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J. CHURCHWARD

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FLUID DELIVERY APPARATUS

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Fig. 1.

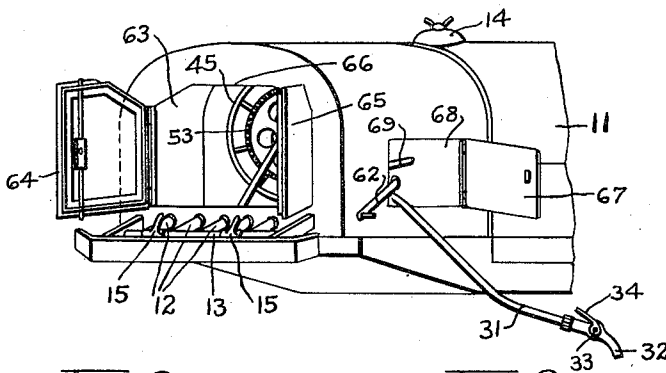


Fig. 2.

Fig. 3.

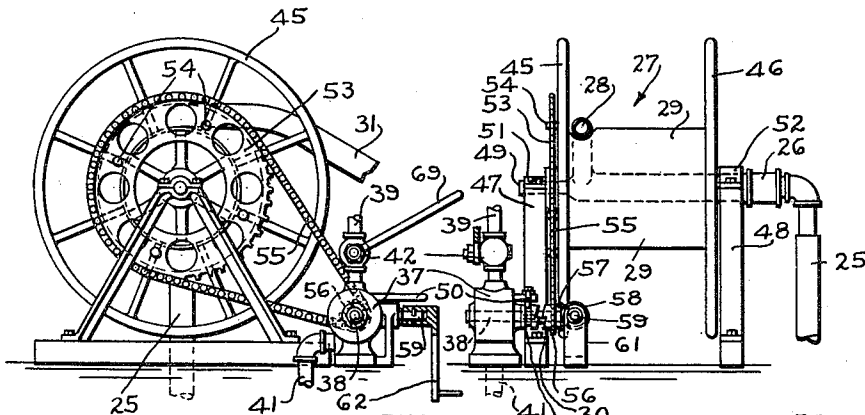


Fig. 4.

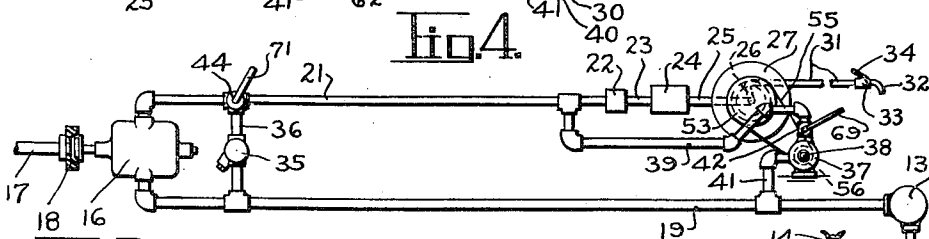
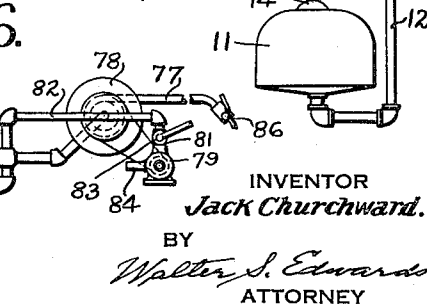
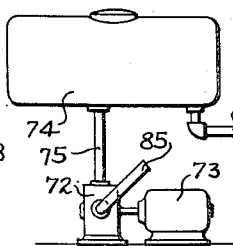
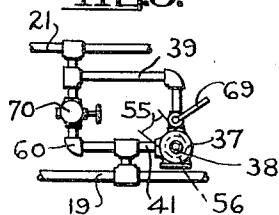


Fig. 5.

Fig. 6.



UNITED STATES PATENT OFFICE

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FLUID DELIVERY APPARATUS

Jack Churchward, New Haven, Conn.

Application April 13, 1940, Serial No. 329,470

11 Claims. (Cl. 221-67)

This invention relates to fluid delivery apparatus and more particularly to an improved apparatus of such nature, in which a hose reel is provided, which is adapted to be power driven, and which is further adapted for use in association with fluids, such as oil, water, or gas, delivery trucks, such as oil tank trucks, fire engines, tree spraying apparatus, air compressors, and the like.

