G. E. MUELLER.

NON-INTERFERING SWITCH DEVICE.

APPLICATION FILED NOV. 1, 1912.

1,152,963.

Patented Sept. 7, 1915.

3 SHEETS—SHEET 1.

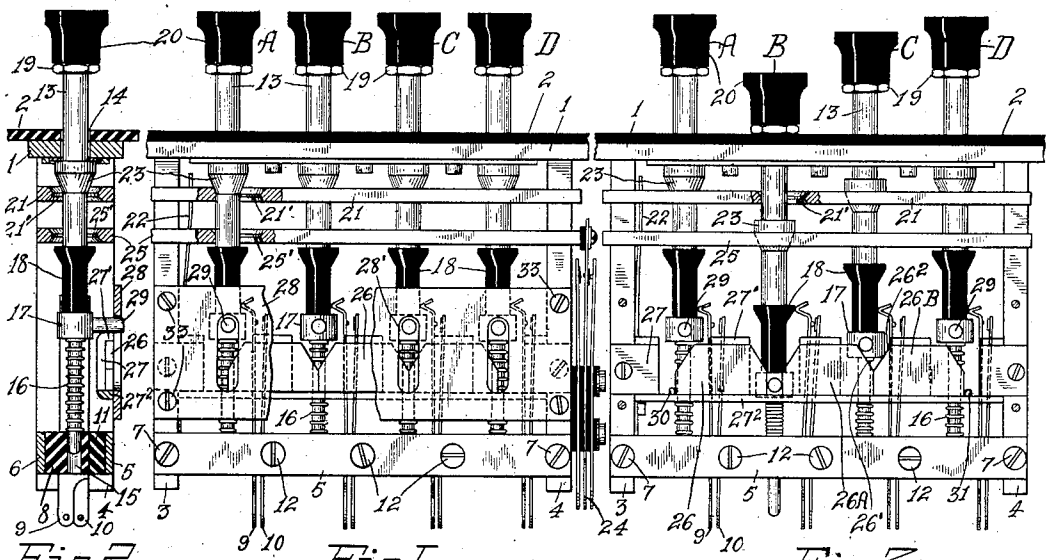

Fig. 2.

Fig. 1.

Fig. 3.

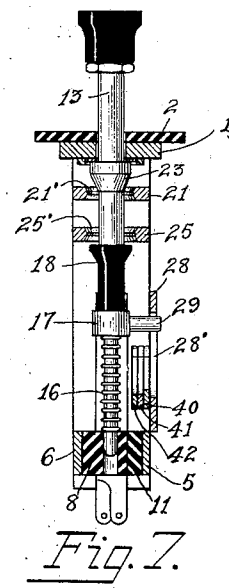

Fig. 7.

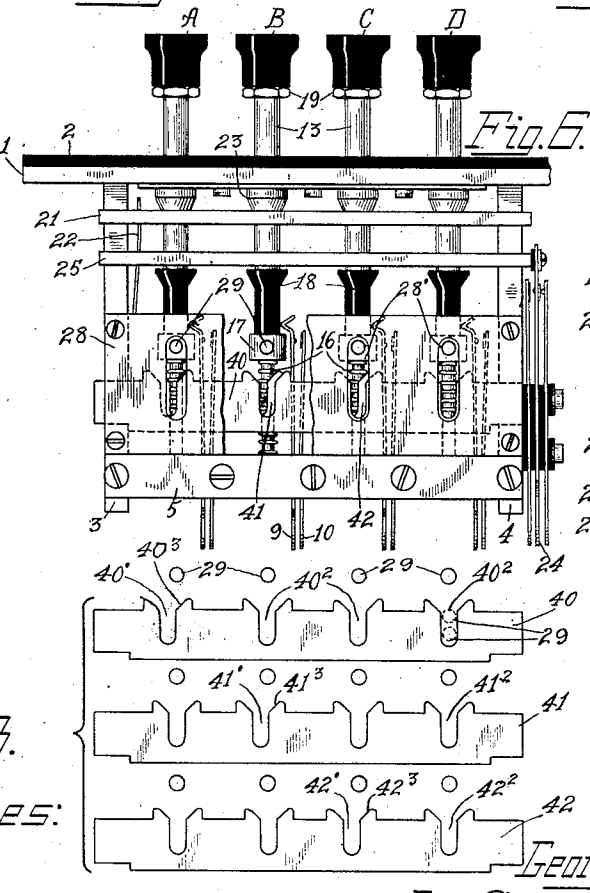

Fig. 6.

