

No. 634,840.

Patented Oct. 10, 1899.

F. B. WARRING.
CENTRIFUGAL PUMP.

(Application filed Apr. 28, 1899.)

(No Model.)

Fig. I.

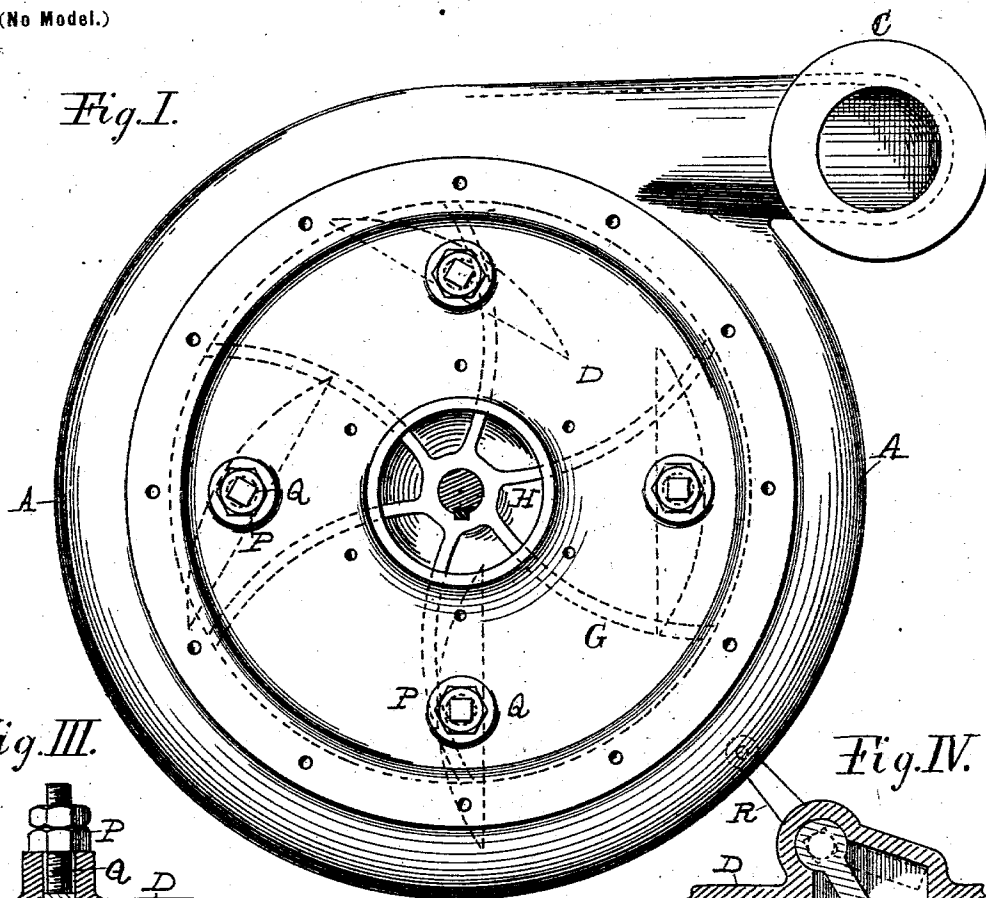


Fig. III.

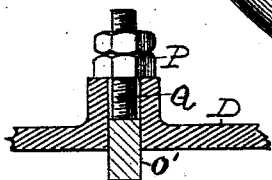


Fig. IV.

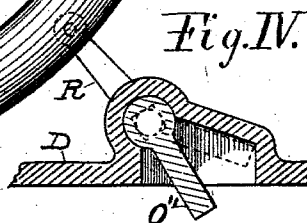
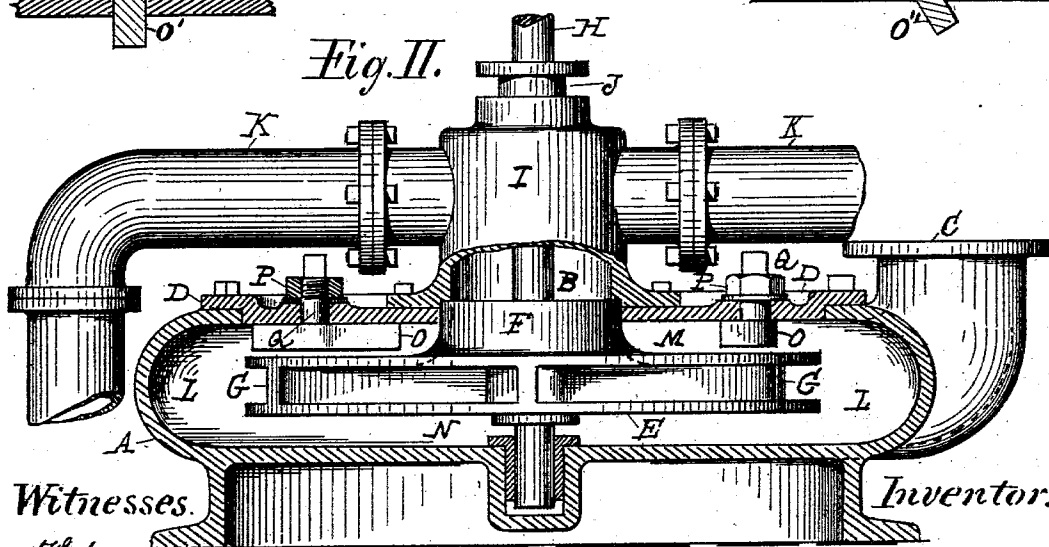


Fig. II.



Witnesses.

W. H. Hartenack
Elmer Wickes.

Inventor:

Franklin B. Waring
By *J. Richards & Co.*
Atys.

