

Sept. 20, 1938.

R. D. CONKLIN

2,130,764

COMBINED MOTOR MECHANISM AND CONTROL SWITCH THEREFOR

Filed Sept. 30, 1937

3 Sheets-Sheet 1

Fig. 1

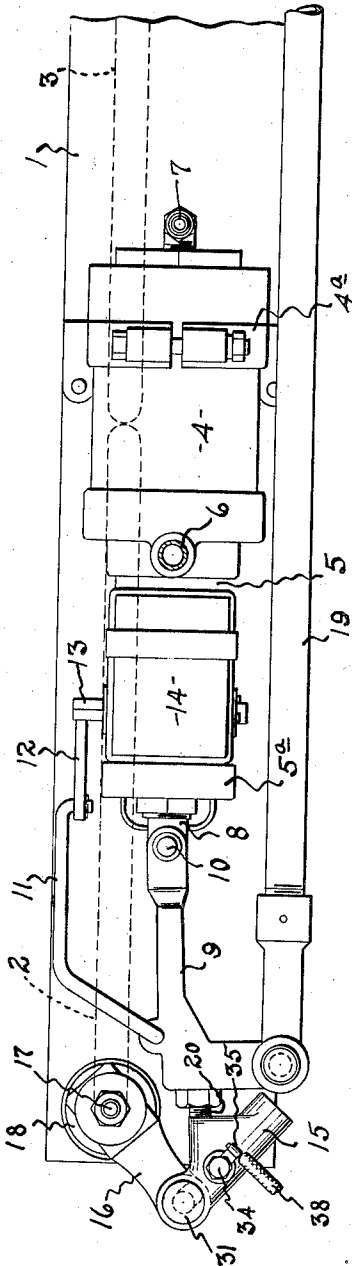
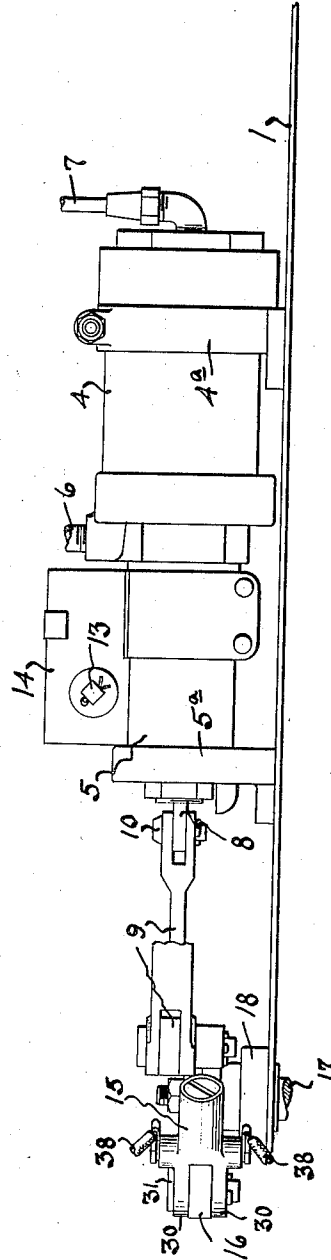


