No. 772,989. PATENTED OCT. 25, 1904.

I. C. WILLIAMS.

CENTRIFUGAL PUMP.

APPLICATION FILED JAN. 8, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

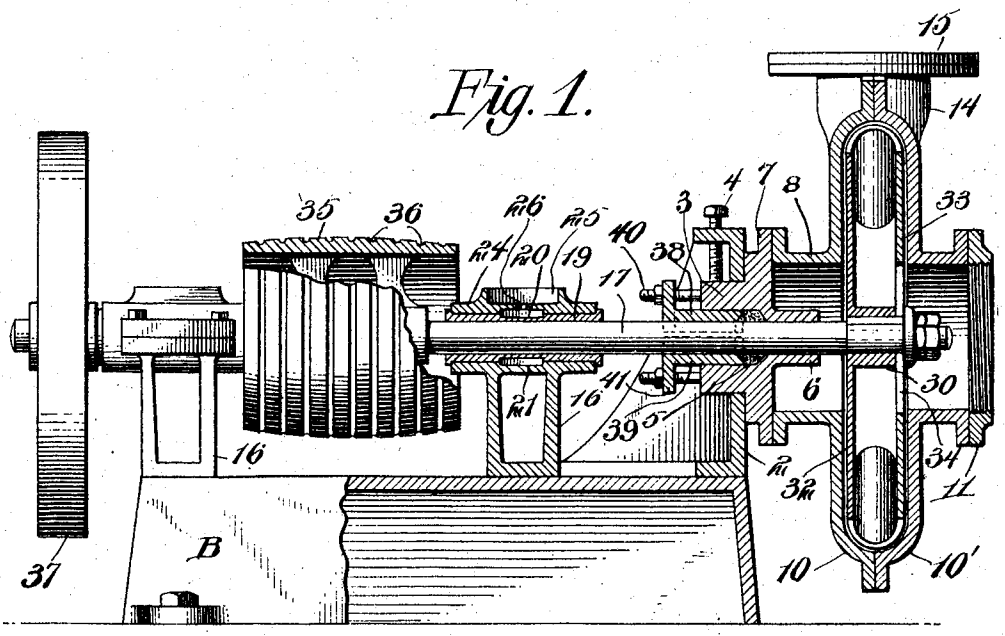
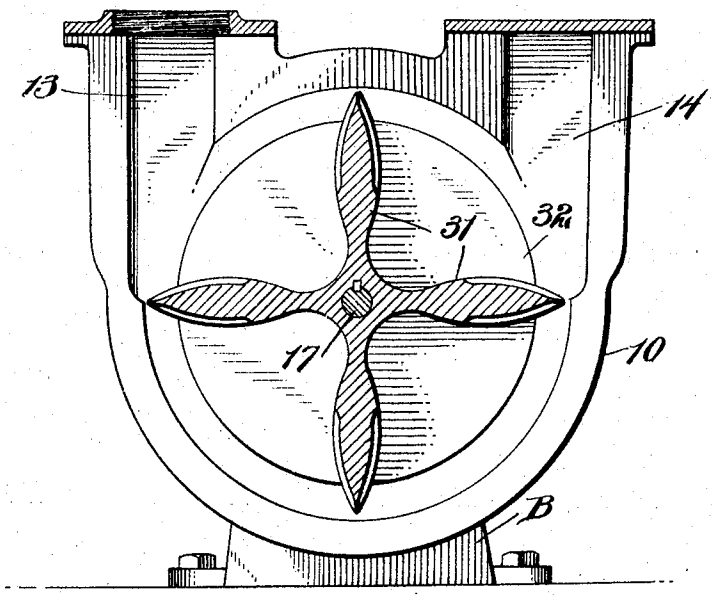


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

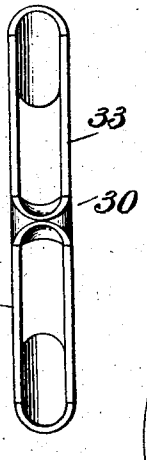


Fig. 4.

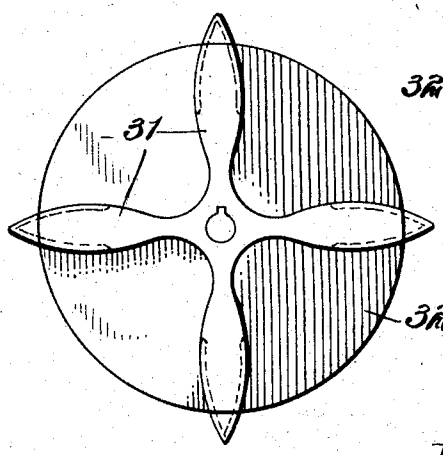


Fig. 5.

