995,978.

H. M. McCASLIN.

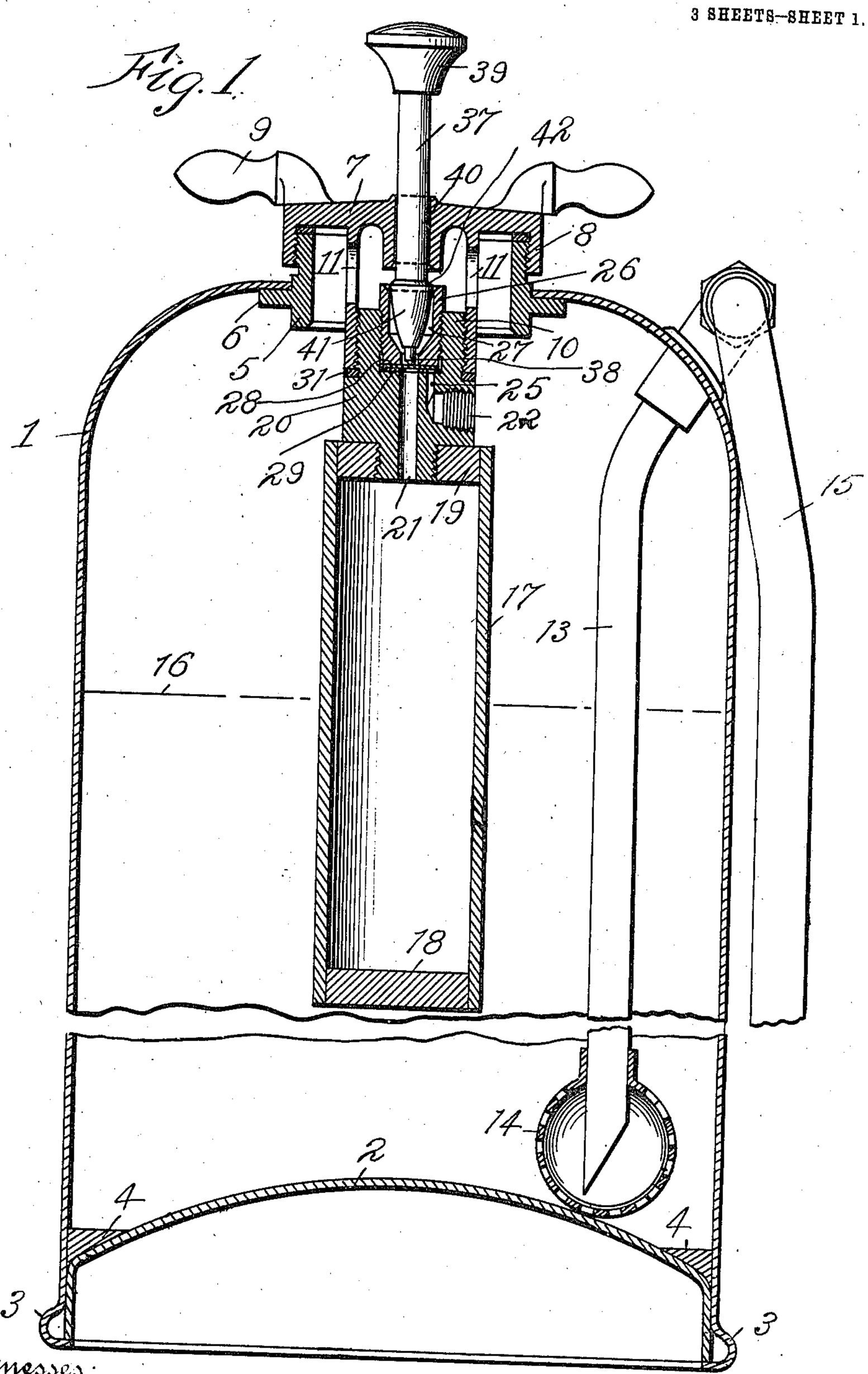
FIRE EXTINGUISHING APPARATUS.

APPLICATION FILED FEB. 21, 1908.

