

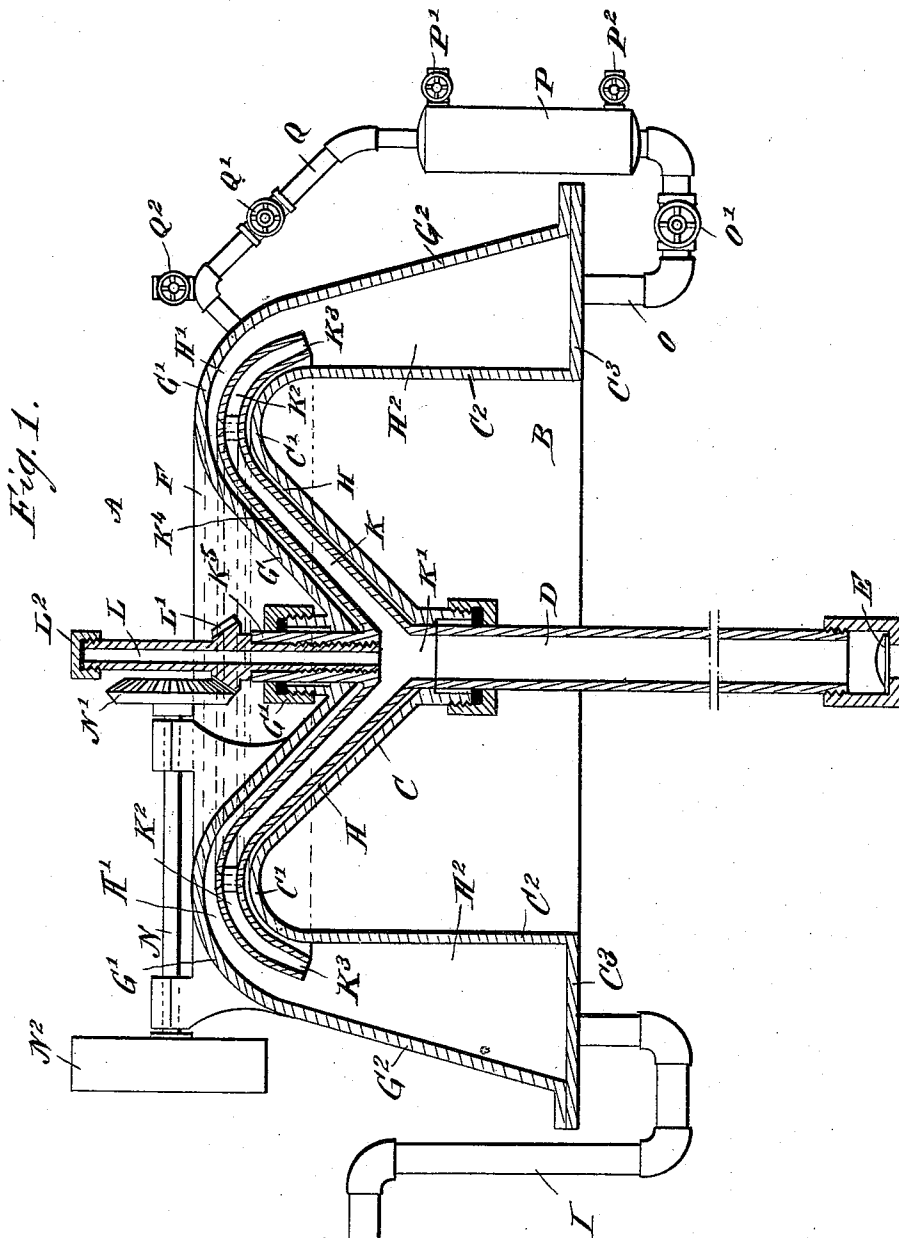
(No Model.)

2 Sheets—Sheet 1.

E. S. NICHOLAS & J. R. TURNER.
CENTRIFUGAL FORCE PUMP.

No. 450,491.

Patented Apr. 14, 1891.



