Nov. 11, 1958 C. P. ORR 2,860,009

FUEL ATOMIZING SPRAY DEVICE

Filed July 15, 1955

Fig. 1.

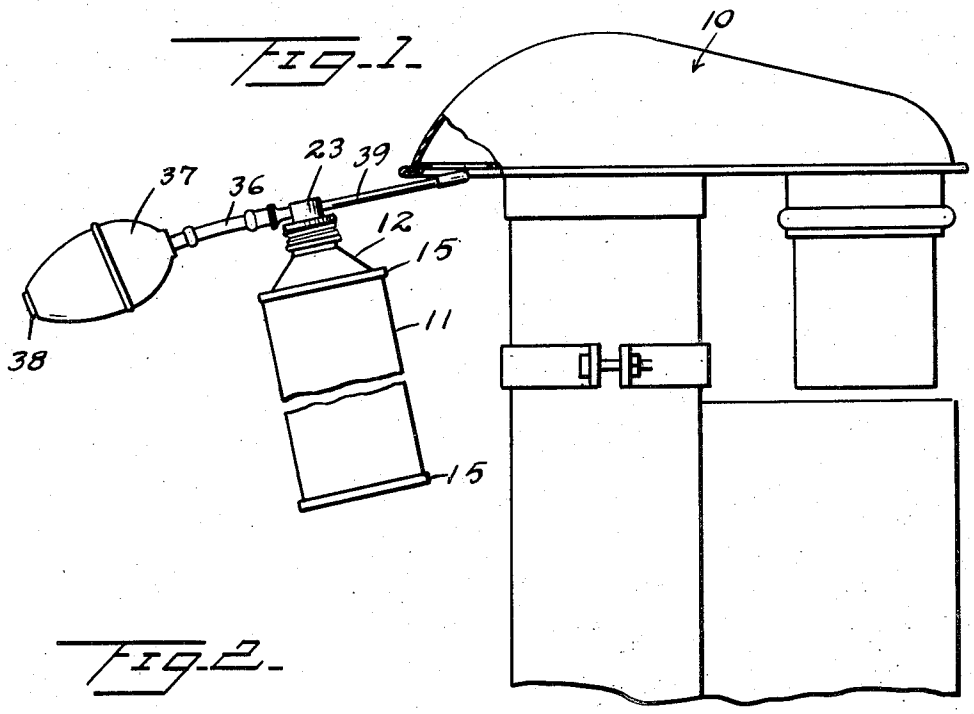


Fig. 2.

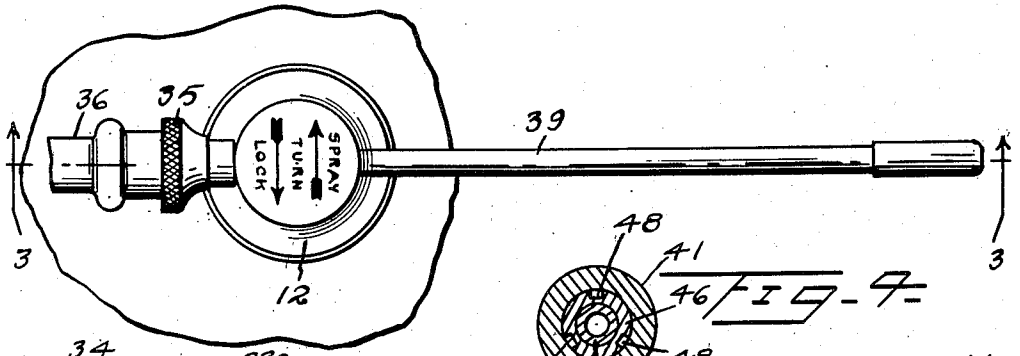


Fig. 4.

