

United States Patent

Rayner

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[54] JOYSTICK CONTROL SWITCH

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[51] Int. Cl. H01h 25/04

[58] Field of Search 200/6 A, 17

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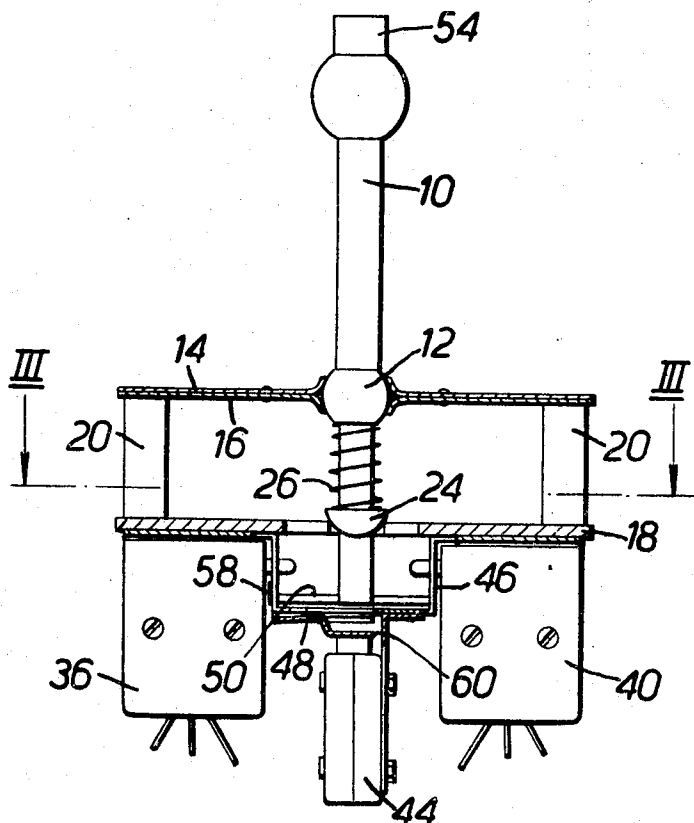
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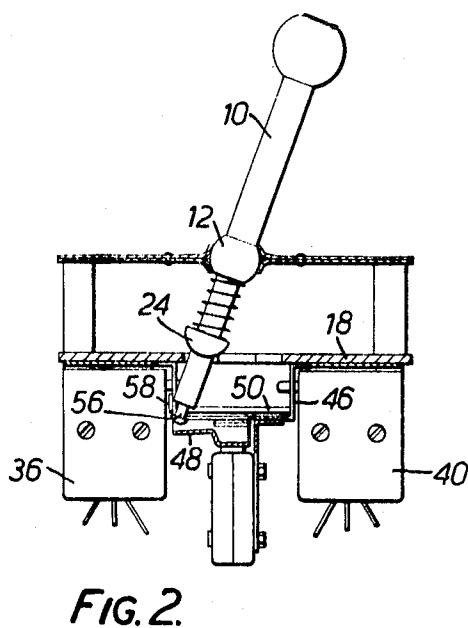
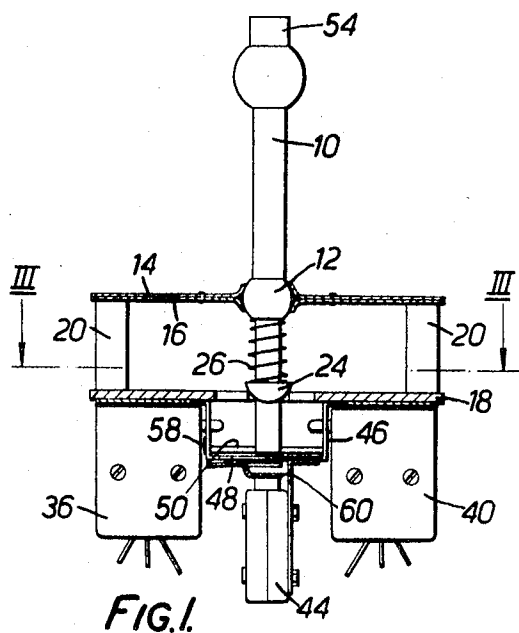
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[57] ABSTRACT

