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PUMP SHOULDER LINER

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4 Claims. (Cl. 103—114)

This invention relates to centrifugal pumps or to the like and more particularly to an improved wear resisting ring for protecting the edge of the volute chamber adjacent the peripheral edge of the impeller of a centrifugal pump.

Centrifugal pumps are frequently employed to pump abrasive liquids such as mixtures of sand and gravel with water. Such service is extremely hard on the interior of the pump and in order to increase the life of the apparatus hard alloy steel inserts of various types have been used at the points of greatest wear. The annular edges of the volute chamber adjacent the peripheries of the impeller shroud discs are subjected to very severe abrasive action and particularly in the large capacity pumps which are used in mining or dredging operations, difficulty has been experienced in fitting and installing hard alloy wear resisting rings on these annular edges of the pump casing.

Attempts have been made, prior to my invention, to install wear rings of hard alloy to the shoulders of the volute chamber of centrifugal pumps by shrinking or expanding them into position by heat. This procedure, however, is extremely difficult to carry out in the field. Further, when a shoulder liner becomes worn and it becomes necessary to replace same it is extremely difficult to remove the liner to install a new one. Usually the facilities are not available where the pumps are installed to heat the entire volute chamber as is frequently necessary and the entire casing must be returned to the factory. With my invention, however, this difficulty is entirely overcome and the wear resisting alloy shoulder liners can be quickly and easily installed and replaced without special tools or any heating or cooling equipment.

It is among the objects of the present invention to provide a simple, effective and inexpensive means for protecting the shoulders or edges of the pump volute chamber which are disposed adjacent the shroud discs of the impeller of a centrifugal pump of the type described. Other objects of my invention are the provision of a pump shoulder liner which may be readily installed in the field and which will effectively seal the joint between the liner and the pump casing; the provision of a wear resisting shoulder liner made of steel alloy of such extreme hardness that it would be difficult to machine with the required accuracy for a shrink fit, and which, due to its construction, does not require such extreme accuracy of machining; and the provision of a shoulder liner which may easily be rotated

to change its angular position relative to the volute and thus increase the effective life of the liner. The above and other objects of my invention will appear from the following description of a preferred embodiment thereof, reference being had to the accompanying drawing, in which—

Figure 1 is a fragmentary cross-sectional view showing the volute chamber or casing of a centrifugal pump and a portion of the impeller thereof.

Figure 2 is a detached fragmentary perspective view of one of the shoulder liner members shown in Figure 1.

I have illustrated my invention as applied to a simple form of centrifugal pump in which a casing 1 forms the volute chamber 2. The impeller 3 is provided with side discs or shrouds 4 and 5. On the peripheral edge of each disc 4 and 5 rings 6 and 7 of wear resisting alloy are preferably shrunk or otherwise suitably secured. The cover plates 8 and 9 may be provided with rubber lining members 10 and 11 and, as illustrated, are secured to the volute chamber or casing 1 by means of screws 12. The shoulder liner members for protecting the corners of the volute chamber 2 adjacent the impeller 3 are generally indicated at S and S'. As these members are identical except that one is right hand and the other left hand only one will be described in detail.

The member S comprises a ring member of angle cross-section having a vertical flange portion 13 and a laterally extending flange portion 14. This ring member is preferably made of suitable hard wear resisting alloy steel and a rubber sleeve 15 is adhered to the outer surface of the flange 14. By properly vulcanizing the rubber ring or sleeve 15 to the flange 14 so that a firm bond is provided between the rubber and the steel a tight joint can be established between the shoulder protector or liner S and the casing 1, as will be described later.

As is clearly seen in Figure 1 the casing 1 is bored out to a slightly greater diameter at 16 than at the annular edge or corner 17. The outside diameter of the rubber ring 15, when installed on and firmly bonded to the member S, is made slightly larger, for example, about $\frac{1}{32}$ " than the diameter of the portion 17 of the pump casing 1. However, as the casing is relieved at 16 the ring member S, and in like manner the member S', can readily be inserted into the casing 1 from the outside and then driven or forced in so that the rubber member 15 is firmly gripped

and compressed between the flange 14 and the portion 17 of the casing. This necessarily results in some of the rubber of the ring 15 being displaced outwardly as is indicated in Figure 1 and the larger diameter of the portion 16 of the casing permits such displacement to take place.

