

Sept. 23, 1958

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2,853,564

DIGITAL SWITCH

Filed Dec. 12, 1955

2 Sheets-Sheet 1

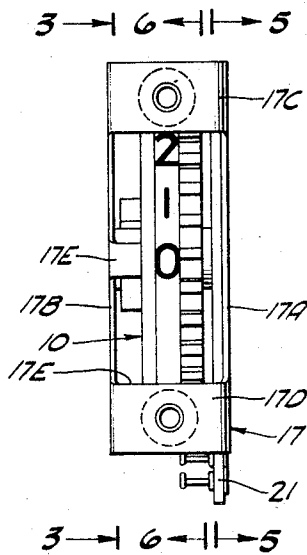


FIG. 1.

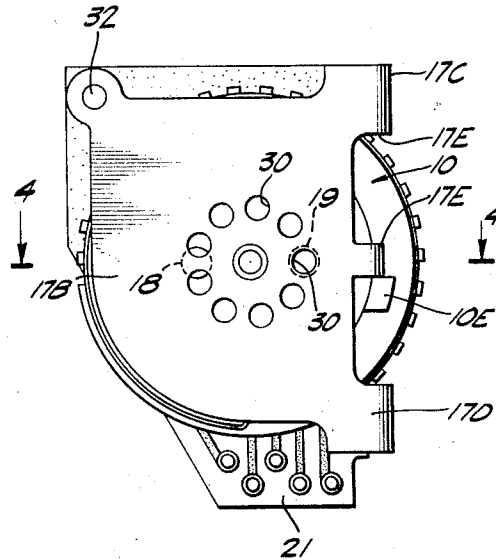


FIG. 2.

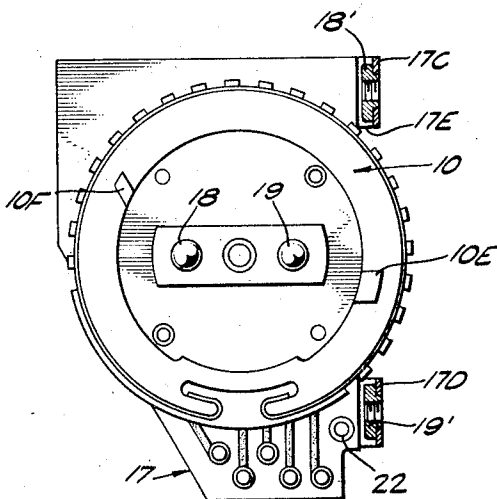


FIG. 3.

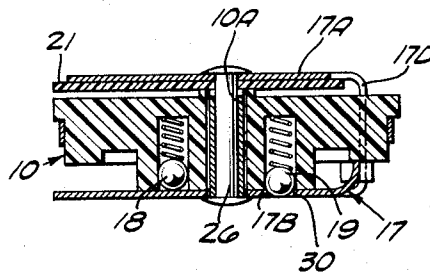


FIG. 4.

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2 Sheets-Sheet 2

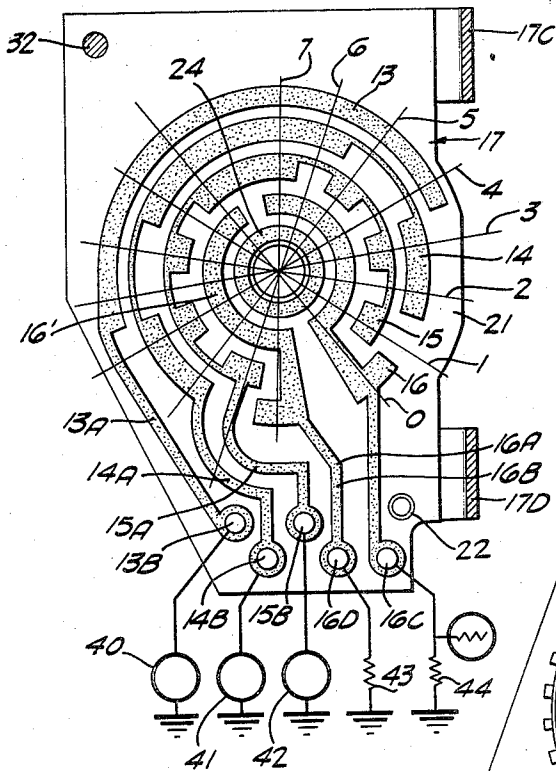


FIG. 5.

