

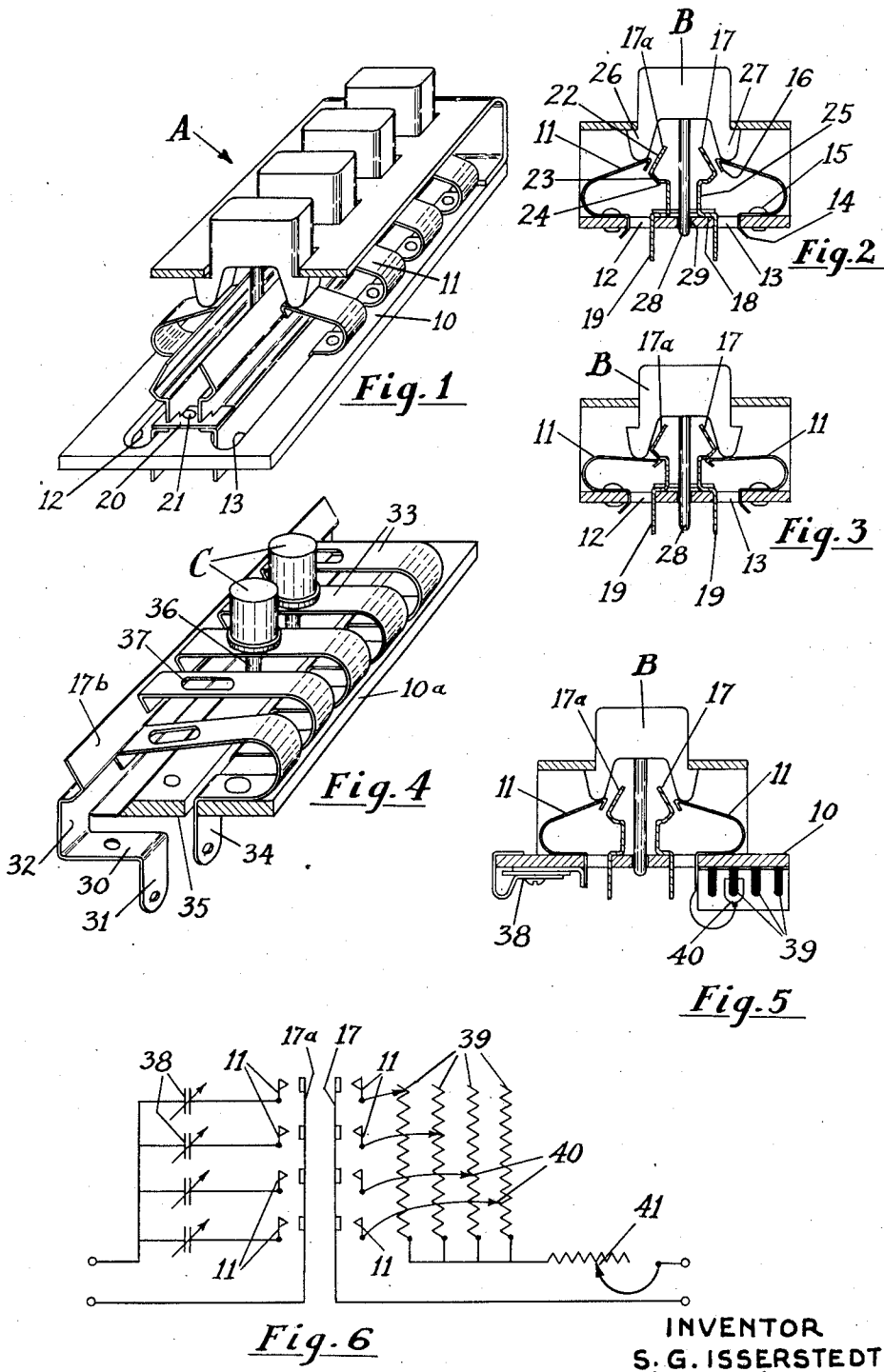
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MULTIPLE PUSH-BUTTON SWITCH

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MULTIPLE PUSH-BUTTON SWITCH

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1

This invention relates to multiple push button switches and more particularly to switches which automatically release a depressed button upon the depression of another button.

