

July 5, 1960

C. P. ORR

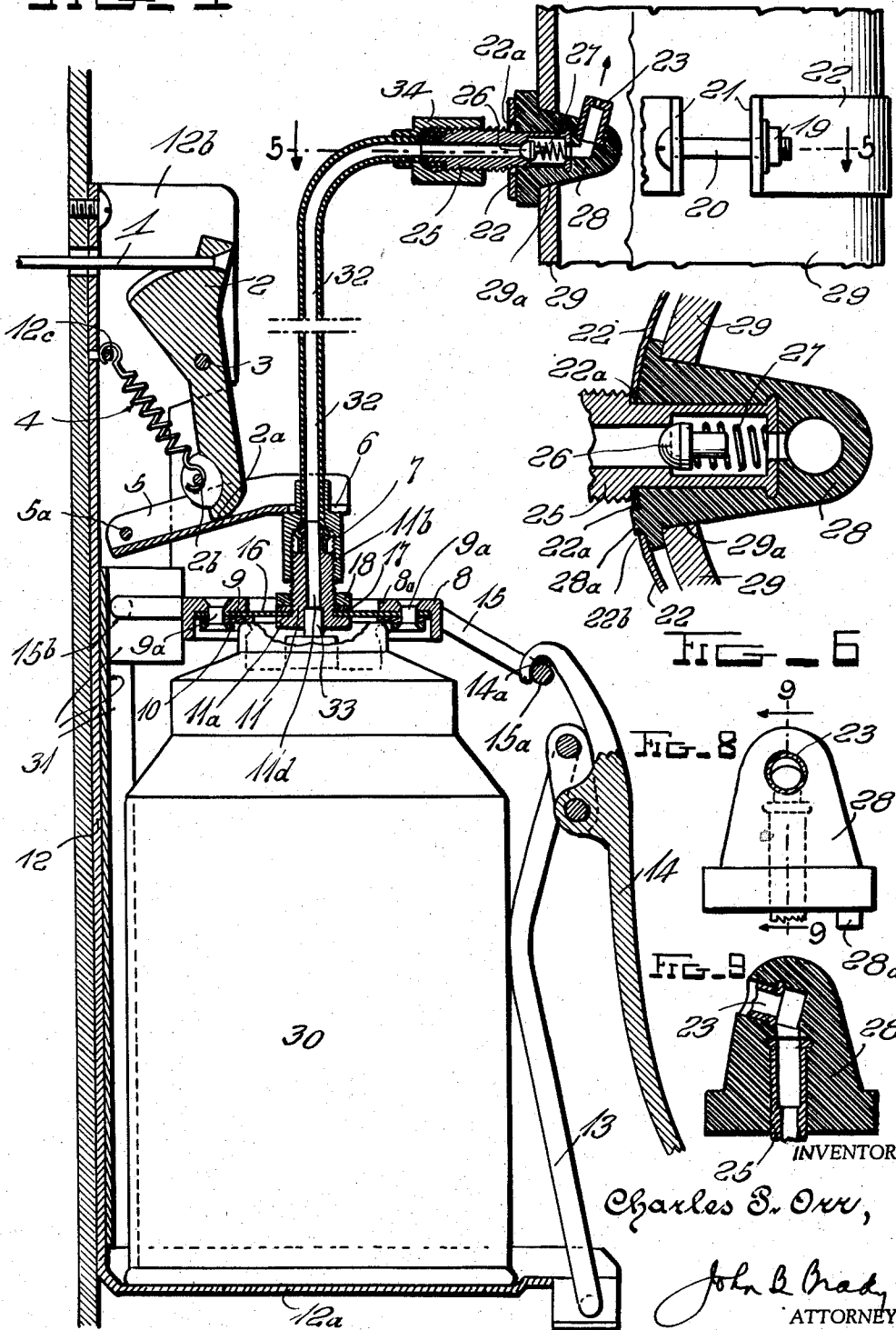
2,943,766

SPRAY APPLICATOR SYSTEM FOR INJECTING STARTING FLUID
INTO DIESEL AND GASOLINE ENGINES

Filed Dec. 30, 1957

3 Sheets-Sheet 1

