May 17, 1966 M. AMIRAULT ETAL 3,251,307

IMPELLER FOR SMALL-SIZED PUMP

Filed Feb. 18, 1964

Fig. 1.

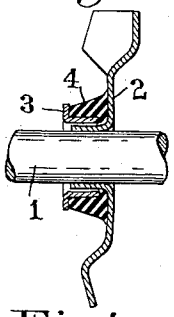


Fig. 2.

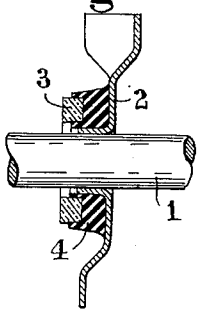


Fig. 3.

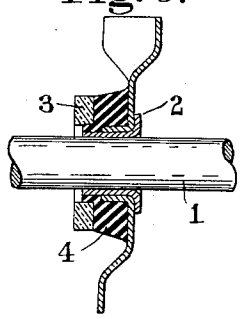


Fig. 4.

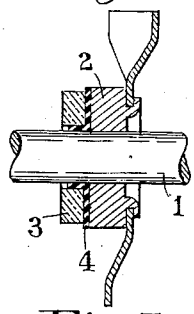


Fig. 5.

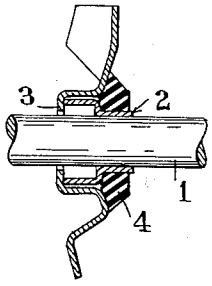


Fig. 6.

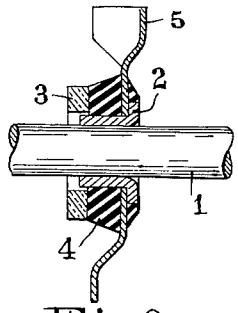


Fig. 7.

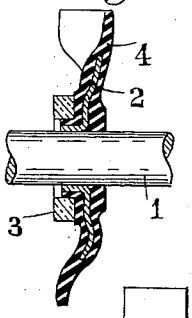


Fig. 8.

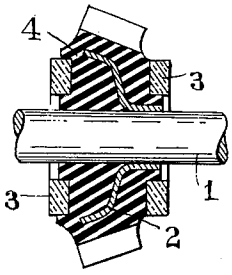


Fig. 9.

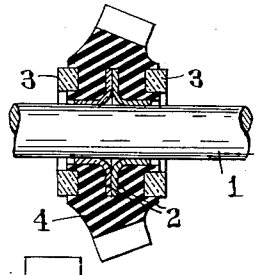


Fig. 10.

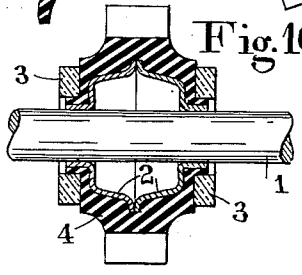
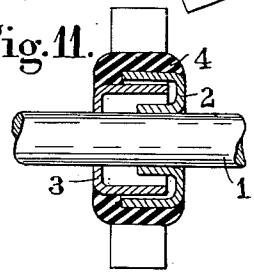


Fig. 11.



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3,251,307

IMPELLER FOR SMALL-SIZED PUMP

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Claims priority, application France, Feb. 26, 1963, 926,027, Patent 1,357,730
9 Claims. (Cl. 103—115)

This invention relates to improvements in or relating to pump impellers or turbines notably those utilized for circulating cooling water in the engines of automobile vehicles, in washing machines and for any other pumps for home use.

It is known, in the manufacture of pump impellers, to use the combination of metal with rubber or plastic. These last-named materials or elastomers are widely used in conventional constructions either for protecting the metal or obtaining without difficulty the complicated shapes and contours of bladed wheels.

It is the essential object of this invention to provide a pump impeller wherein rubber, plastic or like elastomer is used as a means for assembling two or more metal parts or parts made from a rigid material which constitute the principal component elements of the impeller or turbine, the thus assembled elements being shaped to permit or produce the passage or movement of the fluids.

Thus, more particularly, this invention permits of constructing an impeller or turbine wherein one of the rigid components is assembled with the shaft whilst at least another rigid component constitutes a movable sealing member, this assembly comprising in addition a resilient member constituting the means interconnecting the rigid components.

With this arrangement it is possible, in a particularly simple manner, to construct a complete impeller of a small-sized pump which comprises a movable sealing face or element.

The features and advantages of this invention will appear more completely from the following description given with reference to the accompanying drawings showing axial sections of typical forms of embodiment of various exemplary constructions according to the teachings of this invention. In the drawing:

FIGURES 1 to 4 show the rigid element or elements secured on the shaft and provided with the turbine blading, the elastic element connecting to said first rigid element or elements another rigid element constituting a movable sealing member;

FIGURE 5 shows the elastic element connecting to the rigid element secured on the shaft another rigid element formed with the blading and also with a radial movable sealing flange;

FIGURE 6 shows the elastic element connecting to the rigid element secured on the shaft a pair of other rigid elements, in this case a bladed wheel and a movable sealing ring; and

FIGURES 7 to 11 illustrate the elastic element formed with integral blades and carried by the rigid element connected to the shaft and carrying one or two movable sealing members.

