

July 25, 1944.

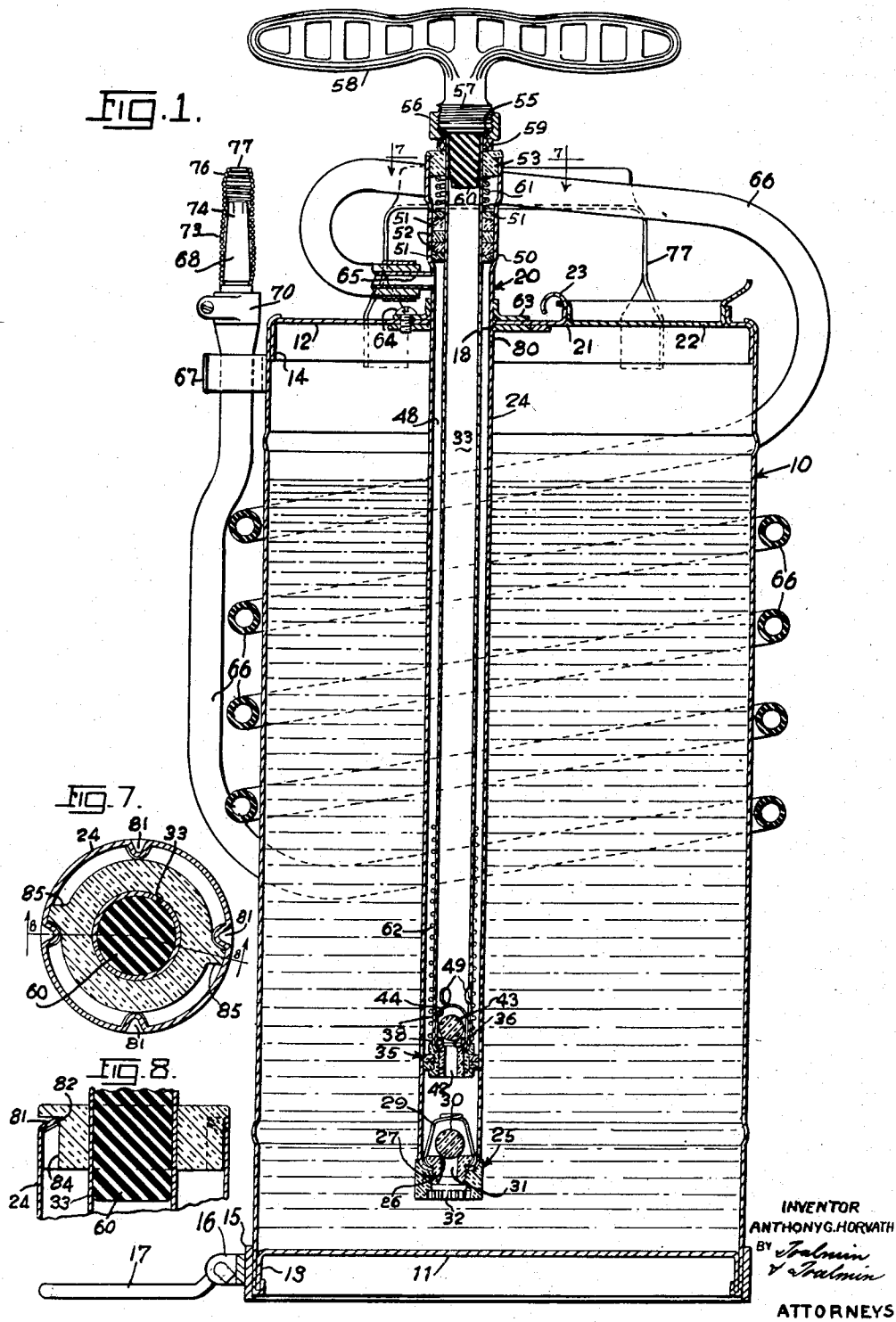
A. G. HORVATH

2,354,265

PUMP

Original Filed May 27, 1942

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