Switches of this type are well known but they usually embody a number of cooperating parts including springs, sliders, etc. which produce a somewhat complicated structure and which is relatively costly to manufacture. Moreover, such switches usually have a particular mechanical structure which interlocks to retain the particular push button in its downwardly depressed position engaging separate contacts for establishing the circuit desired. A much simpler type of multiple interlocking switch is possible as will appear according to the present invention.

It is a main object of the present invention to provide a multiple interlocking switch which is particularly simple in design using a minimum number of parts and in which the interlocking parts actually constitute the circuit closing elements as each push button is depressed.

A further object of the invention is to provide a switch of this kind which may be manufactured readily from stamped parts and fastened together and which do not require machining.

A still further object of the invention is to provide a switch of this kind in which the individual contact spring of the switch actually make the contact, and perform the locking action, as well as also serving to return the push button to its off position as another push button is depressed, in addition to forming connecting lugs for the wiring.

A further object of the invention is to provide a switch employing at least one resiliently mounted contact and a locking bar common to all the push buttons, said bar being displaceable instantly to release a depressed push button and automatically to break the electrical contact, previously established, upon the depression of another push button.

A further object of the invention is to provide a compact switch of this kind which may employ a pair of opposed contacts and locking bars operating to lock and release the push buttons when actuated and wherein said bars also may serve as a shield between the opposed sets of contacts, and wherein said bars may be extended through the mounting plate also to serve as a shield between the connection lugs for the wiring or between variable condensers or other electrical apparatus which may be attached to the mounting plate.

A further object of the invention is to provide

2

a switch of this kind which may be manufactured at extremely low cost compared to the prior art.

With these and other objects in view the invention, in its simplest form, generally comprises a mounting plate, a series of spring contacts mounted thereon and a locking and contact bar resiliently mounted on said plate and engageable by any of the contact springs when depressed whereby to lock a contact spring depressed and to release another contact spring previously depressed, while simultaneously effecting an electrical contact through the engagement of a contact spring with the locking and contact bar. Preferably the switch embodies a pair of opposed locking and contact bars and pairs of opposed contact springs, each pair being depressible by one push button. The switch is particularly applicable to a multiple push button switch for radio receivers, such as for station selecting purposes and wherein the contact and locking bars may readily be used as a shielding means, and wherein the mounting plate may be readily used for the mounting of the individual tuning condensers.

The invention will be fully understood by reference to the following detailed specification taken in conjunction with the accompanying drawings.

In the drawings,

Fig. 1 is a fragmentary perspective view partly in section of a preferred form of switch according to the present invention.

Fig. 2 is a transverse section taken through the switch in Fig. 1 showing one push button and the contacts in the raised or open position of the switch.

Fig. 3 is a similar view to Fig. 2 showing the contacts depressed in the closed and locked position of the switch.

Fig. 4 is a fragmentary perspective view partly in section of a switch of the single type employing one set of spring contacts and contact and locking bar.

Fig. 5 is a transverse section through a switch and of a nature similar to Fig. 2 but illustrating the adaptability of the switch to radio station selecting equipment; and

Fig. 6 is a diagrammatic plan view illustrating the switch applied to a simple radio receiver circuit.

Referring to the drawings, A indicates a switch combination as a whole which includes a base plate 10 designed to carry a plurality of opposed spring contact fingers 11. The base is preferably longitudinally slotted as at 12 and 13 on each

side of its center line so that one end of the fingers 11 may be projected to form the connecting lugs 14. In this connection, the fingers are readily riveted to the base at a point intermediate their ends as indicated at 15.

Directly opposite the contact ends 16 of the spring contacts fingers 11 a pair of resiliently mounted locking bars 17 and 17^a are mounted. These bars at their lower ends are preferably offset as at 18 to freely engage the base 10 on one side of the slots 12 and 13 as the case may be and are preferably formed with a downwardly projecting skirt 19 which passes through the slots 12 and 13 respectively and is employed particularly where shielding between the connection lugs 14 is desired or between apparatus mounted on the lower face of the base plate 10 as will appear hereinafter.