UNITED STATES PATENT OFFICE.

FRANKLIN B. WARRING, OF SAN JOSÉ, CALIFORNIA, ASSIGNOR TO THE
CATON'S FOUNDRY AND MACHINE COMPANY, OF SAME PLACE.

CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 634,840, dated October 10, 1899.

Application filed April 28, 1899. Serial No. 714,857. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN B. WARRING, a citizen of the United States, residing at San José, county of Santa Clara, and State of California, have invented certain new and useful Improvements in Centrifugal Pumps; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to centrifugal pumps and to certain improvements therein, especially pumps to operate under considerable pressure, and to a means of avoiding or regulating the hydraulic thrust on the sides of the incased impellers in such pumps.

My improvements, which are applicable to either vertical or horizontal pumps, consist in the application of movable vanes to modify, relatively, the rotation of the water at the sides of the impellers, and thereby the static pressure sustained thereon, so the operating parts can be put in equilibrium, and in so arranging such movable vanes that they can be adjusted from the outside of the pump-casing and set to suit variations of the head or pressure and while the pump is operating and without dismembering its parts.

The objects of my invention are to provide means of regulating externally the pressure on the sides of the impellers, and thus avoid the expense of separating the pumps to gain access to internal devices for this purpose; also, to provide by the same externally-operated devices for variations of the head or pressure, such as occur in drawing water from pits and wells at different depths, as the season and supply may determine.

To these ends I construct centrifugal pumps as shown in the drawings herewith, forming a part of this specification.

Figure I is a plan view of a vertical centrifugal pump provided with my improvements. Fig. II is an elevation, partly in section, through the same pump, showing pivoted vanes to regulate the water's rotation on the top side of the impeller. Fig. III is a section through sliding vane O to accomplish the same purpose. Fig. IV is a section transversely of a movable vane for the same purpose pivoted in a plane parallel to the side of the impeller.

In the operation of centrifugal pumps having incased impellers and when the water is not set in revolution at the sides of the impeller the latter is subjected at all exposed surfaces to a pressure equal to that of the static head against which the pump is operating, and when, as in the present case, the water-inlet way is at one side of the impeller the area of such inlet-way being relieved of pressure causes by unbalanced pressure a thrust on the impeller or on the line of its axis equal to the area of the inlet-way multiplied into the head or resistance. This thrust on the impeller is removed in proportion as the water at its sides is set in revolution, being counteracted by centrifugal force of the water, and this furnishes a means of regulating the thrust to suit various circumstances—as, for example, sustaining the weight of the impeller, the driving-shaft, and connected parts when the pump is set vertically, as is common in pumping from pits and as shown in the drawings. This variation of thrust or its regulation has heretofore been accomplished by means of vanes of unequal length at each side of the impeller to baffle and prevent rotation of the water, relatively, at the sides thereof; but the relative length or area of such vanes is difficult to predetermine and fails to meet the requirements when the head or pressure is changed. To obviate this difficulty, I provide for controlling the rate of the water's revolution at the side or sides of the impeller, as before stated, by means of "adjustable" baffling-vanes operated from the exterior of the pump-casing.

Referring to the drawings, A is the pump-casing, (shown here annular in form,) provided with an inlet-way B and discharge-way C, covered by a removable plate D, so the impeller E can be inserted and removed from the top. The impeller E is of the incased type, having a nozzle F and a series of internal vanes G, as shown by dotted lines in Fig. I, and is keyed to the spindle H, which passes up through the induction-chamber I and a gland J in the usual manner. Water enters through the suction-pipes K K, which may connect to several wells. The discharge of water from the impeller being approximately tangential, this, with tractive friction around

the periphery of the impeller, sets the water in the chamber L in revolution in such degree as to counteract in part the static pressure on the sides or top and bottom of the impeller. This provides a means of regulating the thrust on the impeller by means of baffling the rotation of the water at the sides M and N or above and below the impeller.

In the case of a vertical pump such as is shown in the drawings it is desirable to sustain by the hydraulic thrust the weight of the impeller E, its spindle H, and usually a long shaft extending to the top of a pit in which the pump is placed. Hence baffling-vanes are required at the top only. These vanes O, I construct in any suitable manner, so the area opposed to the water's rotation can be changed and adjusted as the head or pressure requires. A pivoted lune form for such vanes is shown by dotted lines in Fig. I adjustable to various positions, as indicated in the drawings. I have shown four such vanes to better indicate positions of adjustment; but it will be evident that in most cases and when deep or wide enough a single one will produce the desired effect. These vanes O are set in any desired position by loosening the nuts P on the stems Q and setting the vanes accordingly. When a single vane O' is employed, I prefer to arrange it, as shown in Fig. III, to slide through the plate D, so as to prevent rotation of the water in the chamber M above the impeller E, and when the pumps are sub-

merged, as is often the case when they are erected in pits, I arrange the baffling-vane O', as shown in Fig. IV, so as to be operated above the water-level by means of a rod attached to the lever R. In any of these forms it will be seen that the baffling-vanes O can be adjusted to present more or less opposing surface, and the thrust on the impeller E can be regulated from the outside of the pump-casing even while the pump is in operation or submerged.

Having thus explained the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a centrifugal pump having an incased impeller, adjustable baffling-vanes to prevent in various degrees the revolution of the water at the sides of the impeller in the manner and for the purposes substantially as specified.

2. In a centrifugal pump, an incased impeller therein and in combination therewith, movable baffling-vanes at the side or sides thereof and means to adjust such vanes from the outside of the pump-casing, substantially as specified.

These features I believe to be novel and useful and ask that Letters Patent be granted therefor.

FRANKLIN B. WARRING.

Witnesses:

CHAS. W. KNOX,

GUY W. CAMPBELL.