Fig. 2



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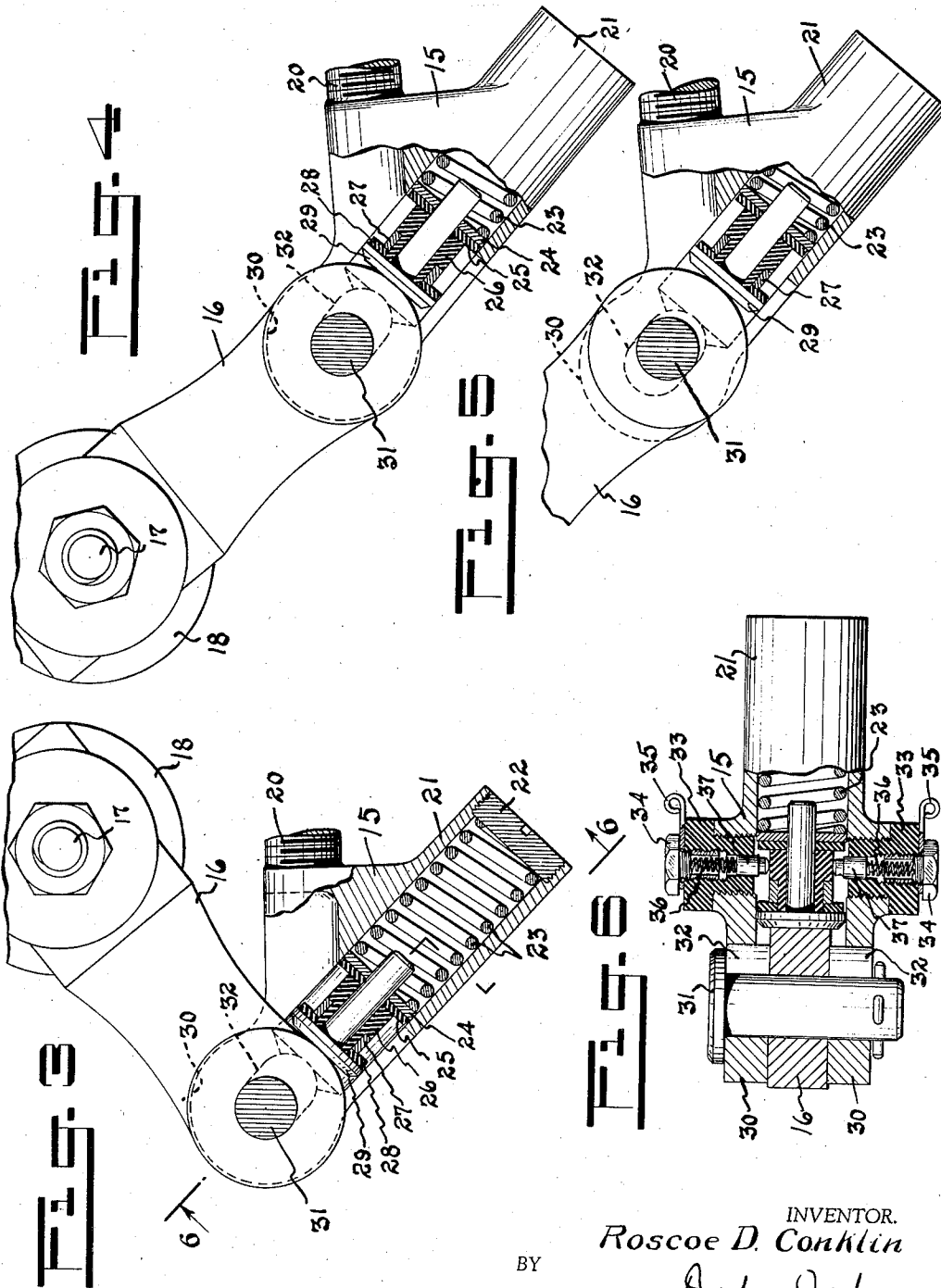
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3 Sheets-Sheet 3