In a joystick control switch having an operating lever rotatable about a point intermediate the length of the lever, the lever is positively indexable in each of a plurality of positions of rotation by means of a collar slidably mounted on the lever and resiliently biased into engagement with a gate member defining the plurality of positions of rotation, and in each of the plurality of positions of rotation the lever operates a depressible-plunger-type switch by contact of the lever with the plunger either directly or through the intermediary of a single lever member. A button located in one end of the lever is depressible to slide a shaft extending longitudinally of the lever to depress the plunger of an additional switch at the other end of the lever, in one position of rotation of the lever.

9 Claims, 6 Drawing Figures





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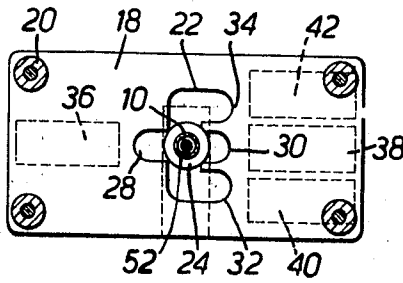


FIG. 3.

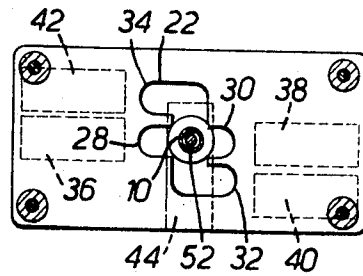


FIG. 4.

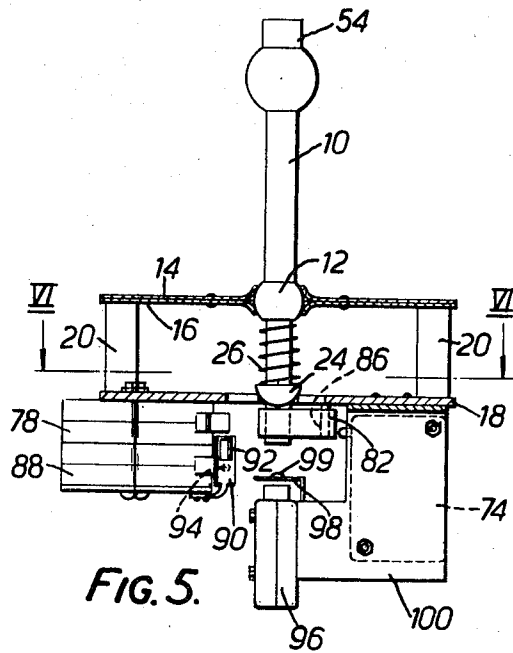


FIG. 5.

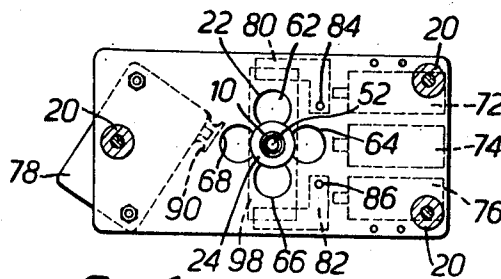


FIG. 6.

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JOYSTICK CONTROL SWITCH

BACKGROUND OF THE INVENTION

The present invention relates to joystick control switches. A joystick control switch is known which includes an operating lever rotatable about a pivot point intermediate first and second portions of the lever, the first portion being manually displaceable to rotate the lever about the pivot point, a mechanism for positively indexing the lever in each of a plurality of positions of rotation and a plurality of switches operable in response to the position of the lever in respective ones of the positions of rotation. In this joystick control switch it is difficult to design a simple arrangement for performing the functions of positively indexing the lever and operating the switches in response to the position of the lever. Consequently known joystick switches tend to be complex and unnecessarily expensive.

It is an object of the present invention to provide a joystick control switch in which the functions of positively indexing the operating lever and operating the switches are performed by a simple mechanism.

