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PUSH-BUTTON SELECTOR SWITCH WITH LATCH PLATE MEANS

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2 Sheets-Sheet 2

Fig. 3

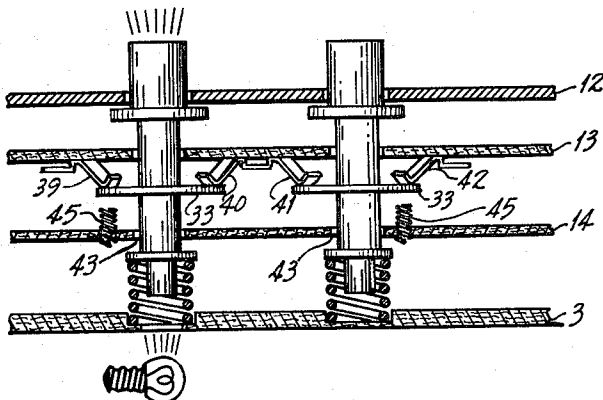


Fig. 4

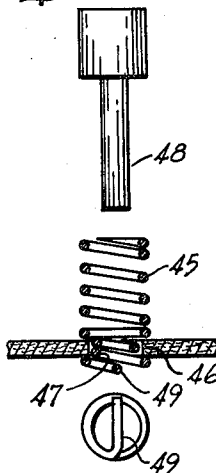


Fig. 5

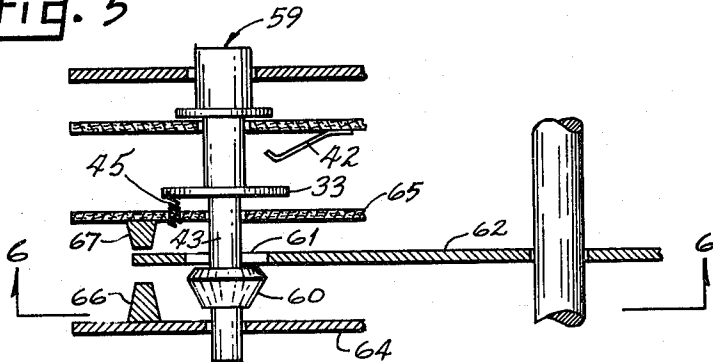
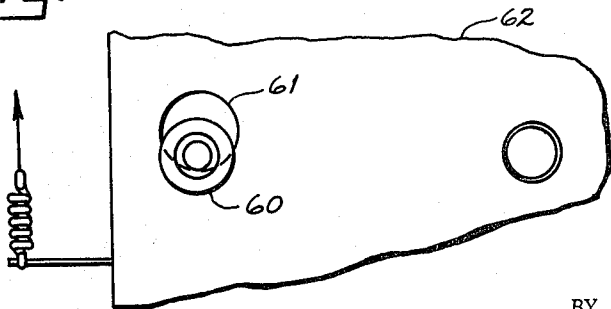


Fig. 6



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PUSH-BUTTON SELECTOR SWITCH WITH LATCH PLATE MEANS

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This invention relates to a selector switch and in particular is directed to a circular type selective switching system for producing a plurality of selective communication channels.

One of the principal objects of the invention is to produce an improved type circularized selector switching system which is simple, rugged, compact, easily assembled, durable and economical to fabricate. Another object of the invention is to produce a selector switch which multiplexes different receiving and/or call stations. Another object is to produce a selector switch system easily adapted to printed circuits.

Other objects and advantages will become apparent from a reading of the specifications and a study of the accompanying drawings and wherein:

FIG. 1 shows the construction of a switching assembly partially sectioned according to the invention.

FIG. 2 shows a portion of the switch assembly of FIG. 1 in section.

FIG. 3 shows another section of the switch assembly shown in FIG. 1 and in particular shows a pair of singular push button switches, and a particular arrangement for their interconnection.

FIG. 4 is a fragmented view of a compressive type coil spring and the manner in which it is embedded in the retaining plate.

FIG. 5 shows another partial view of FIG. 1 and in particular additionally provides means for locking the push-button switch at a particular station.

FIG. 6 shows a fragmented view of the latch plate of FIG. 5 for maintaining the push-button in a fixed position after having been depressed.

To facilitate reading of the application, those items which are similar or the same and function in the same manner will be designated by the same reference number. Now referring to the drawings and in particular to FIG. 1, there is shown therein a switch panel assembly 1 comprising a series of four spaced apart plates 2 and in particular a base plate 3 having circumferentially spaced thereon a series of apertures 4, receiving in transverse alignment a series of compressive return coil springs 5, the said springs being disposed to undergo compressive stresses resulting from depressing push-buttons 5 and being further disposed to permit the said push-button to return to its original position after the depressive forces have been removed. The remaining three spaced apart plates are similarly provided with apertures arranged in a circular manner, each of the apertures in the respective plates being aligned with the apertures 4 of plate 1 as previously stated. The aligned apertures are further disposed to maintain the push-buttons in a firm upright manner.

