

(No Model.)

C. McINTYRE.
CENTRIFUGAL PUMP.

No. 569,656.

Patented Oct. 20, 1896.

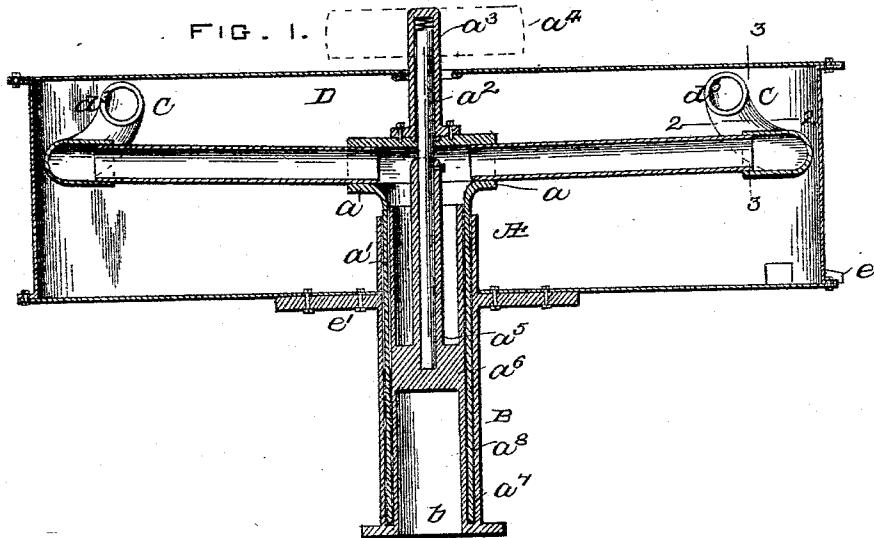
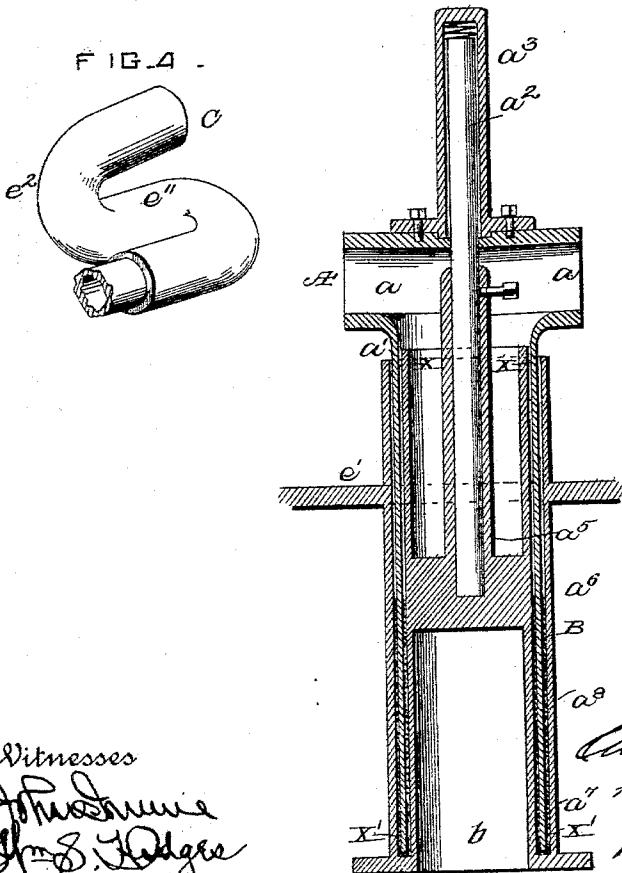


FIG. 3.



Witnesses
J. H. Schumme
J. S. Dodge

Inventor
Charles W. McIntyre,
By [Signature]
Attorney

UNITED STATES PATENT OFFICE.

CHARLES MCINTYRE, OF FORT BENTON, MONTANA.

CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 569,656, dated October 20, 1896.

Application filed November 24, 1894. Serial No. 529,844. (No model.)

