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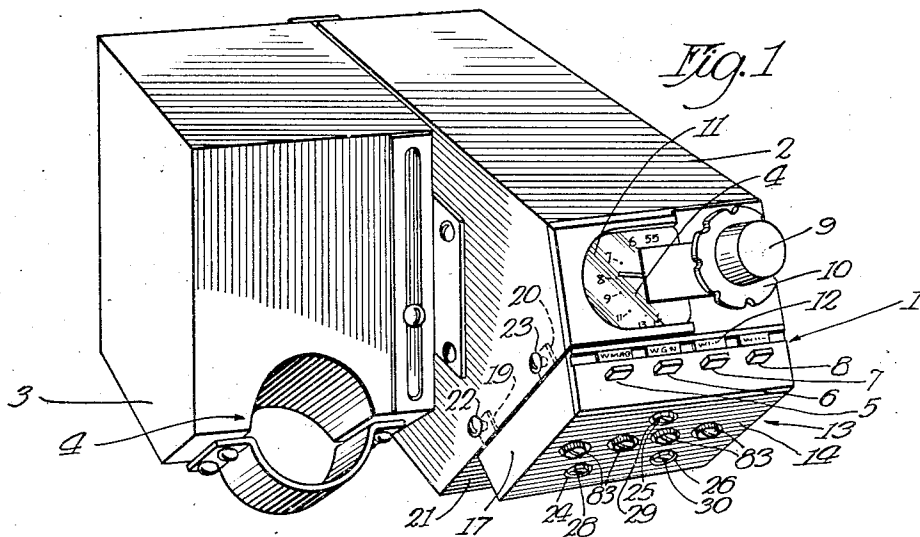
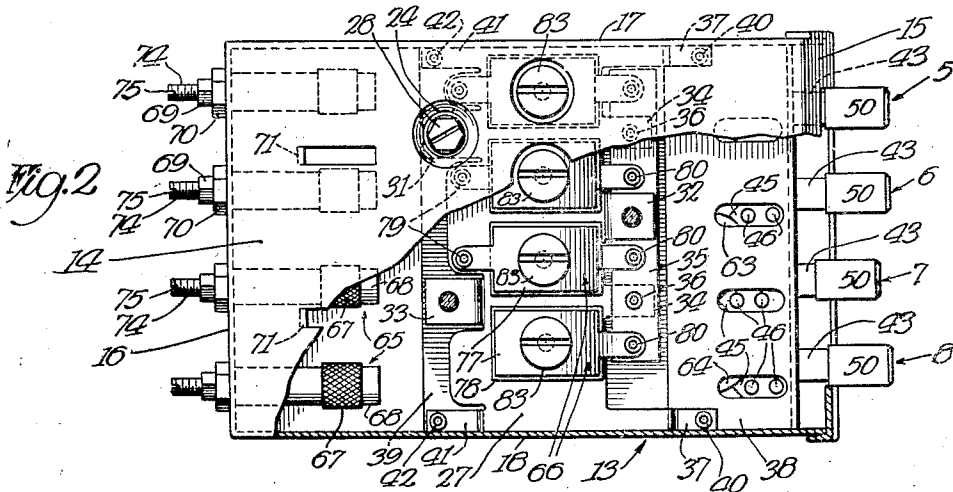
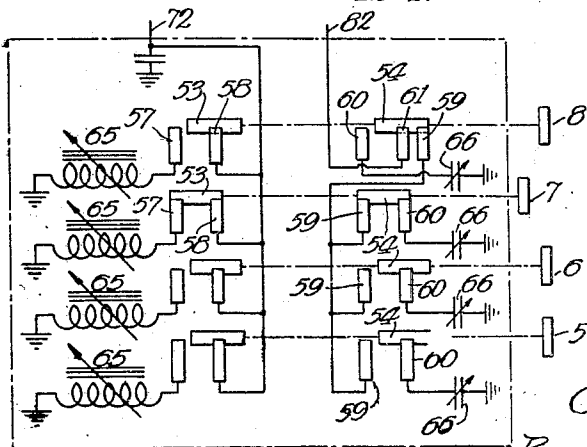
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2,297,819