The locking bars 17 and 17^a are resiliently mounted in this manner such as by end spring plates 20 which may be riveted as at 21 to the base plate 10 between the opposed locking and contact bars 17 and 17^a and designed to lie in spring pressing engagement with the upper face of the offset 18 of each bar. In this connection the bars 17 and 17^a may be inwardly slotted as shown in Fig. 1 to accommodate the spring plate 20. Accordingly, therefore, it will be clear that if either of the locking bars 17 or 17^a are inwardly pressed, the bars will yield by means of a rocking action on the base plate as against the pressure of the springs 20.

The upper extremities of the locking bars 17 are offset in a particular manner to perform a locking and releasing function as any push button B is depressed. Towards their upper extremity they are formed with a downwardly and outwardly sloped deflecting face 22 designed to intersect at the lower end of this face with an upwardly and outwardly sloped releasing face 23 which at its lower extremity is designed to intersect a locking shoulder 24 disposed substantially at right angles to the preferably straight body portions 25, or, in other words, parallel to the mounting base 10. The contact ends 16 of the contact fingers 11 are disposed in the normal off position of the switch to partially overlie the deflecting surface 22 of the bars 17 and 17^a respectively and in spaced relation thereto, as shown in Fig. 2. The push button for each pair of spring contacts may take the form of a bifurcated member formed with the spaced apart feet 26 and 27 designed to overlie the contact end 16 of these springs and to form a means for depressing said contact fingers upon depression of the push button. In this connection the push buttons preferably have a centrally located shank 28 designed to pass through a guide opening 29 in the base plate whereby to guide the path of the push button as it is depressed.

Upon depression of a push button B, it will be readily apparent that the contact ends 16 of the fingers 11 will immediately engage the deflecting faces 22 of the locking bars 17 and 17^a and, by reason of the slope of the deflecting surfaces, will cause the upper extremities of the bars to swing inwardly. The contacts will then be caused to pass downwardly to the position shown in Fig. 3 and when they have passed the lower extremity of the deflecting surface and have been depressed to an extent at least corresponding to the location of the shoulders 24, the bars in swinging outwardly under their spring pressure will lock the contact ends 16 of the fingers 11 below the shoulder 24 in each case. Moreover, assuming that one

of the push buttons has been depressed so as to depress its contacts in the position shown in Fig. 3 and it is desired to push another button such as illustrated in Fig. 2, it will be apparent that immediately the contact ends 16, as shown in Fig. 2, engage the deflecting faces 22 of the locking bars 17 and 17^a and these bars start to move inwardly, the contact fingers held by the shoulders, as shown in Fig. 3, will be released from their locking engagement with the shoulders and due to the spring tension of the contact fingers 16 and the slope of the releasing faces 23 of the bars 17 and 17^a, the fingers in springing upwardly and engaging these releasing faces will have the result of forcibly swinging the bars 17 and 17^a inwardly to permit the contacts to move past the offset portion of these bars as formed between the deflecting faces 22 and the releasing faces 23, thereby to return the contacts automatically to their upright or open position.

The simplicity of design and construction of the switch and its compactness are readily apparent and this is made possible by the fact that no mechanical apparatus is included for the interlocking and releasing function, apart from the actual contacts themselves, since the necessary contact is immediately made as between the fingers 11 and the locking bars 17 and 17^a simultaneously with the releasing action performed by these bars and the previously locked contacts. Thus, the individual contact springs make the contact, perform the locking action, function to return the previously depressed push button to its off position and also form connecting lugs for the wiring. Moreover, the locking bars 17 and 17^a form the common contact, serve as a stop for the downward movement of the push buttons and in the case of two sets of contact fingers, as above described, the locking bar above and below the base plate functions as a shield between these sets of contacts.

Finally, it is perfectly evident, having regard to the character of the parts, that the switch can be manufactured from stamped parts, fastened together and no machine is required.

