

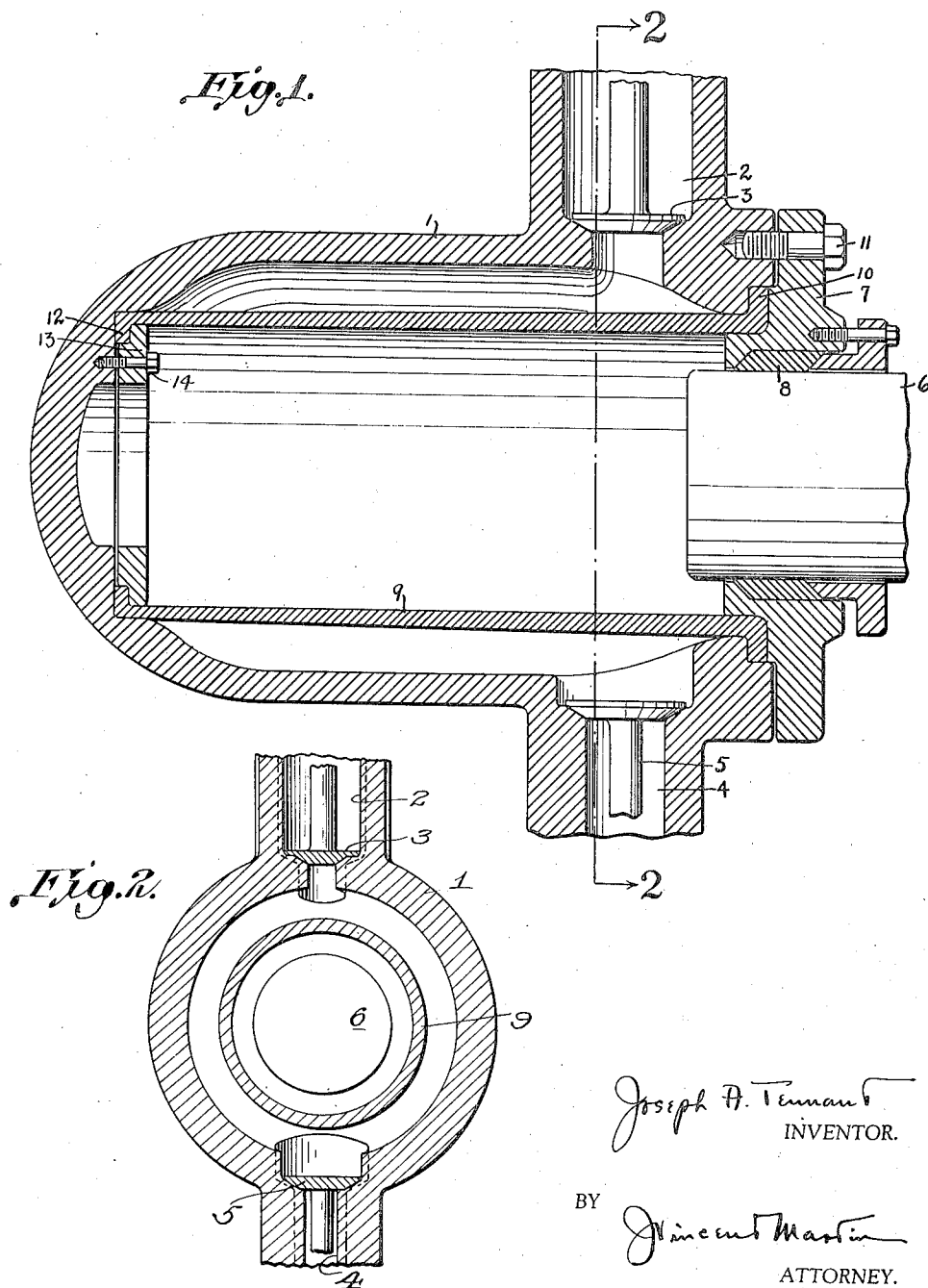
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PUMP

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PUMP

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7 Claims. (Cl. 103—44)

This invention relates to pumps.

It will be found particularly useful in pumps designed for pumping abrasive and corrosive fluid of the general type disclosed by Letters Patent of the United States to Stephens No. 1,848,441, of March 8, 1932. A conventional pump of this type, adapted for use as a mud or slush pump in deep well drilling, includes a barrel; inlet and outlet valve therefor; a hollow expansible member within the barrel; and a reciprocable piston to actuate fluid confined within the expansible member to cause expansion and contraction thereof, whereby fluid is drawn into and forced out of said barrel.

