Dec. 5, 1939. O. J. JASBERG 2,181,973

PUMPING SYSTEM

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Fig. 3

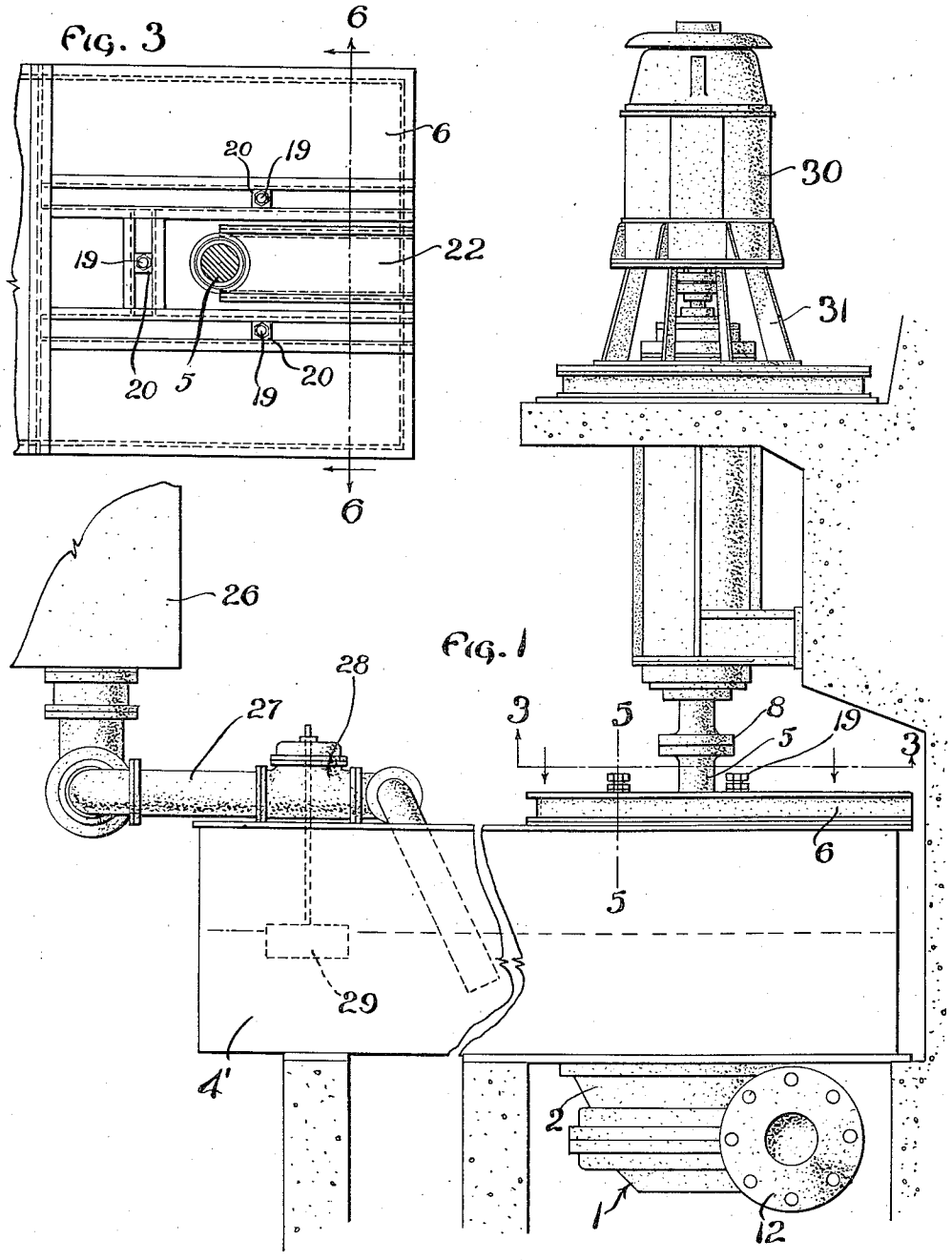

Fig. 1

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Fig. 2

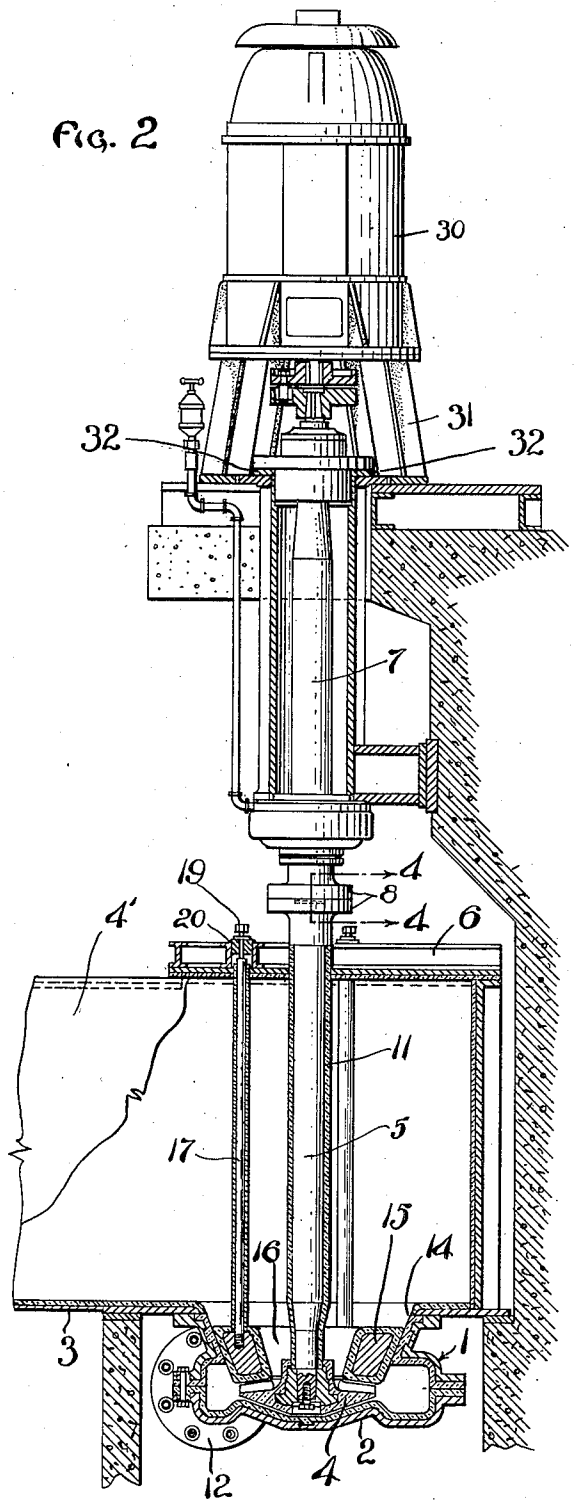

Fig. 4

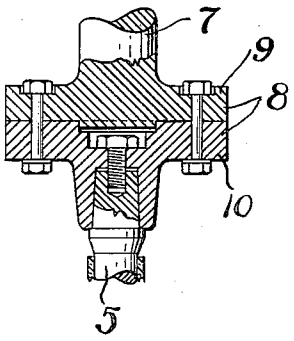

Fig. 5

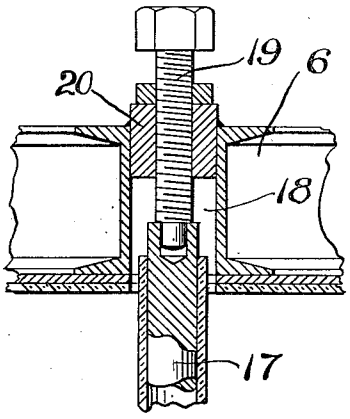

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Fig. 7

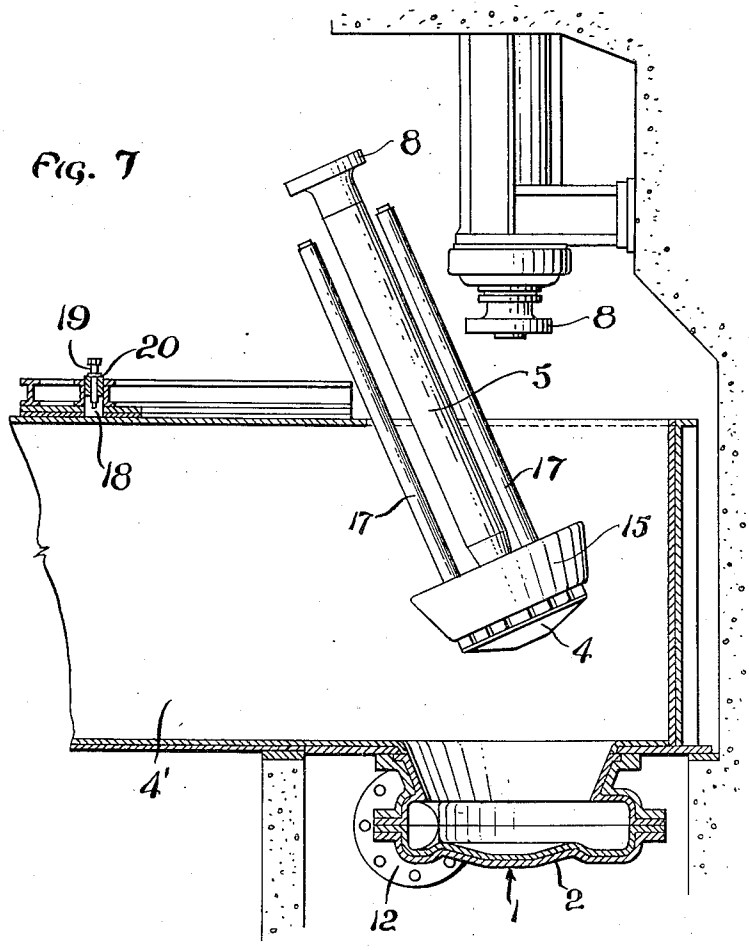
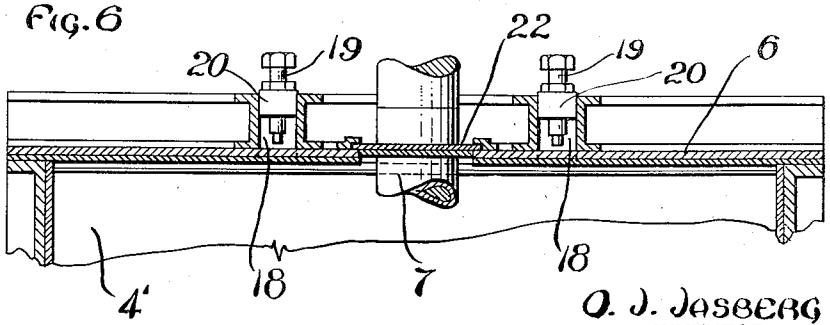


Fig. 6



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Patented Dec. 5, 1939 2,181,973

UNITED STATES PATENT OFFICE

2,181,973

PUMPING SYSTEM

Onni J. Jasberg, Kellogg, Idaho

Application April 23, 1938, Serial No. 203,731

1 Claim. (Cl. 103—218)

This invention relates to pumping systems such as those employed in the copper, zinc, and other similar mining industries, for circulation of dilute sulphuric acid or other acids, in leaching or electrolytic tanks.

