(No Model.) 2 Sheets—Sheet 1.

J. H. FRENIER.

SAND AND WATER FEED MECHANISM FOR STONE SAWING MACHINES.

No. 352,916. Patented Nov. 23, 1886.

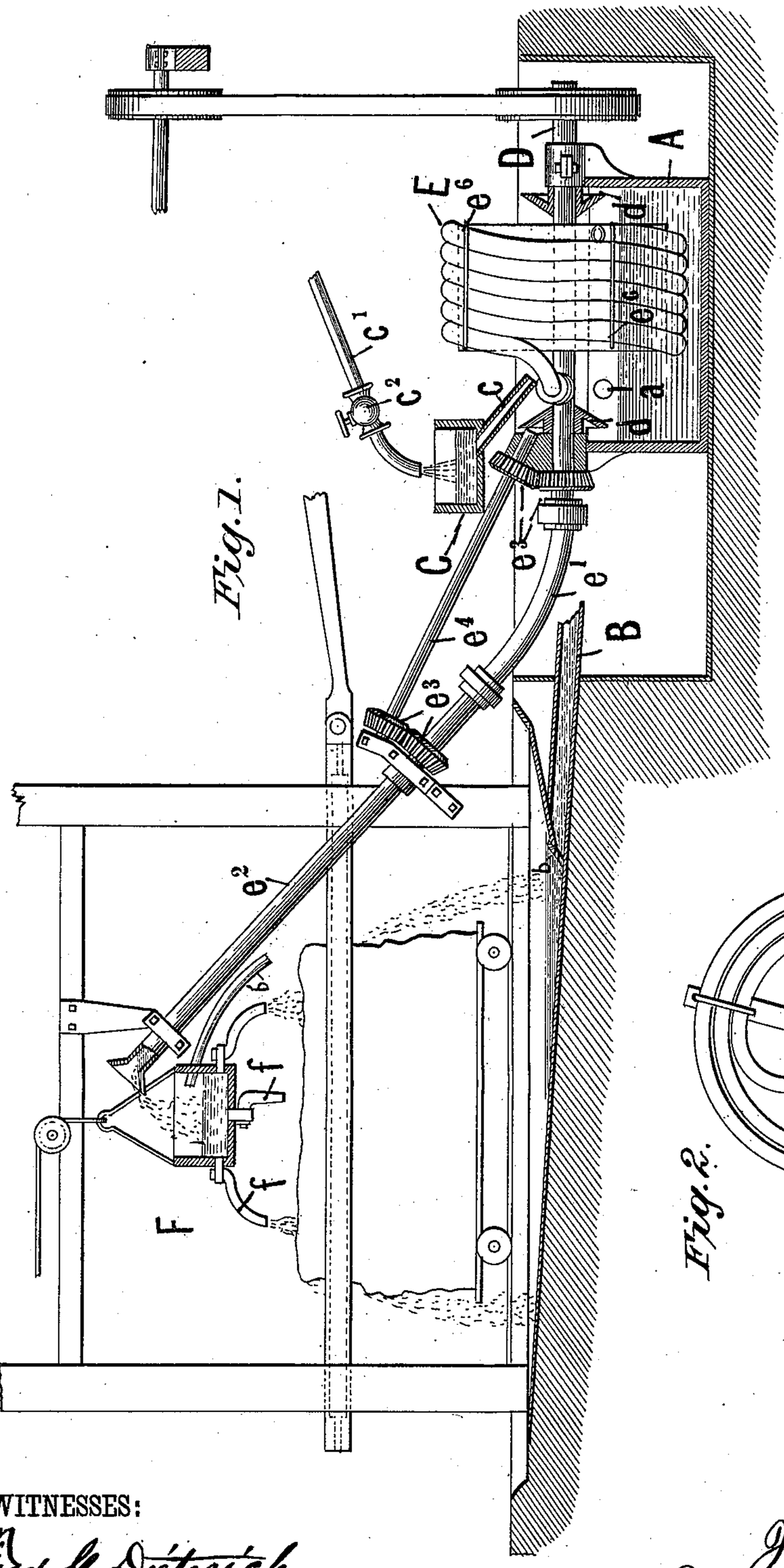

Fig. 1.