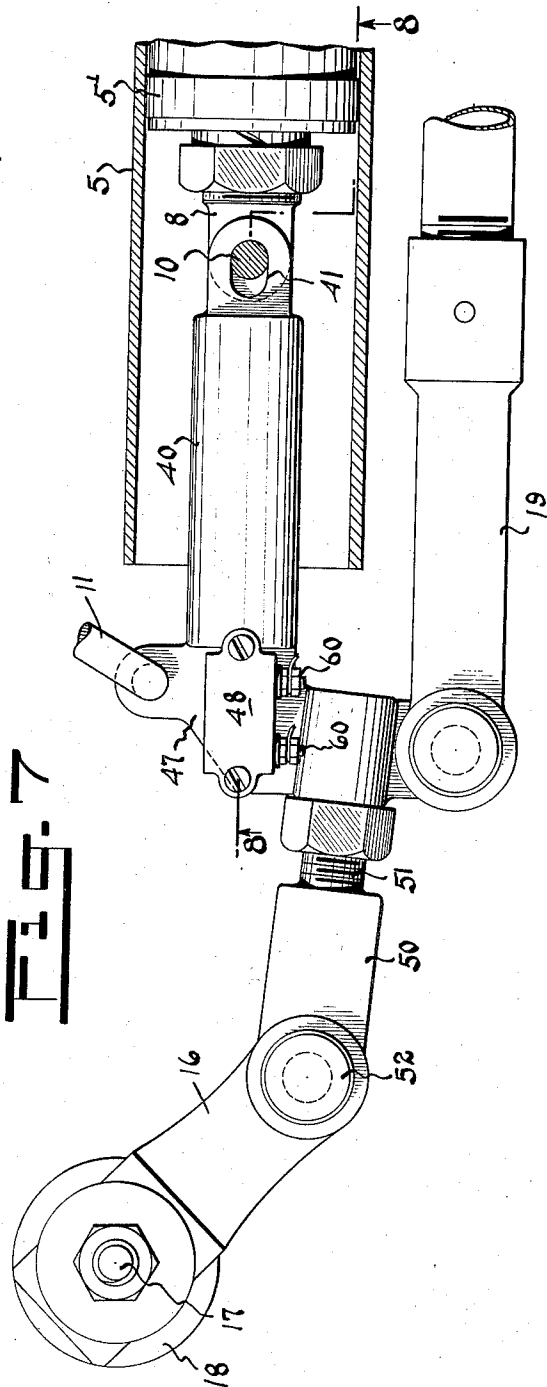
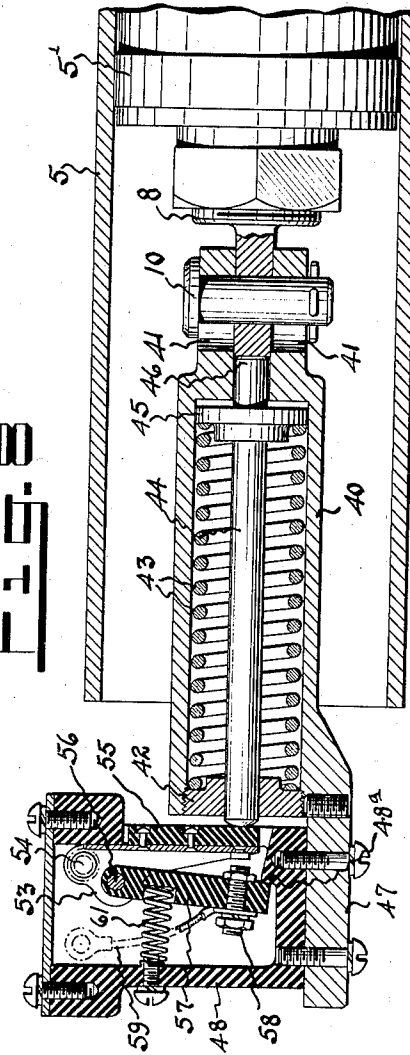


Fig. 8



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2,130,764

COMBINED MOTOR MECHANISM AND CONTROL SWITCH THEREFOR

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Application September 30, 1937, Serial No. 166,683

1 Claim. (Cl. 192—150)

This invention is directed to a form of mechanism comprising, in combination, a motor illustrated as of the pneumatic type, and a control switch therefor incorporated in the connecting mechanism between the motor and the device to be operated.

A general object of this invention is the provision of the combination of a device to be operated, such as a door, a motor for operating it, and means for operatively connecting the two together, including in the connection a control switch for the motor.

The many and detailed objects of this invention will become fully apparent from the following description when taken in connection with the drawings which illustrate two modifications thereof.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, as exemplified in the following disclosure.

In the accompanying drawings,

Fig. 1 is a top plan view of the mechanism in accordance with this invention, with some parts broken away.

Fig. 2 is a side elevational view thereof.

Fig. 3 is an enlarged detail view, partly in cross-section, with some parts broken away of the switch mechanism and its manner of connection to the device to be operated, as for example, a door when the door is in closed position and the switch is open.

Fig. 4 is a similar view with the door in open position and the switch open.

Fig. 5 is a view similar to Fig. 6 showing the switch in closed position.

Fig. 6 is a view taken on the line 6—6 of Fig. 3 showing the switch in open position.

Fig. 7 is a top plan view with some parts in section and some parts broken away of a modified form of construction.

Fig. 8 is a view taken on the line 8—8 of Fig. 7.

It is common practice in the operation of the doors on vehicles such as buses, street cars, subway cars, and the like, by means of a motive device, either electric or pneumatic, to provide a reversing switch on the forward edges of the doors, usually within a flexible casing, which closes when a door strikes an object in closing and thereby controls either directly or indirectly the motive device operating the door to reverse the supply of energy thereto to cause it to fully open. In some cases the incorporation of the reversing switches in flexible casings on the forward edges of the doors is not desirable. The

general object of this invention is to provide, in combination, a reversing switch for a similar purpose directly incorporated into the connecting mechanism between the door and motor whereby the switch is caused to close should the door engage an object in closing.

