May 8, 1934. T. E. YOUNG 1,957,877

PERMUTATION SWITCH

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FIG. 1

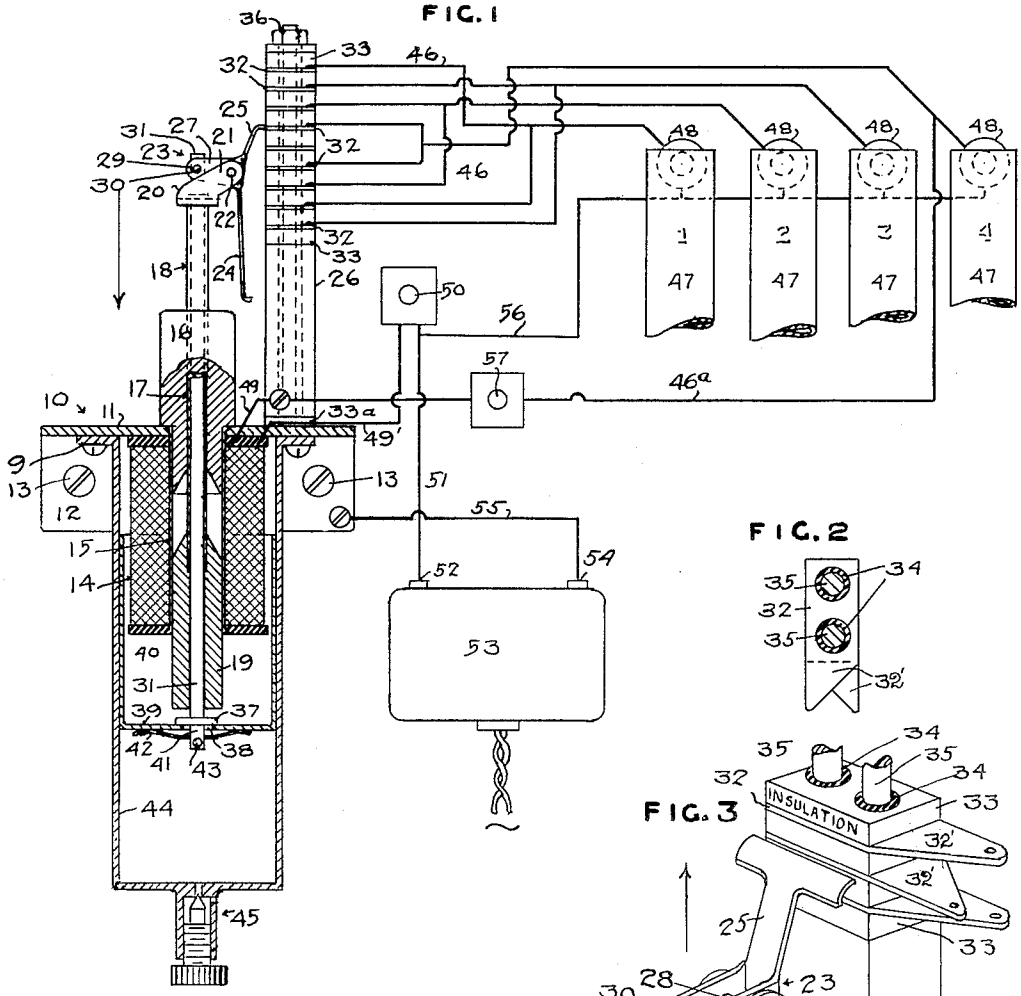
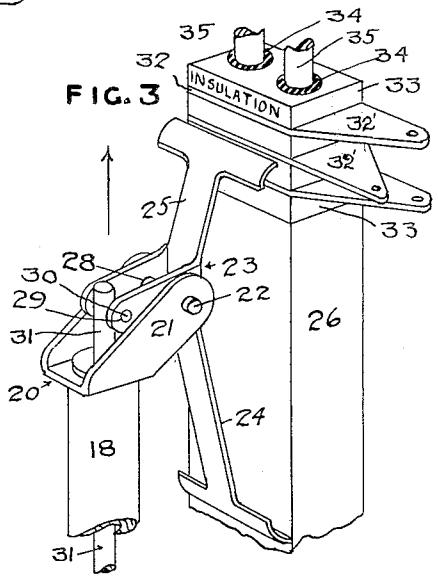


FIG. 2

FIG. 3



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PERMUTATION SWITCH

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5 Claims. (Cl. 200—97)

This invention relates to a permutation switch for operating signal or other devices.

One of the objects of the invention is to provide an apparatus of this kind in which the various devices may be operated in any desired sequence and the same device if desired may be operated with or without the intervening operation of others of the said devices.

A second object is to provide means whereby the duration of the action may be varied.

A further object is to provide an apparatus of this class in which the predetermined sequence of signals can not be interrupted by continued or repeated pressure on the starting button, or by closing of connected circuits connected to the signal devices.

Other objects and advantages of the invention will be apparent from a consideration of the following description of one form of construction in which it may be embodied, taken in connection with the accompanying drawing in which Figure 1 shows a front view of the apparatus with parts broken away and parts in section. Figure 2 shows a horizontal section of the contact assembly and Figure 3 a perspective detail of the switch member.

A bracket 10 having a horizontal shelf 11 and a downwardly extending portion 12, may be fastened by screws 13 to any convenient vertical surface (not shown).

An electro-magnet 14 preferably of the solenoid type is attached to the lower side of shelf 11 by tube 15, of suitable material not pervious to magnetism. An iron plug 16 fits tightly in the top of tube 15 and has a central hole 17 through which freely slides sleeve 18 carrying on its lower end plunger 19 forming the armature for the solenoid and on its upper end fulcrum member 20 having upwardly extending lugs 21 carrying pivot pin 22.

