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F. RAY.

CENTRIFUGAL, TURBINE, OR SIMILAR PUMP.

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Fig. 3.

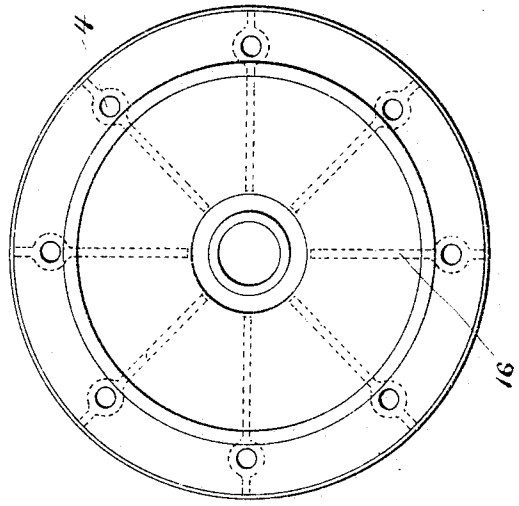


Fig. 1.

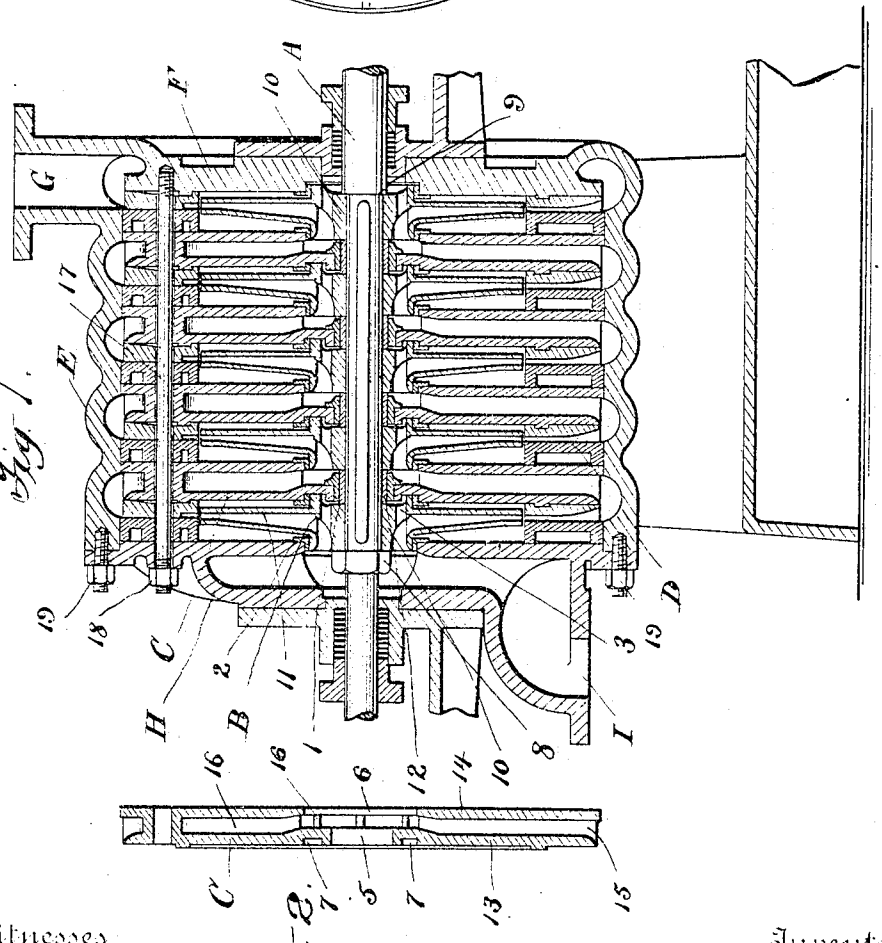


Fig. 2.

Witnesses
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No. 782,273. Patented February 14, 1905

UNITED STATES PATENT OFFICE.

FREDERICK RAY, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO HENRY R. WORTHINGTON, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CENTRIFUGAL, TURBINE, OR SIMILAR PUMP.

SPECIFICATION forming part of Letters Patent No. 782,273, dated February 14, 1905.

