

S. M. D. MILLER.
CENTRIFUGAL PUMP.
APPLICATION FILED MAY 31, 1910.

1,012,265.

Patented Dec. 19, 1911.

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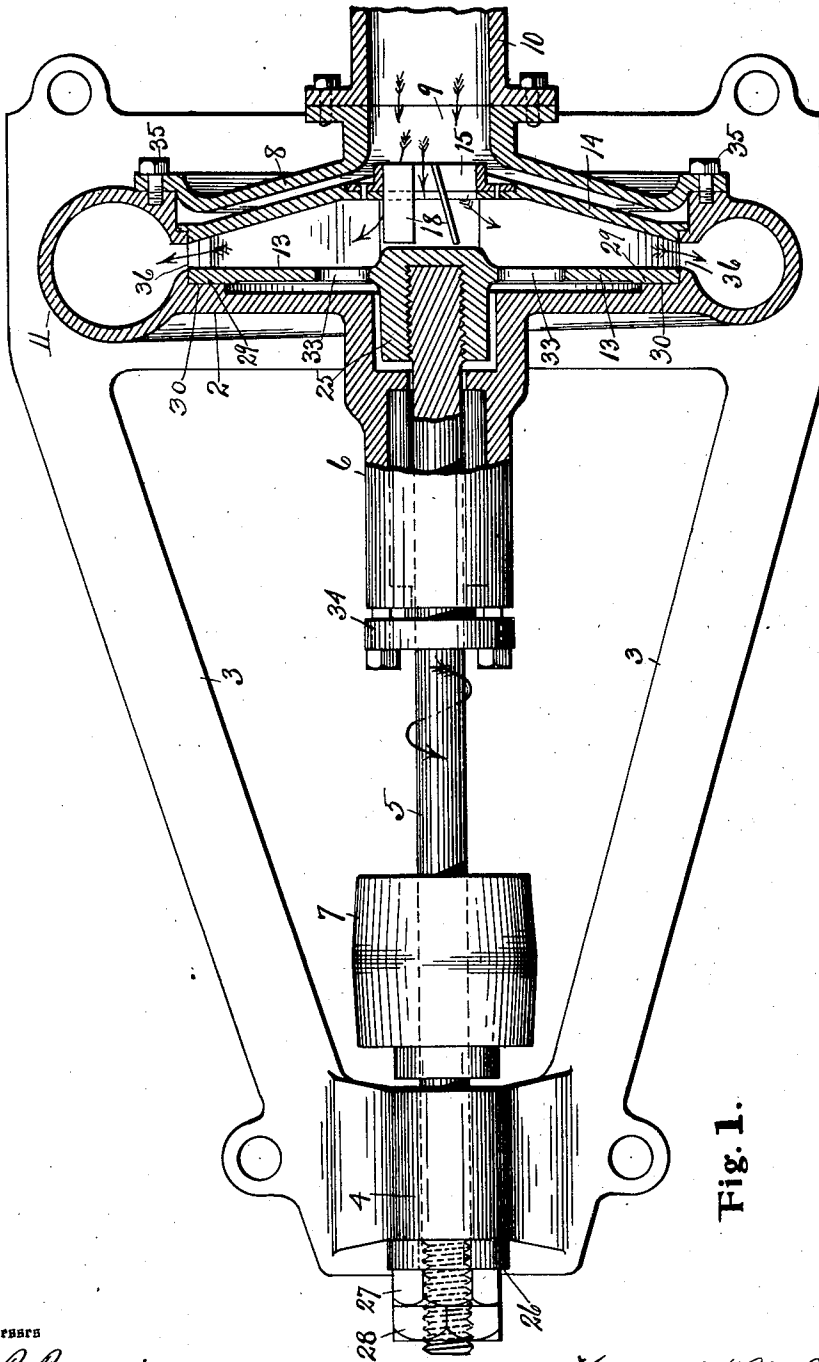


Fig. 1.

