

No. 880,327.

PATENTED FEB. 25, 1908.

E. W. RIGGS.

COMPOUND CENTRIFUGAL PUMP.

APPLICATION FILED MAY 9, 1907.

2 SHEETS—SHEET 1.

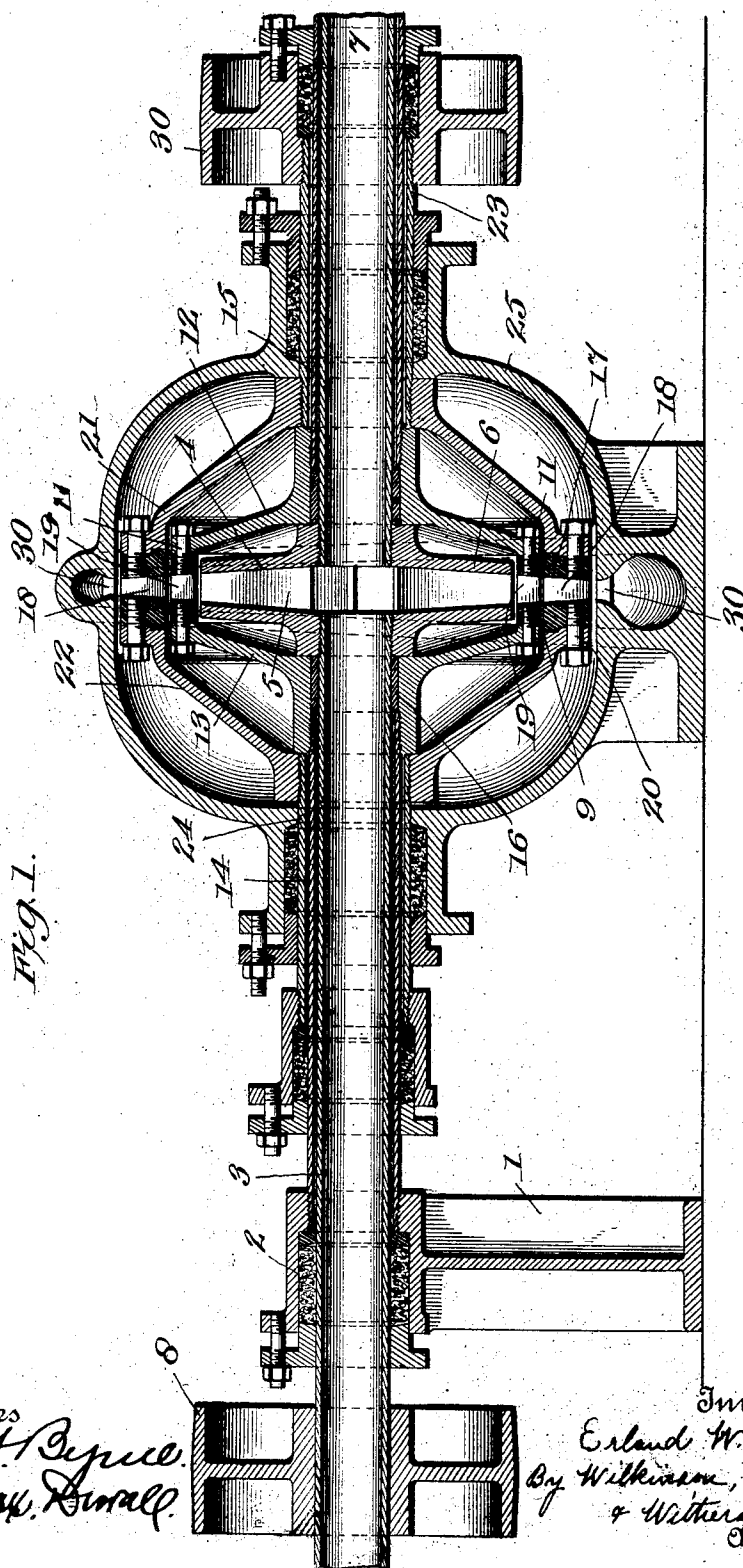


Fig. 1.

Witnesses
Geo. A. Bynum
Wm. Max. Small

Inventor
Erland W. Riggs.
By *Wilkinson, Fisher*
+ *Witherspoon*,
Attorneys.

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2 SHEETS—SHEET 2.

Fig. 2.

