

July 31, 1951

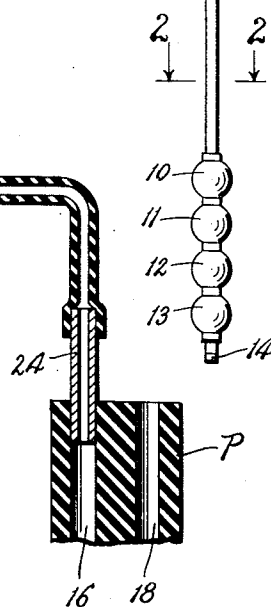
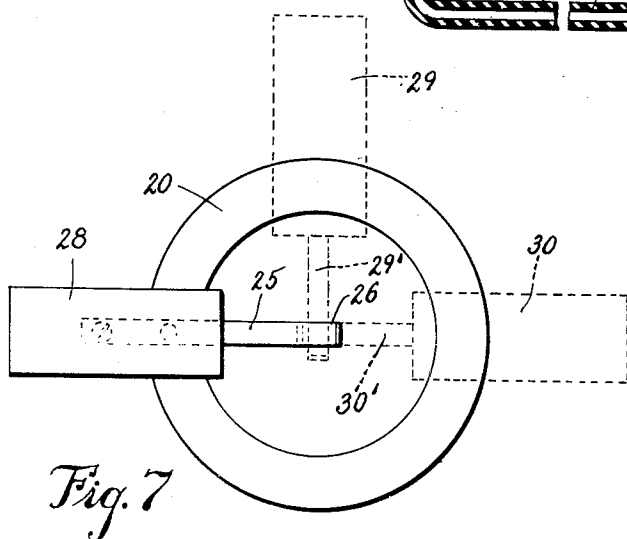
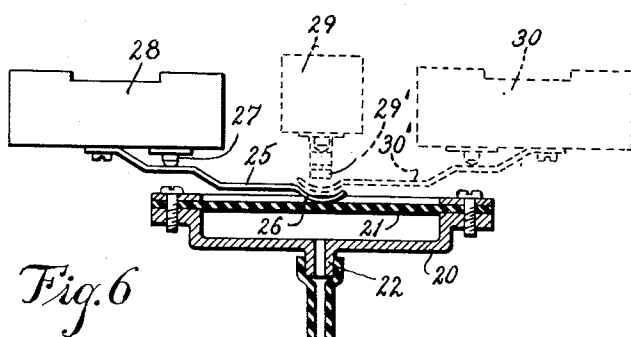
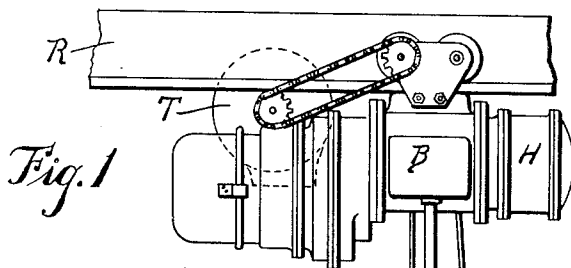
E. B. SPENCER