The screws 12 pass through suitable holes 18 in the flange 13 of the ring S and have threaded engagement with the casing 1. Rubber or other suitable gaskets 19 are provided between the inner surface of the flange 13 and the outer surface of the casing 1 and, when the screws 12 are drawn up tight, the flange 13 and gasket 19 will be firmly seated against the casing 1 and a tight joint will be provided between the wear resisting flange 14 of the member S and the volute casing 1. This joint is liquid tight and completely excludes all abrasive material.

The point of greatest wear on the shoulder liners S and S' is ordinarily about at the outlet passage from the volute chamber. With my improved construction, when the liner becomes worn at this point the screws 12 can be removed and the liners taken out and turned relative to the volute until a substantially unworn portion is located at the point of wear. This operation may be repeated as necessary and thus maximum life secured from each liner.

Although I have described the illustrated embodiment of my invention in considerable detail it will be understood by those skilled in the art that numerous variations and modifications may be made in the specific form thereof, that my improved liner member for pumps may be installed in pumps of types other than that illustrated herein, and that my improved rubber sealing and fitting ring may be utilized wherever it is desired to provide means for easily and quickly installing a wear resisting or protecting metal ring in an opening of another member. I do not, therefore, wish to be limited to the exact embodiment of my invention herein shown and described but claim as my invention all forms thereof coming within the scope of the appended claims.

I claim:

1. In combination with a member having an annular opening, a ring shaped liner member of angular cross-section, one flange of said angular liner being adapted to extend into the annular opening in said member and protect the edge thereof, said protecting flange having a rubber surface covering adhered thereto, said rubber surface member being of slightly greater outside diameter prior to installation than the diameter of the opening in said member, said opening of said member having a portion of increased diam-

eter at its outer edge to provide ready entry of said rubber covered flange and adapted to accommodate displaced rubber when said flange is installed.

2. In combination with a pump casing having an annular shoulder, a liner for said shoulder including a metal ring having a rubber covering member firmly adhered to its outer surface, said annular shoulder in said casing having a portion of smaller diameter adjacent the inner wall of said casing and a portion of larger diameter, spaced from said inner wall, in which a part of said rubber member is disposed, said rubber covering being of greater outside diameter, prior to installation, than said portion of the casing which has said smaller diameter, said part of said rubber member being displaced due to compression thereof upon insertion of said ring in said smaller diameter portion of said shoulder.

3. In combination with a pump casing having an annular shoulder, a liner for said shoulder including a metal ring having a rubber covering member firmly adhered to its outer surface, said annular shoulder in said casing having a portion of smaller diameter adjacent the inner wall of said casing and a portion of larger diameter, spaced from said inner wall, in which a part of said rubber member is disposed, said rubber covering being of greater outside diameter, prior to installation, than said portion of the casing which has said smaller diameter, said part of said rubber member being displaced due to compression thereof upon insertion of said ring in said smaller diameter portion of said shoulder, and means for securing said liner in said opening.

4. In combination with a pump casing having an annular shoulder, a liner for said shoulder including a metal ring having a rubber covering member firmly adhered to its outer surface, said annular shoulder in said casing having a portion of smaller diameter adjacent the inner wall of said casing and a portion of larger diameter spaced from said inner wall, in which a part of said rubber member is disposed, said rubber covering being of greater outside diameter, prior to installation, than said portion of said casing which has said smaller diameter, said part of said rubber member being displaced due to compression thereof upon insertion of said ring in said smaller diameter portion of said shoulder, and an impeller mounted for rotation in said casing, said impeller having a side disc and a ring of wear resisting material shrunk on to the periphery of said disc and disposed in axial alignment with said metal ring.

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