

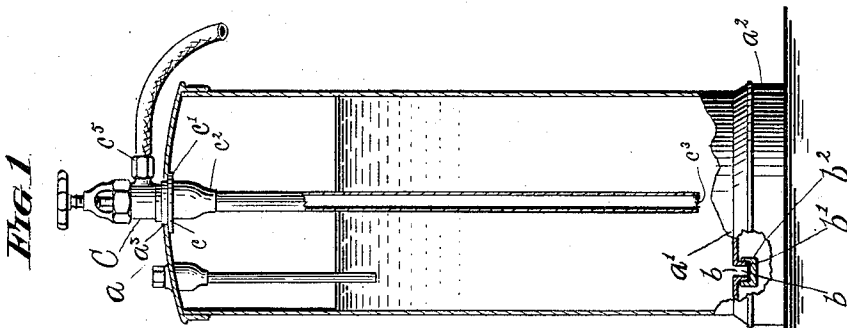
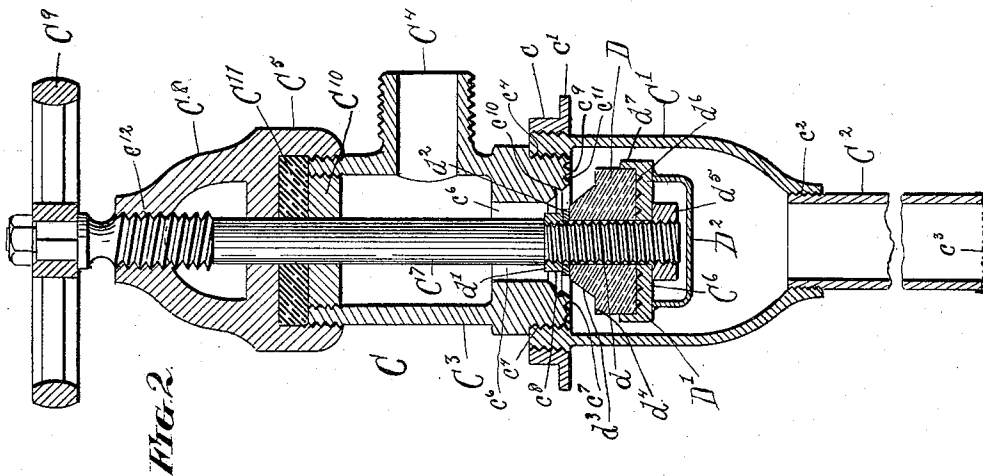
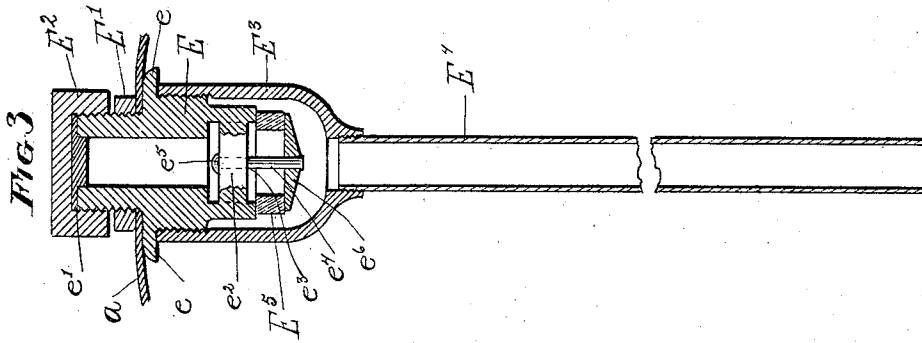
No. 607,591.

Patented July 19, 1898.

J. M. MILLER.  
FIRE EXTINGUISHER.

(Application filed May 20, 1897.)

(No Model.)



Witnesses  
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# UNITED STATES PATENT OFFICE.

JOSEPH M. MILLER, OF CHICAGO, ILLINOIS.

## FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 607,591, dated July 19, 1898.

Application filed May 20, 1897. Serial No. 637,471. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH M. MILLER, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fire-Extinguishers, of which the following is a specification.

This invention relates to improvements in fire-extinguishers, and refers more particularly to extinguishers of that class in which the apparatus consists of a portable receptacle charged with a suitable extinguishing liquid and gas under pressure ready to be brought into instant use when required.

The object of the invention is to provide improvements in the construction and arrangement of the several parts of a device of the character described whereby a more reliable, efficient, and convenient apparatus is provided at a minimum cost of manufacture.

To this end the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

The invention embraces also a valve of novel and improved construction, the parts of which are so arranged and designed as to render it more effective, reliable, and durable than those heretofore in use for the same or analogous purposes.