FIG. 1



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FIG. 2

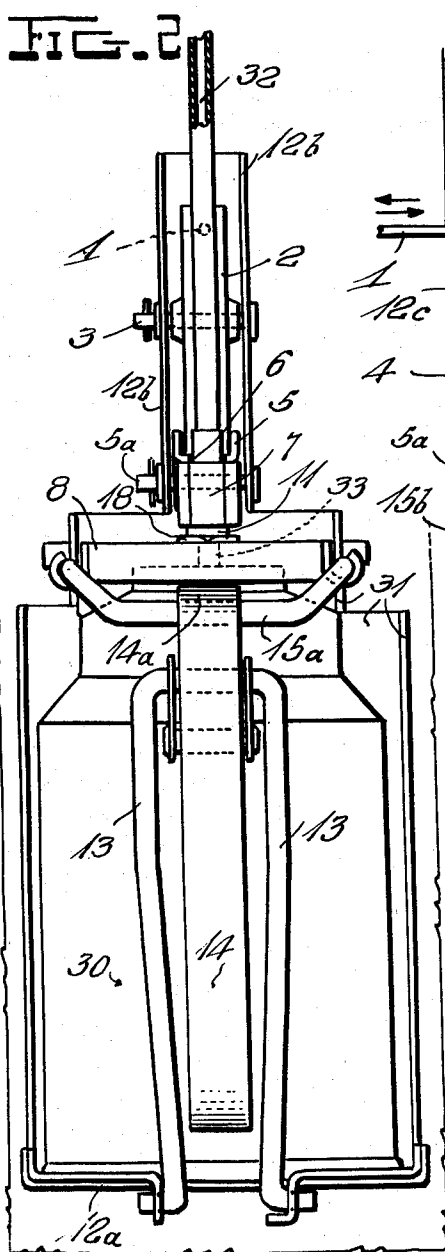


FIG. 7

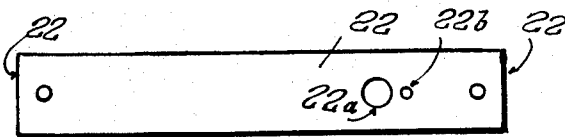
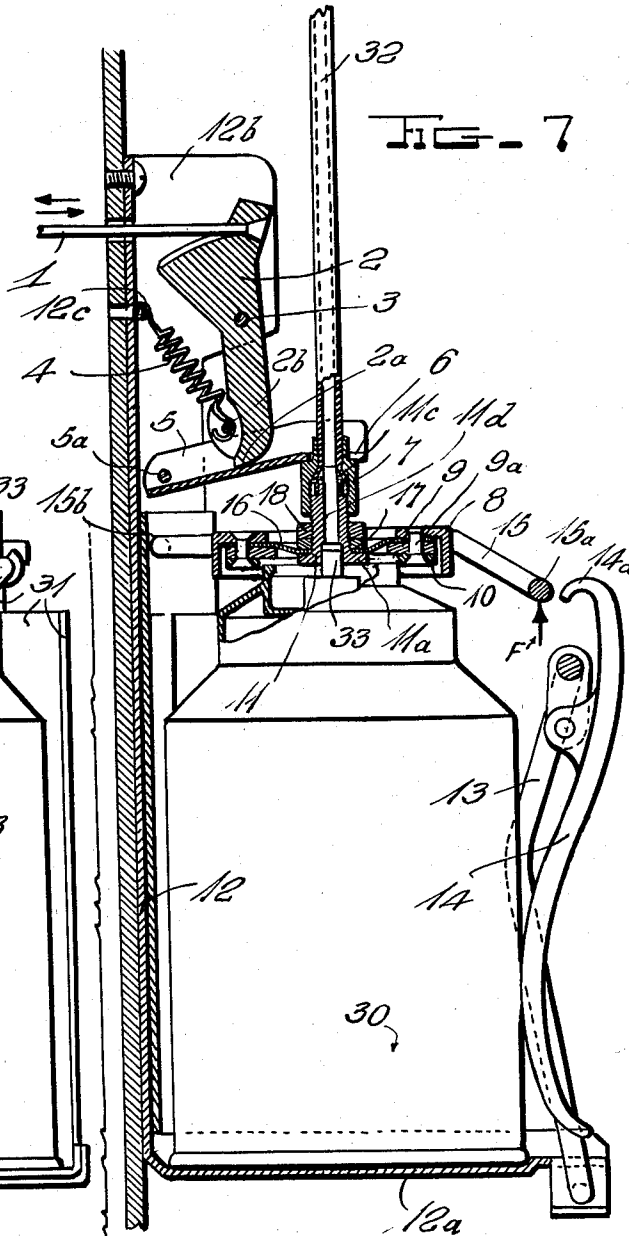


