May 10, 1938. P. G. MacGREGOR 2,116,684

PUMP

Filed April 9, 1937

Fig. 1

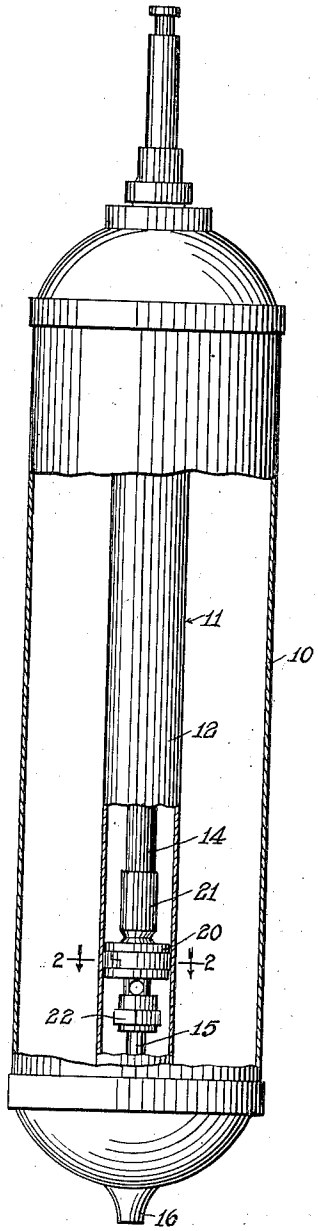


Fig. 2.

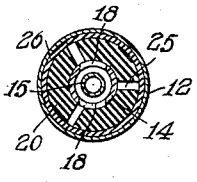


Fig. 3.

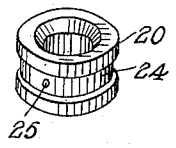


Fig. 4.

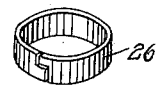


Fig. 5.

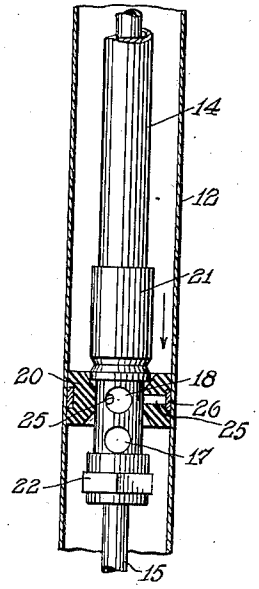
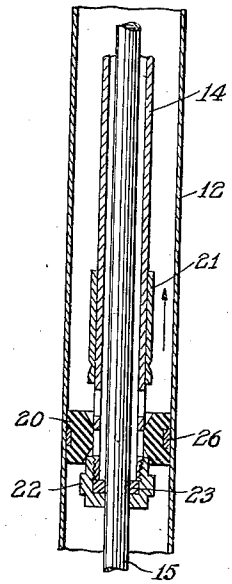


Fig. 6.



INVENTOR.

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UNITED STATES PATENT OFFICE

2,116,684

PUMP

Peter Graham MacGregor, Pequannock, N. J., assignor to Pyrene Manufacturing Company, Newark, N. J., a corporation of Delaware

Application April 9, 1937, Serial No. 135,827

1 Claim. (Cl. 103—192)

This invention relates to pumps and has particular reference to fire extinguisher pumps of the double-acting type.

An important object of the present invention is to provide a generally improved fire extinguisher pump; and to that end the invention contemplates a simple and reliable means, whereby pressure set up within the pump tube or cylinder incident to the discharge of liquid therefrom may be utilized to attain an effective seal between the pump piston and the inner wall of the pump tube or cylinder.

Other objects and advantages of the invention will become apparent from the following description of the invention when taken in connection with the accompanying drawing, in which—

Fig. 1 is a view partly in section and partly in elevation of a fire extinguisher embodying the present invention;

Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the pump piston;

Fig. 4 is a perspective view of a piston ring adapted for use with the pump piston;

Fig. 5 is an enlarged view partly in section and partly in elevation showing the position of the piston with reference to the piston tube on its inward stroke; and

Fig. 6 is a view similar to that of Fig. 5 and showing the position of the piston on the piston tube on its outward stroke.

The extinguisher herein shown as embodying the present invention includes a liquid receptacle 10, within which is arranged a pump 11 of the double-acting type, such as is shown and described in United States Patent No. 1,688,195, granted to Peter G. MacGregor, October 16, 1928, from which it will be understood that the pump is adapted to rotate about its longitudinal axis and is equipped with suitable liquid pick-up means by which proper ingress of liquid to the pump is insured regardless of the position in which the extinguisher is held while being operated.

