

March 5, 1929.

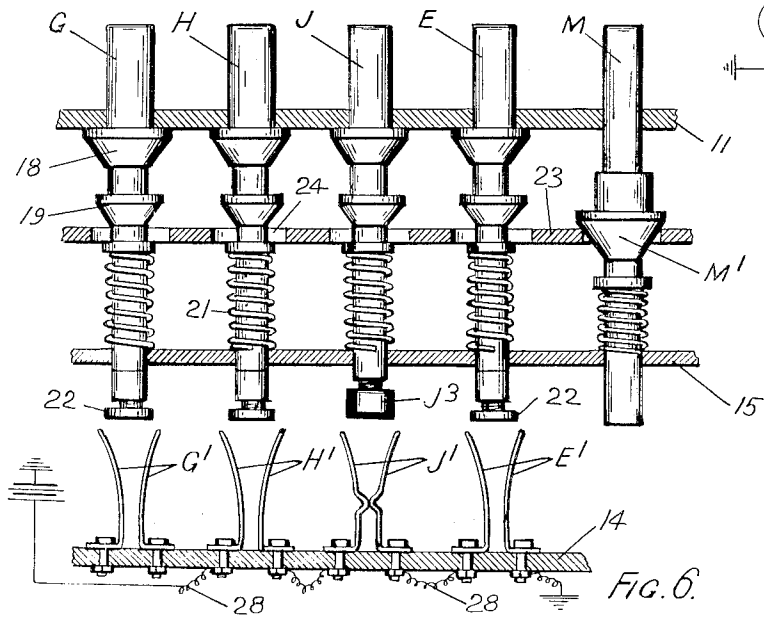
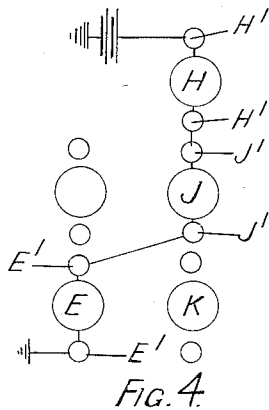
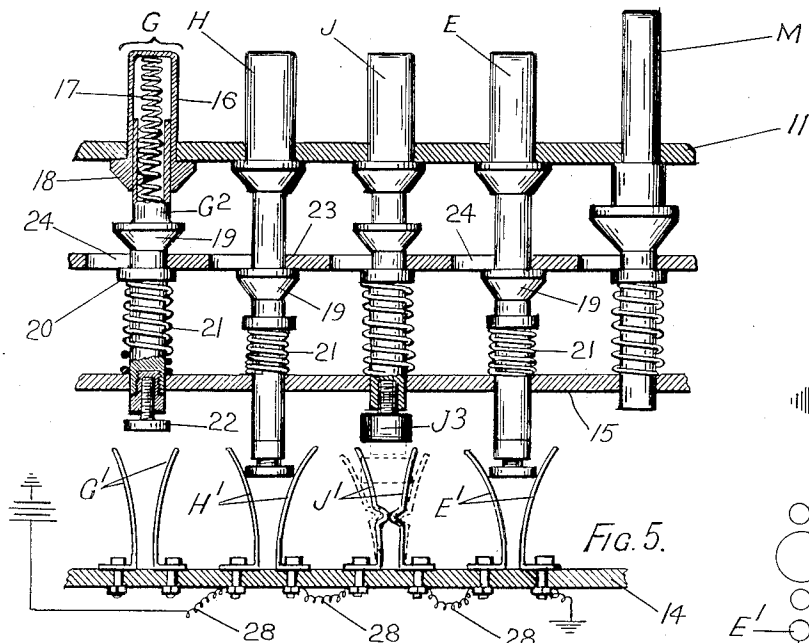
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1,704,582

ELECTRICAL LOCKING AND RELEASING SWITCH

Filed Nov. 16, 1926

2 Sheets-Sheet 2



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ELECTRICAL LOCKING AND RELEASING SWITCH.

Application filed November 16, 1926, Serial No. 148,749, and in Australia November 20, 1925.

This invention relates to devices for closing and opening an electric circuit and its object is to provide a locking and releasing switch (particularly applicable to the ignition circuit of a motor vehicle) of combination or permutation type designed to prevent the unauthorized closure of the circuit by any person unacquainted with the particular (operative) combination.

