Feb. 28, 1933. J. A. TENNANT 1,899,364

PUMP

Filed Jan. 15, 1932 3 Sheets-Sheet 1

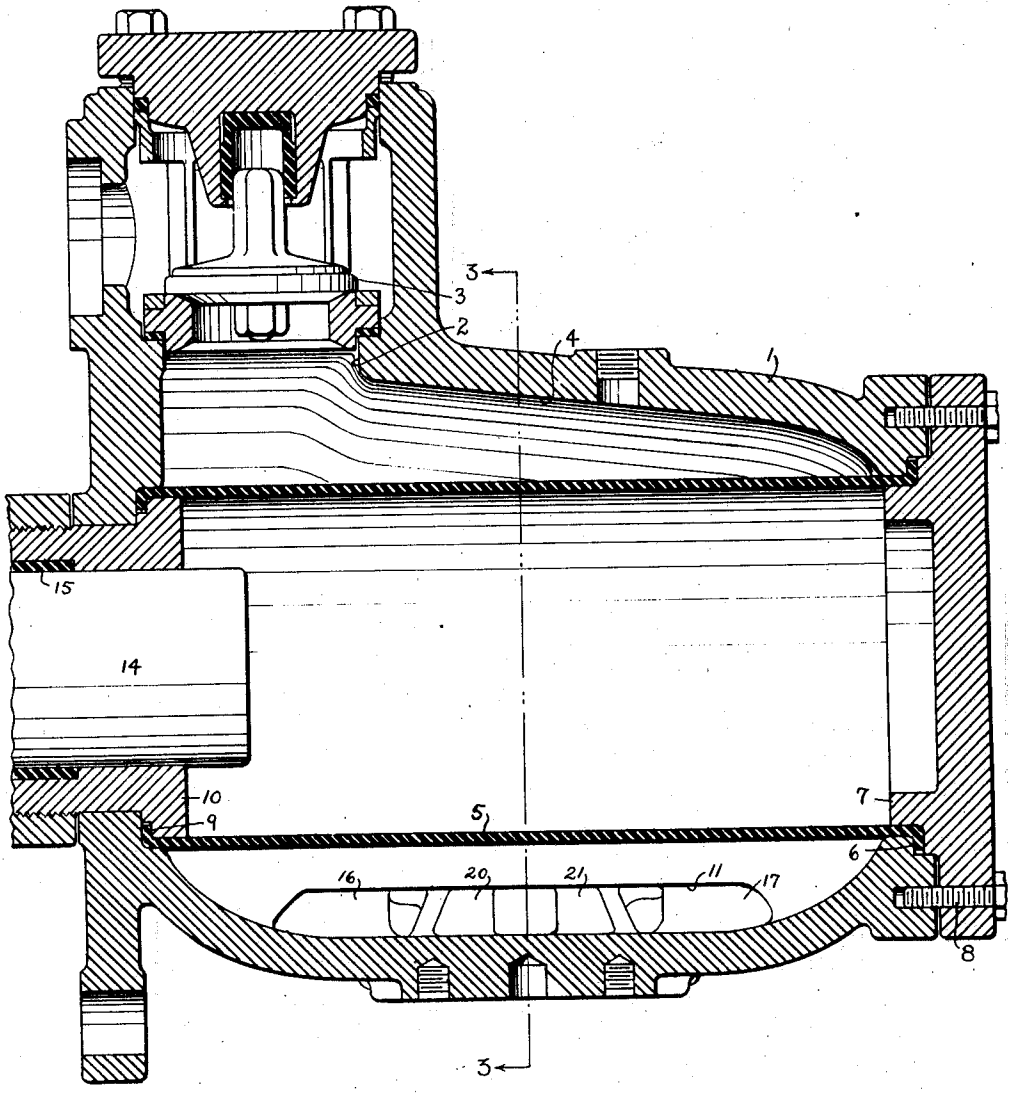


Fig. 1

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