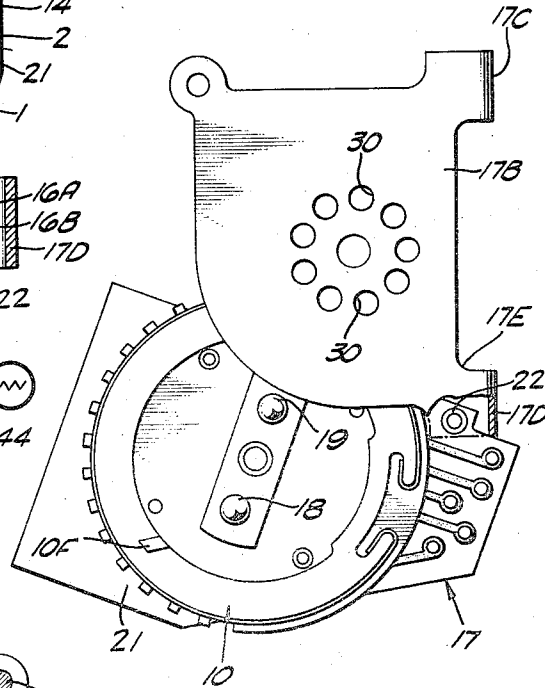


FIG. 7.

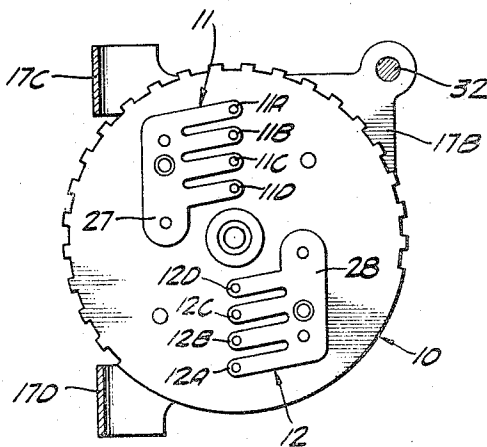


FIG. 6.

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1

2,853,564

DIGITAL SWITCH

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3 Claims. (Cl. 200—11)

The present invention relates to an improved switch and, in particular, to a multi-position switch for producing different coded combinations of conducting circuits, as, for example, in a digital coded sequence.

An object of the present invention is to provide a switch of this character which is relatively simple and inexpensive to manufacture, considering the number of relatively complicated switching functions which are produced thereby.

A specific object of the present invention is to provide a relatively simple switch for connecting selected ones of a plurality of signal sources to a load in a coded sequence, depending upon the position of a multi-position control element.

Another specific object of the present invention is to provide a switch of this character incorporating a rotary element as the control element with the contacts so arranged as to provide a substantially balanced mechanical arrangement that is capable of withstanding prolonged repeated successful use.

Another specific object of the present invention is to provide a switch of this character which functions, in all positions thereof, to preserve a substantially constant load for the plurality of selectable sources.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. This invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a view in front elevation of a switch embodying features of the present invention;

Figure 2 is a view in side elevation of the switch shown in Figure 1;

Figure 3 is a sectional view taken as indicated generally by the line 3—3 in Figure 1;

Figure 4 is a transverse sectional view taken as indicated generally by the line 4—4 in Figure 2;

Figures 5 and 6 are sectional views taken on corresponding lines 5—5 and 6—6 in Figure 1; and

Figure 7 is a view showing in elevation portions of the switch in partly disassembled relation.

The switch illustrated in the drawings includes generally an eight position rotary control element 10 carrying a pair of diametrically disposed series of contact fingers 11, 12, cooperating with a series of stationary contact segments 13, 14, 15, 16 and 16' which are mounted on a frame member 17, the element 10 being indexed in any one of such seven positions by detent means in the form of spring biased balls 18, 19, cooperating with apertured portions in the frame member 17.

The frame or supporting member 17 is formed of sheet stock metal which is bent in generally U-shaped form to provide a pair of parallel spaced plates 17A, 17B which are held together by the pair of integral strap portions 17C, 17D, such strap portions 17C, 17D being spaced

2

to define a central apertured portion or window 17E through which a portion of the rotary wheel 10 extends for convenient manual operation.

These strap portions 17C and 17D have nuts 18' and 19' suitably secured thereto, as, for example, by welding, brazing, or the like, to conveniently allow mounting of the composite switch on an apertured panel (not shown).

The frame member plate 17A has mounted thereon a plate 21 of insulating material by means of an eyelet 22 (Figure 7) to allow pivotal movement for assembly and disassembly purposes. The plate is normally prevented from pivoting by a pin or rivet 32 passing through aligned apertures in the plates 17A, 17B and 18.

The insulating plate 21 has formed thereon the aforementioned metallic contact members 13, 14, 15, 16 and 16' with connecting conducting strips or leads 13A, 14A, 15A, 16A and 16B, as well as the inner metallic contact ring 24, all of which may be formed thereon using well known techniques in the so-called "printed circuit" art.

These leads 13A, 14A, 15A and 16A are in contact, respectively, with soldering lugs or binding posts 13B, 14B, 15B, 16C and 16D.