CIRCUIT SELECTING SWITCH

Filed Oct. 31, 1939

2 Sheets-Sheet 1



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Fig. 3

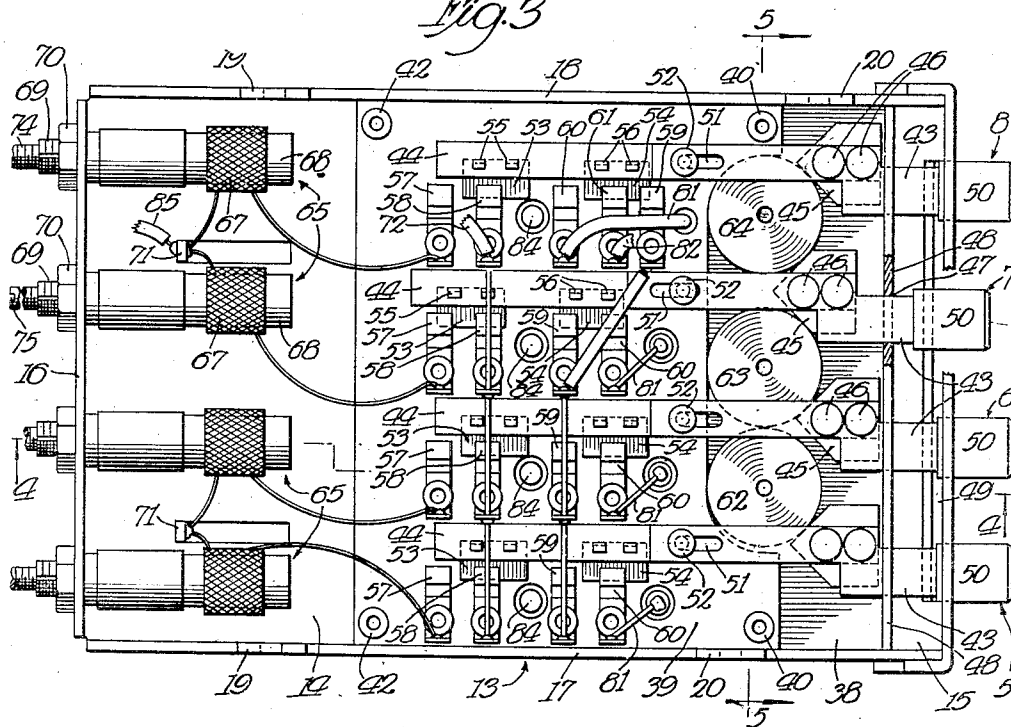


Fig. 4

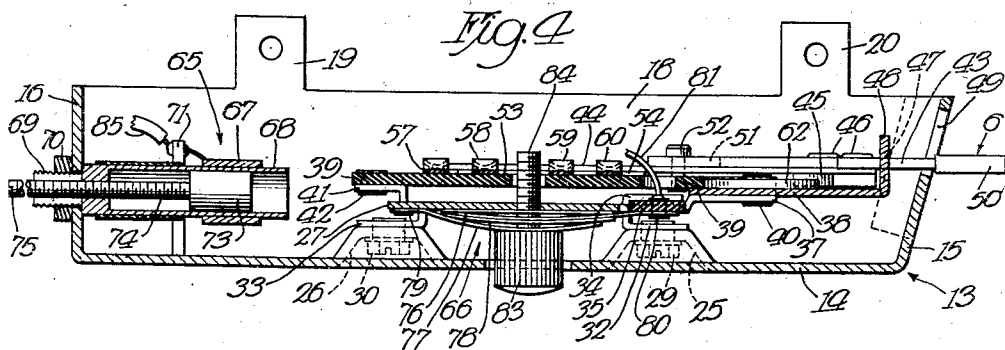
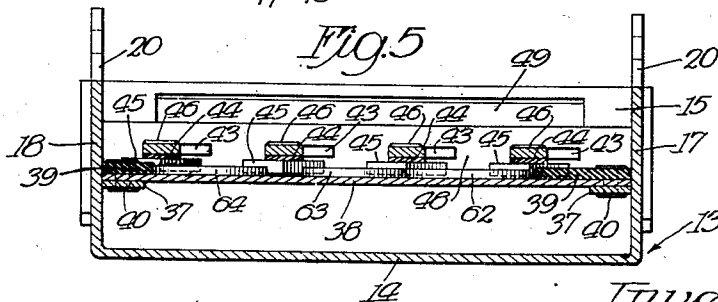


