Oct. 4, 1966 W. D. RICHARDS 3,277,254

NOZZLE SWITCHES FOR FLUID DELIVERY SYSTEMS

Filed Nov. 4, 1963 2 Sheets-Sheet 1

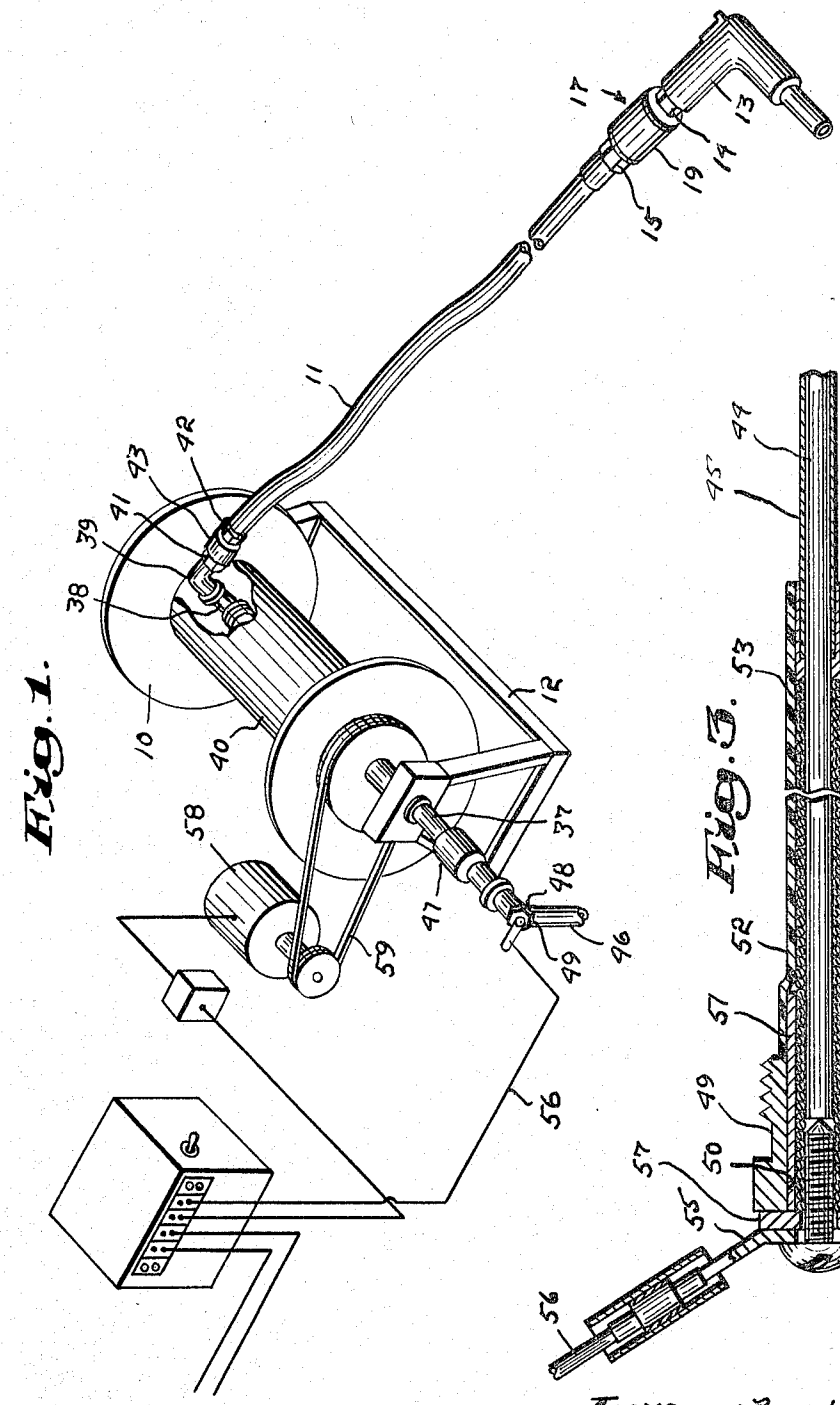


Fig. 1.

Fig. 3.

