Feb. 3, 1942. S. E. ALLEN 2,271,851

FIRE EXTINGUISHING APPARATUS

Filed Sept. 7, 1938 3 Sheets-Sheet 1

Fig. 2.

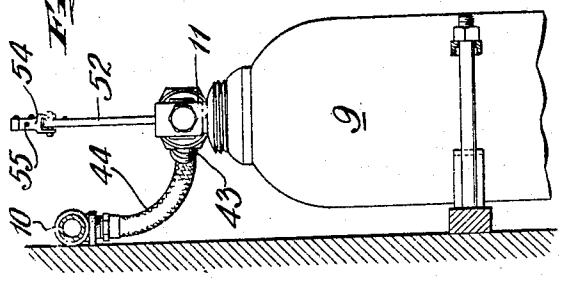



Fig. 3.

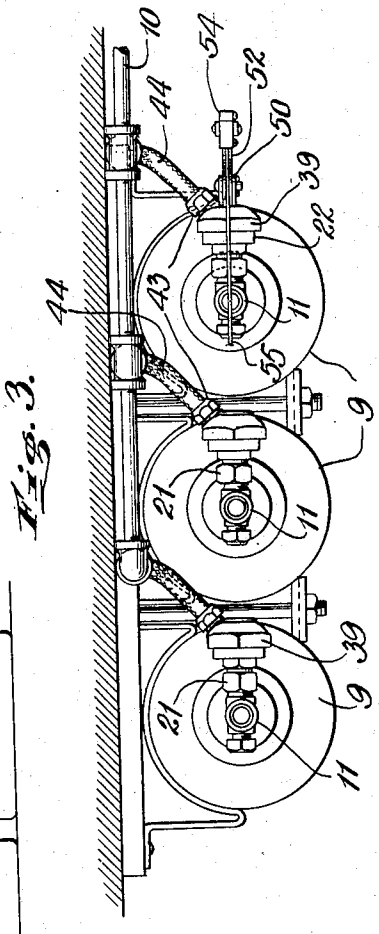
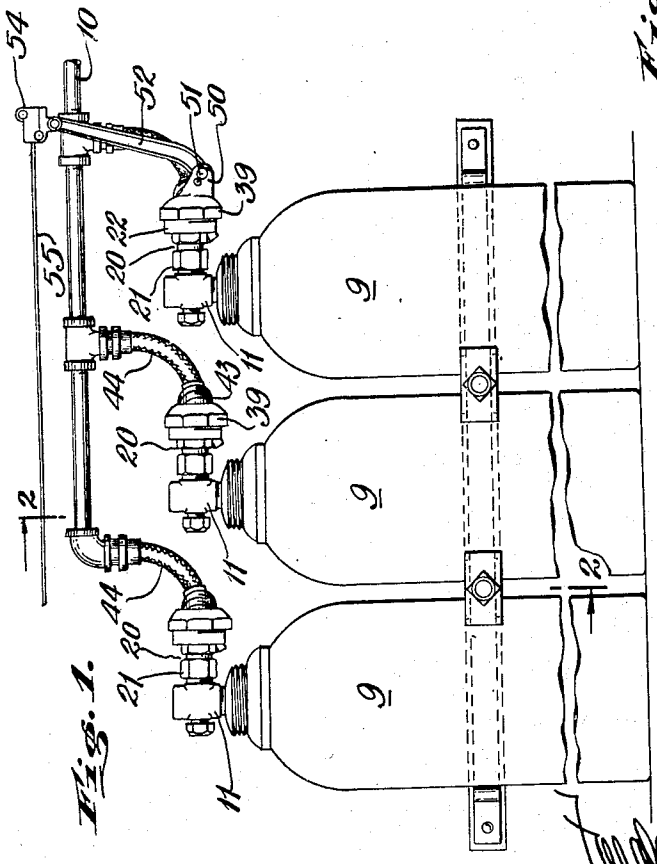



Fig. 1.