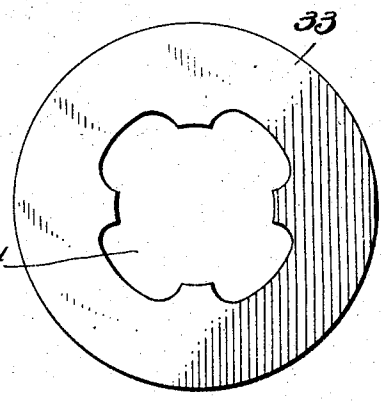


Fig. 6.

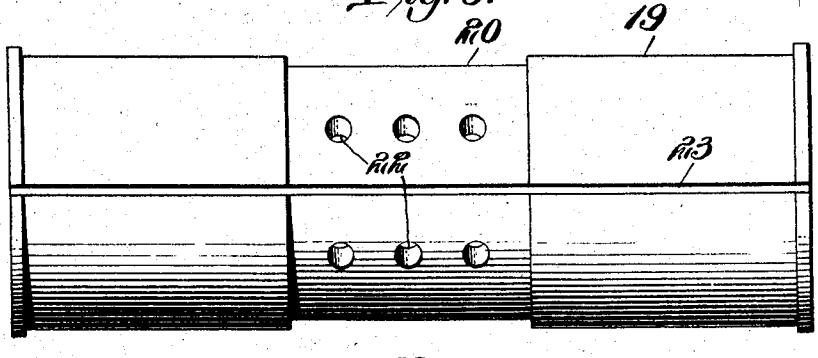
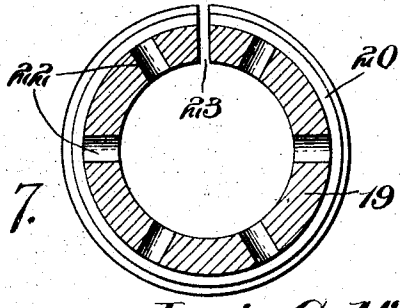


Fig. 7.



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No. 772,989. Patented October 25, 1904.

UNITED STATES PATENT OFFICE.

IRVIN C. WILLIAMS, OF JOHNSONBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JOHN ALEXANDER CRAIG, OF JOHNSONBURG, PENNSYLVANIA.

CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 772,989, dated October 25, 1904.

Application filed January 8, 1904. Serial No. 188,235. (No model.)

To all whom it may concern:

Be it known that I, IRVIN C. WILLIAMS, a citizen of the United States, residing at Johnsonburg, in the county of Elk and State of Pennsylvania, have invented a new and useful Centrifugal Pump, of which the following is a specification.

This invention relates to centrifugal pumps, and has for its principal object the provision of a centrifugal pump adapted for operation in pumping liquids and semiliquid masses, such as paper-stock, which shall be of simple and durable construction, thoroughly effective in operation, and susceptible of use as a right or left hand pump, as may be desired.

A further object of the invention is to provide a pump of the character specified in which the casing of the rotary piston is so mounted as to be readily adjustable to discharge at either side and at any desired inclination.

A further object of the invention is to provide, in a pump of the character specified, improved means for imparting movement to the pump-shaft and to provide an improved form of bearing for the pump-shaft by means of which the shaft may be kept lubricated and the friction of operation diminished.

In attaining the several objects above mentioned and others, which will appear as the invention is more fully disclosed, I prefer to make use of the novel construction and combination of parts of a centrifugal pump hereinafter fully described, illustrated in preferred form in the accompanying drawings, and having the novel features thereof particularly pointed out in the appended claims.

In the drawings, Figure 1 is a view, partly in elevation and partly in longitudinal section in the vertical plane, of a pump constructed in accord with this invention. Fig. 2 is a view in section on the plane separating the two members of the piston-casing. Fig. 3 is a view in side elevation of the piston detached. Fig. 4 is a view in front elevation of the piston with the plate detached from the piston. Fig. 5 is a view of the plate which is bolted to the front of the piston and forms a part thereof. Fig. 6 is a side view of a bushing for the pump-shaft. Fig. 7 is a transverse section through the bushing midway between its ends.

