W. E. ANDERSON.

IMPELLER VANE FOR WATER PUMPS.

APPLICATION FILED JULY 1, 1919.

1,367,343.

Patented Feb. 1, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

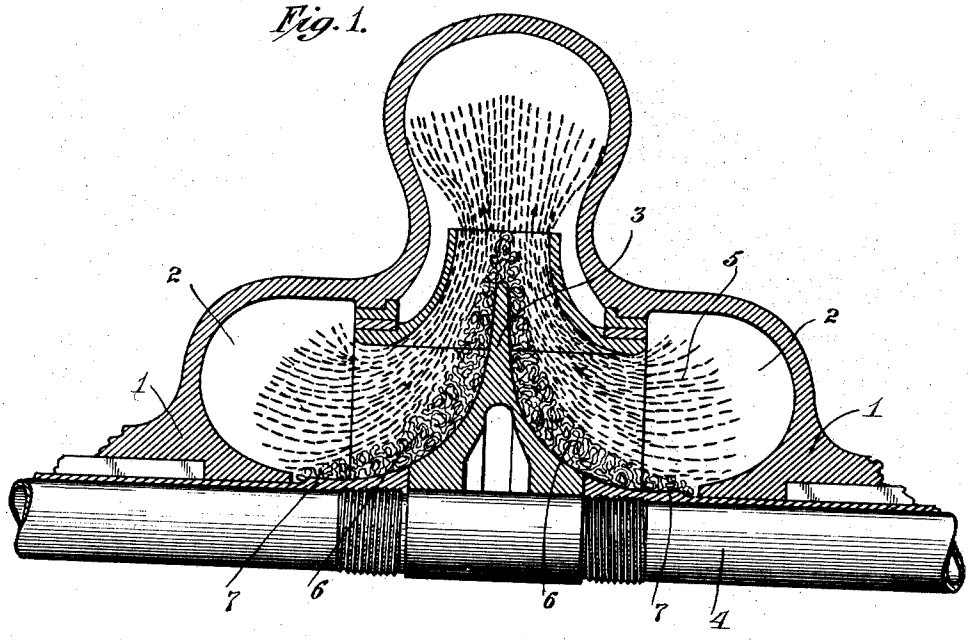
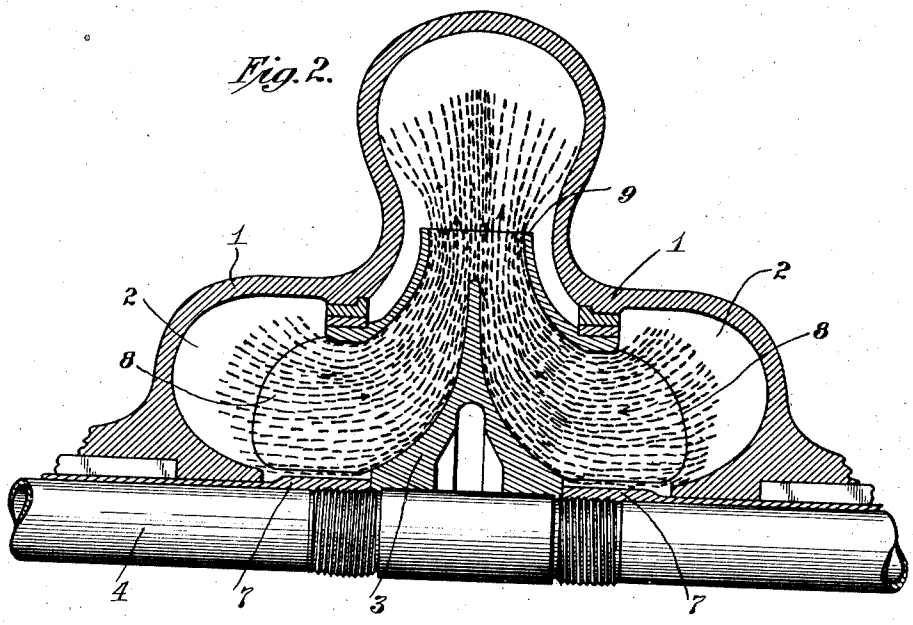


Fig. 2.



WITNESS:

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2 SHEETS—SHEET 2.

Fig. 3.

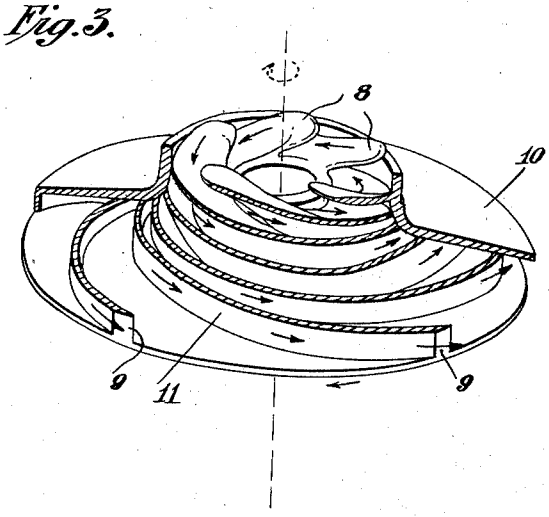


Fig. 4.

