

R. H. RICE.
IMPELLER FOR CENTRIFUGAL APPARATUS.
APPLICATION FILED JULY 9, 1909.

1,021,265.

Patented Mar. 26, 1912.

Fig. 1.

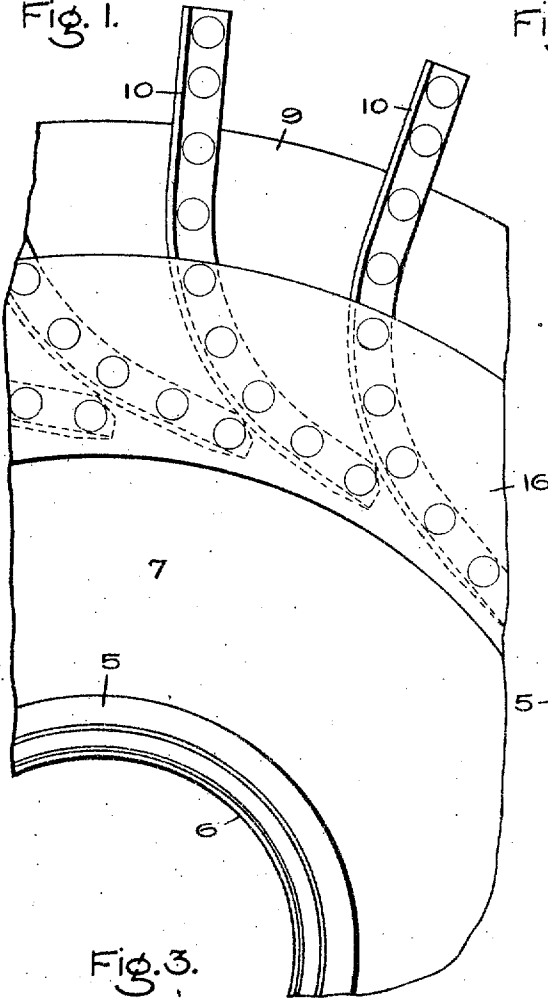


Fig. 2.

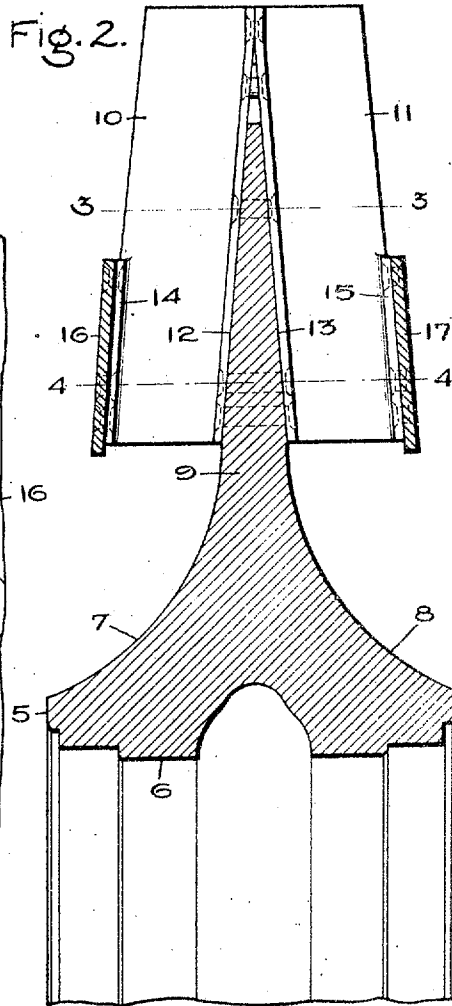


Fig. 3.

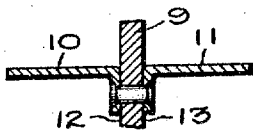
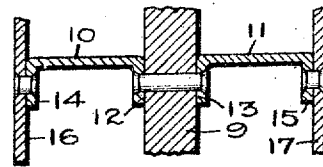


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

RICHARD H. RICE, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

IMPELLER FOR CENTRIFUGAL APPARATUS.

1,021,265.

Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed July 9, 1909. Serial No. 506,749.

To all whom it may concern:

Be it known that I, RICHARD H. RICE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Impellers for Centrifugal Apparatus, of which the following is a specification.

This invention relates to impellers or driving members for centrifugal apparatus such as pumps, compressors and the like and the object of the invention is the provision of an efficient impeller of improved construction in which the material is disposed to most advantageously withstand the stresses to which the impeller is subjected due to its very high rotative speed, and also in which the impeller structure is rugged and simple and much less expensive to manufacture than that of the impellers heretofore used.

In the accompanying drawing illustrating an embodiment of my invention; Figure 1 is a partial side view of an impeller; Fig. 2 is a cross section of the impeller; Fig. 3 is a section on the line 3—3 of Fig. 2; and Fig. 4 is a section on the line 4—4, Fig. 2.

