May 3, 1938. J. P. MILLER ET AL 2,116,319

FIRE EXTINGUISHER

Original Filed March 17, 1934

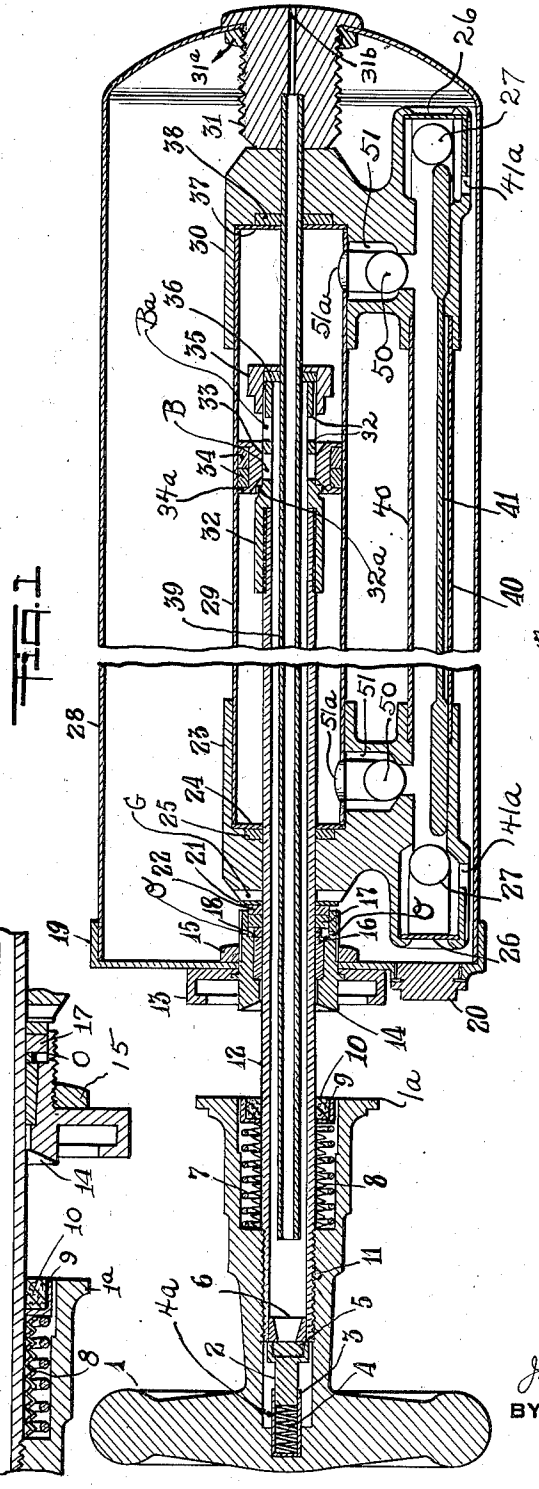

FIG. 1

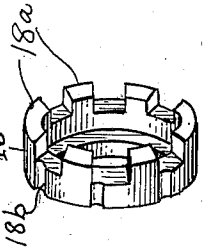

FIG. 2

FIG. 3

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Patented May 3, 1938 2,116,319

UNITED STATES PATENT OFFICE

2,116,319

FIRE EXTINGUISHER

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Application March 17, 1934, Serial No. 716,095
Renewed March 23, 1938

1 Claim. (Cl. 299—98)

Our invention relates to a new and improved portable fire extinguisher.

One of the objects of our invention is to provide a new and improved fire extinguisher of the pressure or pump operated type.

Another object of our invention is to provide a device which can be manufactured at low cost and which can be conveniently assembled.

Another object of our invention is to produce a device which shall be reliable in operation.

Another object of our invention is to provide an improved device having a casing and a movable pump piston, in which improved means are provided against sealing the casing from the outer atmosphere, when the device is in the closed position.

Other objects of our invention will be set forth in the following description and drawing which illustrates a preferred embodiment thereof, it being understood that the above statements of the objects of our invention is intended to generally explain the same without limiting it in any manner.

