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W. M. GAYLORD, JR., ET AL

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CORROSION RESISTANT PUMP

Filed Aug. 12, 1954

2 Sheets-Sheet 1

Fig. 1.

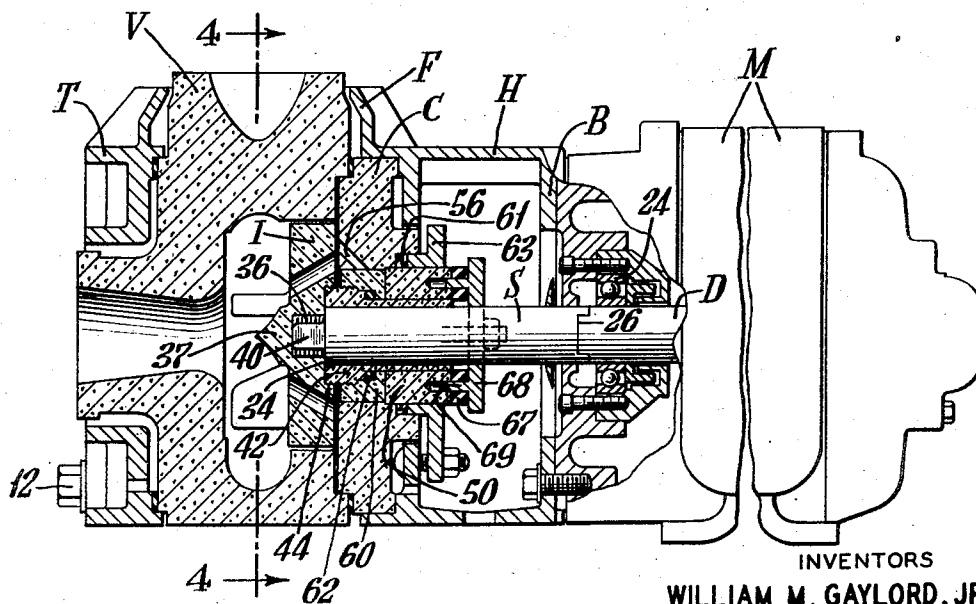
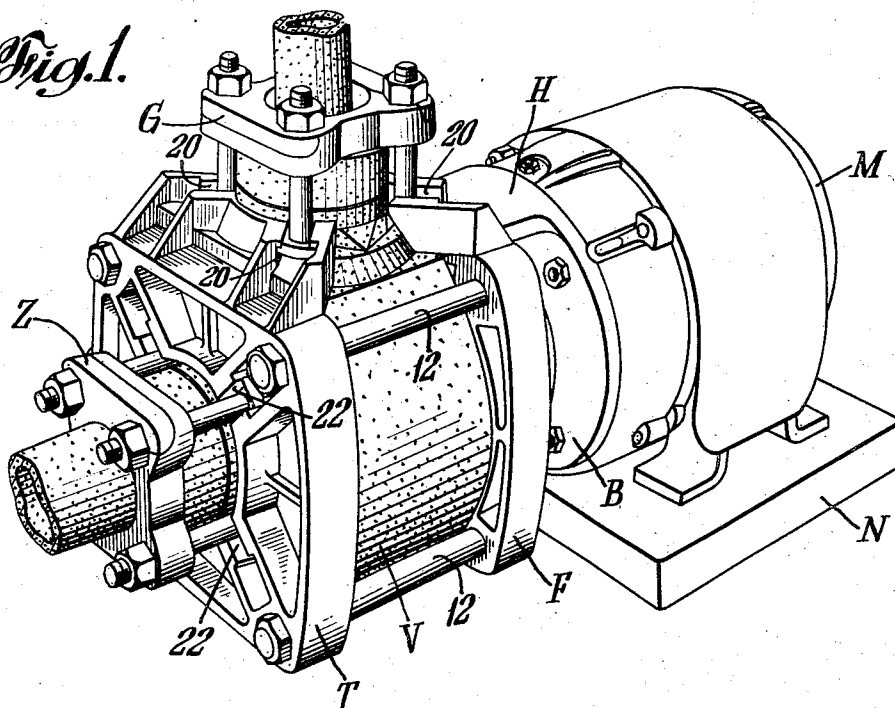


Fig. 2.