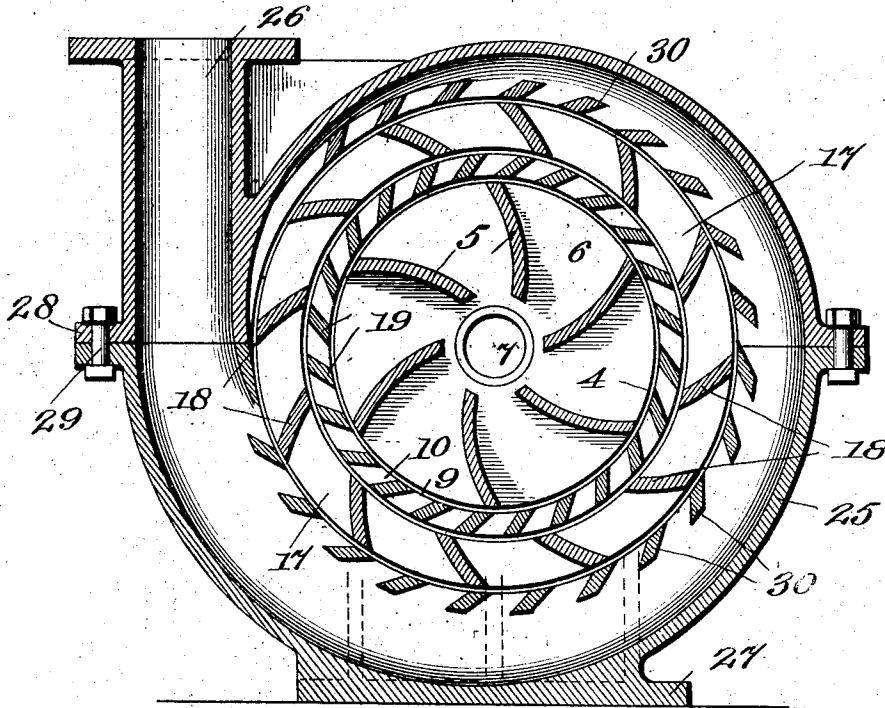


Fig. 3.

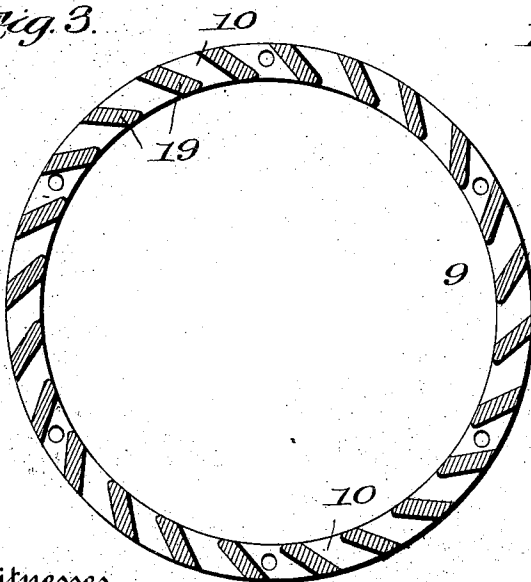
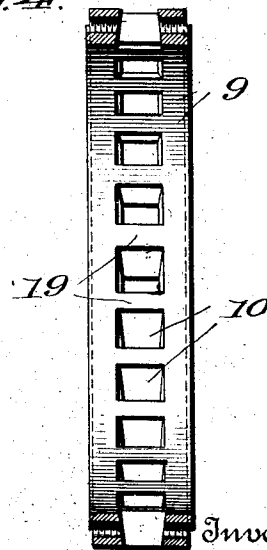


Fig. 4.



Witnesses
Geo. A. B. B. B.
Mr. Map. Small.

Inventor:
Erland W. Riggs.
By Wilkinson, Fisher & Witherspoon
Attorneys.

UNITED STATES PATENT OFFICE.

ERLAND W. RIGGS, OF BUTTE, MONTANA, ASSIGNOR OF ONE-HALF TO MORRIS S. LARGEY,
OF BUTTE, MONTANA.

COMPOUND CENTRIFUGAL PUMP.

No. 880,327.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed May 9, 1907. Serial No. 372,700.

To all whom it may concern:

Be it known that I, ERLAND W. RIGGS, a citizen of the United States, residing in Butte, in the county of Silverbow and State of Montana, have invented certain new and useful Improvements in Compound 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.

My invention relates to improvements in compound centrifugal pumps, and the object of my invention is to provide a simple and economical device of this kind, which with a small expenditure of power will lift a large amount of water to a considerable height, this application being an improvement upon my former invention, Serial No. 268,598, filed July 7, 1905.

