(No Model.) 2 Sheets—Sheet 1.

S. C. SHEPARD.

ROTARY FORCE PUMP.

No. 528,347. Patented Oct. 30, 1894.

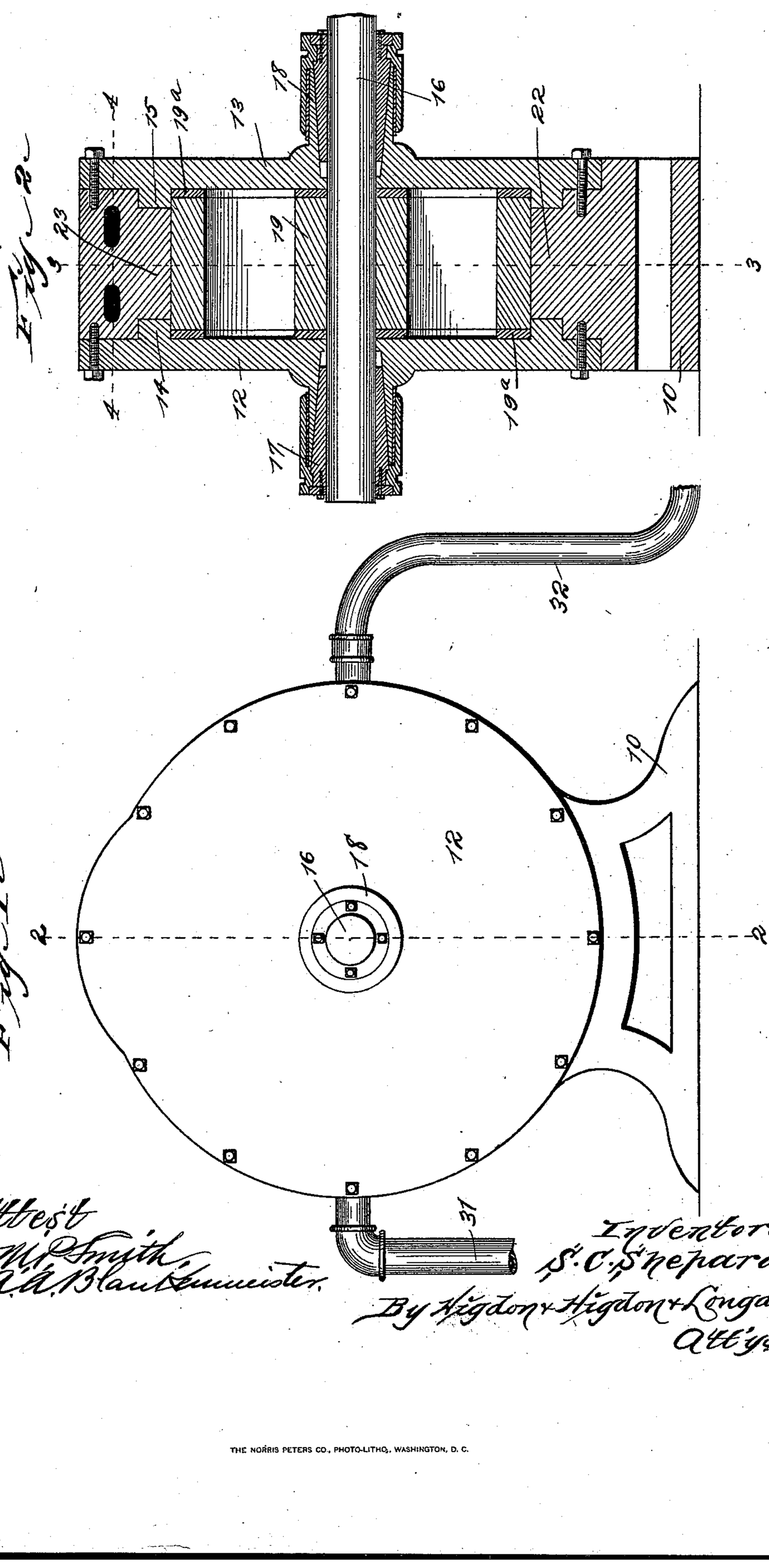

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

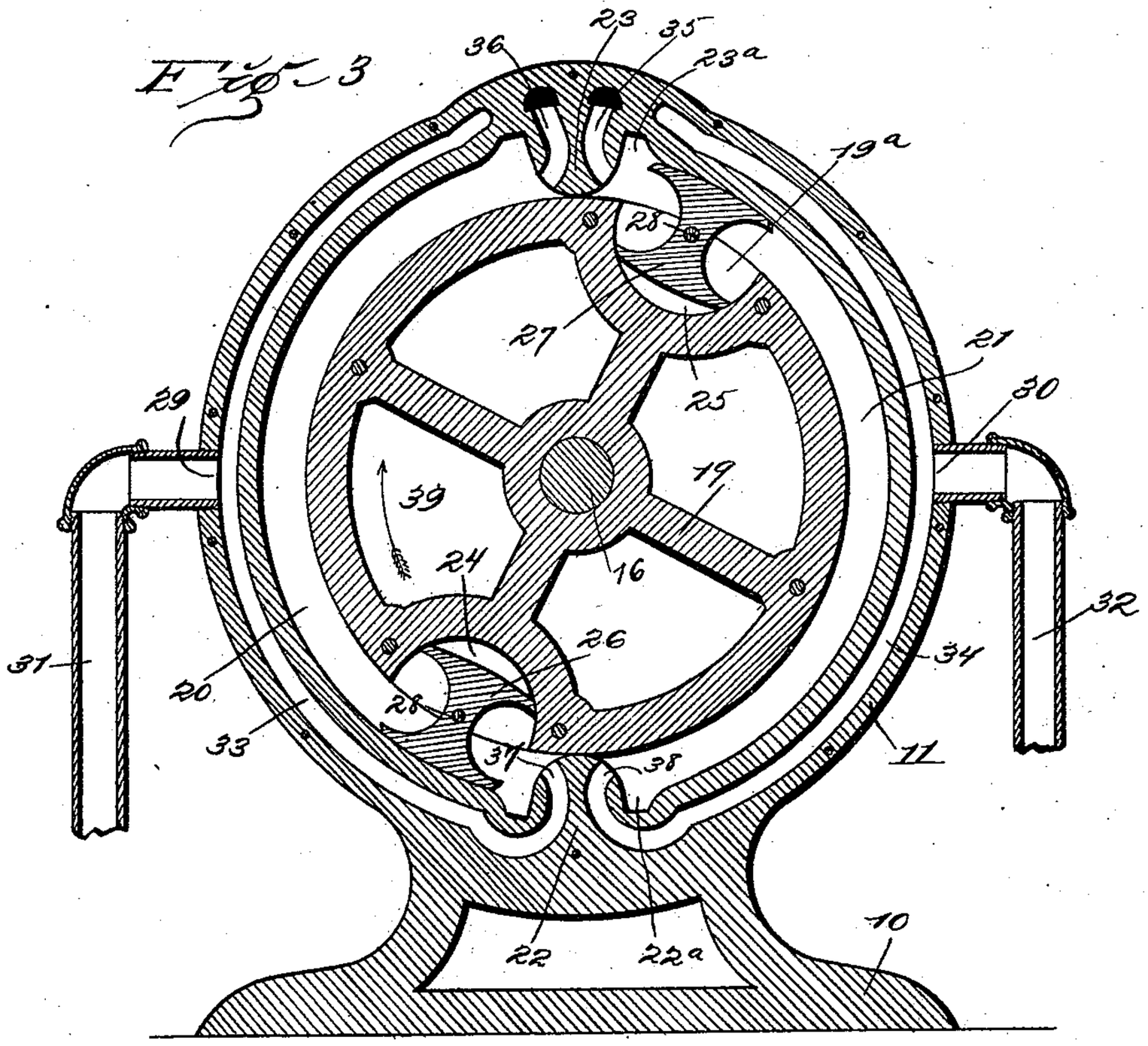


Fig. 4

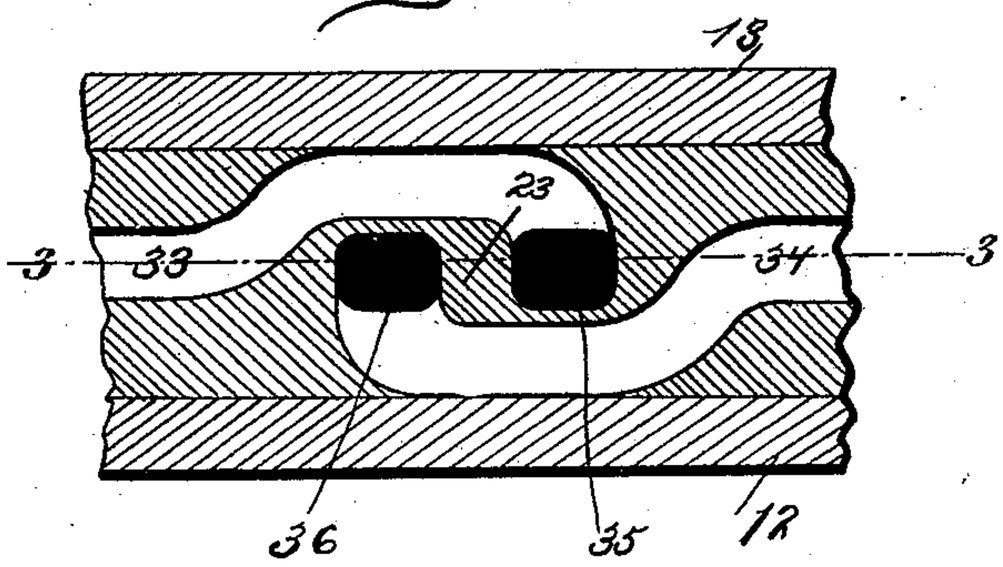
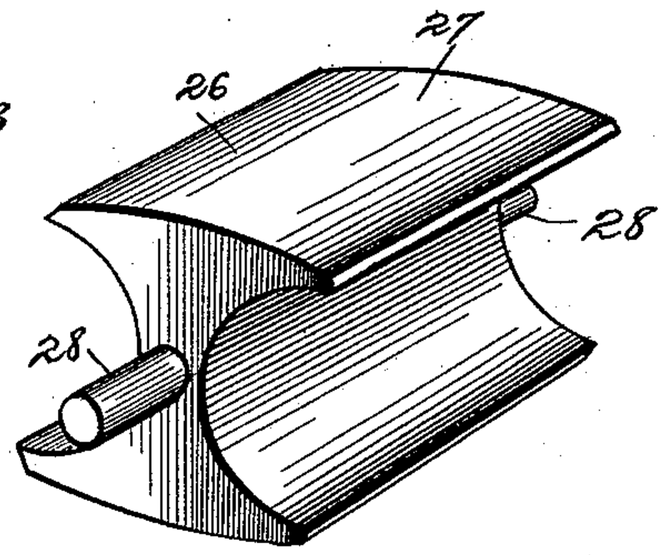


Fig. 5



Attest
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UNITED STATES PATENT OFFICE.

SYLVANDER C. SHEPARD, OF HANNIBAL, MISSOURI, ASSIGNOR OF ONE-HALF TO CORNELIUS A. TREAT, OF SAME PLACE.

ROTARY FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 528,347, dated October 30, 1894.

Application filed May 7, 1894. Serial No. 510,268. (No model.)

To all whom it may concern:

Be it known that I, SYLVANDER C. SHEPARD, of the city of Hannibal, Marion county, State of Missouri, have invented certain new and useful Improvements in Rotary Force-Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

The object of this invention is to provide improved means for pumping water, in which are employed combined suction and forcing influences.