Referring to the drawings, in which corresponding parts are designated by similar characters of reference, 1 designates the bed upon which the pump structure is mounted, and in the present instance the bed consists of a casting of rectangular cross-section provided with perforated lugs on the sides for the reception of bolts or screws by means of which the bed may be secured upon a floor or other suitable support. At one end of the bed there is rigidly secured thereon, as by bolts or other suitable fastening means, a bracket 2, having an opening therethrough for the reception of a casting 3, which is adjustably secured in said opening by means of set-screws 4, mounted in the upper portion of the bracket. The casting 3 consists of a stuffing-box 5, which fits within the opening provided therefor in the bracket 2, a boxing 6 at the end of the stuffing-box, and a flange 7 at the juncture of the stuffing-box 5. The flange 7 is rabbeted upon the face adjacent to the stuffing-box and is provided near the margin with a series of holes to receive bolts by which the casing 8 of the pump is securely fastened to the casting 3. The casing 8 is composed of two members 10 and 10′, which are complementary to each other and are secured together by means of bolts passing through webs formed at the margins of the said members. The casing 8 is provided upon either side with a central opening surrounded by a flange, the flange upon one side of the casing being brought into contact with the flange on the casting 3 and rigidly secured thereto by means of bolts. Upon the opposite side of the casing the flange forms the means for securing to the casing an internally-threaded collar 11 for the attachment of a pipe, hose, or other conduit through which the material pumped may be drawn. The opening with the collar 11 secured thereon will hereinafter be referred to as the "inlet-opening." At diametrically opposite points parallel discharge-pipes 13 and 14 extend tangentially from the casing, one of said dis-

charge-pipes being ordinarily closed by means of a plate 15 bolted over the end of the pipe and the other being ordinarily provided with an internally-threaded collar for the attachment of a pipe, hose, or other conduit to conduct material from the pump.

Behind the bracket 2 upon the bed 1 are mounted two pillow-blocks or bearing-standards 16 to support a pump-shaft 17. Each of the pillow-blocks has formed in the top thereof a semicircular groove for the reception of a bushing 19, which forms a lubricating-bearing for the shaft. The bushings 19 are preferably formed of spring-brass, and each one is provided intermediate of its ends with an external annular groove or channel 20, which corresponds in position to a chamber 21, formed in the grooved upper surface of the pillow-block. Each of the bushings is also provided at its ends with annular shoulders to prevent longitudinal movement of the bushings in the pillow-blocks, and in order to facilitate the passage of lubricant into the interior of the bushing a plurality of perforations 22 are formed in the wall of the bushing where it is externally channeled. The bushings being made of spring-brass normally take the form shown in Fig. 6, in which the slot 23, extending longitudinally of each bushing, is open. When the bushings are fitted around the shaft 17 and clamped in semicircular grooves at the top of the pillow-blocks, the bushings are compressed sufficiently to close the slots 23. The bushings are secured in position in the upper ends of the pillow-blocks by means of caps 24, grooved to correspond to the grooves in the pillow-blocks and provided on top with oil-receiving cavities 25, in which, if preferred, lubricators of any preferred structure may be secured. Oil-holes 26 extend from the bottom of said oil-receiving cavities into the groove on the under surface of each cap, said grooves being provided with oil-chambers corresponding to those formed in the pillow-blocks. Upon the end of the shaft within the casing a rotary piston 30 is rigidly mounted. The piston 30 is preferably composed of four radially-disposed wings 31 and a web 32 of circular contour cast integral with the wings at the rear face of the piston, the web having a diameter a little less than the distance between the ends of oppositely-disposed wings. Upon the front face of the piston, opposite the web 32, there will preferably be bolted a plate 33, whose diameter is substantially equal to that of the web and which is provided at the center with an opening 34 to permit the passage of the material pumped into the space between the plate and the web. The piston is of course of such dimensions that the wings thereof will barely escape contact with the wall of the casing in which the piston revolves, and the ends of the wings are rounded to conform to the shape of the chamber formed within the casing. Each of the wings is generally of fusiform contour and is consequently adapted to produce the same effect when the piston is rotated to right or left. The sides of the wings are preferably concaved near their outer ends, as shown in Fig. 3.