INVENTORS
WILLIAM M. GAYLORD, JR.
HENRY S. RAUB
ALBERT F. HAUCH
BY *Richard S. Shreve, Jr.*
ATTORNEY

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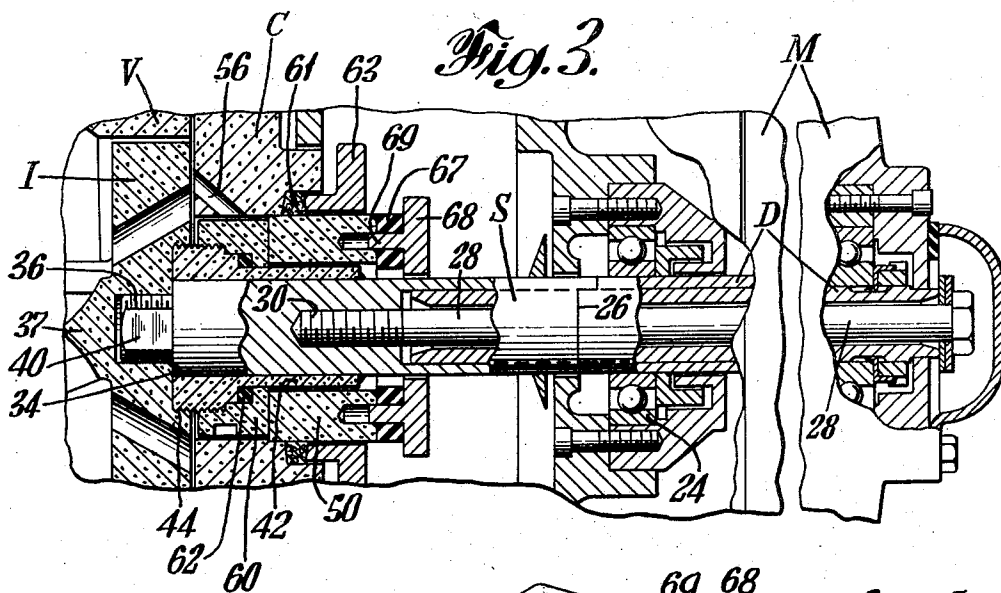
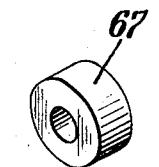
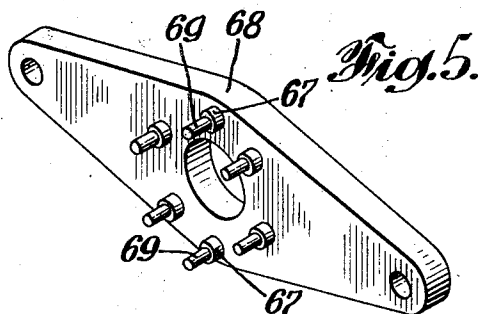
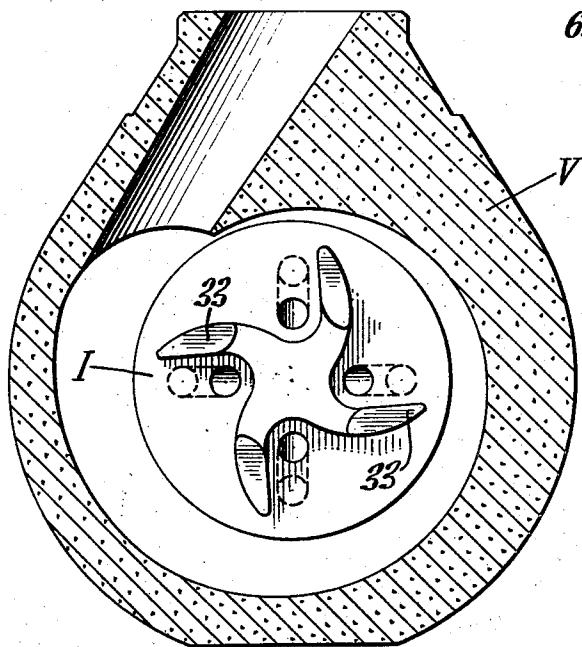


Fig. 4.



INVENTORS
WILLIAM M. GAYLORD, JR.
HENRY S. RAUB
ALBERT F. HAUCH

BY
Richard S. Shreve
ATTORNEY

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CORROSION RESISTANT PUMP

William M. Gaylord, Jr., Cleveland, Henry S. Raub, Bay Village, and Albert F. Hauch, Cleveland, Ohio, assignors to Union Carbide Corporation, a corporation of New York

Application August 12, 1954, Serial No. 449,389

2 Claims. (Cl. 103—87)

This invention relates to impervious graphite and/or carbon centrifugal pumps for corrosion resistant purposes, and has for its main object to simplify and improve the construction and operation of pumps of this character.

The pump is mounted on a motor, and the impeller shaft is sleeved onto the motor shaft in a direct drive relation. The pump has a hollow open sided barrel shaped metal casting comprising a volute support flange and a motor engaging flange and integral upper and lower connecting ties or struts therebetween. An impervious graphite volute casing and cover are bolted between the volute support flange and a metal cover flange. The motor is bolted to the motor engaging flange and has a hollow motor shaft with shoulders engaging the impeller shaft which carries an impervious graphite impeller. A tension rod passing through said hollow motor shaft is screwed into said impeller shaft.

In the drawings:

Figure 1 is a perspective view of the impervious graphite centrifugal pump according to the preferred embodiment of the present invention;

Figure 2 is a vertical axial section through the pump shown in Fig. 1;

Figure 3 is an enlarged detail of a portion of Fig. 2;

Figure 4 is a section taken along the line 4—4 of Fig. 2;

Figure 5 is a perspective view of the casting for preventing rotation of and supplying endwise pressure to the stationary sealing ring; and

Figure 6 is a perspective view of one of the rubber compression rings for the casting shown in Fig. 5.