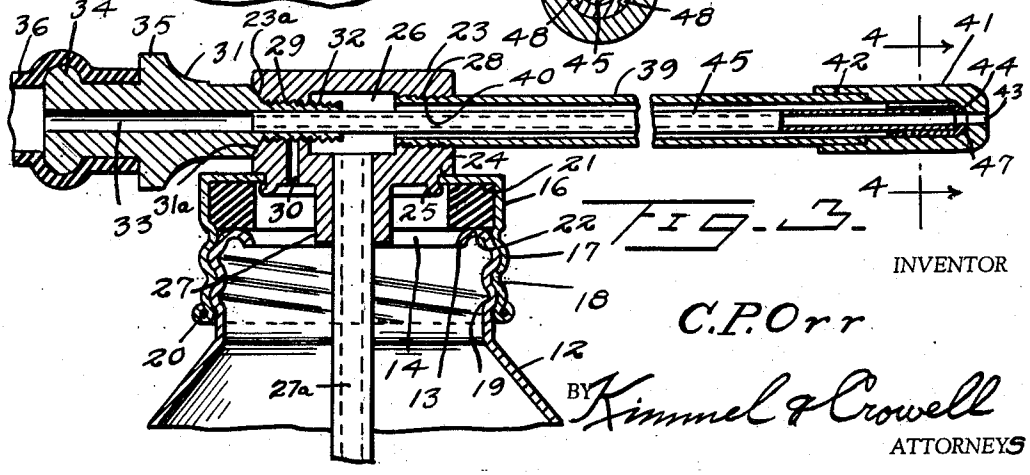


Fig. 3.

INVENTOR

C.P.Orr

BY Kimmel & Crowell

ATTORNEYS

United States Patent Office 2,860,009 Patented Nov. 11, 1958

2,860,009

FUEL ATOMIZING SPRAY DEVICE

Charles Phillips Orr, Camden, N. J., assignor to Spray Products Corporation, Camden, N. J., a corporation of New Jersey

Application July 15, 1955, Serial No. 522,199

3 Claims. (Cl. 299—88)

The present invention relates to the application of a special starting fluid to internal combustion engines and more particularly to a means of spraying a special starting fluid into the air intake.

One of the primary objects of this invention is to provide a spray device for atomizing and injecting starting fluid into the air intake passages of an internal combustion engine.

Another object of this invention is to provide a spray device of the character described which may be sealed when not in use, to prevent evaporation of the starting fluid.

A further object of this invention is to provide a spray device of the character described with interchangeable spray reservoirs so that the spray mechanism may be changed from reservoir to reservoir as the spray fluid is used.

A still further object of this invention is to provide a spray device of the character described with a sealing valve which can be operated by rotation of the spray bulb.

Another object of the invention is to provide means to assist in starting engines which have been subjected to extremely cold climatic conditions.

Other and further objects and advantages of this invention will become more apparent from a consideration of the following specification when read in conjunction with the annexed drawings, in which:

Figure 1 is a side elevation of the invention shown in spraying position with relation to an internal combustion air intake;

Figure 2 is a top plan view of the device partly broken away;

Figure 3 is an enlarged vertical cross section with parts broken away, taken on the line 3—3 of Figure 2, looking in the direction of the arrows, and

Figure 4 is a vertical cross section taken on the line 4—4 of Figure 3, looking in the direction of the arrows.

Referring now more specifically to the drawing, reference numeral **10** indicates generally the air intake of an internal combustion engine. It should be understood that the term "internal combustion engine" used throughout this specification refers to both classes of engines, namely, those employing an electrical ignition system and those which are fired automatically due to high compression. These engines are known in the trade as gasoline engines and diesel engines.

A spray can **11** is provided with a reduced neck portion **12** at the upper end thereof which terminates in an inwardly extending flange **13** surrounding the opening **14**. The spray can **11** is constructed with sealing beads **15** at the top and bottom edges of the cylindrical portion of the can.

A cap **16** of slightly larger diameter than the flanged portion **13** of the spray can **11** is provided with a depending flange **17** which is screw-threaded as at **18** to engage the screw-threaded portion **19** of the can **11**. The bottom of the flange **17** of the cap **16** is reverted to form

a rolled edge **20**. A sealing ring **21** formed of rubber or other compressible material is positioned within the cap **16** so as to engage the upper edge **22** of the reduced neck portion **12**, effectively sealing the cap **16** to the can **11**.