FIG. 11

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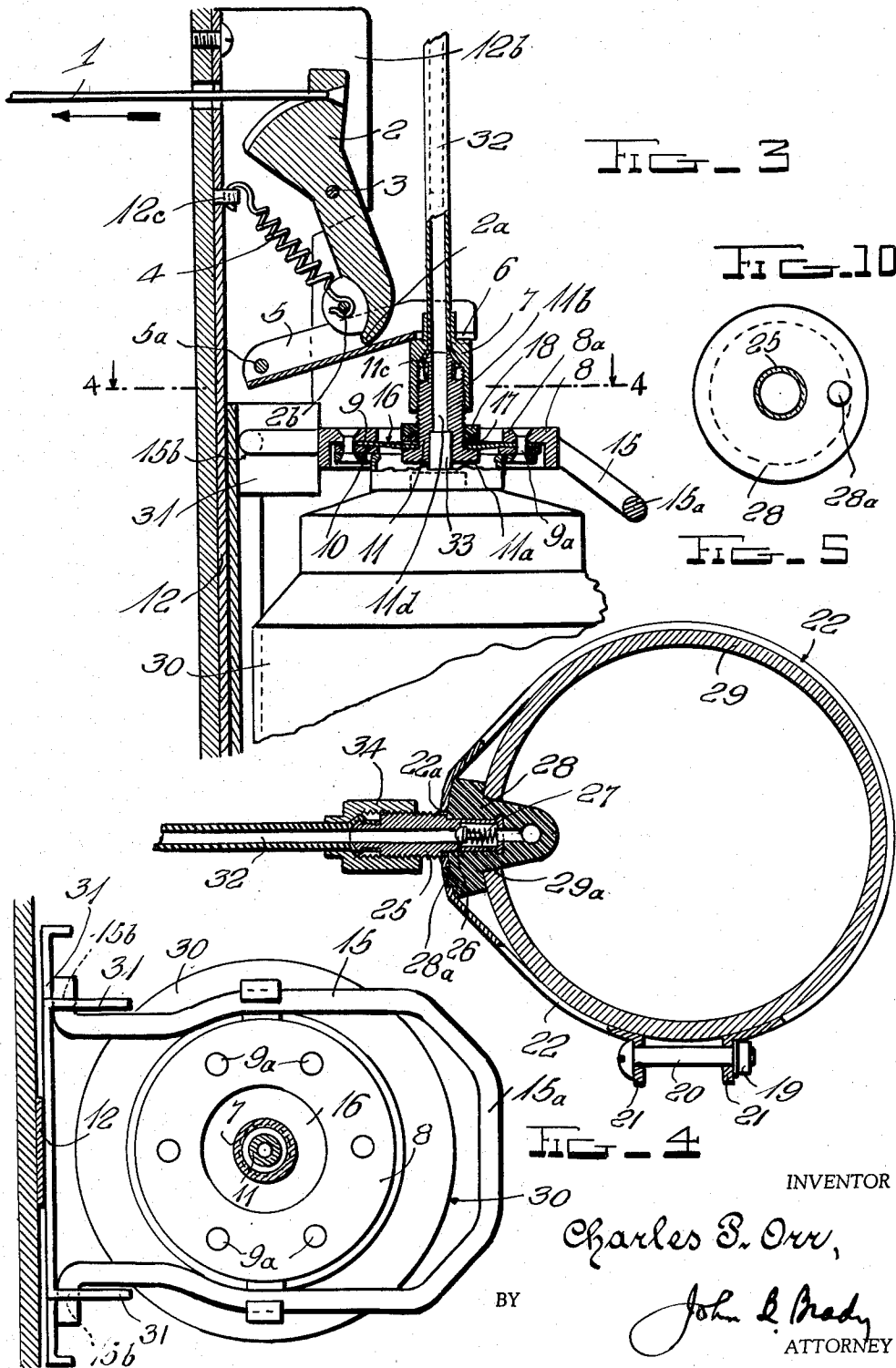
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SPRAY APPLICATOR SYSTEM FOR INJECTING STARTING FLUID INTO DIESEL AND GASOLINE ENGINES

