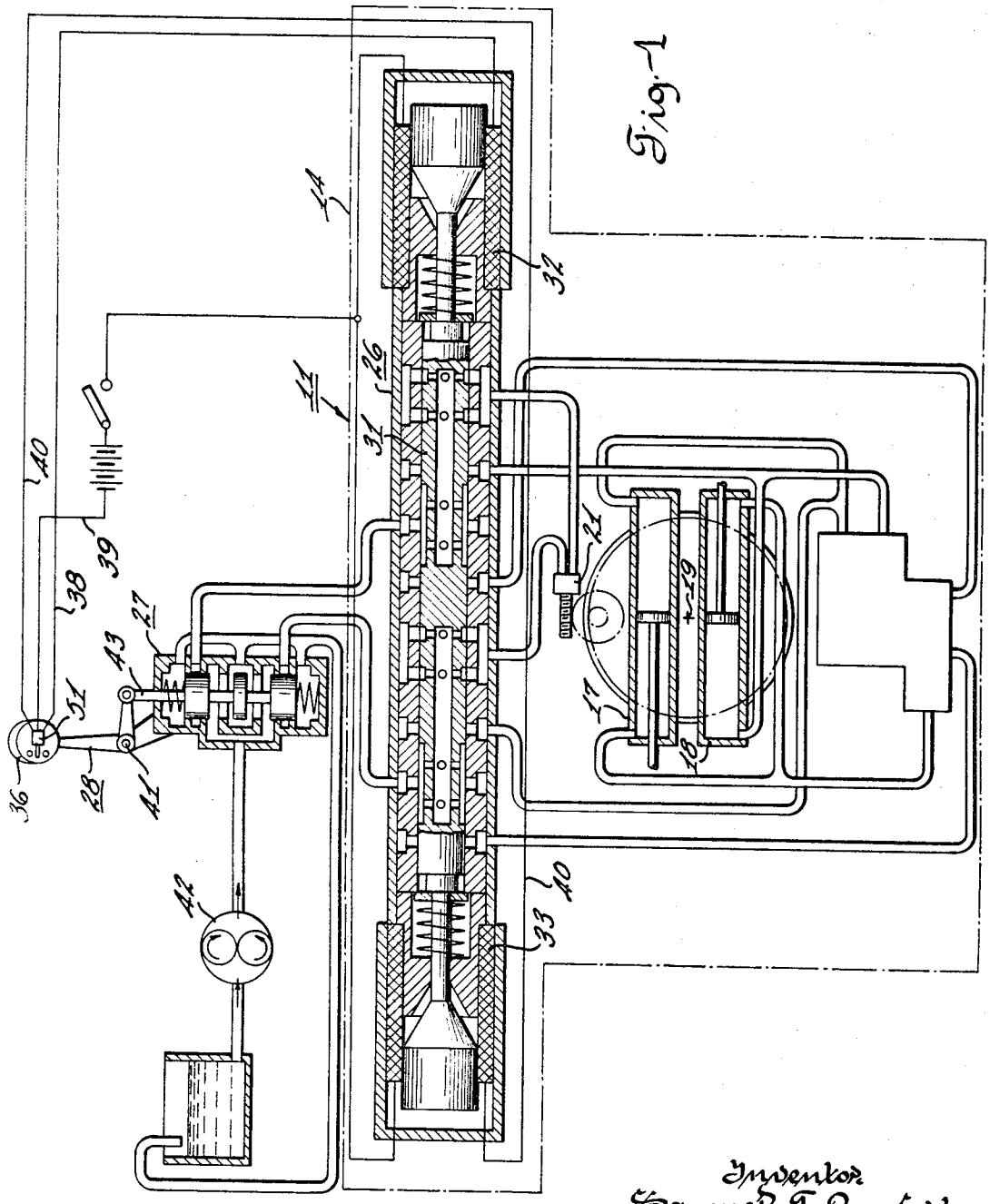
Aug. 6, 1968 S. T. COMFORT 3,395,732

ATTACHMENT CONTROL SELECTOR

Filed May 25, 1966 2 Sheets-Sheet 1

Fig. 1



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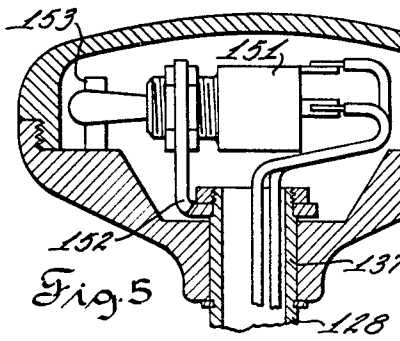