SUMMARY OF THE INVENTION

The present invention provides a joystick control switch in which the operating lever is positively indexed in each of a plurality of positions of rotation by means of an abutment member mounted on the lever and slidable longitudinally thereof and resiliently biased into engagement with a gate member defining the plurality of positions of rotation.

DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention will appear from the following description of two embodiments of the invention given by way of example with reference to the accompanying drawings in which:

FIG. 1 is a sectional view of one embodiment of a joystick control switch in accordance with the present invention, showing the operating lever in one position of rotation;

FIG. 2 is a similar view to that of FIG. 1 of the same embodiment but showing the operating lever in a different position;

FIG. 3 is a section on the line III—III of FIG. 1;

FIG. 4 is a section similar to that of FIG. 3 of a modification of the embodiment of FIGS. 1 and 3;

FIG. 5 is a sectional view of a second embodiment of a joystick control switch in accordance with the present invention; and

FIG. 6 is a section on the line VI—VI of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The joystick control switches shown in the drawings are particularly suitable for controlling tape recorders, more particularly the tape recorders of a language laboratory. In a language laboratory a plurality of tape recorders is controllable from a common control station. Each pupil sits at one of the tape recorders, situated remote from the control station, and can listen to speech recorded as a sample in one track on the tape and record his own imitation of the sample in another track on the tape in intervals in the speech in the sample track. Sound in this track can be erased without erasing the sample track, or played back simultaneously with the sample. A teacher sits at the control station and can listen and speak to each pupil individually. The teacher may also control from his station many of the operations of the tape recorders, for instance tape spooling, both forward and reverse. Equipment is also provided adjacent the tape deck of each tape recorder for local control by the pupil of the functions of the machine. The joystick control switches of the present invention are particularly suitable for such local control of the functions of the tape recorder.

In each of the joystick control switches shown in the drawings, the operating lever may be positively indexed in each of five positions. One is an "off" position in which the

tape recorder is idle. The other positions correspond to the energization of the tape recorder for feeding the tape at slow or fast speeds in forward or reverse directions. In the position of the lever corresponding to the slow speed, forward direction, a button on the free end of the lever may be depressed to energize the tape recorder to record speech on to the tape. The fast forward and reverse speeds are intended for rapid forward and reverse spooling of the tape, to reach a desired point on the tape in as short a time as possible. However, when the tape is rewound at the fast reverse spooling speed, any sound reproduced by the playback from the speech is quite unrecognizable, and it is difficult to stop the tape accurately at any desired point. By rewinding the tape at the relatively slow reverse speed, which can be as high as three times the slow forward speed used for recording, the pattern of the speech can be readily distinguished, and the tape can readily be stopped at or near the beginning of a phrase of the speech. The facility for fast rewinding is retained, however, so that the time taken to rewind the tape completely on to one spool is not unduly prolonged.

Each of the joystick control switches is also useful in a so-called language practice machine, which is a single tape recorder basically similar to one of the tape recorders of the language laboratory system for a pupil to practice imitating the sample speech on his own.

Referring now to the drawings in more detail, the embodiment of the joystick control switch shown in FIGS. 1 to 3 comprises a tubular operating lever 10, pivotable about a ball-and-socket joint formed by a nylon ball 12 on the lever intermediate its ends swiveling in a socket formed between two plates 14 and 16. The plates 14 and 16 are secured together and mounted spaced from a baseplate 18 on pillars 20. A gate 22 is formed in the baseplate 18 and the lever 10 projects through this gate, positive indexing of the movement of the lever being obtained by a rounded collar 24 mounted on the lever 10 and slidable longitudinally thereof and pressed into engagement with the gate 22 by a compression spring 26.