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6 Claims. (Cl. 222—180)

My invention relates broadly to starting systems for internal combustion engines and more particularly to means for injecting an atomized combustible spray of starting fluid into diesel and gasoline engines for facilitating starting in cold or damp weather.

This application is a continuation in part of my copending application Serial Number 522,199 filed July 15, 1955, now Patent No. 2,860,009 for Fuel Atomizing Spray Device.

My application Serial Number 522,199 filed July 15, 1955 for Fuel Atomizing Spray Device discloses a structure of fuel supply and atomizing device for injecting starting fluid into the air intake passages of gasoline and diesel engines.

Attention is also invited to my application Serial Number 537,188 filed September 28, 1955, now Patent No. 2,894,716 for Engine Priming Line Attachment for Dashboards showing an arrangement of priming line attached to the intake manifold of an engine and extending to the dashboard of a vehicle so that the engine can be primed with an atomized spray of starting fluid delivered to the intake ducting of an engine from a position adjacent the dashboard through a flexible tube extending from the position of application of the atomized spray to the intake ducting of the engine.

One of the objects of my invention is to provide an applicator for use with diesel and gasoline engines for utilizing conventional pressurized cans of starting fluid which may be readily installed, removed, and replaced in the applicator for applying a starting spray in an atomized state to diesel and gasoline engines effective under conditions of low temperature for starting such engines.

Another object of the invention is to provide a construction of applicator which forms a substantially closed system with a diesel or gasoline engine for cold or damp weather starting in which an atomized spray of starting fluid is introduced into the intake ducting of the engine without opening any portion of the intake system to dust particles or allowing offensive odors from the starting fluid to escape into the immediate area about the engine.

Still another object of the invention is to provide an applicator for utilizing an atomized spray of starting fluid for starting diesel and gasoline engines derived from the conventional pressurized can utilized as a pressure cartridge wherein the atomized spray may be started and stopped and re-established at the will of the operator and pressure fed into the intake ducting of the engine at such times as may be required over a period of time until the pressure supply in the pressurized can is exhausted.

