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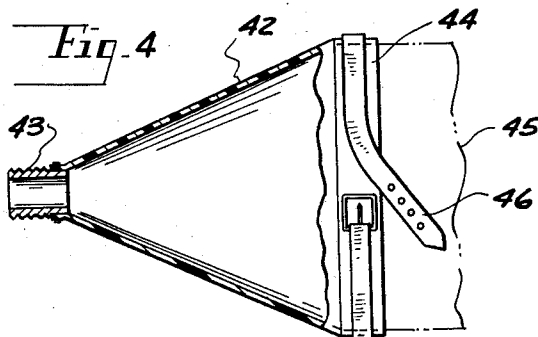
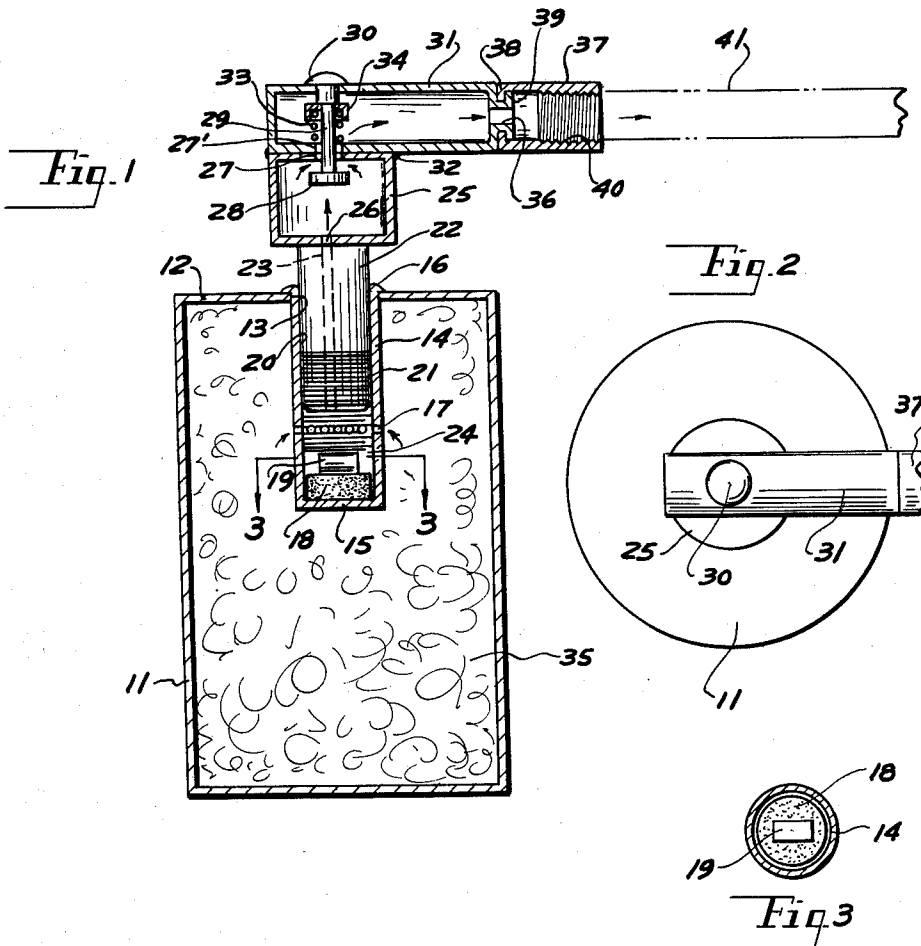
M. R. CONE