The form of the gate determines the movement of the lever. In the embodiment of FIGS. 1 to 3, the gate has four arms 28, 30, 32, 34 into which collar 24 may index upon movement of lever 10. Collar 24 may also index in the vertical or midposition of lever 10, shown in FIGS. 1 and 3. Arms 28 and 30 lie on opposite sides of a straight line through the midposition and guide lever 10 between positions in which its top end is respectively forward and backward. Arms 32 and 34 are bent so that to reach the end of either of these arms, the lever 10 must be moved first sideways then backwards. This feature introduces a delay in switching to these side positions, which may be particularly useful where the side positions of the lever are used to energize the fast spooling of the tape.

The four extreme positions of the lever are associated with respective depressible-plunger-type microswitches 36, 38, 40, 42 which are mounted underneath baseplate 18, the bottom end of the lever being arranged to operate the plungers of the microswitches. The microswitches 36 to 42 are appropriately connected electrically to energize solenoids controlling the drive couplings in the tape recorder in conjunction with which the joystick control switch is used.

An additional microswitch 44 is mounted beneath baseplate 18 on a bridge 46. A bar 48 is pivoted at one end on a pin 50, and engages at its other end the plunger of the microswitch 44. The bar 48 can be depressed by a shaft 52 (see FIG. 3) extending through the lever 10 from a "record" button 54 at the top end of the lever, the lever also containing a return spring (not shown) for the shaft 52. With the top end of the lever in its forward position, as shown in FIG. 2, the button 54 can be depressed so that the end of the shaft extends out of the end of lever 10, depressing the bar 48 as shown in FIG. 2, and actuating the microswitch 44 to connect the record transducer head of the tape recorder to a microphone. With the lever 10 in this position, and the button 54 depressed, an annular notch 56 near the end of the shaft 52 engages behind a leaf spring 58 to latch the shaft in the depressed position; movement of the

lever back towards the midpoint releases the shaft 52, and opens the microswitch 44. With the lever in its midposition, the shaft 52 can engage in a depression 60 in the bar 48 to actuate the microswitch 44, so that the microphone is energized. In all other positions of the lever, the microswitch cannot be actuated.

In the modification shown in FIG. 4, an alternative arrangement for the gate 22 and microswitches 36 to 42 is provided. With this arrangement, slow forward feeding of the tape is selected by moving the top end of the lever forward to index collar 24 in arm 28 and actuate microswitch 36, fast forward feeding is selected by moving the lever first sideways and then forward to index collar 24 in arm 34 and actuate microswitch 42, slow reverse feeding is selected by moving the lever backwards to index collar 24 in arm 30 and actuate microswitch 38, and fast reverse feeding is selected by moving the lever first sideways and then backward to index collar 24 in arm 32 and actuate microswitch 40.

Referring now to FIGS. 5 and 6, the embodiment of the joystick control switch shown therein comprises many components similar to components of the embodiment shown in FIGS. 1 to 3. These components are assigned the same reference numerals throughout the drawings, and will not be further described in connection with FIGS. 5 and 6. In the embodiment shown in FIGS. 5 and 6, the gate 22 in base plate 18 comprises four arms 62, 64, 66 and 68 spaced at 90° intervals about a central point. Upon movement of lever 10, collar 24 may index in each of arms 62 to 68 or in a midposition resulting in the vertical position of lever 10 shown in FIGS. 5 and 6.

Four microswitches 72, 74, 76 and 78 are mounted underneath baseplate 18 and are associated with respective ones of arms 62, 64, 66 and 68 of gate 22. Two L-shaped levers 80 and 82, pivotable on pins 84, 86 fixed to base plate 18, are associated with arms 62 and 66 respectively. The lower end of lever 10 is arranged to operate the plungers of microswitches 72 to 78. Thus the lower end of lever 10 may bear directly against the actuators of microswitches 74 and 78, and may bear against one leg of each of levers 80, 82 to rotate those levers so that the other legs of those levers may bear against the plungers of microswitches 72, 76 respectively. Microswitches 72 to 78 are electrically connected to energize solenoids controlling the drive couplings in an associated tape recorder, microswitches 78 and 74 controlling the slow forward and reverse speeds and microswitches 72 and 76 controlling the fast forward and reverse speeds. The midposition or vertical position of lever 10 corresponds to an "off" condition in which the tape recorder is not energized to drive the tape.

