2 Sheets—Sheet 1.

W. H. NEWTON.

DREDGING APPARATUS.

No. 175,575. Patented April 4, 1876.

FIG. 1.

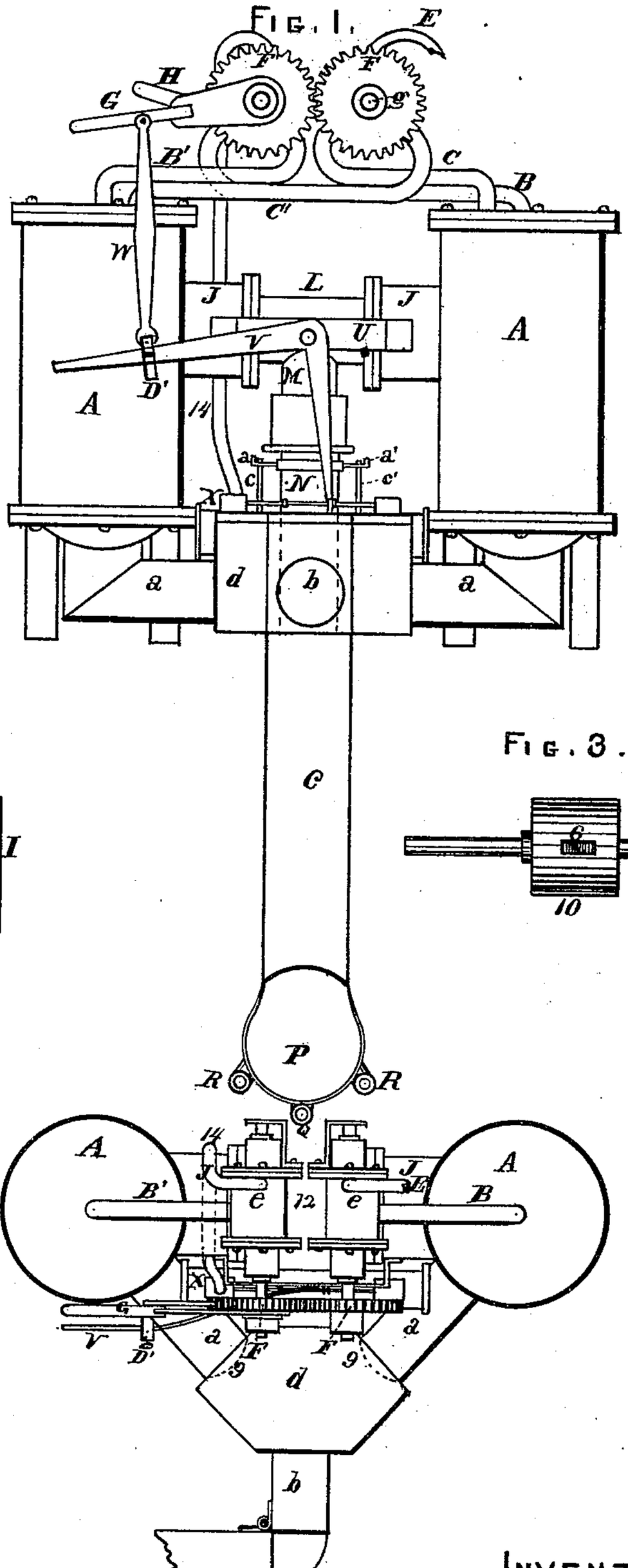

FIG. 4.

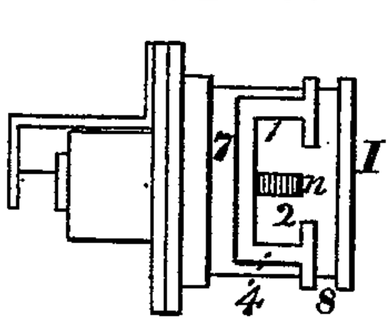

FIG. 3.

FIG. 2.

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F. W. Hawley.

INVENTOR:

William H. Newton

By G. L. Chapin Atty.

2 Sheets—Sheet 2.

W. H. NEWTON.

DREDGING APPARATUS.

