Sept. 27, 1966 R. E. HARTSOCK 3,275,782

SELECTOR SWITCH COMPONENTS

Original Filed Dec. 6, 1960

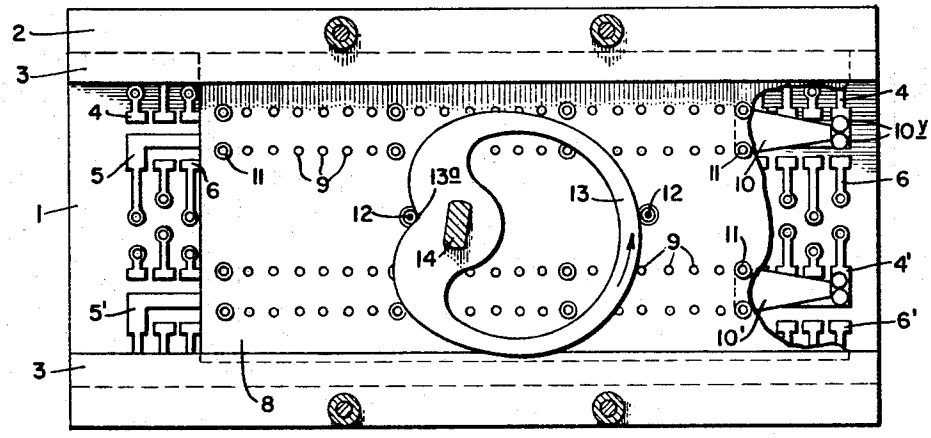


FIG. 1.

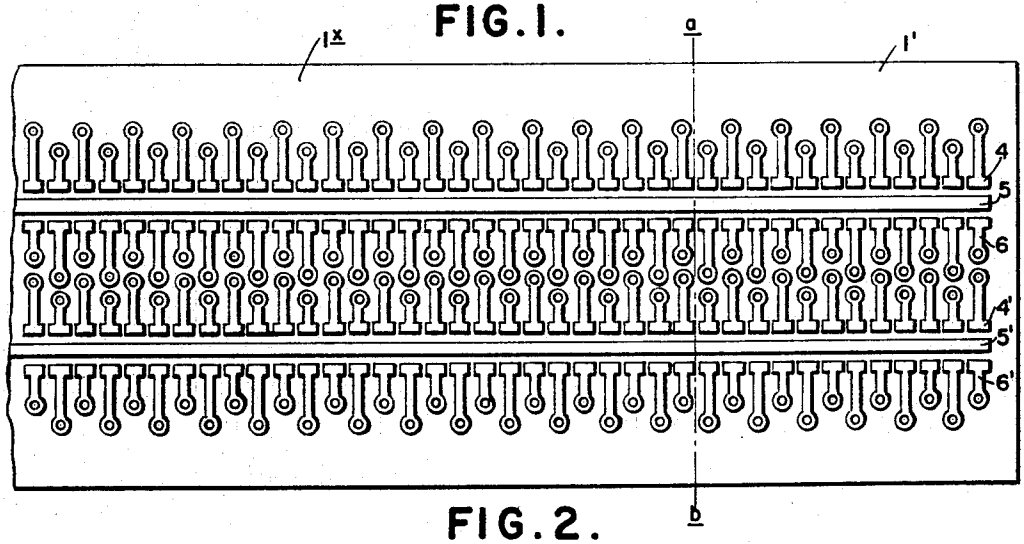


FIG. 2.

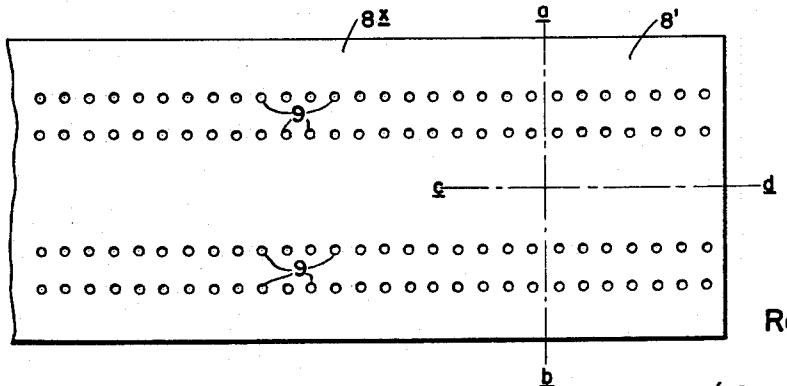


FIG. 3.

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United States Patent Office 3,275,782 Patented Sept. 27, 1966

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SELECTOR SWITCH COMPONENTS

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Original application Dec. 6, 1960, Ser. No. 74,097, now Patent No. 3,196,223, dated July 20, 1965. Divided and this application Nov. 10, 1964, Ser. No. 410,144
2 Claims. (Cl. 200—166)

This application is a division of my prior co-pending application Serial Number 74,097, filed December 6, 1960, now Patent No. 3,196,223.