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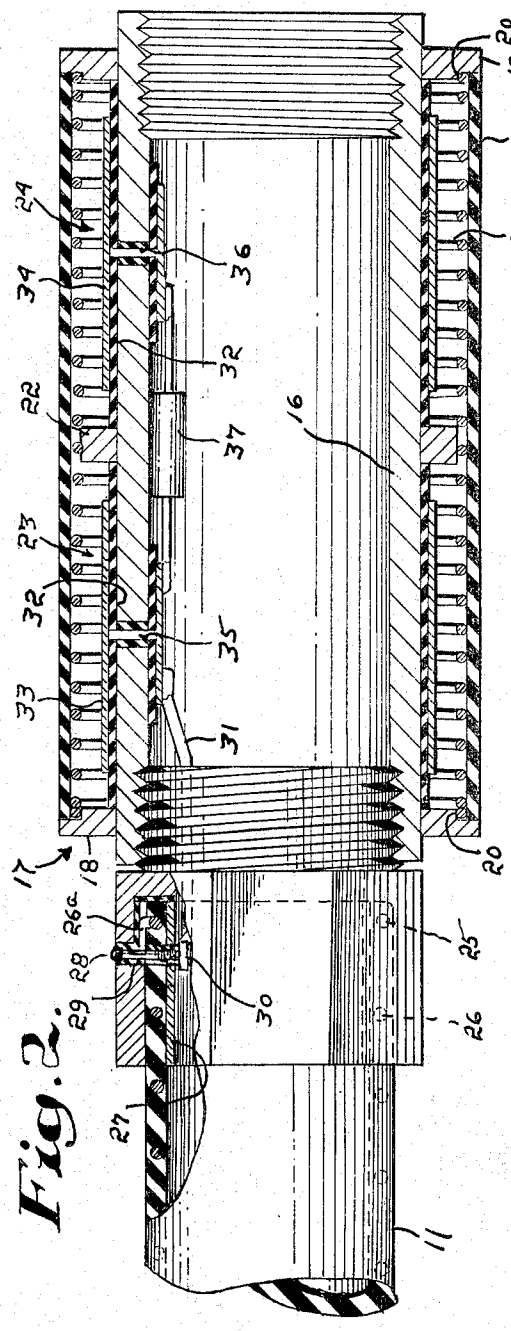


Fig. 2.

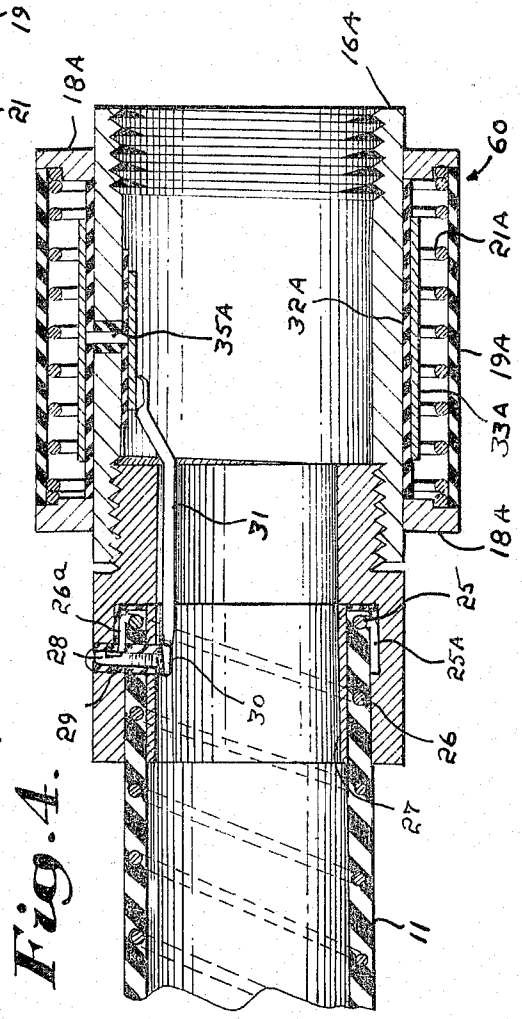


Fig. 4.

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NOZZLE SWITCHES FOR FLUID DELIVERY SYSTEMS

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6 Claims. (Cl. 200—52)

The present invention relates to switches and related circuitry for the nozzle of liquid delivery conduits.

While nozzle switches in accordance with the invention can be used in many fields for handling a wide range of fluids, problems involved in the delivery of residential fuel oil well illustrates the problems involved and the general objectives, novel features and advantages of the invention. In the delivery of fuel oil, the distance of the filler pipes, of the oil tanks from the nearest position to which the delivery truck can be driven varies considerably so that an oil delivery truck is customarily provided with a reel supporting a substantial length of hose.

The driver of the truck, while enabled thus to fill any tank on his route, has to pull out the required length of hose, fill the customer's tank, drag the hose back to the truck, and then rewind it on the reel. The truck engine is running with the pump in service until the driver returns to the truck. While the gasoline wasted at each stop is in itself an important factor, the difficulty that the driver has in hauling the hose around with the pump in operation are the problems with which the present invention is primarily concerned.