Fig. 5



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UNITED STATES PATENT OFFICE

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CIRCUIT SELECTING SWITCH

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Application October 31, 1939, Serial No. 302,191

5 Claims. (Cl. 200—5)

This invention relates to circuit selecting switches, and more particularly concerns a multiple unit switch having separately operable switch units for use with a plurality of electric circuits, in which only one at a time of said switch units may be moved into circuit-closing position, and in which the movement of any one switch unit toward its circuit-closing position will force any other previously operated switch unit from its circuit-closing position.

The object of the invention is to provide a simple and positively acting switch construction of the aforesaid character which may be operated to selectively close one electric circuit, or a plurality of related circuits, and insure the opening of all of the other circuits which are unrelated to the selected circuit or circuits.

The invention is herein shown as embodied in a selective switch mechanism for radio receiving apparatus designed for use upon automobiles, and the separately operable switch units are shown each designed for controlling two circuits related by pre-tuning to respond to a desired radio wave frequency, whereby the apparatus may be instantly switched to receive signals from one or another broadcasting station, but the invention is not limited in any sense to such apparatus, nor are the separately operable switch units limited to the control of any particular number of circuits.

In the drawings—

Figure 1 is a perspective view of an automobile radio receiving set provided with a circuit selecting switch mechanism constructed according to my invention;

Fig. 2 is an approximately full size bottom plan view of the switch mechanism, with the bottom of the casing thereof partly broken away;

Fig. 3 is an enlarged scale top plan view of the switch mechanism, showing the principal features of my invention;

Fig. 4 is a longitudinal sectional view, taken upon the line 4—4 of Fig. 3;

Fig. 5 is a transverse sectional view, taken upon the line 5—5 of Fig. 3; and

Fig. 6 is a schematic diagram of the preferred form of circuit arrangement employed.

Attention is directed to the fact that the present construction differs from previous types of circuit selecting switches in that no latching mechanism is employed for holding the switch units in operated position against the opposing influence of springs. Such latching switches usually comprise springs which are placed under compression or tension by the circuit-closing op-

eration of the respective switch units, and the switch units are held by a latch against the return action of said springs until another switch unit is moved toward its circuit-closing position to engage with the latch and effect the release of any previously operated switch unit therefrom, whereupon the respective spring is relied upon to return the released switch unit to its original position and open the corresponding circuit. In such devices, the springs must be strong enough to overcome the friction of a rub-contact switch, and an increase in such friction or the weakening or breaking of a spring would result in failure to return the released switch unit, but would not prevent the closing of another circuit. In fact, in many of such devices, more than one, or all, of the individually operable switch units may be simultaneously operated and latched in circuit-closing position with undesirable results. In the present device, the construction is such that there is room for only one switch unit to occupy closed position, and the movement of such one switch unit into closed position literally crowds out any other switch unit from its closed position. The action is positive, the force employed to move a selected switch unit to close its circuit or circuits being the force which moves a previously operated switch unit from its circuit-closing position.