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Feb. 3, 1942. S. E. ALLEN 2,271,851

FIRE EXTINGUISHING APPARATUS

Filed Sept. 7, 1938 3 Sheets-Sheet 2

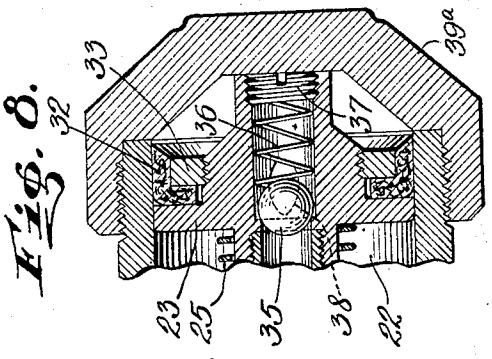

Fig. 8.

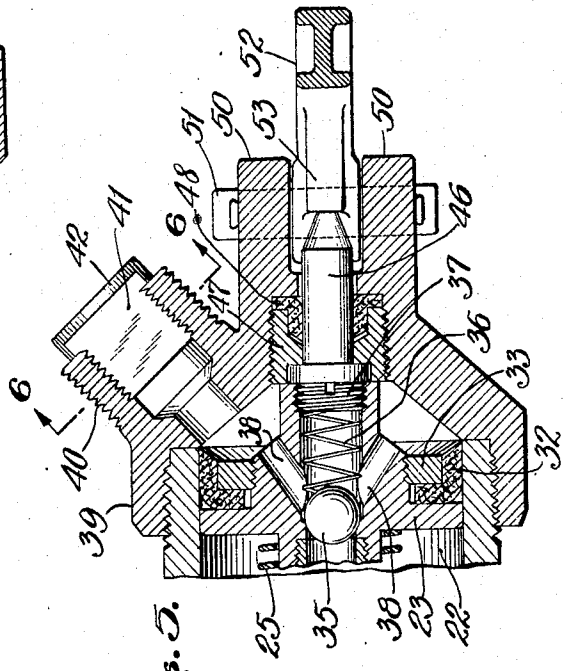

Fig. 5.

