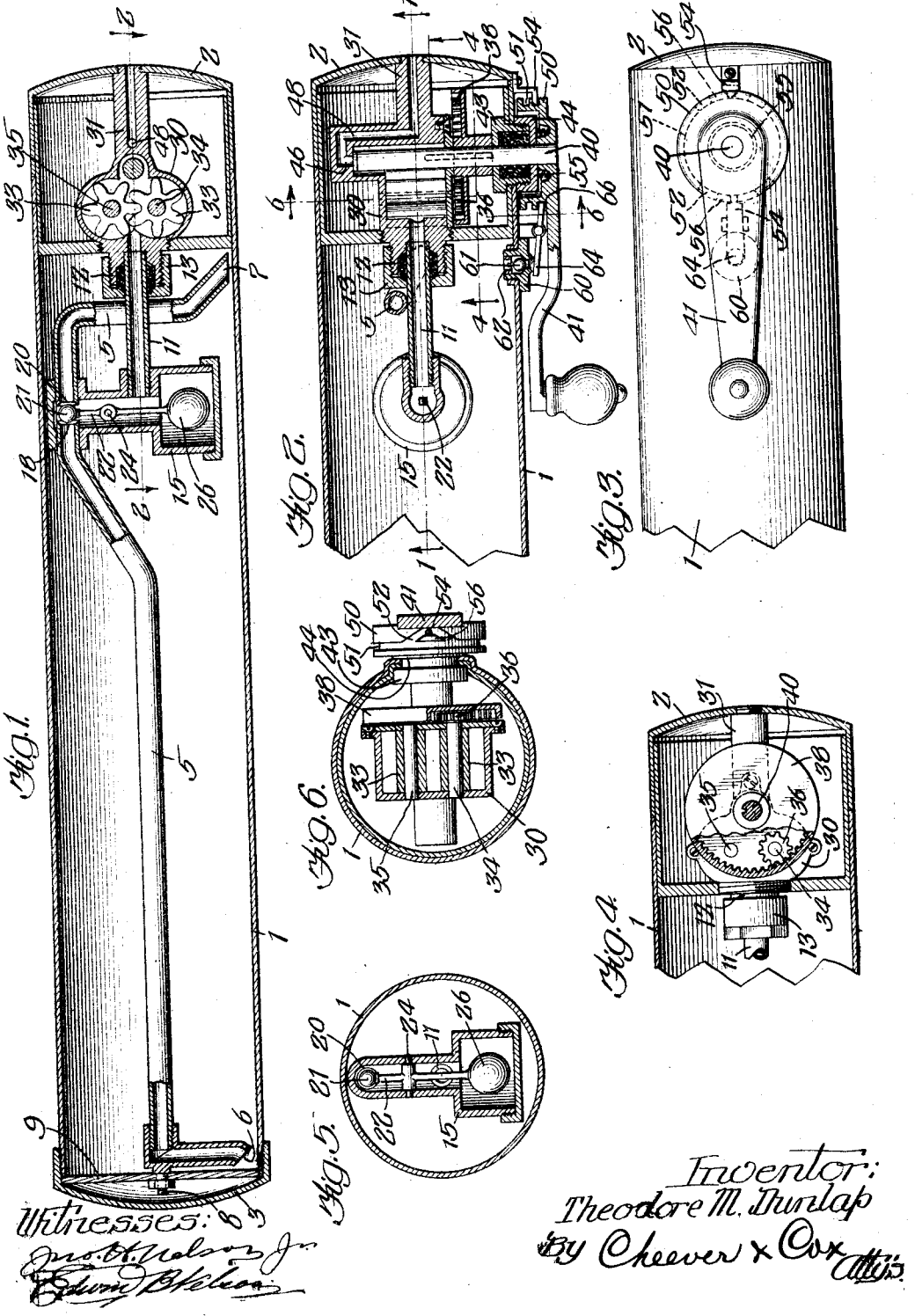
T. M. DUNLAP.

FIRE EXTINGUISHER.

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Witnesses:

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UNITED STATES PATENT OFFICE.

THEODORE M. DUNLAP, OF CHICAGO, ILLINOIS, ASSIGNOR TO HARRY A. NEWBY.

FIRE-EXTINGUISHER.

1,185,639. Specification of Letters Patent. Patented June 6, 1916.

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To all whom it may concern:

Be it known that I, THEODORE M. DUNLAP, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvement in Fire-Extinguishers, of which the following is a specification.