In accordance with the invention, these objectives are attained by providing each delivery hose with a switch at the nozzle end thereof, each switch to control at least one circuit, that controlling the reel motor circuit in either or both directions or that controlling the ignition and starter circuits, or both circuits, the hose having a pair of spirally disposed parallel conduits within its wall and insulated from each other.

Another objective of the invention is to provide a nozzle switch controlling a single circuit consisting of a conduit portion provided with a flexible insulating sleeve whose ends are connected to the conduit portion to provide a chamber. An insulated conductor includes a contact within the chamber supported by the conduit portion but insulated therefrom. Within the chamber there is a resilient, bare, conductor member in electrical contact with the conduit portion and normally spaced from the contact but engageable therewith when the sleeve is squeezed inwardly by the operator. Where two circuits are to be controlled, two such switches may be employed but it is preferred to provide a single nozzle switch with the chamber established by the flexible sleeve divided by an annular member to establish two separate chambers, each for the contact of a respective one of the two conductors and with each engageable by the resilient conductor means by squeezing the sleeve inwardly, forwardly, or rearwardly of the annular member.

In practice, one of the conductors of the hose is connected to the conduit portion of such a switch and the other extends within the conduit portion and is connected through it to the contact or contacts. Where two contacts are used, they are connected in series by an intermediate capacitator so that both alternating and direct current may be carried by the same conductor with the desired current flow being effected by squeezing the resilient conductor inwardly against the appropriate contact.

In the accompanying drawings, there are shown illustrative embodiments of the invention from which these and other of its objectives, novel features, and advantages will be readily apparent.

In the drawings:

FIGURE 1 is a somewhat schematic view of the delivery hose and reel of an oil delivery truck, the hose including a nozzle switch in accordance with the invention for controlling both alternating and direct current circuitry,

FIGURE 2 is a longitudinal section, on an increased scale, of the nozzle switch,

FIGURE 3 is a longitudinal section, on an increased scale, of the connection between the part of the lead that rotates with the reel and a fixed part thereof, and

FIGURE 4 is a longitudinal section of another nozzle switch in accordance with the invention for controlling a single circuit.

In FIGURE 1, a reel **10** for the hose **11** is shown as rotatably supported on a base **12** which, in practice, is mounted in any desired manner on the body, not shown, of a fuel oil delivery truck.

The nozzle **13** and the free end of the hose **11** are provided with fittings **14** and **15**, respectively, threaded into opposite ends of the conduit portion **16** of a generally indicated nozzle switch **17** shown in FIGURE 2.

The conduit portion **16** has a pair of annular supports **18** for the ends of a flexible, resilient, insulating sleeve **19**, typically of rubber, and the supports **18** have shoulders **20** which support the ends of a coiled spring **21**. The sleeve **19** and the spring **21** overlie an intermediate annular member **22** which divides the space between the sleeve **19** and the conduit portion **16** into chambers **23** and **24**.

The hose **11** is shown as having a pair of spiralled and parallel insulated conductors **25** and **26** incorporated in its wall. The end of the hose **11** within the fitting **15** has an internal metal sleeve **27** and the conductor **25** has a bared end **25***a* turned back over the outside of the hose **11** and lodged against the fitting **15** to ensure good electrical contact therewith. As the fitting **15**, the conduit portion **16** and its supports **18**, and the spring **21** are conductors of electricity, any part of the spring **21** becomes a switch contact.

The conductor **26** is likewise exposed at that end of the hose **11** and has a bared end **26***a* turned back over the outside of the hose **11** and is connected to a screw **28** extending through the hose **11** and the sleeve **27** and insulated therefrom and from the fitting **15** as indicated at **29**. A cap **30** on the screw **28** connects a lead **31** thereto which extends within the conduit portion **16**.

Within the chambers **23** and **24** and supported on the outer surface of the conduit portion **16** by insulation **32** are sleeve-like contacts **33** and **34**, respectively, each having an insulated connection extending into the interior of the conduit portion. The connection of the contact **33** is indicated at **35** and is connected to the lead **31**. The connection for the contact **34** is indicated at **36** and a capacitor **37** connects its inner part to that of the connection **36**.

It will be apparent that the operator, by squeezing the sleeve **19** inwardly on one or the other side of the intermediate member **22** can bring the spring **21** into engagement with underlying contact thus to close a circuit with the circuit immediately opening if the operator releases his grip.

It will be noted that the axial support of the reel **10** includes a conduit **37** extending into the reel and provided with a radially disposed part **38** including an elbow **39** whose outer end is exposed exteriorly of the reel cylinder **40** having a fitting **41** connected to a fitting **42** on the proximate end of the hose **11** by a coupling sleeve **43**. The fittings **41**, **42**, and the sleeve **43** are the counterparts of the fittings **14** and **15** and the conduit portion **16** as to the conductors **25** and **26** within the wall of the hose **11** with the conductor **25** grounded by connecting an end to the fitting **41** in the same manner that its other end is connected to the fitting **15**.