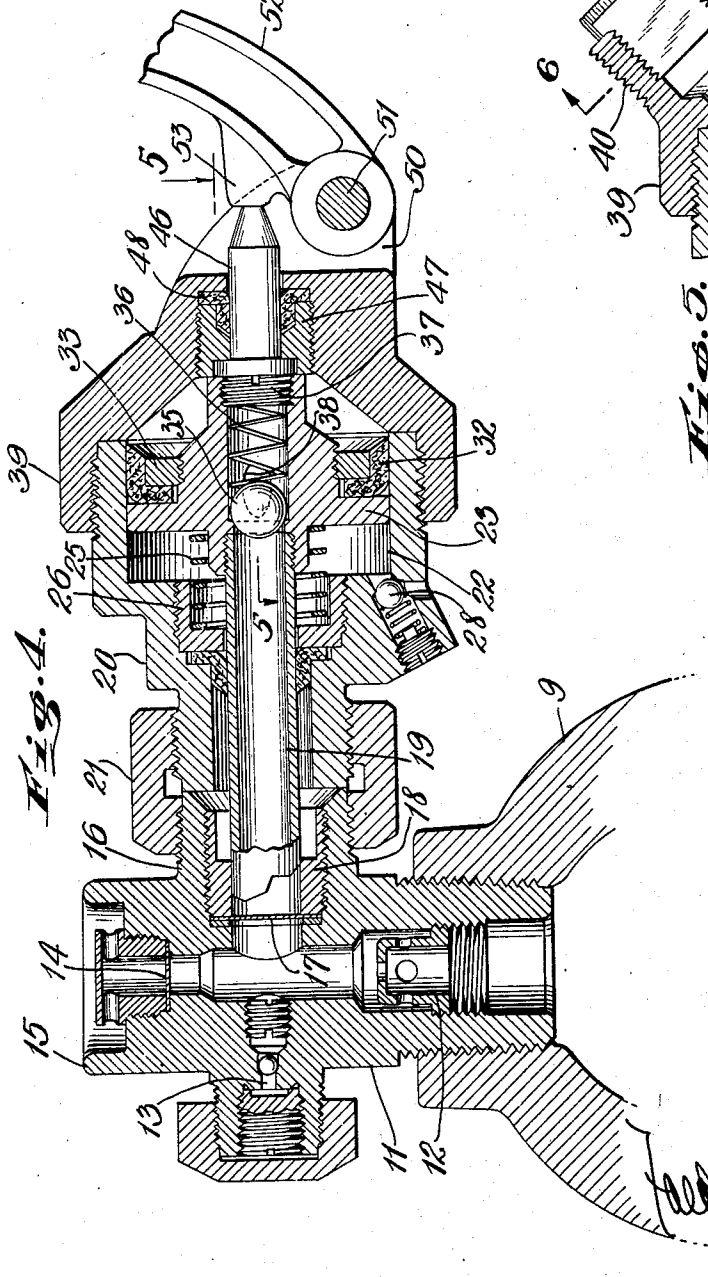

Fig. 4.

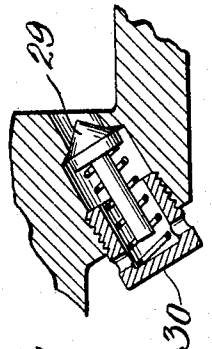

Fig. 7.

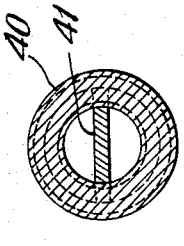

Fig. 6.

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Feb. 3, 1942. S. E. ALLEN 2,271,851

FIRE EXTINGUISHING APPARATUS

Filed Sept. 7, 1938 3 Sheets-Sheet 3

Fig. 9.

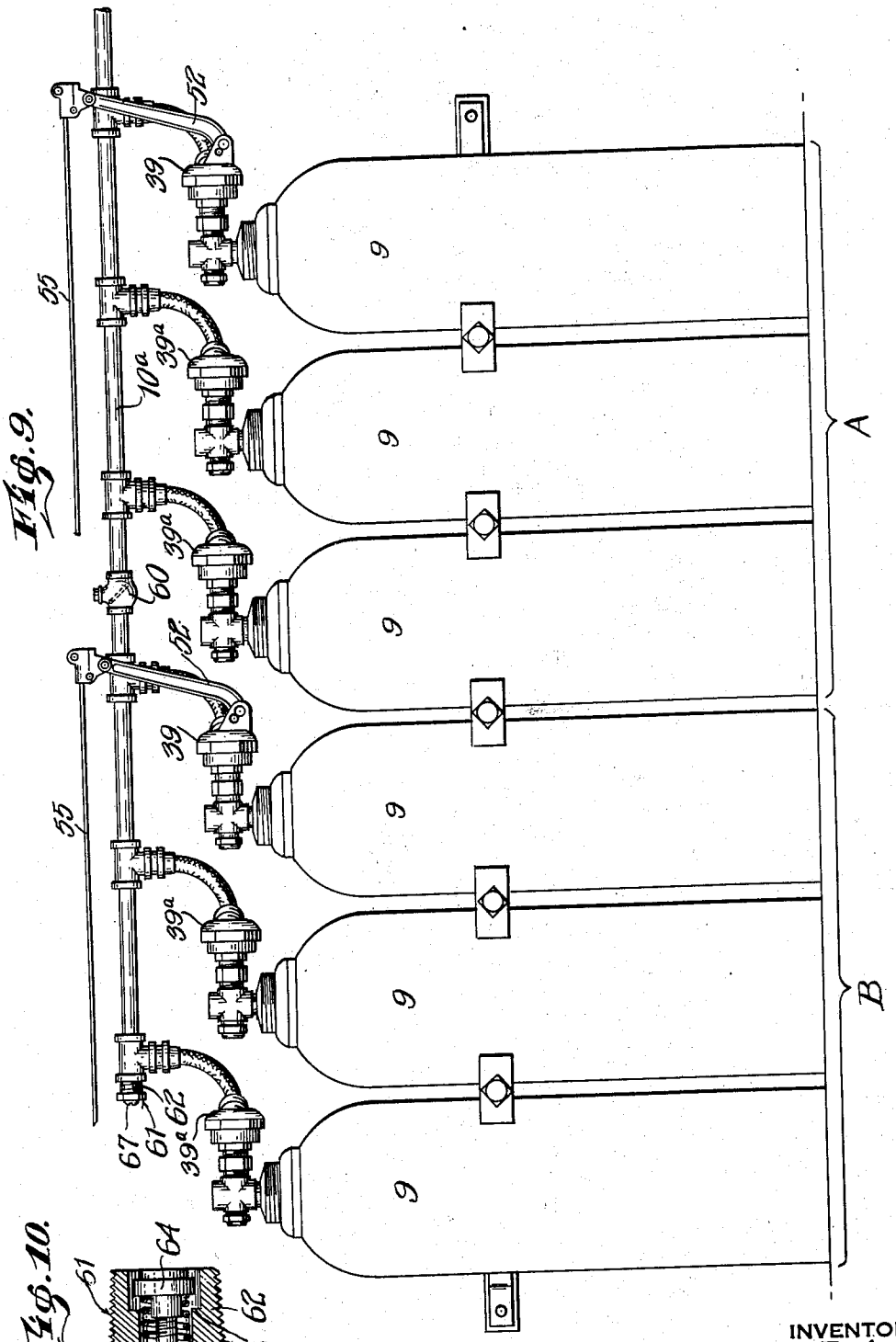
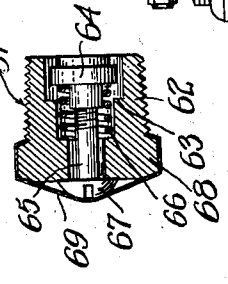



