

Jan. 7, 1941.

D. G. KIMBALL

2,228,167

MULTIPLE PUSH SWITCH

Filed Feb. 3, 1938

Fig. 1.

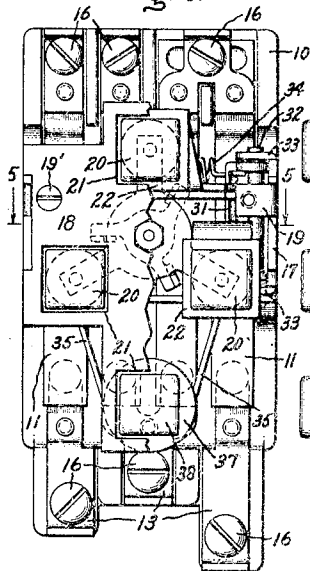


Fig. 2.

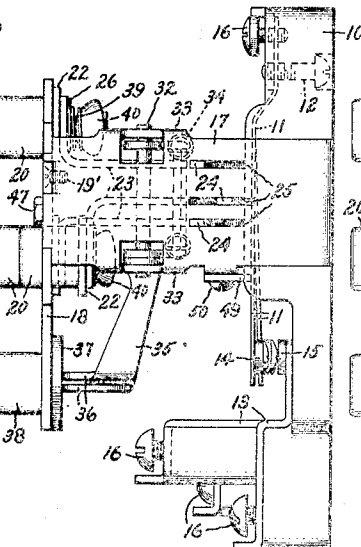


Fig. 3.

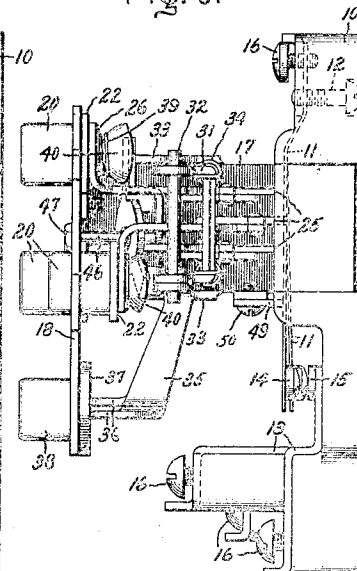
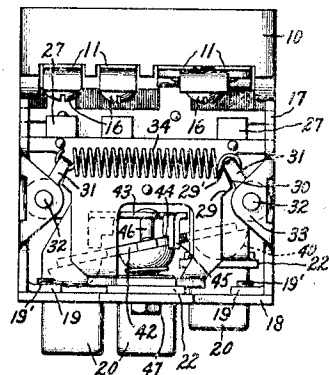


Fig. 4.



INSULATION

Fig. 6.

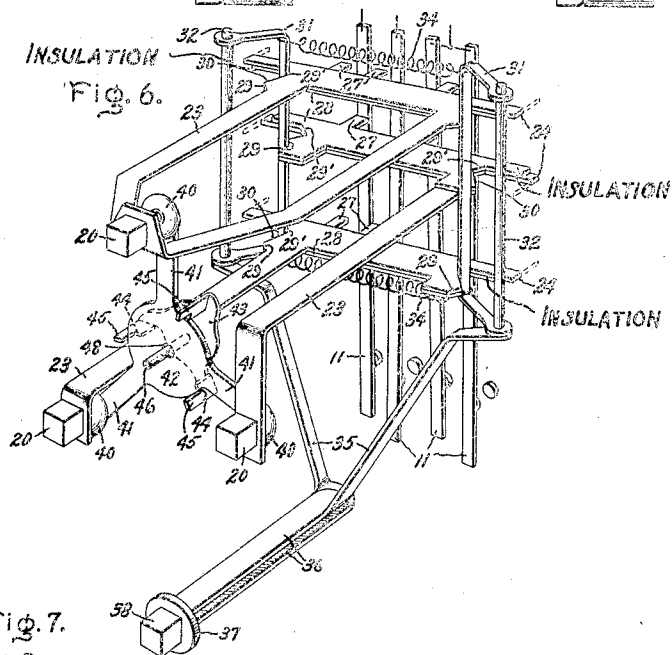


Fig. 5.

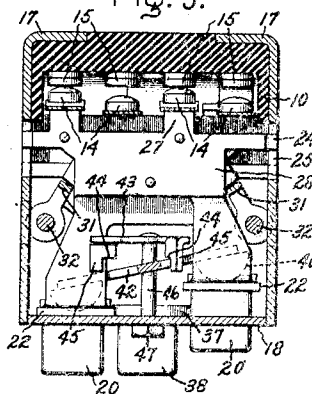
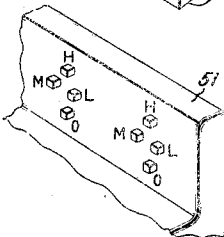


Fig. 7.



Inventor:
Donald G. Kimball,
by *Harry E. Dunham*
His Attorney.