The plates in their mounted position are held in spaced alignment by a nut and a bolt assembly 10 as shown in FIG. 2. In particular, spaced apart plates 12, 13, and 14 are separated by cylindrical spacers 15 and 16 held in compression by nut 17 and bolt 18 when in compression. Surrounding the nut and bolt assembly 18 there is further arranged a pair of spaced apart conductive disc like members 19 and 20 having wedged there between a smaller diameter compressive sponge like insulating disc member 21. This material could be curetane and the like. The said conductive disc members 19 and 20 being compressively maintained by the nut and bolt assembly 10 as so

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to permit common contact thereof when subjected to certain compressive forces subsequently to be explained. The spacer 21' and its length determines to what extent the disc members are spaced and accordingly how much pressure needs to be exerted thereon for contact.

With respect to the push-button members themselves, as shown in FIG. 2, a typical assembly comprises a telescopic like push-button 30 made of insulating material such as Lucite and positioned within the aligned apertures of the respective spaced apart plates so as to permit correct and free movement of the said push-button under compressive outside forces. In particular, below the button head 31 there is fixedly mounted a washer 32 which abuts plate 12 and thereby prevents the push-button from escaping without the said apertures as previously defined when subjected to the restoring position by the compressive spring 3. Approximately midway there is mounted to the push-button a disc like conductive contact washer 33 and an insulated washer retaining bushing or sleeve 34, the said bushing and washer being compressively maintained and held to the push-button by the compressive spring 3. When the push-button is assembled, it is held in compressive alignment within the apertures of the respective plates by the compressive spring 3.

Plate 13, which may be referred to as the top switching plate, has arranged thereon in a symmetrical manner a series of contacts 39, 40, 41, and 42 each connected in a manner previously determined in accordance with design requirements. This is shown in FIG. 3, where the said contacts form a continuous circuit when contactively combined with contact washers 33 of the respective push-buttons. There is further shown in FIG. 3 a bottom switch plate 14 having further arranged thereon, about each of the apertures 43 formed therein, a plurality of coil-like springs 45 circularly disposed about the said apertures.

In particular it may be said that such contacts are self-aligning. Referring to FIG. 4 it may be seen that the contact spring 45 is a coil spring and is embedded into the hole 46 of the panel 14. The spring has its lower extremity 47 squared so that when inserted into the hole 46, by applying tool 48 to the cross-wire 49 the coil spring 45 could be erect and correctly aligned, with no further adjustments necessary. It is also possible to have the spring 45 constructed so as to have lower portion, intermediate the ends, of a reduced diameter than the rest of the spring so as to permit the insertion of the spring at the point of least diameter into the panels. In this arrangement the spring would be also self-aligning.

Contact springs 45 are arranged to permit interconnections between external circuits as a result of the compression of the contact springs and in particular the making of contact between the respective contact springs and the contact rise to the invention as embodied herein. An additional refinement, as shown in FIG. 3 is the addition of a small light at the lower push-button extremity to permit the button-head to give off light thereby permitting use of the switch in the dark. Since the push-button is essentially of Lucite material, light will be easily transmitted through its body portion.

FIG. 2 shows an additional refinement with respect to producing additional flexibility and selection of external circuitry. In particular, there is shown in said figure a pair of additional contacts 50 which may be actuated by the depression of push-button 30, the extremity thereof 51 causing contacts 52 and 53 to engage to produce the external effect desired. A further study of the said FIG. 2 shows that when push-button 30 is depressed, the discs 19 and 20 held in a pre-stressed condition by virtue of the insulating washer therebetween will cause the said con-

tacts 19 and 20 to engage likewise producing a still further effect as desired. If one analyzes FIG. 2, one can readily see that it is possible in the arrangements of the various contacts associated with push-button 30, that a sequence of events may take place depending upon the degree of compression of the said push-button. For example, a slight depression may cause the conductive disc or washer 33 to become disengaged from contact 60a to produce a first external effect. Upon further compression, the washer 33 will cause the compression of the disc members 19 and 20, the contacting thereof to produce another or second external effect. A still further compression permits the washer 33 to engage the contact spring 45 thus producing a third external effect. Finally, by still compressing further the push-button 30, the contacts 52 and 53 will become engaged, thus producing a fourth external effect. Hence, in this manner you get a sequential type of external effect or a selective type of external effect depending upon the manner in which the push-button is compressed. It becomes readily discernible that by taking a plurality of such push-buttons and arranged in a like manner, the combination of selective positions becomes quite appreciable.

There is shown in FIGS. 5 and 6 a further refinement of the invention in that there is provided method and structure for permitting the locking of a push-button after it has been compressed to a given level. In other words, if it is desired not to have momentary contact, but to have a permanent locked in position, the structure as shown in FIGS. 5 and 6 will effect such a situation.

