S. A. HUNTLEY.

CENTRIFUGAL PUMP.

APPLICATION FILED DEC. 12, 1905.

919,869. Patented Apr. 27, 1909.

2 SHEETS—SHEET 1.

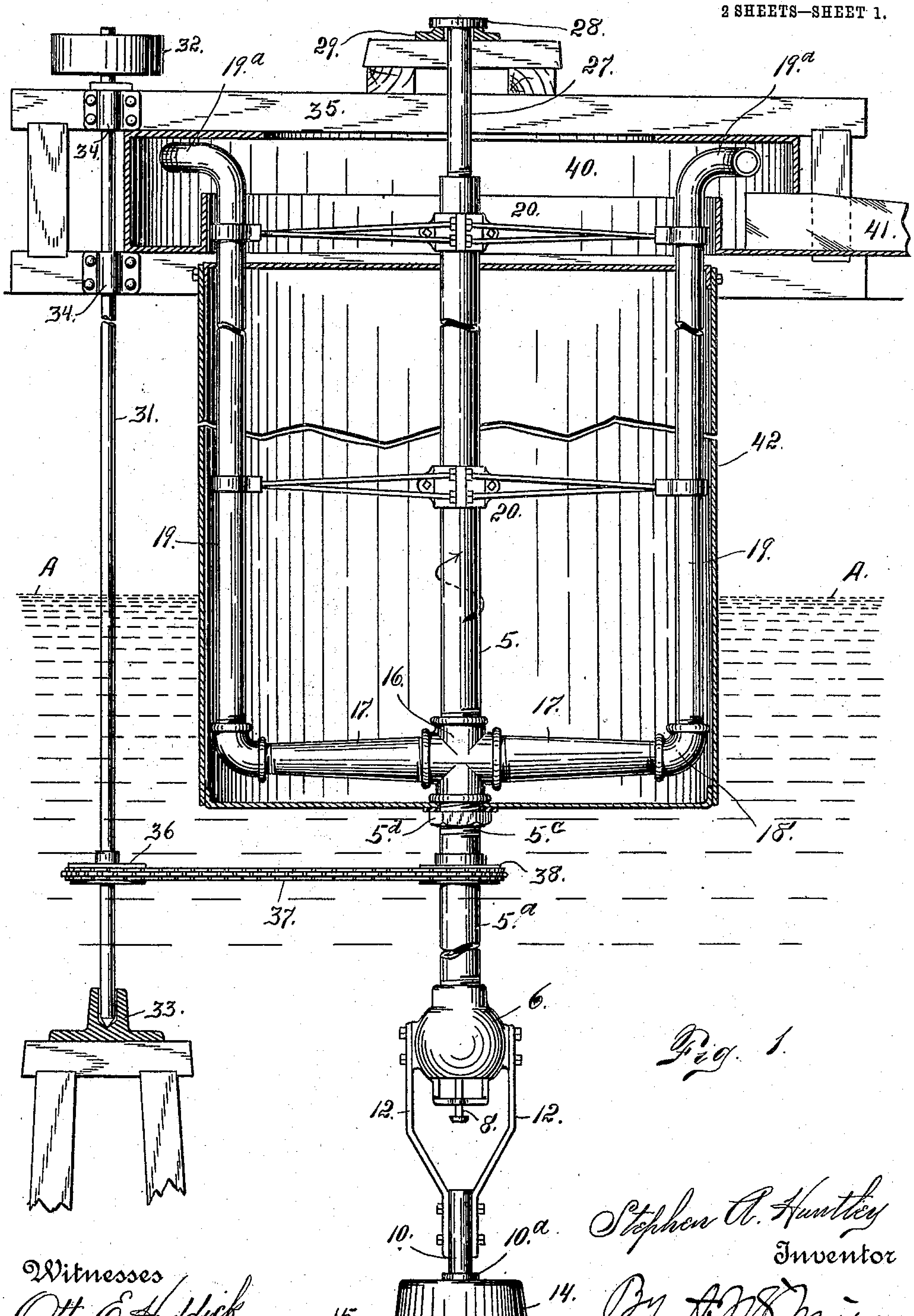

Fig. 1.