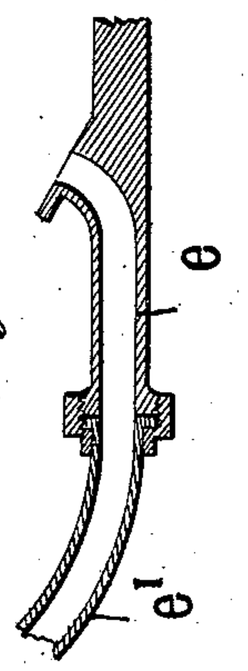

Fig. 3.

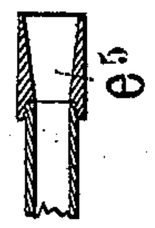

Fig. 4.

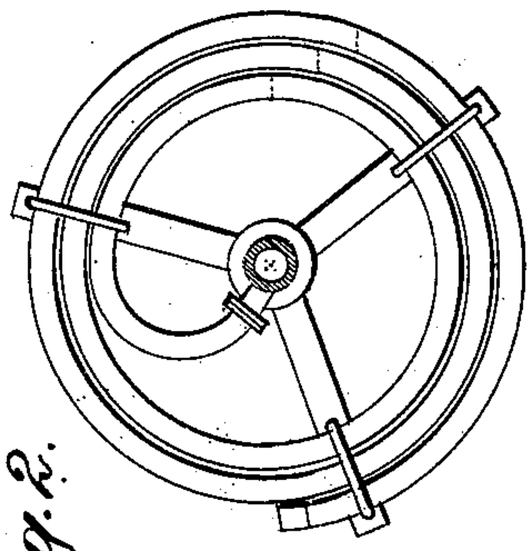

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

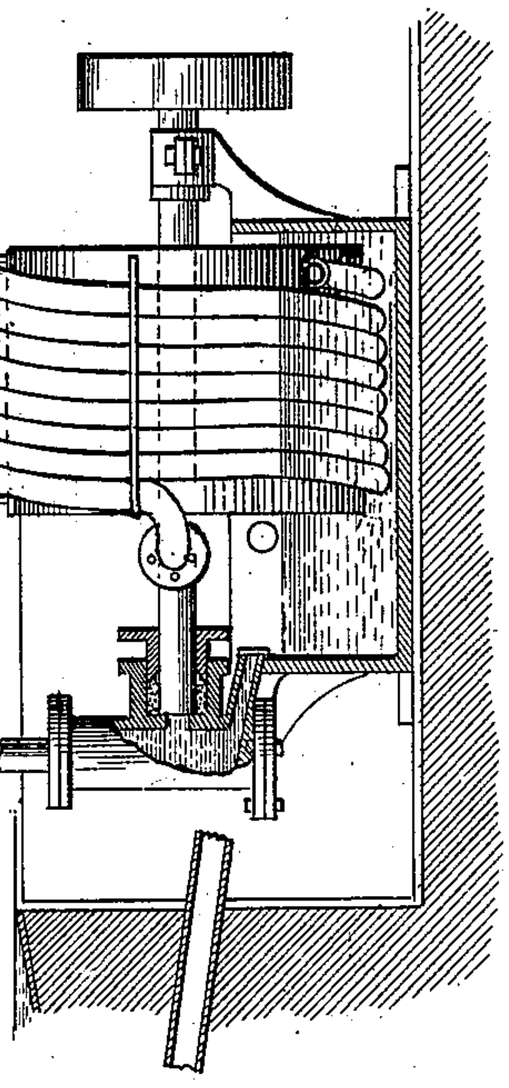