The cap **16** is provided with a central opening therethrough through which is passed a cap fitting **23**. Cap fitting **23** is recessed as at **24**, and a flange **25** is pressed outwardly under the cap **16**, sealing the cap fitting **23** air-tight to the cap **16**. The cap fitting **23** is provided with a central hollow area **26** and has depending from the lower face of the cap fitting **23** a tubular extension **27** which supports the vertically depending tube **27*a*** that extends into the starting fluid in can **11** communicating with the hollow area **26**. The hollow area **26** serves as a temporary fuel storage chamber for accumulating sufficient starting fluid from the tube **27*a*** for establishing an adequate supply head of fluid in fluid conduit **39** for insuring continuous atomization at spray opening **43** of nozzle **41**. A screw-threaded bore **28** extends through the side of the cap fitting **23** with its axis in a generally horizontal plane. A second screw-threaded bore **29** of a diameter somewhat smaller than the screw-threaded bore **28** extends through the other side of the cap fitting **23** in axial alignment with the bore **28**. Both of the bores **28** and **29** extend from the outside of the cap fitting **23** to the hollow area **26**. An air bleeder port **30** communicates with the bore **29** and the interior of the can **11** to permit the passage of air therethrough.

An adapter fitting **31** is provided with an elongated tubular extension **32** which is screw-threaded along its outer surface and is adapted to be threaded into the bore **29**. The body **23** at the side adjacent the bore **29** has an inwardly tapered recess **23*a*** which coacts with a tapered annular complementary surface **31*a*** on fitting **31** forming a seal when the device is not in use. When a seal is established between recess **23*a*** and surface **31*a*** the tubular extension **32** also closes or seals port **30** preventing leakage of fluid from can **11**. The adapter fitting **31** has a port **33** extending longitudinally therethrough and is provided at its end opposite the tubular extension **32** with an outwardly extending flange **34**. A flange **35** is positioned on said fitting **31** at a point spaced apart from the flange **34**. The screw threaded portion of tubular extension **32** is of such length that the fitting is maintained in position for sealing body **23** against leakage when fitting **31** is backed off from body **23** in the threads of the threaded bore **29** sufficiently to uncover port **30** and provide the recycling path for fluids through tube **27*a***, chamber **26** and port **30** back to the reservoir constituted by can **11**, while bulb **37** is being repeatedly and successively compressed. That is to say, the external threads on the fitting **31** and the internal threads in the bore **29** outwardly beyond the port **30** cover a lineal distance sufficient to maintain the fitting **31** in position with respect to can **11** and in sealed relation to the body **23**. A flexible conduit **36** is adapted to engage over the flange **34** with its end seated against the flange **35**. An atomizer bulb **37** formed of flexible material is secured to the opposite end of the flexible conduit **36**. The atomizer bulb **37** is provided with an air-tight valve **38** to permit air to enter the bulb **37** after the bulb **37** has been compressed.

A tubular fluid conduit **39**, having one end thereof screw threaded as at **40**, is threaded into the bore **28** of the cap fitting **23** and extends a substantial distance longitudinally therefrom. The outer end of the fluid conduit **39** is provided with a fluid nozzle **41**. The nozzle **41** is recessed at **42** so as to permit the fluid conduit **39** to be inserted therein. The outer end of the nozzle **41** is provided with a spray opening **43** of substantially re-

duced diameter with the inner face of the spray opening outwardly bevelled to form a valve seat **44** surrounding the spray opening **43**.

An air conduit **45** is seated within the bore **33** of the fitting **31** and extends coaxially with the fluid conduit **39**. A tubular valve member **46** is provided with a bevelled valve face **47** which is adapted to cooperate with the valve seat **44** when the air conduit **45** is completely contained within the fluid conduit **39**. The outer face of the tubular valve **46** is longitudinally grooved as at **48** to permit fluid to pass therethrough to reach the spray opening **43**.

In the use and operation of the invention, the can **11** is filled with a starting fluid preferably having the following properties:

Specific gravity	0.7
Flash point, ° F	−20
Ignition temperature, ° F	366
Auto ignition temperature, ° F:	
Gasoline	495
Diesel #1 fuel	490
Diesel #2 fuel	494
Range of inflammability in air—Min. 2%—Max.	44%
Boiling point, ° F	95
Vapor pressure:	
32° F. absolute	3.5
60° F	6.8
95° F	14.7
104° F	17.6
122° F	24.7
Freezing point, ° F	Below −72
Auxiliary lubricant	Effective
Corrosion inhibitor	Effective
Anti-freeze	Effective
Color	Orange