2,562,847

PNEUMATIC PENDANT CONTROL FOR ELECTRIC SWITCHES

Filed March 5, 1946

2 Sheets-Sheet 1



Inventor
Earl B. Spencer

By *W. H. Zumbach*

Attorney

July 31, 1951

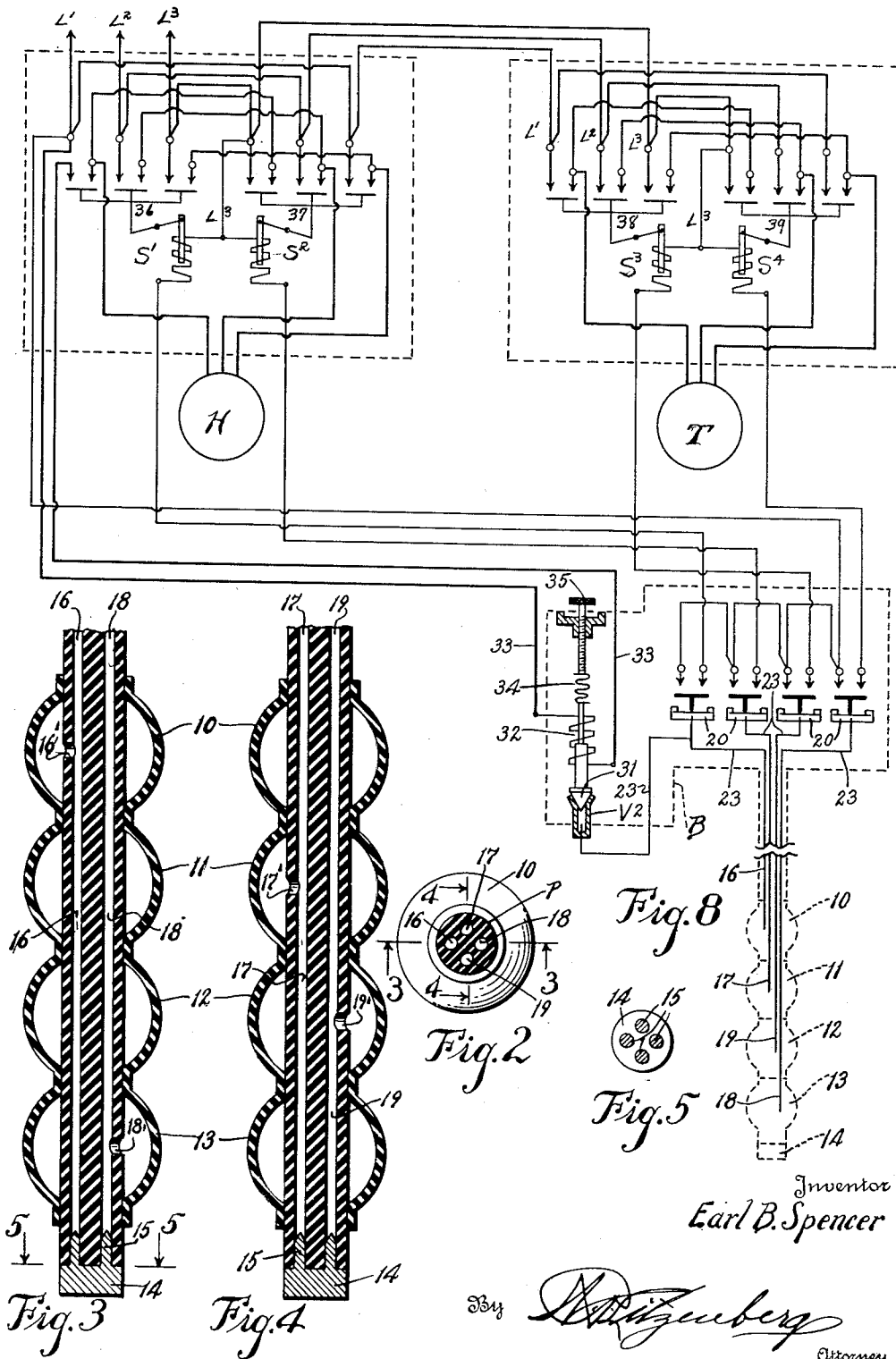
E. B. SPENCER

2,562,847

PNEUMATIC PENDANT CONTROL FOR ELECTRIC SWITCHES

Filed March 5, 1946

2 Sheets-Sheet 2



Inventor
Earl B. Spencer

By *W. H. Rosenberg*
Attorney

UNITED STATES PATENT OFFICE

2,562,847

PNEUMATIC PENDANT CONTROL FOR
ELECTRIC SWITCHES

Earl B. Spencer, La Canada, Calif.

Application March 5, 1946, Serial No. 652,176

3 Claims. (Cl. 60—62.6)

1

My invention relates to pendant control for pneumatically operated switches, and it has among its salient objects to provide an improved pendant construction and arrangement which is soft and flexible and which is efficient and convenient in the manual control of electric switches, and it is particularly well adapted for use in connection with traveling cranes, hoists and mono-rail equipment.

In such equipment, it is common to use a pendant cord or cable having a push-button switch mechanism attached thereto, and in order to make a substantial switch arrangement in this switch box, it is quite complicated and must be properly encased for its protection, and becomes more or less unwieldy and is easily broken by banging against obstructions and has been the cause of serious accidents resulting from the switch box hitting workmen.

It is an object of my invention to provide a pendant control which shall avoid all of these objections, dangers and inconvenience, as well as the expense connected therewith.

In hoists, cranes and the like, the actuating switches for applying the power are generally mounted on the hoist or crane, the power source being connected through trolley wires or tag lines. These switches are actuated by solenoids which take a microscopic amount of current, and the circuits therefor are closed by push-buttons.