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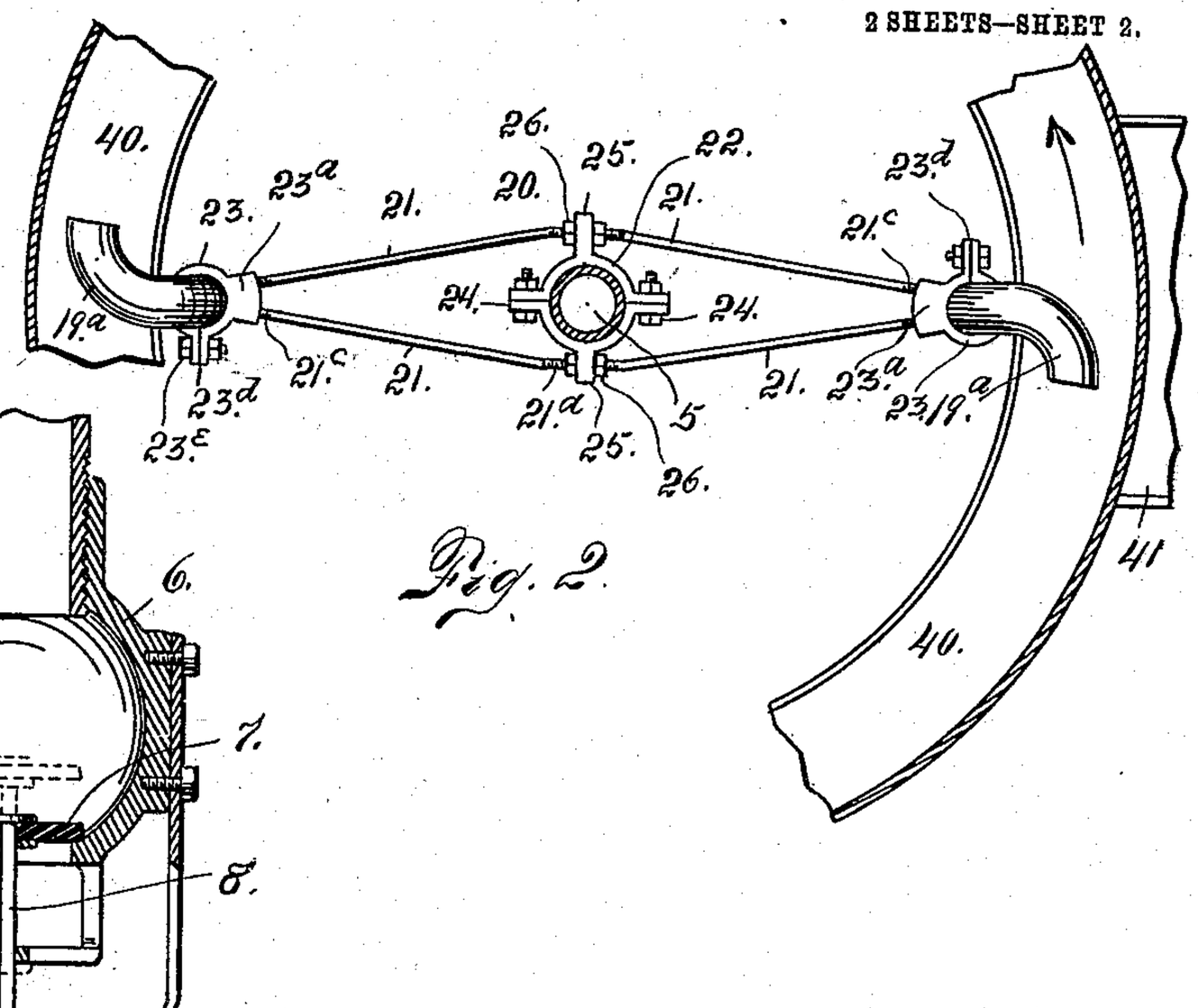

Fig. 2.