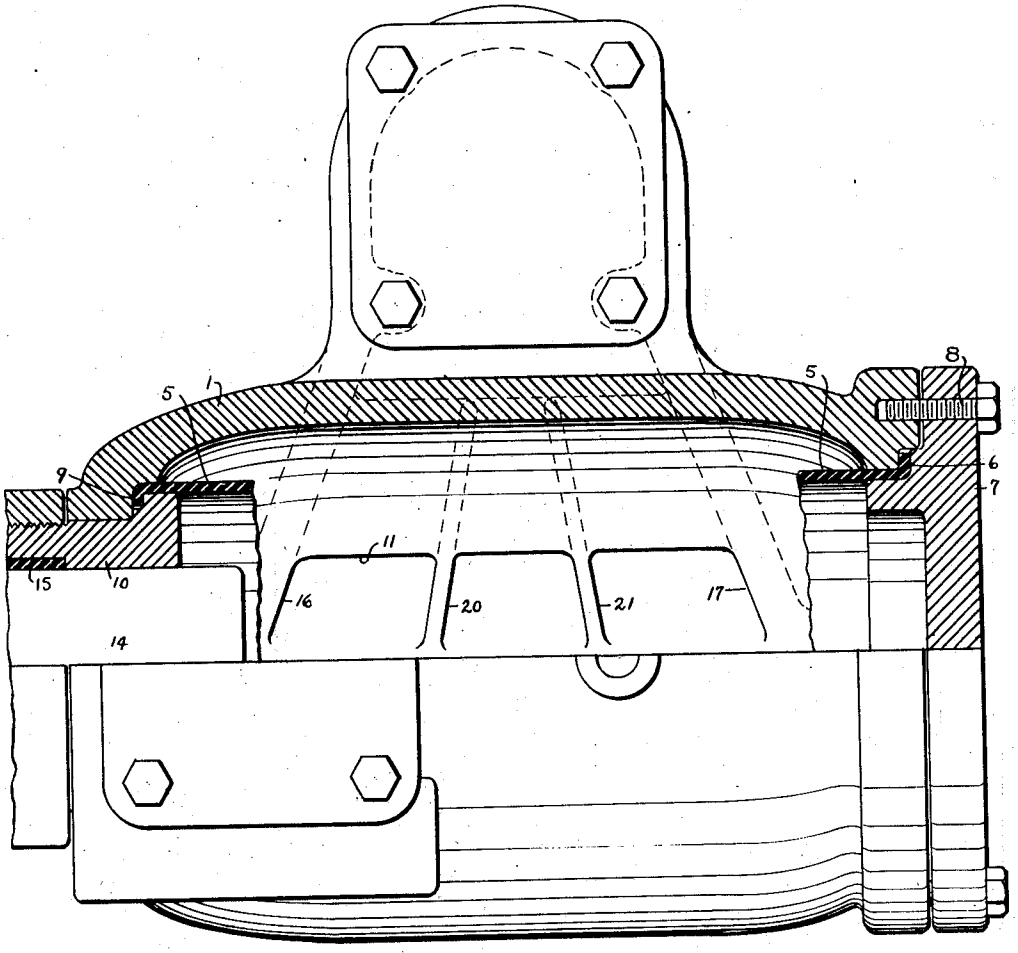


Fig. 2

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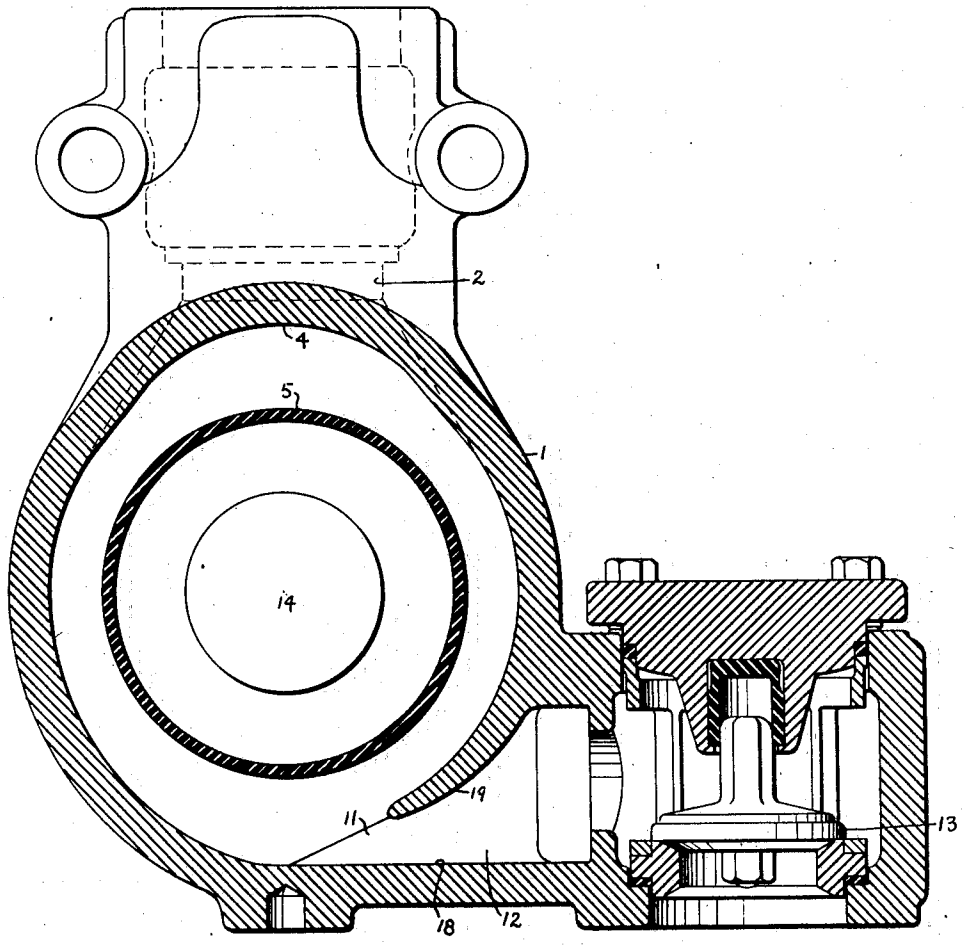