Patented June 20, 1911.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

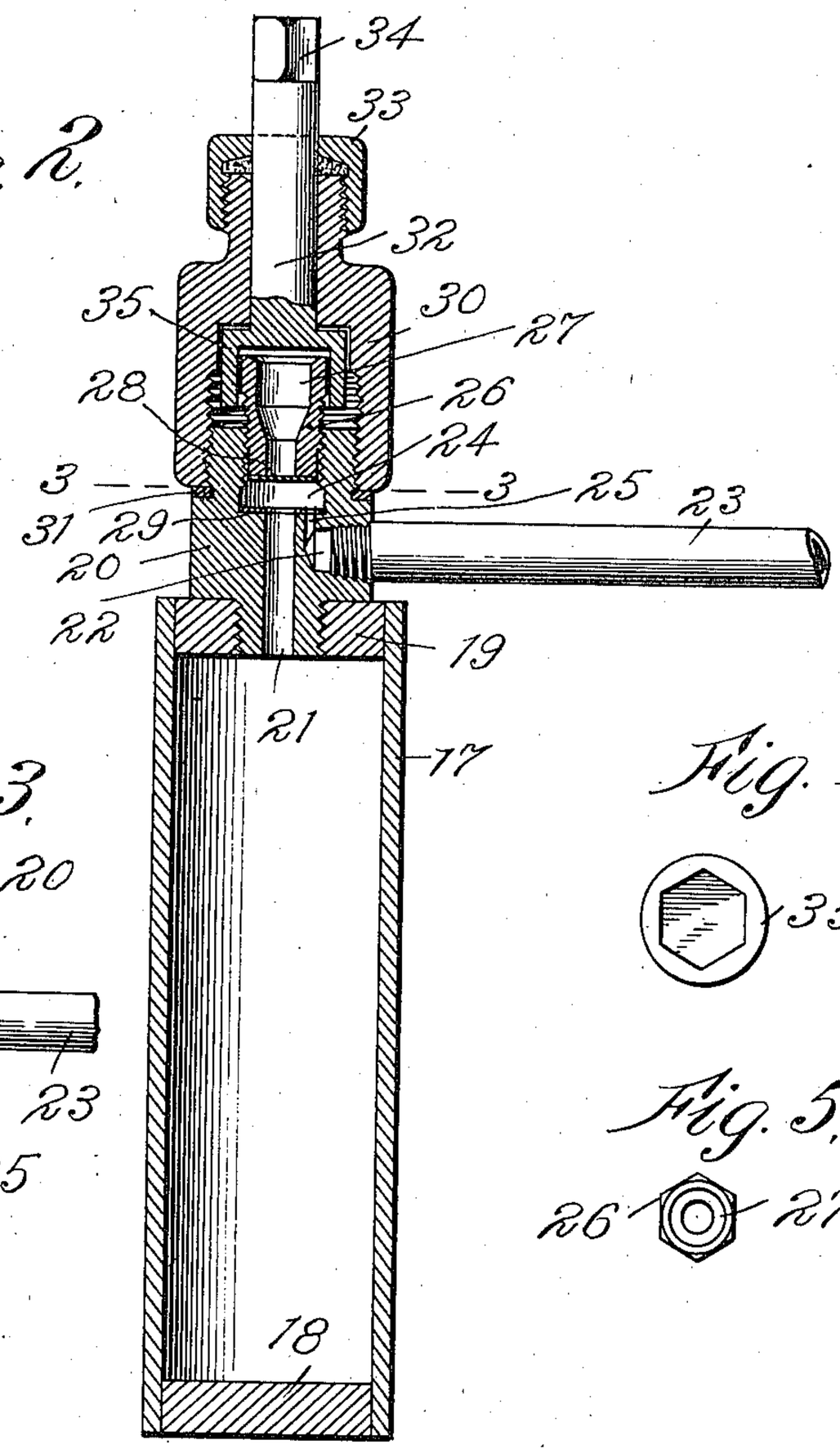

Fig. 3.

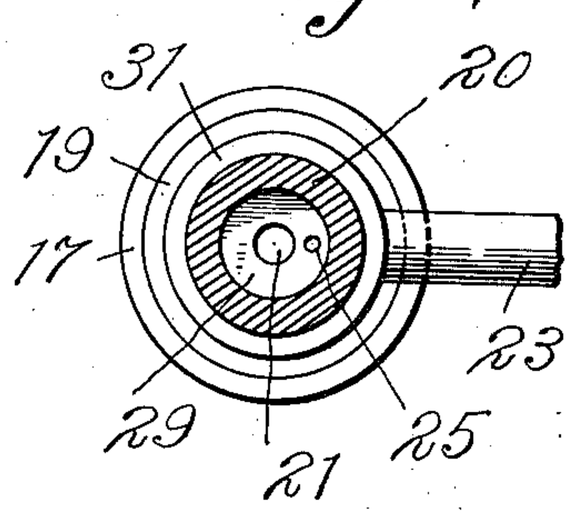

Fig. 4.