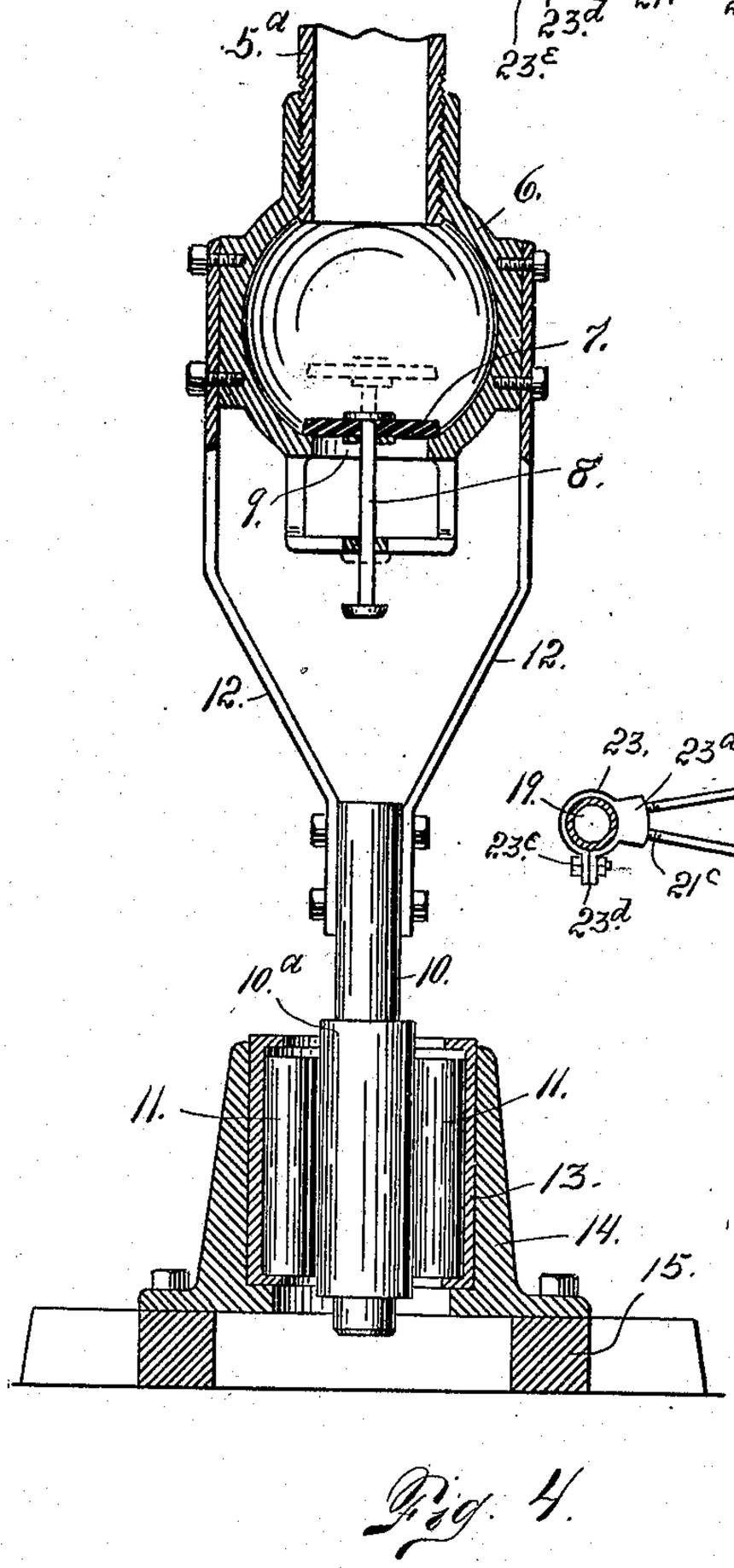

Fig. 4.