Fig. 8

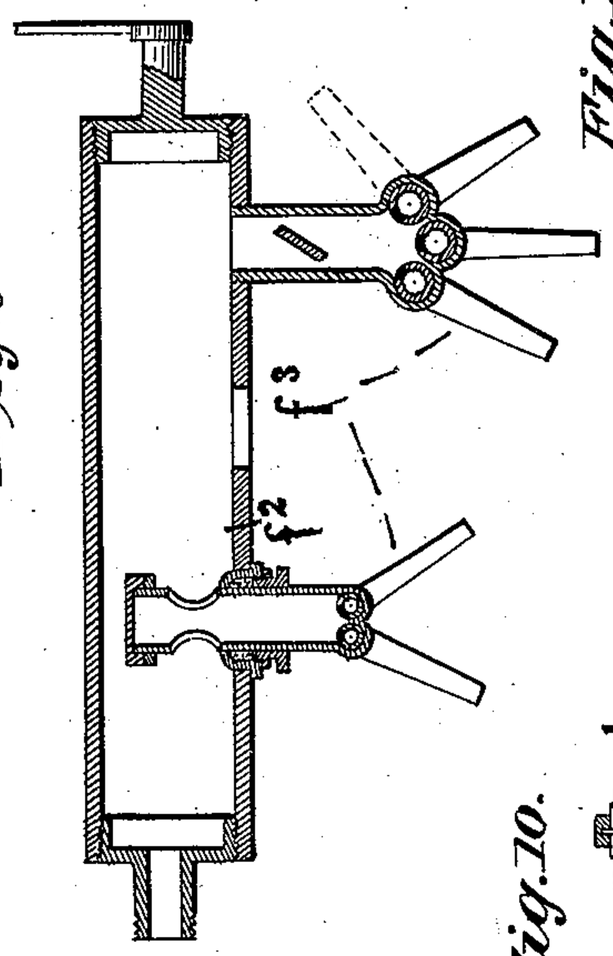


Fig. 9.

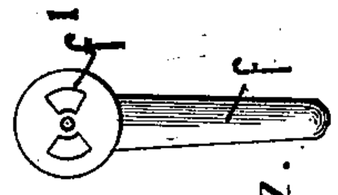


Fig. 11.

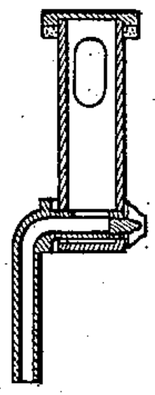


Fig. 5.

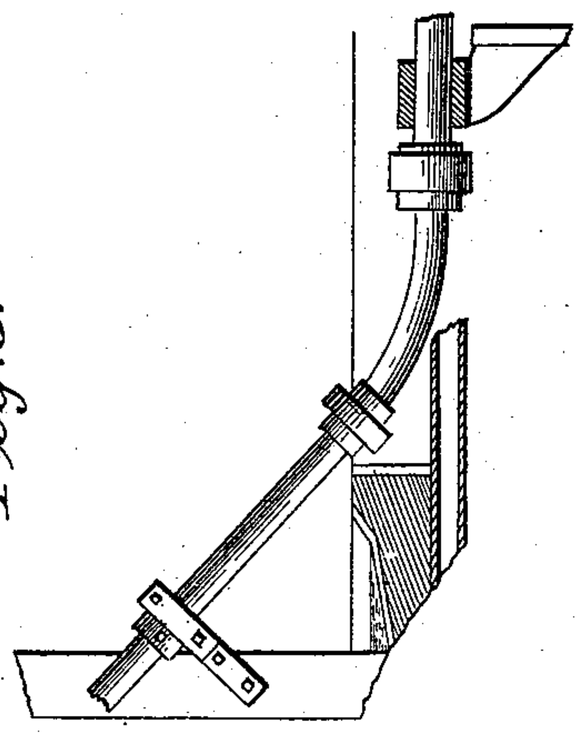


Fig. 7.