Referring now in detail to the attached drawings, there is shown at 1 any suitable support for the motive device which in the arrangement illustrated may be a plate mounted directly over the door opening. At 2 and 3 are diagrammatically illustrated the top edges of a pair of doors which cooperate to close the opening. Supported on the plate 1 is the motive device which is illustrated as a pneumatic motor of the differential type comprising a large cylinder 4 and a small cylinder 5, united in longitudinal alignment and provided with a pair of connected pistons, not shown, in accordance with the usual practice. An air supply pipe connection 6 is made to the two cylinders at a point intermediate the pistons, in accordance with common practice, and is intended to be continuously connected to a source of constant air pressure. The opposite end of the large cylinder 4 is provided with an air supply pipe 7, in accordance with common practice, which extends to the fluid supply source through an electromagnet control valve, not shown. As is well known, with such an arrangement the magnet valve is normally, that is, when deenergized, in a position to supply air to the cylinder 4 through the pipe 7 while closing the pipe 7 to exhaust. The result is that the piston assembly is at its left hand position in Figures 1 and 2, the left hand end of cylinder 5 being open to the atmosphere. The motor assembly is supported from the plate 1 by means of brackets 4a and 5a.

The end of the common piston rod for the piston assembly is shown at 8 projecting from the end of the cylinder 5 as it does when in door closed position as explained above. An L-shaped lever 9 is pivotally connected to the piston rod 8 by means of a pivot pin 10. Although it forms no part of this invention, there is shown a control switch 14 mounted on the top of the cylinder 5, the shaft 13 of which projects from the casing and has a lever 12 secured thereto. This lever is connected by the link 11 to the lever 9 so that the switch operates in conjunction with the movement of the motor.

The lever 9 is connected by a switch member 15 the housing of which is provided with a threaded lug 20 secured to the lever 9 and held thereon by a locknut. The switch 15 is pivotally connect-

ed in a manner to be described in greater detail hereinafter, by a pivot pin 31 to a short arm 16 which is secured to the upper end of the vertical door shaft 17, journaled at one end in a bearing member 18 on the plate 1. The door 2 is secured to the shaft 7 in accordance with well known practice. The lever 9 is also pivotally interconnected with the door shaft, not shown, of the door 3 by means of a link 19 and the necessary well known mechanism, whereby when the motor piston assembly moves to the right in Fig. 1 the door shaft 17 will rotate in counterclockwise direction and the other shaft will rotate in clockwise direction to cause the doors 2 and 3 to swing in the same direction, as for example in Fig. 1, upwardly.

The details of construction and the manner of operation of the switch 15 are illustrated in Figs. 3 to 6 inclusive. The switch comprises a housing 20 having a tubular extension 21 at one end closed by means of a removable plug 22. Within the housing is a spring 23 which rests at one end on a plug 22 and engages at the other end with a metal washer 24. On top of the washer 24 is an insulating washer 25 and on top of that is a cylindrical tubular insulating bushing 26. At the upper end of the bushing is a washer 28 which fits on the end of the bushing to hold in place a metal contact ring 27 mounted on the bushing, as shown. At 29 is a metal pin having an enlarged head and having its stem extending through the washers and bushing, as shown. The various washers, bushing pin and ring may, if desired all be secured together in a unit in any suitable manner as by means of cement, if desired.

The end of the switch housing opposite the tubular portion 21 is bifurcated, as shown, to provide a pair of ears 30 which have aligned elongated openings 32. One end of the lever 16 lies between these ears, as shown, and has a circular opening through which a pivot pin 31 extends. Pivot pin 31 lies in the elongated openings 32 so that it may slide therein in a manner to be explained later. As is clear from Fig. 6, the end of the lever 16 rests on the head of the pin 29 and being concentric with respect to the pin 31 may pivot on that pin and not cause the movement of the pin 29 and the assembly associated therewith or connected thereto.

The sides of the switch housing are provided with threaded bosses in which are mounted the insulated plugs 33. These plugs have central passages extending therethrough, the outer ends of which are larger than the inner ends and threaded. Mounted in the threaded ends of the passages are the metal cap screws 34 which serve to clamp the circuit wire terminal pieces 35 in place. The shanks of these screws are counterbored and in them rest the springs 36 which engage the contact plungers 37 slidably mounted in the other ends of the bores in the bushings 33. The contact plugs 37 bear against the bushing 26 when the parts are in normal position, but bear against the ring 27 thereby electrically interconnecting them when the switch undergoes relative movement with respect to the end of the lever 16 against the resistance of spring 23, as may occur because of the elongated openings 32.

There is shown in Figs. 1 and 2 the connector wires 38 which are attached to the terminal connectors 35 and extend in accordance with well known practice in the art to the magnet valve in the pipe line 7 and the current source.