Fig. 3

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Patented Feb. 28, 1933 1,899,364

UNITED STATES PATENT OFFICE

JOSEPH A. TENNANT, OF HOUSTON, TEXAS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STEPHENS PUMP COMPANY, OF ROUND ROCK, TEXAS, A CORPORATION OF DELAWARE

PUMP

Application filed January 15, 1932. Serial No. 586,764.

This invention relates to pumps.

It will be found particularly useful in pumps designed for pumping abrasive and corrosive fluids of the general type disclosed by Letters Patent of the United States to Charles D. Stephens, No. 1,832,258, of November 17, 1931. 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 valves 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. Solid matter in the fluid may settle and accumulate in the barrel below the expansible member; and as the member cannot then expand downwardly, it will expand upwardly and blow out through the outlet.

To avoid the objectionable result just referred to, the present invention has for one of its specific objects the provision of new and improved means to prevent the accumulation of solid matter betwen the barrel and the expansible member.

Another specific object is to provide new and improved means to prevent movement of the expansible member into the outlet and to permit movement of the fluid to the outlet opening when the expansible member expands excessively.

It is to be understood, however, that while the present invention constitutes an improvement in pumps of the type referred to, it may be used advantageously in various other pumps to prevent settling or depositing of solid matter carried by the pumped fluid.

The prefererd embodiment of the invention in a pump of the type referred to is illustrated by the accompanying drawings, of which Fig. 1 is a sectional side elevation of the pump; Fig. 2, a top plan view, partly in section; and Fig. 3, a sectional end elevation.

In the drawings, the substantially frustoconical barrel is indicated at 1. It has in its upper portion adjacent its base end an outlet 2 normally closed by an exhaust valve 3; and an internal recess 4 extending from the outlet 2 and decreasing in depth and width toward the small end of the barrel.

Within the barrel 1 is a substantially cylindrical expansible member 5 preferably made of rubber. It has an external annular flange 6 compressed by and held between the small end of the barrel 1 and the head 7 which is secured in place by the bolts 8; and an internal annular flange 9 that is compressed by and held between the base end wall of the barrel 1 and a clamp 10. The ends of the expansible member 5 are thereby connected and sealed to the ends of the barrel.

In the lower portion of the barrel is an inlet opening 11 communicating with fluid passageway 12 normally closed by the valve 13.

A reciprocable piston 14 extends through the clamp 10 into the expansible member 5. It is packed as indicated at 15.

The barrel 1 is constructed as one of the two conventional barrels assembled as indicated in the patent to Charles D. Stephens No. 1,832,259, of November 17, 1931.

When the piston 14 is moved to the right (Fig. 1), a portion of the actuating fluid within the member 5 is displaced, and the member 5 is thereby expanded to force the pumped fluid out of the barrel 1 through the outlet 2, the valve 13 remaining closed and the valve 3 opening. When the piston 14 is moved to the left (Fig. 1), the expansible member 5 is contracted, the valve 3 remains closed, and the valve 13 opens to permit a fresh charge of fluid to enter the barrel through the opening 11.

In the conventional pump, the fluid enters the barrel at a low velocity so that the solid matter in the fluid is permitted to settle in the bottom of the barrel below the expansible member. The expansible member cannot then expand downwardly and it, therefore, expands upwardly excessively. The means provided by the present invention to prevent the accumulation of solid matter in the barrel will now be described.