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FIG. 5

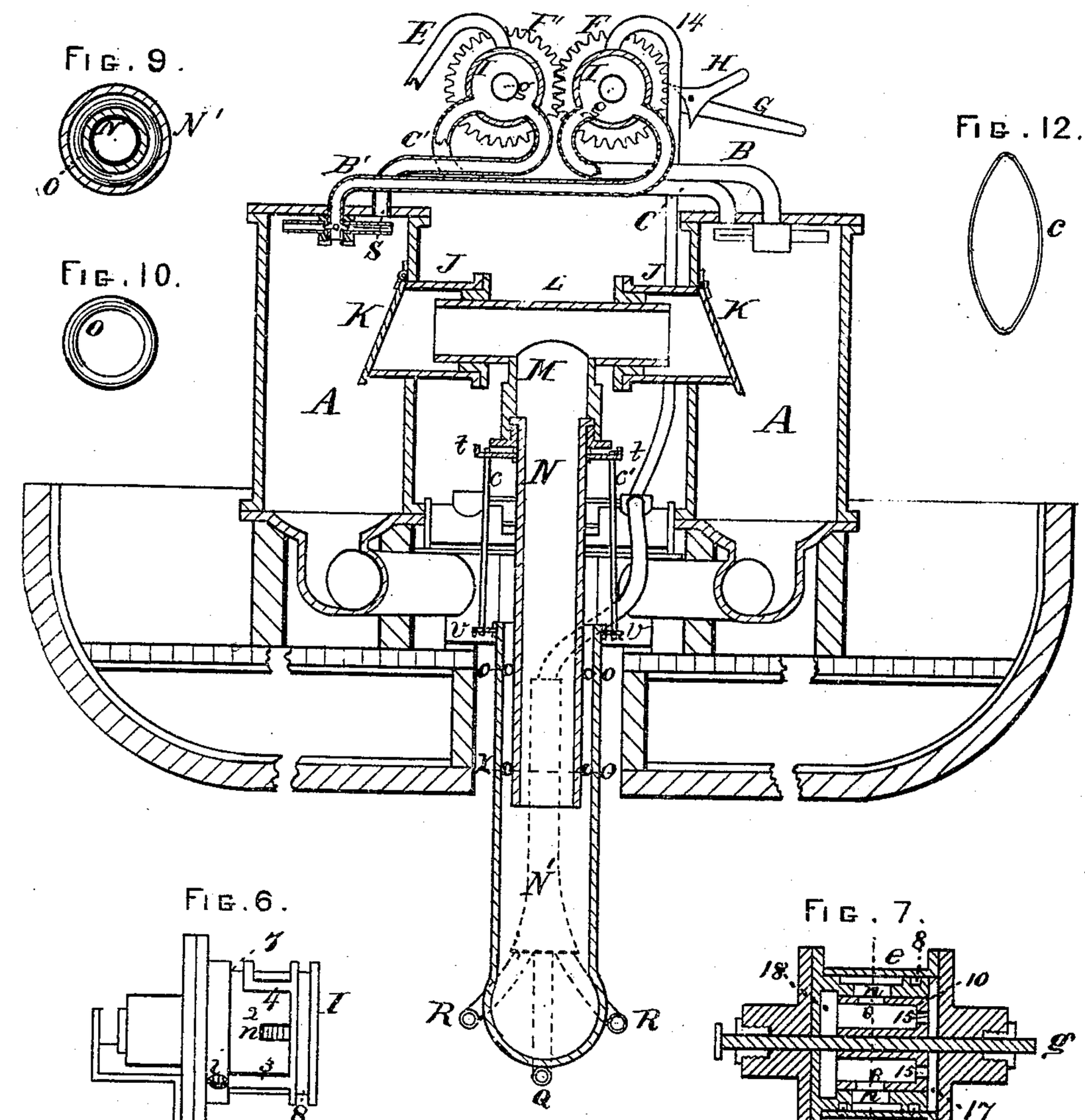

FIG. 9.

FIG. 10.

FIG. 12.

FIG. 6.

FIG. 7.

FIG. 11.