To this end, my invention consists in the construction, combination and arrangements of parts, hereinafter described, pointed out in my claim, and illustrated by the accompanying drawings, in which—

Figure 1 is a side elevation of the complete device. Fig. 2 is a sectional elevation on the line 2—2 of Fig. 1. Fig. 3 is a sectional elevation on the line 3—3 of Figs. 2 and 4. Fig. 4 is an enlarged sectional plan on the line 4—4 of Fig. 2. Fig. 5 is a perspective view of one of the vanes.

In the construction of the device as shown, the numeral 10 designates a base, and 11 an approximately annular shell formed on, or fixed to, said base and supported thereby. Fixed to the shell 11, in parallel planes and inclosing the sides of said shell, are plates 12, 13, on which plates are formed annular flanges 14, 15 adapted to fit in annular recesses in the said shell. Centrally located in bearings formed in the plates 12, 13, and extending transversely of the shell 11, is a driven shaft 16 provided with, and adapted to revolve in, stuffing-boxes 17, 18.

Located within the cylinder formed by the shell and plates, and rigidly mounted upon the shaft 16, is a head 19 comprising a body portion and plates 19^a, mounted on said body portion and adapted for engagement with the inner faces of the plates 12, 13, the periphery of which head is concentric with the interior face of said shell and at such a distance therefrom as to form water passages 20, 21.

Formed on, and extending inwardly from, the shell 11 are abutments 22, 23, which abutments are provided with semi-circular faces and are located diametrically opposite each other, the apices of the semi-circular faces being adapted for engagement and sliding contact with the periphery of the head 19.

Depressions 22^a and 23^a are formed in the interior face of the shell 11 on opposite sides of the abutments 22, 23, respectively. Semi-cylindrical concavities, or depressions, 24, 25 are formed in the periphery of the head 18 between the plates, and mounted within said concavities and rotatably connected to the plates of said head, are vanes 26, 27 having two semi-circular concaved opposite sides and two convex opposite sides, the convex opposite sides being adapted for alternate engagement with the inner face of the shell 11, the semi-circular opposite sides being adapted for alternate engagement with the semi-circular faces of the abutments 22, 23. The connections between said vanes and the plates comprise trunnions 28 mounted for revolution in bearings formed in said plates, the construction of the vanes 26, 27 being clearly shown in Fig. 5.

An induction port 29 is provided in one side of the shell 11, and an eduction port 30 is provided in the side of the shell 11 diametrically opposite to the induction port. A water induction pipe 31 communicates with the port 29, and a water exhaust, or discharge, pipe 32 communicates with the port 30, the pipe 31 leading from a source of water supply, the pipe 32 leading to a point of discharge of the water, or use thereof.

An induction passage 33 is formed in the shell 11 adjacent to the port 29, said port 29 communicating with the said passage at approximately the central portion thereof. The passage 33 leads both ways from the port 29 to points of discharge within the passages 20 and 21 at the lower and upper ends thereof, respectively.

An exhaust passage 34 is formed in the shell 11, opposite to the passage 33, and communicates with the port 30. The passage 34 leads both ways from the port 30 to points of communication with the passages 21, 20 at the lower and upper ends thereof, respectively.

The upper end portions of the passages 33, 34 overlap, or cross, each other and respectively communicate with ports 35, 36 in the abutment 23, the said ports affording communication between the said passages and the passages 20, 21 at the upper ends of said latter passages, and on opposite sides of the said abutment. The lower end portions of the passages 33, 34 communicate with the lower ends of the passages 20, 21, by means of ports 37, 38, respectively formed in the abutment 22 and opening from opposite sides thereof.

The shaft 16 is adapted to be geared to a prime mover of any desired character, but I preferably employ for that purpose the rotary engine invented by me and described in an application for United States Letters-Patent bearing even date herewith.