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PRESSURIZED SMOKE DISPENSER

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2 Sheets-Sheet 1



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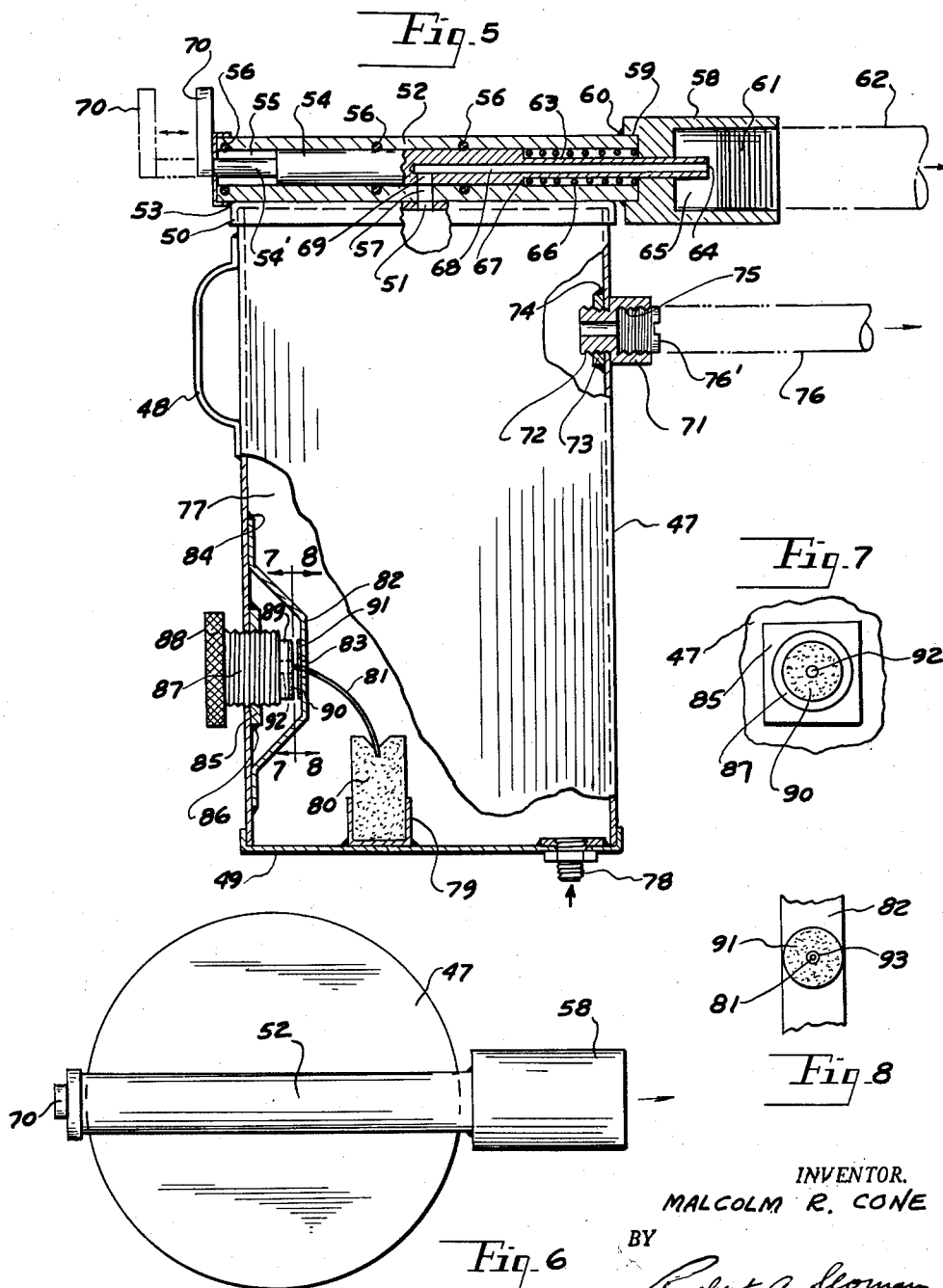
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PRESSURIZED SMOKE DISPENSER

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3 Claims. (Cl. 252-359)

This invention relates to a smoke dispenser and more particularly to a pressurized smoke dispenser.