My invention relates to fire extinguishers, more particularly of the class adapted to be operated by hand to deliver a fire extinguishing liquid.

The general object of the invention is to provide a simple, compact and reliable device. As contributing to this general object, it is my purpose to provide manually operated means for forcing the extinguishing liquid from the device; second, to provide means for insuring that liquid will be delivered so long as there is any liquid remaining in the device; third, to provide automatic valve mechanism whereby liquid will be prevented from accidentally escaping from the device but air will be admitted when required to take the place of the liquid which has been removed; fourth, to provide automatic valve mechanism which will keep the liquid within the device when the latter is not in use but will automatically open as soon as the device is operated; fifth, to provide various details of construction which will be hereinafter more fully described and claimed.

I accomplish my objects by the mechanism illustrated in the accompanying drawings in which—

Figure 1 is a longitudinal section of the complete device upon the central plane indicated by the line 1—1, Fig. 2. Fig. 2 is a longitudinal section on the line 2—2, Fig. 1. Fig. 3 is an exterior side view of the crank and adjacent parts. Fig. 4 is a sectional detail on the line 4—4, Fig. 2. Fig. 5 is a transverse section of the device showing the main controlling valve and associated parts. Fig. 6 is a transverse section on the line 6—6, Fig. 2.

Similar numerals refer to similar parts throughout the several views.

The casing 1 is preferably cylindrical and of a size such that it may be conveniently held in one hand. It constitutes the container or receptacle for the extinguishing liquid and also as the support for the operating mechanism. It is closed at the front end by cap 2 and at the rear end by a cap 3. Journaled within the casing is a tube 5 which has two branches 6 and 7. In the main the tube lies coincident with the longitudinal axis of the casing while the branches 6 and 7 have receiving openings or mouths located at opposite ends of the casing near the inner cylindrical surface thereof. It will be understood that in use, the extinguisher will be held in various positions, sometimes pointing obliquely upward and sometimes pointing obliquely downward. Under such conditions after part of the liquid has been discharged, the remainder will, of course, gather at one end of the casing or the other, depending upon the position in which the device is held. The object of the tube 5 with its receiving branches 6 and 7 is to enable the device to draw and deliver liquid irrespective of the position in which the device is held and irrespective of the amount of liquid remaining in the device. Tube 5 is journaled at one end by a trunnion 8 supported in a plate 9 near the cap 3. At the other end it is supported by the tube 11 the forward end whereof is rotatable in the stuffing box composed of the nipple 12 and the stuffing box nut 13. At the rear end tube 11 communicates with a housing 15 which, with its associated parts, serves to prevent the tube 5 from rotating when the casing rotates and to hold the open ends of the branches 6 and 7 always at lowermost position. Tube 5 which is here shown to consist of two sections enters housing 15 and is there provided with two valve seats 18 and 20. A valve 21 is mounted upon a stem 22 in position to coöperate with said valve seats and to close one when the other is open. When the valve is in intermediate position, as shown in Fig. 1, both of the valve seats are open. Stem 22 is pivoted upon a pin 24 within the housing 15 and is provided with a weight 26 which tends to always hold said housing and the stem 22 vertical. This has the double tendency of holding the branches 6, 7 vertical with their receiving mouths in lowermost position, and of holding valve 21 seated upon the seat which is temporarily uppermost. Housing 15 is chambered and communicates with the valve seats 18 and 20 and with trunnion tube 11, and hence the extinguishing liquid may be supplied to tube 11 through either branches of tube 5.

At the forward end tube 5 delivers into a pump casing 30 which has a delivery duct 31 issuing through the forward cap 2. In the preferred form of pump which I have selected to illustrate the invention, the extinguishing liquid is forced through the casing by a pair of interfitting pump gears 33, 33 mounted on shafts 34, 35 journaled in said casing. According to the present design, shaft 34 is driven by a spur pinion 36 driven by an internally toothed gear wheel 38, as best shown in Figs. 2, 4 and 6. Gear 38 is splined upon the main crank shaft 40, as best shown in Fig. 2. Shaft 40 is driven by a hand crank 41 on the outside of the casing, said shaft passing out through a stuffing box 43, closed by a stuffing box nut 44. Shaft 40 is not only rotatable but is longitudinally movable; and by reason of the latter characteristic is capable of seating upon and leaving the valve seat 46 formed in pump casing 30 at the inner end of shaft 40, as shown in Fig. 2. Valve seat 46 controls the duct 48 which leads from the interior of the pump casing to the discharge duct or nozzle 31.