It will be noted that the inlet opening 11 is elongated and extends substantially the length of the barrel. The passageway 12 leading to said opening is defined by walls 16

and 17 diverging toward and terminating at the opening 11, and by walls 18 and 19 converging toward and terminating at the opening 11. And the passageway 12 has therein webs 20 and 21 diverging toward the opening 11 to cause fluid to issue from said opening from substantially one end to the other.

By the means just described, the fluid is introduced into the barrel along substantially its length and in a direction substantially tangential to its inner surface, at a high velocity. The bottom sector of the barrel is thereby swept free of any solid particles that might have settled or become deposited thereon, during the operation of the pump. Mud or the like adhering to the wall of the barrel above the bottom is also removed by the fluid, because the fluid is given a rotary motion between the barrel and the expansible member. And so the solid matter, with the fluid, passes through the outlet. This takes place on every stroke of the pump.

If the member 5, as a result of any cause, expands upwardly excessively, it will not come in contact with the upper, inner surface of the barrel because of the recess 4, and the recess 4 will, therefore, provide a fluid passageway to permit the escape of fluid through the outlet 2.

The invention is not limited to the preferred embodiment herein disclosed. Various changes may be made within the scope of the following claims.

I claim:

1. A pump having a barrel; inlet means for said barrel; outlet means for said barrel; an expansible member within said barrel; 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 inlet means including an elongated fluid opening extending along substantially the length of said barrel.

2. A pump having a barrel; inlet means for said barrel; outlet means for said barrel; an expansible member within said barrel; 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 inlet means including a fluid opening through which fluid is introduced into said barrel in a direction substantially tangential to its inner surface.

3. A pump having a barrel; inlet means for said barrel; outlet means for said barrel; an expansible member within said barrel; 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 inlet means including an elongated fluid opening extending along substantially the length of said barrel, through which fluid is introduced into said barrel in a direction substantially tangential to its inner surface.

4. A pump having a barrel; inlet means in the lower portion of said barrel; outlet means in the upper portion of said barrel; an expansible member within said barrel, 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 inlet means including an elongated fluid opening extending along substantially the length of said barrel.

5. A pump having a barrel; inlet means in the lower portion of said barrel; outlet means in the upper portion of said barrel; an expansible member within said barrel; 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 inlet means including a fluid opening through which fluid is introduced into said barrel in a direction substantially tangential to its inner surface.

6. A pump having a substantially frusto-conical barrel; inlet means in the lower portion of said barrel; outlet means in the upper portion of said barrel adjacent its base end; said barrel having an internal recess extending from said outlet means substantially to the small end of said barrel; a substantially cylindrical expansible member within and substantially coextensive with said barrel; 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 inlet means serving to introduce fluid into said barrel along substantially its length and in a direction substantially tangential to its inner surface.

7. A pump having a barrel and inlet means including an elongated fluid opening extending substantially the length of and substantially tangential to the inner surface of said barrel.

8. A pump having a barrel; outlet means in the upper portion of said barrel; and inlet means in the lower portion of said barrel; said inlet means including an elongated fluid opening extending along substantially the length of and substantially tangential to the inner surface of said barrel.

9. A pump having a barrel, and inlet means including a fluid passageway having an elongated opening extending along substantially the length of and substantially tangential to the inner surface of said barrel, said passageway being defined by walls diverging toward and terminating at said opening, and by walls converging toward and terminating at said opening; said passageway having webs therein to cause fluid to issue from said opening from substantially one end to the other.

10. A pump barrel having an outlet, and

an internal recess extending substantially the length of said barrel from said outlet.

11. A substantially frusto-conical pump barrel having an outlet in its upper portion adjacent its base end, and an internal recess extending from said outlet substantially to the small end of said barrel, said recess decreasing in depth from said outlet toward the small end of said barrel.

12. A pump having a barrel, said barrel having inlet and outlet means, and a piston movable in said barrel to draw fluid into said barrel through said inlet means and to expel it from said barrel through said outlet means, said inlet means serving to introduce the fluid in a direction substantially tangential to the inner surface of said barrel.

13. A pump having a barrel, said barrel having inlet and outlet means, and a piston movable in said barrel to draw fluid into said barrel through said inlet means and to expel it from said barrel through said outlet means, said inlet means serving to introduce the fluid along substantially the length of and in a direction substantially tangential to the inner surface of said barrel.

In testimony whereof, I hereunto affix my signature.

JOSEPH A. TENNANT.