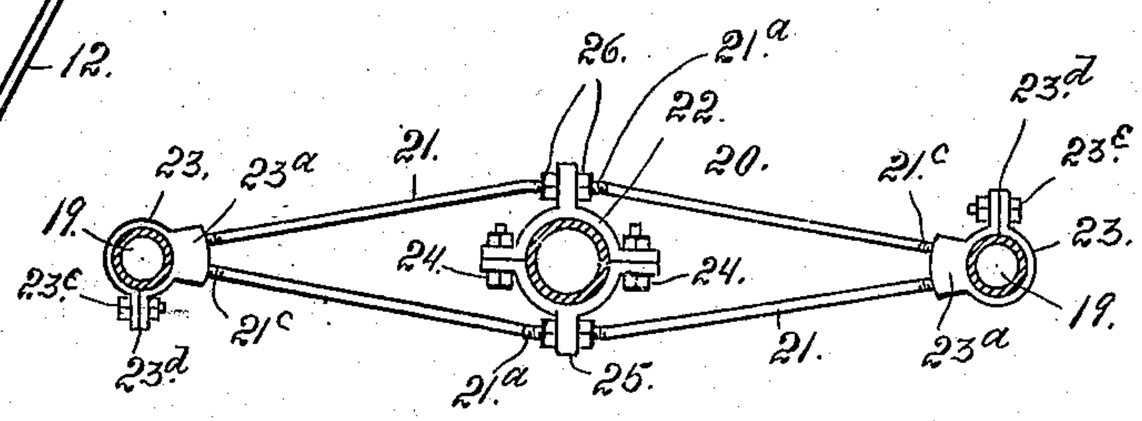

Fig. 3.

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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL PUMP.

No. 919,869. Specification of Letters Patent. Patented April 27, 1909.

Application filed December 12, 1905. Serial No. 291,425.

To all whom it may concern:

Be it known that I, STEPHEN A. HUNTLEY, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Centrifugal Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in centrifugal pumps and consists of the features, arrangements and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is an elevation of my improved pump, the float and the trough being sectionized. Fig. 2 is a fragmentary top view of the same partly in section. Fig. 3 is a horizontal section illustrating the adjustable trussed connection between the shaft and the upright eduction pipes. Fig. 4 is a sectional view of the lower part of the structure shown on a larger scale than in Fig. 1.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a rotary shaft whose lower portion 5^a is hollow and connected with a valve casing 6 in which is located a suction valve 7 having a guide stem 8 protruding from the bottom of the valve casing which is open as shown at 9 to allow the water to enter freely under the influence of the suction induced by the centrifugal action of the eduction pipes. To the valve casing is secured a shaft 10 by means of rods 12 which are securely bolted to the connected parts. The shaft 10 is enlarged as shown at 10^a and engages an anti-frictional bearing composed of rollers 11, the said rollers being inclosed in a case 13 located in a casting 14 secured to a bed 15 which it is assumed is located at the bottom of the receptacle or body of water furnishing the pumping supply.

The lower part of the shaft 5^a is hollow and communicates at its upper extremity with a fitting 16 into which it is threaded. This fitting is provided with four interiorly threaded openings. Into the uppermost is screwed a vertical shaft 5 which if formed hollow must be closed at its extremity where it joins the fitting 16 since it is not desirable that the water should pass upwardly in this shaft above the fitting. Into the opposite lateral openings in this fitting 16, are screwed horizontally-disposed branches 17 which lead to elbows 18 into which are screwed the upwardly-extending eduction pipes 19 whose upper extremities are horizontally curved as shown at 19^a to form discharge extremities which project in opposite directions. When the structure is rotated the motion is in a direction opposite that toward which the eduction extremities 19^a point whereby the resistance of the atmosphere to the water discharge has a tendency to aid the rotary action of the revoluble parts.