The invention consists in a device including a plurality or major group of keys of which any preselected number or combination (hereinafter termed "minor group") when operated bridge a corresponding number of normally open pairs of contacts connected in series in the circuit and thus close the latter, means for retaining the keys in the operative or closing position, and other means for releasing them and thereby opening the circuit when required or desired.

A feature of the invention is the connection in series with the operative contacts of one or more additional contacts normally closed and the arrangement of the key or keys corresponding to the latter so that when operated similarly to the others, they act reversely and open the circuit at these contacts. The object of this is to prevent the closure of the circuit should all the keys be manipulated at one time, one at least of the keys operating to open the circuit.

A further feature of the invention is that the operation of any one key only at one time releases any key which has been previously set to operative position, so that it is not possible to close the circuit by manipulating the keys successively or even selectively in units, but all the keys constituting the operative or minor group or correct combination must be manipulated simultaneously.

A still further feature of the invention is that the visible ends of the keys return to normal position after manipulation and therefore those constituting the operative group even when in circuit-closing position are not distinguished from the others and the correct combination is not visibly disclosed at any time except during actual manipulation which occupies but a minimum of time.

To fully describe my invention I will now refer to the accompanying drawings which depict an embodiment of my invention and in them,

Fig. 1 is a perspective view showing the

device affixed to the instrument board (shown in part) of a motor vehicle.

Fig. 2 is a sectional elevation.

Fig. 3 a sectional view on line 3—3 of Fig. 2.

Fig. 4 a wiring diagram.

Fig. 5 a diagrammatic part sectional elevation on the dotted line 5—5 of Fig. 3, showing certain keys in operative or circuit-closing position, and

Fig. 6 a similar view showing the same keys released by the operation of a releasing key.

The operative parts of the device are contained within a box 10 fitted with a cover plate 11 and to which is attached an electric cable 12, the individual conductors passing into the box.

Keys, A, B, C, D, E, F, G, H, J and K constituting the major group together with a release key M project through the cover plate 11, the individual keys of the major group being distinctively marked as for example by the letters by which they have been hereinbefore referred to and as shown in Fig. 1.

Associated with and juxtaposed respectively to the said keys A to K inclusive, are pairs of spring contacts those shown in Fig. 2 being indicated by reference characters F^1 , G^1 , H^1 , J^1 and K^1 , while in Figs. 5 and 6, one other, that is E^1 , is shown associated with key E. It will be understood that similar contacts, though not appearing in the drawings, are provided in association with keys A, B, C, D and E. These contacts are mounted upon an insulating plate 14.

The keys slide through the cover plate 11 and through a guide plate 15, and each key of the major group is, with one exception as hereinafter explained and in the embodiment selected as exemplifying my invention and depicted, constructed and operates as follows, particular reference being made to the key shown at the left hand side of Fig. 5.

The stem G^2 of the key is fitted with a sliding cap 16 outwardly pressed by a spring 17 and having a shoulder 18 which contacts with the inner face of the cover plate 11. The stem G^2 has a conical shoulder 19, and spaced therefrom is a collar 20 between which and the fixed guide plate 15 is a spring 21 urging the stem G^2 outwardly. At its inner end the stem G^2 is equipped with a contact

piece 22 insulated from the stem and adapted to bridge the spring contacts G^1 when the stem is pushed inwardly. A locking plate 23 formed with apertures 24 of a size to permit the passage therethrough of the conical shoulders 19 of the key stems G^2 , the periphery of each aperture normally embracing that portion of each stem between the collar 20 and shoulder 19. The locking plate 23 is slidable in a direction at right angles to the axes of the key stems, and is urged in one direction by a spring 25 (see Figs. 2 and 3) attached at one end to the fixed guide plate 15 and at the other to the locking plate.

The insulating plate 14 and guide plate 15 are mounted upon four posts 26 secured to the cover-plate 11 and formed with reduced portions or waists slidably embraced by slots 27 in the locking plate 23 (see Figs. 2 and 3).