Fig. 10.

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Patented Feb. 3, 1942

2,271,851

# UNITED STATES PATENT OFFICE

2,271,851

## FIRE EXTINGUISHING APPARATUS

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Application September 7, 1938, Serial No. 228,748

14 Claims. (Cl. 169—11)

The present invention relates to improvements in fire extinguishing apparatus.

One of the objects of this invention relates to improvements in discharge heads for containers whereby the containers can be mounted in close relation to each other in a battery of containers and can be readily connected and disconnected from the battery of containers.

Other objects of this invention are the provision of an improved anti-recoil means mounted in the discharge port to prevent recoil in case the puncturable disk is accidentally punctured when the container is dismounted from the assembly and which does not interfere with coupling a discharge pipe to said port, improved anti-recoil means in the neck of the container, and improved means for protecting the safety anti-recoil plug and safety disk during transit.

Another object of this invention consists in the provision of means for preventing the entry of foreign matter such as grit or water into the working parts of the discharge head.

A further object of this invention relates to the combination and arrangement of a plurality of batteries of containers separately dischargeable through a common discharge line together with means for preventing back pressure due to the discharge of one battery from operating the other, and means for indicating discharge from such other battery.

Other objects of the invention will appear from the following description taken in connection with the drawings, in which—

Fig. 1 is a side elevational view of a battery of high pressure fluid containers;

Fig. 2 is an end elevational view taken on the line 2—2 of Fig. 1;

Fig. 3 is a top plan view of Fig. 1;

Fig. 4 is a longitudinal central section taken through a container, a closure member, and a discharge head;

Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 4;

Fig. 6 is a section taken on the line 6—6 of Fig. 5;

Fig. 7 shows a modification of a release and check valve;

Fig. 8 shows a closure cap for a discharge head in which the puncturing element is operated solely by fluid pressure;

Fig. 9 shows batteries of containers arranged in tandem; and

Fig. 10 shows a relief valve used in the arrangement shown in Fig. 9.

In Fig. 1 there is disclosed a battery of three fluid containers 9 quickly detachably supported on a wall as indicated in Figs. 2 and 3. If desired, these containers may rest on the floor as permitted by the connection between the containers and the common delivery pipe 10 as will appear more clearly from the more detailed description.

The container 9, referring to Fig. 4, is provided with an interiorly threaded neck into which is threaded a closure member 11 provided with a delivery passage the lower end of which is enlarged and threaded to receive and support a ported inverted cup-shaped baffle member 12 and also the usual syphon tube not disclosed. The baffle or anti-recoil member 12 is provided with diametrically located ports and also an end port sufficiently small to prevent any appreciable recoil by discharge of the fluid therethrough. The open end of the cup is provided with external threads engaging the threads of the closure member at a point below the top of the neck of the container, to prevent injury thereto in case the closure member is broken off at its weakest point which is in the vicinity of the end of the neck of the container.