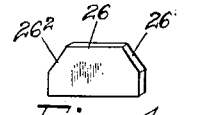

Fig. 4.

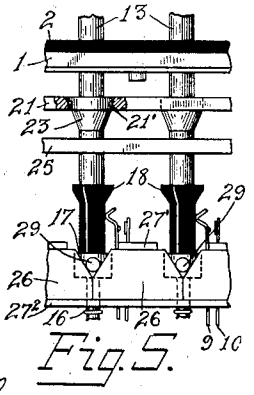

Fig. 5.

Fig. 8.

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3 SHEETS—SHEET 2.

Fig. 11.

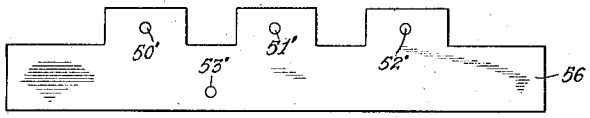


Fig. 12.

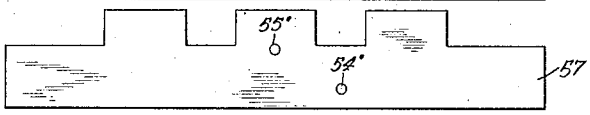


Fig. 10.

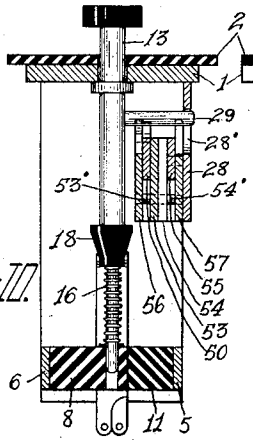
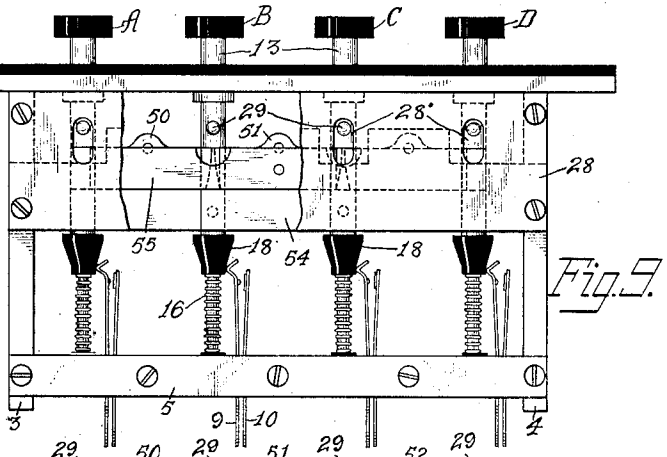


Fig. 9.



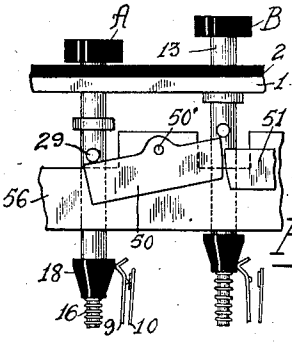


Fig. 14.

Fig. 13.

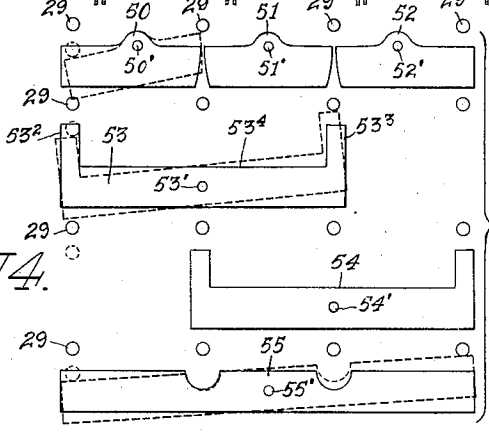


Fig. 17.

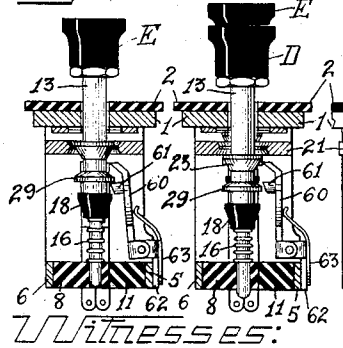


Fig. 16.