To all whom it may concern:

Be it known that I, CHARLES MCINTYRE, of Fort Benton, in the county of Choteau and State of Montana, have invented certain new and useful Improvements in Centrifugal Pumps; and I do hereby 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.

This invention relates to certain new and useful improvements in centrifugal pumps, and has for its object the production of simple and highly efficient means whereby the pump or the hollow radiating arms thereof will be constantly kept primed, the use of valves in the outer ends of said arms is dispensed with, and the water can be discharged with a minimum resistance of air-pressure.

A further object is to provide the hollow radiating arms of a rotary pump with means for regulating the outflow of the water, whereby the pump can run at fast or slow speed or entirely stop and again discharge water without loss of priming; and a further object is to provide an improved air-tight joint for the wheel at its hub or center.

The invention consists, broadly, of a centrifugal pump in which the water or the like travels at right angles to the arms of the pump at or prior to its discharge.

The invention further consists of a centrifugal pump having its hollow radiating arms provided with traps or nozzles at their outer ends and so bent or curved that the pump will remain primed and from which the water can be discharged in different directions.

The invention further consists of a bearing for the wheel-shaft having a continuous groove or channel containing mercury and in which fits a depending cylindrical portion of the wheel, whereby air is prevented from entering the hollow wheel from the center.

The invention also comprises the peculiar construction, combination, and arrangement of parts, substantially as hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of a centrifugal pump

provided with my improvements. Fig. 2 is an enlarged detail view of one of the traps or nozzles. Fig. 3 is an enlarged sectional view of the hub or central bearing. Fig. 4 is a view of a slight modification.

Inasmuch as these improvements are specially designed to be used in connection with the form of centrifugal pump shown and described in my pending application for patent, filed March 18, 1892, Serial No. 466,688, and in a second application filed herewith, Serial No. 529,843, and since such pump is that shown in the accompanying drawings, but brief reference will be made thereto, except as to the points of improvement.

Referring to the drawings, A designates the hollow rotary wheel, which consists of four radiating hollow arms *a* and a central depending cylindrical extension *a'*. The wheel is centrally supported by a perpendicular shaft *a²*, which fits in a central sleeve *a³*, extending from the top of the wheel at the center thereof, and upon this sleeve is keyed the pulley *a⁴*, around which the driving-belt (not shown) is passed.

The shaft *a³* is supported by a stationary cylindrical sleeve or bearing *a⁵*, connected by arms *a⁶* to a casing B. This casing is provided with a continuous groove or channel *a⁷*, extending from the upper end thereof to the base, and in this channel is designed to fit the central depending cylindrical extension *a'*. In this channel is placed mercury *a⁸*, the normal position of which is shown in Figs. 1 and 3; but when the wheel is in motion, the pressure of the air being relieved at center of the pump, the mercury will rise to about the point X between the extension *a'* and the inner portion of the casing B and lower to the point X' between said extension and the outer portion of said casing. By this means I secure a complete air-tight joint when the wheel is in motion and prevent water from leaking out when the wheel is at rest, and I am also enabled to dispense with packed joints. The water, it will be understood, is received through a lower central opening *b*.

C designates a trap or nozzle secured on the outer end of each of the hollow arms. As shown in Figs. 1 and 2, this trap is made from

a pipe or casting and is bent or curved inwardly to one side of the hollow arm, as at d , but on a slight inward incline, and is then carried upward, as at d' , and then bent backwardly into a horizontal portion d^2 , which extends transversely over the top of the hollow arm at a point about over the inner end of the trap or elbow. After the pump is primed the water stands approximately at the level indicated by dotted line 2 2, but when the pump is set in motion, so that the radiating arms revolve rapidly, the water stands on the line 3 3 until a velocity is reached sufficient to create a centrifugal force greater than the pressure of the air, when the traps will begin to discharge water at their outlet-openings d^3 . It will be seen that it is impossible for any water to discharge at the opening d^3 without overcoming the pressure of the air at the line 3 3, and consequently either creating a vacuum in the center of the pump or drawing water from the reservoir below (not shown) to supply that discharged at the traps or nozzles. With this form of trap or nozzle the pump can stop or start or run slow or fast without once losing its priming.