A simple type of single contact switch is illustrated in Fig. 4. In this case the locking bar 17^b of similar construction is mounted along one edge of the base plate 10^a and is preferably formed at both ends with the mounting bracket 30 which may be offset to form the connecting lug 31, the whole being connected with the locking bar 17^b by the resilient web of metal 32 which imparts to the locking bar the resilient mounting characteristics desired for the operation to be performed. Other means, of course, might be employed for resiliently mounting the locking bar in any construction of switch according to the present invention, the basic characteristic being a yielding of the locking and contact bar to perform the locking and releasing function.

The contact fingers 33 are disposed towards the other side of the mounting plate 10^a secured in similar manner to the other form of construction and preferably having connecting lugs 34 which are projected through a longitudinal slot 35 in the base plate. The fingers are designed to carry suitable push buttons C which preferably carry the projecting guide shanks 36 passing through orifices in the base plate 10^a and through suitable slots 37 in the spring fingers 33. Essentially, therefore, in this type of construction, the switch comprises four component parts, viz., a base plate, a spring contact finger (employed in num-

ber), a resiliently mounted locking bar, and a push button (employed in number). The type of switch shown in Figs. 1 to 3 compares accordingly except that the number of contacts are doubled and a pair of contact bars are employed.

The adaptability of the switch in the case of a radio receiver is illustrated in Fig. 5 wherein it will be apparent that the base plate 10 will readily receive tuning condensers such as the condenser 38, their being one tuning condenser for each contact on one side of the switch and a series of separate volume controls 39 on the opposite side of the switch, one for each spring contact, and which are connected by sliders 40 to the connecting lugs 14 of each spring contact. It is obvious also that in place of the individual volume control a corresponding second set of individual tuning condensers may be mounted on that side of the switch and, therefore, the switch will for each push button established make connections of two tuned circuits as is the practice in conventional radio receivers. Thus, the volume of the station brought in by the depression of a particular button B of the switch is automatically controlled, while alternatively, by means of two series of tuning condensers two tuned circuits are established in the conventional manner. Thus, the special application of the switch of the present invention to low cost radio receivers is illustrated to indicate how conveniently both tuning condensers and/or individual volume controls may be mounted on the same mounting plate.

In Fig. 6, the circuit for the switch shown in Fig. 5 is illustrated, thus to provide individual volume controls which are set together with the tuning condensers so that all stations selected are received at approximately the same volume. A manual volume control 41 may be provided in series or in any other manner to permit the listener to adjust the volume to suit his taste.

The general advantages of the switch construction according to the present invention are fully apparent from the foregoing. It will be obvious that various changes might be made in the switch construction within the spirit of the invention, so that the foregoing disclosure should not be interpreted in a limiting sense other than such limitations as are contained in the appended claims.

What I claim as my invention is:

1. A multiple interlocking push button switch comprising a base, a plurality of spring contacts

mounted in a row on said base, a means of connecting each of said contacts to an external circuit, a plurality of push buttons in connection with said contacts and designed to depress them, a locking bar resiliently mounted in parallel spaced apart relation to said row of contacts on said base and having a deflecting surface and a locking shoulder, said locking bar being mounted with respect to said contacts so that as one of said contacts is depressed by one of said push buttons, said contact slidably engages said deflecting surface of said locking bar to lock said contact in a depressed position beneath said locking shoulder and to release any other depressed contact, a means of connecting said locking bar to an external circuit, said locking bar functioning as an electrical contact with any of said contacts disposed in a depressed position.

2. A multiple interlocking push button switch comprising a base, a plurality of formed spring contacts mounted in a row on said base, said base having a longitudinal slot therealong and each of said spring contacts having one end projecting through said slot, said projecting end being designed for electrical connection to any external circuit, a plurality of push buttons in connection with said spring contacts, said push buttons having shafts designed to pass through an elongated slot in said spring contacts and through a guiding orifice in said base so that said spring contact can be depressed by depressing said push button, a locking bar resiliently mounted on said base in parallel spaced apart relation to said row of contacts, said locking bar having a deflecting surface and a locking shoulder designed to contact said contacts, and a means of connecting said bar to an external circuit, said locking bar being yieldable as a contact slidably engages said deflecting surface of said bar to lock said contact under said locking shoulder and to release any other contact disposed in depressed position, said locking bar functioning as an electrical contact with any of said contacts disposed in depressed position.

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