It will be understood from the foregoing that the members 17 and 19 are hollow and have an unobstructed communication with the hollow depending member 5^a of the rotary shaft 5. The eduction pipes 9 are located directly opposite each other and extend parallel with the shaft 5 above the fitting 16. The eduction pipes 19 are connected with each other and with the shaft 5 by means of trusses 20 composed of tie rods 21, a central collar 22 and end collars 23. The collar 22 is composed of two members which are clamped to the shaft 5 by means of bolts 24. This collar 22 also has oppositely disposed lugs 25 provided with plain openings through which are passed threaded portions 21^a of the rods 21. The collars 23 are reinforced as shown at 23^a and provided with interiorly threaded sockets which receive the outer threaded extremities 21^c of the rods 21. The collars 23 are split and provided with engaging lugs 23^d connected by bolts 23^e whereby they are clamped to the eduction pipes 19. To the opposite sides of the lugs 25 of the collar 22 adjusting nuts 26 are applied to the threaded portions 21^a of the rods 21, whereby the proper position of eduction pipes with reference to the shaft 5 may be maintained during the operation of the machine. It is evident that the eduction pipes 19 should be alined directly opposite each other and that their

axes should be in the same vertical plane with the axes of the shaft 5 in order to properly maintain the symmetry of the structure and obtain the best results in operation.

As shown in the drawing there are two of these trusses connecting the eduction pipes with the shaft 5. It is evident that any desired number may be employed depending upon the height of the eduction pipes and the shaft 5. The upper extremity of the shaft 5 is provided with a threaded socket into which is screwed a reduced extension 27 having a disk 28 at its upper extremity engaging a bearing 29, whereby the shaft and its connections may be suspended. It is the intention, however, that the structure shall have a floating support whereby the friction upon the seat or bearing 29 shall be practically done away with. Indeed if desired the head 28 may project above this bearing. In this event the extension 27 forms a centering guide for the structure, the same as the shaft member 10 at the lower extremity of the device.

The eduction pipes and the shaft 5 are inclosed by a casing 42 which as shown in the drawing is closed at the top and bottom. The hollow shaft member 5^a is threaded at its upper extremity as shown at 5^c and to this threaded part is applied a nut 5^d which is screwed tightly against the bottom of the float 42 whereby the latter is tightly clamped between the nut and the fitting 16, the latter having a flange surrounding its threaded extremity into which the hollow shaft member 5^a is screwed. The eduction pipes 19 as well as the shaft 5, pass through the top of the float 42, the said members fitting closely therein.

When the device is in use it is assumed that the water is of sufficient depth to form a floating support for the revoluble device. As shown in the drawing the water level is designated by the letter A. Ordinarily this pump will be used to raise water from a body of water whose surface has little fluctuation. Provision, however, may be made for considerable fluctuating movement.

At the upper extremity of the structure is located a trough 40 into which the eduction pipes discharge. The water from this trough escapes through a laterally disposed outlet chute 41.

As shown in the drawing the centrifugal structure is operated from a rotary shaft 31 having a pulley 32 at its upper extremity, and whose lower extremity is journaled in a stepped box 33. The upper portion of the shaft is journaled in boxes 34 mounted on a stationary structure 35.

The lower part of the shaft 31 is provided with a sprocket wheel 38 connected by a chain 37 with a similar wheel 36 fast on the lower part 5^a of the shaft.