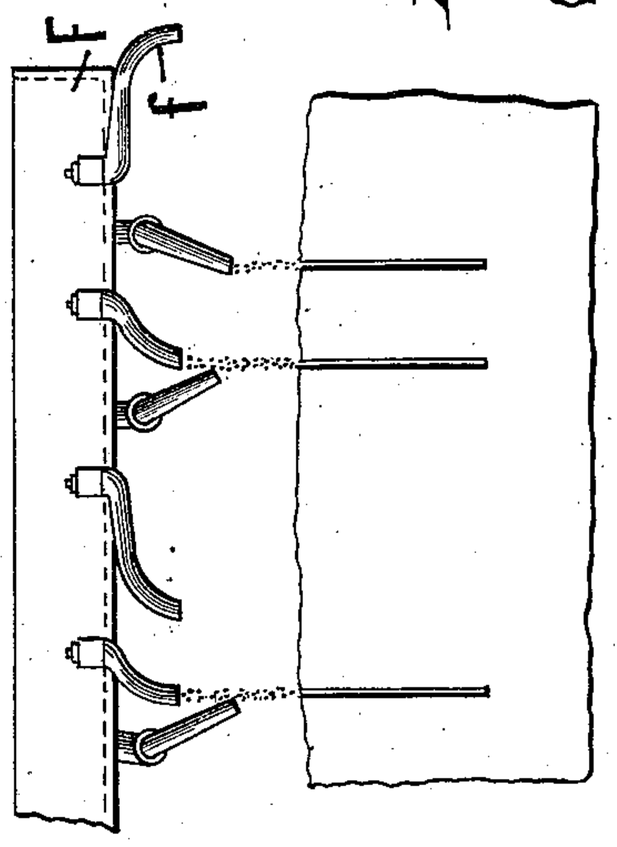
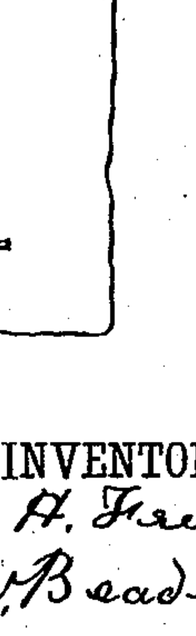


Fig. 10.



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UNITED STATES PATENT OFFICE.

JOHN HENRY FRENIER, OF RUTLAND, VERMONT.

SAND AND WATER FEED MECHANISM FOR STONE-SAWING MACHINES.

SPECIFICATION forming part of Letters Patent No. 352,916, dated November 23, 1886.

Application filed September 17, 1885. Serial No. 177,355. (No model.)

To all whom it may concern:

Be it known that I, JOHN HENRY FRENIER, of Rutland, county of Rutland, and State of Vermont, have invented new and useful Improvements in Sand and Water Feed Mechanism for Stone-Sawing Machines; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to that class of machines employed for elevating and distributing sand and water to stone-sawing machines, whereby the saws are constantly supplied with sand and water, or chilled shot and water, by means of which the stone is abraded or cut away. It is also adapted to machines for grinding and polishing stone.

The object of my invention is to provide a means for automatically supplying the sand and water mixture to the saws, said supply being taken from the drain beneath the stone, thus keeping up a constant supply of the same; and it consists in an improved pump and connection, by means of which the sand and water mixture is constantly agitated and thereby kept in suspension during its course, as will be fully described hereinafter.

In the drawings, Figure 1 represents a side view of my invention as applied to an ordinary stone-sawing machine; Fig. 2, an end view of a spiral coil, which has the pipe wound in three rows, one upon the other, instead of in one row, as shown in Fig. 1; Fig. 3, a section of a portion of the raising apparatus shaft; Fig. 4, a section of the open inlet end of the coil, with a removable mouth-piece. Fig. 5 is a partial side view of a raising mechanism adapted for small machines, the system of gearing employed in Fig. 1 being dispensed with; Fig. 6, a modified form of construction, in which a stationary discharge-pipe is employed instead of a revolving one; Fig. 7, a front view of the distributing-reservoir and the distributing-pipes leading therefrom; Fig. 8, a partial sectional view of the reservoir and one of its distributing-pipes with its valve; Fig. 9, a top view of the pipe and valve shown in Fig. 8; Fig. 10, a modified construction of a distributing-reservoir with its pipes and valves, and Fig. 11 a sectional detail view of one of the pipes.

