United States Patent

Betlejewski et al.

[15] **3,674,948**

[45] **July 4, 1972**

[54] CONTROL MECHANISM HAVING CYCLE SWITCHES SELECTIVELY ACTUATING A MODE SWITCH

[72] Inventors: **Frank W. Betlejewski**, Chicago; **Sanford M. Hanberg**, Morton Grove, both of Ill.

[73] Assignee: **Bell & Howell Company**, Chicago, Ill.

[22] Filed: **Feb. 2, 1971**

[21] Appl. No.: **111,891**

[52] **U.S. Cl.** .....**200/50 C**, 200/5 B

[51] **Int. Cl.** **H01h 9/20**

[58] **Field of Search**.....200/50 C, 18

[56] **References Cited**

UNITED STATES PATENTS

2,639,337	5/1953	Framhein	200/18 X
2,348,107	5/1944	Brongersma	200/50 C
1,424,402	8/1922	Hartman	200/5 E UX

Primary Examiner—Robert K. Schaefer
Assistant Examiner—M. Ginsburg
Attorney—William F. Pinsak and John E. Pelle, Jr.

[57] **ABSTRACT**

A control mechanism is provided for selecting among predetermined operational modes of an instrument upon actuation of selected of a plurality of manually operable cycle switches. The cycle switches are coupled mechanically with a mode switch which is adjustable to be actuated to one of the operative modes upon first actuation of a cycle switch following an actuation of another cycle switch. The last actuated cycle switch may be cycled repeatedly without changing the mode switch.

