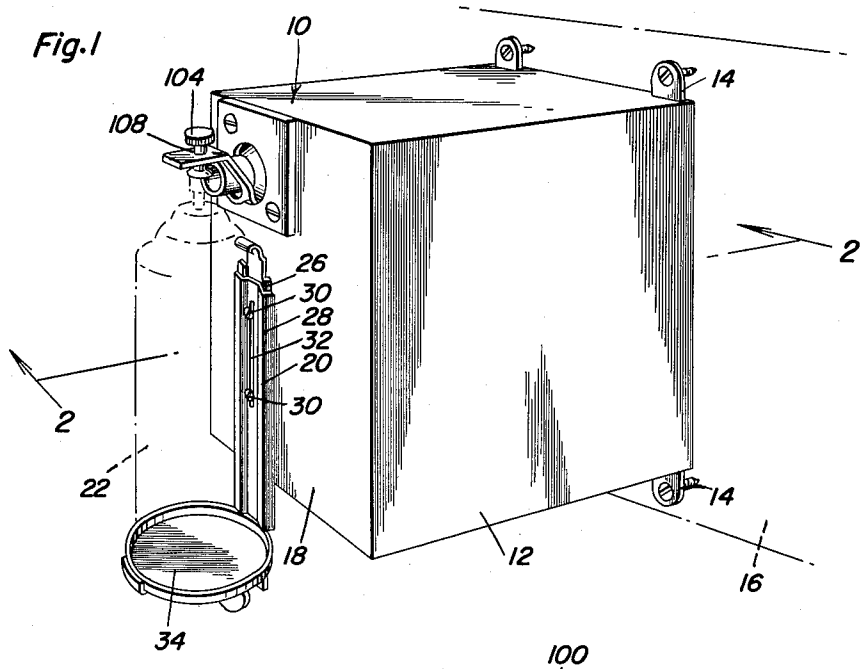
July 11, 1961 A. J. THOMAS ET AL 2,991,912

SPRAY APPARATUS

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Fig. 1



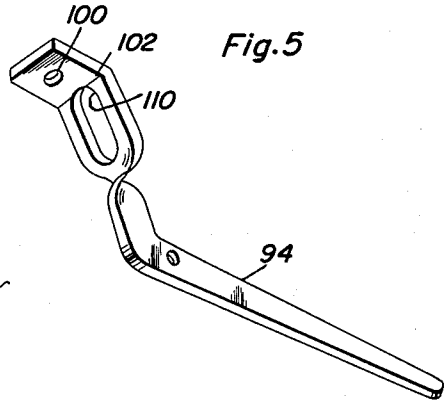
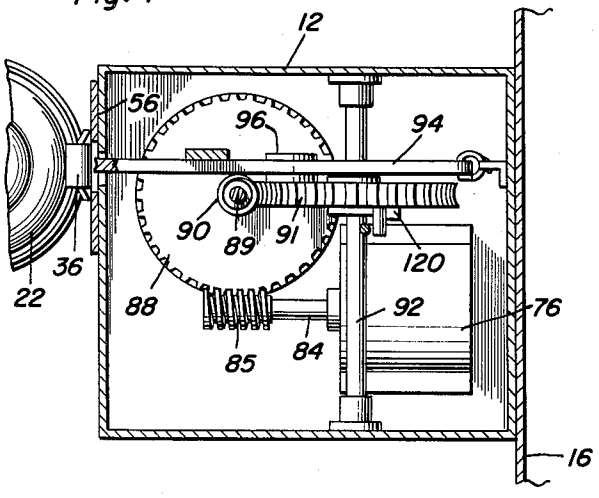


