

The faces of the threads are covered by some suitable fabric which is pressed into shape when the core is being formed. The wire or cord is wound around in the bottom of the grooves to hold the cloth or fabric in its desired position. The object of incasing the carbon core or electrode with cloth or fabric is to prevent the disintegrated carbon passing out through the spigot with the running water, in addition to which the presence of the fabric enables the core to be molded much easier and it will hold its shape better than where the sharp corners of the green carbon are exposed. Surrounding this core is a cylinder which is threaded into the base casting, and whose top is closed by a cap. This cylinder carries the encircling electrode, *A*, which is insulated from its support, as is also the core, *B*. The electrode is formed with spiral grooves in its inner face, corresponding with the thread of the core, so that the water must necessarily follow the zigzag path. The inner face of the electrode is covered with fabric for the same reasons as have already been given. The core terminates short of the cap-piece, forming a chamber in the upper part of the heater from which leads the discharge pipe, which in turn runs to the spigot, which may be of the usual style, or may be constructed so that when the operating handle is turned in either direction the spigot will be open to permit the passage of the water. With the aid of such a spigot it is possible to run cold water through the apparatus when it is turned in one direction, and when it is turned in the opposite direction the circuit is completed and the electrodes are energized so that the water passing through the apparatus will be heated before it issues from the spigot. The handle carries a contact making and breaking plate, *E*, which passes over the face of the two terminal contact points, *F* and *G*, which are secured to an insulation block. From these terminals wires lead to the core and to the electrode. When the handle is turned to the right the water will not be heated, but if the handle be turned to the left the circuit will be completed, and all the water which passes through will be warm. Another interesting feature is the fact that the hot water, at least, will be sterilized, for a 110-volt current will destroy all the animal and vegetable matter in the water, the zigzag path which it is compelled to travel being advantageous; and it also tends to precipitate any foreign matter in the grooves without the core or the encircling electrode. The water passing upwardly through the zigzag path formed by the threads will also be given a whirling motion, so that when it reaches the chamber in the top of the heater centrifugal action will assist in ridding the water of foreign particles. This very interesting and useful invention was recently patented by H. M. Hill.

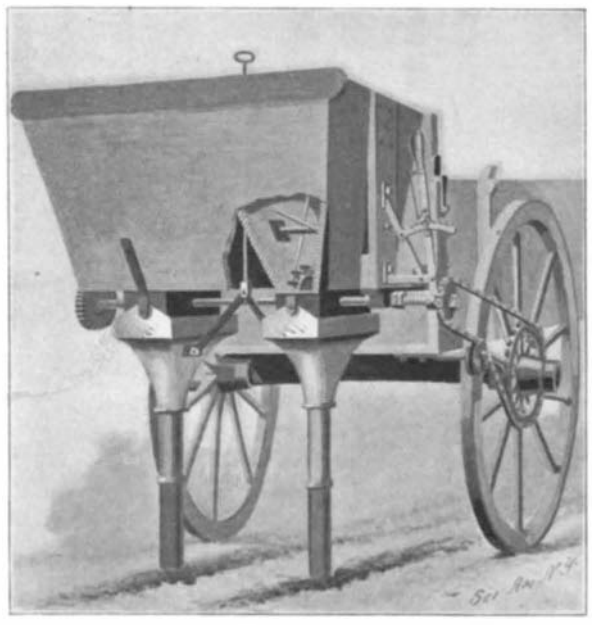
AN IMPROVED FERTILIZER-DISTRIBUTER.

A fertilizer-distributer which can be fitted to an ordinary wagon, and which is of such construction that it can deliver material within a wide range, is the subject of an invention patented by Harris McVea, of Vanceville, La.

The frame of the distributer consists of a backboard and a downwardly and inwardly inclined front section. When the device is to be used, the tail-board of the wagon is taken out and the backboard of the distributer substituted.

Within the frame two hoppers are located, through both of which an agitator-shaft passes, serving to break up the lumps in the material. Beneath the agitator-shaft a feed-wheel shaft is mounted, the feed-wheels being arranged so that they turn in the discharge openings of the hoppers. This feed-wheel shaft is driven from one of the rear supporting-wheels of the wagon by a sprocket-and-chain gear, a lever-operated clutch mechanism being provided to throw the feed-wheel shaft into and out of gear with the supporting-wheel of the wagon. Slides are provided for closing the discharge-openings of the hoppers.

The fertilizer, fed by the wheels, passes through two spouts to the ground, which spouts are pivotally mounted and are swung to or from the ground by means of two links pivoted to the spouts and operated by a vertical handle-bar provided with means whereby it can be held in any adjusted position. By thus pivotally mounting the spouts and adjusting them for any width between rows, the fertilizer can be delivered within a wide range. The fertilizer is to be carried in the wagon and supplied to the hoppers in any desired manner.