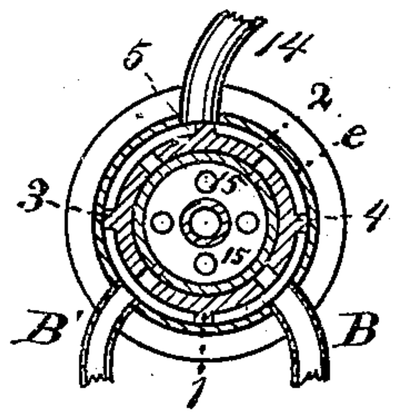

FIG. 8.

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UNITED STATES PATENT OFFICE

WILLIAM H. NEWTON, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN DREDGING APPARATUS.

Specification forming part of Letters Patent No. **175,575**, dated April 4, 1876; application filed January 31, 1876.

To all whom it may concern:

Be it known that I, WILLIAM H. NEWTON, of the city of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Dredging Apparatus, of which the following is a specification:

The present invention relates to an apparatus for deepening the beds of harbors and water-channels, and for excavating peat; and its nature consists, first, in the novel construction of mechanism for combining a force-pump with a vacuum-pump, for the purpose of giving to the latter a positive movement of the valves. For raising water the ordinary force-pump answers the purpose; but for dredging, where stone are to be taken up through the suction-pipe, the vacuum is too imperfectly attained; consequently there is a great waste of power. By means of my combined improvement I get a vacuum almost perfect, whereby I am enabled to elevate any bowlder or stone which will pass through the suction-pipe and vacuum-pump, wholly independent of hydrostatic power. Second, in a suspended suction-pipe, which is hung to hollow horizontal arms communicating, respectively, with the vacuum-pump cylinders, and arranged to operate through a well-hole in a boat or scow; third, in springs combined with a suspended telescopic suction-pipe, whereby the pipe may have an easy bearing on the bed of the channel, and accommodate itself to the oscillation of the surface of the water, the rocking of the boat, and to different depths of water; fourth, in an ejection and force pipe nozzle, provided with a central helical plate, whereby the stream has given to it a rotary motion around its own axis for better disintegrating the earth; fifth, in a telescopic pipe provided with rubber-ring rollers between its sections, to prevent the passage of air or water, and to keep out sand or earth.

In the drawings, Figure 1, Sheet 1, represents a side elevation of my improved apparatus, taken transversely to a boat or scow. Fig. 2, a top view thereof; Fig. 3, a plan view of one balance-valve and its shaft, shown double the size as compared with Figs. 1 and 2. Fig. 4 is a plan view of the cylinder for inclosing the balance-valve, removed from its case. Fig. 5, Sheet 2, is a longitudinal sectional elevation of my improved apparatus, showing, also, a transverse section of a boat or scow, with valves removed for clearness. Fig. 6, a plan view of the valve-cylinder, taken one-quarter round on its periphery from the view of the same cylinder shown at Fig. 4, Sheet 1; also double size. Fig. 7, a longitudinal section of one balance in its cylinder, showing also the exterior case enlarged two diameters; Fig. 8, a transverse section of the force-pipe nozzle enlarged four diameters, from Figs. 1 and 5; Fig. 9, a transverse section of the telescopic suction-pipe, on line *x*, Fig. 5; Fig. 10, a view of one of the rubber-ring rollers removed; Fig. 11, a transverse section through Fig. 7, on line *z*.

A represents the cylinders of a vacuum-pump, which are provided with check-valves K K, Fig. 5, placed on the inner inclined ends of horizontal sleeve-pipes J, which communicate with the cylinders, and with a suction-pipe, N N′.

The discharge-pipes at the bottom of the cylinders are shown at *a a*, and they communicate with a valve-box, *d*, in which the valves are hung, to close the ends of the pipes *a*, as indicated by dotted lines 9, Fig. 2. The discharge-pipe leading from valve-box *d* is made flexible by joints, as shown at Fig. 2, or otherwise, so as to convey material elevated to any place desired. The balance-valves consist of two hollow cylinders, 10, arranged to turn in stationary cylinders I. On the periphery of these cylinders are formed ribs 1 3 4 5, between which are countersunk spaces 2, Figs. 4 6 7 11, and there are near their ends formed annular channels 7 8 for the passage of steam from the balance-valve in one cylinder and the passage of water in the other.

Each cylinder I has four ports, *n*, and each balance-valve 10 has two parts, 6, and the cylinders I have each a port, *i*, for the induction of steam or water, and in the ends of the cylinders 10 are ports 15, that steam or water may pass through to the ends of cylinders I and balance them, as shown in Figs. 7 and 11, and to admit water or steam to the interior of the valves.