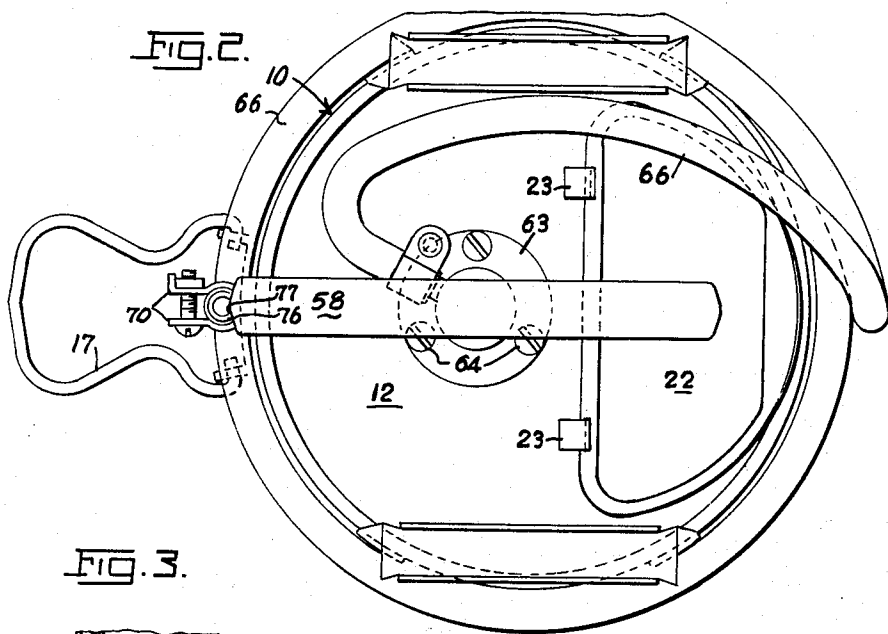


FIG. 3.

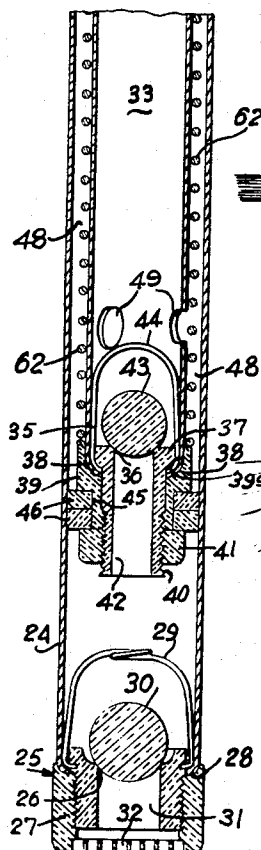


FIG. 4.

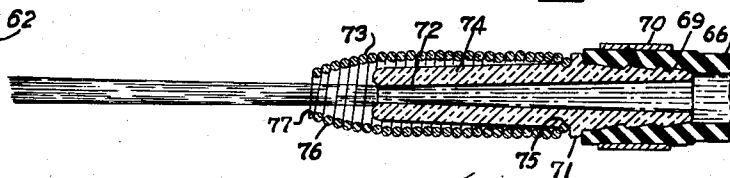


FIG. 5.

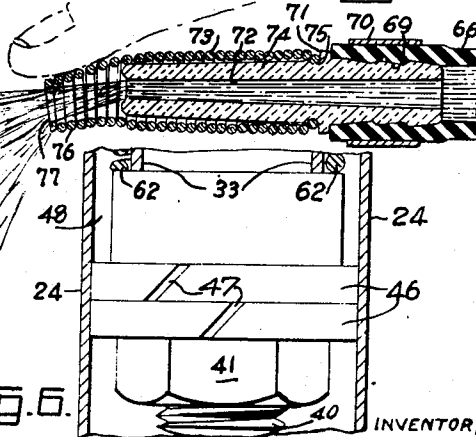


FIG. 6.