Other and further objects of the invention reside in the mechanical assembly for coupling a supply tube to the discharge orifice of a pressurized can of starting fluid and securing the can in position ready for instantaneous operation at necessary intervals for the supplying of an atomized spray of starting fluid to a diesel or gasoline engine as set forth more fully in the specification hereinafter following by reference to the accompanying drawings in which:

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Fig. 1 is a diagrammatic and schematic side elevational view with certain parts shown in vertical sections and illustrating a typical installation of controlled starting fluid supply system connected with the intake ducting of an engine;

Fig. 2 is a front elevational view of the mounting means for the pressurized fuel supply can of the installation shown in Fig. 1;

Fig. 3 is a fragmentary composite elevation and vertical sectional view similar to the view illustrated in Fig. 1 but showing the next progressive operational step in operating the fuel supply valve on the pressurized can for supplying fuel to the line leading to the intake ducting of the engine;

Fig. 4 is a horizontal sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a transverse sectional view through the intake ducting of the engine and showing particularly the atomizing valve which directs the starting fluid in a spray in a position displaced inwardly from the wall of the intake ducting;

Fig. 6 is an enlarged transverse sectional view of the atomizing valve structure which connects the fuel line with the intake ducting;

Fig. 7 is a view similar to the views shown in Figs. 1 and 3 but illustrating the manner in which the pressurized can is removed and replaced by raising the sealing means by manual force applied at the position F.

Fig. 8 is a side elevational view of the spray button drawn on an enlarged scale;

Fig. 9 is a longitudinal sectional view taken through the spray button on line 9—9 of Fig. 8;

Fig. 10 is an end view of the spray button at the scale on which Figs. 8 and 9 are drawn, and

Fig. 11 indicates on an enlarged scale the manner in which the spray button is secured in position with respect to the engine intake ducting.

My invention is directed to an arrangement of applicator which is readily installed adjacent a diesel or gasoline engine for receiving conventional pressurized cans of starting fluid which may be readily installed and replaced from time to time for supplying an atomized starting spray of a highly combustible mixture to the intake manifold of the engine. The arrangement is such that a closed path is established from the pressurized can to the intake manifold of the engine eliminating leakage of the fluid or atomized spray so that no offensive odors issue from the system. The spray may be started and stopped at the will of the operator. The invention provides a considerable improvement over previous applications of starting fluid to engines in that heretofore to be effective two men were required to utilize a pressurized can of starting fluid effectively in an engine, one man being required to press on the starter, in a truck for instance, and the other man being required to simultaneously spray the fuel under the air cleaner of the engine or into the intake ducting or into a hole of the air intake manifold. Heretofore when the starting fluid spray was directed under the air cleaner much of the fluid was lost. This has led to the practice of removing the air cleaner so that the pressurized can when held in the hand might be used to direct a spray into the open end of the manifold. This has the serious drawback that dust and foreign matter can get into the manifold at the same time and ruin the engine. Also if the starting fluid is applied through a hole in the intake manifold or into the intake ducting, dust can get into the engine. This invention provides a closed system where no dust can get into the engine and no odors from the starting spray can be distributed around the engine. One man can operate the system of the present invention as the release of fluid from the pressurized can is remotely controlled from the dashboard or the engine control panel of the vehicle. The system is

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safe as no inflammable ether gets into the air. The system is very effective as the operation of the engine can be diagnosed by ear because guided by ear the engine may be supplied more starting fluid when the engine appears to be dying and may be given less starting fluid when the engine is getting rough in operation. The structure of the invention may be mass produced inexpensively.

The atomizing valve located in the intake ducting of the engine is displaced interiorly of the ducting so that the spray of fuel is introduced at an angle of approximately 15 degrees with respect to the wall of the intake ducting in an upstream direction. This insures effective starting by the mixture of vaporized ether and fine liquid droplets suspended and carried along with the air.

The line or flexible tubing leading from the pressurized can to the atomized valve at the intake ducting is maintained full of liquid but isolated from the atomizing valve in the intake ducting by means of a check valve. There is no waiting for the tube or line to fill up and there is no after dribble after release. This insures a well atomized spray during the entire discharge period. It also permits close auditive control by giving more starting fluid when the engine shows signs of stalling and stopping discharge of the starting fluid when the engine shows signs of roughness.