Fig. 5.

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3 SHEETS—SHEET 3.

Fig. 6.

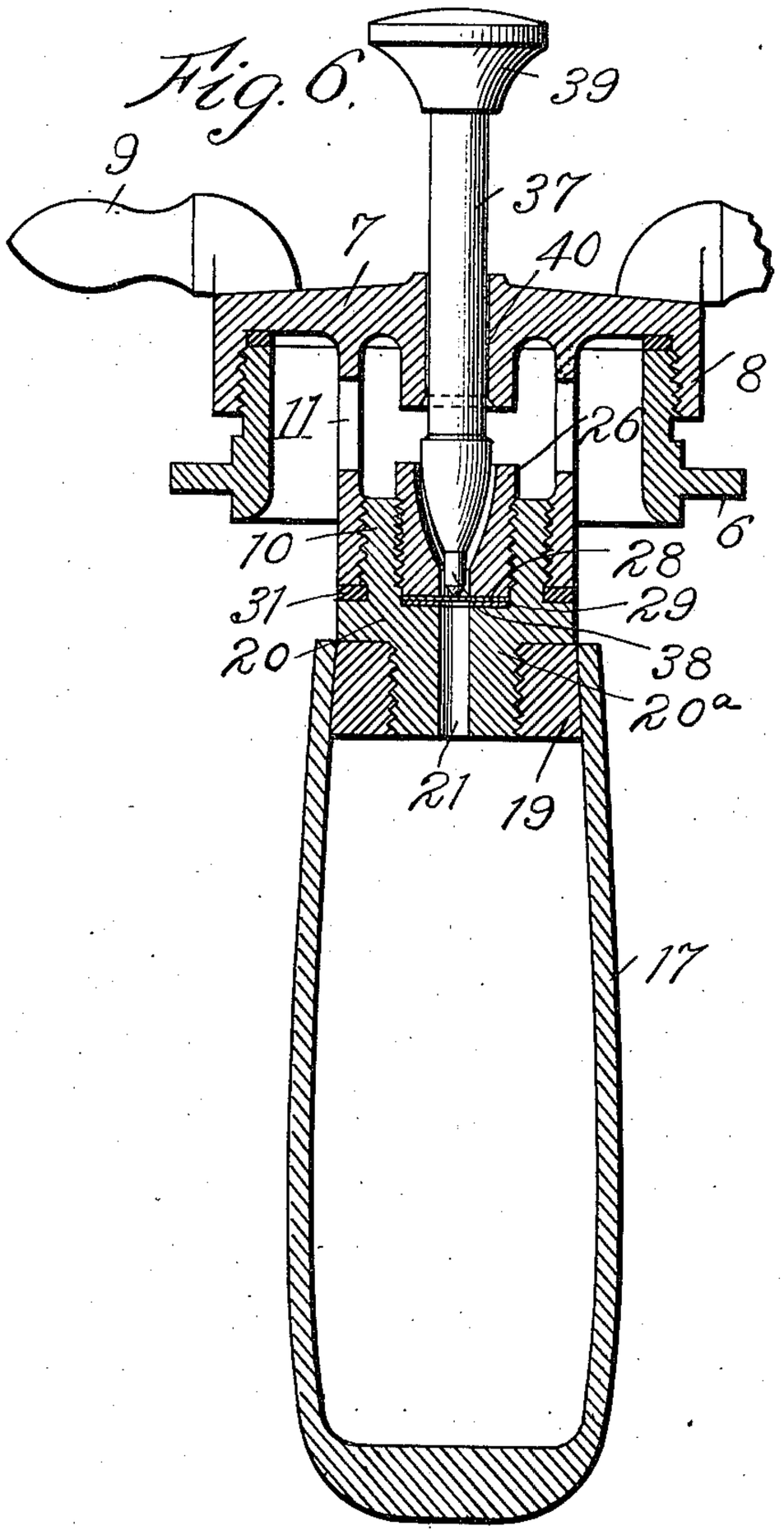

Fig. 7.