In my invention I substitute for these push-buttons and the many wires leading to the control box, a series of tubes like an extruded rubber hose with a series of conduits or channels therethrough which would be connected, respectively, to a series of pneumatically operated switches, through metal or rubber diaphragms and plungers or actuating members which would actuate the push button circuit control mechanism all contained within a switch box on the hoist, crane or other electrically controlled mechanism.

This tube would be suspended and at its lower end would have a series of bulbs or expanded sections, one for each conduit or channel through said tube, thus making it possible to select the particular bulb for a particular switch for a particular control switch. From each of these bulbs, therefore, there would extend a conduit or channel to a particular pneumatic switch, so that by squeezing the bulb any one of the pneumatic switches could be actuated as desired.

An advantage of these progressively operated switches is that in no case could one slam the motor on the line too quickly, and in order to control this in a regulatable way, a throttling adjustment could be inserted in the panel box so that too fast a closing of this series of switches could be prevented.

In order to describe my invention more in detail, I have illustrated one practical embodiment thereof on the accompanying two sheets of drawings, which I will now describe.

2

Figure 1 is a side elevation of a hoist and traveling crane with my pneumatic pendant control connected therewith, one motor being indicated for raising and lowering the load, and another motor being shown for moving the crane in both directions;

Figure 2 is a cross sectional view through the pendant at line 2—2 on Fig. 1;

Figures 3 and 4 are enlarged, longitudinal sectional view through the pendant tube, with bulbs shown in section, taken on the lines 3—3 and 4—4, respectively, of Fig. 2;

Figure 5 is a detail, in section, taken on the line 5—5 of Fig. 3, showing a removable plug therefor;

Figure 6 is an enlarged view, in section, showing a pneumatically operated switch mechanism;

Figure 7 is a plan view, looking down on the arrangement indicated in Fig. 6; and

Figure 8 is a diagrammatic view illustrating the wiring connections and the control connections through my pendant control mechanism.

Referring now more in detail to the drawings, I will first describe the construction of my improved pneumatic pendant. In Fig. 1, I have illustrated a hoist crane operating on an overhead rail, designated R. A travel motor T is shown at the left, and a hoist motor H is shown at the right, and the switch box B is shown mounted thereon and moving therewith. From this switch box B, my improved pendant P is shown depending therefrom and provided at its lower end with a series of bulbs, designated 10, 11, 12 and 13, and at its lower end it is shown provided with an insert plug 14, having four prongs, as 15, to be inserted into the four conduits formed in said pendant; as clearly indicated in Figs. 3 and 4 and 5. An enlarged sectional view through the pendant on the line 2—2 of Fig. 1, is seen in Fig. 2. This shows the four conduits in said pendant, and these conduits are designated 16, 17, 18 and 19, and will be understood from Figs. 3 and 4. Each of the conduits in said pendant has a connecting port with its particular bulb. Conduit 16 has a port 16' opening into bulb 10; conduit 18 has a port 18' opening into bulb 13, as seen in Fig. 3, while conduit 17 has a port 17' opening into bulb 11, and conduit 19 has a port 19' opening into bulb 12, as seen in Fig. 4, which is a sectional view taken on the line 4—4 of Fig. 2, and at right angles to the sectional view taken on the line 3—3 of said Fig. 2.

In Fig. 6, I have shown in enlarged sectional view, a diaphragm body 20, having a diaphragm 21 thereon, said body 20 being connected, as at 22, by means of a flexible rubber tube 23, and a nipple 24, with the conduit 16 of the pendant P, so that when bulb 10 is compressed in the hand, through the port 16' air will be forced into said diaphragm body 20 to move the diaphragm 21, in a manner well understood.

In connection with this Fig. 6, and also in Fig. 7, I have illustrated how a plurality of pneumatically operated switches can be connected with one

diaphragm and progressively actuated by squeezing the bulb more and more tightly. Shown in full lines is a switch lever 25, having a spoon-like end 26 resting on the diaphragm 21, as shown. This switch lever when raised by the diaphragm operates to move a switch plunger 27 which closes or opens the switch in the case 28, of any known kind. I have indicated in light broken lines two other cases, as 29 and 30, with their switch levers 29' and 30' overlying the switch lever 25 as clearly indicated in Figs. 6 and 7. These switch cases 28, 29 and 30, can be so positioned, or their switch levers can be so positioned relative to each other that they will successively be moved as the diaphragm 21 is moved to three different distances by squeezing the bulb 10 differently. These three switches can be connected so that three different speeds can be had, as slow, fast or medium. For example, if bulb 10 is squeezed slightly, it will move the switch lever 25 and its switch plunger 27. If said bulb is squeezed more the diaphragm will move switch lever 25 until it engages and moves switch lever 30' and its switch. If said bulb is squeezed tight it will move the diaphragm sufficiently to lift all of the switch levers, including 29', which would be connected for fast operation.