The invention will be readily understood from the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, with parts in axial section, of an apparatus embodying my invention. Fig. 2 is an axial sectional view, enlarged, of the valve controlling the discharge-outlet. Fig. 3 is a similar view of the valve controlling the air or gas charging inlet.

An apparatus embodying my invention comprises a receptacle of suitable form for convenient handling or transportation which is in part filled with a chemical fire-extinguishing liquid and its remaining space occupied by air or gas charged under sufficiently high pressure to drive the liquid out in the form of a jet or stream which may be directed upon the fire when the discharge-outlet is opened.

Referring to said drawings, A designates as a whole a receptacle adapted to contain liquid and air under pressure, shown in the present

instance as made of cylindric form and provided with a slightly convex upper end or cover *a* and with a flat bottom or lower end wall *a'*, surrounded by a depending base or supporting-flange *a''*; but it will be obvious that the exact form of the receptacle is immaterial so long as it be a suitable one for the use intended.

In the bottom end wall is provided a filling-aperture *b*, through which the liquid is charged into the vessel, said aperture being conveniently, and as shown in the present instance, formed through a nipple *b'*, seated in said end wall, and the projecting end of which is screw-threaded and covered with a screw-cap *b''*. After charging the receptacle with liquid the screw-cap will be soldered or cemented in place to insure a permanently-hermetical joint.

In the upper end wall or cover *a*, preferably at the center thereof, is arranged a valve (designated as a whole by C) forming the discharge-outlet of the extinguisher. Describing said valve in detail, *c* designates a seating ring suitably secured permanently in the aperture *a''* of the cover, said ring being provided with a radially-outturned flange *c'*, which underlies the margin of the aperture, so as to insure a sufficiently strong union of said parts to withstand the internal pressure. The ring *c* is internally threaded to receive the upper end of a cylindric valve-casing *C'*, which depends within the receptacle, the lower end of said casing being contracted and internally screw-threaded, as indicated at *c''*, to receive the upper end of an uptake-pipe *C''*, which extends downwardly within the receptacle to a point near the bottom thereof, and is preferably provided at its lower end with a screen or strainer *c'''* of wire-gauze or the like. The upper end of the valve-casing is internally threaded and receives the lower end of the correspondingly-threaded valve-body *C'''*, as indicated at *c''''*. Said valve-body is of tubular form, provided at one side at a point intermediate of its length or height with an outlet-nipple *C''''*, suitably threaded or otherwise adapted to receive a hose-coupling *c'''''*, and externally threaded at its upper end to receive an end-closing cap *C''''''*. At its lower end said valve-body is provided with an axi-

ally-arranged somewhat contracted inlet-passage  $c^6$ , surrounded by a valve-seat  $c^7$  of peculiar conformation. That part of said seat immediately surrounding the valve opening or passage is made conical or beveled, as indicated at  $c^8$ , and surrounding this beveled portion is a flat seat portion  $c^9$ , formed at right angles to the axis of the valve. Within the valve-seat are formed a plurality of annular or circumferential grooves or corrugations  $c^{10}$   $c^{11}$ , one or more grooves being preferably provided in each of said seating-surfaces. These grooves are each continuous or circumferentially complete and are shown in the present instance as made of V shape in cross-section and perform an important function in rendering the valve perfectly tight-fitting, as will hereinafter more fully appear. With the valve-seat thus formed is arranged to cooperate a valve plug or disk (designated as a whole by  $C^6$ ) mounted upon the lower end of a valve-stem  $C^7$ , which extends upwardly and centrally through the valve-body and through the upper end-closing cap of the same.

In order to actuate the valve-stem so as to carry the valve-plug to and from its seat, the upper end portion of said stem is screw-threaded, as indicated at  $c^{12}$ , and arranged to extend through a correspondingly-threaded aperture formed in a stirrup or bracket  $C^8$ , which is cast integrally with and rises above the upper end-closing cap of the valve-body, and in order that said stem may be conveniently manipulated it is provided at its upper end with a hand-wheel  $C^9$ , secured rigidly thereon. A suitable gland or stuffing-box is provided where the valve-stem passes through the upper end cap, said stuffing-box being conveniently and as shown in the present instance formed by means of a disk or diaphragm  $C^{10}$ , threaded within the upper end of the valve-body, and a rubber or other suitable packing  $C^{11}$ , interposed between said diaphragm and the inner end wall of the inclosing cap. The outer margin of said packing also extends over the upper end margin of the valve-body, and thus insures a tight joint between the valve-body and end-closing cap.