AN IMPROVED FERTILIZER DISTRIBUTER.

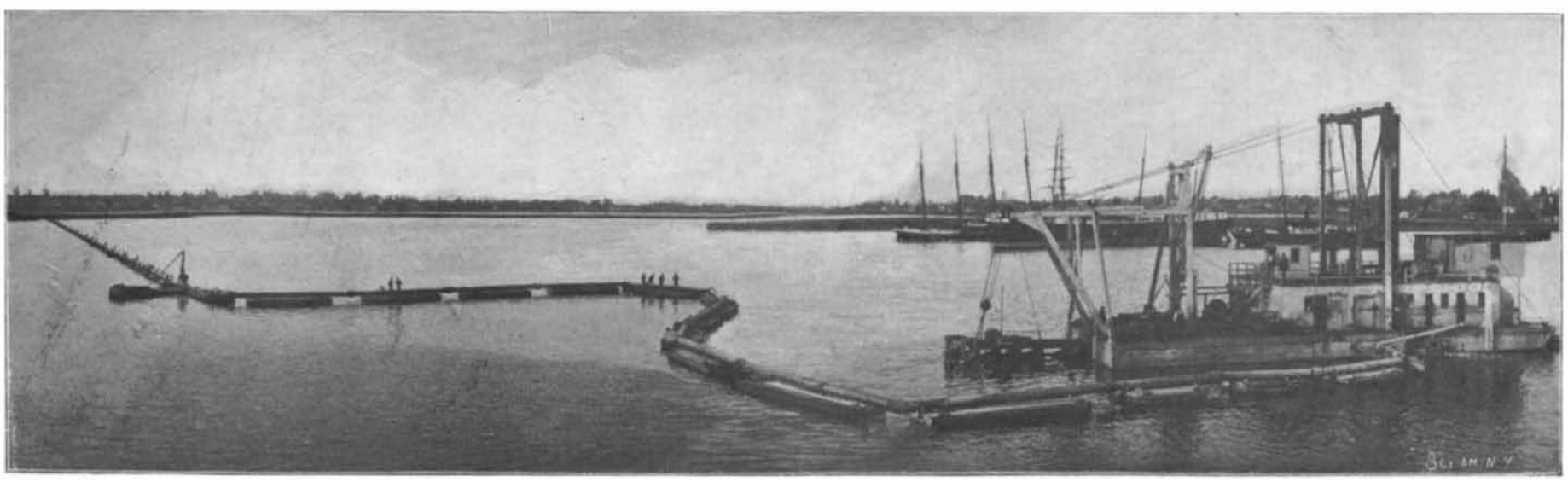
HARBOR IMPROVEMENT, OAKLAND, CAL.

The improvement of Oakland Cal., Harbor is one of the greatest undertakings of the general government on the Pacific Coast. In 1874 a shallow estuary flowed through a vast extent of marsh land, mostly covered at high water. A recent report of the commerce of the estuary, after the 20-foot channel had been dredged, indicated that freight to the amount of 3,254,215 tons and passengers to the number of 186,360 had been transported in 1899.

The purpose of the improvement is to extend deep water navigation to the two prosperous cities, Oakland and Alameda, which have a joint population of 100,000. The new harbor lies between these communities, both of which have extensive manufactories, which find splendid sites on land which has been raised above tide by material dredged from the channel. There are also admirable facilities for the economical shipment of freight. Shipbuilding, lumber yards, iron works, the handling of coal and other heavy products, are concentrated on the banks of the new channel. The added value of the reclaimed ground amounts to many times the cost of the improvement, which up to date is $2,450,000. The first appropriation for the improvement was made in 1874, and amounted to $20,000. The scheme is now but partially complete. Two stone jetties start from the deep waters of San Francisco Bay and extend, the north one 13,000 feet, and the south jetty 10,000 feet, in parallel lines, 800 feet apart. The jetties, or training walls, are composed of stone, and between these walls a channel 20 feet in depth and 300 feet in width, has been dredged. The total length of the harbor is 19,000 feet, and at the easterly terminus a tidal basin 300 acres in extent has been deepened, so as to afford a safe harbor for accommodation of ships out of commission or laid up for the winter.

From the channel alone 647,715 cubic yards were raised by dredging, and deposited on the shores. Several thousand acres have been thus reclaimed. The first scope of the Oakland Harbor improvement was greatly below present realizations. The jetties have been raised several feet, and a strong movement has been inaugurated to increase the channel to a width of 500 feet at the present depth and to extend its length to double its present dimensions.

The material through which the channel was dredged consists of mud, sand, and a hardpan. Be-



HARBOR IMPROVEMENT, OAKLAND, CAL.