Witnesses

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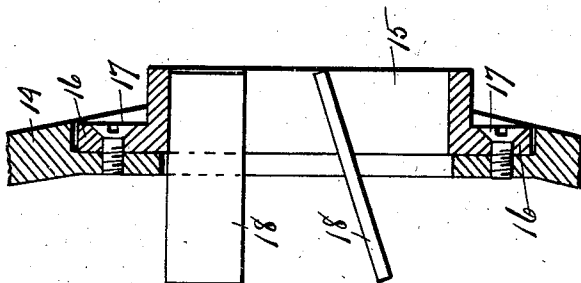
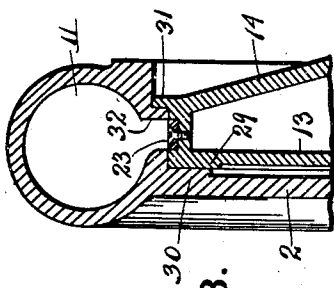
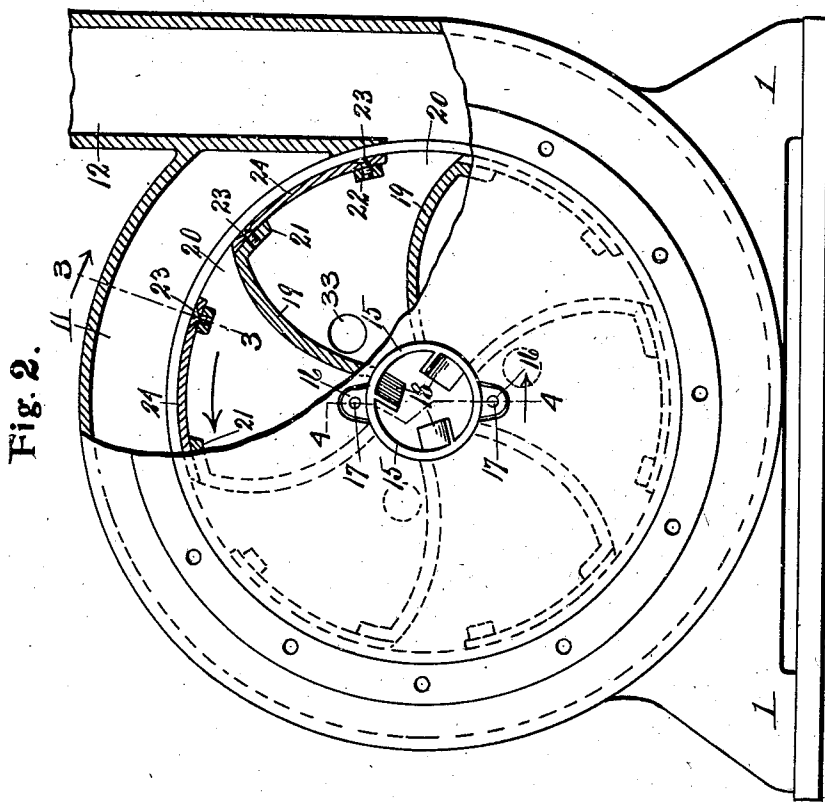
Attorneys

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CENTRIFUGAL PUMP.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL M. D. MILLER, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, 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.

This invention relates to a centrifugal pump, and consists in the construction and arrangement of parts hereinafter more fully set forth and pointed out particularly in the claims.

The object of the invention is to construct a centrifugal pump of comparatively simple and inexpensive construction wherein the arrangement is such as to enable a maximum quantity of fluid to be handled with the consumption of a minimum amount of power, provision being made for enabling the wearing faces between the runner and casing to be adjusted so as to compensate for any wear between said parts and obviate undue leakage.

The above object is attained by the mechanism illustrated in the accompanying drawings, in which:—

Figure 1 is a plan view, partly in horizontal section, showing a pump frame and casing, and a runner within the casing, all in accordance with my invention. Fig. 2 is a front end elevation of the parts shown in Fig. 1, a portion of the casing and discharge pipe being broken away. Fig. 3 is an enlarged fragmentary view in section, as on line 3—3 of Fig. 2. Fig. 4 is an enlarged fragmentary view in section, as on line 4—4 of Fig. 2.

Referring to the characters of reference, 1 designates a stationary base upon which the pump casing is mounted. Extending from the base of the casing are the diagonal brace arms 3 which are joined to a rear bearing 4 at the outer end of the driving shaft 5. The inner end of the shaft 5 is supported in a suitable bearing 6 and secured to said shaft at a convenient point thereon is a pulley 7 adapted to receive a drive belt, not shown, through the medium of which the shaft 5 may be rotated. The pump casing 2 is cir-

cular and the outer face plate 8 thereof is convexed. Formed through the geometric center of the outer face plate 8 of the pump casing is the intake port 9 with which the intake pipe 10 communicates. Surrounding the pump casing is a circular scroll 11 which is cylindrical in transverse section, and the transverse area of which gradually increases to the point of communication with the discharge pipe.

Within the pump casing 12 is a hollow runner comprising a flat circular disk or plate 13 and an adjacent circular disk 14 concavo-convex in cross section. The shape of the disk 14 of the runner coincides with the shape of the outer plate 8 of the casing, and affords an increased area within the central portion of the runner. The disk 14 of the runner has a central opening in axial alinement with the intake port of the casing and seated around said opening is a ring 15. Said ring is secured to the plate 14 of the runner by means of the laterally projecting ears 16 which are recessed into said plate and through which pass the fastening screws 17. Within the opening of the ring 15 are diagonal blades 18 which are so positioned as to give their outer ends a lead in the direction in which the runner rotates. By so disposing the blades in the opening of the ring 15, they are caused to direct the water into the runner rather than to throw it outwardly from the center of the ring, thereby materially aiding in supplying to the runner the desired volume of water on which to operate.