While the claims of said application were directed to the structure of a complete selector switch assembly, the claims of the present application are drawn to the separate parts of such assembly, as articles of manufacture, and to the method of combining and using such separate parts to produce a variety of selector switches of different designs, as desired.

One of the problems of manufacturers of selector switches has been the necessity for designing and building a completely new and special switch to meet the particular requirements of each different customer or application. This made the cost of constructing such special switches undesirably high.

In its broader aspects, the object of the invention is to provide a new approach to the problem of supplying special designs of switches to meet the different requirements of particular applications. To this end, the invention contemplates the manufacture of generally standard switch parts which may be selected and assembled, with slight modification in some cases, so as to provide switching arrangements and circuitry of many different kinds.

More specifically, the invention is directed to selector switches of the type comprising a rigid board or support carrying one or more series of fixed contacts, and a scanning plate movable parallel with said support and carrying one or more movable spring contacts positioned to engage the fixed contacts. The invention contemplates constructing the board or support in the form of a strip of one or more standard widths and of indefinite length, and cutting off from such a strip of selected width a section of the necessary length to form a switch for any desired application. Similarly, the invention contemplates constructing the plate in the form of a strip of standard width and indefinite length, such strip having one or more rows of uniformly spaced pairs of holes extending continuously throughout the length of the strip, and cutting from such strip a section of the required size to co-operate with the above-mentioned section of the board or support. Then one or more spring contacts can be mounted, as by riveting, in any desired pairs of holes in any selected positions.

Thus, by fabricating standard strips, and cutting from such strips boards and plates of the required size, and mounting on such plates any desired number of spring contacts in any desired positions, selector switches may be produced adapted for the different requirements of many particular applications, and the cost of production of such switches will be far less than by the old method of specially designing each individual switch.

In order that the invention may be readily understood, reference is had to the accompanying drawing, forming part of this specification, and in which:

FIG. 1 is a horizontal section through one specific form of a selector switch assembly, embodying the invention described and claimed in my said prior application;

FIG. 2 is a plan view of a standard strip formation made in accordance with the present invention, carrying a plurality of parallel rows of contacts, from which strip a section of suitable size may be cut to form the board or supporting panel of a desired switch assembly; and

FIG. 3 is a similar plan view showing a strip having a plurality of rows of pairs of holes extending throughout the length thereof, from which strip a section may be cut to form a scanning plate of any desired size.

While reference may be had to said prior application for full details of various forms of selector switching devices and circuits, it is thought that FIG. 1, illustrating the essentials of one form of switching device to which the present invention is applicable will suffice to explain the relation between the two inventions.

Referring, therefore, to FIG. 1, **1** designates a rigid, rectangular board, panel or support formed of insulating material. At the longitudinal edges of this board or panel are mounted guide rails **2** having inwardly projecting horizontal flanges **3**. On the board or support **1**, are a plurality of groups of conducting elements, each group comprising a plurality of parallel rows extending lengthwise of the panel or support. Each of these groups consists of two rows of individual fixed contacts **4** and **6** and **4'** and **6'**, spaced apart a uniform distance. Between each pair of rows of these separate fixed contacts extends a common conductor strip **5** or **5'**. Both the individual contacts and the common conducting strips are joined to terminals **7** which extend through the board or panel for the connection of the outside circuitry, in a well-known manner.

The contacts and conducting strips may be advantageously applied to the board or panel by printed circuit technique.

Mounted for movement in a plane parallel with that of the board or panel **1**, and spaced therefrom, is a plate **8** of insulating material, which I shall refer to as a "scanning plate." This plate is confined under the overhanging horizontal flange **3** of the guide rails **2**, and it will be noted that the width of the scanning plate **8** is substantially less than the distance between the guide rails **2**. This is for a purpose hereinafter more fully described.

The scanning plate **8** has two parallel rows of uniformly spaced pairs of holes or perforations **9**, these rows extending throughout the length of the plate and being spaced apart a distance comparable to the spacing of the common conductor strips **5** and **5'**.

Interposed between the panel or support **1** and the scanning plate **8**, and secured to the under side of the latter as by means of rivets or eyelets **11** passing through selected pairs of holes **9** are a plurality of movable spring contacts **10** constructed to engage the fixed contacts **4**, **5** and **6**. The resilience of these contacts **10** insures good electrical connection with the fixed contacts, and also urges the plate **8** against the under side of the flanges **3** of the guide rails **2**. Thus the spring contacts tend to move the plate **8** away from the support or panel **1** and this movement is limited by the engagement of the plate with the flanges **3**.