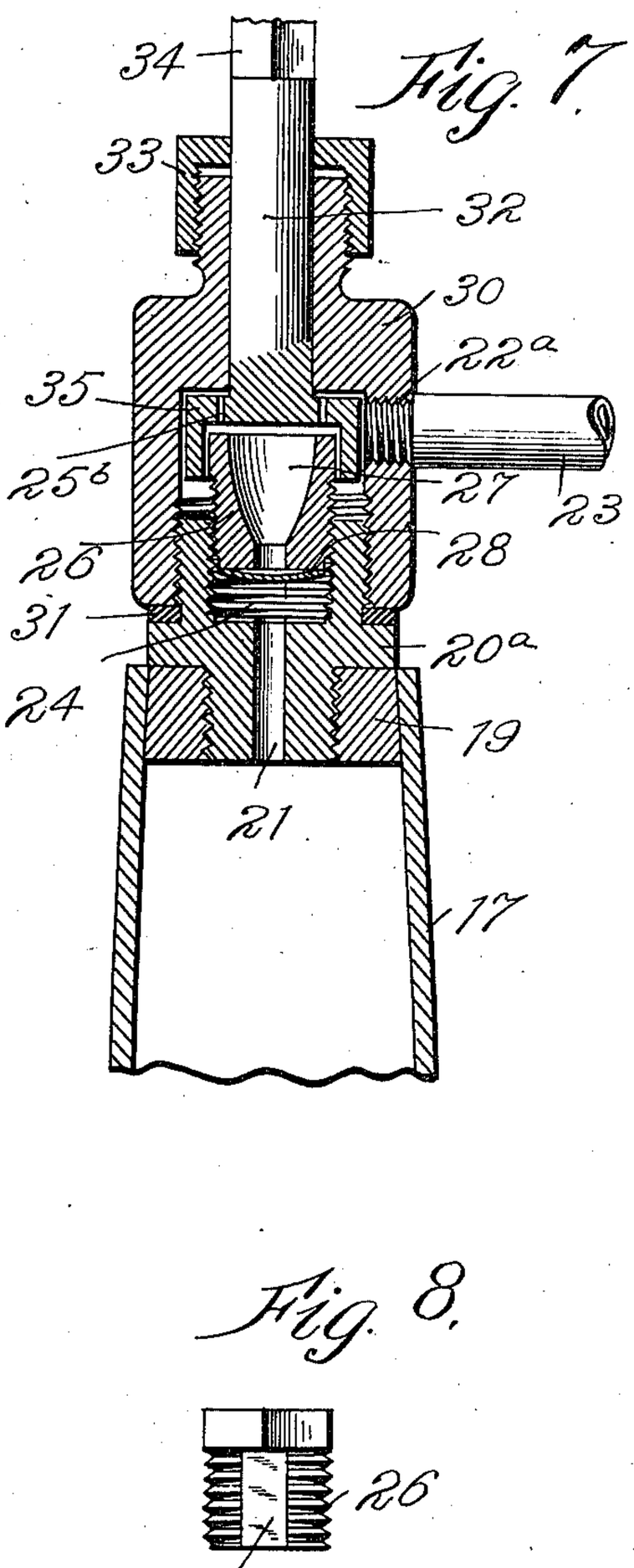

Fig. 8.

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UNITED STATES PATENT OFFICE.

HARRY M. McCASLIN, OF ELMIRA, NEW YORK, ASSIGNOR TO AMERICAN-LA FRANCE FIRE ENGINE COMPANY, OF ELMIRA, NEW YORK, A CORPORATION OF NEW YORK.

FIRE-EXTINGUISHING APPARATUS.

995,978. Specification of Letters Patent. Patented June 20, 1911.

Application filed February 21, 1908. Serial No. 417,150.

To all whom it may concern:

Be it known that I, HARRY M. MCCASLIN, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Fire-Extinguishing Apparatus, of which the following is a specification.

My invention, while in some of its features as hereinafter described and claimed, of broader application, primarily relates to that class of fire extinguishers which employ as the extinguishing fluid some solution which does not freeze at any ordinary natural temperature and which solutions have accordingly come to be recognized and designated, by those skilled in this art, as non-freezing liquids, the object being to provide apparatus which will not be affected by natural temperature changes, nor subject to loss of pressure, nor to deterioration by corroding action, and particularly which is so secure and positive in operation as to be susceptible of use in locations where the conditions are particularly adverse as, for example, on railway cars and in other places where jar and shock are apt to disarrange the mechanism.