In the diagrammatic view in Fig. 8, single lines represent the tube or conduit connections from the respective bulbs and the light broken line, outlines the switch box in which would be located the pneumatically operated switches illustrated in Fig. 6. It will be understood, of course, that these switches which are operated from the different bulbs are the light switches, referred to as micro switches, and these are what is illustrated by the cases 28, 29 and 30 in Fig. 6. This invention has to do with a pneumatic pendant control for operating such switches, and is fully illustrated in just the lower part of the diagrammatic view in Fig. 8. It is, therefore, not considered necessary to trace a lot of circuits, as shown in the upper part of said Fig. 8, as this has nothing to do with the invention. In the lower part of said Fig. 8, the diaphragm mechanisms for the four bulbs 10, 11, 12 and 13, are all designated 20, and the connecting tube, as in Fig. 6, is designated 23 in each case.

In connection with said Fig. 8, I have shown one safety valve mechanism for releasing the air pressure in case of any overload electrically. This includes a valve body V² connected with the air tube 23 from the diaphragms 20, with a valve 31 closing the same, and adapted to be opened by a solenoid 32 connected in the electric line or circuit represented by the line 33 which includes said solenoid 32. A spring 34 with an adjustment screw 35 are illustrated in this diagrammatic view to indicate how the safety release of the air from the diaphragms can be provided for in connection with the pneumatically operated switches, as illustrated in connection with my invention. It will be understood that such relief valve would be connected with all of the tubes 23, and all circuits thus protected, but inasmuch as this mechanism is not important to the invention of this application, these connections need not be further shown or described. The circuits which are controlled by these pneumatically operated switches, of course, can be of any kind, number, and strength. My invention is particularly designed for over head hoists, cranes and the like, as indicated in Fig. 1, with the switch box B, shown in place thereon, but can be used

for any electric switch control mechanism. The invention proper, therefore, has to do only with the pneumatic pendant, illustrated, connected with switch-actuating means, as the diaphragms, illustrated in Fig. 6.

In the diagrammatic showing in Fig. 8, the travel motor and the hoist motor, referred to in connection with Fig. 1, are indicated by the letters T and H. The main circuits are indicated by the reference letters L¹, L², L³, and the main or controlling switches therefor are designated 36, 37, 38 and 39, and these are operated by the solenoids S¹, S², and S³ and S⁴, said solenoids being actuated by the circuits controlled by the sensitive or micro switches, as 28, 29 and 30, actuated by the diaphragm, as 21, or other pneumatically moved element sufficient to actuate said switches. As these are standard and well understood, it is not believed that further detailed description is required, as it is no part of the invention involved herein.

I do not, therefore, limit my invention to the details of construction and arrangement here shown for explanatory purposes, except as I may be limited by the hereto appended claims.

I claim:

1. A control pendant for electric switches consisting of an elongated flexible body of hose-like form having a plurality of separate conduits therethrough, lengthwise thereof, for carrying impulses of fluid therethrough, each conduit having a port through its outer wall, and a bulb formation around said flexible body and integral therewith, at each of said conduit ports, whereby pressure on a bulb formation forces an impulse of fluid through its port and through the conduit with which it is connected.

2. A control pendant for electric switches consisting of a hose-like body of flexible material having a plurality of separate conduits therethrough, lengthwise thereof, for carrying impulses of fluid therethrough, each conduit having a port through its outer wall, and an integral bulb formed on said hose-like body at each of said ports, and integral with said body, whereby pressure on a bulb formation forces an impulse of fluid through its port and through the conduit with which it is connected.

3. A control pendant body substantially as shown consisting of an integral elongated body of rubber-like material with a plurality of separate conduits therethrough, lengthwise thereof, and a succession of bulb formations along said body, like beads on a string, each of said bulb formations having a port therein to a particular conduit, whereby pressure on said bulb forces an impulse of fluid through its particular conduit, and a plug having a prong for each conduit and designed to be inserted into the end of said elongated body and removable to open said conduits for safety.

EARL B. SPENCER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,076,091	Allen	Oct. 21, 1913
1,205,010	Pearson	Nov. 14, 1916
1,799,126	Schrimer	Mar. 31, 1931
1,877,502	Flocco	Sept. 13, 1932