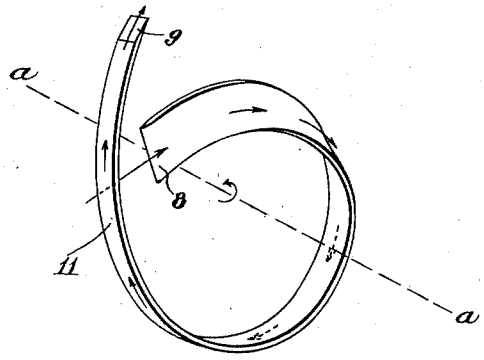
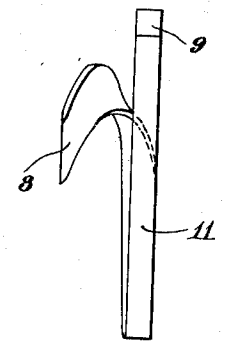


Fig. 5.



WITNESS

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IMPELLER-VANE FOR WATER-PUMPS.

1,367,343. Specification of Letters Patent. Patented Feb. 1, 1921.

Application filed July 1, 1919. Serial No. 307,947.

To all whom it may concern:

Be it known that I, WILLIAM E. ANDERSON, a citizen of the United States, residing at Phillipsburg, in the county of Warren and State of New Jersey, have invented a certain new and useful Improvement in Impeller-Vanes for Water-Pumps, of which the following is a specification.

This invention relates to an improvement in pump impellers and particularly in the vanes adapted to be used in pump impellers of the centrifugal type.

The objects of the present invention are to improve the efficiency of the present pumps of the centrifugal type, to increase the quantity of water delivered by a pump when compared with a pump made in accordance with the present method; to provide vanes in the impeller that will first engage the fluid in the intake of the pump and thrust it in an axial direction and, during the passage of the water through the impeller will gradually and uniformly change the direction of flow of the water, simultaneously and gradually increasing the velocity of the water until when the water reaches the discharge end of the vane at the outer periphery of the impeller it is driven in a direction perpendicular to the axis of the impeller. This change in direction of flow of water while passing through the pump is accomplished gradually throughout the impeller by the special form of vane forming a part of the present invention.

A further object of the invention is to prevent the loss of efficiency and decreased flow of water through the pump, due to the centrifugal action of the rotating parts near the intake of the impeller which causes the particles of water which come in contact with these rapidly rotating parts to be thrown outwardly away from the impeller hub.

In the present invention the first rotating part with which the water in the intake comes in contact is the inlet end of the impeller vane which protrudes slightly into the intake and engages the water forcing it in an axial direction within the parts of the impeller which force it through the impeller to the discharge end as described above.

It is a well known function of centrifugal pumps that the impeller will handle and discharge all of the water which reaches the vane of the impeller. It is therefore an object of the invention to enable the impeller vanes to engage the largest possible amount of water at their intake end.

With these and other objects in view my invention consists in the features of construction and operation set forth in the following specification.

In the drawings annexed hereto and forming a part hereof:

Figure 1 shows conventionally a part of a pump and impeller in section made in accordance with the present practice.

Fig. 2 shows in conventional manner a pump having the form of impeller and vanes made according to the present invention.

Fig. 3 shows an impeller partially broken away to more clearly show the new form of impeller vanes.

Fig. 4 shows the form of one complete vane made in accordance with the present invention.

Fig. 5 another view of one complete vane.

Referring more particularly to the drawings, 1 refers to the pump casing which may be of any usual common type, the one shown in Fig. 1 being of the balanced or double intake type, the intakes being shown at 2. The rotating impeller is shown generally at 3, mounted upon the rotating shaft 4 adapted to be rotated at a high velocity by any well known means.

The lines of flow of the fluid operated on, which is usually water, are shown at 5 in Fig. 1, these in the usual form of pump now generally used taking the form roughly outlined in Fig. 1. The irregular curves shown at 6 are drawn to show the effect of eddying of the water due to the water being thrown outwardly or tangentially from the rapidly rotating parts of the impeller near the intake. These rotating parts are shown at 7 which form parts of the sleeves surrounding the shaft 4 joining and continuing the outline of the impeller wheel 3.

Referring now more particularly to Fig. 2 the impeller casing is shown as of the same type as that above in Fig. 1, the outlines of the impeller wheel itself being closely similar. The impeller, however, in this form, which is the improved and preferred form used in my invention, have the vanes contin-

uing from the point 8 which is well out into the intake 2 of the pump beyond the impeller hub and cover plate and extend from that point up to the extreme outer periphery 9 of the impeller wheel 3, thus guiding and directing the fluid from the time it enters the intake portion of the impeller until it reaches its final point of discharge from the impeller. In this figure the effect accomplished by avoiding the disturbance due to the rotating parts 7 is shown, this being shown in the stream line of the fluid filling the entire space within the impeller.