In most instances, the hose used in the delivery of fuel oil, gasoline, and the transmission of water from a fire engine of the type commonly known as booster engines, tree spraying apparatus, and air from air compressors, is wound upon a reel and may be carried on a portable truck, or like vehicle, from which it is manually unwound when the vehicle is at the place where the delivery of the fluid is desired. Provision is generally made whereby the reel may be manually rotated after the delivery has been made to wind the hose thereon. In oil, or like, delivery trucks, the fluid is drawn from supply tanks by a pump arranged to be driven by the engine used for propelling the truck, while in fire engines, of the above nature, the water flowing from the tank is acted upon by a booster pump to increase its pressure.

In accordance with the features and principles of this invention it is proposed to use the force of the flow of the fluid such as liquid, or gas, caused by the oil, water, gas, or like, pump, to actuate suitable means to rotate the reel to wind the hose thereon, when the flow of the fluid, through the hose, is shut off. One object of this invention, therefore, is to provide an improved fluid delivery apparatus including the above features.

Another object is to provide in apparatus of the above nature, a hose reel, and controlled means to rotate the hose reel which is actuated by the fluid in the system after its flow through the hose has been stopped, or otherwise interrupted.

Another object is to provide an improved power driven hose reel for a fluid delivery apparatus of the above nature, and means to control the speed at which the hose reel is rotated.

Still another object is to provide in a fluid delivery apparatus of the above nature, means actuated by the flow of fluid in the apparatus to rotate the hose reel, and means to regulate the flow of fluid to said reel rotating means.

A further object of this invention is to provide an improved fluid delivery apparatus which will be relatively inexpensive to manufacture, simple in construction, and which is very efficient and durable in use.

With these and other objects in view, which

will appear as the description proceeds, there has been illustrated in the accompanying drawing, one form in which the invention may be conveniently embodied in practice.

In the drawing, wherein like reference numerals designate like parts throughout the several views:

Figure 1 illustrates the rear end of a fluid delivery apparatus, or oil delivery truck, which embodies the features and principles of this invention;

Figure 2 is a side elevational view of a hose reel included in the structure of such apparatus;

Figure 3 is a front view of the same;

Figure 4 is a schematic view of the piping system for the fluid delivery apparatus illustrated;

Figure 5 is a schematic view of a modified arrangement of the piping system for the fluid delivery apparatus; and

Figure 6 is a schematic view of the piping system when the apparatus is used with an air compressor, or the like.

The fluid delivery apparatus shown is one illustration of the embodiment of the features and principles of this invention, but it is to be understood that this invention is not to be limited to the specific application illustrated. For instance, the novel features of this invention are obviously useful in any fluid delivery apparatus which includes a hose reel and means to cause a flow of fluid through the hose from a source of supply, and wherein the apparatus permits a by-pass circuit to be included about said flow causing means. It is to be further understood that the term "fluid" as used herein is intended to refer to liquids and gases, such as oil, water, and air.

The fluid delivery apparatus shown in the drawings, includes the rear tank section 11 of a plurality of sections, usually provided in a fuel oil tank truck of any of the well-known forms of such trucks. Pipes 12 lead from these tanks to a manifold 13, usually disposed at the rear of the truck. The tank 11 is provided with a filling spout 14 and the manifold 13 with drainage cocks 15. A pump 16, see Figure 4, is provided which is adapted to be operated from a power take-off 17 leading from the truck propelling means including a clutch, not shown, through a suitable universal joint indicated at 18. An intake pipe 19 leads from the manifold 13, thus being in connection with a pipe 12 from a tank 11, to the pump 16, and a delivery pipe 21 leads from the pump 16 to the usual air release device 22 from which a pipe 23 leads to a meter

24. From the meter 24 a pipe 25 leads to a connection 26 at the side of a hose reel 27.

The hose reel 27 is provided with a hose connection 28 adjacent the periphery of its hose receiving drum 29, and which is connected to the connection 26 and is adapted to have a hose 31 connected thereto. The hose reel 27, and its connections to the pipe 25, may be any one of the well-known constructions. A nozzle 32 is provided, at the free end of the hose 31, which is provided with a shut-off valve 33 adapted to be actuated by a handle, or finger grip, 34. In most instances, the pipe system above described is provided with a pressure relief valve 35, which is included in a by-pass pipe line 36, and which is set to open at from 35 to 40 pounds pressure. The meter 24 may be of the well-known and often used automatic shut-off type whereby, after permitting the delivery of a determined and desired quantity of fluid, it shuts off the flow to the hose 31.