My invention consists in the several matters set forth in the appended claims and will first be fully described with reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation of a fire extinguisher embodying my invention, a part of the extinguisher being broken away; and one form of the cartridge containing fluid gaseous at atmospheric temperatures and pressures, being shown in position; Fig. 2 is a sectional elevation illustrating the cartridge applied to the devices for charging it; Fig. 3 is a horizontal sectional view taken on the line 3—3, Fig. 2; Fig. 4 is an underside view of the operating stem shown in Fig. 2; Fig. 5 is a top view of the sealing nut; Fig. 6 is a sectional elevation of the preferred form of the cartridge for containing fluid gaseous at atmospheric pressures and temperatures, and also showing adjacent parts of the extinguisher top; Fig. 7 is a sectional elevation illustrating the upper part of this form of cartridge and the charging devices; and Fig. 8 is a side view of the sealing nut preferably used with this form of the invention.

Referring to the liquid-container: the shell or cylinder 1 of the extinguisher may be of any usual or preferred construction, but is preferably, as shown, constructed from drawn seamless tubing, closed at bottom by flanged and dished head 2, secured in place by beading 3, and reinforced with solder at 4. At top, the cylinder has an externally screw threaded neck or collar 5, deeply flanged at 6 under the edges of the shell, and secured by brazing or otherwise. The cylinder head or cover 7 has the internally screw threaded flange 8 engaging the collar 5, the handles 9 enabling the head to be turned on and off, and an internally screw threaded neck 10 provided with gas passages 11 communicating from the interior of said neck to the interior of the collar 5, and so to the upper or pressure area 12 of the extinguisher cylinder. Also attached to the shell 1 is the discharge pipe 13 extending substantially to the bottom of the cylinder and there provided preferably with a strainer 14, while exterior to the cylinder there is connected to the pipe 13 the usual flexible hose 15 having preferably the customary discharge nozzle (not shown).

The cylinder 1 is to be filled substantially to the level of the mark 16 with a suitable fire extinguishing fluid, preferably a solution which remains fluid under any ordinarily occurring low temperature, especially one containing materials readily obtainable in the most out-of-the-way places, for example a solution of calcium chlorid in water, which has in itself valuable fire extinguishing qualities. A disadvantage heretofore inherent in apparatus employing such non-freezing solutions has been the tendency to form insoluble salts due to the chemical action taking place when the contents of the extinguisher were commingled to produce the discharging pressure, the result of the formation of such salts being a fouling of the extinguisher and its discharge pipe and consequent interference with that certainty of operation which is necessary to suit the exigent requirements of underwriters.

Referring now to the pressure supplying means: this part of my improvements is directed to the provision of means for supplying pressure, which means shall be inert to the extinguisher solution, constant and unaffected materially by temperature changes. To this end I employ in connection with a container for such a non-freezing fluid as