All the forms of embodiment illustrated in the drawing comprise at least one rigid element **2** firmly fastened or connected to the shaft **1** and having attached thereto an elastic element **4**. This elastic element **4** carries in turn at least one rigid element **3** constituting at least partially a movable sealing ring.

In the form of embodiment illustrated in FIGURES 1, 2, 3 and 4, the rigid element **2** is formed with an integral

sleeve-like or cylindrical portion force-fitted on the shaft **1** and with another integral portion extending radially around the shaft and constituting a disc blading. In FIGURES 1 and 2 the rigid element **2** consists of a unitary pressed metal sheet. In FIGURES 3 and 4 it consists of two rigidly interconnected members, one in the form of a single pressed disc formed with the impeller blading and the other in the form of a shaft-engaging member consisting in FIGURE 3 of a simple pressed-metal flanged sleeve and in FIGURE 4 of a shouldered hub. In FIGURE 1 the rigid element **3** constituting the movable sealing ring consists of a simple pressed metal ring. In FIGURES 2, 3 and 4, this rigid element **3** consists of a ring made from a movable sealing material such as cast-iron, ceramic, graphite, bronze, steel.

In FIGURE 5, the rigid element **2** secured on shaft **1** consists of a shouldered or pressed sleeve connected through the elastic element **4** to the other rigid member **3** constituting the movable sealing element and the bladed portion of the impeller.

In FIGURE 6, the rigid element **2** secured on shaft **1** consists of a shouldered or moulded hub. The elastic element **4** secured on this hub carries two rigid elements, i.e. a bladed disc **5** and a movable sealing **3**.

In FIGURES 7 to 11 the elastic ring **4** secured on the rigid element **2** firmly connected to shaft **1** is formed with the blading. In FIGURES 7, 8 and 11 the element **2** is an unitary part and in FIGURES 9 and 10 it is obtained by rigidly assembling two separate parts. In FIGURE 10 these two parts are separated by a certain gap for the purpose of sparing the elastic material in the part of the assembly where its presence is unnecessary. In the forms of embodiment of FIGURES 7 and 11 the elastic element **4** carries on one side, around the shaft **1**, a movable sealing ring **3**. In the form of embodiment of FIGURES 8 to 10, two movable sealing rings **3** are mounted on both sides of the elastic element **4**.

In all the forms of embodiment, the element **2** adapted to be distorted by expansion when force-fitted on the shaft is not in direct contact with the element **3** adapted to act as a friction element, but is connected thereto only through the medium of the elastic element, thus avoiding any distortion of said element **3** of which the operative face must remain flat if it is used for sealing a rotary joint with a side-contact joint.

The faces of the rigid elements which register with the elastic material may be perforated to ensure a better adherence of the elastic material.

What we claim is:

1. An impeller for small-sized pumps, which comprises an inner sleeve adapted to be rigidly force-fitted on a rotary shaft and carries outer peripheral blades, said impeller consisting of a rigid portion of which said shaft-engaging force-fitting sleeve is an integral part, at least one rigid member having an annular plane face extending at right angles to the shaft axis, and a member of resilient material adapted to secure said rigid member to said rigid portion provided with said force-fitting sleeve, whereby slight deflection movements may be performed by said rigid member and its plane face in a direction parallel to said shaft axis.

2. An impeller for small-sized pumps as set forth in claim **1**, wherein said rigid member formed with said plane face disposed at right angles to said shaft axis is made from a material adapted to form a fluid-tight joint by movable contact.

3. An impeller for small-sized pumps as set forth in claim **1**, wherein said blades are formed in the outer peripheral portion of said rigid portion of which said shaft-engaging force-fitting sleeve is an integral part.

4. An impeller for small-sized pumps as set forth in claim 2, wherein said rigid portion is made from a single pressed-sheet metal blank.

5. An impeller for small-sized pumps as set forth in claim 2, wherein said rigid portion consists of a sleeve and of a series of blades rigidly secured on the outer periphery of said sleeve.

6. An impeller for small-sized pumps as set forth in claim 4, wherein said sleeve consists of a pressed sheet-metal member.

7. An impeller for small-sized pumps as set forth in claim 4, wherein said sleeve consists of a cut-off metal member.

8. An impeller for small-sized pumps as set forth in claim 1, wherein said blades are formed in the outer peripheral portion of said rigid member provided with said annular plane face extending at right angles to the shaft axis.

9. An impeller for small-sized pumps as set forth in claim 1, wherein said blades are formed in the outer periphery of said member of resilient material.

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