Application filed August 6, 1904. Serial No. 219,697.

To all whom it may concern:

Be it known that I, FREDERICK RAY, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Centrifugal, Turbine, or Similar Pumps, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improved construction for multistage centrifugal, turbine, or similar pumps, the especial object of the invention being to simplify and cheapen the manufacture of such pumps, while securing an efficient and durable construction.

My improved pump is made up of impeller and partition sections arranged successively upon the pump-shaft, the partition-sections, consisting of two disks separated to form the delivery-passages by which each impeller delivers to the central suction of the next impeller, and the disks of each partition-section being connected by fixed guide-vanes in the delivery-passages, by which the fluid is guided and its circular motion reduced. If separate diffusing-rings are used in a turbine-pump, these will be placed in proper position between the successive partition-sections and surrounding the impeller-chambers. Outside of the impeller and partition sections is a separate casing provided with the usual curved channels for the passage of the delivery liquid from the impeller or diffusing rings to the delivery-passages in the partition-sections, and this casing is preferably made in a single piece and formed integral with either the suction or delivery head. It will be found most convenient to form the casing with the delivery-head and to form the suction-head with its suction-chamber and suction connection separately. With this construction the parts may readily and conveniently be assembled upon the pump-shaft, and then secured together by bolts or screws passing through the sections and binding the suction and delivery heads and casing together.

As a full understanding of the invention can best be given by a detailed description of a construction embodying the same, such a description will now be given in connection with the accompanying drawings, forming a part of this specification, and illustrating a pump embodying all the features of the invention in their preferred form, and the features forming the invention will then be pointed out in the claims.

In the drawings, Figure 1 is a central longitudinal section of the pump. Fig. 2 is a central section of one of the partition-sections. Fig. 3 is a side view of the partition-section of Fig. 2 looking to the left.

Referring the drawings, A is the pump-shaft, and B C respectively the impeller and partition sections thereon; D, the diffusing-rings, which are shown as formed separately from the partition-sections; E, the outside casing; F, the delivery-head having the delivery G and shown as formed integral with the casing E, and H is the suction-head having the suction connection I.

Referring now to the detail construction of the parts in the form shown, the impeller-sections B consist of the hubs 10, which are splined upon the shaft A, as usual, and formed with curved surfaces for guiding the fluid to the impeller-vanes and the vane portions 11, which are shown as the common inclosed impellers, having side walls with vanes between them. These impellers are shown as separated on the shaft A by rings 12, on which are mounted, with suitable packing 1, the partition-sections C, and metal packing-strips 2 are shown as used in the running joints formed between the impeller-shoulders and the pump ends and partitions. It will be understood, however, that these packing details and the method of mounting the sections on the shaft are not essential to the present invention and may be of any other form. The impellers B are shown as provided with passages 3, by which the suction fluid may pass to the back of the impeller for balancing; but this balancing feature may be omitted or other balancing means employed.

The partition-sections C consist of the disks 13 14, separated a sufficient distance to form the delivery-passages 15, in which are the fixed vanes 16, which connect the disks, the disks

and vanes being formed integral. These vanes 16 are the usual guide-vanes between which the liquid passes from the delivery of one impeller to the suction of the next impeller and are shown as straight radial vanes. These vanes, however, may be curved, if desired, within the present invention. These vanes, or some of them, have enlargements provided with openings 4, through which pass the bolts or screw-rods 17, by which the assembled pump parts are secured together. The disks of the partition-sections are provided with central openings, the disk 13 being provided with a shaft-opening 5 and disk 14 with a larger opening 6 for the suction of the next impeller. The disk 13 is cut away to form shoulder 7, by which the running joint on the delivery side of the impeller is formed, and the running joint on the suction side of the next impeller is formed with the edge of the disk 14 about the opening 6.

There is nothing special about the construction of the diffusing-rings, and these may be separate rings, as shown, of any suitable construction or provided in any other suitable manner. If separate diffusing-rings are used, as shown, they will be provided with openings corresponding to openings 4 in the partition-sections to receive bolts or screw-rods 17.