To enable others skilled in the art to make and use my invention, I will proceed to describe fully the construction and operation of the same.

For convenience and clearness of description the invention will be described under several heads, as follows: First, the main supply-tank and its connections; second, the raising mechanism, and, third, the distributing-reservoir and its pipes.

First. The main supply-tank and its connections:

A represents a tank of any suitable size and shape, which is located on a longitudinal plane sufficiently below the plane of the stone-sawing machine to obtain the proper fall for drainage. *a* represents an overflow-opening, by means of which the mud, worn sand, and detritus resulting from the sawing action is carried off. In this tank is placed the main supply of sand and water in such quantities as to fill the same up to the normal level, which is some distance below the line of the shaft of the raising mechanism, as shown.

B represents a drain-conduit located below the stone, and leading away to the tank A, as shown partly broken off in Figs. 1 and 6. By means of this drain-conduit the water and sand which fall from the stone and saws are delivered again into the main supply-tank.

b represents a screen located at the proper point on the conduit, by means of which stones and pebbles are prevented from entering the tank.

C represents an auxiliary tank located above the main tank A, and connected therewith by a proper pipe or trough, *c*, through which fresh sand is supplied to the main tank at proper intervals in proper quantities to compensate for the waste.

c' represents a water-supply pipe having a cock, c^2, by means of which the sand in the auxiliary tank is properly stirred and delivered through the pipe or trough *c* into the main tank A.

Second. The raising mechanism:

D represents a shaft held by any proper bearings upon the tank or other suitable place, upon which is located a drum, as shown in Figs. 1 and 6, or spider-arms, as shown in Fig. 2; or any other suitable construction may be employed.

d d represent collars of any suitable construction, by means of which the bearings on the shaft are protected from the sand.

E represents a section of pipe wound spirally upon the drum or spider-arms, either in single rows, as shown in Figs. 1 and 6, or in three rows, as shown in Fig. 2, or any other desired number of rows within proper limits. This pipe, as shown in the drawings, is wound spirally, but it may be wound in any form desirable; also, instead of a coiled pipe the spiral passage may be made or formed in the wheel, or in any other desirable manner or construction.

e, Fig. 3, represents a sectional view of a shaft of special construction made hollow in one of its ends, by means of which connection is made with the end of the coil proper and the flexible pipe-section *e'*, as shown. This shaft may be made hollow for its entire length, except where connected to the coil. By means of this shaft the spiral coil-tube is supported and driven. The flexible tube or pipe *e'* is made of any suitable flexible material, and is connected to the shaft D and to pipe e^2 by any suitable pipe-coupling.

e^2 represents a pipe-section leading from the upper end of the flexible section *e'* to a point over the distributing-reservoir, as shown, or to a central reservoir. The upper end of this pipe-section is made with a flaring mouth to better adapt it for discharging its contents properly into the reservoir.

e^3 e^3 e^4 represent the parts of a system of gearing by means of which the movement of the shaft D is communicated to upper pipe-section, e^2. Any suitable bearings are provided for the pipe-sections, as shown.

When the mixture is not raised very high, or when the quantity to be raised is small, or for other reasons, the system of gearing shown in Fig. 1 might be dispensed with, (see Fig. 5,) as the motion of the drum-shaft is easily transmitted to the revolving pipe e^2 through the flexible pipe *e'*; but in large apparatus, or where the discharging-pipe e^2 is very large or very long, I prefer to use the system of gearing, as in Fig. 1, to revolve the pipe e^2, thus relieving the flexible pipe *e'* of all twisting-strain.

