No. 776,835. PATENTED DEC. 6, 1904.

T. R. GOTH.

CENTRIFUGAL PUMP.

APPLICATION FILED OCT. 15, 1902.

NO MODEL.

Fig. 1.

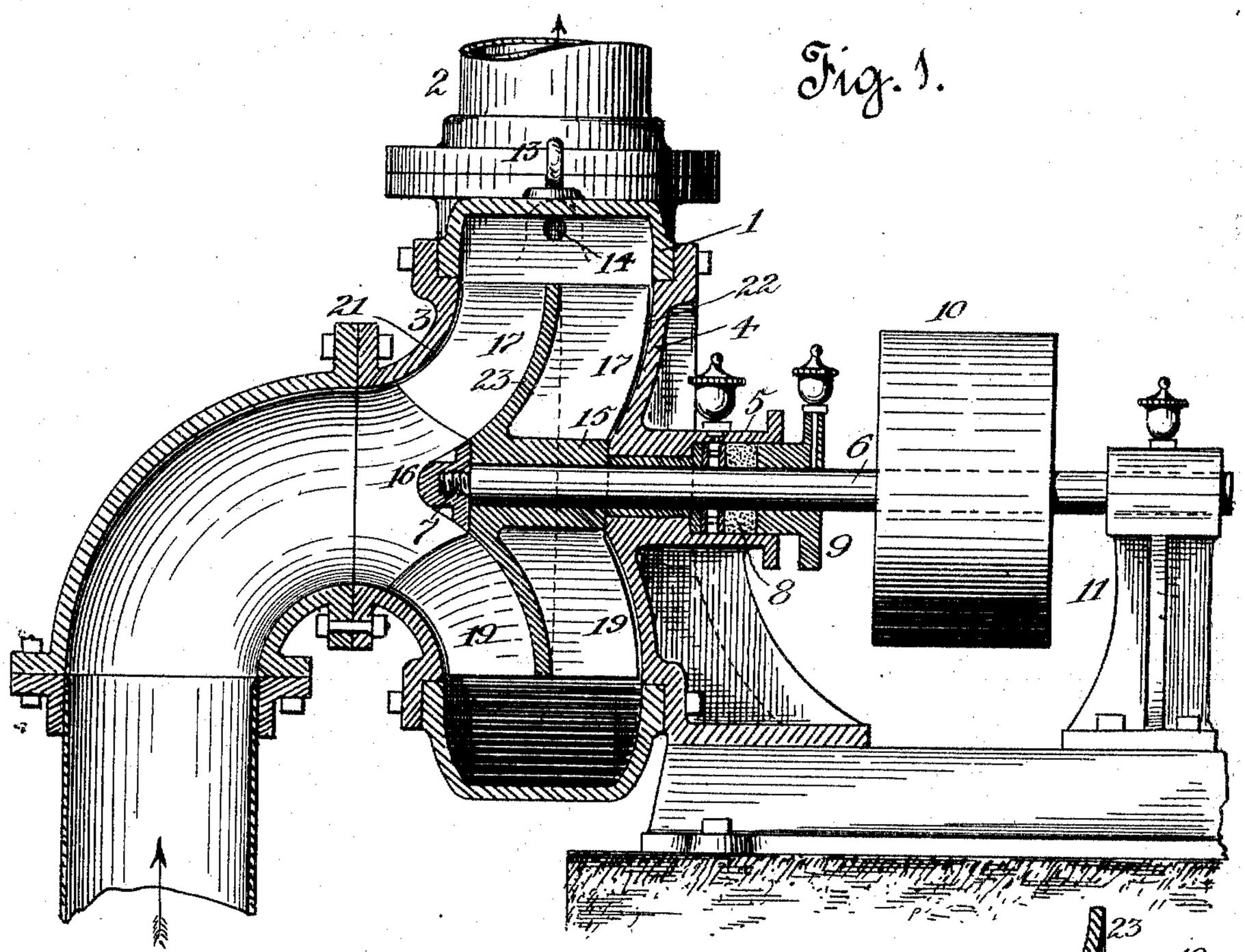


Fig. 3.