Fig. 5

Fig. 2

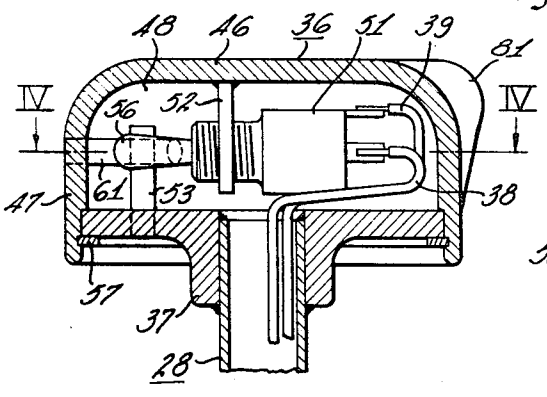


Fig. 3

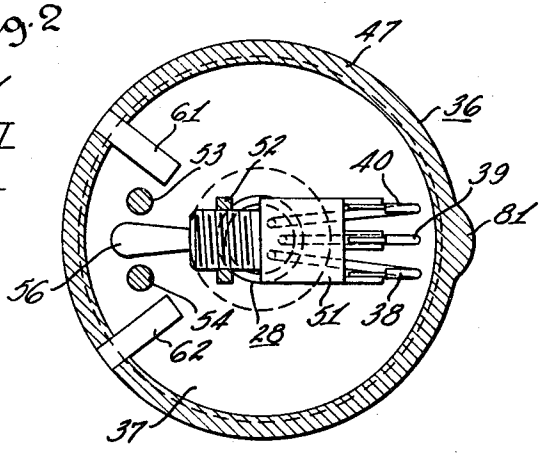


Fig. 4

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3,395,732

ATTACHMENT CONTROL SELECTOR

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Filed May 25, 1966, Ser. No. 552,924
6 Claims. (Cl. 137—636.2)

This invention relates to a control system for a multiple function attachment such as used on lift trucks.

Heretofore separate valve levers and push button selection means have been provided for operator control of multiple function lift truck attachments. Some prior art arrangements have required the operator to first manually select the function desired and then move his hand to the valve control lever to carry out the function selected. One prior art arrangement, shown in U.S. Patent 2,920,775, provides a single lever control for a multiple function lift truck attachment, however, such prior art construction is expensive, requires an excessive number of parts and employs exposed actuating switches, rendering the components relatively susceptible to deterioration and accidental damage. Another prior art arrangement is shown in my U.S. Patent 3,179,274 utilizing push button function selector switches. This arrangement employs electrical relays and holding circuits whereby once the push button selector switch is actuated the function is selected and movement of the control valve thereafter will perform the function selected. The difficulty with my prior arrangement is that the operator may forget which function he has previously selected and may unintentionally damage equipment, payload and personnel. For instance if the lift truck is equipped with a rotating, side shifting clamp and the operator thinks he has the rotating function selected when in fact he has the clamping function selected and decides to rotate the load while the lift truck is moving he may unintentionally release the load which, of course, would result in damage to the load and possibly injure personnel.

It is an object of the present invention to provide a control system for a multiple function attachment wherein the operator need not rely on memory or observation to select the proper function of the attachment.

It is a further object of this invention to provide a simple, inexpensive function selector means in a control system for a multiple function attachment.

It is a further object of this invention to provide a selector switch within the control knob of the control valve lever in a multiple function attachment control system.

It is a further object of this invention to provide a control system for a multiple function attachment utilizing a solenoid valve and an electrical control switch for such valve which is adequately protected from accidental damage and climatic conditions.

It is a further object of this invention to provide an improved single lever control for a multiple function attachment wherein the operator does not need to remove his hand from the control lever during operation of the attachment.

These and other objects and advantages of this invention will be apparent when the following description is read in conjunction with the drawings in which:

FIG. 1 is a schematic illustration of a control system for a multiple function attachment in which my invention is incorporated;

FIG. 2 is a side view of a lift truck employing a multiple function attachment and control system therefor;

FIG. 3 is a vertical section through the control lever for operating the control valve and incorporating features of this invention;

FIG. 4 is a section view taken along the line IV—IV in FIG. 3; and

FIG. 5 is a vertical section of a second version of a control knob which may be used in a control system of the present invention.

FIG. 1 shows schematically a control system for a multiple function attachment in which the present invention is utilized. The attachment **11** is mounted on a lift truck carriage **12** as shown in FIG. 2 which in turn is supported in a conventional manner on a lift truck mast **13**. The dot-dash lines **14** in FIG. 1 enclose the portion of the multiple function attachment and control therefor which is mounted on the carriage **12**. The attachment illustrated in FIGS. 1 and 2 is a rotating, side shifting clamp attachment wherein the clamp **16** (only one of which is shown) may be moved toward one another by retraction of hydraulic jacks **17, 18** and may be moved away from one another by expansion of jacks **17** and **18**. The front portion of the attachment **11** may be rotated relative to the rear portion thereof about a longitudinal axis **19** by a hydraulic motor **21** in a conventional manner.