described above, a flask or cartridge containing a substance of low boiling point inert to the said fluid and placed in the cartridge in liquid or highly compressed form. Preferably carbonic acid is used on account of its combination of inert fire extinguishing qualities and low boiling point. This fluid, gaseous at atmospheric temperatures and pressures, may be stored in liquid form in a relatively small cartridge or flask in sufficient quantity to produce even at abnormally low natural temperatures substantially constant pressure for the expulsion with great force of the contained extinguisher fluid until the complete evacuation of the extinguisher is reached. The cartridge must be of sufficient strength to resist the bursting strain of such confined body of fluid under the greatest variations of temperature, whether due to natural causes or the proximity of flame, and should also have, as a safety device, means for gradually letting off the pressure should unsafe limits be reached, and preventing the destructive bursting of the cartridge. The cartridge is shown at 17, of cylindrical form and consisting of a drawn steel tubing, permanently sealed at the bottom as by means of the welded bottom disk 18. A centrally apertured disk 19 is fastened to the upper end of the cylinder and is centrally screw threaded to receive a neck 20 having the central supply and discharge orifice 21. In the side of the neck 20 is a charging socket 22, screw threaded to receive the charging pipe 23 (see Fig. 2), which may be connected to a supply of carbonic acid under high pressure. Central of the neck 20 is a chamber 24 communicating with the socket 22 as most clearly appears in Fig. 2. It will be most convenient to first describe the means of charging the cartridge. When a cartridge is to be charged, the socket of the neck 20 is screwed upon the end of charging pipe 23, bringing the socket in communication through the passages 25, 24, 21, with the interior of the cartridge. A sealing nut 26 is screwed into the internal screw thread of the upper end of the neck 20 and has attached to its lower end and sealing its axial chamber 27 a brass disk or diaphragm 28. It will be seen that when this sealing nut is in the upper position shown in Fig. 2, the chamber 24 is open to both the passages 25 and 21 and the charging pipe 23 is thus in communication with the cartridge, but when the sealing nut is screwed down as shown in Fig. 1, the sealing disk 28 covers both of the passages 25, 21, and effectually seals the cartridge. An annular lead gasket 29 placed on the bottom of the chamber 24 with apertures in the line of the passages 25, 21, perfects the sealing action of the disk 28 when the sealing nut is down. I do not, however, depend entirely upon the sealing nut 26 and disk 28 when filling or charging the cartridge, but by preference attach to the neck a filling cap 30 having the internal screw thread engaging an external thread on the neck 20, and seating when screwed down tight, against a lead gasket 31, interposed between its lower edge and a shoulder on the said neck. An operating stem 32 extends axially through the filling cap and through a stuffing box 33 thereon, and is provided at its upper end with a nut or paned surface 34, and at its lower end within the chambered portion of the cap with a head 35, fitted to engage rectangular or otherwise paned exterior of the sealing nut 26. When the filling cap is applied to the neck of the cartridge and the latter screwed upon the filling pipe 23, the operating stem 34 is turned to raise the sealing nut 26 to the position shown in Fig. 2, thus opening the communication between the pipe 23 and the cartridge and carbonic acid gas under suitable pressure is supplied thereto under control of any usual or preferred valve mechanism. When a sufficient quantity of carbonic acid in compressed or liquid form has entered the cartridge, the supply is stopped, the stem 32 is turned in reverse direction, the sealing nut turned down so as to force the sealing disk 28 tightly against the upper ends of passages 25, 21, and the filling cap and stem may now be removed and the cartridge removed from the filling pipe 23, leaving the cartridge thoroughly sealed and in form suitable for use or shipment.

In Fig. 1 the cartridge is shown applied to the extinguisher for use. Before the head or cover 7 is applied to the extinguisher, the neck 20 of the cartridge is screwed within the neck 10 of said head, in which position the lower end of a sliding stem 37 engages within the chamber 27 of the sealing nut, bringing the teat 38 on its lower end immediately above the sealing disk 28. The stem 37 has a head 39 with a sufficiently broad upper surface to enable it to be struck sharply by the hand without discomfort when its lower end is to be used for perforating the disk. The stem has a sufficiently loose fit in the axial opening 40 of the head 7 to enable gradual changes of pressure occurring in the extinguisher to communicate with sufficient freedom through said axial seat, and thus prevent that gradual evacuation, or "siphoning" of the extinguisher which would be caused by repeated changes of pressure of the confined air in the extinguisher due to temperature changes. The stem has the enlarged portion 41 immediately above the teat 38 substantially filling the cross sectional area of the chamber 27 so that when the stem has been struck smartly down and the disk 28 perforated and the confined gas within the cartridge forces its way up through the aperture in

the disk and against the lower end of the stem and the tapered lower surface of the enlargement 41, the stem will be thrown up to clear the teat 38 from the sealing disk and force the upper or shouldered surface 42 of the enlargement 41 against the lower end of the axial seat 40. The engaging surfaces of the shoulder 42 and the lower end of axial seat 40 are preferably made with a ground joint so that at this point the extinguisher is effectually sealed to prevent the escape of the confined pressure, which is all thus directed to operation on the surface of the extinguisher fluid, which is forced downward in the extinguisher out through the strainer 14 and tubes 13, 15, and all under sufficient control by reason of the small area of the opening which has been made in the sealing disk to prevent the development of abnormal pressures within the extinguisher at any time. The enlargement or head 41 serves, it will be seen, the double purpose of sealing the passage around the stem 37 and preventing the stem from being forced out through the head when the pressure of carbonic acid is released into the outer cylinder.