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2,354,265

PUMP

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Original application May 27, 1942, Serial No.
444,688. Divided and this application February
25, 1943, Serial No. 477,005

11 Claims. (Cl. 103—178)

This invention relates to fire extinguishers of the hand operated type wherein there is provided a pump for supplying fire extinguishing fluid under pressure.

An object of the invention is to provide an improved form of hand operated fire extinguishing apparatus that can be produced at a lower manufacturing cost without reducing the efficiency of the apparatus.

Another object of the invention is to provide a fire extinguishing apparatus wherein a hand operated pump is used for supplying the fire extinguishing liquid under pressure, the valve mechanisms of the pump being constructed from plastics materials.

Another object of the invention is to provide a fire extinguishing apparatus having a nozzle that is constructed and arranged to discharge a stream of fire extinguishing liquid or may be operated to break the stream into a very fine mist for extinguishing incendiary bombs or other high temperature flame-producing metals and chemicals.

Another object of the invention is to provide a fire extinguishing apparatus that can be used for extinguishing ordinary fires or for extinguishing high temperature flame-producing materials such as magnesium, thermite and others.

Another object of the invention is to provide a piston pump for a fire extinguishing apparatus having the walls thereof coated with porcelain enamel for resisting rust and corrosion.

Another object of the invention is to provide an improved form of hand operated pump for a fire extinguishing device.

It is still another object of the invention to provide a hand operated pump for a fire extinguishing apparatus that is constructed and arranged for discharging a continuous stream of liquid.

It is still a further object of the invention to provide a pump for a fire extinguishing device wherein the sealing rings for the pump piston are constructed from a plastics material.

Another object of the invention is to provide a pump wherein the suction valve, the foot valve and the means for sealing between the pump rod and the pump cylinder are constructed from plastics material.

It is another object of the invention to provide a pump having a seal member between the pump rod and the pump cylinder wherein the gland members are constructed from plastics material.

It is another object of the invention to pro-

vide a pump wherein the guide bushing for the pump rod is constructed from plastics material.

It is another object of the invention to provide a pump wherein the pump cylinder and the pump rod are coated with a film of porcelain enamel and the suction valve, foot valve and seal members for the pump are constructed from plastics material so that they can directly engage the porcelain enameled surface without chipping the same.

Another object of the invention is to provide a pump having an integral pump head and a pump cylinder constructed from a continuous tube to permit porcelain enameling of the structure as a unit.

Another object of the invention is to provide a bayonet lock for the plastic guide bushing for the pump rod.

Another object of the invention is to eliminate the use of screws and screw threads in the pump cylinder for attaching the various elements thereto to avoid damage to the porcelain enameled film thereon.

Further objects and advantages will become apparent from the drawings and the following description.

In the drawings:

Fig. 1 is a vertical cross-sectional view of the fire extinguishing apparatus of this invention.

Fig. 2 is a top plan view of the fire extinguishing apparatus.

Fig. 3 is a vertical cross-sectional view of a portion of the pump mechanism showing the construction of the foot valve and check valve for the pump.

Fig. 4 is a cross-sectional view of the nozzle for the fire extinguishing device shown as used for discharging a continuous stream of liquid.

Fig. 5 is a cross-sectional view of the nozzle shown as used for breaking the stream of liquid into a fine mist.

Fig. 6 is a partial cross-sectional view of the foot valve for the pump showing the piston rings in elevation.

Fig. 7 is a cross-sectional view of the pump rod guide bushing taken along line 7—7 of Fig. 1.

Fig. 8 is a cross-sectional view of a pump guide bushing taken along line 8—8 of Fig. 7.