The present invention is generally directed to a portable fingertip operated pressurized container and dispenser of smoke with attached threaded nozzle shroud adapted as a connector for delivery tubes, hoses, pipe fittings, or to any connection for delivering a cloud of smoke.

The present invention is particularly adapted for the detection of leaks, such as in internal combustion engines, steam and hydraulic engines and motors and furnaces and stoves, and their appendages, air conditioning equipment and its appendages, chimneys, tanks, such as fuel, water, gas tanks, chemical containers, plumbing, heating industrial, agricultural, residential, commercial, military, aeronautical, marine, mining, lumbering manufacturing, packaging and all other fields where assurance of non-leaking equipment is needed.

Accordingly, a primary object of the present invention is to provide a pressurized smoke dispenser for the testing of airtight, liquid tight condition of equipment and wherein the presence of a leak of some nature will be detected by the escape of smoke from a confined area.

It is another object of the present invention to provide in a pressurized smoke dispenser a mechanism for producing the smoke therein, the said smoke being produced either by a chemical action of certain chemicals with a smoke producing agent, or by the burning of materials for the production of smoke.

These and other objects will be seen from the following specification and claims in conjunction with the appended drawings, in which:

FIG. 1 is a longitudinal section of the pressurized smoke dispenser.

FIG. 2 is a fragmentary plan view thereof.

FIG. 3 is a section taken on line 3-3 of FIG. 1.

FIG. 4 is a side elevational view, partially broken away and sectioned of a flexible plastic dispenser connector for use in conjunction with the smoke dispenser of FIG. 1.

FIG. 5 is a front elevational view partially broken away and sectioned of a different form of smoke dispenser.

FIG. 6 is a plan view thereof.

FIG. 7 is a fragmentary section taken on line 7-7 of FIG. 5.

FIG. 8 is a fragmentary section taken on line 8-8 of FIG. 5.

It will be understood that the above drawings illustrate a preferred embodiment of the invention and that other embodiments are contemplated within the scope of the claims hereafter set forth.

Referring to the drawings, one form of pressurized smoke dispenser is shown in FIGS. 1 through 4 wherein there is provided a suitable sealed container 11 having a top wall 12 apertured at 13 and through which extends the central cylinder 14 having a closed bottom wall 15 and at its upper open end turned over and fixedly secured as at 16 to the top wall 12 of container 11.

Intermediate the ends of the cylinder 14 in a horizontal plane are a series of spaced aperture 17 establishing communication between the interior of cylinder 14 and container 11.

Positioned upon the bottom wall 15 of cylinder 14 is a smoke producing agent 18 of such chemical composition, such as ammonia, that when activated by combination with another chemical is adapted for the production of a carbon-type of smoke.

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Arranged directly above the disc 18 of smoke producing agent is a suitable activator capsule 19 containing a chemical, such as hydrochloric acid, which when applied to the smoke producing agent will produce a large quantity of smoke within the cylinder 14.

The interior wall of cylinder 14 is threaded as at 20 and is adapted to threadedly receive a depending exteriorly threaded shank 21 of the dispenser tube 22 which has a flat bottom wall, but which includes a longitudinal passage 23 in communication at its upper end with the interior of the valve chamber 25 suitably secured upon the upper end of dispenser tube 22. In operation as the dispenser tube 22 and assembled parts thereon are threaded by rotation, or relative rotation, down into the cylinder 14 within container 11 moving into the chamber 24, pressure is applied to the activator capsule 19 crushing the same and permitting the escape of its contents for intimate and physical contact with the smoke producing agent 18 with the result that smoke is produced within chamber 24 and which is adapted for transfer through the longitudinal passage 23 in the dispenser tube 22 up into the valve chamber 25.

The container 11 has filled therein a suitable propellant 35, such as nitrogen under pressure, carbon dioxide under pressure or some synthetic propellant, all under pressure. Alternately Freon may be employed under pressure or compressed air. Any of these propellants may be employed for moving the smoke from the chamber 24 up through the dispenser tube 22 up into valve chamber 25.