Referring, now, to Figure 1 of the drawings, the circuit selecting switch 1 is shown in position upon a radio receiving set comprising two casings, 2 and 3, adjustably connected together and designed to be adjustably supported upon the steering column of an automobile, the socket clamp for securing the casing 3 upon the steering column being shown at 4. The forward end-parts of four circuit selecting switch units, 5, 6, 7 and 8, are shown presented for convenient manual operation just below the controlling devices 9 and 10 and the tuning indicator 11 of the radio receiving set. Provision for station-identifying indicia for each of the switch units is indicated at 12.

The entire circuit selecting switch mechanism is shown as supported in an open top casing 13, having a bottom 14, and front, rear, and side walls, 15, 16, 17 and 18, respectively. A pair of ears 19 and 20 extend upwardly from each of the side walls 17 and 18, and the casing 13 is supported thereby upon casing 2 of the radio receiving set, each of said ears being passed upwardly through respective slots (not shown) in the lower slanting face 21 and secured by corresponding screws 22 and 23 which are passed

through the sides of casing 2 and screws into said ears. The open top of casing 13 is thus completely covered by face 21.

A plurality of bosses 24, 25 and 26, are pressed upwardly in the bottom 14 to form supports for the base-plate 27 and provide sinkages for the heads of respective base-plate securing screws 28, 29 and 30, which are passed through apertures in said bosses and screwed into corresponding downwardly offset horizontally extending ears 31, 32 and 33, formed upon said base-plate. Base-plate 27 is also formed with three pairs of upwardly offset horizontally extending ears, the first pair 34—34 extending forwardly over and supporting a strip of insulating material 35 riveted or otherwise secured thereto, as at 36—36, the second pair 37—37 extending further forward under and supporting the plate 38 and the forward part of a plate of insulating material 39, riveted or otherwise secured thereto, as at 40—40, and the third pair 41—41 extending rearwardly under and supporting the rearward part of plate 39, riveted or otherwise secured thereto, as at 42—42.

As illustrated in Figures 3 to 5, each of the switch units 5 to 8, inclusive, comprises an upper Z-shaped flat plate 43, a straight flat bar of insulating material 44, and a lower wedge-member 45, rigidly secured together as by rivets 46—46. The upper plates 43 project forwardly through respective guide-slots 47—47 in the upwardly turned flange 48 of plate 38 and through an opening 49 in the front wall 15 of casing 13 and are capped at their forward ends with push-manuals 50—50, preferably of insulating material. Each plate 43 and bar 44 is slotted, as at 51, and a headed pin 52 is passed through the slots and riveted or otherwise secured in plate 39, cooperating with the slots to guide and limit the longitudinal movement of the respective switch unit. The bars 44 each carry a pair of contact blades 53 and 54 rigidly secured thereto, as at 55 and 56, respectively, the blades 53 being positioned to cooperate with respective pairs of spring contact fingers 57 and 58, and the blades 54 being positioned to cooperate with respective pairs of spring contact fingers 59 and 60. Blade 54 of switch unit 8 also cooperates with an additional spring contact finger 61. The spring contact fingers 57 to 61, inclusive, are riveted or otherwise secured upon the plate of insulating material 39. The forward edge of plate 39 is recessed, as illustrated in Figure 3, and partially embraced by this recess are three flat circular disks 62, 63 and 64. These disks lie flat upon the plate 38 free for movement thereupon beneath the bars 44 and, as illustrated in Figure 4, are slightly less in thickness than the plate 39 and the wedge-members 45 with which they cooperate, as will be later described.

In Figures 2 and 3, the switch unit 7 is shown in circuit-closing position, although its inward movement has not been sufficient to bring the forward end of the slot 51 against the respective pin 52 and center the contact blades 53 and 54 under their respective pairs of spring contact fingers 57—58 and 59—60. However, further inward movement of unit 7 is prevented by the interference of disks 63 and 64 with the further entrance of wedge-member 45 therebetween. When unit 7 was pushed into circuit-closing position, the wedge-member 45 engaged the peripheries of the two disks 63 and 64 and forced them apart, moving them aside upon the plate 38 and along and against the abutment formed by 75