This invention relates to a fire extinguishing apparatus that is provided with a hand operated pump for discharging a stream of liquid under pressure. The apparatus is of the type known as a tank type fire extinguisher that is self-contained in that the supply tank, the pump, and the discharge hose are constructed and arranged

as a unit. More particularly, the apparatus is of the type adapted to be placed upon the floor or other solid support and held in position by a foot clamp or pedal so that the pump on the device can be operated by a single person. While the invention described herein refers to a particular type of fire extinguishing device, yet it is understood that various features of construction shown and described in the apparatus can be used in fire extinguishing devices of other types. The various structural features can be used in the small hand type of fire extinguisher as well as in the tank type herein disclosed.

In this invention the fire extinguisher consists of a supply tank 10 having a bottom wall 11 and a top wall 12. The bottom wall 11 is provided with an annular flange 13 that is disposed against the supply tank 10, and the bottom edge of the tank 10 is formed over the flange 13 to seal the bottom wall to the tank wall 10. The top wall 12 is provided with an annular flange 14 that engages the tank wall 10 and is spot welded thereto. An annular ring 15 is disposed about the tank wall 10 adjacent the bottom end thereof and is suitably secured to the tank wall by means of spot welding. A bracket 16 extends outwardly from the annular ring 15 and is provided with a foot pedal 17 hinged to the bracket 16.

The top wall 12 is provided with an opening 18 through which a pump 20 extends. A second opening 21 is provided in the top wall 12 that provides a filling opening for the tank 10 and is closed by means of a cover 22 that is hinged upon the pair of upwardly turned legs 23.

The pump 20 consists of an outer cylinder 24 that provides the pumping cylinder. The lower end of this cylinder is provided with a check valve that consists of a valve seat member 26 threaded into a valve retaining member 27. The lower end of the cylinder 24 is provided with an inwardly turned flange 28 that is clamped between the valve seat member 26 and the valve retaining member 27. A wire cage 29 is attached to the valve seat member 26 and retains a ball check 30 in position upon the valve seat member 26. The valve seat member 26 is provided with an opening 31 through which liquid can pass and the valve retaining member 27 is provided with openings 32 to permit flow of liquid from the interior of the supply tank 10, through the valve seat member 26 and into the cylinder 24.

The valve seat member 26 and the valve retaining member 27 are constructed from a plastics material which can be either of the thermoplastic or thermo-setting types. These members can be suitably injection or compression molded so that their method of manufacture eliminates the necessity for any subsequent finishing of the elements. Also the plastic materials have sufficient resiliency that the cylinder 24 can be clamped therebetween without chipping the porcelain enamel with which the cylinder 24 is coated. The ball check 30 is a glass ball member that can be suitably finished at the time of its manufacture thereby eliminating any subsequent finishing of this item. The accuracy of manufacture of the ball check 30 and the valve seat member 26 is sufficient to provide a seat check valve merely by assembling the various parts without any finishing after their manufacture.

The pump 20 is also provided with an inner piston rod 33. This piston rod is in the form of a cylinder, and has a foot valve 35 disposed in

the lower end of the cylinder. The foot valve consists of a valve seat member 36 having a flange 37 on the upper end thereof adapted to engage an inwardly turned annular flange 38 provided on the lower end of the inner cylinder 33. A valve retaining member 39 is adapted to extend over the valve seat member 36 and has a recess 39a therein adapted to engage the outer surface of the annular flange 38 on the inner cylinder 33. The valve seat member 36 extends below the valve retaining member 39 and is provided with a threaded portion 40 that receives a nut 41 adapted to engage the valve retaining member 39 to clamp the annular flange 38 between the valve seat member 36 and the valve retaining member 39. A central opening 42 is provided through the valve seat member 36 and is adapted to be closed by a ball valve 43. A wire cage 44 is carried by the valve seat member 36 for retaining the ball valve 43 in position adjacent the passage 42.