The function performed by the attachment is determined by the position of a double solenoid selector valve **26**. As illustrated, the selector valve **26** is in its neutral position in which the attachment may be rotated in either direction depending upon the position to which the control valve **27** is moved by control valve lever **28**.

The selector valve **26**, which is mounted on the non-rotatable part of the attachment **11**, has a flow control component in the form of a spool **31** which is axially shiftable from its illustrated neutral position in opposite axial directions by solenoids **32, 33**, depending on which is energized. The double solenoid valve **26** and the attachment are similar to the construction shown in my U.S. Patent 3,179,274.

When the operator wishes to perform a clamping operation he rotates the knob part **36** of control lever **28** in one direction relative to its end part **37** a predetermined extent. This connects lead **38** to battery lead **39** thereby energizing solenoid **32** which moves the spool **31** to the left as viewed in FIG. 1. In this position of the spool **31**, the operator may cause the arms **16** to close, that is to move toward one another, by pivoting the control lever **28** clockwise about its pivot **41** whereby fluid pressurized by pump **42** is supplied to the rod ends of jacks **17, 18**. Counterclockwise adjustment of lever **28** will cause control valve spool **43** to be raised, thereby connecting the pump output to the closed ends of the jacks **17, 18** to cause the clamp arms **16** to be opened.

The knob part **36** as shown in FIGS. 3 and 4 has a top wall **46** and a side wall **47** which together with the end part **37** of lever **28** define an interior cavity **48** for receiving a three position toggle switch **51**. A snap ring **57** maintains the parts **36, 37** in assembly. As shown in FIGS. 3 and 4 the toggle switch **51** has threaded engagement with a bracket **52** welded to the top wall **46** of knob part **36**. When the knob part **36** is rotated in opposite directions from the illustrated clamp rotating position, abutment means in the form of pins **53, 54** will move actuating element **56** to clamping and side shifting function selection positions. The toggle switch **51** is a conventional, commercially available switch to which leads **38, 39, 40** are soldered. The switch **51** is relatively small in size and it may be possible for the operator to apply excessive force to the actuating element **56** unless means are provided to prevent same from occurring. I provide such a safeguard by provision of stop means including pins **61, 62** on knob part **36** which abut pins **53, 54** on end part **37** upon predetermined pivotal movement of the knob part **36** in either direction from its illustrated intermediate position.

In FIG. 5 I show a second embodiment of my novel control lever wherein the toggle switch **151** is secured to the end part **137** of a valve control lever **128** by a bracket **152** and the abutment means **153** are secured to the knob part **136**. In this arrangement the leads to switch **151** are not subjected to scuffing action on pivoting the knob part.

By way of summary when the operator operates the control valve **27** with the knob part **36** in the position illustrated in FIG. 4, the front part of the clamp attachment **11** will be rotated in on direction or the other about a longitudinal pivot axis **19**, depending on the direction of axial movement of control valve spool **43**. When the control lever is moved from its illustrated hold position to operating positions with the knob part **36** pivoted in one direction, clamping and unclamping functions will be achieved. If the knob part **36** is rotated in the other direction from its intermediate position, a side shifting function may be performed. Incorporating a toggle switch for selecting the attachment function within the knob of the control lever **28** provides an inexpensive and reliable control which is considerably safer than prior art controls. The switch **51** is protected against accidental damage and is not subjected to rain or the like when the lift truck is outdoors. Indexing means in the form of a forward protrusion **81** may be formed on the knob part **36** so the operator may feel the rotated position of the knob part and hence be reminded of the function selected. The operator will quickly develop an unconscious sense of function selection.

The embodiments of the invention for which an exclusive property or privilege is claimed are defined as follows:

1. In a control system for a multiple function material handling attachment having a plurality of fluid motors for operating same, the combination comprising:

control valve shiftable between neutral and attachment operating positions,

a manually operated control lever connected to said control valve having a knob part pivotally connected to an end part of said lever,

walls on said knob part defining an interior cavity,

an electrically operated selector valve shiftable to a plurality of control positions,

electric means controlling said selector valve including a control switch for said selector valve disposed within said cavity and secured to one of said parts, said switch including a switch actuating element shiftable between a plurality of control positions, and

abutment means on the other of said parts in confronting relation to said actuating element, said abutment means engaging said actuating element and shifting same upon said knob part being pivoted a predetermined extent relative to said end part.

2. The structure set forth in claim **1** wherein said one part is said knob part.

3. The srucure set forth in claim **1** wherein said one part is said end part.

4. The structure set forth in claim **1** and further comprising stop means formed on said parts limiting relative pivotal movement of said parts to prevent excessive force movement of said actuating element.

5. The structure set forth in claim **1** wherein said selector valve includes a flow control component shiftable between three positions in which three different attachment functions are performable and wherein said switch has three operating positions corresponding to said three positions of said selector valve.

6. The structure set forth in claim **5** wherein said switch is a toggle switch.

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