The movement of the main shaft 40 toward and from seat 46 is automatic, and the mechanism for accomplishing this movement will now be described.

The hub 50 of the crank 41 has a groove 51, best shown in Fig. 6. In the main, this groove is annular with its plane perpendicular to the axis of the shaft. At one point, however, it has a branch 52. In the preferred form the branch groove reënters the goove 51 thus permitting the crank to be rotated in either direction from the normal closed position shown in Figs. 2 and 6. When the groove 52 is reëntrant it forms a cam 56 for holding the shaft in closed position. A bracket 54 is fastened to the side of the casing and the nose of the bracket extends into this groove. A spring 55 is interposed between nut 44 and the inside of the hub 50 and this has a constant tendency to force the end of shaft 40 away from its seat 46, and to cause the nose of bracket 54 to travel in the straight annular groove 51. But when the user is through with the device and wishes to close the duct 48, he presses inward on hub 50, at the same time rotating it and thus causing the nose of the bracket 54 to enter the branch groove 52. As soon as the cam 56 has come opposite to nose 54, as shown in Fig. 5, the user stops rotating the crank and thus causes bracket 54 acting on cam 56 to retain shaft 40 closed against the seat 46 in opposition to the force of spring 55. Obviously, as soon as the user rotates the crank thereafter (in either direction) the bracket will pass from the branch 52 to the main groove 51 and permit the shaft 40 to shift to open position.

I have provided means for admitting air to take the place of such liquid as may have been discharged from the device. This will now be described:

A valve casing 60 is mounted in the side of the main casing 1 near shaft 40, as best shown in Fig. 2. A check valve 61 is preferably provided within this casing and retained by a retainer 62. Valve 61 seats against the valve casing 60 and prevents liquid from escaping when said valve casing is submerged. Said valve, however, is capable of permitting air from the outside to enter at any time when the pressure within the main casing falls below atmospheric pressure. An auxiliary valve 64 is pivoted to the main casing 1, as shown in Fig. 2, and is operated by a branch groove 66 formed in the hub 50 of the crank 41. Groove 66 is similar to groove 52, and is preferably open at both ends to annular groove 51. The operation is such that when the crank is rotated from normal closed position, shown in Figs. 2 and 6, the stem of valve 64 will enter the straight portion 51 of the groove and permit said valve 64 to remain open. As a result of the auxiliary valve, the tendency to leakage when the device is not in use is practically eliminated.

In operation, let it be assumed that the casing is substantially filled with fire extinguishing liquid and that the parts are in normal closed position shown in the drawings. As soon as the user begins to rotate the crank-handle he causes valve 64 to automatically open and shaft 40 to shift in the direction to open up the passage 48. He simultaneously starts the pump gears going and this forces liquid out through the duct 31. After this operation has been continued for some time, the quantity of liquid remaining in the main casing will be reduced, and if the device is held at an angle the liquid will gather at one end or the other of the casing. Owing to the fact that tube 5 with its branches 6 and 7 is rotatable, and is weighted in such manner that the receiving mouths of said branches will always hang downward, one or the other of said branches will remain submerged so long as there is any liquid left. If the rear end of the device is lowest, the mouth of branch 6 will be submerged, and the counterweight 26 on the valve stem 22 will cause the valve 21 to leave the seat 18 and thus afford a free passage from branch 6 to the housing 15 and thence through the tube 5 and pump casing to the delivery duct 31. Valve 21 will move onto the seat 20 and thus close the branch 7 and prevent the pump from sucking air through said branch 7. If on the contrary, the forward end of the device is held lowest, the mouth of branch 7 will be submerged while the valve 21 will open the valve seat 20 and close the valve seat 18. Consequently it is immaterial in what

position the device is held, it will always deliver liquid so long as there is any liquid to deliver. If there is but a small quantity of liquid in the device and the device is held horizontal, both branches 6 and 7 may draw liquid and the valve 21 will occupy an intermediate position as shown in Fig. 1.