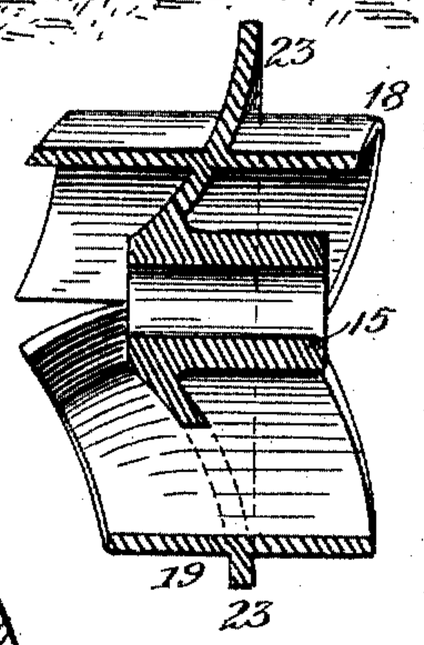
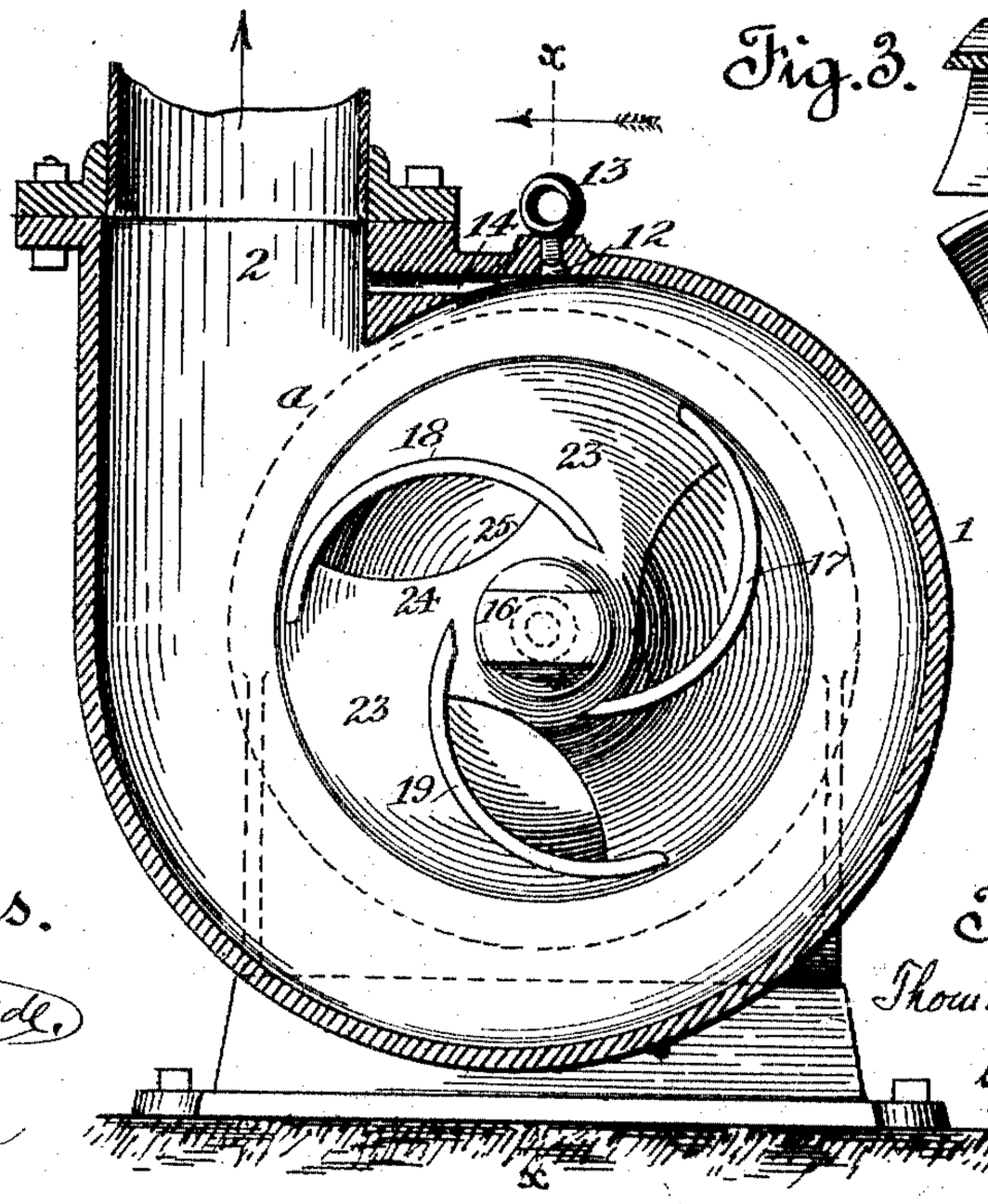


Fig. 2.



Witnesses.

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No. 776,835. Patented December 6, 1904.

UNITED STATES PATENT OFFICE.

THOMAS R. GOTH, OF SAN FRANCISCO, CALIFORNIA.

CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 776,835, dated December 6, 1904.

Application filed October 15, 1902. Serial No. 127,384. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. GOTH, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

My invention relates to centrifugal pumps, and more particularly to the shape and construction of the rotary vanes and of the casing by which they are inclosed.

My object is to so construct the pump as to secure a high pressure at the discharge at a relatively low speed of revolution—to combine the runner and casing in such a form that there will be no power wasted in whirling the water round and round in the casing. On the contrary, the runner and vanes commence to press the water into the outlet at once and continue such operation no matter how fast the speed in revolution may be.