5 Claims, 4 Drawing Figures

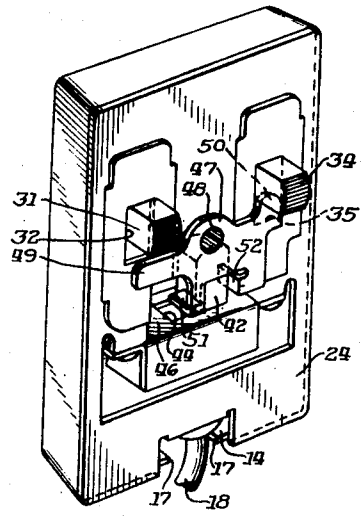


Fig. 1

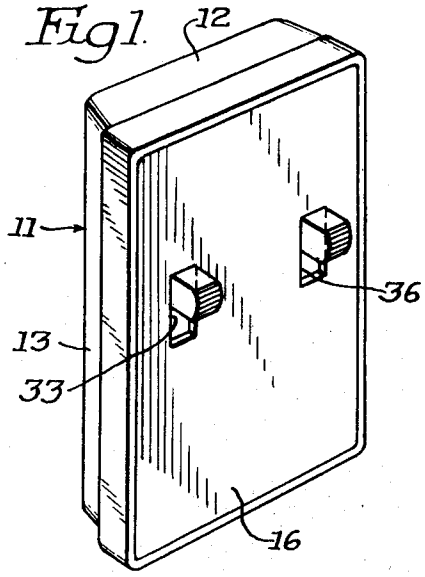


Fig. 4

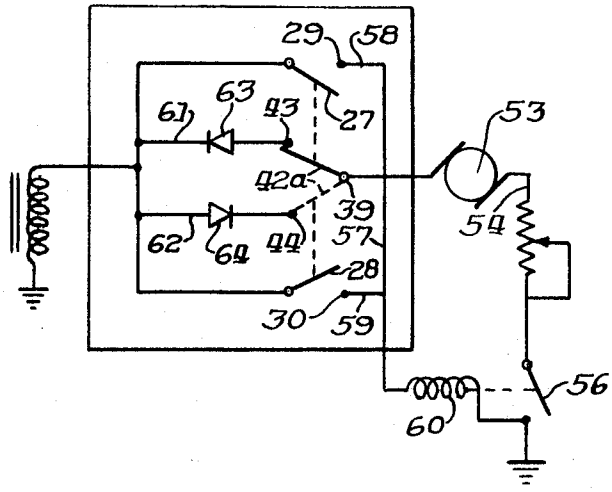


Fig. 2

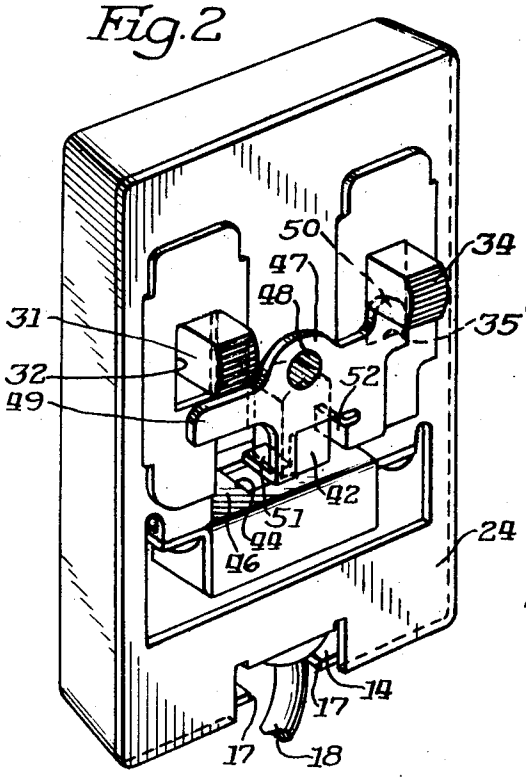
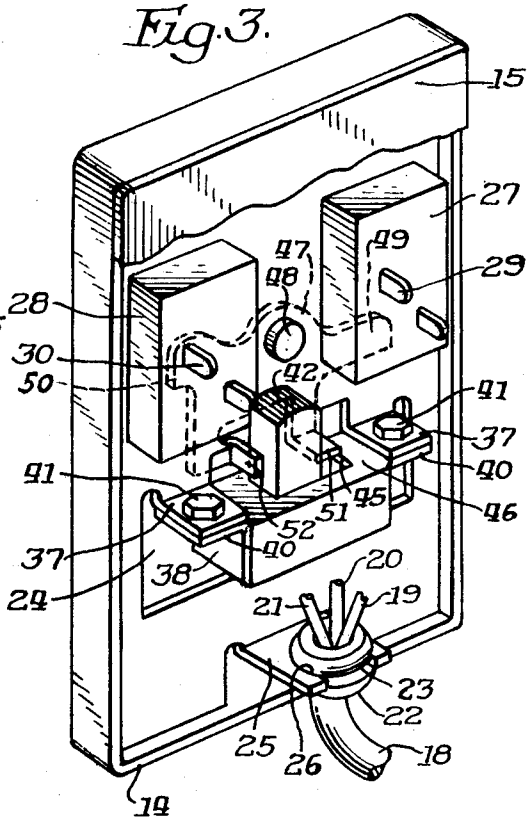


Fig. 3.



Inventors:
Frank W. Betlejewski,
Sanford M. Hanberg.

By William F. Pinckney
John E. Peele Jr. Attys

CONTROL MECHANISM HAVING CYCLE SWITCHES SELECTIVELY ACTUATING A MODE SWITCH

The invention relates to a control mechanism for selecting among predetermined modes of operation of an instrument such as a projector having forward and reverse operative modes. Particularly, the control mechanism relates to a control mechanism having manually operable cycle initiating switches mechanically connected with a mode switch which selects the projector operating mode in response to the cycle switch actuated.

The conventional mechanism for operating a slide projector comprises a first switch for energizing an electrical circuit to cyclically operate the projector drive in either direction. Heretofore, it has been necessary to move another switch to a selected position before again actuating the cycle switch to operate the projector drive in a different mode, such as reverse.

The switch mechanism of the present invention eliminates the necessity of moving the mode switch to its alternate position, and to subsequently actuate the cycle switch. Two separate cycle switches are provided for energizing separate circuits, and for mechanically shifting the mode switch to energize the projector drive for a selected operational mode. Each cycle switch is provided with a spring return push button for partially completing a circuit, and when either push button is pressed it simultaneously operates mechanical means for moving a slidable contact constituting part of a third or mode switch. The slidable contact completes the circuit associated with either of the first mentioned switches, depending upon which push button is pressed. The slidable contact remains in the position to which it was moved last by either push button until the other push button is pressed downwardly. Either push button may be pressed any number of times consecutively to initiate a projector operating cycle, in the same direction. However, the direction of operation of the projector is reversed upon the first operation of the other push button.

