(No Model.)

A. THIERY.

PUMP.

No. 411,625. Patented Sept. 24, 1889.

Fig. 1.

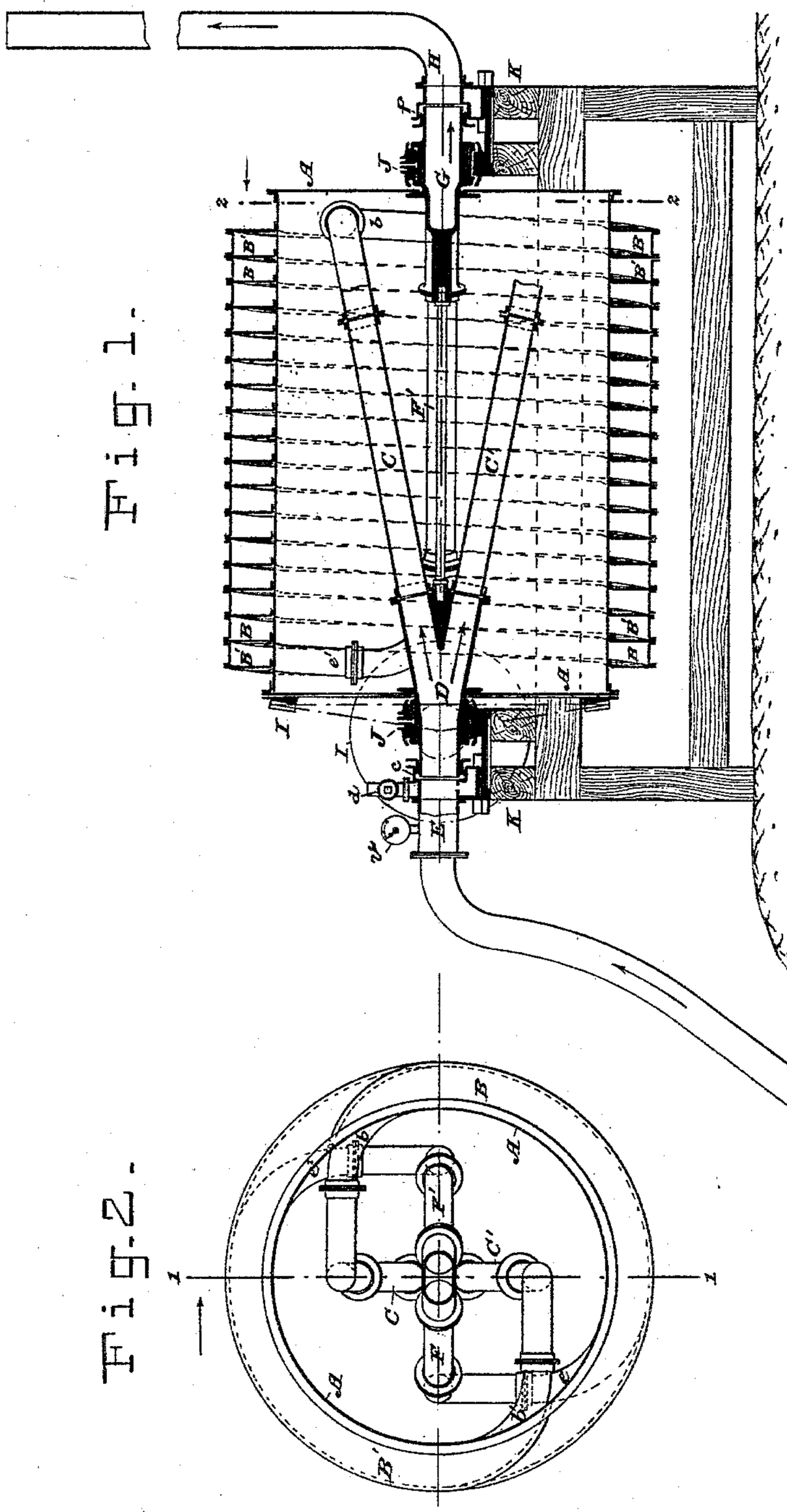

Fig. 2.

WITNESSES:

E. R. Bolton

J. D. Lapham

INVENTOR:

Albert Thiery.

By Henry Connett

Attorney.

UNITED STATES PATENT OFFICE.

ALBERT THIÉRY, OF PARIS, FRANCE.

PUMP.

SPECIFICATION forming part of Letters Patent No. 411,625, dated September 24, 1889.

Application filed October 19, 1887. Serial No. 252,853. (No model.) Patented in France October 21, 1884, No. 164,902, and in Belgium April 20, 1885, No. 68,569.

To all whom it may concern:

Be it known that I, ALBERT THIÉRY, a citizen of the French Republic, and a resident of Paris, France, have invented certain Improvements in Lift and Force Pumps, (for which patents have been granted in France, No. 164,902, dated October 21, 1884, and in Belgium, No. 68,569, dated April 20, 1885,) of which the following is a specification.

My invention relates to a lift and force pump especially adapted for dredging purposes where the liquid is mixed with solids—such as sand, gravel, &c.—and it belongs to the class of pumps based on the principle of the Archimedean screw.

Heretofore pumps based on this principle have not, so far as I am aware, been adapted for lifting liquids by aspiration, the pump being arranged above the level of the liquid. My pump is adapted for lifting liquids when the pump is placed several meters above the level of the liquid to be raised, while other pumps of this class require to be partly submerged in the liquid to be lifted. In my pump the lifting of the liquid is effected through the medium of air admitted at regular intervals and alternately into the two helices of the pump, as will be hereinafter explained.

