

July 27, 1937.

C. D. STEPHENS

2,088,042

PUMPING MEMBER

Original Filed Jan. 18, 1930

3 Sheets-Sheet 1

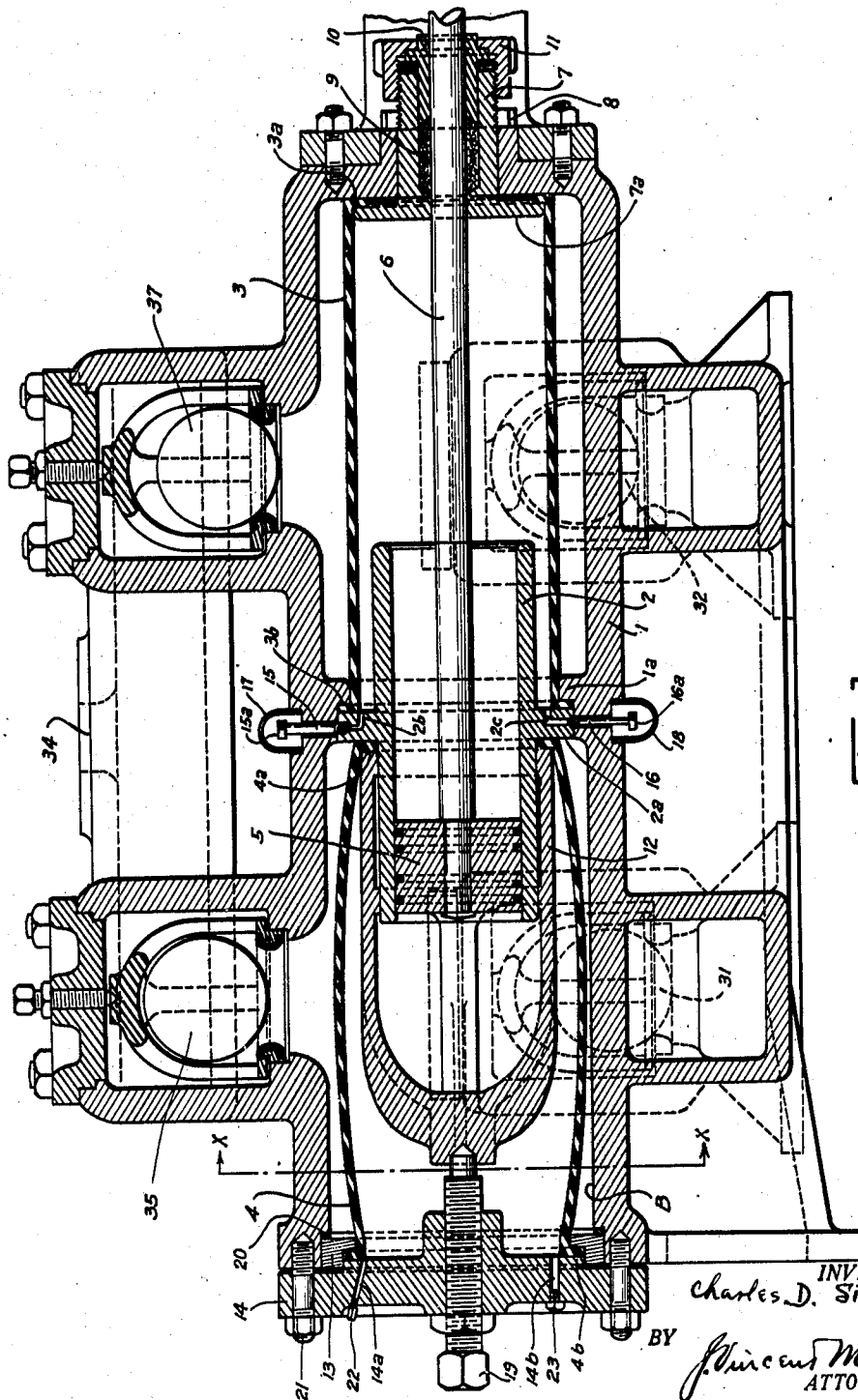


FIG. 1