A filling port 13 normally closed by a ball valve, communicates with one side of the delivery passage and this filling port may be further sealed by a plug and cap as indicated. The upper end of the delivery passage in the closure member 11 is provided with a seat for the usual safety disk 14 which may be held in place by a ported baffle or anti-recoil plug ported as shown and threaded in an enlarged portion of the delivery passage. The closure member is provided with a circular flange 15 of greater height than the plug to protect the safety disk and plug.

The closure member 11 is provided with a lateral extension 16 provided with a delivery port communicating with the delivery passage. This port is enlarged to form a seat for a puncturable discharge disk 17 which may be seated on a sealing member seated against the shoulder formed by said enlargement. Threaded within the enlarged portion of the port is a threaded sleeve 18, which holds the disk 17 in place and constitutes a close fitting guide for the cutting end of the tubular puncturing element 19.

The discharge head 20 which is generally tubular is provided with a threaded reduced end which may be connected to the lateral extension 16 of the closure member 11 by a union nut as indicated at 21. The other end of the discharge head is enlarged to provide a cylinder 22 in which operates a piston 23 provided with an interiorly threaded projection by which the tubu-

lar puncturing element 19 is connected to the piston as clearly shown in Fig. 4. The piston is normally pressed into its rearward home position, that is toward the right in Fig. 4, by a spring 25 seated against the piston over said projection and against a cup 26 threaded in an intermediate reduced portion of the bore in the discharge head. A sealing washer of L-shape cross section held between said threaded cup and the shoulder on the discharge head formed by said intermediate reduced portion of the bore reduces the amount of gas escaping around the puncturing element into the space on the forward side of the piston.

A spring pressed ball valve 28 held on a seat by a plug as indicated in Fig. 4 prevents gas pressure from building up in the cylinder and also prevents entry of any foreign matter such as grit or moisture into the cylinder. The valve permits free movement of the piston when operated mechanically or under fluid pressure.

Fig. 7 shows another form of valve that may be used in place of the ball valve 28. This valve includes a valve member 29 held on its seat by a spring retained in position by a ported plug 30.

The piston is sealed with respect to the cylinder by means of a washer 32 of L-shape cross section held in place by a ring 33 threaded on the stem of the piston 23 as shown in Fig. 4.

The piston 23 is provided with a discharge bore which communicates with the bore in the puncturing element 19. The bore in the piston is reduced to form a limiting abutment for the puncturing element and a seat for a ball valve 35 held thereon by a spring 36 seated on a plug 37 threaded in the reduced end of the stem of the piston.

The cylinder 22 is threaded exteriorly to support a cap 39 which limits the rearward movement of the piston and which is constructed to define a pressure chamber between the cap and the piston into which the fluid is discharged from the bore in the piston through orifices 38 as shown in Fig. 5.

The cap is provided with a ported extension 40, Fig. 5, extending at any angle to the discharge head. The extension is threaded interiorly to receive a baffle or anti-recoil member formed from a threaded bolt by cutting away the sides of the threaded portion and a portion of the head to provide a flat threaded shank 41 and a circular baffle disk 42 and shoulders to limit the movement of the disk toward the end of the extension. The anti-recoil member distributes the fluid in equal amounts in opposite directions to prevent recoil upon discharge of fluid upon accidental puncturing of the disk 17. The exterior of the extension 40 is threaded to receive a hose coupling 43 (Fig. 3) on a hose 44 which may be connected to the common delivery pipe 10 as indicated in Fig. 1.

The delivery head shown in Fig. 4 is apertured to receive a piston operating plunger 46 provided with an enlarged head bearing against the end of the stem of the piston and against a shoulder in a recess in a sleeve 47 threaded in the cap, the sleeve acting as a guide for the plunger and also as a means for holding a sealing washer 48 on its seat on the end of the cap in functional relation with the plunger 46 to prevent the escape of gas from the cylinder at this point. The outer end of the plunger may be tapered as shown and for the purpose of operating the plunger to move the piston and puncturing element to the left in Fig. 4 to puncture the discharge disk 17, the cap is provided with ears 50 receiving a pin 51 on which is mounted a lever 52 which has an abutment 53 for engagement with the end of the plunger by means of which the plunger, piston and puncturing element are operated when the lever is moved toward the left as indicated in Figs. 1 and 4. The lever 52 has a relatively long operating arm and extends upwardly beyond the common delivery pipe 10 where it is provided with clamping means 54 to which an operating bar 55 may be secured. This bar may be suitably supported in any manner on guides, not shown, on the wall of the building or in cases where several manually operated discharge heads are employed the bar may be supported by the levers.