The assembling of the parts will be understood from the drawings without extended description. The impeller and partition sections, with the diffusing-rings, may be mounted upon the shaft A with the rings 10 and packings and the screw-rods 17 and locked on the shaft by nut 8, setting the parts up against the shoulder 9 on shaft A, and the shaft and parts as thus assembled be then placed in the casing E and secured to the head F by screwing the screw-rods 17 into the head F, or the shaft A may be put into the head F and the successive sections and rings slipped into position on the rods 17 and shaft. The suction-head H is then put in place at the end of the casing E and all the parts secured together by the nuts 18 on the rods 17 and studs 19 in the head H and the casing. The shaft may be packed in the heads F H in any suitable manner.

It will be understood that the invention is not limited to the detail construction or arrangement of the parts shown, but that many changes may be made in the construction, especially in the detail form of the impeller and partition sections, and in the construction of the casing and heads and means for securing the parts together, without departing from the invention as defined by the claims.

What I claim is—

1. A multistage centrifugal, turbine or similar pump having between the impellers integral partition-sections consisting of single side disks forming the adjacent side walls of successive impeller-chambers and separated to form delivery-passages between the disks through which the fluid passes to the central suction of the next impeller, and fixed guide-vanes in said passages connecting the disks.

2. A multistage centrifugal, turbine or similar pump having integral impeller-sections alternating with integral partition-sections, said integral partition-sections consisting of single side disks forming the adjacent side walls of successive impeller-chambers and separated to form delivery-passages between the disks through which the fluid passes to the central suction of the next impeller.

3. A multistage centrifugal, turbine or similar pump formed of integral impeller-sections alternating with integral partition-sections, said integral partition-sections consisting of single side disks forming the adjacent side walls of successive impeller-chambers and separated to form delivery-passages between the disks through which the fluid passes to the central suction of the next impeller, diffusing-rings surrounding the impellers, and an outside casing separate from the sections.

4. A multistage centrifugal, turbine or similar pump formed of integral impeller-sections alternating with integral partition-sections, said integral partition-sections consisting of single side disks forming the adjacent side walls of successive impeller-chambers and separated to form delivery-passages between the disks through which the fluid passes to the central suction of the next impeller, an integral outside casing separate from the sections, suction and delivery heads, and bolts passing through the partition-sections and secured in the heads.

5. A multistage centrifugal, turbine or similar pump formed of integral impeller-sections alternating with integral partition-sections, said integral partition-sections consisting of single side disks forming the adjacent side walls of successive impeller-chambers and separated to form delivery-passages between the disks through which the fluid passes to the central suction of the next impeller, diffusing-rings formed separately from the sections and surrounding the impellers between the partition-sections, an outside casing separate from the sections and rings, suction and delivery heads, and means for securing the parts together.

6. A multistage centrifugal, turbine or similar pump formed of integral impeller-sections alternating with integral partition-sections, said integral partition-sections consisting of single side disks forming the adjacent side walls of successive impeller-chambers and separated to form delivery-passages between the disks through which the fluid passes to the central suction of the next impeller, suction and delivery heads, an outside casing separate from the sections and rings and integral with one of the heads, and means for securing the parts together.

7. A partition-section for centrifugal, tur-

bine or similar pumps, consisting of plates forming the single side disks 13, 14 separated to form liquid-passages and provided with central shaft and suction-openings and guide-vanes between the disks, all formed integral.

8. A partition-section for centrifugal, turbine or similar pumps, consisting of plates forming the single side disks 13, 14 separated to form liquid-passages and provided with central shaft and suction-openings and guide-vanes between the disks, all formed integral, said disk 13 having the shoulder 7 to form a running joint with the impeller, substantially as described.

9. A multistage centrifugal, turbine or similar pump formed of integral impeller-sections, alternating with integral partition-sections consisting of the side disks 13, 14, provided with central shaft and suction-openings and separated to form delivery-passages between the disks and guide-vanes between the disks, all formed integral, an outside casing separate from the sections, said sections and casing being formed to permit the sections to be moved longitudinally in the casing, suction and delivery heads, and means for securing the parts together.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FREDERICK RAY.

Witnesses:
W. H. KENNEDY,
C. J. SAWYER.