the recessed edge of plate 39. It will be observed that the three disks are crowded over against the wedge-members of the three units 5, 6 and 8, and that these units are at the limit of their outward movement, as defined by their respective slots 51, thereby preventing further inward movement of the unit 7. This is purposely designed to allow for wear of the wedge-members and disks and still insure the full outward movement of the unselected switch units and the opening of all of the circuits unrelated to those closed by the inward movement of a selected switch unit. Now it will be evident that, if another switch unit be pushed inwardly toward circuit-closing position, its wedge-member 45 will force the disk or disks aside and crowd out the wedge-member of the unit 7, until unit 7 reaches the limit of its outward movement, as defined by its slot 51. The contact blades 53 and 54 are so positioned upon their respective bars 44 with respect to the corresponding pairs of spring contact fingers 57—58 and 59—60 that the circuits controlled by the unselected switch units will be opened just before those controlled by a selected switch unit are closed, and the several disks 62, 63 and 64, and wedge-members 45 thus cooperate to prevent any two switch units occupying circuit-closing position at the same time.

Adjustable tuning coils and condensers are illustrated at 65—65 and 66—66, respectively, and since their particular construction, circuit connections, and operation do not form an essential part of this invention, these features will be but briefly described. As diagrammatically illustrated in Figure 6, there is a coil and a condenser for each of the switch units 5 to 8, inclusive, the circuits for the coils being controlled by respective contact blades 53 and pairs of spring contact fingers 57—58, and the circuits for the condensers being controlled by respective contact blades 54 and pairs of spring contact fingers 59—60.

Each tuning coil 65 comprises a coil-winding 67 surrounding a thin-walled tubular form 68, closed at one end and provided with an inwardly and outwardly threaded neck-bushing 69 which is passed through an opening in the rear wall 16 and clamped to casing 13 by a nut 70. One end of the coil-winding 67 is connected to a ground-post 71, struck up from the bottom 14 of the casing, and the other end of the coil-winding is connected to its respective spring contact finger 57. All of the spring contact fingers 58 are connected to a common oscillator circuit lead 72. Within each of the tubular forms 68, a cylindrical core 73 is fixed upon the end of an adjusting stem 74 which is threaded through the neck-bushing 69 and provided with a squared or slotted outer end 75. As is well known to those familiar with the art, tuning of each coil 65 is effected by turning the end 75 of the respective threaded stem 74 to vary the position of the core 73 within the field of the coil-winding 67.

Each condenser 66 comprises a fixed plate 76 and an adjustable plate 77 separated by a sheet of dielectric material 78. One of the plates 76 or 77 is secured to and grounded upon base-plate 27, as by a rivet 79, and the other of said plates is secured to the strip of insulating material 35, as by a rivet 80, and connected by a short lead 81 with its respective spring contact finger 60. All of the spring contact fingers 59 are connected to a common input circuit lead 82. The adjustable plate 77 of each condenser is formed as a spring arch and is compressible toward its com-

panion fixed plate 76 by the insulated head 83 of a screw, the threaded stem 84 of which passes through larger openings in the dielectric material 78 and the fixed plate 76 and is adjustably screwed into the plate of insulating material 39. The insulated heads 83 of the several condenser adjusting screws extend outwardly through respective openings in the bottom 14 of casing 13 (see Figure 1) and may be knurled or slotted to provide for their convenient manipulation.

A ground lead 85 is secured to one of the ground-posts 71-71 and, together with oscillator circuit lead 72 and input circuit lead 82, is passed up through an opening (not shown) in the slanting face 21 and connected in any suitable manner with the proper parts of the radio receiving circuit within casing 2.

It may be noted that there are three spring contact fingers 59, 60 and 61, provided for engagement with contact blade 54 of switch unit 8. The purpose of this arrangement is to cut out the switch connections of the other condensers with the common input circuit lead 82 when the condenser for this switch unit is connected therewith, since, in the particular construction shown, the combined lead and contact capacities of all of the units would add to the minimum capacity and would unduly limit the tuning range allotted to this unit 8. The placing of this cut-out and the number employed is a detail of circuit construction, however, which depends upon the number of switch units employed and the tuning range allotted to each, and is not a part of this invention.