It will be seen that the apparatus explained is capable of subjection to the highest tests to obtain a sufficient safety factor, to which end the cartridge, after assembling and attachment of the neck, is subjected in practice to a heavy hydrostatic pressure of say six thousand pounds to the square inch. When the sealing nut with the disk seal has been introduced, they are tested to a hydrostatic pressure of say thirty-five hundred pounds, the purpose being to have the sealing disk set at such strength as to yield first to undue expansion and corresponding high pressure within the cartridge so as to allow the gradual escape of the contained pressure within the cartridge and avoid a rupture of the main body thereof which might be dangerous. The disk seal, therefore, acts as a safety blow-out, as a permanent seal, as a temporary seal during charging, and as a means for gradually letting off the pressure into the extinguisher when the latter is put in use.

In a preferred embodiment of my invention shown in Figs. 6, 7, and 8, the transfer of the filling socket from the cartridge neck to the filling cap, enables the shortening of the neck and the simplifying of its construction somewhat. As shown here, the cartridge neck 20^a is made without a filling socket and shortened in height. This construction does away with the port 25. The socket 22^a is made in the filling cap 30, (see Fig. 7), and when the filling pipe 23 is connected thereto and the pressure turned on to fill the cartridge, the fluid finds its way from the interior of the cap 30 down between the outer walls of nut 26 and the inner face of its seat in the neck 20^a—the outer wall of the nut being to this end preferably made with one or more paned surfaces or ports 25^a (Fig. 8), to permit the passage of the fluid from the upper part of the filling cap to the chamber 24 within the neck 20^a below the diaphragm 28, and thence to the interior of the cartridge. Furthermore, the diaphragm being only attached at one point, (or at two diametrically opposite points), by a drop of solder, to the under surface of the nut 28, it will readily permit the fluid to pass downward by bowing as shown in Fig. 7, while the filling is going on, and thus enables the fluid, which reaches the chamber 27 of the nut by passing through the loose fit between the head of the nut 26 and the wrench head 35 of the filling stem 32, to pass on to the cartridge. Further free passage of the fluid to the interior of chamber 27 is preferably supplied by apertures 25^b through the wrench head 35. It will be apparent that while I prefer to use all of the devices shown for insuring the passage of fluid from the interior of the cap, to the interior of the container 17, some may be used without the others. With this form of the invention, the operation of filling and sealing the cartridge is performed in the same way as with that first described, but it will be seen that when the sealing nut is turned down it only seals the one passage—viz., that leading into the cartridge body. A considerable saving of cost and additional simplicity of construction and certainty of operation are effected by putting the filling connection only on the relatively few filling caps at the charging station instead of on all the cartridges sent out with individual extinguishers.

While I have shown and described certain forms of my invention, it is obvious that the same may be modified in many ways without departing from the essential principles thereof which are set forth in the appended claims.

What I claim is:

1. In apparatus of the character described, the combination with a container for liquid extinguisher, of a container for fluid gaseous at atmospheric temperatures and pressures having a gas passage, a sealing diaphragm for said passage, a chambered body above the diaphragm, and a puncturing member slidingly supported in said chambered body so as to be operated upon by the escaping gas.

2. In apparatus of the character described, the combination with a container for liquid extinguisher, of a container for fluid gaseous at atmospheric temperatures and pressures having a gas passage, a sealing diaphragm for said passage, a chambered body above the diaphragm, and a puncturing member having a head or enlargement slidably supported in said chambered body so as to be operated upon by the escaping gas.

3. In apparatus of the character described, the outer container for extinguisher fluid, the container for fluid under high pressure, having a sealed discharging passage for said fluid and an operating member for the seal in said passage, said member loosely supported in and passing through the outer container, whereby pressure in the outer container is equalized with the atmospheric pressure and siphoning prevented.

4. In apparatus of the character described, the combination with a container for liquid extinguisher, of a container for fluid gaseous at atmospheric temperatures and pressures having a gas passage, a sealing diaphragm for said passage, a chambered body above the diaphragm, and a puncturing member having a head or enlargement slidably supported in said chambered body so as to be operated upon by the escaping gas, the puncturing member being loosely seated in the container for liquid extinguisher and its head or enlargement having tight fitting engagement with the inner end of said seat when the head is raised.

5. In apparatus of the character described, the combination with a container for extinguisher liquid, having a removable head provided with a cartridge support and a slidable puncturing stem, of a container for fluid gaseous at atmospheric temperatures and pressures having a neck, provided with a chamber open exteriorly and connected to the interior of the container; and a chambered sealing nut and diaphragm in said neck chamber,—the puncturing stem supported to engage in the chamber of the sealing nut in proximity to the sealing diaphragm.

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