In this form of invention the sleeves 7 surrounding the shaft 4 are cut away as shown and the impeller vanes extend down to within a very close margin of their periphery so that any centrifugal action set up by these rotating sleeves forces the fluid into the path swept out by the impeller vanes. In other words the first rotating parts of the impeller encountered by the fluid are the rotating vanes.

Referring now to Fig. 3 this shows an impeller made up in accordance with the present invention, the front half of the cover plate 10 being broken away to more clearly show the outline of the vanes 11. The impeller shown in this figure is of the single intake or unbalanced type, to which type the present invention is also adapted. The number of vanes shown in this figure, namely five, may be varied more or less and still be within the spirit of the invention. It has been found in practice, however, that four or five similar vanes as shown in Fig. 3 give excellent results. The impeller may also be made up having but one or two of this present type of vane and additional vanes may be inserted between the new type of vane of any usual form.

The form of the vane which forms the principal part of the invention is shown most clearly in Fig. 4, the intake end being shown at 8 and the discharge end at 9, the arrows indicating the course of the fluid in its passage from the intake to the discharge. It will be seen from examination of this figure that the end 8 lies in a plane substantially perpendicular to the axis shown on lines A—A, this axis being that about which the impeller rotates. The surface of the vane which acts to guide and force the water from the intake to the discharge is a warped surface gradually changing its plane as it goes around the circumference of the impeller at a gradually increasing radius from a plane substantially perpendicular to the axis at its intake end to a plane substantially parallel to the axis at its discharge end 9. The water from the time it enters the impeller is thus continually under the influence of one of these vanes so that it is constrained to follow the direction of flow in accordance with the surface of this vane and thus gradually is turned until it is finally thrown out by the centrifugal action of the outer end of the impeller vane.

The warped surface of the vane 11 starts at the intake end of the vane as a helicoid, standing out from the axis about which the impeller revolves at right angles so that rotation of the impeller forces the fluid in an axial direction. As the helicoid extends into the impeller its radius increases and its plane begins to vary from the plane substantially perpendicular to the axis at which it began and approaches a plane lying more and more nearly parallel with the axis of the impeller. At the discharge end of the vanes this plane of the vane is quite parallel with the axis of the impeller so that the fluid finally is thrown out from the impeller in a radial direction by centrifugal force.

The vane throughout its extent from intake to discharge end may be slightly concaved transversely or one end may be concaved and the remainder plane in transverse section.

It is to be understood that the present showing and description disclose only one specific embodiment of my present invention, and that other forms and modifications are included within the spirit and scope thereof, as expressed in the appended claims.

What I claim is:

1. In an impeller for a centrifugal pump, a vane extending into the intake to a point where the flow of the liquid is parallel to the axis of the impeller.

2. In an impeller for a centrifugal pump, a continuous vane extending from a point in the intake where the flow of the liquid is parallel to the axis of the impeller to a point in the outer periphery of the impeller.

3. In an impeller for a high pressure centrifugal pump having axial intake and radial discharge, a vane having a surface starting in an increasing helicoid at the intake end changing to a warped surface and then to a spiral and terminating in a plane parallel to the axis of said impeller at the discharge end.

4. An impeller vane for a centrifugal pump, said vane being a warped surface, the intake end of said vane being in the form of a helicoid the radius of which but slightly increases and the discharge end being in the form of a spiral the radius of which more rapidly increases.

5. An impeller vane for a centrifugal pump, said vane being a warped surface, the intake end of said vane being in the form of a helicoid the radius of which but slightly increases and the discharge end being in the form of a spiral the radius of which more rapidly increases, the change from a helicoid to a spiral occurring uniformly and gradually throughout the length of the vane.

6. In a pump impeller, a plurality of

vanes, the intake end of each of said vanes extending beyond the lateral limits of the impeller hub and cover plate into the pump intake and the discharge ends of said vanes extending to the outer periphery of said impeller.

7. In a pump impeller, a plurality of vanes, the intake end of at least one of said vanes extending beyond the lateral limits of the impeller hub and cover plate into the pump intake and the discharge end of said vane extending to the outer periphery of said impeller.

8. In a pump impeller, a plurality of vanes inclosed within said impeller, each of said vanes extending from beyond the impeller hub and cover plate at their intake ends to the periphery of said impeller at their discharge ends.

9. In a pump impeller, a plurality of vanes inclosed within said impeller, at least one of said vanes extending from beyond the impeller hub and cover plate at their intake ends to the periphery of said impeller at their discharge ends.

10. In a centrifugal pump having an axial intake and radial discharge, an inclosed impeller having a plurality of continuous vanes, each of said vanes extending from a point in the intake where the flow of the liquid is parallel to the axis of the impeller to a point in the outer periphery of the impeller at its discharge end.

11. In an impeller for a centrifugal pump, a vane having a surface commencing at the intake end as an increasing helicoid and continuing for a short distance, then changing into a warped surface which is continued until the surface lies in a plane parallel to the axis of the impeller beyond which the surface changes to a spiral about the axis of the impeller and finally terminates in a plane parallel to the axis.

In testimony whereof, I have hereunto set my hand.

WILLIAM E. ANDERSON.