In particular, there is shown in FIG. 5 a push-button 59 similar to the one previously defined with respect to the other figures, but in addition, there is further provided at the lower extremity thereof, a wedge-like member 60 which is so designed that when the push-button 59 is compressed it penetrates an aperture 61 in latch plate 62 mounted between base plate 64 and bottom switch plate 65. In particular, the aperture 61 is aligned with the push-button shaft to permit the wedge-like member to pass therethrough. However, once the push-button has been compressed to permit the wedge-like member 60 to pass through the plate aperture 61, then due to compressive spring 63 latch plate 62 is caused to rotate in a direction as to permit misalignment of the aperture of the latch plate with the other plates when comprises the mounting structure of the switch assembly. When the latch plate is misaligned, the wedge-like member 60 abuts the plate and restricts the upward movement of the push-button so that in effect it is locked in its depressed position. To remove the locked position of the push-button, all that is necessary is to rotate the latch plate in a direction opposing the action of compressive spring 63, thus permitting the restoring compressive spring 3 to function thereby placing the push-button in its familiar and original state.

One of the major advantages of the above described locking arrangements as compared to existing type switches with linear arrangement of push-buttons is that a single center bearing is used, support being provided at the outer periphery as necessary. In the presently available linear switch arrangement, the latch bar has to move in a linear direction, providing serious problems with the design of glide bearings. An additional disadvantage of the linear type latch bar is a tendency to give malfunctioning due to the bending and warping of a long bar, necessitating extremely heavy cross-sections to provide for proper latching and unlatching by push-buttons separated over the full length of the switch. On the other hand, in a rotary switch, as described, the distance of each push-button to the center bearing is identical, providing much more dependable operation. The only forces acting on the latch plate, tending to deform it are the force of the push-buttons when being depressed and the force of the return spring with the push-button in the depressed position. These forces can be easily counteracted by simple bump-

ers 66 and 67 attached to plates 64 and 65 respectively or in the alternative attached to the latch plate itself.

Various changes and modifications may be made to the specification and drawing without detracting from the true purpose and intent of the invention. For example, the arrangement of the contacts 39, 40, 41 and 42 although as presented are merely representative of the manner in which the push-button contacts may be interconnected, it is possible to so arrange such contacts and their inter-connection so as to provide and convert to a special code when certain respective push-buttons are depressed. For example, if we depressed certain pre-selected push-buttons, they will effect a definite coded output, such as a binary-code. In such a converter each push-button would be marked with a decimal digit and the contacts so arranged as to effect the desired coded output.

Having defined the invention what is claimed is:

1. A selective switch assembly comprising a plurality of circularly oriented spaced apart push-buttons, a plurality of parallel spaced apart plates each having circularly oriented transversely aligned apertures, the push-buttons disposed to reside within and transverse to said apertures, means for fixedly maintaining the said plates in spaced alignment, first contact means, said means including conductive members mounted to one of the said plates, second contact means, including conductive members mounted to a second plate, and third contact means carried by said plate alignment support means and disposed between said first and second plates, and contact means connected to the said push-button and disposed to selectively engage the said contacts between and attached to the plates in response to selective movements of the push-buttons.

2. A selective switch assembly as in claim 1 and wherein the said first contact means further includes a series of interconnections disposed to permit a pre-determined coded array when contacted by the contact means associated with the respective push-buttons.

3. A selective switch assembly as in claim 2 and wherein the said push-buttons are further provided with coded markings for appropriate selection to effect the appropriate coded output array when appropriately depressed.

4. A selective switch assembly comprising a plurality of circularly oriented spaced apart push-buttons, a plurality of parallel spaced apart plates each having circularly oriented transversely aligned apertures, the push-buttons disposed to reside within and traverse said apertures, means for fixedly maintaining the said plates in spaced alignment, first contact means, said means including conductive members mounted to one of the said plates, second contact means, including conductive members mounted to a second plate, contact means carried by said plate alignment support means and disposed between said first and second plates, third contact means carried by and associated with a third plate, contact means connected to the said push-button and disposed to engage the said contacts connected to the plates and to the contacts therebetween, in response to movements of the said push-buttons.

5. A selective switch assembly comprising a plurality of circularly oriented spaced apart push-buttons, a plurality of parallel spaced apart plates each having circularly oriented transversely aligned apertures, the push-buttons disposed to reside within and traverse said apertures, means for fixedly maintaining the said plates in spaced alignment, contact means carried by the said plates, contact means connected to the said push-button and disposed to engage the said contacts connected to the plates in response to movements of the said push-buttons, and push-button locking means for permitting the push-buttons once depressed to retain its depressed position.

6. A selective switch assembly according to claim 5 and wherein the said locking means includes a rotatable

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latch plate having a plurality of circumferentially arranged spaced apart apertures each aligned with a corresponding push-button, the latch plate being disposed between the spaced apart plates and the said push-buttons each being further provided with a cam-like structure and arranged to longitudinally and freely traverse the said apertures in the latch plate to cause its rotational movement and thereby permit the said latch plate and cam-structure to abut each other so as to restrict the upward movement of the push-button after compression.

7. A selective switch assembly as in claim 5 and wherein the said contact means associated with the said plates is further characterized by being a coil-shaped spring with a reduced coil diameter intermediate its two extremities and when mounted to the said plate along the restrictive diameter portion provides a self-supporting and self-alignment contact member.

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