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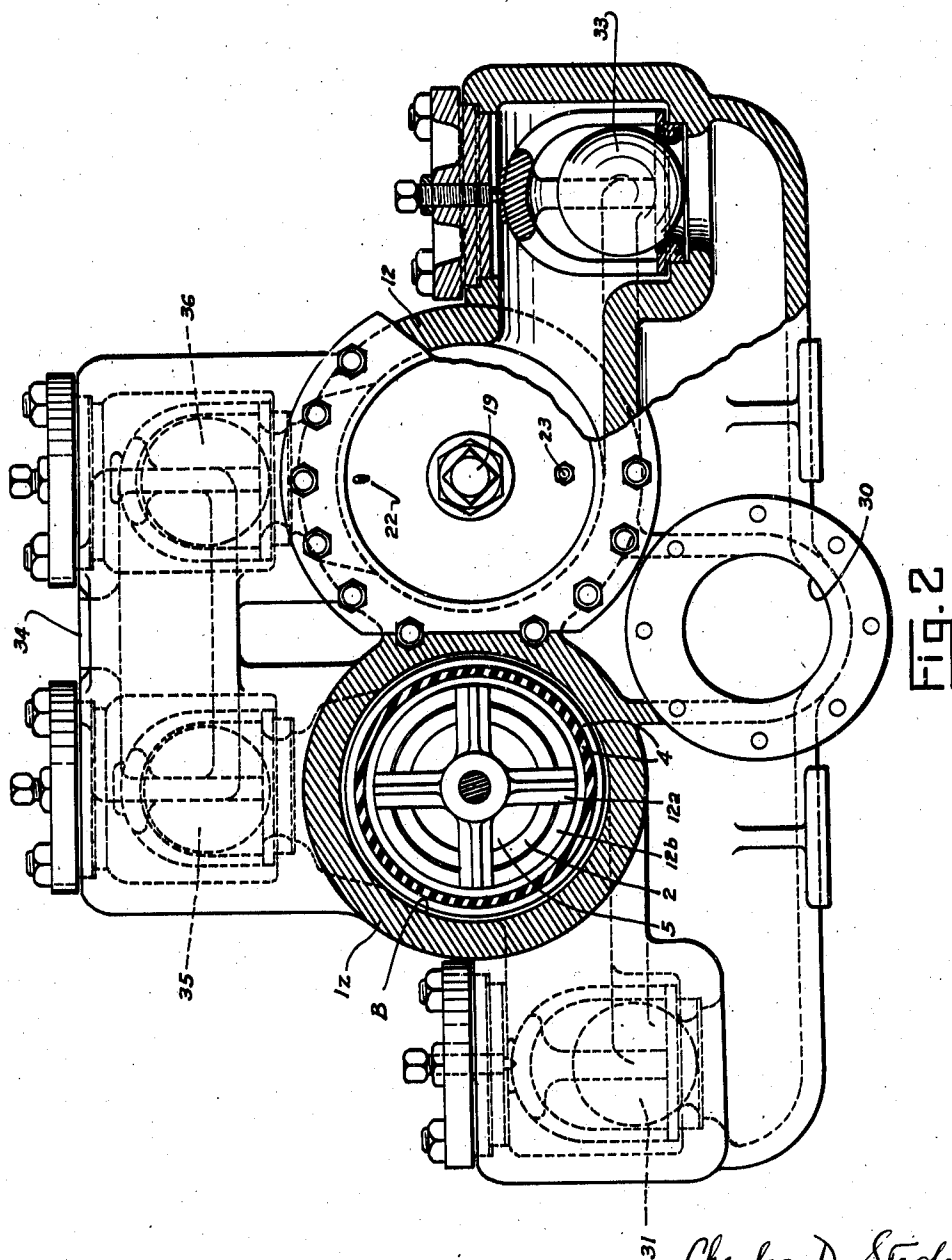
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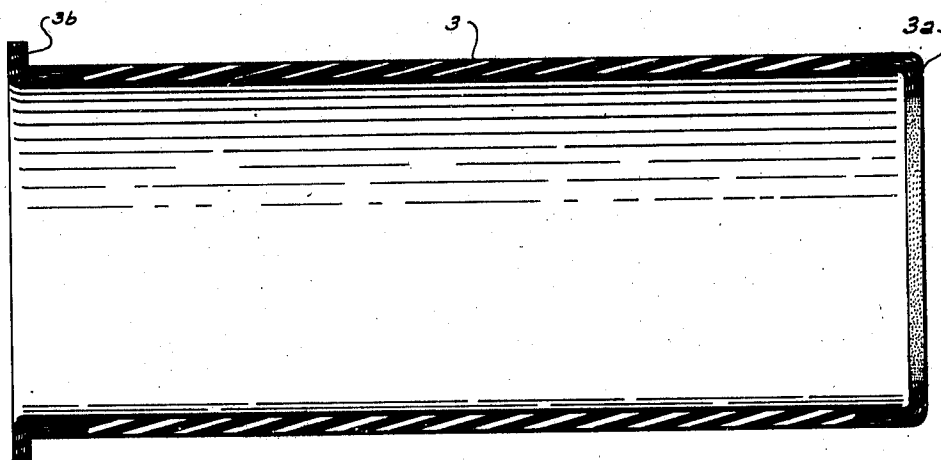