Fig. 1 is a diagrammatic cross-section of the improved device which embodies our invention.

Fig. 2 is a detail elevation of a collar which is used for supporting the breather washer at the rear end of the apparatus.

Fig. 3 is an enlarged fragmental view showing certain of the essential parts.

The device comprises a shell or casing 28 which is preferably made of brass or any other suitable metal. This casing 28 is preferably drawn into shape. At its front end the shell 28 is provided with a nozzle 31 which is also preferably made of brass.

The nozzle 31 is held in position by a collar 31*a* which may be forced into the position shown in Fig. 1 by any suitable means. After having been forced into its final position, the collar 31*a* is held in said final position by means of solder or the like, thus providing an air-tight closure.

The nozzle 31 is provided with an outlet bore or opening 31*b*. A tube 39 also made of brass or other suitable metal has its front end fitting tightly into a recess which is provided in the rear end of the nozzle 31, and said parts can also be connected by solder or the like, in order to provide for an air-tight fit.

A pick-up casting 30, made of suitable lead alloy, is located adjacent the rear end of the nozzle 31, and the outlet tube 39 passes through a suitable bore which is provided in said pick-up casting 30. A packing washer 38, made of felt or other suitable packing material is located in a recess of the pick-up casting 30, and said packing washer fits in a liquid-tight manner against the adjacent portion of the outlet tube 39.

A pump chamber 29, made of brass or other suitable metal fits tightly within a recess which is provided in the rear end of the pick-up casting 30. A drive or force fit is used for holding the pick-up casting 30 to the pump chamber or shell 29 so as to eliminate the necessity of using solder for assembling these two parts of the device.

The pump shell 29 is provided with a front end wall 37 which compresses the washer 38 when the pump shell 29 is driven into the pick-up casting 30, so that the washer 38 is compressed in order to provide the desired liquid-tight fit against the outlet tube 39.

The rear end of the outer shell 28 is closed by means of a cover 19 which is also made of brass or other suitable metal and the longitudinal flange of said cover 19 fits tightly against the rear end of the outer shell 28, and solder is utilized for providing a permanent and air-tight connection.

Adjacent the rear end of the device, a rear pick-up casting 23 is provided. The rear pick-up casting 23 is substantially similar to the front pick-up casting 30 and said rear pick-up casting 23 is also made of a suitable lead alloy.

The pump shell 29 also has a drive fit in the rear pick-up casting 23 and a felt washer 25 is provided which corresponds to the felt washer 38. The rear end of the pump shell 29 has a lateral wall 24, which corresponds in function to the previously mentioned lateral wall 37. The rear lateral wall 24 may be separate from the rear pick-up casting 33 so as to constitute a washer.

The hollow-pump piston rod 12 is slidably mounted relative to the rear pick-up casting 23 and additional slide-bearing means are provided, as later described herein.

The hollow piston rod 12 is also made of brass or other suitable metal. At its front end the hollow rod 12 is connected to a plunger 32.

As shown in Fig. 1, the plunger 32 is provided with a pair of transverse bores B and B*a* so that said plunger 32 is provided with four separated holes in its periphery.

A cap 35 is connected to the front end of the plunger 32, by means of suitable cooperating threading, and a packing washer 36, made of felt or other suitable material, is compressed by the cap 35 against the front end of the plunger 32, so as to provide a liquid-tight fit against the outlet tube 39.

A piston 34*a*, made of brass or other suitable

metal, is slidably mounted upon the plunger 32.

As shown in Fig. 1, the plunger 32 has a shoulder 32a which can push the piston 34a towards the outlet nozzle 31, when the hollow piston rod 12 is pushed inwardly. Upon the reverse stroke of the hollow piston rod 12, there is a limited free movement between the piston 34a and the plunger 32, until the rear end of the cap 35 abuts said piston 34a, whereupon the piston 34a moves outwardly in unison with the plunger 32. The piston 34a is provided with a plurality of packing rings 34, made of felt or other suitable material, which provide a liquid-tight fit against the interior wall of the pump casing 29.