WITNESSES:

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ATTORNEYS

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

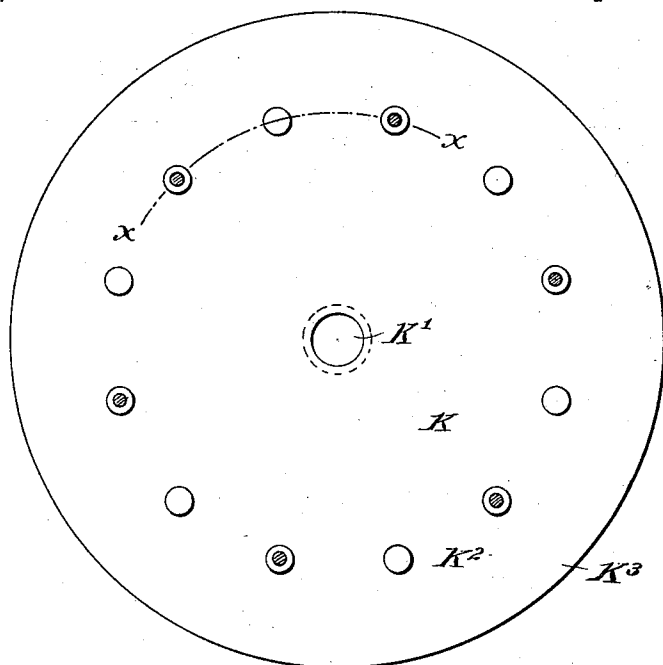


Fig. 3.

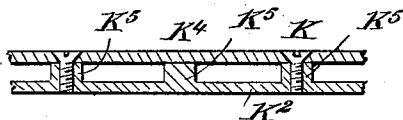


Fig. 5.

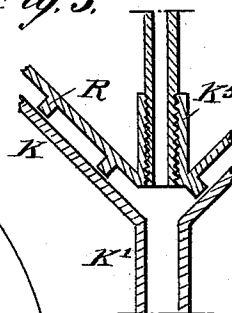
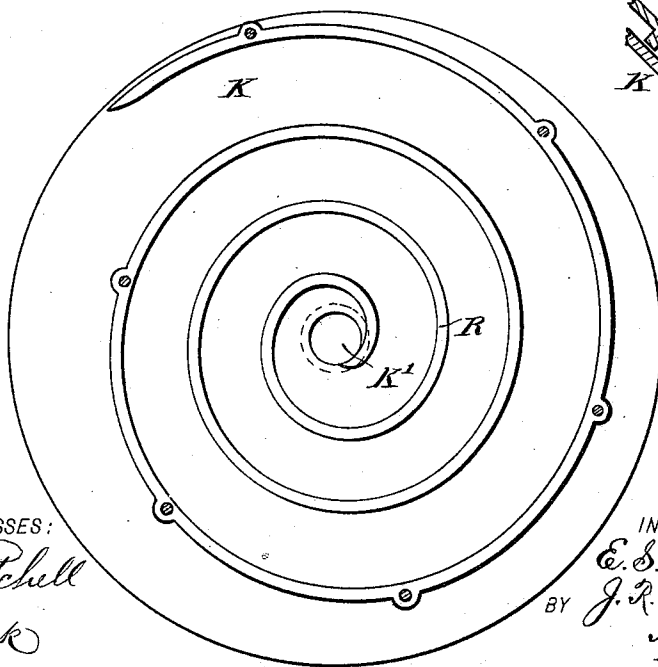


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWARD S. NICHOLAS AND JOSEPH R. TURNER, OF GREENVILLE, OHIO.

CENTRIFUGAL FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 450,491, dated April 14, 1891.

Application filed May 13, 1890. Serial No. 351,683. (No model.)

To all whom it may concern:

Be it known that we, EDWARD S. NICHOLAS and JOSEPH R. TURNER, of Greenville, in the county of Darke and State of Ohio, have invented a new and Improved Centrifugal Force-Pump, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved centrifugal force-pump, which is simple and durable in construction, very effective in operation, designed to raise light or heavy liquids, and adapted to be used for filling tanks, irrigating land, as a domestic pump, for oil-pipe lines, water-works, &c.