The apparatus represented in Fig. 6 is substantially intended in construction and operation as the apparatus represented in Fig. 1, the only difference in construction being that in Fig. 6 the discharge-pipe is stationary, the mixture being discharged at the bottom of said pipe through the hollow shaft *e*. The end of shaft *e* is supported and revolved in a packing-box of suitable construction to form an air-tight joint between the revolving shaft and the stationary pipe, and thus the flexible pipe *e'* is dispensed with.

When constructed as in Fig. 6, the apparatus is adapted for connection at its delivery end with conducting-pipes, so as to force the mixture to a number of machines or to long distances.

e^5 represents a mouth-piece of durable material located on the end of the coil within the tank, which is preferably made with a beveled or thin edge for the purpose of entering the sandy mixture more readily, and is made of any suitable shape.

e^6 e^6 represent fastenings of any proper construction to hold the pipe-coil on the drum or arms, serving also as agitators to stir up the sand and water together, or separate agitators might be fastened to the drum or shaft in any other way, or they might be entirely dispensed with. By means of the revolution of the spirally-formed wheel into the tank the sand is constantly agitated and kept in suspension. The detritus or mud is also separated and brought to the surface and thrown off by the overflow-opening *d*.

Third. The distributing-reservoir:

F F, Figs. 1 and 7, represent the distributing-reservoir, of any suitable size and shape, which is located above one or more machines, according to the circumstances of the case; but in circumstances where many machines are to be fed by the same raising apparatus I prefer to raise and discharge the mixture into a suitable central reservoir, (not shown in these drawings,) and set above the distributing-reservoir, and fitted with suitable pipe or other conduit to conduct the mixture to each one of the distributing-reservoirs, said reservoir having an overflow-pipe leading back to the main tank to prevent flooding when any one of the machines is stopped.

f represents distributing-pipes connected to the reservoir in such manner as to turn freely in any direction. By means of this construction the bent discharging ends of the pipes are brought readily into any desired position for the purpose of discharging the sand and water where it is needed.

f', Figs. 9 and 10, represents a register-plate joint in the distributing-pipe, by means of which the flow of material is cut off when the pipe is turned out of its normal position. Any proper valve, also, may be employed for determining the flow of material through the pipe. An overflow-pipe, *b'*, of any proper construction, leading from the reservoir back to the drain-conduit or the main tank, may be employed to prevent flooding when any one of the stone-sawing machines is stopped, or when some or all the distributing-pipes are closed.

f^2, Fig. 8, represents a modified construction of reservoir with its pipes f^3 f^3, two or three or more in number, grouped together, and having one single valve for the entire series.

f^4 is made with one or more holes, f^5, to afford passage to the mixture when open, as shown, the flowing being cut off, when desired, by pulling out the pipe f^4, so as to close the holes f^5.

The general operation is substantially as follows: The tank having been supplied with the proper quantity of sand and water, the shaft

D is given revolution in the proper direction by the mechanism shown for that purpose, or by any other proper mechanism. By the revolution of the shaft the spiral coil E and its connections are also caused to revolve. At each revolution of the shaft, the open end of the pipe having the mouth-piece thereon is caused to dip into and pass through the volume of sand and water in the tank, taking up in its passage that portion that lies in its path. As the coil is immersed in the mass of sand and water less than one-half its circumference, it follows that the greater portion of the spiral of each coil is filled with air. By the continued revolution of the coil the spirals are filled eventually with alternate volumes of sand and water and air. By the continued revolution of the coil, also, the individual volumes of sand and water and air are caused to progress step by step through the coil, and out through the flexible pipe-connection e' into the upper pipe-section, e^2. The air volumes are of course compressed between the sand and water volumes. By means of these air volumes the sand and water volume is broken up so the friction is largely reduced and the lifting action consequently facilitated. By the employment of the air volume also the sand and water are held in a state of agitation, so that the separation of the two does not occur. By revolving the coil in the opposite direction all the contents may be returned to the tank, this operation being necessary when the machine is to be at rest any length of time, to prevent the sand from settling and choking the pipes.