The piston 34a does not make an air-tight or liquid-tight fit against the plunger 32, so that liquid can always pass between the adjacent surfaces of the plunger 32 and the piston 34a.

The pick-up castings 30 and 23, together with their associated parts, such as the pump shell 29, can turn freely around the axis of the outlet tube 39. Therefore the force of gravity always causes said pick-up castings to assume the position shown in Fig. 1.

Although the lateral face of the front pick-up casting 30 is shown as being closely adjacent the rear end of the nozzle 31, these surfaces are either slightly separated from each other, or they only contact at a single point or annular surface, in order to permit the frictionless turning of said pick-up castings around the bearing which is provided by the outlet tube 39. The rear end of nozzle 31 may have an annular groove, in order to provide an annular shoulder for contacting with pick-up casting 30, so as to permit easy turning of said pick-up casting.

The felt washers 38 and 25 absorb a certain amount of the fire-extinguishing liquid (such as carbon tetrachloride) which is placed within the outer shell 28, because the lateral walls 37 and 24 of the pump shell 29, do not make a liquid-tight fit against the outlet tube 39. However said washers 38 and 25 prevent the leakage of liquid. The absorption of the liquid by said washers 38 and 25 minimizes their friction against the outlet tube 39, in order to facilitate the easy turning of the pick-up castings.

A latch 13 is integral with, or is suitably connected to a bushing member 14, whose rear end projects through the cover 19.

A collar 15 serves to assemble the member 13 with the cover 19. If desired, the members 19, 13 and 14 can be made of one integral piece, by means of drop-forging. This will eliminate the necessity of the collar 15.

A felt washer 16 is located between the rear end of the bushing member 14, and the hollow piston rod 12. A second washer 17, made of suitable lead alloy or other metal, is located between the inner end of the bushing member 14 and the hollow piston rod 12. A breather collar 18, made of brass or other suitable metal, is located between the felt washer 16, and the metal washer 17.

Whenever we specify the use of a felt washer or packing member, we wish to include any other material which can permit air to leak through, while preventing the leakage of liquid.

We prefer to use a material which can absorb liquid while preventing its leakage and while permitting the leakage of air, but the invention is not necessarily limited to the use of a material which can absorb liquid, while permitting the leakage of air.

As shown in Fig. 2, the breather washer, 18 is provided with separated teeth 18a, and grooves 18b.

As shown in Fig. 1, the bushing member 14 is provided with a pair of transverse openings O.

The bushing member 14 is assembled with its washers, by means of a metal washer 22, made of brass or other suitable metal, which abuts the rear lateral wall 21 of the rear pick-up casting 23.

The front and rear pick-up castings 30 and 23, are provided with inlet ports 51, which register with holes 51a which are provided in the pump shell 29. Said inlet ports 51 are controlled by gravity valves 50 which are preferably of the ball type. The inlet ends of the pick-up castings are connected by means of a longitudinal tube 40 which is preferably made of brass or other suitable metal.

The connecting tube 40 has a drive fit in the recessed portions of said pick-up castings. The pick-up castings 30 and 23 are provided with inlet openings 41a. Near said bottom inlet openings 41a, said inlet castings are provided with end closures 26. Gravity valves 27 of any suitable type, which are preferably ball valves, are provided in order to close communication between said inlet openings 41a and said pick-up castings.

In the position shown in Fig. 1, the left-hand ball valve 27 is in the closing position so that the rear pick-up casting 23 cannot pick up any liquid.

Fig. 1 illustrates the right-hand valve 27 in the open position, so that the front pick-up casting 30 can take up the fire extinguishing liquid. A slide rod 41 is provided between the ball valves 27, so that when one of said valves is in the closing position, the other said valve is in the open position.

Fig. 1 shows a large clearance between the slide rod 41 and the inner wall of the connecting tube 40. This permits the liquid to pass through tube 40, when the device is held vertical, with the outlet nozzle held downwards. Any suitable bearing can be provided for holding the slide rod 41 parallel to the longitudinal axis of the tube 40.