Heretofore pumps of the type known to the trade as bootleg pumps, because of the long boot which forms the suction chamber, have been employed in such service, in connection with a level control tank interposed between the main collecting tank and the pump. While such pump constructions and systems have in the main been successful in operation, they are costly both as to first cost and as to maintenance, partly due to the inaccessibility of and the difficulty in dismantling the pump boot to gain access to the pump impeller and casing for repairs thereto or for releading.

An object of the present invention is to provide a pumping system and structure for use in installations of the above or analogous type which will reduce both the initial or manufacturing costs, and the maintenance costs of the pumping structure and which will eliminate the inaccessibility and difficulty of dismantling and re-assembling the pump.

More specifically, the present invention comprises the provision of a pumping unit or structure of this type wherein the pump casing is attached directly to the bottom of the level control tank so that a part of this tank will act as the suction boot of the pump. A suitable shaft is provided which carries the pump impeller and is connected by a suitable coupling to the motor driven shaft in such manner that the impeller unit may be withdrawn with comparative ease through a suitable opening in the tank. The tank also is large enough to admit a mechanic or mechanics, so that the interior of the pump casing may be re-leaded or repaired without disturbing any of the piping connections thereto.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a pumping system embodying the invention, and the features forming the invention will be specifically pointed out in the claim.

In the drawings:

Figure 1 is a side elevation of the improved pumping structure.

Figure 2 is a vertical section through the pump proper and a part of the level control tank.

Figure 3 is a plan view taken on the line 3—3 of Figure 1.

Figure 4 is a detailed section taken on the line 4—4 of Figure 2.

Figure 5 is a detailed section taken on the line 5—5 of Figure 1.

Figure 6 is a detailed section taken on the line 6—6 of Figure 3.

Figure 7 is a section through a part of the level control tank and the pump casing illustrating the manner of removal of the pump impeller unit.