For irrigating purposes the pump is located in or inclosed by a catch-basin D, provided with an outlet-spout e , the object being to catch the water discharged from the arms and direct it into a ditch or other required place. The catch-basin is connected to the upper flanged end e' of casing B and is provided with an upper central opening for sleeve a^3 . The advantages of this improvement are apparent to those skilled in the art. In the first place I am enabled to dispense with valves in the outer ends of the hollow radiating arms, and thus save the cost of such valves and avoid the danger of their getting out of repair. Then again it is impossible for the pump to throw its priming out of the arms, and in the event of any stones or other foreign matter being drawn into the pump the same can readily pass out through the traps or nozzles without injuring any of the parts.

Another advantage is had when the pump is operated in an air-tight cylinder from which the water is forced under pressure, as shown and described in my before-mentioned pending applications for patents. When so used, the traps regulate the supply. This is of special advantage when the demand on the pump varies, as in city use. The traps will discharge the water up to a given pressure running at a certain speed, and when the water is not being drawn or allowed to flow from the cylinder as fast as supplied by the pump the confined water will rise in the cylinder and compress the air therein into a small space, thus increasing the pressure to a point equal to the centrifugal force of the water contained in the hollow arms, when the pump will stop giving off water, but as soon as this pressure is relieved by drawing off a portion

of the water in the cylinder the pump will again discharge sufficient to supply that withdrawn.

In the form of trap above described the water is discharged at right angles to the hollow arms. The discharge being in a direction opposite to that in which the arms revolve, it does not meet with as great resistance from the air as if discharging in any other direction. In fact, the natural pressure of the air is partially relieved when the traps are revolving rapidly, as they are "traveling away from the air," so to speak, and in consequence a suction is created in rear of the open end of each tray.

In Fig. 4 I have shown a slightly-modified form of my trap or nozzle. In this form the trap is curved inwardly to one side of the hollow arm, substantially parallel therewith, as at e'' , and is then bent or curved upwardly, as at e^3 , at a point on a line in rear of the receiving end of said trap, and it is then bent outwardly into a horizontal portion, being on a line with the bend or curved portion e'' . Thus the water raised by the wheel and discharged by its arms into the trap is compelled to travel in a reverse direction and thence upwardly and out through the outer open end of said trap before being finally discharged. By means of this form of trap or nozzle the water is discharged on a substantially straight line from the periphery of the wheel, and when the series of buckets shown in my before-noted pending applications for patents are employed in connection with the wheel the full force of the water will be directed against said buckets.

I claim as my invention—

1. A centrifugal pump having hollow radiating arms the outer ends of which are bent or curved inward and then upward at an angle to said arms, substantially as set forth.

2. A centrifugal pump having hollow radiating arms, and traps secured on the outer ends of said arms bent or curved inward about on a line parallel with said radiating arms and also bent or curved upward, substantially as set forth.

3. A centrifugal pump having hollow radiating arms, and traps or nozzles secured on the outer ends of said arms and bent or curved inward about on a line with said radiating arms and having outer horizontal discharge ends, substantially as set forth.

4. The combination with a centrifugal pump having hollow radiating arms, of the traps or nozzles herein described designed to be attached to the outer ends of said arms, said traps or elbows being bent or curved inward to one side of said radiating arms on a slight incline and then bent or curved upward and thence transversely to said radiating arms, substantially as set forth.

5. In a centrifugal pump, the combination with the hollow wheel having a lower central opening, a depending cylindrical extension and an upper sleeve, of the casing having a

circular groove or channel supplied with mercury, or its equivalent, and in which said extension fits, the central sleeve located in and connected to said casing, and the shaft fitted
5 in said latter sleeve and also in the upper sleeve of the wheel, substantially as set forth.
In testimony whereof I have signed this

specification in the presence of two subscribing witnesses.

CHARLES MCINTYRE.

Witnesses:

HUGH CONWAY WALKER,
JAMES MACDONALD.