An additional microswitch 88 is mounted below microswitch 78. A leaf spring 90 having an aperture 92 is mounted adjacent the plunger of microswitch 88. When lever 10 is in the forward position, in which collar 24 is indexed in arm 68 to actuate microswitch 78 to select the slow forward speed, depression of "record" button 54 results in the projection of shaft 52 from the lower end of lever 10 to project through aperture 92 in leaf spring 90. The lower end of shaft 52 also bears against spring 90 to displace the spring such that a projection 94 on the face thereof contacts and depresses the plunger of microswitch 88. Microswitch 88 is thus actuated, and operatively connects the microphone to the transducer head of the tape recorder to record speech on the tape. The annular notch near the end of shaft 52 engages behind leaf spring 90 to latch shaft 52 in the depressed position, while spring 90 remains bent to actuate microswitch 88. Shaft 52 is released by movement of lever 10 away from its forward position, shaft 52 then returning to its normal position under the action of the return spring (not shown) mounted within lever 10.

A further microswitch 96 is mounted on a frame 100 below baseplate 18. A leaf spring 98 is fixed at one end thereof to frame 100, and at the other end thereof overlies the plunger of

microswitch 96. A projection 99 on the upper surface of spring 98 is arranged to be contacted by the end of shaft 52 when button 54 is depressed while lever 10 is in its midposition, so that spring 98 is displaced to operate the actuator of microswitch 98. Microswitch 98 may be connected to control an alarm for attracting the attention of the teacher at the central station in the language laboratory.

I claim:

1. Joystick control switch means, comprising
 - a support (14, 16) containing an opening;
 - a lever (10) pivotally connected intermediate its ends in said support opening, thereby defining first and second lever portions on opposite sides of said support, said lever being pivotally operable upon manual displacement of said first portion;
 - gate means (18) connected with said support for cooperation with said second lever portion to define a plurality of pivotal positions of said lever relative to said support;
 - abutment means (24) mounted for longitudinal sliding movement on said second lever portion;
 - means (26) resiliently biasing said abutment means into engagement with said gate means for positively indexing said lever in said pivotal positions, respectively; and
 - a plurality of switching means (36, 38, 40, 42) connected with said support for selective operation by said second lever portion in accordance with the corresponding pivotal position of said lever, respectively.
2. A joystick control switch as claimed in claim 1, and further comprising a plurality of housing means containing respective ones of said switching means and a plurality of plunger means projecting from respective housing means and depressible to operate respective ones of said switching means.
3. A joystick control switch as claimed in claim 2 wherein at least one of said plunger means is depressible through direct contact by said second portion of said lever.
4. A joystick control switch as claimed in claim 3 wherein said lever includes respective first and second ends adjacent said first and second portions of said lever, and said one plunger means is depressible through direct contact by said second portion adjacent said second end, and said abutment means comprises a collar member encircling said second portion.
5. A joystick control switch as claimed in claim 3 further comprising lever means rotatable through direct contact by said second portion to depress said plunger means of a further one of said switching means.
6. A joystick control switch as claimed in claim 1, wherein said lever includes respective first and second ends adjacent said first and second portions, and further comprising additional switching connected with said support adjacent the second lever portion, means and button means located in said first end and manually depressible to operate said additional switching means in one of said plurality of positions of rotation of said lever.
7. A joystick control switch as claimed in claim 6 wherein said additional switching means includes plunger means depressible to operate said additional switching means, and further comprising a shaft extending through said lever longitudinally thereof and slidable relative to said lever, resilient bias means for urging said shaft in one direction relative to said lever, said lever being slidable in the opposite direction upon depression of said button means to contact and depress said plunger means of said additional switching means in said one position of rotation of said lever.
8. A joystick control switch as claimed in claim 7 further comprising means for latching said button means when depressed in said one position of rotation of said lever.
9. A joystick control switch as claimed in claim 8, wherein said latching means is inoperable when said lever is displaced away from said one position.

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