Disposed within the runner and extending substantially radially thereof from the line of the intake opening to the perimeter of said runner are the curved blades 19 which divide the interior of the runner into a plurality of radial pockets or chambers, each of which communicates with the hollow scroll 11 through an educt opening 20. The outer end of each of the blades 19 is provided with a foot portion 21 which extends transversely between the side disks of the runner and intermediate said blades the sides of the runner are connected by the cross pieces 22. Secured to the foot portions of the blades and to the cross pieces 22 by means of screws 23 are the curved plates 24 which close the major portion of the opening between the pockets of the runner and the scroll, leaving only the discharge or delivery outlets 25 before mentioned through which the water from

the chambers of the runner may pass into said scroll and thence into the discharge pipe. The area of the openings 20 may be varied accordingly as it is desired to increase or decrease the delivery into the discharge pipe by varying the length of the curved plates 24.

It will now be understood that a rotation of the runner in the direction indicated by the arrow in Fig. 2 will cause the water which has been drawn into the chambers thereof through the intake opening to pass with great velocity from said chambers through the openings 20 into the hollow scroll 11, and thence into the communicating discharge pipe.

The inner end of the shaft 5 is threaded and is screwed into a tapped hub 25 on the disk 13 of the runner. On the outer end of the shaft 5 is a bearing collar 26 against which screws a nut 27 locked by a jam nut 28. Upon the outer face of the disk 13 of the runner at the perimeter thereof is an annular machined face 29 which projects beyond the plane of the face of the disk and into engagement with a raised annular sealing face 30 on the inner wall of the casing, as clearly shown in Fig. 3. Upon the outer edge of the disk 14 of the runner is a circumferential flange 31 having a machined face which coöperates with a corresponding face on the flange 32 projecting inwardly from the wall of the casing to seal the joint between said parts. By means of the nut 27 on the threaded end of the shaft 5, such longitudinal strain may be placed thereon as to draw the sealing parts 29 and 31 of the runner into closely fitting contact with their coöperating parts on the casing to effect a closed joint between the casing and runner and prevent undue leakage, thus enabling a high pressure to be maintained in the hollow scroll or circular receiving chamber 11. Any water which may leak past the sealing faces 29 and 30 into the space between the wall of the casing and the outer face of the disk 13, may return to the interior of the runner through the apertures 33 in said disk, thereby obviating any pressure between the wall of the casing and the disk 13. To prevent leakage along the shaft, the bearing 6 is provided with a suitable gland or stuffing box 34. The outer face plate 8 of the casing is removably secured in place by the bolts 35, affording easy access to the runner. The curved plates 24 serve to close the annular opening 36 between the scroll or circular receiving chamber 11 and the interior of the casing, except for the openings 20 leading from the chambers of the runner to said receiving chamber, thereby so distributing the back pressure over the periphery of the runner as to obviate in a

great measure a return flow of water from the receiving chamber. This arrangement enables a comparatively high pressure to be maintained in the receiving chamber and a corresponding pressure in the discharge pipe 12, whereby the water may be carried to a considerable height, if required.

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

1. A centrifugal pump comprising a circular casing, a receiving chamber embracing the casing and communicating therewith, a runner within the casing having an axial inlet and a plurality of delivery outlets which communicate with the receiving chamber, the casing having a sealing face at the side of the opening communicating with said receiving chamber, the runner having a sealing face which coöperates therewith, and means for urging the sealing face of the runner toward the direction of power against the sealing face of the casing.

2. A centrifugal pump comprising a casing, a receiving chamber surrounding the casing, an inclosing runner within the casing having peripheral delivery outlets communicating with the receiving chamber and having an axial inlet opening, there being an annular space between the wall of the casing and the face of the rear disk of the runner, said rear disk of the runner having apertures around the axis thereof communicating with said space.

3. A centrifugal pump comprising a casing, a receiving chamber surrounding said casing, a rotatable hollow runner within the casing having an axial inlet and peripheral delivery outlets, said outlets communicating with said receiving chamber, sealing faces on the sides of the runner engaging corresponding faces on the casing, a shaft connected with said runner, and means urging the shaft longitudinally to tighten the sealing parts between the casing and runner.

4. A centrifugal pump comprising a casing surrounded by a communicating receiving chamber, a rotatable runner within the casing having an inlet and a plurality of delivery outlets, the sides of said runner having sealing faces on each side of the delivery outlets adapted to coöperate with like faces on the casing and movable in the same direction into contact therewith, and means for urging the sealing faces on the runner into engagement with the corresponding sealing faces of the casing.

In testimony whereof, I sign this specification in the presence of two witnesses.

SAMUEL M. D. MILLER.

Witnesses:

E. S. WHEELER,

I. G. HOWLETT.