The operating head 1 is connected to the hollow piston rod 12 by means of suitable cooperating screw threading, and the connection can be made permanent either by solder or by means of a drive pin 11. At its front end, the head 1 is provided with a recess, in which a helical spring 7 is provided.

An extensible or bellows member 8 is provided, and this is made of brass or any other suitable metal. At its rear end the bellows member 8 is connected to the adjacent part of piston rod 12, by soldering or the like. At its front end the bellows member 8 is connected to a cup-shaped member 9 which is made of brass or other suitable metal.

This construction provides a relative longitudinal movement between the head 1 and the member 9, while the bellows member 8 makes a liquid-tight contact at its rear end with the exterior wall of the hollow piston rod 12, thus preventing any leakage of liquid. Likewise, the thread which connect the head 1 to piston-rod 12, prevent any leakage of liquid, and the head 1 and rod 12 are provided with shoulders, which make a liquid-tight contact.

The cup-shaped member 9 is provided with a stopper 10, which is made of cork or other suitable material.

When it is desired to lock the apparatus the head 1 is pushed to the right of the position which is illustrated in Fig. 1, until the stopper 10 is forced against the outer sharp edge of the bushing member 14, thus providing a liquid-tight and air-tight closure at this point.

As shown in Fig. 1, the outer end wall of the bushing member 14 is of frusto-conical shape, in order to provide said sharp edge. In this position, the shoulder 1a of the head 1 can be pushed into the opening of the latch member 13, and the head member 1 can then be turned in unison with the hollow piston rod 12, so that said shoulder 1a is then locked by the flange of the latch member 13.

In said closed position the spring 7 presses the stopper 10 against the outer sharp edge of the bushing member 14. This pressure is sufficient to cause the material of the stopper member 10 to enter the frusto-conical recess which is provided in the outer end of the bushing member 14, thus providing a very tight closure.

In the position illustrated in Fig. 1, the spring 7 lightly abuts the cup-shaped member 9, so that the bellows member 8 is not extended.

At its rear end, the interior of the hollow piston 12 is provided with a centering-guide 6 which is made of brass and which is provided with a frusto-conical interior opening. Said centering-guide 6 is connected to the interior of the hollow piston 12 by means of a drive fit or solder or the like.

The interior of the head or handle 1 is also provided with a bushing 4a, which is made of any suitable metal such as brass. A helical spring 4 is located in said bushing 4a and said spring 4 operates against a plunger 2, whose inner end is cup-shaped, said cup-shaped end being provided with a stopper 5 which is made of cork or other suitable material.

When the device is closed, the outer end of the outlet tube 39 passes through the guide member 6, so that this outer end is guided against the stopper 5. The spring 4 is then compressed so that the stopper 5 produces a liquid-tight and air-tight closure at the rear end of the outlet tube 39.

The operation of our device is as follows:—

The mounting of the pick-up castings which has been previously specified, causes the bottom inlet ports 41a of said castings to always assume the bottom position which is shown in Fig. 1.

Since the longitudinal axis of the device is not held perfectly horizontal under normal working conditions, the ball valves 27 roll in one direction or the other so that one of said ball valves 27 shuts off communication between one of the pick-up castings and the fire extinguishing liquid, and the other ball valve 27 opens communication between the pick-up casting and the fire extinguishing liquid which is in the interior of the outer shell 28.

In the position shown in Fig. 1, the piston 34a is in an intermediate position so that the handle 1 can be operated to move the hollow piston rod 12 in either direction. When the device is closed, the cap 35 is close to the inner lateral wall 37.

Assuming that the handle 1 is moved to the left of the position shown in Fig. 1, the piston 34a remains stationary until the cap 35 abuts said piston 34a whereupon said piston 34a is moved to the left, until the hollow piston rod 12 has completed its stroke. In this position the left-hand end of the plunger 32 is close to the lateral wall 24.

As the piston 34a is moved to the left of the position shown in Fig. 1, the fire extinguishing liquid is sucked into the pump shell 29, through the right-hand opening 51a. While the piston 34a is being moved to the left of the position shown in Fig. 1, it exerts pressure upon the liquid which is located between the lateral wall 24 and the piston 34a.