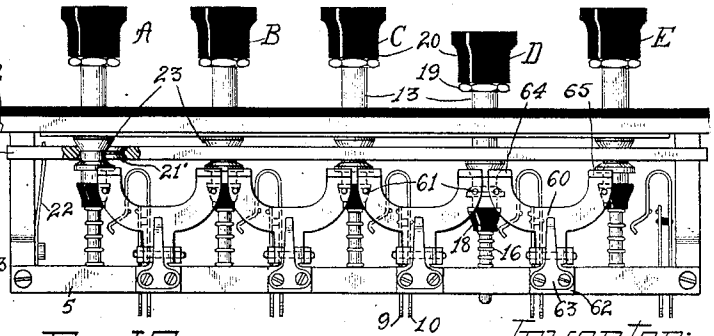


Fig. 15.

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3 SHEETS—SHEET 3.

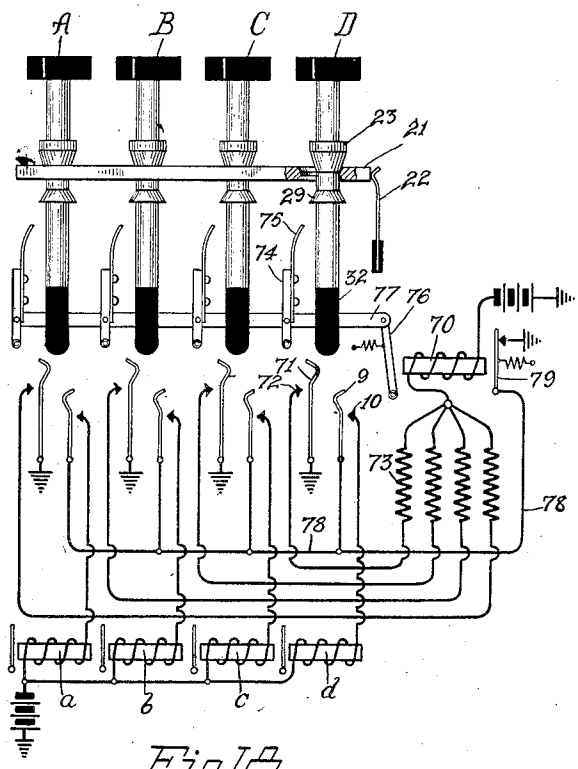

Fig. 18.

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UNITED STATES PATENT OFFICE.

GEORGE E. MUELLER, OF LA GRANGE, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

NON-INTERFERING SWITCH DEVICE.

1,152,963. Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed November 1, 1912. Serial No. 729,105.

To all whom it may concern:

Be it known that I, GEORGE E. MUELLER, a citizen of the United States, residing in La Grange, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Non-Interfering Switch Devices, of which the following is a specification.

My invention relates to switching devices, having to do more particularly with devices in which a plurality of actuating members are provided and means associated therewith to prevent interfering operations of the actuating members. In other words my invention relates more particularly to non-interfering switching devices in which no two or more actuating members can be simultaneously and effectively operated.

In illustrating my invention I have chosen to embody it in electrical keys of switching devices, but in its broader aspect my invention is not limited to such particular devices.

For a better understanding of my invention reference is to be had to the accompanying drawings in which—

Figure 1 is a side elevation of one form of my invention with the actuating members at normal; Fig. 2 is a vertical section through one of the actuating members of Fig. 1; Fig. 3 shows the key of Fig. 1 with one of its actuating members moved to an effective position and another one of the actuating members partly depressed but held against effective operation; Fig. 4 is a detail view of one of the locking plates used for locking the actuating members against effective operation; Fig. 5 shows two of the actuating members of the device of Fig. 1 simultaneously depressed but held against effective operation; Fig. 6 is a side view of another form of my invention; Fig. 7 is a vertical section through one of the actuating members of Fig. 6; Fig. 8 shows in detail the locking plates of Fig. 6; Fig. 9 is another embodiment of my invention; Fig. 10 is a vertical section through one of the actuating members of Fig. 9. Fig. 11 is a rear supporting plate for holding the locking members of Fig. 9; Fig. 12 is a front supporting plate for said locking members; Fig. 13 shows in detail the non-interfering mechanism of the device of Fig. 9; Fig. 14 illustrates the manner in which an actuated plunger prevents simultaneous actuation of another plunger, of the device of Fig. 9; Fig. 15 is another form of my invention arranged to prevent a simultaneous effective operation of adjacent actuating members; Fig. 16 is a vertical section through actuating member D of Fig. 14; Fig. 17 illustrates the manner in which one of the actuating members is held against effective operation with an adjacent plunger depressed; and Fig. 18 is another modification of my invention.