It will be seen that each of the contacts **10** has at its free end a pair of lobes disposed side by side, and connected with the body of the contact by means of a relatively narrow neck. At its other end, the contact has a flat portion **10c** having holes or notches adapted to receive the rivets or eyelets by which the contact is mounted on the scanning plate.

By referring particularly to FIGS. 3 and 4, it will be seen that this transversely disposed pair of lobes spans or bridges one row of contacts such as **4** or **6** and the intervening common conductor **5**, thus establishing an electrical circuit between the common conductor strip and any one of the selected fixed contacts **4** or **6** with which the movable contact **10** selectively engages.

Set into and projecting up from the scanning plate **8** are a pair of follower pins **12** spaced apart a substantial distance longitudinally of the plate. Arranged to cooperate with these pins and fitting snugly between them is a

constant width cam **13** of the cardioid type, rigidly mounted on a shaft **14** extending at right angles to the plate and board or panel.

It will now be understood that as the shaft **14** is turned, the cam **13**, engaging the follower pins **12**, imparts a special novel motion to the scanning plate **8**. FIG. 1 shows the cam in a position where the scanning plate is at the extreme right-hand end of its travel and the pair of lobes 10^y at the end of each movable spring contact engages the common conductor strip **5** or **5'** and the last of the individual fixed contacts **4** or **4'**. As the cardioid cam is turned counterclockwise in the direction of the arrow, the notch 13^a, engaging the adjacent pin **12**, tends to turn or rotate the scanning plate, but this rotation is restrained by the guide rails **2**, and, the space between the guide rails being greater than the width of the plate, the result is that the plate is suddenly shifted laterally, or downwardly, thus causing the movable contact lobes 10^y to engage the common conductor strip **5** and the lower row of individual fixed contacts **6** and **6'**.

Upon further movement of the cam in the same direction, the spring contacts progress toward the left with a rectilinear movement.

In FIGS. 2 and 3, I have attempted to illustrate the fundamental feature of novelty of the invention, as set forth in the preamble. As illustrated in FIG. 2, I prepare a stock strip 1^x of rigid insulating material of standard or any desired width and of indefinite length. On this strip, I provide, as by means of printed circuit technique, one or more groups of fixed contacts, two of such groups being shown, each group comprising a common conductor strip such as **5** and parallel rows of individual contacts spaced from this strip and from each other, one row on each side of the strip.

As illustrated in FIG. 3, I provide a second stock strip 8^x of rigid insulating material, this strip having formed therein one or more parallel rows of pairs of perforations **9**, uniformly spaced and extending throughout the length thereof.

To form a selector switch for any desired application, I cut from the strip 1^x of FIG. 2, as indicated by the line *a–b*, a section **1'** of a length necessary to meet the requirements, and I then cut from the strip 8^x of FIG. 3 a section **8'** of corresponding length, as indicated by the line *a–b*. These two sections can then be assembled, as illustrated in FIG. 1, to form a complete switch, it being understood that any desired number of spring contacts such as **10** may be mounted in any desired pairs of holes **9** in the section **8'**. I further contemplate cutting the strip 8^x longitudinally, as indicated by the line *c–d*, to form a scanning plate having only one row of pairs of perforations, if desired for any particular application.

While the sections **1'** and **8'** of FIGS. 2 and 3 have been illustrated, for the sake of clarity, as having contacts arranged as illustrated in FIG. 1, it is obvious that

any desired number of rows of fixed contacts can be provided on the strip 1^x of FIG. 2, and any desired number of rows of pairs of perforations can be provided in the strip 8^x. Also, while in FIG. 2 I have illustrated the common conductor strips **5** and **5'** as continuous, it would be, of course, a very simple matter to modify them by separating them into sections, if this is desired for any particular application.

It will be obvious that, using my basic pattern and stock strips such as illustrated in FIGS. 2 and 3, I may construct switches suitable for a large variety of applications, it only being necessary to employ different size cams to produce the desired throw or travel of the scanning plate in accordance with the number of steps or positions which is required.

What is claimed is:

1. As an article of manufacture, a rigid support of insulating material having thereon a common conducting strip and a row of fixed contacts on each side of said strip, said rows extending parallel with said strip and said fixed contacts being uniformly spaced from said strip and from each other.

2. An article of manufacture in accordance with claim **1** wherein

said rigid support comprises a strip of definite width and of relatively great and indefinite length from which portions can be severed for assembly in a switch,

said article further comprising

a blank having straight side edges and being of relatively great and indefinite length,

said blank consisting of a rigid strip of insulating material from which portions can be severed for assembly in a switch,

said blank strip having a continuous series of pairs of holes spaced uniformly from each other and arranged in a row extending longitudinally throughout the length of said strip parallel with the side edges thereof;

the severed portions of said support and said blank being assembled in spaced relationship with their peripheral limits defining areas in two spaced parallel planes and with contacts appropriately secured in selected holes in said blank to form an operative switch.

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