The pump 11 includes a pump tube 12, within which is arranged a piston tube 14, adapted for reciprocation with respect to the pump tube and also with respect to a nozzle tube 15 disposed centrally of the piston tube and through which liquid is discharged by way of its upper or inlet end, the nozzle tube being secured in position by reason of its connection with a nozzle tip 16 which is attached to the outlet end of the liquid receptacle 10. The piston tube 14 is provided at its inner end with two pairs of discharge ports 17 and 18, respectively, through the former of which liquid is delivered to the piston tube on the inward stroke of that tube and through the latter of which liquid is delivered to the piston tube on the outward stroke of that tube. On the inner end of the piston tube 14, there is slidably carried a piston 20, which is adapted to so move with relation to the piston tube on its inward stroke as to open the discharge ports 17 and close the discharge ports 18 and which is adapted to so move with relation to the piston tube on its outward stroke as to open the discharge ports 18 and close the discharge ports 17. The piston 20 is limited in its movement in one direction on the piston tube by a sleeve 21 carried by that tube adjacent the ports 18 and is limited in its movement on the piston tube in an opposite direction by a gland nut 22 carried at the end of that tube and provided with a packing 23 which surrounds the nozzle tube 15.

The piston 20 is formed from a suitable material, such as Bakelite, and is provided on its outer surface with an annular channel 24, from the bottom of which a plurality of pressure ducts 25 lead to the central opening of the piston within which the piston tube 14 is slidably accommodated. The pressure ducts are preferably three in number and are equidistantly spaced from each other so that at least one of them will communicate with the piston tube 14 by way of one or the other of the discharge ports 18 on the inward stroke of the piston tube; and so that at least one of them will communicate with the piston tube by way of one or the other of the discharge ports 17 on the outward stroke of the piston tube. Within the annular channel 24, there is carried an expansible piston ring 26, the width of which is such that it snugly engages the side walls of the channel. The piston ring 26 is preferably constructed of Celluloid and is adapted to be expanded radially outwardly under the influence of pressure transmitted to the annular channel 24 from the piston tube 14 by way of one or the other of the discharge ports 17 and at least one of the pressure ducts 25 on the inward stroke of the piston tube, and to be similarly expanded under the influence of pressure transmitted to the annular channel from the piston tube by way of one or the other of the discharge ports 17 and at least one of the pressure ducts 25 on the outward stroke of the piston tube.

Regarding the operation of the fire extinguisher, it will be understood that as the piston tube 14 is moved inwardly (downwardly in the drawing) liquid is drawn into the upper end of the

pump tube 12, as viewed in Figs. 1, 5 and 6, and that liquid contained in the lower end of the pump tube 12 is discharged therefrom by way of the discharge ports 17, the piston tube 14 and the nozzle tube 15; whereas on the outward (upward) stroke of the piston tube 14, liquid is drawn into the lower end of the pump 12 and liquid contained in the upper end of the pump tube is discharged therefrom by way of the discharge ports 18, the piston tube 14 and the nozzle tube 15.

As the pump is operated the piston 20 serves as a valve, one function of which is to establish communication between the piston tube 14 and that end of the pump tube 12 which becomes the high-pressure end of such tube incident to initiating either an outward or inward stroke of the piston tube, and another function of which is to sever communication between the piston tube and the low-pressure end of the pump. Moreover, the piston 20 functions as a valve to establish communication between the annular channel 24 and the alternate high-pressure ends of the pump tube, so as to insure delivery of fluid pressure to that channel.

Inasmuch as the fluid pressure which is delivered to the annular channel 24 from the alternate high-pressure ends of the pump tube 12 acts on the expansible piston ring 26 to force or expand it radially outwardly into firm contact with the inner wall of the pump tube 12, it follows that the escape of liquid from the high-pressure side of the pump tube to the low-pressure side thereof by way of the periphery of the piston ring is effectively prevented. It will be observed also that escape of liquid from the high-pressure side of the pump tube 12 to the low-pressure side thereof by way of the annular channel 24 is effectively prevented, because the piston ring 26 snugly engages the side wall of that channel.

Although only one form of the invention is herein shown and described, it will be understood that various changes may be made without departing from the spirit of the invention or the scope of the following claim.

What is claimed is:

In a pump of the double-acting type, a tubular piston rod, the passage in which serves as a discharge conduit and the wall of which is provided with a pair of spaced ports, one of which is adapted to serve as a discharge port for one end of the pump and the other of which is adapted to serve as a discharge port for the other end of the pump, a piston having an opening therein through which said piston rod has a limited sliding movement, said piston having an annular channel formed on its outer surface and provided with a pressure duct leading from the bottom of said channel to the opening through said piston, the range of movement of the piston on the piston rod and the space between the discharge ports being so proportioned with respect to the location of the pressure duct in the piston that said duct is adapted to communicate with said discharge conduit by way of one of said discharge ports when the piston is at either limit of its range of movement, said piston functioning as a valve adapted to close one of said ports and open the other incident to movement of said piston rod in one direction and to close said other port and open said one port incident to movement of said piston rod in an opposite direction, and an expansible piston ring carried within said channel and adapted to be expanded radially outwardly under the influence of pressure transmitted from said discharge conduit by way of said pressure duct and one or the other of said discharge ports incident to reciprocation of said piston.

PETER GRAHAM MacGREGOR.