Referring now to the form of my invention illustrated in Figs. 1 to 5, it comprises a frame having a top plate 1 carrying an escutcheon plate 2, depending ends 3 and 4, and connecting plates 5 and 6 which are attached by means of screws 7. A block of insulating material 8 slotted to receive the sets of contact springs 9, 10, and an insulating strip 11 is placed between block 8 and strip 5, and clamping screws 12 extend through the strip 5, insulating strips 8, 11, and into the plate 6. A plurality of actuating members A, B, C, D, preferably plunger rods, are provided, comprising the central rod 13 which passes through the alined bearings 14 and 15 of the plate 1 and strip 8 respectively. A retractile spring 16 is provided for the actuating members normally compressed and resting between the collar 17 and block 8. A sleeve 18 preferably of some insulating material rests between the collar 17 and a shoulder on the central shaft 13, said sleeve 18 being adapted to actuate the contacts 9, 10 when a plunger rod is fully depressed. A nut 19 is threaded on the upper end of rod 13 to provide a shoulder against which the button 20 engages when threaded on to the end of shaft 13. A common locking plate 21 is slidingly supported at its ends in the depending frame portions 3, 4, and has a chamfered orifice 21^1 resting against the rod 13. A retractile spring 22 is suitably fastened to the inner surface of end piece 3 and acting upon locking plate 21 in such a manner that when a plunger is depressed the cam 23 carried thereby moves the plate 21 against the tension of spring 22 until the upper or locking surface of cam 23 has passed below plate 21 when said spring 22 forces the plate back into locking position as indicated in Fig. 3. The movement of common locking plate 21 caused by the actuation of a plunger, also releases

any plunger which is being held down thereby. A common contact set 24 is insulatingly mounted upon the end piece 4 and a common plate 25 is provided, being slidingly supported at its ends by the depending frame portions 3, 4, said plate 25 having chamfered orifices 25^1 adapted to coöperate with the corresponding cam 23, to actuate the common contact set 24 when a plunger is depressed to its effective or operative position as shown in Fig. 3. In the embodiment of my invention now being described the means to prevent simultaneous effective operations of the plungers includes a plurality of locking plates 26 slidingly supported by a plate 27 having upturned edges forming flanges 27^1, 27^2 between which plate 26 is held. A cap plate 28 is attached by means of screws 33 to the ends 3, 4 of the frame so as to hold the locking plates 26 in the supporting plate 27. Said plate 28 has guiding slots 28^1 through which the guiding pins 29 extend, said pins 29 being threaded through the collars 17 to engage the shafts 13 and thereby securely holding the collar upon the shaft. The plates 26 have angular cam surfaces 26^1, 26^2 which are adapted to be engaged by the stop pins 29 when a corresponding plunger is depressed. Each plate 26 coöperates with two plunger stops 29 and the plates are movable by the coöperating stops 29 according to the position in which the plunger is depressed. The plates 26 are also adapted to act upon each other to lock unoperated plungers as will be pointed out in the description of operation. To prevent excessive longitudinal movement of plates 26, pins 30, 31 are driven into the flange 27^2 as indicated in Fig. 3.

Having described in detail the construction of the form of my invention illustrated in Fig. 1, the operation thereof will now be described.