In the practical operation of this machine, the parts being in the position shown in Fig. 3, upon the rotation of the shaft 16 in the direction of the arrow 39, the head 19 will be rotated conjunctively with said shaft and advance the vane 26 along the passage 20, the said vane being retained against rotation by the engagement of one of its convex faces with the inner face of the shell. The apices of the faces of the abutments 22, 23 engaging with the periphery of the head 19, provide an approximately water and air tight joint between the said abutments and head, and, therefore, the advancement of the vane 26 along the passage 20 creates a vacuum in said passage at the rear of said vane, which said vacuum is supplied through the port 37 and lower portion of the passage 33, the port 29 and the water induction pipe 31. In the rotation of the head 19 the vane 27 will be moved along the passage 21, and, by reason of the before mentioned tight joint between the abutments and the periphery of the head, such advancement of the vane will result in the creation of a vacuum in said passage 21 at the rear of the said vane 27, which said vacuum is supplied through the port 35, the upper end portion of the passage 33, the port 29 and the water induction pipe 31. The continued advancement, therefore, of the vanes 26, 27 conjunctively results in the creations of vacuums acting upon and influencing the contents of the water induction pipe, and through well known principles of hydraulics, elevating water through said pipe. The advancement of the vane 26 along the passage 20 results in the disturbance, or removal, of the contents of said passage in advance of said vane, the said contents being thus acted upon passing from the passage 20, through the port 36, into the upper portion of the passage 34, through the port 30 and pipe 32 to points of discharge. The advancement of the vane 27 along the passage 21 results in the disturbance of the contents of said passage in advance of the said vane, the said contents being thereby removed through the port 38 into the lower portion of the passage 34, and through the port 30 and pipe 32 to points of discharge. It will be observed, therefore, that the conjunctive advancement of the vanes 26, 27 not only creates a vacuum to the rear of said vanes, but exerts a forcing, or impelling, influence within said passage in advance of said vanes.

It is obvious that were it not for the abutments 22, 23 providing obstructions to the passage of the water in a plane concentric to the head 19 and in contact therewith, such vacuum would not be created, and such impelling influence would not be exerted. It is, therefore, necessary that a means be provided whereby the vanes may avoid, or pass, the said abutments, which means are to be found in the pivotal mounting of the vanes and the semi-circular side faces on said vanes, adapted for engagement and sliding contact with the said abutments. It will be observed, therefore, that in the advance of the vanes, one corner thereof will engage in the depression 23^a first reached thereby, and, contacting with the adjacent side of the abutment 23, be rotated upon their axes, bringing one of their semi-circular, or concaved, faces, into contact with the semi-circular face of such abutment, and thereby permitting the passage thereof beyond such abutment, the said vanes being rotated a one-half revolution upon each contact thereof with an abutment. The continued rotation of the head 19 necessitates a successive and intermittent contact of the vanes 26, 27 with the abutments, and, consequently, a successive and intermittent rotation of such vanes, thus insuring an equal and uniform wear upon all sides of said vanes and the said abutments.

It will be observed that in the rotation of the vanes 26, 27, the corners thereof engage with the faces of the concavities 24, 25 and travel in an orbit co-incident with the arc of such concavities.

It will be observed, by reference to Fig. 4, that the passages 33, 34, in order to overlap, must diverge from a true vertical plane, and be carried parallel to each other for a distance.

It is obvious that this pump may be employed to elevate and impel oil, water, or any liquid substance.

What I claim is—

A rotary pump, comprising a cylinder having inwardly extending abutments 22, 23, a shaft mounted for rotation in said cylinder, a head rigidly mounted upon said shaft and adapted for peripheral engagement with said abutments and lateral engagement with said cylinder, passages 20, 21 between said cylinder and the periphery of said head, vanes rotatably mounted upon the said head and traveling in said passages, means whereby

said vanes may pass the said abutments, an induction passage 33 affording communication between an induction port 29 and one end of the passage 21 and the opposite end of the passage 20, and an eduction passage affording communication between an exhaust port 30 and the respectively opposite ends of the passages 20, 21, the ports of communication between the induction passages and the passages 20, 21 and the eduction passage and the passages 20, 21 being located in the said abutments.

In testimony whereof I affix my signature in presence of two witnesses.

SYLVANDER C. SHEPARD.

Witnesses:

S. C. SWEET,

JNO. C. HIGDON.