Some of the advantages of the described construction are as follows: The sand and water are properly delivered to the distributing-reservoir by means of a slow movement which does not occasion the wear of the parts. No piston or valves are employed. The mouth-piece protecting the end of the pipe may be readily removed, when worn out, to permit the employment of a new one. A small amount of sand and water is required, because it is distributed to just the parts where it is needed.

The method of raising sand and water by the employment of alternate volumes of sand and water and air is not claimed in this application, but may be made the subject of another application. The adaptation of this principle also to the raising of liquids generally is not claimed in this application, but will be made the subject of another application.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a stone-sawing apparatus or other analogous machines, of a collecting-drain beneath the said apparatus, a main supply and collecting tank adapted to hold the sand and water, a rotary spiral pump supported in such manner as to rotate horizontally into the tank and partly submerged in the mixture of sand and water, a reservoir to extend above the plane of the machine, and a delivery-pipe connected to the pump and leading to the reservoir to convey thereto mixed sand and water or chilled shot and water, substantially for the purpose set forth.

2. The combination, with a sawing apparatus, of a collecting-drain beneath said apparatus, and a main supply-tank connected with said drain adapted to hold the sand and water mixture, an overflow-opening at the top of said tank for letting off the detritus, a spiral pump supported to rotate horizontally into said tank and partly submerged in the mixture of sand and water contained in the tank, and means to support and rotate said pump, and a suitable delivery-pipe connected to the pump for conveying the mixture to points where needed, substantially for the purpose set forth.

3. In a stone-sawing machine, the combination of a distributing-drain beneath the machine, a main supply-tank in combination with the drain, a source of fresh sand and water discharging into said tank, a pump-wheel composed of a spiral or helicoidal passage and supported horizontally and partly submerged in said tank, said wheel at each revolution taking in a volume of sand and water and a separate volume of air, which by the continued revolution of the wheel advances and elevates the mixture to the reservoir, substantially as specified, and for the purpose set forth.

4. In a stone-sawing machine, the combination, with the collecting-drain beneath the machine, of a main supply-tank adapted to hold the sand and water mixture, of a rotary spiral pump-wheel set horizontally and composed of a spiral or helicoidal passage or conduit, one end forming an inlet-opening and the other end a discharge-opening, and a discharge-pipe centrally connected with the pump-wheel and revolving with it throughout its entire length, substantially as described, and for the purpose set forth.

5. The combination, with a stone-sawing machine, of a distributing-reservoir above the plane of the machine, of adjustable pipes consisting of rigid parts connected to the reservoir, and an adjustable swinging piece connected to the rigid part, and both provided with register-valved joints adapted to shut off the supply when turned out of their normal positions, substantially as described, and for the purpose set forth.

6. In combination with a tank containing a sand and water mixture, a spiral pump formed of a coiled pipe supported horizontally and partly submerged in said tank, adapted to take at each revolution a volume of sand and water mixture and a separate volume of air, as described, with means for supporting and rotating said pump-wheel, a reservoir set above the plane of the machine, a delivery-pipe leading to said reservoir, a flexible pipe connecting said delivery-pipe to the pump-wheel, and means to transmit the motion of the wheel-shaft

to the delivery-pipe, substantially as set forth, and for the purpose described.

7. In a stone-sawing machine, the combination, with the collecting-drain beneath the machine, of a main supply-tank adapted to hold the supply of sand and water mixture, of a rotary spiral pump-wheel formed with a spiral or helicoidal hollow passage or conduit, one end forming an inlet-opening and the other end a central discharge-opening, a delivery-pipe centrally connected to the wheel and revolving with it, said delivery-pipe consisting of a rigid part and of a flexible part, as described, and a system of gearing for transmitting the rotary motion of the wheel to the delivery-pipe, substantially as and for the purpose set forth.

This specification signed and witnessed this 7th day of September, 1885.

JOHN HENRY FRENIER.

Witnesses:
LÉON LEBLANC,
CHARS POULIN.