As shown in Fig. 1 only one of the containers 10 is operated manually, the operation of the others being initiated by back pressure from the common delivery pipe 10. Fig. 8 shows a closure cap at 39a used in connection with a discharge head operated entirely by gas pressure and from which therefore the manually operated means disclosed in Fig. 4 has been omitted.

When it is desired to cause the discharge of gas from the battery of containers, the lever 52 is moved to the left, Fig. 1, thereby operating the associated piston and the puncturing element to puncture the disk of the associated fluid container. The fluid in the container then passes out through the port in the closure member 11, through the communicating bores in the tubular puncturing element and piston, out through the ports in the stem of the piston into the chamber between the cap and the piston and thence through the hose connection into the common delivery pipe. The pressure built up in the chamber between the cap and the piston due to the discharge of gas from the associated container insures a complete operation of the puncturing element after its operation has been initiated by manual or automatic means or by gas pressure from the common delivery pipe.

The anti-recoil device 12 before described is provided to prevent recoil in case the cylinder valve is broken off at its weak portion, that is at the portion in proximity to the end of the neck of the container. The safety plug and disk 14 are protected against injury and dislocation by the flange 15 formed on the closure member 11. The anti-recoil device 41, 42 is provided to prevent recoil in case of accidental discharge due to puncturing of the disk 17 during transit.

As will appear from Fig. 1, the containers may be arranged in closely spaced relation due to construction of the discharge heads and to the direction of the delivery port 40 with respect to the discharge head. The construction of the discharge head and the delivery port permit the discharge heads to be arranged longitudinally of the series of containers thereby saving space such as would be necessitated if the discharge heads were extended away from the wall, and permitting free access to the hose coupling which would be prevented in case the discharge heads were extended toward the wall. By arranging the mechanical valve operating means on the end of the head to travel in the direction of the length of the head, the operating levers will operate in the space occupied by the battery of containers and if desired a plurality of these levers may be operated from a common operating rod as is apparent.

It is clear that I have provided a construction which occupies a minimum amount of space and in which the individual containers are readily

removable and replaceable in a battery of containers. It is also apparent that I have provided complete protection against recoil due to discharge resulting upon breakage of the closure member, rupture of the safety disk, and upon an accidental puncturing of the discharge disk. By employing a valve in the venting port of the cylinder I have provided means for preventing the entry of foreign matter such as, grit or moisture into the working parts of the discharge head.

In Fig. 9, I have shown a battery of six containers in two groups A and B of three containers each, the first container of each group being manually operable as in Fig. 1 as indicated by corresponding reference characters, and the remaining containers of each group being operated by back pressure developed upon discharge of gas from the first container. Each container is connected by a hose to a common discharge line 10*a* and to prevent operation of the discharge mechanism of the containers of group B upon discharge of the containers of group A, I place a check valve 60 of any suitable construction in the discharge line 10*a*. If the check valve should not function properly, the gas leaking past the valve might build up sufficient pressure to operate the discharging mechanism associated with the containers of group B. To prevent this I connect the hose of the last container of group B to the delivery pipe 10*a* by a T-head through which the manifold is vented of gas escaping past the check valve. To prevent venting after the first container of group B has been operated, I provide a low pressure relief valve 61, Fig. 10. This valve comprises a screw plug 62 which is threaded into the T-head and is provided with a valve seat 63 on which a valve 64 carried by a stem 65 is adapted to be seated by back pressure when the back pressure built up is sufficient to operate the pressure operated puncturing elements of the containers in group B. The valve is normally held open by a spring 66 surrounding the stem 65 and seated against the valve 64 and a shoulder in the plug 62, the movement of the valve being limited by the head 67 on the stem which also seals the passageway between the stem and the bore in the plug. I may provide the plug with a flange 68 over which may be secured a cap of frangible material such as colored Cellophane 69 which may be made weak enough to be readily ruptured by a low back pressure and obviously also by the head 67 when the valve closes, indicating a leaking check-valve and together with the position of the head indicating discharge from the containers of group B. If desired, I may provide the cap with vent holes through which gas leaking past the check valve may readily escape without rupturing the cap. The groups of containers A and B may be operated in stages manually, or by any suitable automatic control devices, group A may be operated without operating group B, and both groups may be operated to discharge simultaneously or concurrently by operating the discharge mechanisms of the first containers of both groups simultaneously or concurrently or by operating that of the first container of group B.

