

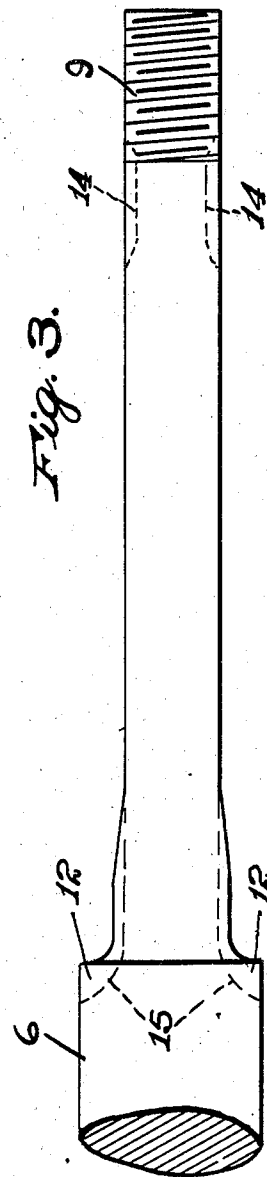
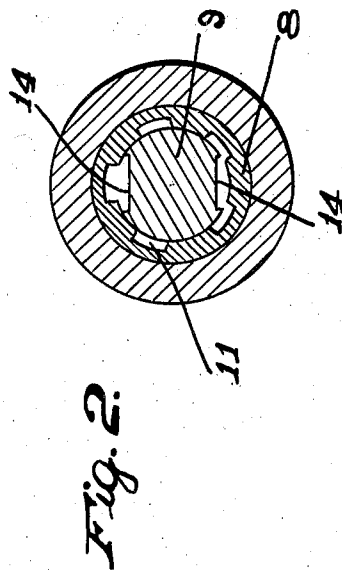
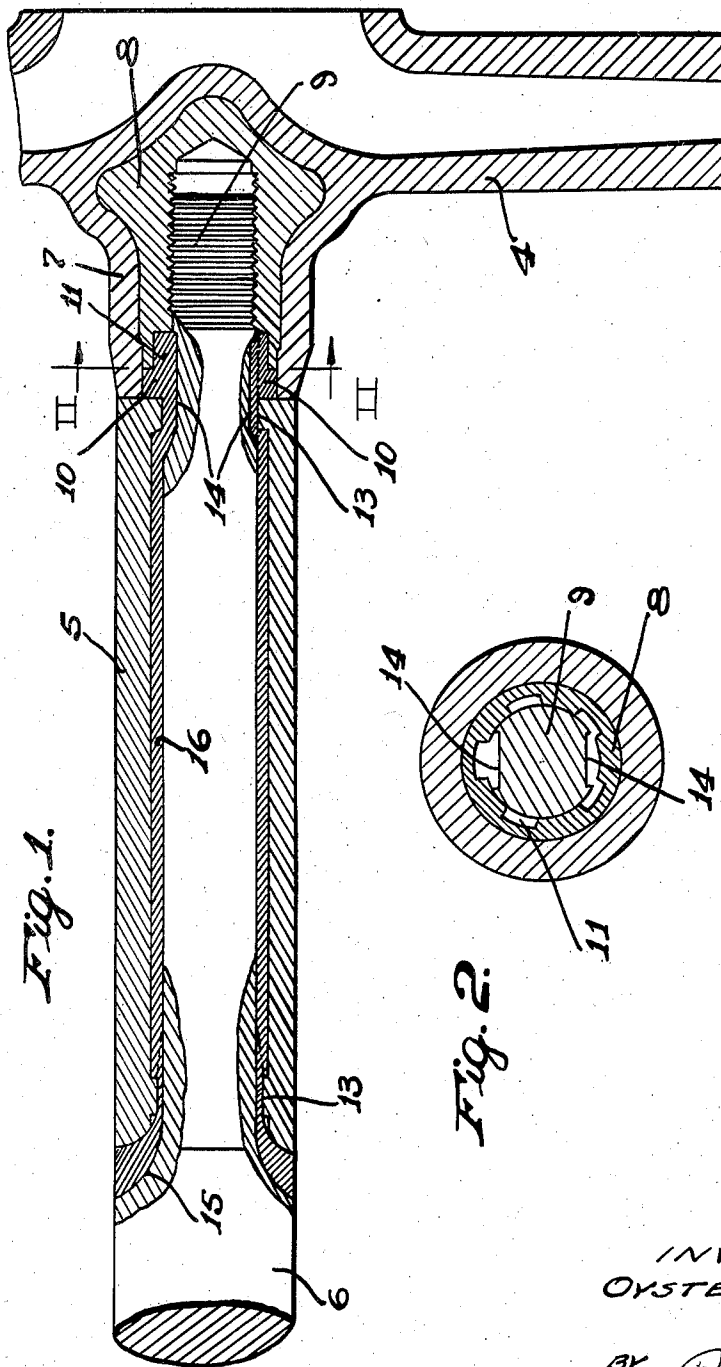
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PUMP RUNNER ASSEMBLY