My invention provides means for the selective application of starting fluid to diesel or gasoline engines, that is, a system in which repeated applications of starting fluid may be given to the engine at desired times. The system is not to be confused with attempts which have been heretofore made of piercing a container to provide one time application of a priming medium to the engine. Such containers have been thrown away after each start. In the instant invention the pressurized can filled with starting fluid is used repeatedly from time to time for effecting a starting operation until the contents of the can have been exhausted at which time it is necessary to renew the can by replacement of a fresh can.

Referring to the drawings in more detail reference character 1 designates the pull cable which leads to the dashboard of a vehicle in a position controllable from the driver's seat in the vehicle for operating the starting device of this invention. The pull cable 1 extends through an aperture in the rear wall of a bracket 12 as shown in Fig. 1 which is mounted close to the engine and separated by a barrier from the driver's area. The bracket 12 provides mounting means for the pressurized can of starting fluid represented at 30. The can 30 is gripped by a latch-wire 13 pivoted beneath the transverse shelf 12a of the bracket 12 and extended generally in a vertical direction where it is coupled as shown to a latch-handle 14 having a hook portion 14a which engages the end of the loop 15a of the press-down wire 15 which is pivoted at 15b in the vertically extending frame members 31 supported in bracket 12. The press-down wire 15 carries the seal cap 8 which is annular in shape and provides mounting means for the seal diaphragm 16 which is peripherally secured in position by means of the gasket 9 peripherally fastened to the intumed flange 8a of the seal-cap 8 by means of rivets 9a. A disc-seal 10 is provided to insure a tight connection between the seal-diaphragm 16 and the seal-cap 8. It will be noted that in replacing a renewal can in the bracket 12 the sealed diaphragm is centered over the top of the pressurized can in such position that the gasket 9 carried by the flange 8a of the seal-cap 8 serves as a sealing means for the rim of the top of the can while the bore 11d of the nipple-discharge member 11 is centered over the discharge orifice 33. When the pressurized can is clamped in position by downward movement of the latch-handle 14 and inward movement of the latch-wire 13 the pressurized can is securely maintained in position against dislodgment due to vibration of the vehicle as shown in Fig. 2. The upward movement of the seal-cap 8 when released by latch-handle 14 is adequate as permitted by upward movement of the

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lever 5 and the flexible plastic tube 32 to permit withdrawal of an empty can and the reinsertion of a fresh pressurized can.

The center of the seal-diaphragm 16 carries the nipple-discharge member 11 which is provided with a circular flange 11a embracing the lower surface of the seal-diaphragm 16 and coating with the sealing washer 17 which fits over the screw threaded sleeve portion of the nipple-discharge member 11 and bears against the upper surface of the seal-diaphragm. The sleeve portion of the nipple-discharge member 11 is externally screw-threaded as represented at 11b over which the diaphragm hold-down nut 18 is secured for maintaining the nipple-discharge member 11 in a vertical position centrally of the seal-diaphragm 16. The upper terminus of the nipple-discharge member 11 terminates in a central frusto-conical shaped head 11c over which the end of the flexible plastic tube 32 is fitted. An internally screw-threaded nipple 7 embraces the end of the flexible plastic tube 32 and is screw-threaded over the external screw threads 11b of the nipple-discharge member 11 for clamping the end of the flexible plastic tube 32 into coupled relationship with the frusto-conical shaped head 11c. The nipple-discharge member 11 has a hollow tubular bore 11d which aligns with the hollow center of the flexible plastic tube 32 for the passage of an atomized spray therethrough. The internal bore 11d of the nipple-discharge member 11 fits over the end of the depressible discharge valve 33 of the pressurized starting fluid can 30 for enabling the atomized spray to be directed through the bore of the nipple-discharge member 11 and through the frusto-conical shaped head 11c and into the flexible plastic tube 32.