The operation of this mechanism will now be described. In Figs. 1 and 2 the mechanism is

disclosed in door closed position with the piston assembly at the extreme left so that the end 8 of the piston rod is exposed. In order to open the doors the magnet valve in the pipe line 7 is energized to close the pipe 7 off from the fluid pressure supply and open it to exhaust. This circuit is usually under the control of the vehicle operator. Since pressure fluid is continuously supplied between the pistons through the pipe 6, the piston assembly will move to the right withdrawing the end 8 of the piston rod into the open end of cylinder 5 causing the door shaft 17 to move in a counterclockwise direction in an obvious manner. As explained before, the other door shaft which is not shown will rotate in a counterclockwise direction through the connecting mechanism, not shown, attached to the link 19. This movement continues until the doors are fully opened in which position they will remain.

In order to close the doors the magnet valve in the pipe line 7 is deenergized supplying air to the right hand end of the large cylinder 4 through pipe 7. The piston assembly then begins to move to the left closing the doors. It will be noted from a consideration of Figs. 3 to 6 inclusive, that in normal closing movements of the doors the pivot pin 31 will be held in the outer ends of the elongated openings 32 by spring 23 which is strong enough to prevent any movement thereof from that position under normal conditions. However, if the door equipped with this device strikes an obstruction, such as the body of a passenger while closing, it will come to a stop but the piston assembly and connecting parts will tend to continue their movement, pushing the switch assembly ahead with respect to the lever 16 so that the pivot pin 31 is now at the other end of the slot 32. This movement will cause the pin 29 and the associated bushing assembly to move into the tubular portion 21 of the switch housing, compressing spring 23 and moving the contact ring into engagement with the contact plungers 37. These contact plungers are in a circuit to the magnet valve in the pipe 7 so that it is energized closing pipe 7 off from the fluid pressure supply and opening it to exhaust. The result is that the piston assembly immediately reverses its direction of movement, the pressure supply now only being through pipe 6 to cause the doors to fully open.

A modified form of structure which is double acting, having the same function as described above, is illustrated in Figs. 7 and 8. In this arrangement the open ended cylinder 5 is shown in cross-section and a portion of the small piston is shown at 5'. The connecting link between the end 8 of the piston assembly and the shaft 16 is different from that previously described in this case. It comprises a tubular portion 40 having a bifurcated end with aligned elongated slots 41 connected to the end 8 of the piston rod by means of a pivot pin 10. The other end of the tubular housing 40 is closed by a removable plug 42 and serves to hold in place a spring 43 which engages a collar 45 mounted on a rod 44 which is slidably mounted in a passage in the right hand end of the housing 40 and a passage in the plug 42. The end 46 of the rod 44 rests against the end of the piston rod 8.

The connecting link is provided with an extension 47 which is pivotally connected to the link 19 and with the lever 16 by means of a short link 50 provided at one end with a threaded extension which fits thereinto and pivotally connected at the other end with the lever 16 by 75

means of a pivot pin 52. Mounted on the extension 47 is a switch 48 in the housing of which is a lever 53 pivotally mounted at 54. Secured to this lever is a plug of insulating material 55 which 5 lies in the opening in the switch housing in a position to engage the end of the rod 44. Pivotally mounted at 56 on the lever 53 is an insulating arm 57 which has mounted thereon contact 58 in a position to engage a contact mounted 10 on the lever 53. This contact is connected by a pigtail connector 59 to one of the terminals 60 of the switch. The lever 53 is connected to the other terminal 60 of the switch. A spring 61 lies between the housing of the switch and the 15 lever 57, as illustrated, to hold it against a projection or shoulder 48a on the switch housing.

The parts are all shown in normal position with the switch 48 open. In this case should the doors strike an obstruction in closing, the 20 doors will stop moving but the piston assembly will continue to move, causing the rod 44 to move to the left in Fig. 8 as spring 43 is compressed and moving lever 53 into a position to engage the contact 58. The closing of this switch as

before will effect energization of the magnet valve in the pipe 7 so that the engine may reverse and open the doors.

From the above description it will be apparent to those skilled in the art that the features of this invention may be embodied in other physical 5 forms without departure from the novelty and scope thereof. I do not therefore desire to be strictly limited to the description as given for purpose of illustration but rather to the scope 10 of the claim granted me.

What I claim is:

A combination as described including a motor, an object to be moved, a lever connected to said motor, a lever connected to said object, a pivot 15 pin interconnecting said levers, one of said levers having an elongated slot in which said pin lies, a switch mounted on one of said levers and a spring for holding it in engagement with the other whereby excess pressure on said levers 20 causes relative movement between them so that the pin slides in said slot and the switch is closed.

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