With this object in view, my invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings: Figure 1 is a longitudinal cross section of my invention, some of the supports not being shown. Fig. 2 is a vertical central cross section of the same. Fig. 3 is a cross section of the inner fixed diffusion ring, and Fig. 4 is a vertical cross section of the same.

In practice the entire pump is supported upon a heavy metal frame by being securely bolted thereto, but this frame is not shown in the drawings.

1 represents one of the supports for the pump, which is securely fastened to the frame. Through this support in a stuffing box 2 runs a hollow pipe 3, the inner end of which is screwed into one side of a revoluble wheel 4 provided with curved vanes 5. These vanes are contained between disks 6, each of which is perforated at the center to receive one end of the pipes 3 and 7. A pulley 8 is attached to the pipe 3 for revolving the same, and this pulley is revolved by any suitable means.

Just outside the revoluble wheel 4 is a fixed diffusion ring 9, which is provided with slots 10 to permit the outward passage of the liquid. This diffusion ring is held by means of bolts 11 between the edges of two circular dished plates 12 and 13. The plate 13 is supported on the end of a tube 14, which is screwed into it, and the other end of this tube is screwed into the support 1. Simi-

larly the other plate 12 is supported on a tube 15. A packing such as 16, surrounds the inlet tube 3 to prevent the fluid from leaking around the edge of the wall 4. This diffusion ring is provided with inclined vanes 19, which are inclined in the opposite direction to that of the blades 5 on the wheel 4.

Outside the diffusion ring 9 is located a revolubly mounted annular wheel 17 provided with vanes 18 curved in the same direction as the vanes 5. This wheel is cast in one piece, and is held by means of bolts 20 in the outer edges of dished plates 21 and 22. These plates are each provided with a central perforation, and a pipe 23 is screwed into the central part of the plate 21, and a pipe 24 is screwed into the central part of the plate 22.

Surrounding the wheels and the diffusion ring is a stationary casing 25 so arranged as to form a volute arrangement around the central tubes 3 and 7, and terminating in a discharge nozzle 26, and having a flattened base 27, which rests upon the supporting frame. This casing 25 is made in two sections each provided with projecting lips 28, and the sections are united together by bolts 29 in the usual way. This casing is also provided with a series of vanes 30 just outside the vanes 18 of the wheel 17, and inclined in the opposite direction from that of the vanes 18, but substantially in the same direction as the plates 19 on the diffusion ring 9.

30 represents a pulley fastened to the pipe 23, and through which the pipes supporting the inner wheel and the diffusion ring pass. Stuffing boxes are provided wherever the hollow pipes pass through the casing, or through supports, or through each other.

I have found it preferable in practice that the wheels 4 and 17 should be revolved at different rates of angular speed, the outer one at a higher angular speed than the inner one.

In the drawing I have shown two revolving pumps and two stationary diffusion rings, but I do not limit myself to this number, as three, or even more, of each could be used.

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

1. In a compound centrifugal pump, the combination of a central centrifugal pump provided with curved vanes and mounted on a hollow shaft, another centrifugal pump

surrounding said first-named pump and mounted on hollow shafts, a stationary diffusion ring between said pumps, and means for driving the outer pump at a greater angular speed than the inner pump, substantially as described.

2. In a compound centrifugal pump, the combination of a central pump mounted on a hollow shaft and provided with curved vanes, an annular centrifugal pump surrounding said first-named pump and having vanes curved in the same direction as the vanes of said first-named pump, a stationary diffusion ring provided with vanes curved in the opposite direction to the vanes on the pumps, means for driving said outer pump at a greater angular speed than said inner pump, a volute shaped casing surrounding said pumps, and inlet and discharge pipes, substantially as described.

3. In a compound centrifugal pump, the combination of a central pump mounted on

a hollow shaft and provided with curved vanes, a stationary diffusion ring surrounding said pump and provided with vanes curved in the opposite direction, a second annular centrifugal pump surrounding said diffusion ring mounted on a hollow shaft and provided with curved vanes, the vanes on said second pump being curved in substantially the same direction as those on the first-named pump, means for driving said outer pump at a greater angular speed than the inner pump, a volute shaped casing provided with vanes substantially parallel to the vanes on said diffusion ring, and inlet and discharge pipes, substantially as described.

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

ERLAND W. RIGGS.

Witnesses:

JOHN D. HAINES,
F. S. MCGINN