The pump consists of two like closed and parallel channels or helices which embrace a cylinder or drum, the two helices corresponding in character to a double-threaded screw. The drum and helices are mounted to revolve on a horizontal axis, at one end of which is the induction or suction pipe, and at the other end in the axis is the eduction or discharge pipe. The induction-pipe is connected by a forked breeching with two oppositely-diverging pipes that connect, respectively, with the diametrically-opposite receiving ends of the two helices, and the discharge-pipe is connected in a like manner with the discharging ends of the two helices. An air-inlet is provided at the induction-pipe to admit air behind the charges or portions of liquid raised as the drum revolves.

My invention will be hereinafter fully described, and its novel features carefully defined in the claims.

In the accompanying drawings, illustrative of my invention, Figure 1 is a longitudinal axial section of a pump embodying my improvements, the plane of the section being indicated by line 1 1 in Fig. 2. Fig. 2 is a sectional end elevation of the pump, the plane of the section being indicated by line 2 2 in Fig. 1.

Around the drum or cylinder A of the pump, mounted rotatively on a horizontal axis, are formed or arranged two closed parallel spiral channels B and B′, which form helices in the manner of the two threads of a double-threaded screw. There may be more than two of these channels, but I prefer to employ two only.

A pump of the character so far described, and adapted to be worked partly submerged, has been before proposed, and I do not claim this. Such a pump must be placed at the level of the liquid to be lifted.

The receiving ends *b* and *b′* of the respective helices B and B′, which are at the right in Fig. 1, are diametrically opposite one another, and are connected, respectively, with the axially-arranged induction-pipe E by means of a breeching D and two diverging pipes C and C′. These latter are arranged inside of the drum A. The trunk of the breeching D forms the tubular journal of the drum at that end, and rotates with the latter, and it is connected with the stationary induction-pipe E by means of a stuffing-box *c*. An air-inlet cock or valve *d* is provided at the suction-inlet of the pump, and near this valve is placed a vacuum-indicator *v*. The discharging ends *e* and *e′* of the respective helices B and B′, which are at the left in Fig. 1, are arranged diametrically opposite each other and connected with the eduction or discharge pipe H by means of a breeching G and two diverging pipes F and F′, arranged within the drum A. The breeching G is connected to the stationary eduction-pipe by a stuffing-box *f*, and its trunk serves as a tubular journal for the drum at that end. The pairs of pipes C C′ and D D′ are so arranged, respectively, that a plane passing through the axes of the pipes of one pair will be at right angles to a plane passing through the axes of the pipes of the other pair, as clearly indicated in Fig. 2.

The drum and attached parts may be rotated by any suitable gearing, as, for example, by bevel-gears I I, indicated somewhat diagraphically in Fig. 1.

J J represent the bearings of the drum, and K the frame or bed upon which they rest.

Before starting the pump it must be primed—that is, sufficient water must be put into the helix to fill two of the spirals to a depth equal to the depth of the passage in the same. When the drum is rotated about its axis, the solid matters and water rise in the suction-pipe and enter the induction-aperture of the pump, passing into that helix which is at the lower side and filling it up to the level of the cylinder-axis. At the same moment the opening to the upper helix appears above the drum-axis and communicates with the air-inlet *d*, whereby said helix is supplied with air. When the drum has completed a half-revolution, the situations of the two helices will be reversed, and that which during the preceding half-revolution received liquid and solid matter will now receive air, and the other will receive liquid and solid matter. The rotation of the helices drives the mixed liquid and solid matter onward toward the eduction or discharge pipe. At each half-revolution of the drum a portion of liquid and solid matter enters the helix and this is driven forward, forming a sort of piston. This piston leaves behind it for a moment a vacuum, which is at once filled by the inflow of air at the cock *d*. At the next turn another portion of liquid enters the helix, and thus the charges of air and liquid enter in alternate order. The helices operate in the same manner, but they alternate with one another in their action.

The suction in my pump is produced in the same manner as in a pump provided with a piston; but in my pump the liquid itself is the piston and produces a vacuum behind it. This vacuum is filled by the air, which interposes itself between the successive charges of liquid. The discharge of the mixed liquid and solid matters is favored by the compression of the air between the charges of the former in the helix. The degree of compression of the air will depend on the head on the eduction-pipe of the pump.

The operation of my pump, whereby it acts as a lift and force pump, is dependent on the air-inlet and on the arrangement of the helix, with its inlet connected by an oblique pipe with the axially-arranged induction-pipe, whereby the helix receives air and liquid in alternating charges, as described.

It will be understood that the drum A in my pump is useful only as forming a base to support the helices B and B′. Indeed, as herein shown, it forms the inner walls of the helical channels. The connecting-pipes leading from the terminals of the helices to the induction and eduction pipes are arranged within the drum for the sake of compactness and simplicity of construction.

Having thus described my invention, I claim—

1. In a lift and force pump, the combination, with the like helical channels mounted rotatively on a common axis, of pipes connecting the receiving ends of said channels with the induction pipe or inlet of the pump, the said induction-pipe provided with an air-inlet *d*, the pipes connecting the delivery ends of the said helical channels with the eduction-pipe of the pump, and the said eduction-pipe, substantially as described and set forth.

2. In a pump, the combination, with the like helical or spirally-arranged channels B B′, mounted rotatively on their common axis and having tubular journals on which they rotate, of the pipes C and C′, connected, respectively, with the terminals *b* and *b′* of said channels at one end and with the breeching D at their other ends, the pipes F and F′, connected at one end with the terminals *e* and *e′* of said channels and at their other ends with the breeching G, the said breechings D and G, and the air-inlet at the induction end of the pump, the pipes C C′ and F F′ being arranged within the drum-like coils formed by said channels B B′, as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALBERT THIÉRY.

Witnesses:
JULES FAYOLLER,
AUG. VINCK.