Fig. 5

Fig. 4



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SPRAY APPARATUS

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Fig.2

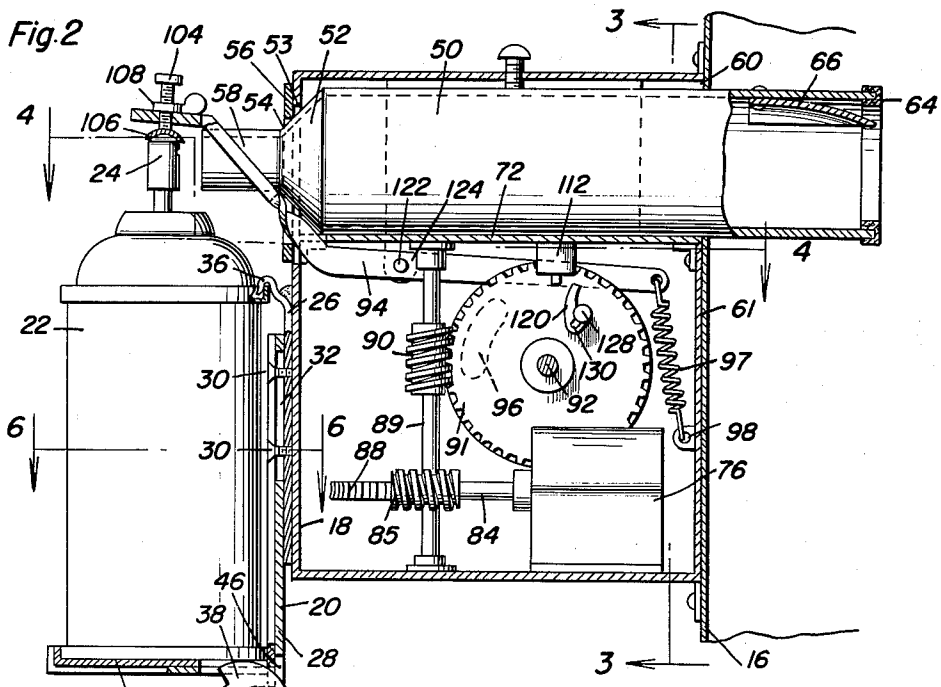


Fig.3

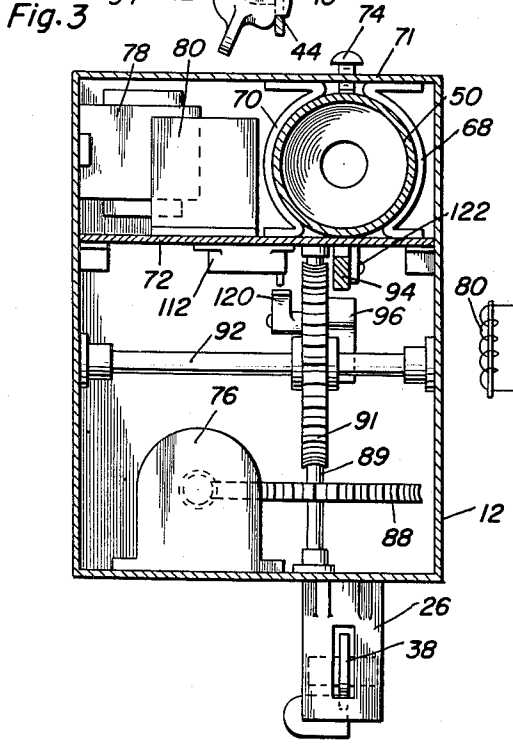


Fig.6

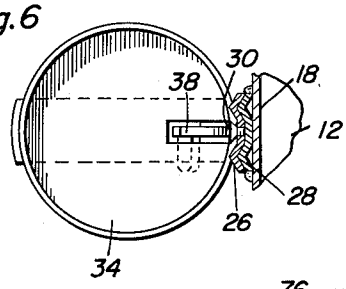
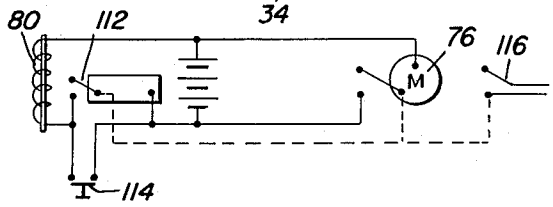


Fig.7



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SPRAY APPARATUS

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4 Claims. (Cl. 222—70)

This invention relates to a device for discharging discrete charges of liquid into an area and more particularly to apparatus for emitting periodic charges of deodorant or other liquid into the heating ducts or the air conditioning systems in buildings of any type.