The power driving means selected for rotating the reel 27 is illustrated as being an oil, or other fluid, motor 37 adapted to be actuated to rotate its shaft 38 by the force of the flow of fluid there-through, in this instance, from an inlet pipe 39 to an outlet pipe 41. Preferably the motor 37, in this instance, is one which will develop sufficient power, when actuated by fluid under thirty-five pounds pressure, to rotate the reel 27. The inlet pipe 39 is connected through a flow control valve 42 to the motor 37 and to the pump delivery pipe 21, before the latter is connected to the air-release device 22. The outlet pipe 41, from the motor 37, is connected to the pump intake pipe 19. At the jointure of the by-pass pipe line 36 with the pump outlet pipe 21 a three-way valve 44 may be installed, whereby the pipe line 36 may be closed and the check valve 35 made inoperative, and to cause all of the fluid to pass along to the motor 37.

In the application of the features of this invention to a fire engine, or like apparatus, for instance tree spraying apparatus, etc., it is obvious that the tank 11 will be analogous to the fluid supply tanks of such apparatus, and that the pump 27 will be analogous to the booster pump of the fire engine, and to any suitable pump used with other portable fluid delivery apparatus. In such apparatus, the air release device 22, the manifold 13, and the meter 24 may be omitted from the system.

The reel 27 has the usual side flanges 45 and 46 disposed one at either side of the hose receiving drum 29 and rotates between suitable uprights 47 and 48, by having its shaft 49 journaled in suitable bearings 51 and 52 supported by the uprights 47 and 48 respectively. A sprocket 53, relatively large in diameter, is shown connected by suitable means 54 to the flange 45 and is, through a chain 55, drivingly connected to a sprocket 56, relatively small in diameter, rotatively mounted on the shaft 38 of the fluid motor 37. The hub of the sprocket 56 is herein shown provided with clutch teeth 59 adapted to be engaged by corresponding clutch teeth provided on a sleeve 40 keyed to but slidable on the motor shaft 38. A swingable arm 50 is arranged in operative engagement with the sleeve 40 to slide the same to engage the aforesaid clutch teeth whereby the sprocket 56 will be driven by the motor 37. Gears, or pulleys and belts, could be used in place of the sprockets 53, 56, and the chain 55 if desired. A bevel gear 57 is suitably secured to the sprocket 56 and is in mesh with a bevel gear 58. The

bevel gear 58 has its shaft 59 journaled in an upright 61, which shaft 59 extends outwardly through the upright 61 at right angles to the fluid motor shaft 38 and is adapted to receive a crank handle 62 thereon whereby the sprocket 56 may be manually rotated to rotate the reel, if desired when the clutch teeth are disengaged.

If desired, the clutch arrangement above described between the sprocket 56 and the motor shaft 38 may be omitted, and provision made to by-pass the fluid in the motor 37 to permit its shaft 38 to be rotated manually by the crank 62. Such an arrangement is shown in Figure 5 wherein a by-pass system of pipes 60, including a normally closed valve 70 is shown connected between the motor inlet 39 and outlet 41. When this arrangement is used the sprocket 56 and bevel gear 57 are secured to the motor shaft 38 and no clutch arrangement is required. When it is desired to manually rotate either the motor shaft 38, or the shaft 59, the by-pass valve 70 is opened whereby fluid pressure in the motor 37 is relieved and the sprocket 56 may be rotated by hand to rotate the reel.

In the application of this invention as shown in the drawings the reel 27 and the fluid motor 37 are disposed in a compartment 63, see Figure 1, generally provided at the rear of the tank truck for this purpose. The compartment 63 is, in this instance, provided with rear doors 64 and 65 adapted to close an end opening 66, admitting entrance into the compartment from the rear, and a side door 67 adapted to close an opening 68, admitting entrance to the compartment from the side. In this instance the reel 27 is disposed in the compartment 63 so that the hose 31 may be drawn therefrom through the side openings 68. A handle 69, provided for actuating the flow control valve 42, and the crank handle 62 when it is connected to the bevel gear shaft 59 will be extended through the side opening 68.

Upon reaching the place where fluid delivery is desired, the truck, carrying the apparatus illustrated in Figures 1-4 inclusive, is stopped, and the pump 16 is started by proper actuation of the truck driving clutch, the motor control valve 42 and the nozzle valve 33 being closed. The three-way valve 44, when one is provided, is set to permit flow of fluid through the by-pass pipe line 36, the check valve 35, and through the pump outlet pipe 21. The sleeve 40 is moved to disengage the clutch teeth and the hose 31 is unwound from the reel 27 and its nozzle 32 directed into, or at, the point of delivery, or of application, of the fluid. The valve 33 is then opened, by manipulation of the handle 34, and the fluid is delivered from the hose 31 whenever desired.