The invention consists in certain parts and details and combinations of the same, as will be described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a sectional plan view of the cone. Fig. 3 is a sectional side elevation of part of the same on the line *xx* of Fig. 2. Fig. 4 is a sectional plan view of a modified form of the cone, and Fig. 5 is a sectional side elevation of a modified form of the improvement.

The improved centrifugal force-pump A is provided with a casing B, having a center wall formed in the shape of an inverted cone C, from the apex of which extends downward the suction-pipe D, provided with a check-valve E. The central cone C, at its base B, terminates in an annular curved flange C'; from which extends downward the annular inner wall C², provided with an outwardly-extending flange or base C³. The casing B is provided with a cover F, having the inverted cone G in its center, from which extends, at the circumference, the downwardly-curved annular flange G', terminating in an outer wall G², reaching to the base C³, and secured to the latter by suitable means. The casing B thus formed has an inverted-cone-shaped space H, from which extends a downwardly-curved annular space H', leading to the water-receptacle H², formed between the inner and outer walls and the base, as is plainly shown in Fig. 1. From this water-receptacle H² leads a discharge-pipe I.

In the inverted-cone-shaped space H is mounted to turn an inverted duplex or hollow cone K, formed of two spaced concaved disks, and provided in its apex with a downwardly-extending short neck K', opening into the suction-pipe D, so that the water passing to the latter can pass directly into the interior of the duplex or hollow cone K. The hollow or duplex cone is provided at its base with the curved annular ring K², extending into the similarly-shaped part H' of the casing B, and the said curved ring K² is provided with a continuous annular outlet K³, discharging into the water-receptacle H². The upper conical disk or cover K⁴ of the inverted hollow cone K is secured by suitable bolts or screws to the lower conical disk or main body, as is plainly illustrated in Figs. 2 and 3. The opening in the hollow cone K decreases from the center to the continuous opening K³, by reason of the difference in the angles of the two disks, said angles being on lines which intersect at the base of the duplex cone, and the area of the latter is somewhat less than the cross-section of the suction-pipe D.

The fastening-screws pass through the cover K⁴ into bosses K⁵, preferably arranged at or near the curved part or base of the cone. Between the bosses K⁵ is left sufficient space which forms port-holes or orifices, so as to leave a continuous passage in the cone from the apex to the circumference of the rim. Extra enlarged ports may be formed in the opening K³ to permit impurities—such as sand and pebbles—to pass to the outside. In case they are used the entire discharge-opening should be slightly larger in area than the cross-section of the suction-pipe.

From the center of the cover K⁴ extends upward a hub K⁶, mounted to turn in suitable bearings G' formed in the cover G of the casing B. In the hub K⁶ is secured a hollow shaft L, provided with a fixed bevel gear-wheel L', meshing into a gear-wheel N', secured on the horizontally-extending shaft N, mounted to turn in suitable bearings formed on the cover G of the casing B. The shaft N is provided with a pulley N², connected with suitable machinery, so as to impart a rotary motion to the said shaft N, which rotary motion is transmitted by the gear-wheels N' and L' to the shaft L, whereby the hollow cone is rotated within the casing B. The upper end

of the shaft L is adapted to be closed by a cap L², which can be removed to permit of filling or priming the cone, as hereinafter more fully described.

From the base C³ of the casing B leads a pipe O, provided with a valve O', and connected with an air-chamber P, provided near its top and bottom with valves P' and P². From the top of the air-chamber P leads a pipe Q, opening into the space H' of the casing B, the said pipe being provided with a valve Q' and an air-cock Q² located above the highest point of the casing B.

As illustrated in Fig. 4, the cone K may be provided with an interior spiral R, which commences at the neck K' and terminates near the base, so that the water passing through the cone travels along the spiral before it is discharged at the opening K³, as illustrated in Fig. 5. The cone K is solid and is provided on its under side with a spiral R, filling the space between the hollow cone K and the cone C.