An object of the invention is to provide apparatus for discharging discrete quantities of deodorant vapor or other vapors into the duct work of a building in order that the deodorant can be distributed within the entire building thereby saving time and energy involved in using spot sprays.

A further object of the invention is to provide a handy, small and practical unit which can be operatively connected with the blower circuit or some other circuit of either the air conditioning equipment or the heating equipment in hot air systems, the unit so constructed that an electric motor is set into motion in response to an external stimulus, for example operation of the furnace or air conditioning circuit or a component part thereof or, for example in response to the operation of a switch. When the unit motor is set into motion it cycles the apparatus so that a charge of vapor is emitted from a pressure container and through a barrel which is adapted to connect into the previously mentioned duct work or which may be otherwise discharged. An example of another application of this invention is in a large lavatory, for example a lavatory such as would be found at a baseball park, stadium, auditorium etc. A unit constructed in accordance with the invention could be arranged to discharge discrete quantities of deodorant during a preset time cycle. During peak loads, for example during a football game, the unit could be set into motion and the time cycle adjusted so that the repetition of discrete charges is increased.

However, the major application of this invention is in connection with buildings in order to avoid individual spraying of rooms or other spaces in the building. Every room or space which is equipped with a duct discharge will have a discrete quantity of scented air periodically passed through it and into the room by use of this invention.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of apparatus constructed in accordance with the invention, the same applied to a conventional duct which, for the purposes of example may be the bonnet of a furnace or the plenum chamber adjacent to the bonnet or some other centrally located main duct from which the smaller ducts emanate.

FIGURE 2 is a sectional view taken on a line 2—2 of FIGURE 1.

FIGURE 3 is a sectional view taken on a line 3—3 of FIGURE 2.

FIGURE 4 is a sectional view taken on a line 4—4 of FIGURE 2.

FIGURE 5 is a perspective view of a lever which constitutes part of the invention.

FIGURE 6 is a sectional view taken on a line 6—6 of FIGURE 2.

FIGURE 7 is a schematic illustration of a wiring diagram showing a battery operated motor that is actuated

manually by closing a switch or operated by the external stimulus derived from operation of a furnace blower cycle.

In the accompanying drawings there is a unit 10 exemplifying the apparatus which achieves the purposes of the invention. The unit is constructed of a support having the form of a case 12 with means, for example, mounting ears 14, by which to attach the case onto the side wall 16 of a duct, plenum chamber or some other part of a hot air heating system or an air conditioning system. One wall 18 of support 12 has a holder 20 secured to it by which to retain a container 22. This container is conventional in all respects. It is a container which has deodorant or some other liquid in it under a pressure head. The discharge outlet of the container is controlled by valve 24 whose mechanism is unshown. These containers are so well known as to be evident without detailing the internal structure thereof. By deflecting the valve nozzle, the valve (unshown) opens permitting a charge of the liquid, in the form of a vaporous spray, to be emitted from the container.

Holder 20 consists of a pair of rails 26 and 28 which are angular in cross-section and which are nested with each other so as to be extensible. Bolts 30 are passed through a slot 32 in rail 28 and are threaded in capped openings in rail 26. Therefore, rail 28 can be adjusted with respect to rail 26, and rail 26 is fixed, as by spot welding, to wall 18. Supporting platform 34 is fixed to the adjustable rail 28 and moves up and down as this rail is adjusted with respect to the comparatively fixed rail 26. The lower part of the container 22 rests on the platform. Hook 36 on the upper extremity of rail 28 faces downwardly and is adapted to engage a rim on container 22. The bottom of the container is engaged by a locking cam 38 which is mounted for rotation on pivot 40, the latter carried by an ear 42 on rail 28. There is a land 44 in cam 38 adapted to engage an edge of opening 46 in rail 28 and this functions as a latch after passing over a slight enlargement of the cam. While being rotated, another surface of cam 38 presses against the bottom of the container 22 assuring that the hook 36 is in firm engagement with the rim of the container. By virtue of this construction the size of holder 20 can be varied to accommodate different sizes of containers 22.