It will be seen from the foregoing that my device is completely automatic in the sense that as soon as the handle is rotated, both the inlet and outlet valves will be positively moved to proper position and the pump will commence to deliver liquid. Furthermore, the delivery of liquid will continue so long as there is any liquid left. Again, the delivery is positive and does not depend upon gas pressure from within the device. As a result of the last mentioned characteristic, it is unnecessary to maintain any pressure within the device when not in use and therefore the device may be stored away for a long period without any danger of finding that an unknown slow leak has destroyed its operativeness. My device is convenient to manipulate for it may be readily held in the left hand of the user while the latter uses his right hand to rotate the crank handle. It will be understood, however, that the size of the casing is not an essential characteristic and that devices having much larger casings or containers may be used.

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

1. A fire extinguisher having a container for fire extinguishing liquid in the form of a cylinder capable of being grasped in the left hand of the operator, and passing thence under the left arm of the operator whereby the device may be steadied, said container having a discharge opening at the forward end, a pump at the forward end of said container, a crank located near the forward end of said container for operating said pump, said crank being located at the side of the container in position to be conveniently rotated by the right hand of the operator.

2. A fire extinguisher having a cylindrical container of a diameter convenient for being grasped in the left hand of the operator, said container having a discharge opening at its forward end, a pump near the forward end of said container for forcing liquid out through said discharge opening, a shaft partially within said container for operating said pump, said shaft extending to one side of the container, and a crank secured to said shaft at the side of the container for rotating it, said crank being located in convenient position to be grasped by the right hand of the operator when the shaft lies approximately horizontal and with its outer end nearest to the operator, said pump being adapted to deliver liquid out through the discharge opening, under the conditions specified, when the crank is rotated in a clockwise direction.

3. In a fire extinguisher, the combination of a cylindrical casing having a discharge opening, a housing within the casing delivering into said opening, two tubular sections, the inner end of each section communicating with the interior of said housing, the outer end of one section being located near one end of the casing and the outer end of the other section being located near the other end of the casing, a valve coöperating with the inner ends of said sections for opening and closing the passage therethrough, and a counter weight within said housing for operating said valve substantially in the manner set forth.

4. A fire extinguisher comprising a casing adapted to contain fire extinguishing liquid, said casing having a discharge opening at one end, two sections of tubing within the casing each section communicating at its inner end with the discharge opening of the casing and being provided at said inner end with a valve seat, the outer ends of said sections of tubing having receiving mouths located near the opposite ends of the casing, a valve automatically seating upon said valve seats in the sections of tubing mentioned, means for causing said valve to seat upon the section temporarily uppermost, and gravity operated means for maintaining the receiving mouths of said sections of tubing downward substantially as described.

5. In a fire extinguisher, the combination of a casing having a discharge opening, a valve seat controlling said opening, a pump for forcing liquid through said valve seat, a shaft for operating said pump, said shaft being shiftable in an axial direction for opening and closing said valve seat, said shaft being normally in closed position, and automatic means for shifting said shaft to open position when rotated from normal position.

6. In a fire extinguisher, the combination of a casing having a discharge opening, a valve seat controlling said opening, a pump for forcing liquid through said valve seat, a shaft for operating said pump, said shaft being shiftable in an axial direction for opening and closing said valve seat, said shaft being normally in closed position, a hub for rotating said shaft, said hub having a branched cam groove, and a stationary bracket projecting into said groove for automatically causing said shaft to shift to open position when rotated from normal closed position.

7. In a fire extinguisher, the combination of a casing, a delivery duct, a shiftable shaft holding said duct closed when shifted to one position and holding it open when shifted to another position, a pump operated by the

rotation of said shaft, and cam mechanism for shifting said shaft when rotated from normal position.

8. In a fire extinguisher, a casing having a discharge opening, a pump delivering into said discharge opening, a crank for operating said pump, a vent valve for permitting air to enter the casing, and cam mechanism operated by said crank for controlling said valve.

9. A fire extinguisher comprising a casing, a pump within said casing, a delivery duct leading from said pump, a rotatable shaft for operating said pump, said shaft being longitudinally movable to control the flow through said duct, said shaft being normally in closed position to prevent the passage through said duct, cam mechanism secured to said shaft for moving it lengthwise, a vent valve for admitting air to said casing, and means operated by said shaft for automatically controlling said vent valve.

10. A fire extinguisher comprising a casing, a pump within said casing, a delivery duct leading from said pump, a crank for operating said pump, a vent valve for permitting air to enter the casing, said valve being normally closed, a cam operated by said crank, said cam being rotatable to and from normal position, and connections between said valve and said cam for opening said vent when said cam is rotated from normal position.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

THEODORE M. DUNLAP.

Witnesses:

HOWARD M. COX,

KATHRYN S. READY.