

[54] **SELECTION DEVICE**

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335/68; 317/146, 148.5; 235/92 PE

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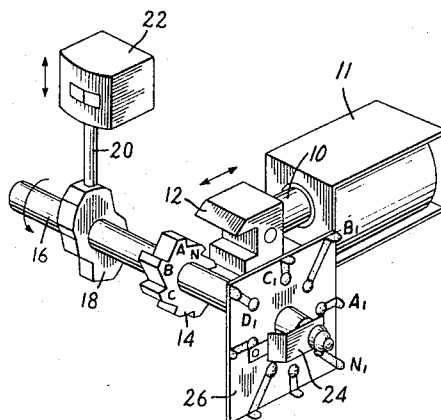
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[57]

ABSTRACT

An astable multivibrator provides a drive signal for reciprocating an electrically operated plunger to which rotates a controlled member. One stationary contact is provided for each of the positions where the controlled member is to be selectively stopped, and when a movable contact rotating along with the controlled member reaches a selected one of the stationary contacts the multivibrator is deenergized to stop rotation of the controlled member at its particular position corresponding to the selected contact.

4 Claims, 3 Drawing Figures



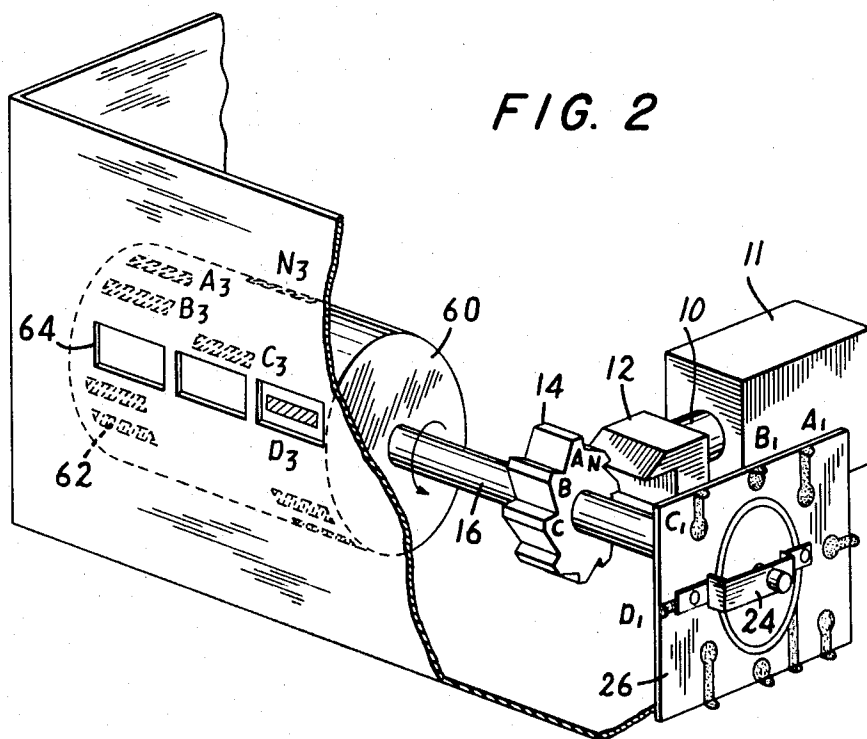
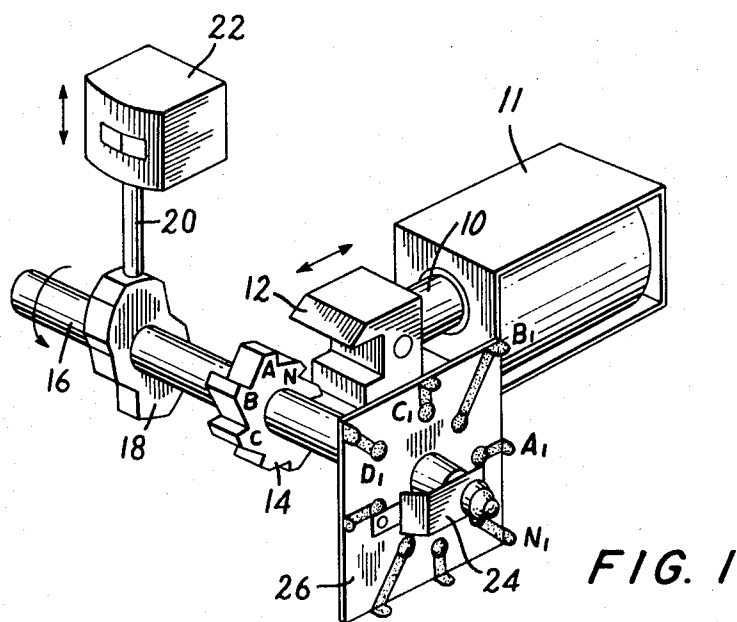
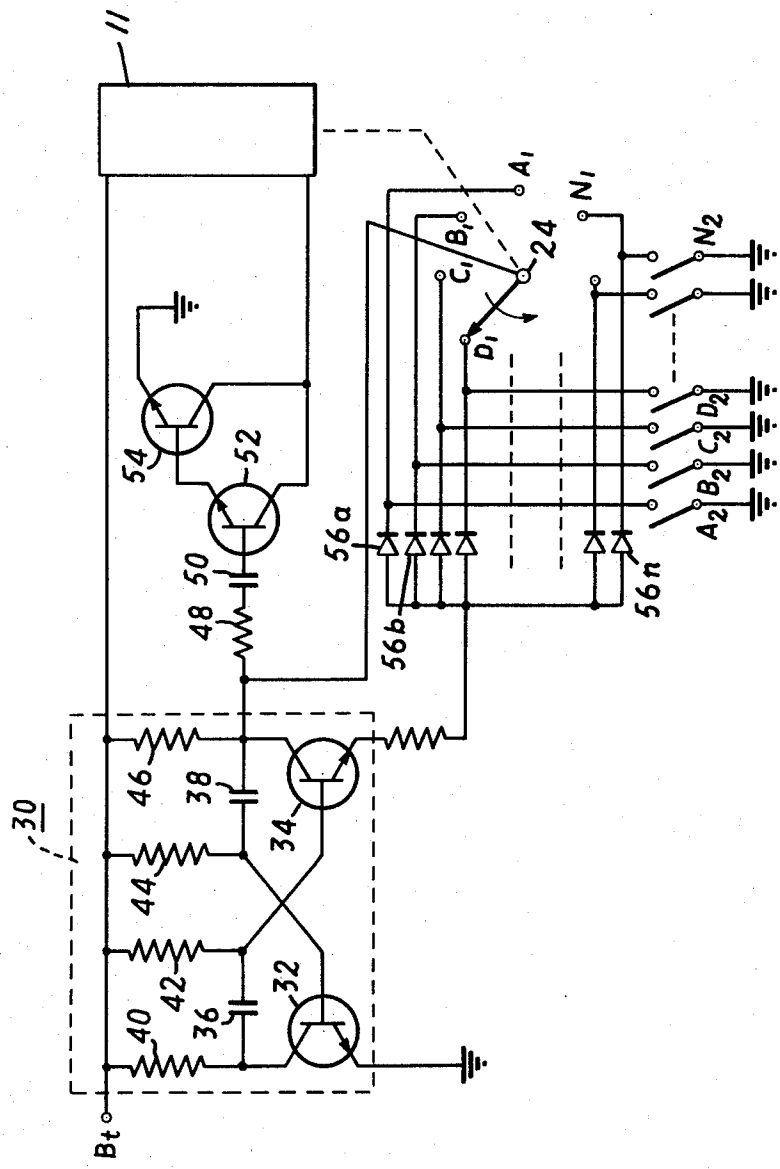


FIG. 3



SELECTION DEVICE

BACKGROUND OF THE INVENTION

This invention relates to a selection device for setting a controlled member to a selected one of various positions where it is to be selectively stopped.