The peculiar formation of the wings of the piston set forth in the preceding paragraph is designed to increase the efficiency of the operation of the piston by adapting it to act equally well when rotated to the right or left and also to make it more effective in operation upon semiliquid materials, such as paper-pulp, or upon liquids containing massive solid bodies. The concavities in the sides of the piston-wings near their outer ends are efficacious in directing solid masses contained in the liquids passing through the pump into the median plane between the two sections of the pump-casing, and so diminishing in a measure the friction of operation of the pump, as well as tending to prevent the clogging of the pump through the jamming of the solid particles between the ends of the piston-wings and the inner surface of the piston-casing.

The means employed for driving the pump-shaft may be a motor of any suitable character, and power is preferably imparted from the motor to the shaft by means of a belt running over a pulley 35, secured upon the shaft between the pillow-blocks 24. The pulley 35 is approximately cylindrical in form, as shown, but is of slightly larger diameter in the middle than at the ends. The surface of the pulley is not smooth, but is provided with a plurality of small circumferential grooves 36, which are arranged sufficiently close together to prevent adhesion of the belt to the pulley through the action of the atmospheric pressure upon the surface of the belt. The movement of the shaft is steadied by means of a balance-wheel 37, secured upon the end of the shaft opposite the rotary piston, and the balance-wheel also serves the subsidiary purpose of balancing the weight of the piston upon the other end of the shaft. In order to coöperate with the stuffing-box formed in the casting 3, there is preferably mounted on the shaft adjacent thereto a gland consisting of complementary members 38 39, which are bolted together, as shown, and are rigidly connected with the casting 3 by means of long bolts 40 passing through flanges 41 formed at the ends of the members 38 and 39 most remote from the casting 3.

From the foregoing description the operation of the pump may be easily understood. The supply pipe or tube being connected with the collar 11 and the conduit for removing the material from the pump being secured in the collar 15 at the end of the open discharge-pipe, the rotary movement of the piston when power is transmitted to the pulley 35 in the proper direction will draw the liquid or semiliquid

masses to be pumped through the supply-pipe into the casing and through the opening 34 in the plate 33 into the space between said plate and the web 32. The centrifugal action of the pump will then throw the material pumped outward toward the periphery of the casing and cause it to escape through the open discharge-pipe.

The pump has been illustrated as arranged to act as a "right-hand" pump—that is to say, the pump is illustrated as arranged for operation with the piston rotating in the same direction as the hands of a clock. If, however, it is desired to operate the pump in the opposite direction, the discharge-pipe shown as open in the drawings may be closed and the closed discharge-pipe may be opened. Then the pump will be adapted for operation as a "left-hand" pump without further change.

By providing two discharge-pipes at opposite sides of the piston-casing the cleaning of the casing or entrance thereinto for the purpose of making repairs is greatly facilitated. As will be obvious, when the pump is operatively connected with the inlet-pipe and the outlet-pipe entrance to the interior of the piston-casing may be effected without disarranging the pump connections in any way by simply removing the plate 15 over the discharge-pipe 14.

In order to change the angle of discharge, the only adjustment necessary is to loosen the set-screws 4 in the top of the bracket 2 to permit the rotation of the casting 3, to which the pump-casing 8 is bolted. When the casing has been set in exactly the position desired, the set-screws may be again brought into operative engagement with the casting, and the pump will be ready for operation.

While I have described the preferred form of embodiment of my invention, it is to be understood that various changes in the form, proportions, and exact mode of assemblage of the elements exhibited may be made without departing from the spirit of the invention or sacrificing the advantages thereof, and I do not wish to be limited to the precise details of construction described and shown.

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

1. In a centrifugal pump, an adjustable pump-casing having a central inlet and a pair of outlets, the outlets being disposed tangent to the periphery of the casing at opposite sides thereof and extending outward in parallel directions, and a piston mounted for rotation within said casing and comprising a plurality of radially-arranged fusiform wings having their ends disposed in close proximity to the inner surface of said casing and a rigid web connecting said wings at the back.

2. In a centrifugal pump, a casing presenting a chamber of circular contour having a central inlet-opening, and a piston arranged for rotation in said casing, said piston comprising a plurality of radially-arranged fusiform wings having a web connecting said wings at the back, and a plate having a central opening secured upon the front face of said wings.

3. In a centrifugal pump, a casing having a piston-chamber therein of suitable circular contour and having a central inlet-opening, and a piston arranged for rotation within said casing, said piston comprising a plurality of fusiform wings presenting concavities on both sides near the outer ends, a web secured upon the back of said wings, and a plate having a central opening secured upon the front of said wings.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

IRVIN C. WILLIAMS.

Witnesses:
H. L. BAYLESS,
F. W. BAYLESS.