It is important that there be as little clearance as possible between the expansible member and the barrel when the expansible member is expanded so that practically all of the gas and fluid in the barrel will be forced out through the outlet valve. This is important because when the expansible member is contracted it tends to create a vacuum in the barrel and it is this that draws fluid into the barrel through the inlet valve, and all gas then present in the barrel expands and occupies a part of the volume in the barrel that should be occupied by incoming fluid.

Reduced clearance can be obtained only by expanding the hollow expansible member substantially to the walls of the barrel. This cannot be done safely if, for instance, the expansion takes place first adjacent the outlet port because the outlet port will be thereby sealed off and the adjacent portion of the member will be pushed therethrough and ruptured.

The present invention has for its object the provision of a new and important expansible member for pumps of this type, whereby the said clearance will be greatly reduced without any objectionable results. This is accomplished by so constructing the member that expansion thereof starts at that end of the barrel remote from the outlet port and proceeds along the barrel toward the outlet port; the member, when completely expanded, being in contact with substantially the entire inner surface of the barrel.

The preferred embodiment of the pumping member in a pump of this type is shown by the accompanying drawing of which Fig. 1 is a fragmentary sectional elevation and Fig. 2 a vertical section on the line 2—2 of Fig. 1.

In the drawing the barrel is indicated at 1. It has in its upper portion adjacent one end an outlet 2 normally closed by an outlet valve 3. In the lower portion of the barrel is an inlet 4 normally closed by an inlet valve 5.

A piston 6 extends through the clamp 7 and is packed as indicated at 8.

The new and improved expansible member provided by this invention is indicated at 9.

It has on one end an external annular flange 10 compressed by and held between one end of the barrel 1 and the clamp 7 which is secured to the barrel by bolts 11; and at the other end an internal annular flange 12 compressed by and held between the other end of the barrel 1 and the clamp 13 which is secured to the barrel by bolts 14. The ends of the expansible member 9 are thereby connected and sealed to the ends of the barrel 1.

The member 9 is preferably substantially 70 cylindrical and made of rubber, increasing in thickness from that end of said barrel 1 remote from the outlet 2 toward that end of said barrel adjacent the outlet 2 so that the resistance to expansion offered by the member 9 increases 75 longitudinally toward the outlet means.

When the piston 6 is moved on its forward stroke (to the left, Fig. 1) the expansible member 9 is expanded by the displacement of the actuating fluid therein. As the member 9 increases 80 in thickness longitudinally from that portion remote from the outlet 2 toward the outlet 2 it will offer a resistance to expansion increasing longitudinally toward the outlet port 2. Therefore, the expansion of the member 9 will start at its said 85 remote portion and will then proceed along the barrel toward the outlet port 2. The construction is such that the member 9 moves substantially into contact with the entire inner surface of the barrel 1 and therefore practically all of 90 the gas and fluid in the barrel is expelled through the outlet port 2.

The invention is not limited to the preferred embodiment and use herein disclosed.

I claim:

1. A hollow expansible pumping member constructed to offer a longitudinally increasing resistance to expansion.

2. A hollow expansible pumping member constructed to offer a longitudinally and gradually 100 increasing resistance to expansion from substantially one end to the other.

3. A hollow expansible pumping member increasing in thickness longitudinally to offer a varying resistance to expansion.

4. A substantially cylindrical hollow rubber pumping member increasing in thickness longitudinally to offer a varying resistance to expansion.

5. A pump having a barrel; inlet and outlet 110

means for said barrel; a hollow expansible pump-
ing member in said barrel; and means to expand
and contract said member to draw fluid into said
barrel through said inlet means and to expel
it from said barrel through said outlet means;
said member being constructed to offer a resist-
ance to expansion increasing toward said outlet
means.

6. A pump having a barrel; inlet and outlet
10 means for said barrel; a hollow expansible pump-
ing member in said barrel; and means to expand
and contract said member to draw fluid into said
barrel through said inlet means and to expel it
15 from said barrel through said outlet means; said
member being so constructed that, when ex-
panded, it moves first substantially to that por-
tion of the inner surface of said barrel remote

from said outlet means and then toward said out-
let means.

7. A pump having a barrel; inlet and outlet
means for said barrel; said outlet means being
adjacent one end of said barrel; a hollow rub- 80
ber pumping member in said barrel; and means
to contract and expand said member to draw
fluid into said barrel through said inlet means
and to expel it from said barrel through said
outlet means; said member increasing in thick- 85
ness substantially from that end of said barrel
remote from said outlet means to that end of
said barrel adjacent said outlet means to offer
a resistance to expansion increasing longitudi-
nally toward said outlet means. 90

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