When a key such as G (Fig. 5) is in normal or inoperative position its collar 20 bears against the locking plate 23 while the cap 16 is urged outwardly by spring 17 and its shoulder 18 contacts with the cover plate 11. When the cap 16 is pressed inwardly spring 17 is compressed, shoulder 18 contacts with shoulder 19 on the stem G^2 so that the latter moves inwardly; in so doing the conical surface of shoulder 19 contacts with the edge of aperture 24 and moves the locking plate laterally against the tension of spring 25, until aperture 24 registers with shoulder 19 (see Fig. 6). Said shoulder 19 then passes through the aperture 24 and spring 25 pulls the plate 23 to normal position behind shoulder 19, thus locking the key in operative or circuit closing position in which the contact 22 meets and bridges spring contacts G^1 . In Fig. 5 keys H and E are shown in operative position.

Assuming that keys H and E (Fig. 6) are in this position it will be obvious that subsequent manipulation of key G would move the locking plate 23 to the right and bring apertures 24 into register with their shoulders 19 thus permitting the keys to return to normal position under the influence of spring 21 and opening the contacts H^1 and E^1 .

If all the keys were constructed to operate in the manner described it is obvious that by simultaneously manipulating all of them all the pair of spring contacts would be bridged and the circuit closed whatever system of wiring may have been adopted. To meet this contingency I construct and arrange one at least of the keys and its associated spring contacts to operate reversely, and in the depicted embodiment of my invention, key J and spring contacts J^1 are selected to so function. The contacts J^1 are normally closed (see Figs. 5 and 6) and the inner end of key J is terminally fitted with an insulating block J^2 which when the key is pressed inwardly operates to open said contacts J^1 .

Having described the construction and op-

eration of the keys I will now refer to the wiring. I select as the operative or minor group certain keys, as an example, keys H and E , and I connect their respectively associated spring contacts H^1 and E^1 and also contacts J^1 in series by conductors 28. Now if any group of keys other than H and E are manipulated no closure of the circuit is effected, and the manipulation of any group including J and also H and E would be similarly ineffective as the circuit would be opened by the action of key J opening contacts J^1 . It is therefore obvious that, in the exemplified arrangement, the only keys which will close the circuit are keys H and E , the circuit being closed through contacts H^1 , J^1 and E^1 . On these keys being manipulated and their stems locked by the plate 23, their caps return to normal position by their springs 17 so that the actual operative keys though in circuit closing position are undistinguishable externally from the others.

To release the keys and thus again open the circuit, the release key M is pressed inwardly so that its conical shoulder M^1 moves the locking plate to the right as shown in Fig. 6, but even the return movement of the operative keys is not visible as their caps do not move.

I have described an arrangement in which two keys only constitute the operative group, but it will be understood that any number and any arrangement may be adopted.

What I claim and desire to secure by Letters Patent is:—

1. In an electric locking and releasing switch including a plurality of spring controlled keys, any selected number not less than two of which constitute circuit closing keys and one at least is a circuit opening key, a locking plate common to all the keys, means on each key to move said plate laterally when a key is manipulated, and a spring urging said plate in reverse position to lock said key in manipulated position.

2. In an electric locking and releasing switch including a plurality of spring controlled keys, any selected number not less than two of which constitute circuit closing keys and one at least is a circuit opening key, and including key-locking means, sliding caps on the outer ends of the keys and springs pressing said caps outwardly and operating to maintain said caps in one and the same planar position whether the keys are in locked or unlocked position.

3. In an electric locking and releasing switch including a plurality of spring controlled keys, any selected number not less than two of which constitute circuit closing keys and one at least is a circuit opening key, and including key-locking means, a single release key operating, when manipulated, to move said locking means and release any key previously locked.

4. An electric locking and releasing

switch including a plurality of spring controlled keys each comprising a stem fitted with a sliding outwardly spring pressed cap having a stop limiting its outward motion, and said stem having a shoulder square on one face and inclined on its opposite face, in combination with a spring controlled locking plate moved laterally by the inclined face of the shoulder of a key and returned by its spring to lock a previously manipulated key, guiding means for the keys, a plurality—not

less than three—of spring electric contacts connected in series of which at least two are normally open and are closed by manipulation of corresponding keys, and at least one is normally closed and is opened by manipulation of a corresponding key, and a housing through which said key caps project. 15

Signed at Sydney, New South Wales, Australia, this fifteenth day of October, A. D. 1926. 20

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