One end of the conductor **26** is brought within the fitting **41** in the same manner that its other end is brought within the fitting **15**. In the case of the fitting **41**, however, the end of the conductor **26** is joined to a wire rod **44** provided with an insulating sleeve **45**.

The conductor **37** is connected to the delivery pipe **46** from the pump, not shown, by a swivel joint **47** and the delivery pipe **46** has an elbow **48** having a threaded bore to receive a threaded plug **49**, see FIGURE 3.

The plug **49** has a bore **50** receiving a sleeve **51** of stock that is a non-conductor of electricity and of a length to protrude beyond the inner end of the plug **49** to provide means for holding an end of a flexible sleeve **52** of stock that is a non-conductor of electricity and that covers a length of coil spring **53** which receives the end of the wire rod **44**, the received end being bare and in electrical contact therewith. In this connection, it will be understood that the rod **44** turns with the reel **10**. It may be a rather free fit within the coil spring **53** because it is never straight enough to avoid contact with a few turns thereof so that a good electrical contact is ensured with negligible friction between the relatively moving parts.

A screw **54** extends through the connector **55** of the lead **56**, an insulating washer **57**, and into contact with the proximate end of the rod **44** and also anchoring the proximate end of the spring **53**.

The lead **56** may be connected to both alternating and direct current sources in view of the nozzle switch thus described with one source, when its circuit is completed, operating ignition and starter circuits, for example, and the other circuitry for controlling the motor **58** which has a belted drive **59** for the reel **10**.

With such a control, the operator not only has control of the oil delivery but also of the motor and of the reel while with the nozzle switch generally indicated at **60** in FIGURE 4, only one basis of control is provided. As the embodiment of the invention detailed in FIGURE 4 is the same as that detailed in FIGURE 2 except that it has but one chamber and one conductor, the same reference numerals are employed but these are distinguished by the suffix addition "A," it being understood that the conductor therein shown may be either for a direct or an alternating current source.

I claim:

1. In a nozzle switch, a tubular conduit portion of electrically conductive stock, a cylindrical electrical contact supported on the outside of said tubular conduit and insulated therefrom, an outer sleeve approximately concentric with and spaced from said cylindrical contact with its ends supported by said conduit portion beyond the ends of said cylindrical contact, said sleeve being of stock that is flexible and a non-conductor of electricity, resilient bare conductor means between said sleeve and said cylindrical contact and normally biased out of engagement with said cylindrical contact, said conductor means including electrically conductive connections with said conduit portion, said conductor means so underlying said sleeve that, when said sleeve is pressed inwardly to a predetermined extent in any area in an annular zone inclusive of said electrical contact, said conductor means is urged against its bias into contact with said cylindrical contact, and a circuit including leads, one connected to said conduit portion and the other within said conduit portion and extending outwardly through and insulated from said conduit portion and connected to said cylindrical contact.

2. The nozzle switch of claim **1** in which the resilient bare conductor means is a coiled spring.

3. The nozzle switch of claim **1** in which the conduit portion includes a pair of axially spaced, annular supports for the ends of the outer sleeve and the ends of the resilient bare conductor means.

4. In a nozzle switch, a tubular conduit portion of electrically conductive stock, a pair of axially spaced, cylindrical electrical contacts supported on the outside of said tubular conduit and insulated therefrom and from each other, an outer sleeve approximately concentric with and spaced from said cylindrical contact with its ends supported by said conduit portion beyond the remote ends of said cylindrical contacts, said sleeve being of stock that is flexible and a non-conductor of electricity, resilient bare conductor means between said sleeve and said cylindrical contacts, said conductor means including electrically conductive connections with said conduit portion, an annular member on said conduit portion between said contacts and underlying said sleeve and said conductor means between the ends thereof, said conductor means so underlying said sleeve that, when said sleeve is pressed inwardly to a predetermined extent in any area in an annular zone inclusive of either electrical contact, said conductor means is urged against its bias into contact therewith, and a circuit including leads, one connected to said conduit portion and the other within said conduit portion and extending outwardly through and insulated from said conduit portion and connected to said cylindrical contact.

5. The nozzle switch of claim **4** in which the resilient bare conductor means is a coiled spring whose middle is supported by the annular member.

6. The nozzle switch of claim **4** in which there is a lead within the conduit portion including conductors extending outwardly through the conduit portion and insulated therefrom, one for each contact and connected therewith, and means between the conductors of the lead operable to provide electrically distinguishable current characteristics at the contacts.

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