A further object is to balance the runner by a perforated center disk from which the vanes extend sidewise like wings, water being received and thrown out on both sides of such disk, establishing a balance which tends to prevent end thrust on the runner-shaft. Further, the shape and construction of the casing and vanes are such as to make the pump equally economical at high and low heads or pressure, and as it will handle sand, gravel, or mud it is adapted for different kinds of work, thus doing away with the necessity of changing the runner to suit the work.

A practical embodiment of my invention is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal section on the line *x x* of Fig. 2. Fig. 2 is an end sectional elevation with the suction-pipe elbow and casing-cover removed. Fig. 3 is a detail section of the runner to illustrate the combination of the vanes with the central balancing-disk.

The pump-casing is composed of a substantially circular casting 1, having the discharge-outlet 2, and of the two covering-plates 3 and 4, all bolted together, as shown. The plate 3 is open centrally and the supply-pipe elbow is bolted to it, the curve of such elbow being continued by the curves of the front plate, as shown in Fig. 1. The back plate 4 is somewhat dished inwardly, as illustrated in same figure. The periphery of the casing—that is, the casting 1—is a true scroll. As illustrated in Fig. 1, it is flat at the top, but gradually changes its cross-section to a curvilinear form until, where it joins or forms the neck of the discharge-pipe, it is an arc of a true circle. The bottom of Fig. 1 indicates this change in cross-section, the walls of the casing being curvilinear and running into a flat bottom of much less extent than is shown at the top. I have found this shape of casing to be exceedingly advantageous in practical operation. Were the pump-shell a true circle, with its center in center of the runner, the casing would be unnecessarily large and the neck of the discharge-pipe must be extended to provide a place for the air-vent. Further, the water would discharge with equal pressure all the way around, and so would have to pass around the chamber before discharge. In the form shown in the drawings the body of water escapes at once into this outlet. Further, the casing has no narrow circumferential neck connecting with a hollow circular rim, but is of full width, as illustrated in Fig. 1, and being flat at the top adjacent to the outlet where the great volume is discharged and changing gradually to a circle at the neck operates with the minimum of friction and discharges to the greatest advantages.

Formed with the plate 4 is a bearing 5 for the runner-shaft 6. The bearing is properly bushed to receive the shaft, which extends inwardly through the casing-wall and has a threaded end 7. A packing 8 and gland 9 keep the bearing tight. The shaft has the power-pulley 10, and bearings for its outer end are provided in the standard 11. Oil cups and passages of any suitable construction are furnished for lubricating the shaft, and suitable devices for this purpose are shown in Fig. 1. The priming-hole 12 in the casing can also receive a ring 13, as shown, for lifting purposes. A passage 14 leads from the interior of the casing to the water-outlet and forms a vent for the escape of air.

Within the casing and secured upon the

shaft 6 is the runner, comprising a series of vanes formed with a central balancing-disk. The hub 15 of the runner abuts against the back plate of the casing and is held in place by the tapered and threaded nut 16. The vanes 17 18 19 are shown as three in number, and I prefer to use three, although I have employed two vanes with good results. The front elevation of these vanes in Fig. 2 shows them as true arcs of circles struck from a center which may vary, but which may be stated to be substantially between one-third and one-fourth of a radius of the runner distant from its center. Then the radius of the circle of which the vane is an arc will be the distance from said center to the circumference of the runner. The side elevation of these vanes, Fig. 1, shows their edges 21 22 as conforming to the curves of the casing at front and back. These vanes are formed with the central disk 23, which is shown as of an approximately conical shape, Fig. 1, and is provided with openings 24, bounded at one edge by the curve of the vane and at the other by an opposing and substantially similar curve 25. In this construction, therefore, the vanes are practically curved wings projecting on each side of an open central disk. The surface of the disk as it is presented to the water-inlet while substantially a cone should be and is shown to be somewhat concaved, so as to conform to the curve of the front plate or cover 3. By this shape I secure the advantages of a balancing and strengthening central disk or web and still leave a free passage of a favorable curve from the inlet to the outlet. The disk being provided with large openings 24, the water entering divides, a part passing freely through these opening, and the water on both sides of the disk is acted upon and thrown out centrifugally by the vanes into the common discharge-opening. The pressure of water on both sides of the disk establishes a balance which tends to prevent end thrust and so to secure a steady and uniform rotation.

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

1. A casing for a centrifugal pump having in elevation a curvilinear scroll-shaped body provided with a tangential discharge, and having in cross-section, an inner periphery, which is flat at the top but changes gradually to circular form at the neck of the discharge-outlet.

2. In a centrifugal pump, a runner comprising a central disk or web, curved vanes projecting on both sides from said disk, and openings in the disk bounded at one edge by the curve-line of said vanes, and at the other by an opposing curve in the disk.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 29th day of September, 1902.

THOMAS R. GOTH.

Witnesses:
L. W. SEELY,
F. M. BURT.