I have illustrated and described several embodiments of my invention but it is to be understood that this has been done for the purpose of disclosure and is not to be considered as limitative and that I reserve the right to make such changes as may fall within the principles of this invention and the scope of the accompanying claims. The term "manually" is intended to be generic to manual and automatic operations of the discharge mechanisms, which are herein disclosed as lever operated.

I claim:

1. In combination with a bottle shaped container, a closure member threaded in the neck of the container and provided with a fluid delivery passage, and an anti-recoil device secured at its lower end to the wall of said passage at a point below the end of the neck of the container, said device being provided with a passageway for fluid from the container directing said fluid radially at a point above the end of the neck of the container.

2. In combination with a bottle shaped container, a closure member secured in the neck of said container and provided with a fluid delivery passage, and an inverted cup-shaped anti-recoil device secured to the wall of said passage at a point below the end of the neck of said container, said device being provided with diametrically disposed ports and a small axial port.

3. In combination with a container, a closure member secured to said container and provided with a fluid delivery passage and a port opening to the exterior of said member, a safety disk disposed across said port, an anti-recoil plug secured in said port, said plug being provided with a closed outer end and an axial bore communicating with radial ports located beyond the end of said port, and a flange on said closure member surrounding said plug in spaced relation thereto and projecting beyond the outer end of said plug.

4. In combination with a vertically disposed container, a vertically disposed closure member secured to said container, a horizontally disposed discharge mechanism secured to said closure member, said discharge mechanism including a horizontally extending cylinder and a piston for operating a puncturing element, a piston operating lever pivoted on a horizontal axis on the free end of said cylinder, a discharge port extending horizontally of said cylinder, the wall of said port being threaded interiorly to receive a hose coupling, and an anti-recoil device screwed into said port having projecting deflecting means spaced from the end of said port and of smaller diameter than the exterior diameter of said wall.

5. In combination with a plurality of groups of containers, a manually operable discharge head for one container in each group, a back pressure operated discharge head for the other containers of said groups, a common discharge manifold, discharge connections between said discharge heads and manifold, and a check valve in said manifold between the discharge connections of said groups operating to prevent back pressure due to the discharge of a container in one group from operating a container of the other group.

6. In combination with a plurality of groups of containers, a manually operable discharge head for one container in each group, a back pressure operated discharge head for the other containers of said groups, a common discharge manifold, discharge connections between said discharge heads and manifold, a check valve in said manifold between the discharge connections of said groups operating to prevent back pressure due to the discharge of a container in one group from operating a container in the other group, and a low pressure relief valve connected to the portion of the manifold to which said other group is connected.

7. In combination with a plurality of groups of

containers, a manually operable discharge head for one container in each group, a back pressure operated discharge head for the other containers of said groups, a common discharge manifold, discharge connections between said discharge heads and manifold, a check valve in said manifold between the discharge connections of said groups operating to prevent back pressure due to the discharge of a container in one group from operating a container in the other group, and a low pressure relief valve connected to the portion of the manifold to which said other group is connected, said relief valve including a spring strong enough to hold said relief valve in open position against back pressure due to fluid leaking past said check valve but so weak that the back pressure created by the discharge of fluid from containers of said second group, will seat said valve.

8. In combination with a plurality of groups of containers, a manually operable discharge head for one container in each group, a back pressure operated discharge head for the other containers of said groups, a common discharge manifold, discharge connections between said discharge heads and manifold, a check valve in said manifold between the connections of said groups operating to prevent back pressure due to the discharge of a container in one group from operating a container in the other group, a low pressure relief valve connected to the portion of the manifold to which said other group is connected, said relief valve including a weak spring strong enough to hold said relief valve in open position against back pressure due to fluid leaking past said check valve and weak enough to permit the valve to be seated by back pressure created by the discharge of fluid from containers of said second group, a valve element normally closing said manifold against ingress of foreign matter, and an operative connection between said relief valve and valve element.