To next describe the valve-plug in detail, the lower end of the valve-stem is screw-threaded, as indicated at  $d$ , and upon this threaded portion is first placed a threaded ring  $d'$ , which forms an annular shoulder adapted to limit the upper movement of the valve-plug upon the stem. An important feature of the present invention is to provide such a construction in the valve that the valve plug or disk shall be direct seating or, in other words, will be drawn directly against the valve-seat without rotation, notwithstanding the fact that the valve-stem upon which it is mounted is rotated in order to advance it to its seat. To this end an anti-friction-washer  $d^2$  is placed next to the ring  $d'$ , and the valve-plug proper,  $D$ , is provided with an aperture of sufficient size to permit it to move

freely upon the valve-stem and is arranged to bear at its upper end against said anti-friction-washer. The upper face of said valve-plug is provided with a conical portion  $d^3$  and a flat radial portion  $d^4$ , adapted to fit the correspondingly-shaped portions of the valve-seat hereinbefore described. The lower end of the valve-plug, which latter is formed of relatively soft rubber or analogous packing material, is conveniently made flat, and in order to compress or force the plug firmly against the valve-seat a follower or disk-shaped head  $D'$  is mounted loosely upon the valve-stem and is held so as to clamp the valve-plug firmly between itself and the opposing washer by means of a nut  $d^5$ , threaded upon the extreme end of the stem. The inner face of said follower, which impinges against the dial-plug, is also provided with a series of annular grooves or corrugations  $d^6$ , and in order to prevent the valve-plug from being expanded or flattened out radially to an undue extent said follower is provided with an upstanding confining-flange  $d^7$ , which surrounds the valve-plug throughout a portion of the height of the latter. After the several parts of the valve-plug have been assembled upon the valve-stem in the manner hereinbefore described a cap  $D^2$  is soldered upon the lower surface of the follower in such manner as to cover the end of the valve-stem and the nut thereon and form a hermetical closure which will prevent the access of liquid to the interior of the valve-plug.

Referring now to the construction of the air or gas inlet or charging valve, (shown in detail in Fig. 3,)  $E$  indicates a combined nipple and valve-body which is seated in a suitable aperture in the cover of the receptacle, said nipple being provided with a radial flange  $e$ , which underlies the margin of the aperture and between which and an outer clamping-ring  $E'$ , threaded upon the projecting end of the nipple, the portion of said cover surrounding the nipple is clamped. The projecting end of the nipple is provided with a closing screw-cap  $E^2$ , and in order to insure an air-tight joint between the latter and the nipple a packing-disk  $e'$  is arranged within the upper end of the cap and against which the upper end of the nipple impinges when the cap is screwed down.

$E^3$  designates a cylindric valve-casing internally screw-threaded at its upper end and engaged with a correspondingly-threaded portion upon the exterior of the valve-body  $E$ . The lower end of said valve-casing is contracted and internally screw-threaded to receive the end of a pipe  $E^4$ , which extends downwardly to a point below the normal level of the liquid within the receptacle, as indicated clearly in Fig. 1.

$e^2$  designates a bar cast integrally with and arranged to extend horizontally across the passage at the lower end of the valve-body, which bar is provided with an aperture  $e^3$ ,

through which passes a valve-stem  $e^4$ , the size of the aperture being such as to permit the valve-stem to slide easily therein. The upper end of the valve-stem is provided with a suitable head  $e^5$ , which serves to limit the downward movement of the valve-stem, and the latter carries at its lower end a rigid valve-disk or follower  $e^6$ , the upper surface of which is flat and is arranged at some distance from the opposing lower end of the valve-body. Between said valve-disk and said opposing end of the valve-body is arranged a rubber valve-ring  $E^5$ , the vertical thickness of which is such that it will be held compressed to a slight extent when the valve-disk is in the position most remote from the end of the valve-body permitted by the length of the valve-stem.

The operation of the apparatus thus described is as follows: Before charging the receptacle the outlet-valve C will be closed by turning the hand-wheel in the direction to draw the valve-plug upwardly against its seat, (in this instance by turning it to the right.) As the valve-plug reaches and is brought into contact with its seat the conical portion thereof will first serve to center the plug accurately upon its seat, and as soon as it begins to bear with any considerable degree of pressure against the latter the friction between the seat and rubber plug will be greater than that between the washer and holding-ring at one side of the plug and follower and nut at the opposite side of the plug, and the latter will therefore cease rotating and be thereafter drawn directly against the seat. The continued upward movement of the conical part of the plug within the correspondingly-shaped portion of the valve-seat will compress said plug radially, so as to cause it to form an air-tight joint around the valve-stem, which passes through it, and will at the same time force the rubber into the corrugations in the seat. The still further movement upward of the follower will carry the flat portion of the plug into contact with the corresponding portion of the valve-seat and cause it to enter the corrugations of the latter, the compression of the plug serving at the same time to cause it to assume the shape of the corrugated inner face of the follower and enter the grooves of the latter. The confining-flange of the follower on the one side and the beveled seat and corrugations in the unbeveled portions of the seat on the other side serve to effectually confine the plug and prevent it from expanding or spreading out unduly under such compression. At the same time the circumferentially-continuous corrugations or grooves enable an air-tight joint to be formed without compressing the plug to such an extent or degree as to permanently injure it and prevent it from resuming its normal form when permitted by the opening of the valve. It is to be noted also in this connection that the internal pressure will tend at all times to