Selection devices of the type referred to are suitable for use in selecting a signal on any one of a plurality of signal channels, for example, on record tracks of a magnetic tape or drum. Also they are suitable for use with a display selection system for selectively displaying a plurality of alarms or guidances within a single display window or within a plurality of display windows in accordance with the type and importance of the display. In the conventional type of channel selection system, the selection of channels has been accomplished by using a multiplicity of relays or channel heads leading to the disadvantages that the associated electronic circuitry has been complicated in construction, large-sized, and expensive to manufacture. Also the conventional type of display selection system has necessarily included one display member for each concept of the information to be displayed, or separate means for indicating the importance of each concept of the information, complicated drive means, and a multiplicity of relays resulting in the disadvantages as described above.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide a new and improved selection device having a variety of applications and being simple in construction.

It is another object of the invention to provide a new and improved selection device including a single driving member for selecting a plurality of signals, wherein the device can be manufactured at low costs.

It is still another object of the invention to provide an inexpensive, small-sized selection device capable of starting and stopping through a single operation.

The invention accomplishes the above cited objects by the provision of a selection device comprising, in combination, a controlled member to be selectively any one to a plurality of predetermined positions, a plurality of selection switches one for each of the predetermined positions of the controlled member, an astable multivibrator operative in response to the actuation of a selected one of the selection switches, a plunger driven by the astable multivibrator to drive the controlled member, and an electric contact rotatable in accordance with the movement of the controlled member, to successively scan the selection switches, the arrangement being such that, by electrically coupling the rotatable contact to a selected one of the selection switches, the operation of the multivibrator and the movement of the plunger terminated when the controlled member reaches its predetermined position corresponding to that selection switch electrically coupled to the rotatable contact.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features and advantages of the invention will become more readily apparent from the following detailed description taken in conjunction with the accompanying drawing in which:

FIG. 1 is a perspective view of a selection device constructed in accordance with the principles of the invention;

FIG. 2 is a perspective view of a modification of the invention with parts broken away; and

FIG. 3 is a schematic diagram of an electric control circuit for controlling the device shown in FIG. 1 or 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing and FIG. 1 in particular, it is seen that an arrangement disclosed herein comprises a plunger 10, a feed claw 12 secured to the free end of the plunger 10 and a ratchet wheel 14 operatively coupled to the feed claw 12. The ratched wheel 14 is mounted on a rotary shaft 16 disposed substantially perpendicularly to the axis of the plunger 10 to convert reciprocating movements of the plunger 10 as shown at the double-headed arrow in FIG. 1 to intermittent rotational movement of the shaft 16 as shown at the arrow alongside the latter. The rotary shaft 16 has fixedly secured thereon a cam 18 engaging one end of a follower 20 having the other end connected to a controlled member, in this case, a channel head 22. In order to selectively put the channel head 22 into a selected one of a plurality of its predetermined positions, the cam 18 has camming surfaces equal in number to the said positions of the head 22 and the ratchet wheel 14 includes a plurality of teeth A, B, . . . , N aligned with the camming surfaces of the cam 18 in the axial direction of the rotary shaft 16.

An electric contact 24 of any suitable resilient electrically conductive material is fixed to that end of the rotary shaft 16 remote from the cam 18 for rotation along with the shaft 16. As the rotary shaft 16 is rotated the movable contact 24 is adapted to scan a group of stationary contact members A₁, B₁, . . . , N₁ disposed at substantially equal angular intervals on a printed circuit module 26 suitably fixed with respect to the rotary shaft 16. The number of the stationary contact members is equal to the number of positions of the head 22 and therefore of the teeth on the ratchet wheel 14 or the camming surfaces of the cam 18.