Suitable mechanism, by means of which the above-mentioned and other advantages of the invention are attained, will be fully described in the following specification, taken in conjunction with the accompanying drawings showing a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a front perspective view of a housing enclosing a control mechanism embodying the invention;

FIG. 2 is a front perspective view of the control mechanism with the front cover removed;

FIG. 3 is a rear perspective view of the control mechanism with the back wall of the housing cut away to facilitate illustration; and

FIG. 4 is diagrammatic wiring diagram of the electrical circuits of the control mechanism.

Referring to the drawings, a housing 11 for holding the control mechanism comprises a top wall 12, two side walls 13, a bottom wall 14, a back wall 15, and a separate front cover 16 fitting snugly over the walls 12, 13 and 14. The front edge of the bottom wall 14 is cut away, as indicated at 17, to permit a wiring conduit 18 to pass therethrough. The conduit carries three electric wires 19, 20 and 21 and has a grommet 22 secured adjacent one end thereof. The grommet 22 is provided with a circumferential groove 23.

A support plate 24 is mounted in the housing in parallel spaced relationship to the back wall 15. The lower edge of the support plate is slit vertically along two spaced lines and the portion between the slits is bent upwardly to provide a lip 25 extending rearwardly at right angles to the support plate. The lip 25 is notched at 26 to receive the grommet 22. The edges of the lip defining the notch 26 fit snugly in the groove 23 to secure one end of the conduit in place.

Two cycle switches 27 and 28 are mounted on the rear of the support plate and include terminals 29 and 30, respectively, extending rearwardly therefrom. The switch 27 is operated by a push button 31 that projects forwardly from the switch through aligned apertures 32 and 33 in the support plate 24 and the front cover 16, respectively. The apertures 32 and 33 are elongated in the vertical direction to permit vertical movement of the push button in response to finger pressure applied against the top of the push button. The push button is spring biased to return to its up position when the finger pressure is released. The switch 28 is operated in the same manner by a push button 34 projecting through aligned apertures 35 and 36 in the support plate and front cover, respectively. The apertures 35 and 36 are also elongated in the vertical direction.

Two laterally spaced coplanar lips 37 extend rearwardly at right angles from the support plate below the lower edges of the switches 27 and 28 to support a mode or third switch 38 that has a terminal 39 (shown in FIG. 4). Mode switch 38 has laterally extending wings 40 juxtaposed against the bottom surfaces of the lips 37 and secured thereto by any suitable fastening members 41. The switch 38 includes a slidable post 42 having mounted thereon a contact 42*a* alternately engageable with one of two terminals 43 and 44 as shown in FIG. 4. The post 42 projects upwardly through an aperture 45 in the top wall 46 of the switch 38. The aperture 45 is elongated laterally to permit the post 42 to slide laterally between two positions as hereinafter described.

When either of the push buttons 31 or 34 of the cycle switches is actuated, the post 42 is positioned by mechanical, coupling means shown as a lever 47 pivotally mounted on a pin 48 which projects forwardly perpendicularly from the supporting plate 24. The mechanical operation of the mode control switch 38 for positioning contact 42*a* will be described with specific reference to FIG. 2. When the push button 31 is pressed downwardly it engages the upper edge of one end 49 of the lever 47 to move the lever counterclockwise about the pin 48. The push button 34 engages the upper edge of the other end 50 of the lever to move it clockwise about the pin when the push button 34 is pressed downwardly. The lever 47 has one finger 51 engaging the left side of the post 42 on the left of the pivot pin 48 and another finger 52 engaging the right side of the post on the right of the pivot pin. Accordingly, downward pressure on the push button 31 moves the post 42 to its right hand position, and downward pressure on the push button 34 moves the post to its left hand position. When either push button 31 or 34 moves the post to one position it remains in that position until the other push button is pressed downwardly. Thus, move switch 38 is changed to a new position only upon first operation of one push button following an operation of the other push button.