force the valve-plug more firmly against its seat and that inasmuch as the follower is free to move upon the valve-stem and a space is provided between the extreme end of the latter and the sealing-cap  $D^2$  the follower may move up or follow the valve-plug should the latter be compressed to a greater extent by the internal pressure than it had theretofore been by the drawing up of the valve-stem. This is a feature of much importance, inasmuch as it will be obvious that the internal pressure might cause a gradual compression of the plug for a considerable period of time after the receptacle had been charged. The discharge-outlet having been thus properly closed, the receptacle will be inverted and the proper quantity of liquid poured in through the filling-aperture in the bottom end and the closure thereof replaced and sealed. The receptacle will now be again righted, the cap of the air or gas charging inlet removed, and a suitable air or gas pump applied to the nipple. Upon operating the air-pump the air will readily force itself out past the soft rubber, compressing the latter sufficiently to allow it to escape into the valve-casing and thence down through the inlet-pipe. When, however, the pumping ceases, the internal pressure acting upon the valve-disk will cause the latter to compress the rubber valve-ring against the lower end of the valve-body, and thus form a perfect check-valve, preventing the escape of air or liquid, and the greater the internal pressure the more effectual will the valve be. A suitable length of hose provided with any ordinary hose-nozzle having been attached to the nipple of the discharge-valve the apparatus will now be in readiness for operation and may be brought into instant use by simply unscrewing the discharge-valve, whereupon the pressure of the air or gas within the receptacle will force the liquid out until the latter is discharged to a level below the end of the uptake-pipe of the discharge-valve.

The provision of the discharge-outlet at the upper end of the receptacle rather than at the lower part thereof is of importance because, owing to the fact that the liquid used is heavily charged with chemicals which have a tendency to precipitate, there is a liability that the discharge-outlet may become obstructed and the device rendered inoperative or useless just at the time when the emergency occurs requiring its use if the discharge-outlet be located in the lower part, whereas with the construction herein described this is impossible. The provision of the gauze or strainer at the lower end of the uptake-pipe serves to prevent the access of any solids which might be precipitated in the liquid to the valve mechanism.

The arrangement herein shown whereby all of the apertures of the receptacle are trapped or sealed by the liquid is obviously of importance, since with this construction it is only necessary that the several valves or closures

be liquid-tight in order that the apparatus be kept in perfect operative condition and the full pressure maintained.

I claim as my invention—

5 1. In a valve, the combination with a valve-seat, of a valve-stem arranged to reciprocate toward and from said seat, a soft-rubber valve-plug mounted upon said stem so as to be capable of a limited movement endwise thereon,  
10 a rigid follower mounted upon said valve-stem adjacent to the pressure side of the valve-plug and also capable of free movement upon the valve-stem toward said valve-plug, means for positively retaining the follower upon said  
15 stem and a sealing-cap mounted upon the follower and inclosing the end of the valve-stem, the form of said cap being such as to permit the necessary limited movement of the follower upon the stem.

20 2. A check-valve comprising a valve-body provided with a passage therethrough, a seat surrounding said passage, a stem guided to reciprocate toward and from said seat, a rigid valve-disk or follower mounted upon the stem  
25 at a distance from the valve-seat and a soft-rubber or analogous valve-ring interposed between the disk and valve-seat, said disk being free to move up toward the valve-seat but held positively from movement in the opposite direction beyond a determined position,  
30

said position being such as to hold the valve-ring under compression.

3. A check-valve comprising a valve-body provided with a passage therethrough, a seat  
35 surrounding said passage, a bar or support extending across the passage, a valve-stem arranged to reciprocate through said bar and arranged to project at one end beyond the valve-seat and provided at its opposite end  
40 with a stop adapted to contact with the guide-bar and limit its movement, in one direction, a rigid valve-disk or follower mounted upon said stem at a distance from the valve-seat and a soft-rubber or analogous valve-ring interposed between the disk and valve-seat,  
45 said disk being free to move up toward the valve-seat but held positively from movement in the opposite direction beyond a determined position, which position is such as to hold the valve-ring at all times under com-  
50 pression.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 10th day of May, A. D. 1897.

JOSEPH M. MILLER.

Witnesses:

HENRY W. CARTER,  
ALBERT H. GRAVES.