Referring now to FIG. 3, there is shown an electric control circuit for controlling the operation of the device as shown in FIG. 1. An astable multivibrator of well known construction is generally designated by the reference numeral 30 and adapted to drive the electrically operated plunger 10 as above described. More specifically, the astable multivibrator includes a pair of NPN type transistors 32 and 34 each having a base electrode connected to the collector electrode of the other transistor through a coupling capacitor 38 or 36 which is, in turn, connected on both sides to a source of positive potential B+ through resistors 40 and 42 or 44 and 46, respectively. One of the transistors, in this case, the transistor 32 has its emitter electrode connected to a point of reference potential such as the ground. The source B+ is connected to one terminal of a driving member such as a solenoid 11 for operating the plunger 10 and the collector electrode of the other transistor 34 is connected through a series combination of coupling resistor and capacitor 48 and 50 to an amplifier including a pair of NPN type transistors 52 and 54 having a Darlington configuration. The transistor 54 is shown in FIG. 3 as having a collector electrode connected to the other terminal of the said driving member.

The collector electrode of the transistor 34 is connected to the rotatable contact member 24 which is described above in conjunction with FIG. 1. The contact members $A_1, B_1, \dots, N_1$ as above described are shown in FIG. 3 as stationary contacts which are electrically coupled together to the emitter electrode of the transistor 34 through the respective semiconductor diodes 56a, b, $\dots, n$. Also the contact members $A_1, B_1, \dots, N_1$ are capable of connection to a point of reference potential such as ground through normally open selection switches $A_2, B_2, \dots, N_2$, respectively, one for each of the predetermined positions of the channel head 22, for example, for each of plural record tracks on a magnetic tape. The diodes 56 serve to isolate the contacts connected to all open selection switches $A_2, B_2, \dots, N_2$ from a closed said switch.

The selection device of the invention thus far described is operated as follows: It is first assumed that a selected one of the selection switches, for example, the switch C_2 has been closed. The multivibrator 30 then operates to reciprocate the plunger 10 thereby to rotate the cam 18 and the contact 24 through the feed claw 12 and the ratchet wheel 14 until the contact member 24 engages the stationary contact member C_1 . This causes the output of the multivibrator 30 to be connected to ground through the contact member C_1 and the closed switch C_2 whereupon the multivibrator 30 ceases to oscillate. Meanwhile the cam 18 is rotated to permit the channel head 22 to be brought into its position determined by the particular camming surface thereof contacting the follower 20. As previously described, the camming surfaces of the cam 18 are aligned with the corresponding teeth on the ratchet wheel 14 and have the one-to-one correspondence with the stationary contact members which have, in turn, their own selection switches connected thereto. Thus it will be appreciated that the particular termination of oscillation of the multivibrator 30 causes the channel head 22 to be set to its position determined by the selected selection switch, in this case, the switch C_2 . The channel head 22 is ready for picking up a signal on the particular signal channel, for example, such as the particular record track on the magnetic tape corresponding to the initially closed selection switch, in this case, the switch C_2 . Then, by opening the closed selection switch, the system is ready for the succeeding operation.

With the selection switch C_2 maintained in its closed position it is assumed that another selection switch has been closed while the plunger 10 is moving. Under the assumed condition, the channel head 22 will be stopped when the contact member 24 has reached the stationary contact member which is nearer to the rotating contact 24. After the completion of the operation of the plunger 10 the position of the head 22 is not affected by the another selection switch unless the previously selected switch such as C_2 is reset to its original position. In order to utilize the features as above described, the resistors and capacitors of the multivibrator can be appropriately preselected in magnitude.

From the foregoing it will be appreciated that the invention has provided an inexpensive selection device capable of selecting a desired one of multiple channels by a single channel head through the use of a simple mechanism and a simple electric circuitry.