The apparatus shown in the drawing comprises a volute casing V and cover C both of impervious graphite. These graphite parts are supported by a unitary metal casting, preferably iron, comprising a motor engaging flange B, a volute supporting flange F, and struts on the members H therebetween, forming a hollow open sided barrel shaped casting. The motor engaging flange B is bolted to the frame of a motor M mounted on a foundation N. The graphite parts are bolted between the flange F and a metal cover flange T. A discharge flange G is bolted to the top of flanges F and T, and a suction nozzle Z is secured to the cover casting T.

The motor M has a motor shaft D on which is sleeved an impeller shaft S of stainless steel. The impeller shaft S passes through registering central apertures in the flange F and cover C and has secured thereto an impervious graphite impeller I, which rotates inside the volute casing V. Thus the pump fastens to the frame of the motor and uses the bearings of the motor since it has none of its own.

The flange F and cover T have cast holes for the bolts 12, and both have T slots 20 receiving standard square head bolts for the discharge flange G. The cover flange T has similar slots 22 for the suction nozzle Z.

The motor shaft D is journaled in motor bearings 24 in the motor frame, and the impeller shaft S has a close tolerance slip fit over the motor shaft extension, seating

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on and keying to milled shoulders 26 on the motor shaft D. This protects the joint from corrosion, decreases size of impeller shaft, and provides for fixed location of the impeller on an interchangeable basis.

The motor shaft D is hollow, and a drawbolt 28 having a head outside the motor shaft passes therethrough and is screwed into threads 30 under the head of the impeller shaft S. This permits removal of the impeller and its shaft.

The front of the impervious graphite impeller I has streamlined vanes 33 on its front face as shown in Fig. 4 for increased efficiency and higher head at all speeds. The impeller I also has a flow splitter hub 37 which adds to the streamlining through the pump.

The inner end of the impeller shaft S for assembling the impeller I is of reduced diameter forming a shoulder 34 and threaded as at 36, and slabbed off on two sides forming flats 40. Mounted on the impeller shaft hub is an impervious carbon sleeve 42 which has a threaded joint 44 to the impeller of larger diameter than the neck of the sleeve. A heavy rotary seal ring 60 is screwed onto the threads 44 and compresses a gasket 62.

The rotary seal ring 60 rotates against a stationary seal ring 50 of impervious carbon. A teflon gasket 61 seals against leakage through the annular space between the cover C and the ring 50. A metal follower ring 63 bolted to the flange F compresses the gasket 61. A drilled hole 56 in the cover C aids the cooling action and furnishes steady flow to the sealing faces through differential pressure. Hence the rotary seal is completely enveloped in and cooled by the solution in the pump, and is removable from the impeller to be replaced when worn or damaged.

The stationary seal ring 50 is prevented from rotation by a metal casting 68 shown in Fig. 5, which has six pins 69 entering corresponding holes in the sealing ring 50. Each pin receives a rubber ring 67, for endwise pressure on the ring 50. The multiple rings have flatter stress strain characteristics and do not trap solutions which might escape past seals.

The packing around the stationary seal and the pressure endwise on the stationary seal are both adjustable while the pump is operating. All three points of possible leakage are separately adjustable.

What is claimed is:

1. In a corrosion resistant pump, a hollow open sided barrel shaped metal casting comprising a volute support flange and a motor engaging flange and integral upper and lower connecting struts therebetween, an impervious graphite casing and cover, a metal cover flange casting, said graphite parts being bolted between said castings, a motor bolted to said motor engaging flange and having a hollow motor shaft with shoulders, an impeller shaft sleeved onto said hollow motor shaft and engaging said shoulders, an impervious graphite impeller cemented onto said impeller shaft, and a tension rod passing through said hollow motor shaft and screwed into said impeller shaft but terminating short of said impeller.

2. In a corrosion resistant pump, a metal casting comprising a volute support flange and a motor engaging flange and integral connecting struts therebetween, an impervious graphite casing and cover, and a metal cover flange casting, said graphite casing being seated in said metal cover flange and said graphite cover being seated in said volute support flange, said volute support flange and cover flange casting being substantially flat and spaced apart by said graphite parts, said substantially flat metal parts being substantially polygonal and the corners thereof being bolted together across said graphite parts and outside thereof, a motor bolted to said motor engaging flange, an impervious graphite impeller driven by said motor and rotating in said volute casing, said cover flange casting having a central suction inlet and T-slots extending

radially therefrom, axially extending graphite suction piping aligned with said inlet, a suction attachment flange surrounding said suction piping and spaced thereby from said cover flange casting, said volute casing having a discharge passage tangential to said impeller, radially extending graphite discharge piping aligned with the outlet of said discharge passage, the tops of said volute support flange and said cover flange casting having T-slots radial to the axis of said discharge piping, a discharge attachment flange surrounding said discharge piping and spaced thereby from said castings, and bolts having square heads in said T-slots and extending therefrom outside of said graphite piping and across the spacing and through said attachment flanges for securing said graphite piping to said volute casing.

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