UNITED STATES PATENT OFFICE

2,228,167

MULTIPLE PUSH SWITCH

Donald G. Kimball, Stratford, Conn., assignor to
General Electric Company, a corporation of New
York

Application February 3, 1938, Serial No. 188,495

6 Claims. (Cl. 200—5)

The present invention relates to a multiple push switch for operation in combination with a multiplicity of electrical circuits.

It is an object of the invention to provide an improved construction and arrangement in switches of this type, to provide means to prevent more than one electrical circuit from being operated at any one time, and to provide means to prevent simultaneous operation of a plurality of the electrical circuits.

In the accompanying drawing Fig. 1 is a plan view of the switch; Fig. 2 is a side view of the switch shown by Fig. 1; Fig. 3 is a side view similar to Fig. 2 with part of the supporting structure broken away; Fig. 4 is an end view looking down from the top of Fig. 1; Fig. 5 is a sectional view on line 5—5 of Fig. 1; Fig. 6 is a perspective view showing the details of the switch mechanism on an enlarged scale, and Fig. 7 shows an application of the switch to a range panel, by way of an example.

Referring to the drawing, the switch comprises a base 10 having movable contact blades 11 secured thereto by means of screws 12. For co-operation with the movable blades a plurality of fixed blades 13 are provided at the other end of the base. The switch blades 11 and 13 are provided with cooperating contacts 14 and 15, respectively, which may be silvered; in addition, the blades are provided at their terminal ends with terminal screws 16 for connection to a plurality of electric circuits. In order to support the switch mechanism, strips 17 extend upwardly from each side of the base and carry a top plate 18 which is mounted on the inwardly bent ears 19 by a plurality of screws 19'. To provide guiding means for the switch operating buttons 20 the top plate is provided with rectangular openings 21 which receive the buttons 20 and hold them in position. The buttons 20 are provided with flanges 22 which cooperate with the inner face of the top plate to prevent the buttons from becoming displaced through the top plate.

The switch mechanism is mounted beneath the top plate and includes a plurality of plungers or slidable members 23. The plungers are placed in spaced parallel relationship with each other and are guided for sliding movement by the integral projections 24 extending through slots 25 disposed in the supporting strips 17. The plungers are connected to the operating buttons by means of hollow sleeves 26 which are press fitted into recesses (not shown) in the operating buttons for a purpose to be described hereafter. In order to operate the flexible contact members

14, the plungers are provided with fingers 27. In the structure herein illustrated the fingers 27 form part of insulating plates 28 secured to the lower portions of the plungers 23. By this construction the plungers are insulated from the contact blades 14 and 15. Each of the plungers may be provided with one or more of the fingers 27 to cooperate with a corresponding contact member or members and this provision is made in accordance with the circuit combination with which the switch is to be used. In the construction herein illustrated, by way of an example, the fingers of the upper plunger (Fig. 6) operate the first, second and fourth contact members, those of the second plunger, the first and third contact members, and those of the third plunger, the first and second contact members. It will be understood that other arrangements of the fingers may be resorted to within the scope of this invention.

Each side of the plungers is formed with a plurality of recesses 29 and 29' separated by a projecting cam surface 30. The recesses cooperate with pivoted pawls 31 disposed on each side of the plungers. The pawls 31 are U-shaped and are secured to the rotatable shafts 32 which, in turn, are pivotally mounted in ears 33 extending from the side walls 17. In order to lock any one of the plungers in operative position, i. e. with the fingers 27 coacting with the corresponding contact blades, the pawls extend longitudinally along the sides of all of the plungers and normally remain seated in the recesses 29 where they are held in engagement with the plungers by the springs 34. The springs 34 are connected between the pawls and one is placed at each end of the pawls. It will be apparent that as any one of the plungers is depressed by operation of a button 20 that the cam surface 30 will deflect the pawls against the action of the springs permitting the plunger to move from an inoperative to an operative position in which position the pawls become seated in the recesses 29, thereby holding the depressed plunger in depressed or operative position.

A releasing mechanism for the pawls is provided in the form of extending arms 35 which are secured to the shafts 32 and which are provided with upwardly extending faces 36 for engagement with the flange 37 forming part of a release button 38. The release button 38 is guided in an opening 21 in a manner similar to the buttons 20. It will be apparent that depression of the button 38 will cause rotation of the shafts 32, thereby moving the pawls out of engagement with the recesses 29 to release the de-

pressed plunger for return to an inoperative position. The plunger is returned to inoperative position by means of a spring 33 seated in the sleeve 26 and which is compressed between the button 20 and an abutment head 40 formed on an arm 41 extending from a spider 42. The spider is provided with a plurality of the arms 41 one extending under each of the plungers 23 and a spring 33 is disposed in each of the recesses in the buttons within sleeves 23 between each of the arms 41 and plungers 23.