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PUMP RUNNER ASSEMBLY

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6 Claims. (Cl. 287—53)

REISSUED

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The invention relates to a pump runner assembly of the type requiring corrosion resisting material as the composition of the runner proper and shroud which contact with the liquid handled by the pump and a drive shaft of stronger, tougher material. The invention has for its objects the provision of improved means for locking the runner to its shaft, so that in case the pump is started up backwards, the runner will not unscrew itself from the shaft. One embodiment of the invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a longitudinal section through the assembly. Fig. 2 is a section on the line II—II of Fig. 1, before applying the locking metal. And Fig. 3 is a detail view of the shaft.

Referring to the drawings, 4 is the pump runner of corrosion resisting metal, such as high silica iron, which is not subject to machining other than grinding, and 5 is the shroud of similar material surrounding and protecting the drive shaft 6 of machinable metal, such as steel or other metal commonly used in shafting. In the pump installation, the stuffing box of the pump casing fits around the shroud in the customary manner, as shown for example in my Patent No. 2,049,204, dated July 28, 1936.

A cavity is provided in the hub 7 of the runner which carries a filler 8 of machinable metal, such as bronze, white metal or the like positioned by a casting operation. An opening is provided in the filler and threaded to receive the threaded end 9 of the drive shaft. An annular recess 10 is provided at the end of the filler, and a set of keyways 11 are milled in the end of the filler communicating at their outer ends with the recess 10. In the present instance, there are five keyways, as indicated in Fig. 2, but this number may be varied depending on the diameter of the shaft 6. A shoulder is provided on the shaft at 12, against which the left hand end of the shroud 5 engages, when the shaft is screwed into position, thus placing the shroud in compression between the shoulder and the end of the hub 7 and preventing any rotary movement of the shroud relative to the runner and shaft.

The shroud fits around the shaft relatively closely at the end portions 13, 13 (Fig. 1), but intermediate such portions, a substantial clearance space is provided to permit of the pouring of the locking material later described. The part of the shaft opposite the annular recess 10 and keyways 11, is provided with a pair of keyways 14, 14, which keyways also extend past the portions 13, 13 of the shroud. A pair of similar keyways 15, 15

are provided in the shaft 6 at the shoulder 12, which keyways extend past the portions 13, 13 of the shroud which lie next to the shoulder.

The locking of the shaft against unscrewing is accomplished by flowing fusible metal 16, such as lead or babbitt through the space between the shroud and the shaft until the annular recess 10 and the keyways 11 leading therefrom are filled. It will be noted that regardless of the rotary position of the shaft with respect to the filler 8, the two keyways 14, 14 will always register with a plurality of keyways 11, thus insuring a filling of such grooves by the locking metal and an interlock against subsequent unscrewing of the shaft.

In pouring the locking metal 16, the assembly is held with the shaft in vertical position and is heated to insure against freezing of the metal during the pouring operation. One of the keyways 15 adjacent the shoulder 12 is utilized as the inlet in pouring, a suitable funnel gate being applied to facilitate the operation. The metal, thus supplied, flows downward between the shaft and shroud and fills the annular recess 10 and all of the keyways 11. The keyway 15 at the shoulder 12, which lies in opposition to the one through which pouring occurs, merely acts as an escape passage for air or gases during the pouring operation, thus facilitating the free inflow of the metal. When the assembly cools, the locking metal solidifies, and any unscrewing action of the runner relative to the shaft, is positively prevented, due to the locking effect of the metal in the two sets of keyways 11 and 14, the one lying in the filler and the other in the shaft. The arrangement also gives assurance that the keyways 11, which are overlapped by the keyway 14, will be filled with the fusible metal, since the combined depth of the two keyways permits a much more ready flow of the fuse metal than is the case with those of the keyways 11 whose sole source of supply is the annular recess 10. These latter keyways constitute narrow pockets closed at their inner ends, and into which it is somewhat difficult to flow molten metal because of the air trapped therein.