Assuming all of the plungers are in their normal position and the second plunger B from the left is depressed, upon the starting of the downward movement, the plunger cam 23 carried thereby moves the common locking plate 21 toward the left against the tension of spring 22 and upon cam 23 reaching a position below or free of the locking plate 22, said plate is moved back by spring 22 to its locking position as illustrated in Fig. 3. The downward movement of the plunger is arrested when the contact springs 9, 10 are operated as shown in Fig. 3. This downward movement or actuation of the plunger also causes its cam 23 to engage and move the common contact plate 25 toward the left thereby operating the common contacts 24, said contacts being illustrated in Fig. 1 but not in Fig. 3. Also upon actuation of the plunger B stop pin 29 carried thereby engages the cam surfaces 26^1, 26^2 of the coöperating locking plates 26, 26^A respectively. Plate 26 is thereby moved toward the left to prevent an effective operation of plunger A and plate 26^A is moved toward the right thereby also moving plate 26^B, the last two said plates preventing an effective operation of plungers C and D. This is illustrated in Fig. 3. In the embodiment of my invention as illustrated in Fig. 1, I have arranged the actuating members with indicating positions, at which position they are not effective. That is, when an actuating member is depressed to its effective position as shown by plunger B, upon the operator releasing the pressure of the finger the plunger will restore until the cam 23 rests beneath the common locking plate 21, at which time the contact springs 9, 10 are interrupted. With the plunger B in its indicating position, stop 29 thereof is still in position to hold the locking plate in a locking position and should the operator attempt to actuate another plunger such as plunger C for example, and at the same time hold B down, plunger C can be only partly depressed, that is it can be depressed until its stop 29 engages the locking plate 26^A which will occur before the corresponding contacts 9, 10 are actuated as illustrated in Fig. 3. Of course due to the plate 26^A being engaged by plate 26^B, effective operation of actuating member D is also prevented and likewise plate 26 prevents effective operation of plunger A. With all of the actuating members in their normal position, should the operator attempt to depress two adjacent plungers simultaneously, the stops 29 carried thereby will engage the corresponding plate 26, thereby preventing an effective operation of the actuating members as indicated in Fig. 5. Likewise, should the operator attempt to simultaneously actuate any two or more plungers, the stops 29 and plates 26 will coöperate to prevent it. Assuming now that plunger B has been actuated and returned to its indicating position, thereafter when the operator depresses another plunger such as plunger C for example, the cam 23 carried thereby engages and moves common locking plate 23 to allow restoration of the actuated plunger B whereby said plunger B restores removing its stop 29 out of the path of locking plate 26^A so that the continued advance of plunger C to an effective position, is permitted. It is to be understood that I contemplate applying the non-interfering mechanism of Fig. 1 to keys having any number of actuating members as well as to the exact device shown. Also the locking plates 26 may be changed and modified to coöperate with the actuating members in various ways and still come within the scope of my invention.

Figs. 6 to 8: Referring now to the embodiment of my invention as illustrated in Figs. 6 to 8 inclusive, the parts thereof corre-

sponding to parts of the first form of my invention are indicated by like reference characters. The modification now under consideration differs from the first form of my invention in the particular non-interfering mechanism employed. The actuating members A, B, C, and D of Fig. 6 correspond to the plungers of Fig. 1 in that they also have effective and indicating positions. So far as the keys of Figs. 1 and 6 are concerned the indicating position may or may not be used. That is if desired, the contact springs and insulating sleeve may be so constructed that the contacts will be operated when the plunger is in the position wherein it is held by the common locking plate. In the device of Fig. 6 I provide non-interfering means including locking plates 40, 41, 42 slidingly supported at 43 in the depending end pieces 3, 4. The locking plates 40, 41, 42 are provided with holding slots and cam surfaces adapted to coöperate with the stops 29. These slots and cam surfaces are so arranged that when a plunger is depressed the plates are so moved or held that the other plungers are prevented from being effectively operated. In using four actuating members A, B, C, D, three plates 40, 41, 42 are used. Each plate having a slot (as 40^1 in plate 40) offset with respect to the other slots of the plate so that when the actuating plunger corresponding to the offset slot is depressed, the stop 29 carried by said member either moves the plate to, or holds it in, a position whereby its other slots are offset and the cam surfaces (as 40^3 plate 40) tend to lock the remaining plungers against effective actuation. Plate 40 has an offset slot 40^1 for plunger A, plate 41 has an offset slot 41^1 for plunger B, and plate 42 has an offset slot 42^1 for plunger C. If five or more actuating members are to be provided, then I find that the number of locking plates required is one less than the number of actuating members, there being a plate for each actuating member except one, which as is indicated in Fig. 6, is the actuating member D. The locking plates are loosely supported at their ends in the parts 3, 4, that is they are slidingly held so as to remain in any position to which they are moved. Assuming that plates 40, 41, 42, are in the relative position indicated in Figs. 6 and 8, actuating member D may be depressed to an effective, or to a locking position whereby the stop 29 carried thereby will enter holding slots 40^2, 41^2, 42^2 thus holding plates 40, 41, 42 in the relative position shown so that the cam surface 40^3 is beneath stop 29, cam 41^3 is beneath stop 29 of plunger B, and cam 42^3 is beneath the stop 29 of plunger C. Should any of these plungers A, B, C be actuated and plunger D held in its indicating or in its effective position, plungers A, B, or C could only be depressed until their stop 29 engages a cam surface of one of the locking plates, which movement is not sufficient to bring the plunger to an effective position. Assuming now that plunger D has been moved into a locking position and its stop 29 is thus in the slots 40^2, 41^2, 42^2, should the operator desire to actuate one of the other plungers, as B for example, she will depress said plunger whereby its cam 23 will actuate the common locking plate 21 to release the previously operated plunger D before the stop 29 reaches the locking plates. Therefore upon stop 29 of B engaging the cam 41^3 its further movement causes it to ride upon said cam 42^3 and thus move plate 41 toward the right and bring its other cams in position beneath the stops 29 of the other keys to prevent effective actuation thereof. With the plungers at normal should the operator attempt to effectively actuate plungers C and D simultaneously, such simultaneous operation will not be permitted due to the fact that the holding slots and locking plate cams are so related to the stops 29 that but one stop can be moved into the slots at one time. In Fig. 8, locking plate 40, I have indicated by dotted circles the position assumed by the stops 29 with respect to the locking plates, when the plungers are in indicating and effective position respectively.