A switch member 23 whose lower arm 24 normally contacts with a block 26 has lugs 27, having holes 28 shown in Fig. 3 through which passes pivot pin 22. Lugs 27 have also holes 29 carrying pin 30 passing through rod 31 near its upper end. The upper arm 25 of switch 23 can by means hereinafter described, be made to successively contact with a series of contact segments 32, separated by insulating blocks 33, supported by insulating sleeves 34 and clamped together by bolts 35 screwed into shelf 11 and having nuts 36 on their upper extremities. Block 26 is not grounded to the frame.

Returning now to rod 31. Near its lower end it has formed thereon a flat valve 37 positioned above a central port 38 in the head 39 of piston 40. Below valve 37 a continuation 41 of rod 31 passes through port 38 and through spring 42 which rests on pin 43 and holds valve 37 lightly in contact with head 39.

Piston 40 has a close but freely sliding fit in cylinder 44 the latter being fastened to shelf 11 by screws 9. The bottom of cylinder 44 is provided with a variable vent valve 45, by which egress of air from the interior of the cylinder may be regulated.

Each of contact pieces 32 has an extension 31′ to which may be attached conductor or wire 46 running to one of a group of electrically operated devices; in this particular instance, a number of tubular chimes 47 each operated by means of a solenoid 48 in the usual manner. These devices will not be described in detail as they form no part of the present invention.

A wire 49 runs from block 26 to one end of the winding of solenoid 14. The other end of the winding is connected by wire 49′ to a push button 50 at the front door of a residence, for instance. The return wire 51 from the button goes to one side 52 of the secondary winding of a transformer 53 whose primary circuit is connected to any convenient source of electric current. The other terminal is connected to the other side of the transformer 53 as at the terminal 54. A wire 56 connects wire 51 and all of the solenoids 48. Push buttons 57 (only one of which is shown) for independent or manual operation of the chimes may be connected to wires 46 46*a* and their return leads run to block 26. Two or more of the contact pieces may be connected to any one of the solenoids 48.

The operation of the apparatus may be as follows: Button 50 being pressed a circuit is completed from terminal 52 through wire 51, wire 49′, the winding of solenoid 14, wire 49, block 26, lower end 24 of switch 23 and thence through the various parts of the apparatus and wire 55 to the terminal 54 of transformer 53. The chimes are connected in circuit with the parts already described so the circut is closed to the solenoids as follows; current flows by way of wire 49 to the push button 57, thence by wire 46*a*, wires 46 to contacts 32, back to the solenoid 14, and current also flows from wires 46 to solenoids 48 and by wire 56 back to wire 51, back to the transformer. The current in solenoid 14 energizes it and causes plunger 19 to be drawn up almost instantly as the valve 37 is off its seat and the piston offers little resistance to the upward movement of the parts. When the upward stroke is completed, the top of

plunger 19 contacts with plug 16 at the same time that end 24 of switch 23 has left block 26 and rests on the insulated block 33 above it. Plunger 19 now begins its descent under the action of gravity, moving rapidly until valve 37 seats itself, closing port 38, spring 42 momentarily preventing piston 40 from moving downwardly. Air trapped below the piston now retards its descent. Further movement of the plunger draws the pivot pin 22 down, thus tilting upper arm 25 toward contact segments 32 and lower arm 24 away from block 26, rod 31 meanwhile holding pin 30 stationary until the arm 25 rests against the assembly of contact segments 32 and intervening insulating blocks 33.

As the parts descend slowly, due to the slow escape of air from vent valve 45, the upper end 25 of the switch 23 moves over the segments 32 sending electric impulses to the devices connected thereto.

When the plunger reaches the lower end of its travel, the lower side of fulcrum 20 rests on the top of plug 16 but the piston continues a little farther and draws rod 31 down, restoring the parts to their initial positions.

If while the plunger is descending, the button 50, or any of the buttons 57 is depressed no interference with the normal action will occur, as the lower end 29 of switch 23 being out of contact with block 26 the circuit will not be completed.

I claim:

1. In a device of the class specified, an electromagnet, a movable contact piece coupled to the armature of said magnet, a stationary insulated contact block connected with the winding of said magnet, an assembly comprising a plurality of stationary contact segments each connected to an external electrical apparatus, and means whereby said movable contact alternately engages said block and said assembly of contact segments.

2. In a device of the class specified, a magnet, an armature therefor, a contact piece carried by the armature and having movement relative thereto, an assemblage of contact segments each segment connected to an external electrically operated apparatus, a contact block over which said contact piece travels during the working stroke of said armature, and an electrical circuit having connections to said magnet, contact piece, contact segments and to the electrical apparatus.

3. In apparatus of the class specified, an electromagnet, an armature for said magnet, a sleeve connected to said armature, a fulcrum member on the upper end of said sleeve, a rod within said sleeve, a switch arm pivoted in said fulcrum member and coupled to said rod, and a piston coupled to the lower end of said rod for the purpose specified.

4. In apparatus of the class specified, an electromagnet, an armature for said magnet, a sleeve connected to said armature, a fulcrum member on the upper end of said sleeve, a rod within said sleeve, a switch arm pivoted in said fulcrum member and coupled to said rod, and a piston coupled to the lower end of said rod for the purpose specified.

5. In combination in an apparatus of the class specified, a plurality of stationary contacts, a switch arm, an electric magnet whose armature moves said arm, and means whereby said arm does not touch said contacts during the time the armature moves it but contacts during the return stroke of the armature.

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