In operation, as will be hereafter described, propellant 35 is free to enter the cylinder 14 through the plurality of inlets 17, where it picks up particles of the smoke produced in chamber 24 and delivers the same through passage 23 into the valve chamber 25, through the port 26 in the bottom wall of said valve chamber.

The top wall of the valve chamber has a central aperture 27 which defines with said top wall a valve seat with which the valve 28 is normally in registry for closing off the said opening. Said valve includes the upright stem 29 terminating in the pushbutton handle 30 which overlies the top wall of dispenser housing 31 which is fixedly mounted upon the valve chamber 25 and secured thereto as by the welds 32.

A suitable coiled spring 33 surrounds the stem 29 and at its upper end is retained by the cup 34 secured to said valve stem within the valve housing 31. The lower end of the spring engages the bottom wall of the valve housing.

Said valve housing has a similar passageway as at 27' by which the mixture of propellant 35 and smoke passes from valve chamber 25 into the valve housing 31, when the valve has been manually depressed to the position shown in FIG. 1.

As shown in FIG. 1, valve housing 31, at one end, has a reduced longitudinally apertured outlet neck 36 which projects into the threaded connector nozzle 37 which has an internal annular flange 38 retainingly engaged by the outer flange portion 39 of the neck 36 for fixedly securing the said nozzle on the outlet end of the valve housing 31, or dispenser housing.

The nozzle 37 is interiorly threaded at 40 and is adapted to be connected to any suitable conduit such as conduit 41 for the purpose of delivering smoke under pressure for a testing purpose, as for example the testing of a leakage of an otherwise believed airtight container.

In FIG. 4 there is shown an adapter for connection with the said nozzle by which connection can be made to a larger diameter conduit for connection such as at 45.

For this purpose there is provided the preferably flexible plastic cone-shaped member, which at its reduced diameter has an exteriorly threaded fitting 43 secured

thereto and which is adapted to be threadedly projected within the nozzle 37. The maximum diameter portion of the adapter 42 is cylindrical in shape and is adapted to fit flexibly over the enlarged conduit 45 or other member to which smoke is to be delivered.

A sealing strap 46 is secured around the outer edge of the annular portion 44 of adapter 42 providing a means for drawing the same tightly over the conduit or other member 45 to which the pressurized smoke device is adapted. For example, the adapter, or hood may be constructed of a polyethylene and thus be foldable when not in use.

A slightly different construction is shown in FIGS. 5 through 8 wherein there is provided a sealed container 47 with handle 48, bottom wall 49 and the closure cover 50 normally sealed in place over the top edge of the container, being centrally apertured at 51 for communication with the passage 57 within the valve housing 52, which is fixedly secured to cover 50, as by the welds 53.

Longitudinally movable, elongated piston 54 is slidably nested within the bore 55 of valve housing 52 with suitable annular seals 56 longitudinally spaced therein to prevent the escape of smoke under pressure. A suitable nozzle shroud 58 having an internal bore 65 and interiorly threaded at 61 to receive a fitting such as fitting 62, is fixedly secured over one outer end of valve housing 52 as at 59 as by the welds 60.

One end of the cylindrical piston 54 is of reduced diameter defining an elongated nozzle 63 which is nested within valve housing 52 and projects axially through one end thereof and through the nozzle shroud 58 and into chamber 65 having an outlet opening 64.

Coil spring 66 surrounds a portion of the nozzle 63 and at one end engages the base of the shroud 58, and at its opposite end operatively engages the shoulder 67 on the piston 54 normally urging said piston to the left, or dotted line position shown in FIG. 5.

The nozzle 63 has a longitudinal bore as an extension of the longitudinal bore 68 which extends throughout a portion of the length of piston 54 and at its inner end communicates through the passage 69 with the port or passage 57 in the valve housing when the said valve piston 54 has been manually projected forwardly by the handle 70 to the position shown in the drawing.