The rotary element 10 of insulating material has a central metallic hub 10A and is journaled for rotation on the pin or shaft 26 which has its opposite ends secured in the spaced frame plates 17A, 17B, as, for example, by riveting or the like.

The rotary element 10 has secured thereto by means of eyelets or the like, metallic strips 27, 28, which are interchangeable, and which have the integrally formed series of contact fingers 11 and 12. These strips 27 and 28 are so mounted that the switch contacting portions all lie on a diameter passing through the center of rotation, and on opposite sides of the center of rotation to achieve a mechanically balanced structure.

The contact fingers 11A, 12A are engageable with the stationary contact strip 13. The contact fingers 11B, 12B are in contact with the stationary strip 14; the fingers 11C and 12C are in contact with the conducting strip 15; while the fingers 11D and 12D are adapted to contact the strips 16 and 16'.

The rotary element 10, as shown in Figure 4, has a pair of spring biased balls 18 and 19 recessed therein for cooperation with the series of circumferentially arranged apertured portions 30 in the frame plate 17B to comprise detent means serving to maintain the rotary element in a selected indexed position.

The rotary element is limited in its rotary movement to encompass only eight positions by means of a lug 17E, i. e. stop member, positioned to contact the spaced integral lugs 10E and 10F on the rotary member at the extreme movements of travel.

The composite switch is intended to be connected, as shown in Figure 5, to three pulse sources 40, 41 and 42, a dummy load 43, and an output circuit shown in the form of an output resistance 44. The source 40 is connected to terminal 13B, the source 41 is connected to terminal 14B, the source 42 is connected to terminal 15B, the dummy load 43 is connected to terminal 16D, and the output resistance is connected to terminal 16C.

The eight positions of the rotary element 10 is indicated in Figure 5 by the radial lines marked 0, 1, 2, 3, 4, 5, 6 and 7, which numerals correspond to the same identical numerals engraved on the periphery of the rotary element 10.

Thus, the stationary contact members have such a configuration that in position 0, indicated by the line 0, the pulses from all three sources are applied to the dummy load 43, and none are applied to resistance 44.

In the position indicated by line 1, i. e. the number 1 position, the pulse from source 42 is applied to resistance

3
44 and the other two pulses are applied to the dummy load 43.

In the position indicated by line 2, i. e. the number 2 position, the pulse from source 41 is applied to the output circuit and the pulses from sources 42 and 40 are applied to the dummy load 43.

In position 3, pulses from sources 41 and 42 are applied to resistance 44 and the source 40 is connected to load 43.

In position 4, source 40 is connected to resistance 44, and sources 41 and 42 are connected to resistance 43.

In position 5, sources 40 and 42 are connected to resistance 44, and source 41 is connected to resistance 43.

In position 6, sources 40 and 41 are connected to resistance 44, and source 42 is connected to resistance 43.

In position 7, all sources 40, 41 and 42 are connected to resistance 44, and no source is connected to resistance 43.

The pulse sources 40, 41 and 42 may deliver pulses which are time spaced with respect to each other, and when the resistance 44 is an input resistance to a vacuum tube amplifier, the resistances 43 and 44 are of equal magnitudes to preserve a constant load on all sources regardless of the position of the switch.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. Switching means of the character described comprising a generally U-shaped frame member, the intermediate leg of said frame member being apertured to define an apertured portion, a rotatable member supported on the parallel legs of said U-shaped frame member and having a portion thereof projecting through said apertured portion, a flat insulating plate mounted adjacent one of said parallel legs and carrying generally concentrically arranged conducting segments which are insulated one from the other and which differ in contact surface configuration, said rotatable member having a pair of in-

4
terconnected diametrically opposed contact members having fingers thereon on opposite sides of the axis of rotation of said rotatable member with the contact ends of said fingers lying in a straight line passing through the axis of rotation of said rotatable member engaging said segments.

2. An arrangement as set forth in claim 1 including detent means acting between said rotatable member and the other parallel leg of said U-shaped frame member.

3. Switching means of the character described comprising a generally U-shaped frame member having a pair of substantially parallel extending legs and an intermediate leg, said intermediate leg being apertured to provide an apertured window, a manually operable dial member disposed between said parallel legs and supported for rotation thereon about an axis of rotation, said dial member projecting through said apertured portion, an insulating plate affixed to one of said parallel legs, said insulating plate having concentrically arranged conducting segments thereon which are insulated one from each other and which extend generally concentrically with respect to said axis of rotation, binding posts on said insulating plate and connected to said conducting segments, a pair of contact members each having a plurality of contact fingers mounted on opposite sides of said axis of rotation with said contact fingers lying generally on a line passing through the axis of rotation, said contact fingers engaging said conducting segments, and detent means cooperating between said frame and said dial member for maintaining said dial member in a selected indexed position.

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