The valve retaining member 39 is provided with a recess 45 adapted to receive piston rings 46 that are retained in position by means of the nut 41 when threaded upon the valve seat member 36. Each of the piston rings 46 is provided with an angularly disposed slot 47 extending from the top face to the bottom face of the piston ring (see Figure 6). The piston rings 46 are contracted slightly when placed within the outer cylinder 24 so that they frictionally engage the inner surface of the outer cylinder. These rings are therefore constructed somewhat in the same manner and function like the piston rings of an automotive cylinder. The annular grooves 47 are disposed out of alignment with one another to prevent any direct passage of fluid from the chamber below the foot valve 35 to the discharge chamber 48 provided between the inner and outer cylinders 33 and 24 respectively. The inner cylinder 33 is provided with passages 49 through which liquid flows from the foot valve 35 to the discharge chamber 48.

The valve seat element 36, the valve retaining member 39, the nut 41 and the piston rings 46 are all constructed from a plastics material which may be either a thermo-plastic or a thermo-setting resin. The parts can all be injection or compression molded to their finished dimension and therefore considerably reduce their cost of manufacture. Also the plastic has sufficient resiliency to permit clamping of the flange 38 between the valve seat member 36 and the valve retaining member 39 without chipping the porcelain enamel film that coats the surfaces of the inner cylinder 33.

The piston rings 46, being of a plastics material, have a smooth outer surface that can slide upon the porcelain enamel inner surface of the outer cylinder 24 without damaging the same. The slight contraction of the piston rings 47, when assembled into the cylinder 24, is sufficient to provide a seal against the cylinder wall so that a discharge chamber 50 is provided above the piston rings 46 between the cylinders 24 and 33. The ball valve 43 is constructed from glass in the same manner as the ball check 30.

The upper end, or head, of the outer pump cylinder 24 is provided with an enlarged portion 50 that receives a pair of packing glands 51, constructed from a plastics material, between which packing material 52 is located to seal upon the inner cylinder 33 that extends therethrough. A plastic ring 53 is secured within the upper end of the outer cylinder 24 by means of a bayonet lock. The outer cylinder 24 is provided with a

plurality of inwardly directed depressions 81 that engage a groove 82 in the plastic ring 53. Vertical grooves 84 in the plastic ring 53 permit insertion of the ring in the outer cylinder 24. The ring 53 is then rotated in a clockwise direction as viewed in Fig. 7 to bring the stop sections 85 into engagement with the depressions 81. The vertical grooves 84 are then out of alignment with the depressions 81 and the ring is locked in position. The inner cylinder 33 extends through the ring 53 and has a flange 55 on the upper end thereof confined between a nut 56 and a boss 57 provided on the pump handle 58. A felt washer 59 is disposed upon the inner cylinder 33 between the nut 56 and the ring 53 in the upper end of the outer cylinder 24 to absorb the downward motion of the handle 58 when completing its downward stroke. A rubber plug 60 is provided in the upper end of the inner cylinder 33 to seal the same. A spring 61 is placed between the ring 53 and the upper packing gland 51 to compress the packing material 52 to seal against the inner cylinder 33. A spring 62 is placed around the inner cylinder 33 to absorb the shock at the upper end of the stroke of the cylinder 33.

The pump 20 is inserted through the opening 18 in the top wall 12 of the tank 10 so that a flange 63 secured to the outer cylinder 24 engages the upper surface of the wall 12. The flange 63 is secured to the wall 12 by means of the screws 64. The pump head portion 50 and pump cylinder portions 24 are coated with a thin coating of porcelain enamel and are constructed from a continuous tube which aids the process of porcelain enameling the pump parts, also the use of screws and screw threads have been limited to a minimum to reduce danger of damage to the porcelain enamel surface of the pump tubes.

A discharge connection 65 is provided in the upper end of the outer cylinder 24 and has a hose 66 secured thereto adapted to be wound around the tank 10 when the fire extinguishing device is not in use. A suitable hose clamp 67 retains the free end of the hose against the wall of the tank.

The nozzle 68 for the hose 66 consists of an elongated substantially cylindrical-shaped body having stepped recesses 69 in one end thereof adapted to engage the end of the hose 66 which is clamped thereon by means of a hose clamp 70. A flange 71 limits the movement of the nozzle into the hose 66. A central passage 72 is provided through the nozzle 66 through which liquid is discharged.