As heretofore explained the operation of the device is controlled by the pull cable 1 as shown in Fig. 1 from the driver's position in the vehicle. Pull cable 1 connects with the upper end of cam 2 journaled at 3 on a pin mounted in the channel-shaped extension 12b connected with bracket 12. The lower end of cam 2 engages the lever 5 which is pivoted at 5a in the channel-shaped portion 12b of the bracket 12 and is bifurcated on the end thereof as represented at 6 for embracing the flexible plastic tube 32 and engaging the end of the nipple 7 for exerting downward pressure on the assembly constituted by nipple 7, nipple-discharge member 11, the flexible plastic tube 32 connected therewith and the seal-diaphragm 16. This downward pressure is produced as the high point 2a of cam 2 tends to ride down on the lever 5 as shown in Fig. 3. The cam 2 is biased by means of cam spring 4 which connects at one end with the rear wall of bracket 12 as indicated at 12c and at the other end with a recessed portion of cam 2 as indicated at 2b. In normal position the high point 2a of cam 2 is elevated from lever 5 but upon application of a force on pull cable 1 the high point 2a of cam 2 moves against the upper surface of lever 5 thereby forcing the bifurcated end 6 of lever 5 downwardly for depressing the atomizing valve 33 of pressurized can 30 bringing about distribution of the atomized spray from the contents of pressurized can 30 through the flexible plastic tube 32. The lever is of channel-shaped construction and possesses sufficient rigidity to permit downward pressure to be applied thereto over a sufficient distance to effect opening of the atomizing valve 33 of the pressurized can 30.

The flexible plastic tube 32 extends to the air intake ducting of the engine which I have represented at 29 as shown more clearly in Fig. 5. A strap 32 is fastened around the air intake ducting 29 and is provided with apertures 22a and 22b therein which respectively receive spray button nipple 25 and projection 28a of the spray button body 28 for maintaining the body 32 in position projecting through an aperture 29a in the air intake ducting 29. Strap 22 is secured in position by means of a strap screw 20 extending through the adjacent ends 21 of the strap 22 and fastened by means of the strap screw nut 19. The spray button 28 includes an atomizing dis-

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charge tube 23 shown more clearly in Fig. 6 terminating in an orifice shown more clearly in Fig. 1, which is supplied with an atomized spray through a spray button nipple 25 connected with the flexible plastic tube 32 through coupling 34. The spray button nipple 25 encloses a check valve 26 operative against an associated valve seat under control of check valve spring 27. As the pressure enters flexible plastic tube 32 from the pressure supply exerted by pressurized can 30 valve 26 is displaced to open position allowing the spray to be atomized through discharge tube 23 and the orifice therein in an upstream direction spaced from the interior wall of the intake ducting.

The pressurized can 30 is readily insertable in position in the bracket 12 with scarcely more than the feel of the installer who may be working in heavily gloved hands at freezing temperatures. The replacement of used cans of starting fluid is extremely convenient and the effectiveness of the atomized spray in the starting of the engines is very substantial as has heretofore been explained. Fig. 7 shows the method of replacement where latch-handle 14 is first disengaged from the press-down wire 15 by detachment of hook portion 14a from the end of loop 15a whereupon a manual force is applied at F to slightly raise the press-down wire 15 elevating the seal-diaphragm 16 sufficiently to allow the empty can 30 to be withdrawn from shelf 12a of bracket 12 and a fresh can replaced in position whereupon the press-down wire 15 is again secured in position by engagement of loop 15a and hook portion 14a by operation of latch-handle 14. The flexibility of seal diaphragm 16 is sufficient to provide the required displacement of press-down wire 15 to allow removal and replacement of the pressurized can 30.

While I have described the valve actuator on the pressurized can as being of the press-down type I have disclosed my invention in connection with this type of valve for illustrative purposes as I fully appreciate that my invention is equally applicable for use with pressurized containers having other types of valves, such as the press-forward and side motion type of valve. Accordingly, throughout the claims I have described the actuating valve in the pressurized can generally as any type of valve to be used in a pressurized container adapted to be mounted in the applicator system of my invention.

