Jan. 16, 1934. B. M. STALEY 1,943,561

BLADE FOR ROTARY PUMPS

Filed July 6, 1932

Fig. 1.

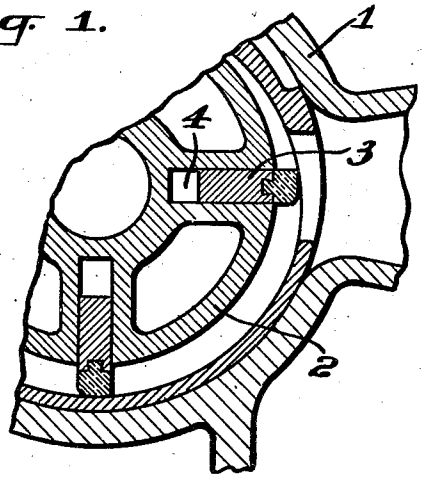


Fig. 2.

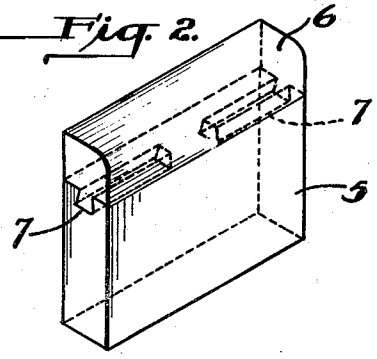


Fig. 3.

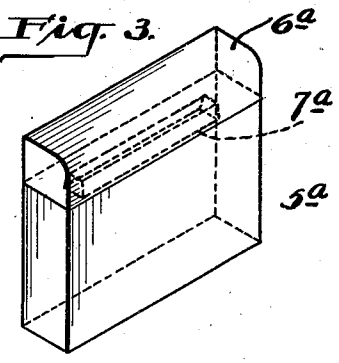


Fig. 4.

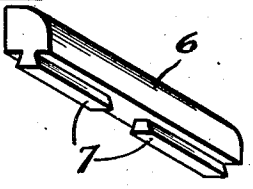
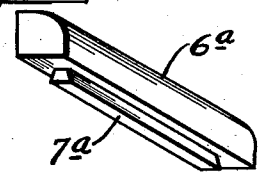


Fig. 5.



WITNESSES

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BLADE FOR ROTARY PUMPS

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4 Claims. (Cl. 103—136)

This invention relates to pumps and compressors of the rotary type in which radially movable vanes or blades are utilized in the rotors thereof, and pertains more particularly to the production of blades for such use having a pump wall-engaging end formed of one kind of material and a body portion formed of another.

An object of the invention is to provide blades of this character having greatly improved wearing qualities and for producing them in a much more economical manner than has been heretofore done.

A more particular object is to provide an improved method for making these blades with an outer or pump wall-engaging end formed of a sturdy high wear-resisting non-metallic material such as hard rubber, wood, fibrous material impregnated with resinous compounds or the like, and a body portion formed of a suitable metal adapted to give them rigidity and sufficient weight to insure their responding to the centrifugal action of the rotor in the manner necessary for their proper operation.

These and various other objects, as well as the various other novel features and advantages of the invention, will be apparent when the following detailed description is read in conjunction with the accompanying drawing, of which Fig. 1 is a fragmentary sectional view taken through a portion of the rotor and the pump wall of a rotary pump employing blades constructed in accordance with the invention; Fig. 2 a perspective view of one embodiment of the invention showing the interengaging parts of the pump wall-engaging end and body portion proper of the blade; Fig. 3 a view similar to Fig. 2 of another embodiment of the invention; Fig. 4 a perspective view of the pump wall-engaging end or tip of the blade shown in Fig. 2; and Fig. 5 a similar view of the tip of the blade shown in Fig. 3.

I am well acquainted with the fact that blades or vanes of the character contemplated by this invention have been made in the past for use in pumps where fluids are encountered which have a tendency to rapidly destroy blades made wholly of metal. However, as heretofore made the life of such blades has been relatively short because of various structural weakness, and their manufacture has been relatively costly. In accordance with the prior practice, both parts of the blade are machined to shape and then fitted together, both of which operations add to their cost. Furthermore, it has been found that the vibration and lateral forces to which such blades are subjected in service have a tendency to loosen these older blade parts quite rapidly, which in turn causes them to fail prematurely.