During this stroke said piston 34a clears the openings which are formed by the bore B, so that the liquid can pass through said openings into the space between the hollow piston rod 12 and the outlet tube 39, so that the liquid can pass through said tube and out through the outlet 31b.

During the return stroke of the hollow piston 34a, when it is moved to the right, said piston 34a substantially covers the holes which are formed by the bore B and it exposes the holes which are formed by the bore Ba. The liquid which is then at the right of the piston passes through said holes which are formed by the bore Ba, it then passes between said members 12 and 39, then into tube 39, and out through the bore 31b. During this period, liquid is free to pass through the tube 40, and the suction at the left of the piston 34a raises the rear ball valve 50 so that the liquid is sucked into the pump casing 29.

When it is desired to refill the outer casing 28, the plug 20 can be removed.

While the device is being operated, it is necessary to admit air into the casing 28, in order to compensate for the loss of liquid, as otherwise the device will become air-bound. Air can leak through the felt washer 16, through grooves 18b of the breather collar 18 and through the holes O of bushing 14.

If any liquid leaks through the felt washer 25, said liquid can move transversely through the radial grooves G which are formed in the rear wall of the rear pick-up casting 23, so that said liquid passes back into the shell 28. If there is any tendency for liquid to leak by the metal washer 22, this is prevented by means of the felt washer 16.

Since there is not a liquid-tight fit between the adjacent lateral walls of the nozzle 31 and of the front pick-up casting 30, any liquid which leaks through the washer 38 is moved transversely back into the outer casing 28 since there is a liquid-tight fit between the nozzle 31 and the front end of the outlet tube 39.

The closure which is provided by means of the stoppers 10 and 5, prevents any evaporation of the fire extinguishing liquid when the device is closed.

The use of the bellows member 8 is particularly advantageous in preventing the evaporation or escape of liquid from the device when it is closed, because the outer end of said bellows member 8 is soldered or otherwise secured in a liquid-tight and air-tight manner to the hollow piston rod 12. Hence, if any liquid leaks past the stopper 10, or if any vapor leaks past the stopper 10, along the outer wall of the hollow piston 12, said vapor or liquid cannot continue to leak out of the apparatus, because it is confined within the bellows member 8.

If desired, the washers 38 and 25 could be sufficiently compressed, or made of suitable material, in order to prevent the leakage of air as well as the leakage of liquid. The felt washer 16 is not compressed to such an extent as to prevent the free leakage of air through said washer into casing 28. This leakage is sufficiently rapid to prevent air-binding, even if the pump is operated rapidly.

When the device is closed, the spring 7 is com-

pressed, so as to force the stopper 10 into the open end of bushing member 14 and against the adjacent part of piston rod 12, thus providing the desired liquid-tight and air-tight closure.

We can use any well known fire extinguishing liquid in the device, such as carbon tetrachloride.

For convenience, in defining the invention, the term "breather" may be applied to a device or member which permits the entrance of air into the casing.

While we prefer to use a separate spring 7, for exerting the desired pressure upon the stopper member 10, in order to relieve the bellows member 8 from acting as a spring, the use of said spring 7 is not always necessary.

While we have shown a conventional type of double-acting pump, the invention is not to be limited to any particular kind of pump, either double-action or single action.

When the piston rod 12 is pushed inwardly, or to the right of the position shown in Fig. 1, it can be moved for substantially its full stroke before the member 10 contacts with the adjacent open end of the bushing member 14.

We have shown a preferred embodiment of our invention, but it is clear that numerous changes and omissions can be made without departing from its spirit.

We claim:

In a pump type fire extinguisher which has a casing and a bushing located in an end wall of said casing and which has a reciprocating plunger movably mounted in said bushing, a stopper member mounted on said plunger and movable relative to said plunger, said stopper member being shaped and adapted to close the outer end of said bushing, said stopper member being movably connected to said plunger in a liquid-tight and air-tight manner by a metal bellows member.

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