The operation is as follows: When the pump has been set up and the suction-pipe D extends into the liquid to be pumped, then the operator, in order to start the pump, first removes the cap L² and then fills the suction-pipe D and the cone K with liquid. A rotary motion is now imparted to the shaft N, as previously described, so as to revolve the cone K within the casing B, whereby the centrifugal force causes the water in the cone K to discharge through the opening K³, so that the vacuum produced in the cone K causes the water to rise from the water-supply into which the suction-pipe D extends. The water lifts or opens the check-valve E, passes through the suction-pipe into the cone K, and is continuously discharged through the opening K³ of the latter as long as the cone revolves. The water is forced from the casing B through the outlet-pipe I to any desired place.

It is understood that the quantity of water sucked up and discharged by the cone K depends upon the size of the latter and the speed at which it revolves. When the spiral R is used, as previously mentioned, then the power of the revolving spiral is added to the centrifugal force of the cone K. When the rotary motion of the cone K ceases, the water held in the cone at the time comes to a state of rest in the cone and the latter remains filled, so that the pump is ready to be started again at any time without a new priming or filling, as previously mentioned. It is understood that the cone K is fitted as close as possible into the casing B, so that the cone revolves in a vacuum, whereby the friction is diminished to a minimum. It will further be seen that when the water has passed to the base of the cone K it flows downward by gravity through the curved annular part K², to be discharged at the opening K³ into the water-chamber H². Any air which may be between the cone K and the cone C is forced outward into the

water-receptacle H whenever the cone K is set in motion, as the centrifugal force moves the air in that direction.

The air-pump P is used when high pressure is desired in the casing B, so as to force the water from the latter through the pipe to a long distance or a great height. In order to do this the valves O' and Q' are opened when the pump is running, so that water from the casing B can pass through the pipe O into the chamber P, so as to force the air out of the latter through the pipe Q into the top of the casing B, whereby pressure is exerted on the water contained in the casing. Now by closing the valves O' and Q' and opening the valves P' and P² the water in the chamber P will be drained out and the chamber again filled with air. The valves or faucets P' and P² are then again closed and the valves O' and Q' are again opened, so that water passing through the pipe O again into the chamber P forces another quantity of air into the casing B, so that additional air-pressure is exerted on the body of water in the said casing. This operation can be repeated until the desired air-pressure is obtained in the casing.

By having the apex of the cone K downward, as previously described, the pump will always be filled with water ready to be started whenever desired. By providing the cone K with the annular downwardly-extending part K² the water has a free discharge from the said cone, as it flows downward by its gravity after leaving the base of the cone proper.

Having thus fully described our invention, we claim as new and desire to secure by Letters Patent—

1. In a centrifugal force-pump, the combination, with a revoluble inverted duplex cone, of an inverted-cone-shaped air-chamber, within which said duplex cone is mounted close to the inner walls thereof to form a vacuum within said air-chamber around the duplex cone by its rotation, substantially as shown and described.

2. In a centrifugal force-pump, the combination, with an inverted-cone-shaped air-chamber, of an inverted duplex cone provided with a spiral and mounted within said air-chamber, substantially as shown and described.

3. In a centrifugal force-pump, a revoluble inverted duplex cone having two conical disks and an annular downwardly-curved flange extending from the base of the upper conical disk of the duplex cone, and a parallel downwardly-curved flange extending from the lower conical disk of the duplex cone, the two flanges forming an annular ring, substantially as shown and described.

4. In a centrifugal force-pump, the revoluble inverted cone having a continuous opening from apex to circumference, and an annular downwardly-inclined rim the parts of which are fastened together at points on the base or rim of said cone, leaving port-holes or orifices between the bosses of said fastenings

curved at an angle conforming to the degree of obliquity of said cone and the curvature of its rim, and making a continuous opening through said port-holes or orifices from the apex of the cone to the circumference of the rim, substantially as shown and described.