When delivery of fluid is completed, the nozzle valve 33 is closed, thus stopping the flow of fluid through the hose 31. The pump 16, however, is not shut off but is continued in operation whereupon the fluid pumped thereby, after a pressure of from 35 to 40 pounds, as the case may be, is built up in the system, will be by-passed about the pump through the pipe line 36 and the check valve 35 when the latter are provided. The fluid motor control valve 42 may now be opened to start operation of the fluid motor 37 and the sleeve 40 moved to engage the clutch teeth, whereupon the reel 27 will be rotated to wind up the hose 31 thereon. By proper manipulation of the motor control valve 42 the speed of the fluid motor 37 may be controlled. Should more fluid pressure be required to operate the motor 37 than is possible to obtain when the by-pass pipe line

36 is in operative connection, the three-way valve 44, when one is provided, is actuated to close the pipe line 36 and cause all of the fluid to flow to the fluid motor 37.

Should the supply of oil, or other fluid, being pumped by the pump 16 be exhausted in the pipe system whereby none is available to operate the motor 37, the reel 27 may be rotated by the use of the manually operative crank-handle 62 provided the sleeve 40 is moved to disengage the clutch teeth between this sleeve and the sprocket 56.

In instances where the clutch arrangement between the motor shaft 38 and the sprocket 56 is not provided but instead the by-pass arrangement shown in Figure 5 is used, the normally closed valve 70 is opened to permit manual actuation of the reel. In instances where the meter 24 is of the well-known and often used automatic type, which may be set to permit the delivery of a desired quantity of fluid and then shuts off the flow to the hose 31, the reel may be arranged to be rotated as soon as this action occurs by opening the valve 42 before the flow of fluid is so interrupted thus providing for an automatic operation of this apparatus.

In some instances it may be desirable to omit the motor control valve 42. When the valve 42 is omitted and the three-way valve 44 is included this latter valve may be used as a motor control valve, by lengthening its operating handle 71. The disposition of the motor control valve 42 adjacent the reel 27, in position to be readily manipulated by the operator as he directs, or guides, the hose 31 upon the reel 27, has been found to be very convenient, insuring proper control of this operation to prevent the hose 31 whipping, or tangling, as it is being wound upon the reel 27. Obviously, when this apparatus is used on fire engines, or with tree spraying apparatus, the meter 24 may be omitted.

When the apparatus of this invention is used with an air, or gas, delivery mechanism, wherein an air compressor 72, see Figure 6, which is driven by a motor 73, and is connected to a pressure tank 74 by a pipe 75, and the tank 74 is connected by a pipe 76 to a hose 77 wound on a reel 78, the reel rotating motor 79 has its inlet 81 connected to the pipe 76 by a pipe 82 through a control valve 83. In such an arrangement, the motor outlet 84 is connected to the source of air, or gas, in this instance, the atmosphere, as is also the intake 85 of the compressor 72, and is thus by-passed about the air, or gas, supplying means for the hose 77. Closing of the nozzle 86 on the outer end of the hose 77 will cause sufficient pressure to be built up in the tank 74 whereby the motor 79 may be operated to wind up the hose by rotating the reel 78 when the control valve 83 is opened.

While there has been shown and described herein one form of an improved fluid delivery apparatus, it is to be understood that the features and principles of this invention may be embodied in other forms without departing from its spirit. It is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, and it will be further understood that each and every novel feature and combination thereof, present in, or possessed by, the improved apparatus herein disclosed, forms a part of the invention included in this application.

What is claimed as new and for which it is desired to secure Letters Patent, is:

1. In fluid delivery mechanism a hose having

an openable and closable nozzle at one of its ends, a rotatable reel upon which the hose may be wound, a fluid supply, a pump connected to said fluid supply and to said hose, and being operable to force fluid from the supply to and through said hose, a fluid motor connected to said reel to rotate it, said motor being connected as a by-pass about said pump to be operated by the fluid pumped thereby when said hose nozzle is closed.

2. In fluid delivery apparatus, a portable vehicle having a source of fluid supply thereon, a hose on said vehicle by which fluid may be delivered remote from said vehicle, a rotatable reel on said vehicle and upon which said hose may be wound, fluid actuated means on said vehicle to rotate said reel and connected as a by-pass between said hose and said supply, and common means on said vehicle and selectively operable to force fluid from said supply to and through said hose, and to and through said reel rotating means to actuate the same.