The spray opening **43** of the device is brought into close proximity with the air-intake portion **10** of an internal combustion engine which may be a normal opening found in the apparatus or a special opening formed for the purpose. The atomizer bulb **37** is then revolved in a counterclockwise direction, unscrewing the tubular extension **32** from the cap fitting **23** which unseats the valve **47** from the valve face **44** and partially opens the air bleeder opening or port **30**. Pressure is then applied to the atomizer bulb **37** which produces a flow of air through the air conduit **45** which in turn by Venturi action draws starting fuel from the can **11**, spraying it in an atomized form into the air intake of the engine. A recycling path for the fluid is provided from the tube **27***a* through storage chamber **26** escaping through port **30** which is uncovered by tubular extension **32** and returning to the reservoir constituted by can **11** insuring a continuous supply of fluid in chamber **26** for delivery through fluid conduit **39** to the atomizing nozzle **41**. The engine is simultaneously operated by a conventional starter to create a vacuum at the air intake, pulling the starting fluid into the cylinders thereof. When the engine has been started the adapter fitting **31** is returned to the position shown in Fig. 3 in which tubular extension **32** is screw-threaded firmly into the bore **29** closing port **30** and establishing a sealed annular seat with cap fitting **23** as indicated at **23***a*.

One of the chief advantages of this invention is the portability of the completely sealed device. The can **11**, sealed but ready for use, can be carried in the tool box or elsewhere in the vehicle, without creating a fire hazard, so as to be available on the spot whenever difficult starting occurs. It should be understood, of course, that additional sealed reservoirs may be carried for attachment to the spray when the original reservoir is exhausted. With this invention there is no necessity to carry a large container of starting fluid for refilling purposes with the attendant dangers of explosion or fire.

Large containers create a fire hazard and, hence, it is desirable to have a container which can be immediately resealed after each use and the storage of which is no problem.

Having thus described a preferred embodiment of this invention, it will be understood that the same is offered merely by way of example, and that the invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A fuel atomizer for starting internal combustion engines comprising a fuel reservoir, a threaded tubular neck formed on the upper end of said reservoir, an internally threaded sleeve detachably engaged with said threaded neck, a cylindrical body, said body having an internal central hollow area constituting a fuel storage chamber and an axial bore extending from said chamber to the lower end of said body, said body having an annular recess formed in its lower edge portion, a radial flange on said sleeve engaging in said annular recess, a tube mounted in said axial bore and extending into said reservoir, said body having a threaded bore extending from said chamber radially outwardly through said body, said body having a diametrically opposed axial aligned second threaded bore extending from said chamber through said body, a port extending from said first threaded bore through the lower end of said body in spaced relation and parallel to said axial bore, an adapter fitting having an axial bore provided with an externally threaded tubular extension detachably engageable in said first threaded bore, resilient pump means secured to said fitting and adapted to pump air through the axial bore in said fitting, said threaded tubular extension cooperating to close the open upper end of said port extending from said first threaded bore when said adapter fitting is fully advanced into said body, an elongated conduit having an externally threaded end detachably supported in the second threaded bore in said body, a nozzle carried by the end of said elongated conduit opposite said threaded end, a valve seat formed internally of said nozzle, and a second conduit having one end thereof mounted in the axial bore in said fitting and having a valve face formed on its opposite end cooperating with the valve seat in said nozzle with said second conduit concentrically positioned with relation to said elongated conduit, the tube which extends into said reservoir from said chamber and the port which is uncovered by the externally threaded tubular extension providing a recycling path for fluid through said chamber into said reservoir while maintaining said chamber filled with fluid and subject to pressured discharge through said nozzle in an atomized spray.

2. A fuel atomizer for starting internal combustion engines as set forth in claim 1 in which said body is provided with a tapered annular sealing surface and wherein said adapter fitting has a complementary tapered surface providing a sealing connection between said fitting and said body while the threaded tubular extension of said fitting closes the port in said first threaded bore.

3. A fuel atomizer for starting internal combustion engines as set forth in claim 1 in which the externally threaded tubular extension of said fitting and the linearly threaded portion of said first threaded bore outwardly beyond the port therein provides a sufficient intercoupled relationship of the threads therein to maintain said fitting in sealed relation to said body and supported in respect thereto.

References Cited in the file of this patent

UNITED STATES PATENTS

1,545,102	Holmes	July 7, 1925
2,213,522	Holmboe	Sept. 3, 1940
2,730,093	Neely	Jan. 10, 1956