In addition to providing a support for the return spring 39, the spider 42 provides a mechanism which prevents the switch plungers being operated more than one at a time and which, in addition, prevents sequential operation of the switch plungers without first releasing the previously operated plunger. To accomplish these results the spider is loosely mounted upon a supporting plate 43 and, more particularly, the spider rests in notches 44 formed in ears 45 which are bent up from the plate 43. The plate itself is supported from the top plates 18 by means of a bolt 46 and nut 47, the bolt extending through an opening 48 disposed centrally of the spider. As one of the plungers is depressed by operation of a corresponding button 20, spring 39 will be compressed forcing down the corresponding arm of the spider so that the spider 42 pivots about the remaining arms as fulcrum points to an inclined position, as shown by Fig. 4, with the arms bearing against the plungers and the depressed plunger being locked in operative position by the pawls 31. If now depression of another button is attempted, the spider cannot pivot about the remaining arms because it is held in an inclined position by the locked plunger and, accordingly, it is impossible to operate another plunger until the originally depressed one is returned to an inoperative position. This is accomplished by depressing the release button 38. Operation of a plurality of the buttons simultaneously is likewise prevented by the spider 42. In such cases the spider cannot tip to an inclined position and will be held in the notches 44 so that the plungers cannot be depressed sufficiently far to operate the pawl locking means.

In the construction described the buttons 20 and 38 are arranged in a diamond pattern to provide a compact and accessible construction. However, it will be apparent that other arrangements of the operating buttons may be employed and that the number of plungers 23 and blades 11 may be increased or decreased at will. In order to limit movement of the spring blades 11 an insulated stop bar 49 is disposed across the blades and is secured to the supports 17 by the screws 50.

The switch herein described may be used in various ways to control the operation of different electrical circuits. One example of the use to which the device may be put is illustrated by Fig. 7 which shows the switch mounted upon the panel of an electric range 51. In this case the contact blades 11 and 13 are so connected in circuit with the heating elements and power sources that the three plunger operating buttons give a "medium," "high" and "low" heating value to the range units. The release button is used as an "off" switch. The various settings of the switch are designated "M," "H," "L" and "O" on the range panel and a separate switch may be installed for each heating element, as shown by Fig. 7.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a multiple switch, a base, a plurality of movable members mounted on said base for controlling electrical circuits, a plurality of spaced parallel plungers for cooperating with certain of said members to control a corresponding electrical circuit, operating buttons connected to said plungers, supporting means, a spider pivotally mounted on said means and having arms cooperating with each of said plungers, a spring disposed between each of said plungers and a corresponding arm to bias said plunger to inoperative position, a pawl engaging each of said plungers and holding any one in operative position, said spider pivoting upon movement of one of said plungers to operative position under the action of said spring to lock the remaining plungers in inoperative position, and manually operable means to release said holding pawl.

2. In a multiple switch, a base, a plurality of movable members mounted on said base for controlling electrical circuits, a plurality of spaced parallel plungers for cooperating with certain of said members to control a corresponding electrical circuit, operating buttons connected to said plungers, a plate having upstanding ears mounted on said base, a spider pivoted on said plate and having arms cooperating with each of said plungers, a spring disposed between each of said plungers and a corresponding arm to bias said plunger to inoperative position, a pawl engaging each of said plungers and holding any one in operative position, said spider pivoting about said ears upon movement of one of said plungers to operative position under the action of a corresponding spring to lock the remaining plungers in inoperative position, and manually operable means to release said holding pawl.

3. In a multiple switch, a base, a plurality of movable members mounted on said base for controlling electrical circuits, a plurality of movable plungers mounted on said base and adapted to operate certain of said members, a plate having a plurality of upstanding ears mounted on said base, a spider pivotally mounted on said plate and having arms engaging each of said plungers, movement of one of said plungers to operative position causing said plunger to engage one of said arms to pivot the spider about said ears with the remaining arms cooperating with the remaining plungers to lock them in inoperative position whereby movement of them is prevented as long as said one plunger is in operative position.

4. In a multiple switch, a base, a plurality of movable members mounted on said base for controlling electrical circuits, a plurality of movable plungers mounted on said base and adapted to operate certain of said members, a plate having upstanding ears mounted on said base, a spider pivotally supported by said ears and having arms cooperating with each of said plungers and springs interconnecting said plungers and arms, movement of one of said plungers to operative position causing depression of a corresponding arm through the medium of a respective spring to pivot the spider about said ears with the remaining arms compressing the respective springs against the remaining plungers to lock them in inoperative position.

5. In a multiple switch, a base, a plurality of movable members mounted on said base for controlling electrical circuits, a plurality of movable plungers mounted on said base and adapted to operate certain of said members, releasable means

holding any one of said plungers in operative position, a spider pivotally mounted on said base, said spider having arms engaging each of said plungers, said spider pivoting about said base upon movement of any one of said plungers to operative position with the respective arms cooperating with the remaining plungers to prevent movement of them to operative position as long as said one plunger remains in operative position under the influence of said holding means.

6. In a switch, a base, a plurality of movable circuit controlling members, a plurality of spaced movable plungers mounted on said base and

adapted to operate certain of said members, manual releasable means holding any one of said plungers in operative position, a spider pivotally mounted on said base, said spider having radially extending arms engaging a corresponding one of said plungers, said spider pivoting about said base upon movement of any one of said plungers to operative position with the respective arms cooperating with the remaining plungers to prevent movement of them to operative position as long as said one plunger is retained in operative position by said holding means.

DONALD G. KIMBALL.