When the device is in operation power may be transmitted to the operating shaft 31 from a line shaft or suitable motor by connecting the same with the pulley 32 by means of a belt (not shown). This rotary action of the shaft 31 will impart the necessary rotary movement to the revolving structure composed of the shaft 5 and its connections. Through the instrumentality of the centrifugal force due to its rotary action sufficient suction will be induced in the eduction device 19, to cause the water to rise from the source and discharge at the extremities 19^a of said eduction device, the rotary action of the structure being aided by the resistance which the atmosphere offers to the discharge of the water from these pipes since their discharge extremities are pointed in opposite directions.

Attention is called to the fact that the upwardly-projecting eduction pipes 19 terminate at their upper extremities in compound curves whereby the water changes direction twice after leaving the main portion of the pipe. The first part of the curve is outwardly in line with a radius of the circle described by the pipes during the rotary movement of the structure, while the other member of the curve coincides or approximately coincides with the arc of the circle described by the upper extremity of the device during its rotary action. As the water when issuing from these curved extremities, strikes the pipe whereby it is caused to change direction the second time, the reaction of the force or impact acts with considerable force in propelling the structure. The direction of the rotary movement is indicated by the arrow in Fig. 2 of the drawing. From an examination of this figure the idea I have endeavored to express will be better understood. These extremities having the compound curves are in the nature of hoods connected with the upper extremities of the eduction pipes 19 and so arranged that the force of the escaping water reacts to aid in propelling the device.

Attention may also be called to the fact that the water as it issues from the extremities 19^a of the eduction pipes strikes the outer wall of the circular trough 40 with considerable force which force also reacts to assist in rotating the structure in a direction opposite the issuing movement of the water.

It may also be stated that the casing 42 forming the float as heretofore explained is preferably cylindrical forming a drum, the said drum being entirely closed, thus greatly reducing the friction due to the rotary movement of the structure through the air. This is an important feature as an air excluding device independently of its buoyant or float function, since the structure provided with this drum which incloses the device above the surface of the water, acts with much less friction on the atmosphere than would the

eduction pipes 19 and their laterally extending branches 17 together with the trussed supports 20, in the absence of the drum.

It may also be stated that the roller bearing at the bottom of the structure is an important feature. The element 13 preferably consists of a hardened steel bushing. The reinforced feature 10^a is also preferably composed of hardened steel the same as the rollers 11. This feature 10^a may consist of a hardened sleeve formed independently of the body of the shaft 10 and shrunk thereon or secured thereto in any other suitable manner.

Having thus described my invention, what I claim is:

1. In a structure of the class described, the combination of a shaft whose upper portion is provided with a supporting bearing and whose lower portion is provided with a roller guide bearing to prevent lateral movement, the lower part of the shaft being hollow and provided with a valve casing in which is mounted a valve having a stem protruding below the said casing, rods connecting the hollow casing with the roller bearing member, and upwardly protruding ejecting pipes extending laterally from the shaft and communicating with the hollow portion thereof for the purpose set forth.

2. A centrifugal pump comprising a revoluble shaft having a hollow portion communicating with the source of water supply by a check-valve-controlled opening, eduction conduits leading from the hollow portion of the shaft and extending upwardly therefrom, a casing rigidly connected with and inclosing the revoluble shaft and eduction conduits, said casing being closed at the top and bottom and means for rotating the apparatus.

3. A centrifugal pump having a central shaft whose lower portion is hollow forming a water conduit communicating with the source of supply, branch conduits extending laterally and upwardly on opposite sides of the shaft, their upper extremities being open for the escape of water, suitable means for rigidly connecting the branch conduits with the shaft, a casing closed at the top and bottom and inclosing the branch conduits and the revoluble shaft and suitable means for rotating the apparatus.

4. A centrifugal pump comprising a main conduit mounted to have a rotary movement, branch conduits extending outwardly and upwardly from the main conduit, and a casing connected with and inclosing a portion of the structure and forming a float of sufficient buoyancy to support or approximately support the weight of the apparatus, the structure being mounted to rotate about a uniform, vertical axis.

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

STEPHEN A. HUNTLEY.

Witnesses:

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Dena Nelson.