The impeller of the pump or compressor illustrated includes a hub 5 having a suitable bore 6 to receive a driving shaft on which it is mounted to rotate within a casing having receiving and discharge openings for the air, gas, water or other fluid to be handled by the pump or compressor. The hub 5 is provided with curved outer surfaces 7 and 8 which merge into the lateral faces of a web 9 having a circular periphery. The curved faces of the hub and web assist in directing the fluid in an efficient manner to the inlet ends of the impeller vanes or blades 10 and 11. The axial width of the cross section of the web and hub increases from the periphery toward the center of the impeller in a manner adapted to secure the most effective distribution of material to withstand the centrifugal stresses set up by the high rotative speed of the apparatus. The hub and web are preferably made from forged steel or a steel casting and machined to finished form.

The lateral faces 12 and 13 of the outer portion of the web 9 are inclined toward each other, thus giving to said portion a wedge-shaped cross-section. The vanes or blades 10 and 11 are provided with flanged inner lateral edges that engage the faces 12

and 13 and are riveted thereto. The vanes extend outwardly beyond the periphery of the web so that the ends of the flanges are brought into engagement with each other and the projecting portions are secured together by rivets. The rivets which secure the vanes to the web and to each other are headed up while hot and on cooling they contract to bind the parts securely together. When viewed from the side, as in Fig. 1, the outer portions of the vanes 10 and 11 are seen to be radially or substantially radially disposed with respect to the center of the impeller while the inner portions of said vanes are curved transversely to the radial portions in such a manner that their inlet ends are nearly at right angles to said radial portions and tangent to a circle described about the center of the impeller. The centrifugal stresses on these curved portions of the vanes tend to bend them over. To strengthen and protect the vanes against this bending action, the inner portions of the outer lateral edges of said vanes adjacent the hub are provided with flanges 14 and 15 and rings 16 and 17 are riveted to the flanges. The vanes are readily curved and flanged by rolling. They can be made from flat metal plates which are passed through dies or rolls that bend the plates to the desired curvature and form the flanges during the same general operation, the outer flanges being cut away afterward leaving the portions 14 and 15 to receive the rings 16 and 17, but they might be formed without this last cutting operation by using flat plates of suitable outline or shape. The other portions of the impeller are formed by ordinary machine processes, thus producing a relatively inexpensive impeller which has a simple and rugged structure well adapted to perform its functions and to withstand the stresses to which it is subjected in service.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is,

1. An impeller comprising a hub, a web extending outwardly from the hub, vanes arranged in pairs with the members of each pair disposed on opposite sides of the web and having their ends projecting beyond the periphery of the web, the outer portions of the vanes being radially arranged and the inner portions curved transversely with respect to the outer portions, flanges on the inner lateral edges of said members or vanes that are attached to the web and to each other beyond the periphery of the web, flanges on the outer lateral edges of the curved portions of the vanes adjacent the hub, and rings secured to said flanges.

2. An impeller comprising a hub, an integral web extending outwardly from the hub, the portion of the web adjoining the hub having curved faces for directing the fluid to the impeller blades or vanes, and the part of the web between said portion and its periphery having oppositely inclined faces, vanes having their inner lateral edges attached to said inclined faces and to each other beyond the periphery of the web, the outer lateral edges of the vanes being parallel to said faces, said vanes also having their outer portions substantially radially disposed while their inner portions are curved transversely with respect to the outer portions, flanges on the outer lateral edges of the curved portions of the vanes, and rings secured to said flanges.

3. An impeller comprising a hub, a web extending outwardly from the hub, the portion of the web adjoining the hub having curved faces and the part of the web between said portion and its periphery having oppositely inclined faces, vanes having flanged inner lateral edges that are attached to the inclined faces of said web with their

outer ends projecting beyond the periphery of the web into engagement with each other, the outer portions of the vanes being radially disposed and the inner portions curved transversely with respect to said outer portions, flanges on the outer lateral edges of the curved portions of the vanes, and rings secured to said flanges.

4. An impeller comprising a hub, a web extending outwardly from the hub, the portion of the web adjacent the hub having curved faces and the part of the web between said portion and the periphery having oppositely inclined converging faces, vanes mounted in pairs on said inclined faces with their outer ends projecting beyond the periphery of the web, the members of each pair being disposed on opposite sides of the web, said vanes having outer radially arranged portions and inner curved portions, integral flanges formed on the inner lateral edges of the vanes which engage said inclined faces and project beyond them into engagement with each other, rivets which pass through the web and each pair of flanges and secure the vanes to said web, rivets which pass through the projecting portions of the flanges and secure them together, integral flanges formed on the outer lateral edges of the curved portions of the vanes, flat rings arranged at each side of the web in engagement with the last mentioned flanges, and rivets for securing the rings to said flanges.

In witness whereof, I have hereunto set my hand this seventh day of July, 1909.

RICHARD H. RICE.

Witnesses:

JOHN A. McMANUS, Jr.,
RICHARD G. POVEY.