This invention is predicated upon my discovery that blades of this character, having considerably improved quality over the older kinds of blades, can be produced at a much lower cost than was heretofore possible by die-casting the body portion of the blade onto the tip or pump wall-engaging end. In accordance with the invention the only machining or preforming operation required upon the parts comprising the blade is that involved in the forming of the tip. This is done by forming it to a desired outer shape in any suitable fashion and providing an undercut tongue on its inner end for attaching the body portion to it. The body which may be formed of any suitable metal having the necessary qualities, as set forth above, is die-cast upon the undercut tongue provided on the tip for such purpose, the casting operation being carried out under relatively high pressures and comparatively low temperatures so that the heat required in the operation will not be sufficient to injure the non-metallic tips when the cast is made.

By way of illustrating the invention, reference is had to the drawing, in Fig. 1 of which the numeral 1 designates a portion of a rotary pump housing and 2 the rotor thereof in which a plurality of blades 3 embodying the invention is mounted in radially extending slots 4. In accordance with the invention, the first step in the making of these blades is that of reducing a piece of material selected for the tip ends 5 to a desired shape, such for example as shown in Figs. 2, 3, 4 and 5, and then die-casting the body 6 thereon. This shaping of the tip may be accomplished in any suitable fashion as long as a suitable undercut tongue 7 or equivalent formation is provided on the body-engaging side for making the necessary union with the body, and the die-casting may also be performed by various means as will be readily appreciated.

One of the outstanding advantages of blades made in this way is their greater strength, which is due greatly to the more rigid joint or union provided between the body and tip of the blade as a result of their being cast together. However, as in the case of the older blades, if the forces encountered in service loosen these parts the life of the blades becomes shortened. One of the chief factors contributing to such destruc-

tion of blades is that they have a tendency, particularly after they become somewhat worn, to wabble endwise in the slots of the rotors in which they are mounted and as a result their body and tip portions are subjected to unequal lateral forces which in turn tend to separate them along the plane of their union. To augment this difficulty I so develop the tongue 7 on the body-engaging ends that a portion of the body is disposed to engage the tongue in a manner to resist any relative lateral movement between the two parts. Referring to Figs. 2 and 4, as will be observed the tongue 7 formed on the bottom of the tip 5 is divided into two sections and these are separated from each other in the middle of the tip so that a portion of the body projects between the inner ends thereof and functions as an abutment or key holding the two parts of the blade rigidly against endwise relative movement. In the preferred form of blade, however, as shown in Figs. 3 and 5, instead of providing a divided tongue on the bottom of the tip 5*a*, it is all formed in one section, but it is not extended completely across the tip, it being spaced inwardly from the edges of the tip wall proper. Thus, when the blade is formed this tongue is embedded in a pocket whereby lateral separation or movement of the blade parts is not only prevented, but the contact line between the tip and body is perfectly smooth, which is desirable.

It will be readily appreciated by those skilled in the art that, due to the simplicity of this method of making such blades, their cost of manufacture over the old method of making them is considerably reduced. Also, that as a result of the much more rigid union provided between the parts they will have considerably greater strength and consequently longer life. Furthermore, due to their improved quality, they need not be made nearly so large as the older blades, nor is it esential that they be fitted in the rotor slots with the accuracy heretofore required.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to be its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A rotary pump blade comprising a bearing tip formed of high wear-resisting material provided on its outer end with a curved pump-wall-engaging surface and on its inner end with an undercut tongue of lesser length than the body of the tip, and a metal body portion die-cast upon said tip with its tip-engaging end rigidly engaging said tongue in a manner to prevent endwise movement of said tip with respect to said body and its side walls extending in alignment with those of the tip.

2. A rotary pump blade comprising a bearing tip formed of high wear-resisting material provided with parallel side walls, a curved pump-wall-engaging surface and having a centrally disposed undercut tongue on its body-engaging end of lesser length than its body and a metal body rigidly die-cast upon said tip with its adjacent end thereof abutting against that of the tip end and its side walls extending in alignment with those of the tip.

3. A rotary pump blade comprising a pump-wall-engaging end section of high wear-resisting material provided with parallel side walls, a curved pump-wall-engaging outer end, a pair of spaced undercut tongues on its inner body-engaging end, and a metal body section rigidly die-cast upon said tongues with its adjacent end abutting against that of the wall-engaging section and its side walls extending in alignment therewith.

4. A rotary pump blade comprising a pump wall engaging end section of high wear-resisting material provided with parallel side walls, a curved pump-wall-engaging outer end and an undercut tongue on its inner body-engaging end, said tongue being of lesser width and thickness than the width and thickness of the blade and located with its edges spaced from the side wall edges of the blade, and a metal body section having a cross sectional shape the same as that of the wear end section rigidly die-cast upon said tongue with its adjacent end abutting against that of the wear end and its side wall extending in alignment with the side walls thereof.

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