FIG. 3

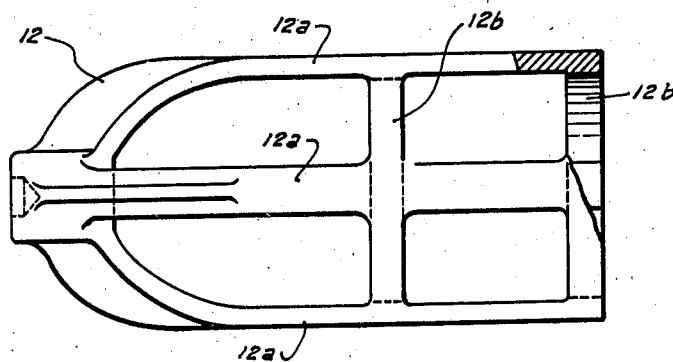


FIG. 4

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UNITED STATES PATENT OFFICE

2,088,042

PUMPING MEMBER

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by mesne assignments, to Abercrombie Pump
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Texas

Original application January 18, 1930, Serial No.
421,651. Divided and this application August
3, 1931, Serial No. 554,740

5 Claims. (Cl. 137-157)

This invention relates to expansible members for pumps of the character covered by my pending application for Letters Patent of the United States, filed January 18, 1930, Serial No. 421,651, and now Patent No. 1,832,258 issued November 17, 1931, of which the present application is a division.

A specific object of the present invention is to provide for pumps of this character a new and improved expansible member to be operatively associated with the pump piston and to prevent the pumped fluid from coming into contact therewith.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a vertical sectional view of a pump; Fig. 2, an end view in which one of the inlet valve assemblies is shown in section and a portion of the casing is removed as indicated by the line $x-x$ of Fig. 1; Fig. 3, a detail view of the expansible member; and Fig. 4, a detail view of the member support.

The pump shown embodies a casing 1 having twin cylindrical portions 12, in each of which is mounted a working cylinder, a piston, and a pair of expansible members.

The casing is provided with a common intake port 30 communicating with the chambers A and B within each of the cylindrical portions 12 of the casing. Between the chambers A and B and the port 30 are four intake valves, three of which are shown (31, 32, and 33). The casing is also provided with a common exhaust port 34 communicating with the cylinders 12, and four exhaust valves, three of which are shown (35, 36 and 37).

The set of elements in one of the cylindrical portions 12 being identical in construction and function to that within the other, a description of but one set will now be given.

Centrally disposed in and spaced from the internal walls of the cylindrical portion 12 is the working cylinder 2; and reciprocable within the cylinder 2 is the piston 5. The normally cylindrical expansible members 3 and 4 are mounted, respectively, in chambers A and B.

It will be observed that the cylinder 2, and expansible members 3 and 4 are axially aligned.

The cylinder 2 has an external annular flange 2a fitting adjacent the internal annular flange 1a of the casing.

The member 3 has an internal annular flange 3a at its outer end which is compressed by and held between the head 1a of the clamp 7 and the end wall of the casing. The clamp 7 is held

by the nut 8 on the exterior of the casing. The inner end of this sleeve has an external annular flange 3b which is held by and compressed between the internal flange 1a of the casing and the external flange 2a of the cylinder.

The inner end of the sleeve 4 has an internal annular flange 4a compressed by and held between the external flange 2a of the cylinder and the inner end of the support 12. The outer end of the sleeve 4 has an external annular flange 4b compressed by and held between the ring 13 and the casing head 14.

The bodies of these members are preferably made of flexible rubber; the flanges, of less flexible fabric and rubber.

The piston rod 6 extends outwardly through the clamp 7 which is internally recessed for the reception of the packing 9 compressed by the gland 10 and nut 11.

The flange 2a of the cylinder is provided with oppositely disposed ducts 2b and 2c in communication with the tubes 15 and 16, respectively. These tubes are capped as indicated at 15a and 16a and covered by hollow plugs 17 and 18. Actuating fluid is supplied therethrough to the sleeve 3 as hereinafter explained.

The support 12 (Fig. 4) has four legs 12a and two spaced rings 12b one of which is at the extremities of said legs. The adjacent end of the cylinder 2 snugly fits in said rings. Fitting within the socket in the outer end of the support 12 is the set screw 19 by which the member 12 is made to compress and hold the flange 4a of the sleeve. This set screw 19 is carried by the casing head 14.