Nozzle 50 in the form of a tube has one end reduced as at 52 and passed through openings 53 and 54 in wall 18 and face plate 56 respectively. Concentric inlet pipe 58 on the end of the reduced part 52 of nozzle 50 has its bore in alignment with the general longitudinal axis of the barrel or nozzle 50 and is in direct alignment with the valve controlled outlet of the container 22. The spray that is discharged from the container 22 passes into and through barrel 50. The opposite end of the barrel is passed through an opening 60 in the back wall 61 of the support 12 and projects a considerable distance therethrough in order to enter the duct 16. An absorbent liner 64, for example of sponge rubber, any of the cloth or cloth-like products or certain plastics having absorbent qualities, may be used for this absorbent lining. Its purpose is to collect the large drops or droplets which may accumulate during the normal operation of the apparatus. It prevents these drops from falling into the duct 16. Deflector 66 is attached to the barrel 50 and is located near the discharge end of the barrel so that the spray passing through the barrel 50 is directed in the desired manner.

The barrel 50 is held in place by mounting brackets 68 and 70 which are secured to the top wall 71 of support 12 and to the horizontal partition 72 in the support. Bolt 74 that is threaded in top wall 71 and engages a surface of barrel 50 also aids in holding the barrel firmly secured in place. Partition 72 functions as a support for other parts of the apparatus. In one embodiment of

this invention, the motor **76** of the apparatus is an A.C. motor. The box **78** above partition **72** (FIGURE 3) will then represent a transformer while box **80** represents a relay. In another and equally as important embodiment of the invention (see FIGURE 7) a D.C. motor **76** is used thereby omitting the necessity of transformer **78** but requiring a battery, preferably a high quality dry cell battery, to power the motor. This apparatus, then, does not rely on an external A.C. source of electrical potential. Therefore it can be placed anywhere in the system and does not have to be wired to the existing service. Even if the existing service and a D.C. system is desired, the transformer **78** is simply substituted by a rectifier such as a diode, selenium cell or tube.

Motor **76** has an output shaft **84** on which worm **85** is fixed. The worm is in engagement with gear **88** that is fixed to shaft **89**, the latter mounted for rotation in bearings on the bottom of support **12** and on the partition **72**. Worm **90** is fixed to shaft **89** and is in engagement with a worm wheel **91**. This is mounted on a transverse shaft **92** that is carried in bearings supported by the two side walls of support **12**. The worms and worm wheel and gears and shafting constitute means for oscillating lever **94** and this actuates valve **24** of container **22**.

The remaining structure that is involved in these means may be seen best in FIGURE 2. It consists of a cam **96** as fixed to a face of worm wheel **91** and that contacts one end of lever **94** and lifts that end of the lever during a part of a single rotation of worm wheel **91**. Spring **97** constitutes yielding means for opposing the movement of the valve operator for arm **94**, one end of spring **97** attached to the extremity of arm **94** and the other end anchored, for example to ear **98** on support **12**. There are means at the end of arm **94** opposite to spring **97**, for adjustably attaching to the valve **24**. These means consist of hole **100** in the angulated extremity **102** of arm **94**. Setscrew **104** is threaded into and through hole **100** and has a foot **106** at its lower extremity. There is a concave lower surface on this foot which is in engagement with the top of valve **24**. Lock nut **108** is on the shank of setscrew **104** and engages a surface of the extremity **102** of arm **94** to hold the setscrew **104** in selected adjusted positions. Slot **110** is in the extremity **102** of arm **94** to provide clearance for the reduced end pipe **58** of barrel **50**.