9. In combination with a plurality of groups of containers, a manually operable discharge head for one container in each group, a back pressure operated discharge head for the other containers of said groups, a common discharge manifold, discharge connections between said discharge heads and manifold, a check valve in said manifold between the connections of said groups operating to prevent back pressure due to the discharge of a container in one group from operating a container in the other group, a low pressure relief valve connected to the portion of the manifold to which said other group is connected, said relief valve including a weak spring strong enough to hold said relief valve in open position against back pressure due to fluid leaking past said check valve and weak enough to permit the valve to be seated by back pressure created by the discharge of fluid from containers of said second group, said relief valve having a valve element normally closing said manifold against ingress of foreign matter, and a frangible closure disposed over said valve element and adapted to be broken by low fluid pressure in said manifold due to fluid leaking past said valve and by said valve element.

10. In combination with at least two containers, a common discharge manifold, a discharge head for each container operable manually and also by fluid back pressure, discharge connections between said heads and said manifold and a check valve in said manifold between the discharge connections with said containers preventing back pressure in the manifold created by the discharge of the container nearest to the discharge end of the manifold from operating the discharge mechanism of the other.

11. In combination with at least two containers, a common discharge manifold, a discharge head for each container operable manually and also by fluid back pressure, discharge connections between said heads and said manifold, a check valve in said manifold between the discharge connections with said containers preventing back pressure in the manifold created by the discharge of the container nearest to the discharge end of the manifold from operating the discharge mechanism of the other, and means for indicating leakage of fluid past said check valve.

12. In combination with at least two containers, a common discharge manifold, a discharge head for each container operable manually and also by fluid back pressure, discharge connections between said heads and said manifold, a check valve in said manifold between the discharge connections with said containers preventing back pressure in the manifold created by the discharge of the container nearest to the discharge end of the manifold from operating the discharge mechanism of the other, means for indicating leakage of fluid past said check valve, and a normally open valve preventing fluid leaking past said check valve from building up a pressure sufficiently high to operate the discharge mechanism of the other container and adapted to close when the discharge mechanism of the latter is operated manually.

13. A high pressure fluid medium supply system comprising a plurality of high pressure fluid medium containing units, fluid pressure operable fluid medium releasing means for each unit, an operating fluid conveying conduit in operative connection with all of said fluid pressure operable fluid medium releasing means, fluid medium discharge means common to and in operative connection with all the fluid medium units, pressure responsive unidirectionally acting fluid flow control means in said operating fluid medium conveying conduit adapted to divide said operating fluid conduit into consecutively adjacent sections each associated with a group of fluid medium containing units, said pressure responsive unidirectionally acting means being adapted to prevent flow of the operating fluid medium from any subsequent section to the preceding sections to operate the medium releasing devices associated therewith and to permit a continuous flow of the operating fluid medium from any preceding section to the subsequent sections, and selective means for initially introducing operating fluid medium into any one of the aforesaid sections to release the fluid content of the respective units associated therewith.

14. A high pressure fluid medium supply system comprising a plurality of high pressure fluid medium containing units, fluid pressure operable fluid medium releasing means for each unit, an operating fluid conveying conduit in operative connection with all of said fluid pressure operable fluid medium releasing means, pressure responsive unidirectionally acting fluid flow control means in said operating fluid medium conveying conduit adapted to divide said operating fluid conduit into consecutively adjacent sections each associated with a group of fluid medium containing units, said pressure responsive unidirectionally acting means being adapted to prevent flow of the operating fluid medium from any

subsequent section to the preceding sections to operate the medium releasing devices associated therewith and to permit flow of the operating fluid medium from any preceding section to the subsequent sections, selective means for initially introducing operating fluid medium into any one of the aforesaid sections to release the fluid content of the respective units associated therewith, and pressure relief means associated with each preceding group relative to a subsequent group adapted to prevent undesired operation of a preceding group due to leakage pressure from an operated subsequent group.

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