What I claim is:

1. In combination in a pump runner assembly, a runner provided with a hub having therein a threaded socket with an annular recess at the outer end of the socket and a plurality of spaced keyways in the wall of the socket extending inward from said recess, a drive shaft having its inner end threaded and screwed into the socket and having a keyway adjacent its threaded end extending past the annular recess and along the keyways in the wall of the socket, a shoulder on

the shaft remote from the end of the hub, a shroud on the shaft clamped thereby between the shoulder and the end of the hub, a pouring passage being provided between the shaft and shroud
 5 extending from the shoulder to the annular recess, and fusible locking metal filling the passage, the annular recess and said keyways.

2. In combination in a pump runner assembly, a runner provided with a hub having therein a
 10 threaded socket with an annular recess at the outer end of the socket and a plurality of spaced keyways in the wall of the socket extending inward from said recess, a drive shaft having its
 15 inner end threaded and screwed into the socket and having a keyway adjacent its threaded end extending past the annular recess and along the keyways in the wall of the socket, a shoulder on the shaft remote from the end of the hub, a
 20 shroud on the shaft clamped thereby between the shoulder and the end of the hub, and having its inner surface spaced away from the surface of the shaft except at the ends of the shroud where the walls of the shroud have a loose running
 25 fit on the shaft, the inner one of such points of running fit lying opposite the keyway in the shaft, a pouring keyway in the shaft at said shoulder extending past the outer one of
 30 the points of running fit, and a fusible locking metal filling the space between the shroud and the shaft, the annular recess and said keyways.

3. In combination in a pump runner assembly, a runner provided with a hub having therein a
 35 threaded socket with an annular recess at the outer end of the socket and a plurality of spaced keyways in the wall of the socket extending inward from said recess, a drive shaft having its
 40 inner end threaded and screwed into the socket and having a keyway adjacent its threaded end extending past the annular recess and along the keyways in the wall of the socket, a shoulder
 45 on the shaft remote from the end of the hub, a shroud on the shaft clamped thereby between the shoulder and the end of the hub, and having its inner surface spaced away from the surface of the shaft except at the ends of the shroud where
 50 the walls of the shroud have a loose running fit on the shaft, the inner one of such points of running fit lying opposite the keyway in the shaft, a pouring keyway in the shaft at said shoulder
 55 extending past the outer one of the points of running fit, a venting keyway in the shaft at said shoulder opposite to the pouring keyway also extending past the outer one of the points of running fit and a fusible locking metal filling the space between the shroud and the shaft, the annular recess and the keyways.

4. In combination in a pump runner assembly, a runner provided with a hub having therein a
 60 threaded socket with an annular recess at the outer end of the socket and a plurality of spaced keyways in the wall of the socket extending in-

ward from said recess, a drive shaft having its inner end threaded and screwed into the socket and having a keyway adjacent its threaded end extending past the annular recess and along the
 5 keyways in the wall of the socket, a shoulder on the shaft remote from the end of the hub, a shroud on the shaft clamped thereby between the shoulder and the end of the hub, a pouring passage being provided between the shaft and
 10 shroud extending from the shoulder to the annular recess, and a fusible locking metal filling the passage, the annular recess and said keyways, the spacing and width of said keyways being such that in all positions of rotation of the shaft with
 15 respect to the hub the groove in the shaft will overlap at least one of the keyways in the wall of the socket.

5. In combination in a pump runner assembly, a runner having a hub and a recess therein, a
 20 filler in the recess having a threaded socket with an annular recess at its outer end and a set of keyways extending inward from such recess in spaced relation, a drive shaft threaded into said
 25 socket and provided with a keyway at its threaded end which extends across the annular recess in parallel with said first keyways and registering with at least one of them, a shoulder on the shaft remote from the end of the runner hub, a shroud surrounding the shaft and clamped between the
 30 shoulder and the end of the hub when the shaft is screwed into its socket in the filler, a pouring inlet for the annular recess and keyways extending from said shoulder longitudinally between the shaft and shroud to said keyway in
 35 the shaft, and a locking body of fusible metal filling said inlet, the annular recess and the keyways.

6. In combination in a pump runner assembly, a runner having a hub and a recess therein, a
 40 filler in the recess having a threaded socket with an annular recess at its outer end and a set of keyways extending inward from such recess in spaced relation, a drive shaft threaded into said
 45 socket and provided with a keyway at its threaded end which extends across the annular recess in parallel with said first keyways and registering with at least one of them, a shoulder on the shaft remote from the end of the runner hub, a shroud surrounding the shaft and clamped between the shoulder and the end of the hub when
 50 the shaft is screwed into its socket in the filler, the inner surface of the shroud being spaced away from the shaft providing an annular space which communicates with said keyway in the shaft, a pouring inlet for said space at the outer
 55 end of the shroud, and a locking body of fusible metal fitting said space and also the annular recess and keyways which are in communication therewith.

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