Referring more particularly to the drawings, the improved pumping system includes the pump structure 1, the casing 2 of which is attached in any suitable manner to the outer surface of the bottom 3 of the level control tank 4', with the side of the casing open to the interior of the tank, as clearly shown in Figure 2 of the drawings. The pump impeller 4 is carried by a suitable shaft 5 which extends downwardly through the level control tank 4'. The upper end of the suitable shaft 5 extends out of the top of the control tank 4' through a suitable opening in the removable cover 6, and it is connected to the motor driven shaft 7 by a coupling 8. In the drawings a particular type of coupling 8 is shown, having one of the coupling flanges, namely the flange 9, formed upon the shaft 7, while the coupling flange 10 is detachably connected to the upper end of the suitable shaft 5. However it is to be understood that any suitable type of coupling may be employed which will provide positive steady connection between the shafts 5 and 7, and permit disconnection of these shafts for the removal of the impeller unit, as will be hereinafter more fully described. The pump structure 1, shown in the drawings, is lined with a suitable acid resistant, such as lead and antimony, however, if it is so desired, the pump parts may be constructed of a suitable acid resisting material, instead of lining or coating the pump parts as shown in the drawings. The shaft 5 is also coated with a coating of acid resistant, as shown at 11.

Owing to the fact that it is necessary to repair the impeller 4 and the interior of the casing 2 of the pump, a pump structure is provided which will facilitate the removal of the impeller without completely dismantling the pump and without disrupting the connections of the casing with the level control tank 4', and with piping (not shown) which may be connected to the discharge flange 12 of the pump. The suction side of the casing 2 which opens into the level control tank 4' has its sides tapering outwardly as they ex-

tend towards the bottom 3 of the tank 4', as clearly shown at 14 in Figure 2 of the drawings. A removable member 15 is provided which fits in the tapered portion of the pump casing and cooperates with the pump casing 2 and the impeller 4 to form the proper passages in the pump and provide a suction opening or eye 16 for the pump, which opens directly into the tank 4'.

The member 15 is held in place by suitable rods 17, which have their lower ends detachably connected to the removable member 15 and extending upwardly through the tank 4' and into suitable sockets 18 formed in the removable covering 6. Set screws 19 are carried by suitable blocks 20, which latter are preferably welded to the cover 6. The set screws 19 engage the upper ends of the rods 17 and clamp against them for securely holding them and the removable member 15 in place.

When it is desired to remove the impeller element, comprising the impeller 4, removable member 15, shaft 5, and rods 17, for repair or re-leading of the impeller and pump parts, the slide 22 which forms a part of and is slideably carried by the cover 6 is moved outwardly, the set screws 19 are loosened, the cover member 6 is lifted slightly so that it will clear the upper ends of the rods 17, and the cover is then moved into open position as shown in Figure 7 of the drawings. The coupling 8 is then disconnected and by slightly tilting, the tilting gradually increasing as the member 15 and impeller 4 are raised, the entire removable element of the pump structure may be easily taken out of the tank 4' for repair. This leaves the pump casing 2 open to the interior of the tank 4', as clearly shown in Figure 7 of the drawings, so that a mechanic or mechanics may enter the tank 4' through the opening in the top and repair the interior of the pump casing without removing it or detaching it from the tank 4' or any piping connections thereto.

As hereinbefore pointed out, one end of the level control tank 4' forms the boot or suction chamber for the pump 1, eliminating the need of the boot such as has been previously employed to provide the suction chamber for pumps of this type.

The level control tank 4' is connected to the main collecting tank 26 through a suitable supply pipe 27, and a float controlled valve structure 28 of any suitable type is placed in the piping 27 for controlling the flow of fluid into the level controlling tank 4'. The float 29, which controls the liquid level in the tank 4', is placed in the tank as shown in dotted lines in Figure 1 of the drawings.

The driving motor 30 is supported above the collecting tank 4' on suitable supporting structure indicated at 31, and shims, as indicated at 32 in Figure 2 of the drawings, may be used for raising the motor structure slightly to permit sufficient separation of the elements 9 and 10 of the coupling 8 to allow the initial movement of the shaft 7, impeller 4, and removable member 15, to allow the removal of these members when desired.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that they may be widely modified within the invention defined by the claim.

What is claimed is:

In a pumping structure, in combination, a level control tank, a pump including a casing embodying an impeller chamber and having its suction side open and attached to said tank whereby the tank will act as a suction chamber for the pump, an impeller in said casing, a removable member forming the suction side of the impeller chamber and passages of the pump, a shaft connected to said impeller, a prime mover, a shaft thereon, a coupling between said prime mover shaft and said impeller shaft, said tank provided with a normally closed opening in its top opposite said pump casing, the suction side of said pump casing outwardly of the impeller chamber thereof and said removable member tapering progressively outwardly from the impeller chamber of the pump casing to the point of connection of the pump casing with the level control tank whereby said impeller, removable member and impeller shaft may be tilted to allow said coupling to clear and whereby the impeller and removable member and impeller shaft may be removed from the casing and tank as a unit.

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