A close wound spring 73 is adapted to be positioned around the nozzle projection 74 and has one end thereof engaging a recess 75 to retain the spring in position upon the nozzle projection 74. The forward end 76 of the closed spring is provided with a decreasing taper to gradually close the end of the spring, but leaving a central opening 77 through which the stream of liquid from the nozzle projection 74 can be discharged without interference when the spring 73 is in co-axial alignment with the nozzle projection 74 as shown in Fig. 4.

When the liquid discharges from the nozzle in the manner shown in Fig. 4, it can be used to extinguish ordinary fires. In Fig. 5, however, the taper or conical end 76 of the spring 73 is shown in a deflected position so that the axis of the taper or cone is not co-axial with the axis of the nozzle projection 74, whereby the stream of liquid discharging from the passage 72 will strike

the inner surface of the spring 73 and be deflected to break the stream into a fine mist. When the stream is thus broken it can be used for extinguishing high temperature fires such as that resulting from the burning of chemicals and metals such as magnesium and thermite.

The operation of the device is such that when the inner cylinder 33 of the pump 20 is moved upwardly liquid trapped within the pumping chamber 48 will be discharged through the discharge connection 65 and the hose 66. During this portion of the stroke liquid will be drawn within the outer cylinder 24 below the foot valve 35 through the ball check 30 thus filling the chamber. On the downward stroke of the inner cylinder 33 liquid below the foot valve 35 will be forced through the foot valve into the interior of the inner cylinder 33, which normally stands full of liquid, so that the liquid entering the cylinder 33 will pass through the openings 49 into the discharge chamber 48 thereby causing liquid in the chamber 48 to be discharged through the discharge connection 65. It will thus be seen that the pump will produce a continuous flow of liquid through the hose 66 and the nozzle for the same. An opening 80 is provided in the upper end of the outer cylinder 24 to prevent syphoning of the liquid from the tank 10 should the hose 66 be positioned below the level of the tank.

Suitable handles 77 are provided for carrying the device from place to place.

While the device disclosed and described herein is a preferred form of the invention, yet it is to be understood that the structure of the apparatus is capable of modification without departing from the spirit of the invention, and that all such modifications as fall within the scope of the appended claims are intended to be included herein. This application is a division of my co-pending application Serial No. 444,688, filed May 17, 1942.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A piston type pump for a fire extinguishing apparatus including a pump cylinder having a porcelain enamel film upon the wall surfaces thereof, and a piston disposed within said cylinder for reciprocation therein, said piston having piston rings engaging the porcelain enamel film on said cylinder wall, said piston rings being constructed from plastics material.

2. A piston type pump for a fire extinguishing apparatus including a pump cylinder having a porcelain enamel film upon the wall surfaces thereof, and a piston disposed within said cylinder for reciprocation therein, said piston having piston rings engaging the porcelain enamel film on said cylinder wall, said piston rings having an angularly disposed slot therein extending from the top to the bottom surfaces thereof whereby said rings frictionally engage the porcelain enamel surface of said cylinder, said piston rings being constructed from plastics material.

3. A piston pump for a fire extinguishing apparatus including a pump cylinder having a porcelain enamel film on the surfaces thereof, a check valve disposed within an end of said cylinder having the parts thereof constructed from plastics material so that said check valve can be clamped directly to the porcelain enamel surface of said cylinder without causing chipping of the porcelain enamel, a piston within said cylinder having expansible piston rings thereon to engage the surface of said cylinder, said piston

rings being constructed from plastics material to prevent scoring of the porcelain enamel finish on said cylinder.

4. A piston pump for a fire extinguishing apparatus including a pump cylinder having a porcelain enamel film on the surfaces thereof, a check valve disposed within an end of said cylinder having the parts thereof constructed from plastics material so that said check valve can be clamped directly to the porcelain enamel surface of said cylinder without causing chipping of the porcelain enamel, a piston within said cylinder having expandible piston rings thereon to engage the surface of said cylinder, said piston rings being constructed from plastics material to prevent scoring of the porcelain enamel finish on said cylinder, said piston having a passage there-through for interconnecting the space below said piston in said cylinder with the space above said piston in said cylinder, and a glass ball valve seating upon said passage to close the same and thus provide a foot valve in said piston for said pump.