In this position, confined smoke within chamber 77 of container 47 passes through outlet 51, port 57 and passage 69 and through the longitudinal passage 68 and out through the outlet 64 of the nozzle 63 into the shroud 58 for communication with the conduit 62 connected therewith.

When the handle 70 is manually released, the action of the spring 66, under compression returns the valve piston 54 to the left to an inoperative position, but moving the port 69 thereof out of registry with the passage 57 so as to cut off further flow of smoke under pressure through the said nozzle 63.

The left end of the valve housing 52 has an apertured closure which receives the axial piston rod 54' which terminates in the upwardly extending handle 70 also shown in FIG. 6, there being a suitable seal also positioned within the valve housing normally registerable with the left end of the valve piston 54 when the piston has moved to the left to inoperative position.

In the event that the present pressurized container 47 is not to be controlled by the valve assembly, above described, there is also provided upon the upper portion of container 47, a suitable outlet fitting 71 whose threaded shank 72 projects through the wall of the container and is secured thereon by the nut 73, itself anchored to the said container as by the weld 74. The outer portion of fitting 71 is interiorly threaded at 75 and is adapted to receive the threaded end of the pipe 76 or other conduit by which developed smoke under pressure may be continuously delivered from the container 47.

It is contemplated as a part of the present invention

that a confined propellant could be employed, as for example, compressed nitrogen, carbon dioxide, synthetic propellant, Freon or compressed air. On the other hand, there is shown in FIG. 5, a fitting 73 is the lower portion of container 47 to which a compressed propellant could be connected, as for example, compressed air. In this manner with a quantity of smoke confined within the container 47, the application of compressed air or other propellant under pressure to the fitting 73 would be effective for transmitting the said smoke either to the valve housing 52 for control therethrough to conduit 62, or alternately through the fitting 71 to the conduit 76 for continual flow. When not in use, the fitting 71 would be closed by a suitable plug, as shown at 75', for illustration.

It is contemplated, as a part of the present invention that the container 47 may have stored therein a quantity of finely divided particles to provide a smoke substance, as for example, powdered charcoal, or carbon, or the like which, when under the control of a propellant, will deliver smoke. It is also contemplated that the container 47 may have a mechanism therein for producing a smoke at a predetermined time, under the control of the user.

For illustration, a smoke producing mechanism may be employed upon the interior of chamber 77. For this purpose and as shown in FIG. 5 there is provided a chemical smoke pot or holder 79 suitably secured to the bottom wall of the container and positioned therein an ignitable smoke producing block 80 of a suitable substance which, when ignited produces a mass of smoke, upon the interior of chamber 77. Block 80, for example, includes hexachlorethane combined with zinc, and a perchlorate as an oxidizing agent, and a retarder, such as ammonium chloride.

A suitable fuse 81 extends from the smoke producing agent, projects upwardly through an aperture 83 in the support bracket 82, whose free ends are secured to interior wall portions of the container 47, as at 84. Any suitable igniting means may be employed for activating the fuse 81, when desired. For this purpose, and by way of illustration, one such igniting means is shown. The nut 85 is secured to the interior wall of container 47 as by the welds 86 and threadedly receives the threaded body 87 of the "screw-in" rotary fuse igniter 88.

The inner end of the threaded portion 87 has a reduced diameter shank 89 and upon the end face thereof there is provided as at 90, an igniter match mount, faced with a friction and ignition material similar to the material employed with safety matches, there being a central aperture therein in communication with the aperture 92 formed in shank 89, as best shown in FIG. 7.

Mounted upon the interior of the wall bracket 82 in longitudinal registry with element 90, there is provided a disc-like match mount faced at 91 with a chemical, such as a combination as phosphorus and sulphur which, when rubbed by the rotary fuse igniter base 90 is adapted to ignite the fuse 81, which extends through a central aperture, or recess 93 in igniter face 91.