FIG. 2 shows a modification of the invention applied to a display selection system. An arrangement shown in

FIG. 2 is different from that illustrated in FIG. 1 only in that a display drum is substituted for the cam 18, the follower 22 and the channel head 24 as shown in FIG. 1. Therefore like reference numerals and characters designate the components corresponding to those illustrated in FIG. 1. The display drum generally designated by the reference numeral 60 is rigidly mounted in coaxial relationship on the rotary shaft 16. The drum 60 is provided on its outer peripheral surface with a group of display indications generally designated by the reference numeral 62 and capable of being selectively displayed through a plurality of viewing windows 64. The display indications 62 are disposed at substantially equal angular intervals on the outer peripheral drum surface, one for each of the selection switches $A_1, B_1, \dots, N_1$, and also at different circumferential rows determined by the type and importance thereof so that, with the particular selection switch closed, that display indication corresponding to the closed switch appears at one of the three viewing windows 64. The display indications are designated by the same reference characters denoting the corresponding switches with the suffix digit of 3. For example, the display indication B_3 corresponds to the selection switch B_2 and therefore to the stationary contact member B_1 . It will be readily understood that the control circuitry as shown in FIG. 3 controls the operation of the device in the same manner as previously described in conjunction with FIGS. 1 and 3. Therefore, it will be appreciated that only a selected one of the display indications 62 is consistently displayed through a selected one of the viewing windows 64 in accordance with the closing of a particular selection switch. FIG. 2 shows the display indication D_3 being viewed through the rightmost window 64 with the movable contact member 24 put in engagement with the stationary contact member D_2 .

If desired, more than one of the display indications may be viewed through one or more of the windows. Alternatively, all the substances of display may be selectively displayed through a single viewing window while they are disposed in a single circumferential row on the drum.

From the foregoing it will be appreciated that the invention can display a selected one of a plurality of display indications or signals through a single viewing window or a selected one or more of a plurality of viewing windows in accordance with the type and importance thereof by simple driving means and control circuitry.

While the invention has been illustrated and described with reference to a few preferred embodiments thereof it is to be understood that various changes, modifications and substitutions may be made without departing from the spirit and scope of the invention. For example, the display drum may be replaced by a display disc or the like. In order to improve the display effect, the viewing window(s) may be operatively associated with an electric lamp(s) adapted to emit colored light only when the substance(s) of display has come into the window(s). Also the invention may be effectively utilized as relays or various control elements.

What we claim is:

1. A selection device comprising, in combination, a controlled member for being selectively set to any one of a plurality of predetermined positions, an astable multivibrator having an output terminal for producing an alternating output signal, a plurality of selection

switch contacts one for each of the predetermined positions of said controlled member, means connecting said selection contacts to said multivibrator, contact means for selective engagement with any one of said selection contacts to cause energization of said multivibrator, electrically actuated rotatable driving means coupled to said multivibrator output terminal for advancing said controlled member sequentially from one position to the next in response to each alternation of the output signal, a rotatable switch contact, means mounting said rotatable switch contact for sequentially sweeping said selection switch contacts, and means coupling said rotatable switch contact to said multivibrator for deenergizing said multivibrator when said rotatable switch contact closes against one of said selection contacts engaged by said contact means.

2. A selection device as set forth in claim 1, in which said electrically actuated rotatable driving means comprises a solenoid having a reciprocating plunger, a ratchet and shaft combination for stepped rotation by said plunger, and a cam mounted on said shaft, and in which said controlled member comprises a channel head having advancement means engaging said cam.

3. A selection device as set forth in claim 1, in which said contact means is connected to a reference potential and said rotatable switch contact is connected to said multivibrator output terminal.

4. A selection device comprising, in combination, a

rotatable controlled member for being selectively set to any one of a plurality of predetermined rotative positions, a plurality of selection switch contacts one for each of the predetermined positions of said controlled member, means for selectively connecting any one of said contacts to a reference potential, an astable multivibrator having an output terminal for producing an alternating output signal, means for connecting said multivibrator to said selection contacts for energization of one of said contacts to the reference potential, electrically actuated rotatable driving means coupled to said multivibrator output terminal for advancing said controlled member sequentially from one said predetermined position to the next in response to each alternation of said output signal, a plurality of fixed switch contacts connected respectively to said selection switch contacts, a rotatable switch contact, means mounting said rotatable switch contact for sequential sweeping of said fixed contacts upon advancement of said controlled member, and means connecting said rotatable switch contact to said multivibrator for deenergizing said multivibrator when said rotatable contact engages one of said fixed contacts connected to the reference potential through its respective selection contact.

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