While I have described my invention in certain of its preferred embodiments I realize that modifications may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. Mounting means for a pressurized fluid container of the type containing an annular shoulder disposed concentrically therearound and a central fluid discharge valve and valve actuator in one end of the container adapted to discharge fluid contents from the pressurized container by the pressure within the container upon actuation of said fluid discharge valve, comprising a support for receiving a pressurized container, a member pivoted on said support and movable to a position engaging the annular shoulder of said container and the said valve actuator of the pressurized container when the container is mounted in the support, said member including a seal-cap engageable with the annular shoulder of the container, a flexible diaphragm supported by said seal-cap and carrying a nipple discharge member engageable over the discharge valve actuator of the container, a fluid delivery tube connected with said nipple discharge member and displaceable bodily with said nipple discharge member and with the flexing of said diaphragm and the movement of said discharge valve actuator and remote control means for actuating said nipple discharge member for correspondingly actuating said discharge valve actuator and effecting the discharge of the pressurized contents of said container through said fluid delivery tube.

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2. Mounting means for a pressurized fluid container of the type containing an annular shoulder disposed concentrically therearound and a central fluid discharge valve and valve actuator in one end of the container and adapted to discharge fluid contents from the pressurized container by the pressure within the container upon actuation of said fluid discharge valve, as set forth in claim 1 in which said nipple discharge member has an external engaging portion, means for actuating said nipple discharge member comprising a lever pivoted at one end on said support and bifurcated on the free end thereof and embracing said fluid delivery tube and bearing upon the external engaging portion of said nipple discharge member, and means operated by said remote control means for moving said lever to a position for actuating said fluid discharge valve actuator.

3. Mounting means for a pressurized fluid container of the type containing an annular shoulder disposed concentrically therearound and a central fluid discharge valve and valve actuator in one end of the container and adapted to discharge fluid contents from the pressurized container by the pressure within the container upon actuation of said fluid discharge valve, as set forth in claim 1 in which said seal-cap is supported by a press-down wire pivoted on said support and terminating in a loop and wherein a latch-handle terminating in a hook portion is pivotally mounted with respect to said support and is displaceable to a position for connecting the hook portion thereof with said loop for clamping said container to said support.

4. Mounting means for a pressurized fluid container of the type containing an annular shoulder disposed concentrically therearound and a central fluid discharge valve actuator in one end of the container and adapted to discharge fluid contents from the pressurized container by the pressure within the container upon actuation of said fluid discharge valve, as set forth in claim 1 in which said pivoted member and said flexible diaphragm are cumulatively displaceable through a distance sufficient to allow the insertion and removal of a pressurized container with respect to said support.

5. Mounting means for a pressurized fluid container of the type containing an annular shoulder disposed concentrically therearound and a central fluid discharge valve actuator in one end of the container and adapted to discharge fluid contents from the pressurized container by the pressure within the container upon actuation of said fluid discharge valve as set forth in claim 1, in which said means for actuating said nipple discharge member comprises a lever pivoted at one end to said support and bifurcated on the free end thereof and embracing said fluid delivery tube and bearing upon the external engaging portion of said nipple discharge member and a pivoted cam having a cam face on one end operating with respect to said lever and connected at the other end with said remote control means, said cam face operating to displace said lever and said discharge valve actuator to selectively discharge fluid from said container into said fluid delivery tube.

6. Mounting means for a pressurized fluid container of the type containing an annular shoulder disposed concentrically therearound and a central fluid discharge valve and valve actuator in one end of the container and adapted to discharge fluid contents from the pressurized container by the pressure within the container upon actuation of said fluid discharge valve, as set forth in claim 1 in which a discharge nozzle is connected with the remote end of said fluid delivery tube with a check valve interposed between said discharge nozzle and the remote end of said fluid delivery tube, whereby said fluid delivery tube remains filled with starting fluid when said check valve cuts off the passage from the remote end of the fluid delivery tube to said discharge nozzle.

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