I claim:

1. Selective switch mechanism comprising a plurality of individually operable circuit-controlling switch bars, means supporting said bars in parallel arrangement with respect to each other and guiding each of said bars to prevent lateral movement and permit reciprocal longitudinal movement thereof into and from circuit-closing position, and motion-transmitting means unconnected with said bars supported for and restricted to movement transversely with respect to the longitudinal movement thereof and in position to engage with and be engaged thereby, and acting between said bars when forced aside by the longitudinal movement of one of said bars toward its circuit-closing position to force another of said bars longitudinally from its circuit-closing position.

2. Selective switch mechanism comprising a plurality of individually operable circuit-controlling switch bars, means supporting said bars in parallel arrangement with respect to each other and guiding each of said bars to prevent lateral movement and permit reciprocal longitudinal movement thereof into and from circuit-closing position, an abutment extending transversely of said switch bars, wedging means comprised in each of said bars, and motion-transmitting means supported for and restricted to movement along said abutment and in position to engage with and be engaged by said wedging means, said motion-transmitting means acting, when forced against and transversely along said abutment by the wedging means of one of said bars when the respective bar is moved longitudinally toward its circuit-closing position, to transmit such transverse movement to the wedging means of another of said bars and force that bar longitudinally from its circuit-closing position.

3. Selective switch mechanism comprising a plurality of individually operable circuit-controlling switch bars, means supporting said bars in parallel arrangement with respect to each other and guiding each of said bars to prevent lateral movement and permit reciprocal longitudinal movement thereof into and from circuit-closing position, wedging means comprised in each of said bars and movable therewith, a support and an abutment each extending transversely with respect to said bars and crossed thereby, and motion-transmitting means arranged upon said support in engagement with said abutment and projecting into the paths of movement of the wedging means of two of said bars, said motion-transmitting means acting, when forced aside along said support and against said abutment by the wedging means of one of said bars when the respective bar is moved toward its circuit-closing position, to force aside the wedging means of the other of said bars and move that bar longitudinally from its circuit-closing position.

4. Selective switch mechanism comprising a plurality of individually operable circuit-controlling switch bars, means supporting said bars in a common plane in parallel arrangement with respect to each other and guiding each of said bars to prevent lateral movement and permit reciprocal longitudinal movement thereof into and from circuit-closing position, flat wedging plates projecting from said bars and movable therewith in a plane closely adjacent the plane in which said bars are reciprocally movable, a support and an abutment each extending transversely with respect to said bars, said abutment occupying the plane in which said wedging plates are movable, a plurality of flat circular disks arranged upon said support in engagement with said abutment, each occupying the plane in which said wedging plates are movable and each projecting into the paths of movement of two of said plates, said disks acting, when forced aside along said support and against said abutment by the wedging plate of any one of said bars when the respective bar is moved toward its circuit-closing position, to force aside and away from said abutment the wedging plate of any other of said bars which may be in circuit-closing position.

5. Selective switch mechanism comprising a plurality of individually operable circuit-controlling switch bars, means supporting said bars in parallel arrangement with respect to each other and guiding each of said bars to prevent lateral movement and permit reciprocal longitudinal movement thereof into and from circuit-closing position, electrical circuit contacts fixed in spaced arrangement alongside said bars, contact blades rigidly secured to said bars in positions thereupon to engage with certain of said fixed circuit contacts upon selective longitudinal movement of said bars into circuit-closing position, and motion-transmitting means unconnected with said bars supported for and restricted to movement transversely with respect to the longitudinal movement thereof and in position to engage with and be engaged thereby, and acting between said bars when forced aside by the longitudinal movement of one of said bars toward its circuit-closing position to force another of said bars longitudinally from its circuit-closing position.

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