Accordingly there is provided a small combustion chamber defined by the apertures 92 and 93 into which the fuse 81 projects and by which the fuse may be ignited and which thereafter successively ignites the combustible smoke producing agent 80 to thus fill and continue to fill the chamber 77 of the container with a smoke to be dispensed either through the valve housing or through the fitting 71.

While one form of igniter has been shown, it is contemplated that other types may be employed in order to ignite the smoke producing block 80. In operation, the fuse 81 is ignited by rotating the igniter head 88 so that the friction surface 90 operatively engages the combustible igniter surface 91 for the production of a flame suitable for igniting the fuse, 81, connected with the chemical smoke pot 79—80.

Accordingly there is shown in FIG. 5, a smoke dispenser wherein the smoke may be initially stored within

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the container 47 or may be produced therein by the ignition of the chemical smoke pot 79—80. Also there is shown a manually controlled valve assembly at the upper end of the container 47 for the dispensing of smoke under the action of a suitable propellant.

It is contemplated also that instead of the dispenser valve structure 52, shown in FIG. 5, that any other form of aerosol valve or spring biased valve may be employed for the purpose of dispensing smoke from container 47.

The fitting 78 is normally adapted for the application of compressed air or some other compressed propellant medium to the interior of container 47. It is contemplated that the compressed air could be supplied, if desired, by a tank storing compressed air, or by a suitable hand pump.

Referring to FIGS. 1 through 3, one form of simplified valve control is shown on the valve housing 31. It is contemplated that a conventional aerosol type valve could be employed for the same purpose.

A means have been shown in FIG. 1 for the production of smoke through the intersection of the ingredients 18 and 19. It is contemplated also that this could be replaced by the storage within container 11 of a quantity of powdered charcoal or carbon, or the like for the production of a smoke cloud under the action of a suitable propellant, which may be stored within the container in the first instance, and upon release of the valve permits a flow through the valve outlet and nozzle 37 to the conduit 41 for delivery at the point of usage.

The fragmentary illustration of a conduit at 45, FIG. 4, may, for example, be an air conditioning conduit, a carburetor throat or the exhaust tail pipe of an internal combustion engine, for illustration.

While several embodiments of the invention have been shown by way of illustration, it is contemplated that the structure above defined may be modified within the terms of the claims hereinafter set forth.

Having described my invention, reference should now be had to the following claims.

I claim:

1. A smoke dispenser comprising a hermetically sealed container confining a pressurized gaseous propellant, a smoke producer including a chambered member projected partially down into and secured to said container, a

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smoke producing agent on the bottom of said chambered member, a sealed crushable capsule adjacent said agent, there being a series of apertures formed through the wall of said chambered member for communication with said propellant, a capsule crusher movably projected down into said chambered member, normally spaced from said capsule and on movement adapted to crush said capsule releasing its chemical for coaction with said agent, a valve chamber mounted on and in communication with said chambered member, and a dispenser outlet communicating with said valve chamber and including a spring biased manual normally closed valve means.

2. In the smoke dispenser of claim 1, an internally threaded connector nozzle secured over the outlet end of said dispenser outlet, and a flexible cone-shaped adaptor having a threaded fitting at its reduced end threaded into said nozzle, the enlarged end of said adaptor being positionable over an enlarged intake means for delivering of smoke thereinto.

3. A smoke dispenser comprising a hermetically sealed container confining a pressurized gaseous propellant, a smoke producer, including an interiorly threaded chambered member projected down into and secured to said container, a smoke producing agent on the bottom of said chambered member, a sealed crushable capsule on said agent, there being a series of apertures formed through the wall of said chambered member for communication with said propellant, a capsule crusher threaded down into said chambered member, spaced from said capsule and on relative rotation of said container adapted to crush said capsule releasing its chemical for coaction with said agent, a valve chamber mounted on said capsule crusher, said crusher having a bore establishing communication between said valve chamber and the interior of said chambered member, and a dispenser outlet communicating with said valve chamber and including a spring-biased normally closed valve means.

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