5. A combination foot valve and piston for a piston type pump for use in a fire extinguishing apparatus and adapted to be secured to the end of a porcelain enameled pump rod that is in the form of a hollow cylinder which consists of, a plastics body having a flange on one end thereof adapted to engage an inner wall of the pump rod cylinder and having a threaded portion on the opposite end thereof, a liquid flow passage through said body, a valve for closing said passage, a second plastics body adapted to be disposed upon said first body and engage the outer surface of the pump rod cylinder, a recess in said second body to receive plastic piston rings, and a plastic nut threaded upon said first body for clamping said first body and said second body to the pump rod cylinder and for retaining said piston rings in said recess.

6. A suction valve for a piston type pump adapted for use in a fire extinguishing apparatus wherein the pump cylinder of the pump is coated with a porcelain enamel finish including, a plastic body having a flange on one end thereof adapted to engage an end wall of the pump cylinder, a passage through said body, a valve closing said passage, said body having threads on a portion thereof, a second plastic body adapted to be threaded upon said first body to engage the wall of the pump cylinder and thereby clamp the wall between said plastic bodies.

7. In a piston pump the combination which includes, a pump cylinder, a pump rod positioned within said cylinder, said cylinder and said rod being coated with porcelain enamel, and a seal member disposed between said rod and said cylinder including seal glands engaging said cylinder and rod and constructed from plastics material, whereby the gland members can directly engage the porcelain enameled surfaces without chipping the same.

8. In a piston pump the combination which includes, a pump cylinder, a pump rod positioned within said cylinder and adapted to be reciprocated therein, said rod and said cylinder having a film of porcelain enamel thereon, and a guide bushing for said pump rod and in which it reciprocates disposed between said rod and said cylinder constructed from plastics material to prevent scoring of the porcelain enameled surface upon said rod upon reciprocation thereof.

9. In a piston pump the combination which includes, a pump cylinder, a pump rod positioned within said cylinder, said rod and said cylinder having a film of porcelain enamel thereon, a foot valve including means for engaging the surface of said rod for securing the same thereto, a suction valve including means for engaging the surface of said cylinder for securing the same thereto, said foot valve and said suction valve having at least the securing means thereof constructed from plastics material to permit their attachment directly to the porcelain enameled surfaces of said rod and said cylinder without danger of chipping the same.

10. In a piston pump, a tube forming a pump cylinder, said tube having an enlarged portion at one end thereof to receive a gland packing member, inwardly formed depressions in the edge of said enlarged portion of said cylinder adapted to provide the locking members for a bayonet lock of a guide bushing adapted to be positioned within the end of said enlarged portion, and a porcelain enameled film covering the entire surface of said cylinder.

11. In a piston pump, a pump cylinder coated with porcelain enamel and having a flange on one end thereof and an enlarged chamber in the opposite end thereof with inwardly turned depressions in the edge of said enlarged chamber, a pump rod in the form of a hollow cylinder coated with porcelain enamel and having a flange on one end thereof, the suction valve for said pump cylinder made from a plastics material and adapted to clamp upon the flange of said pump cylinder to secure said suction valve in the end of said cylinder, a foot valve for said pump rod made from a plastics material and adapted to clamp upon the flange of said pump rod to secure said foot valve thereto, a seal between said pump rod and said cylinder within said enlarged chamber having packing glands made from a plastics material and adapted to be frictionally retained in position to seal therebetween, and a pump rod guide bushing made from a plastics material secured within said enlarged chamber by means of said inwardly turned depressions by a bayonet lock arrangement, whereby said pump is constructed so that the use of screw and screw threads are eliminated in assembling the elements of said pump.

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