The operation of the valve 10 and the cylinders I is such that the two ports 6 are brought opposite to two of the four ports *n* in

the cylinder I to make a discharge, there being four discharges at each revolution of the valve 10. The object of the recesses 2, channels 7 and 8, and ribs 1 3 4 5 on cylinders I is to direct the discharge of ports *n* alternately into one or the other of the vacuum-cylinders A, as the case may require, to attain a nearly perfect vacuum, by an alternate jet of steam and water into the cylinders.

B represents a water-pipe communicating with one cylinder, A, and with one valve, 10, the water-pipe for communicating with the other valves and cylinder being shown at B′, the steam-pipes communicating with the cylinders and valves being shown at C C′. The cylinders I are inclosed in steam-tight cases *e e*, which are coupled together at 12, Fig. 2. The valves 10 are fast to shaft *g*, and to the latter are fixed gear-wheels F F′, which mesh into each other. A lever, G, is fitted to turn on one shaft, *g*, and to it is pivoted a dog, H, with projecting ends to engage the gear. A rod, W, connects the lever G with an elbow-lever, V, which is pivoted to the bridge U fastened to sleeves J.

The lower end of this lever is connected to the piston-rod of a force-pump, X, so as to have an oscillating motion, by means of which the lever G is made to oscillate and carry the dog H to turn the gear F′, and thus rotate the valve 10 to take and discharge water or steam, as may be required. The rod W is adjustable on lever V by a sleeve and set-screw, D′, Fig. 1, so that the length of time for opening the ports *n* and 6 may be controlled by the operator.

By changing the relative position of the cogs of one gear-wheel on the other, the time for producing a vacuum may be varied. The water-pipe 14, for condensing purposes, communicates with the force-pump *x* and valve 10 by means of a port, *i*, Fig. 6. The steam-pipe E comes from the boiler and communicates with the other valve 10 by means of a port similar to *i*.

The volume of condensing water may be varied by the pressure in pump *x*, and the volume of steam in the cylinders may be controlled by a globe-valve or other well-known means.

The suction-pipe consists of a double elbow, L M, Figs. 1 4, 5, arranged to rotate in sleeves J. The smaller part N of suction-pipe is inserted in the sleeve part M of this elbow, and extends into a larger telescopic pipe, N′, and between the two pipes are placed one or more rubber-ring rollers, O, to make an air-tight connection, obviate friction, and prevent wear from sediment. Projecting out from the pipe N and from the larger pipe N′ are arms *t t v v*, on which are placed elliptical springs *c′ c′*, which allow section N′ to move freely on section N, and a pipe, *i*, to accommodate itself to different depths of water, to the oscillation of the surface water, and to the rocking of the boat. R Q represent ejection-pipes which take their water from force-pump X to disintegrate the earth, but are not claimed in this specification.

The nozzle Q is provided with a central helical or twisted plate, T, Fig. 8, to give to the water a rotary motion on its own axis, better to disintegrate the earth.

The apparatus can be applied to the bow of a river or channel boat, and the ejecting-pipes may be operated by the boiler-supply engine, and the vacuum-pumps operated by steam from the boiler, so as to remove sand-bars, which would otherwise obstruct navigation. In such case the suction and exhaust pipes would hang over the rail of the boat, instead of passing through a well-hole.

I claim, and desire to secure by Letters Patent of the United States—

1. In a dredging apparatus, the combination of the vacuum-pumps A A, with force-pump *x*, having valves 10 10, cylinders I I, depending suction-pipe N N′, and sleeves J J, and double elbow L M, as and for the purpose specified.

2. The suction-pipe N N′ M, combined with sleeves J J, so as to operate between the vacuum-pumps, as described.

3. The combination of the sections N N′ of the suction-pipe with the springs *c c′*, substantially as described and shown.

4. The combination of the suction-pipe N N′ with the rubber-ring rollers O O, as and for the purpose set forth.

5. The ejection-pipe nozzle for dredging, in combination with the helical plate, as set forth.

WILLIAM H. NEWTON.

Witnesses:

O. H. ADIX,

G. L. CHAPIN.