As shown in FIGURE 7 motor **76** is energized by a source of electrical potential, for example the battery shown in this figure. The motor is controlled by relay **80** and this is actuated by either of two switches. Micro switch **112** is wired in circuit with the motor and relay to energize the motor in response to operation of switch **112**. Manual switch **114** is also similarly wired. The relay **80** can be wired with the furnace or air conditioning electrical circuit **116** to cause motor **76** to be energized in response to operation of the blower or some other part of the heating or air conditioning plant with which the apparatus is used.

Micro switch **112** is carried by partition **72** and is in the path of travel of the dog **120**. The dog is secured to a face of worm wheel **91** and is adapted to engage the micro switch and cause it to function in response to each rotation of worm wheel **91**. Accordingly, when the apparatus is cycled, as by closing any of the switches mentioned, the cam **96** lifts operator **94** and causes the valve **24** of container **22** to deflect slightly. A charge of vapor laden gas, usually compressed air, is discharged into barrel **50** and ultimately into the duct **16**. The valve **24** will remain open so long as the arm **94** is held in an elevated position, the latter mounted for oscillatory movement intermediate its ends on pivot **122** that is carried by a depending bracket **124** on partition **72**. However, as soon as the cam **96** passes the arm operating position, spring **97** quickly returns the arm enabling valve **24** to return to its normal position, that being closed. As worm wheel **91** continues to rotate, it will reach a point where dog **120** operates micro switch **112** and this will open the circuit to motor **76**. The apparatus will remain idle until switch **112** or switch **114** or the relay **80** otherwise demands the motor **76** to operate.

Dog **120** can be attached in place by a setscrew **128** passing through a slot **130** therein. Accordingly, the dog can be positioned and held on worm wheel **90** so that it does not engage the micro switch **112** during rotation of worm wheel **91**. In this condition, the apparatus will continue to operate in a timed repeating cycle. Ordinarily, though, continual operation is not required.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In a unit for discharging discrete quantities of spray into a duct, a support, an adjustable holder carrying a pressurized liquid container, said container having a discharge valve and outlet, said holder fixed to said support, a lever pivoted to said support having adjustable engaging means on one end thereof positioned proximate said discharge valve for engagement therewith, an electric motor, means including a rotary wheel operatively connected with and directly driven by said electric motor for oscillating said lever, said lever oscillating means also including a cam on one face of said rotary wheel engageable with a portion of said lever to pivot said one end of said lever into engagement with said discharge valve and cam means on said holder pressing said container against said lever.

2. In a unit for discharging discrete quantities of spray into a duct, a support, a holder carrying a pressurized liquid container, said container having a discharge valve and outlet, said holder fixed to said support, a lever pivoted to said support having adjustable engaging means on one end thereof positioned proximate said discharge valve for engagement therewith, an electric motor, means including a rotary wheel operatively connected with and driven by said motor for oscillating said lever, said lever oscillating means also including a cam on one face of said rotary wheel engageable with said lever to pivot said one end of said lever into engagement with said discharge valve, cam means on said holder pressing said container against said lever, a barrel carried by said support and in registry with said outlet through which said spray is adapted to be conducted into the duct, and an absorbent liner in said barrel to accumulate and absorb the drops and large droplets of spray to thereby prevent them from entering the duct.

3. In a unit for discharging discrete quantities of spray into a duct, a support, a holder carrying a pressurized liquid container, said container having a discharge valve and outlet, said holder fixed to said support, a lever pivoted to said support having adjustable engaging means on one end thereof positioned proximate said discharge valve for engagement therewith, an electric motor, means including a rotary wheel operatively connected with and driven by said motor for oscillating said lever, said lever oscillating means also including a cam on one face of said rotary wheel engageable with said lever to pivot said one end of said lever into engagement with said discharge valve, cam means on said holder pressing said container against said lever, a source of electrical energy connected to said motor, a switch serially interposed between said source and said motor to control the energization thereof, and means responsive to operation of said rotating wheel for operating said switch.

4. The combination of claim 3 wherein said switch

opening means includes a dog adjustably carried by said rotating wheel.

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