3. In fluid delivery apparatus, a hose, a rotatable reel upon which said hose may be wound, fluid actuated means to rotate said reel, a source of fluid supply, means to cause a flow of fluid from said supply to said hose, means to interrupt the flow of fluid from said hose, and a by-pass circuit for the fluid around said flow causing means and in which said fluid actuated means is included to be actuated by fluid from said flow causing means, and whereby it will be actuated when the flow of fluid through said hose is interrupted.

4. In fluid delivery apparatus, a hose, a rotatable reel upon which said hose may be wound, fluid actuated means to rotate said reel, a source of fluid supply, means to cause a flow of fluid from said supply to said hose, means to interrupt the flow of fluid from said hose, and a by-pass circuit for the fluid around said flow causing means and in which said fluid actuated means is included to be actuated by fluid from said flow causing means, and whereby it will be actuated when the flow of fluid through said hose is interrupted, and means to control the flow of fluid through said by-pass circuit to vary the speed of said fluid actuated reel rotating means.

5. In fluid delivery apparatus, a hose, a rotatable reel upon which said hose may be wound, fluid actuated means drivingly connected to said reel to rotate it, a source of fluid supply, means to cause a flow of fluid from said supply to said hose, a by-pass circuit around said flow causing means and in which said reel rotating means is connected, means to interrupt the flow of fluid from said hose to cause it to flow through said by-pass, a controlled by-pass circuit for fluid around said fluid actuated means, and means to manually rotate said reel when said controlled by-pass circuit is open.

6. In fluid delivery apparatus, a hose, a rotatable reel upon which said hose may be wound, fluid actuated means drivingly connected to said reel to rotate it, a source of fluid supply, means to cause a flow of fluid from said supply to said hose, means to interrupt the flow of fluid from said hose, and a by-pass circuit for the fluid around said flow causing means and in which said fluid actuated reel rotating means is included whereby it will be actuated when the flow of fluid to said hose is interrupted.

7. In fluid delivery apparatus, a hose through which fluid is delivered, means to cause a flow of fluid through said hose, a rotatable hose reel,

means connecting said flow causing means with said hose including a meter adapted to be set to permit delivery of a desired quantity of fluid and then to shut off the delivery thereof, and fluid actuated means to rotate said reel arranged as a by-pass around said flow causing means to be actuated by a flow of fluid therethrough when said meter operates to interrupt the flow of fluid to said hose.

8. In a fluid, such as air, delivery apparatus, a hose by which air under pressure is delivered, a reel upon which said hose may be wound, means to cause a flow of air under pressure to said hose, means to rotate said reel, a source of air supply constituted by the atmosphere to which said flow causing means and said reel rotating means are connected, said reel rotating means being arranged as a by-pass around said flow causing means and said source of air supply.

9. In combination, a single source of fluid supply, an operating fluid pump having its inlet connected to said fluid supply, a hose connected to the outlet of said pump, a rotatable reel upon which said hose may be wound, a fluid motor drivingly connected to said reel to rotate it, a fluid connection between the outlet and inlet of said pump and including said fluid motor, and means to interrupt the flow of fluid out of said hose to cause fluid to flow through said motor to actuate it to rotate said reel.

10. In combination, a single source of fluid supply, an operating fluid pump having its inlet connected to said fluid supply, a hose connected to the outlet of said pump, a rotatable reel upon which said hose may be wound, a fluid motor drivingly connected to said reel to rotate it, a fluid connection between the outlet and inlet of said pump and including said fluid motor, means to interrupt the flow of fluid out of said hose to cause fluid to flow through said motor to actuate it to rotate said reel, and a controllable by-pass circuit for the fluid between the inlet and outlet of said pump to release said motor from the actuating flow of fluid therethrough.

11. In combination, a single source of fluid supply, an operating pump having an inlet and an outlet, said inlet being in connection with the source of fluid supply, a hose connected to said outlet, a closable nozzle on said hose, a reel upon which said hose may be wound, a fluid motor drivingly connected to said reel, said motor having an inlet and an outlet, said motor inlet being connected to the pump outlet, and said motor outlet being in connection with the source of fluid supply and thus forming a by-pass through which fluid caused to flow by said pump will flow to actuate said motor when said hose nozzle is closed to interrupt the flow of fluid through said hose.