5. In a centrifugal force-pump, a revoluble inverted cone having a continuous opening from apex to circumference of the base, and an annular downwardly-curved flange extending from the base of the cone, and a spiral arranged within the said cone, substantially as shown and described.

6. In a centrifugal force-pump, the combination, with a casing having its center in the shape of a hollow inverted cone, and a suction-pipe extending from the apex of the cone, of a hollow cone mounted to revolve within the cone part of the said casing and provided with a short neck at its apex arranged in line with the said suction-pipe, substantially as shown and described.

7. In a centrifugal force-pump, the combination, with a casing having its center in the shape of a hollow inverted cone, and a suction-pipe extending from the apex of the cone, of a hollow cone mounted to revolve within the cone part of the said casing and provided with a short neck at its apex arranged in line with the said suction-pipe, and an annular downwardly-curved hollow part extending from the base of the said revoluble cone, substantially as shown and described.

8. In a centrifugal force-pump, the combination, with a casing having its center in the shape of a hollow inverted cone, and a suction-pipe extending from the apex of the cone, of a hollow cone mounted to revolve within the cone part of the said casing and provided with a short neck at its apex arranged in line with the said suction-pipe, an annular downwardly-curved hollow part extending from the base of the said revoluble cone, and a hollow shaft secured in the apex of the said cone and connected with machinery for imparting a rotary motion to the shaft, substantially as shown and described.

9. In a centrifugal force-pump, a revoluble inverted cone having a continuous opening from apex to circumference of the base, and a hollow driving-shaft attached to the said hollow cone at its hub, the opening of the said hollow shaft entering the said continuous opening for priming purposes, substantially as shown and described.

10. In a centrifugal force-pump, the combination, with a hollow inverted cone having a downwardly-curved annular part, of a casing in which the said cone is mounted to turn, and an air-chamber connected with the said casing to supply the latter with compressed air, substantially as shown and described.

11. In a centrifugal force-pump, a casing having its center formed of a hollow inverted cone, from which extends a downwardly-curved annular part leading to an annular wa-

ter-chamber, the inner wall of which is vertical and the outer wall slanting, substantially as shown and described.

12. In a centrifugal force-pump, the combination, with an inverted rotary hollow duplex cone, of an annular water-receiver having its horizontal base area bounded by concentric circular walls, the outer wall being inclined downward and outward, an inverted cone in which the hollow cone rotates connected at its base with the upper end of said inner wall, and an annular air-chamber opening into the upper end of the water-receiver and having the center of its top lower than its perimenter, substantially as set forth.

13. In combination with the combined water-receiver and air-chamber, an inverted rotary hollow duplex cone formed of two conical disks which conform in degree of obliquity with the inverted-cone-shaped air-chamber in which said duplex cone is mounted to form a vacuum by its rotation around the duplex cone and to discharge its liquid through the compressed air into the annular water-receiver, substantially as shown and described.

14. In combination with the combined water-receiver and air-chamber, the hollow cone having a downwardly-inclined flange extending over and revolving within the chamber beyond the acute angle formed by the interior perpendicular wall and the circumference of the cone of the bottom of said chamber, substantially as and for the purposes specified.

15. In combination with the hollow cone, a combined water-receiver and air-chamber, in the conical space of the top of which the hollow cone revolves and the remainder of the space of which grows gradually broader and larger as it descends toward the base of said chamber, substantially as and for the purposes specified.

16. The combination of the water-receiver and air-chamber having a conical space at the top and the remainder of its vertical space a wedge-shaped figure whose base is the base of said chamber, and the hollow pumping-cone having a downwardly-inclined rim at its circumference, hollow driving shaft and hub, suction-pipe packing, and suction-pipe having valve, an exterior chamber provided with suitable regulating-cocks lying between the horizontal lines of top and base of water-receiver and air-chamber and connected to said air-chamber and water-receiver by two hollow pipes, one above or on and the other below the horizontal line of discharge of the hollow cone, substantially as and for the purposes specified.

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JOS. R. TURNER.

Witnesses:

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FREDERICK DIETZ.