A sealing gasket 20 is interposed between the casing 1 and ring 13, as shown.

The casing head 14 is secured to the casing by suitable bolts 21 and is provided with apertures 14a and 14b closed by the removable plugs 22 and 23. By means of these apertures actuating fluid is supplied to the expansible member 4.

The parts may be assembled as follows:

The clamp 7 is placed within the inner end of the member 3. The member 3 and clamp 7 are then inserted through chamber B into chamber A, to the positions shown by Fig. 1, whereupon the nut 8 is tightened. It will be observed that the flange 3a of this member is thereby held in sealing contact with the casing and that the flange 3b rests upon the flange 1a of the casing.

The cylinder 2 is then inserted through the chamber B until its flange 2a rests upon the flange 3b of the expansible member 3; and the piston 5 and its rod 6 are then placed in the cylin-

der 2 and clamp 7, respectively. Packing 9, gland 10, and nut 11 are then placed as shown by Fig. 1.

The ring 13 is then placed upon the member 4; the support 12, within said member. The three
5 are thereupon inserted so that the rings 12b slide upon the cylinder 2 and the flange 4a is carried into contact with the flange 2a and the ring 13 into engagement with the gasket 20.

The casing head 14 carrying the set screw 19
10 is then bolted on the end of the casing. The flange 4b of the expansible member 4 and the gasket 20 are thereby compressed. The cage 12 is then moved by the set screw 19 to compress the flange 4a of the expansible member 4 and the
15 flange 3b of the expansible member 3.

The piston being in the position shown by Fig. 1, the plugs 17 and 18 and the caps 15a and 16a are removed, and an actuating fluid, preferably
20 castor oil, is pumped into the sleeve 3 until it appears at the tube 15. The caps 15a and 16a and the plugs 17 and 18 are then replaced.

The piston is then moved to the right end of the cylinder. The plugs 22 and 23 are then removed, and oil is pumped through the lower ap-
25 erture in the head 14 until it appears at the upper aperture, at which time the plugs 22 and 23 are replaced.

The pump is then ready for operation.

It will be apparent to those skilled in the art
30 that the assembly of the parts may be effected in various ways other than that just described. Attention is invited particularly to the fact that the expansible members 3 and 4 are sealed by means exterior of the casing; and that such means may
35 be employed to simultaneously seal said members.

The operation of the pump may briefly be outlined as follows:

As shown by Fig. 1, when the piston is at its forward position the member 4 is expanded; the
40 member 3, in its normal cylindrical shape. Now when the power means, not shown, moves the piston on its return stroke, the member 3 is expanded by the actuating fluid forced therein, and the member 4 contracted by the withdrawal of actuat-
45 ing fluid therefrom. Upon expansion of member 3, the inlet valve 32 is closed; the outlet valve 31,

opened; and the fluid in the chamber A is forced through the exhaust port 34. Meanwhile, the contraction of the member 4 has closed outlet valve 35, opened inlet valve 31, and drawn a
5 fresh charge of fluid through the intake port 30 into the chamber B.

A reverse operation occurs upon forward move-
ment of the piston. The piston forces actuating fluid into the member 4 and draws it from the
10 member 3. Consequent expansion of member 4 effects closure of inlet valve 31, opening of valve 35, and expulsion of fluid from the chamber B through the exhaust port 34. Simultaneous contraction of member 3 effects closure of outlet
15 valve 37, opening of inlet valve 32, and suction of fluid through intake port 30 into chamber A.

The alternate expansion and contraction of the expansible members 3 and 4 is radial, and not
axial.

The invention is not limited to the preferred 20
embodiment shown. Various changes may be made within the scope of the following claims.

I claim:

1. An expansible hollow pumping member hav-
25 ing an internal annular flange at one end and an external annular flange at the other end.

2. A substantially cylindrical expansible hollow
pumping member having open ends, an external
annular flange at one end, and an internal flange
30 at the other end.

3. A substantially cylindrical expansible hol-
low pumping member made of rubber and having
open ends, an external annular flange at one end,
and an internal annular flange at the other end.

4. A substantially cylindrical expansible hol-
35 low pumping member, the body of said member being made of flexible rubber, and the ends of said member being made of less flexible fabric and rubber.

5. A substantially cylindrical expansible hol-
40 low pumping member having an internal annular flange at one end and an external annular flange at the other end, the body of said member being made of flexible rubber and the ends of said mem-
45 ber being of less flexible fabric and rubber.

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