Electrical wiring is shown diagrammatically in FIG. 4. A reversible motor 53 is wired into a line 54 which terminates at one end in the terminal 39, and at the other end in the terminal to which a switch 56 is connected. A line 57, having two branch lines 58 and 59 extending therefrom, is connected at one end to a solenoid 60 or other control of the projector. The branch line 58 is wired to the terminal 29 of the switch 27, and the branch line 59 is wired to the terminal 30 of the switch 28. The switches 27 and 28 are connected to the current source by one of the wires through conduit 18, and are selectively actuated to energize the line 57 by pressing the push button 31 or 34 downwardly. Each time the line 57 is energized, he solenoid 60 is actuated to close the switch 56 and to hold it closed long enough to energize the motor 53 to drive the projector through a single cycle of its operation.

The direction of operation of the motor 53, and consequently the projector, depends upon the current flow through the line 54. The line 54 is connected to the current source by another wire in conduit 18 through the mode switch 38 having the contact 42a movable between terminals 43 and 44 which are connected to the power source wire by two branch lines 61 and 62, respectively. The direction of current flow through the lines 61 and 62 is controlled by the diodes 63 and 64. When the contact 42*a* is in engagement with the terminal 43, the current flow operates the motor to drive the projector in one direction, for example, forwardly upon actuation of cycle switch 27. Similarly, when the contact 42*a* is in en-

gagement with the terminal **44** and the cycle switch **28** is actuated, the current flow is reversed and the motor drives the projector in the opposite direction, i.e. rearwardly.

To summarize briefly, when the push button **31** of the cycle switch **27** is pressed downwardly it closes the circuit and, through pivotal movement of the lever **47**, moves the contact **42***a* of the switch **38** into engagement with the terminal **43**. A projector cycle is initiated thereby as of the switches complete the circuit to energize the solenoid **60** to close the switch **56** and to hold it closed long enough to drive the projector through a cycle. The contact **42***a* remains in engagement with the terminal **43** during each subsequent actuation of button **31** until button **34** of switch **28** is actuated. Downward pressure on the push button **34** moves to contact **42***a* out of engagement with the terminal **43** and into engagement with the terminal **44** to reverse the direction of the motor to drive the projector rearwardly.

Although we have described a preferred embodiment of the invention in considerable detail, it will be understood that the details of the structure described are intended to be illustrative, and may be modified or changed without departing from the spirit or scope of the invention.

What is claimed is:

1. A control mechanism for selecting among predetermined operative modes of an instrument, comprising:

a plurality of manually operable cycle switches connected in an energizeable circuit;

a mode switch having an actuator movable to a plurality of positions corresponding to said operative modes for energizing mode circuitry of the energizeable circuit responsive to each position; and

mechanical means coupling said cycle switches and said mode switch for selectively moving said mode switch actuator to one of said mode positions responsive to operation of one of said cycle switches, and to another of said mode positions responsive to operation of another of said cycle switches for conditioning said circuitry in response to said cycle switches, said mode switch actuator being restrained in one of said positions until displaced by another cycle switch to another of said positions.

2. A control mechanism as in claim **1**, wherein said cycle switches respectively control forward and reverse modes, and said mechanical means comprises a pivoted lever having pusher portions for engaging and positively moving said mode switch actuator to one of said positions upon first operation of one of said cycle switches following an operation of another of said cycle switches.

3. A contrOl mechanism as in claim **1**, wherein said cycle switches are biased return slide switches arranged to cause positive positioning of said mode switch actuator only upon first operation of one of said slide switches against the biasing return following operation of another slide switch.

4. A control mechanism as in claim **1**, wherein said mechanical coupling means is pivotable between at least two positions and each of said cycle switches includes a mechanical portion engageable with said mechanical coupling means to selectively pivot said coupling means in response to operation of said cycle switches whereby said mode switch actuator is moved to one mode by operation of one of said cycle switches and to another mode by operation of another of said cycle switches.

5. A control mechanism as in claim **1**, wherein said mode switch is selectively connectable in separate branch lines permitting current flow in predetermined directions, said cycle switches are connected to complete a circuit portion through one of said branch lines upon actuation wherein said circuit is completed for current flow in the desired direction.

* * * * *