Figs. 9 to 14: In the device illustrated in Figs. 9 to 14 inclusive, the actuating members A, B, C, and D are preferably arranged without any locking mechanism. That is, when depressed by the operator, upon said operator releasing his hold upon the actuating member it is restored to normal by action of restoring spring 16. It is to be understood though that means for locking the actuating member down in an indicating or in an effective position may be provided if desired, for instance such as disclosed in Fig. 1. A common locking plate as 21 may be added and annular cams 23 provided on the plunger rods. In the embodiment now under discussion, pivoted plates 50 to 55 inclusive, as shown in detail in Fig. 13, are provided to coöperate with the plunger rod stops 29 to prevent simultaneous effective actuation of more than one plunger rod. The pivoted plates 50 to 55 inclusive are supported between the plates 56, 57 said plates 56, 57 being attached to the end pieces 3, 4, in a suitable manner. In Fig. 13 the construction and relative positions of the pivoted locking plates is shown, said plates being pivoted from their respective bearings 50^1, to 55^1 inclusive, the pivot points for these plates at the supporting plates 56, 57 being indicated by like reference characters 50^1 to 55^1 inclusive. In Fig. 13 the pivoted locking plates are illustrated in the position they bear with respect to the plunger rod stops 29. Locking plates 53, 54, have

upwardly extending stop engaging portions which are adapted to coöperate with the stops 29, these locking plates being so shaped to allow clearance for intermediate stops 29. That is, taking plate 53 for example, its central portion 53^4 and bearing 53^1 are so related to the upwardly extending portions 53^2, 53^3, that the stop 29 of plunger B although fully depressed will not interfere with the free operation of plate 53. Plates 54, 55 are likewise constructed to be clear of the stops 29 which do not coöperate with them. In operating the device, assuming the actuating member A is depressed to its effective position as indicated in Fig. 14, the movement thereof causes its stop 29 to engage the left end of the locking plates 50, 53, 55 to tilt them to the position indicated by the dotted lines, Fig. 13. In Fig. 14 but the single plate 50 is illustrated to show the manner in which an engaged plate is moved to prevent simultaneous actuation of a second actuating member. The actuation of member A causes a closure of the contacts 9, 10 and while member A is held down the un-engaged ends of plates 50, 53, 55 are in a position to prevent an effective operation of plungers B, C and D respectively. Again assuming all plungers at normal, should the member B be actuated, then its stop 29 tilts the locking plates 50, 51, 54 to bring their un-engaged ends into position to prevent effective operations of the other plungers. The particular, non-interfering mechanism of the embodiment of my invention now under consideration is not limited to the number of plungers or actuating members shown, but may be extended to include any number of actuating members desired. To extend the non-interfering mechanism of Fig. 13 to a device with a greater number of plungers than that illustrated, a combination of pivoted plates may be provided in which a connection is extended between each possible combination of two plungers.

Figs. 15 to 17: The key illustrated in Figs. 15 to 17 differs somewhat from the previously described keys in that the non-interfering mechanism is arranged to prevent simultaneous effective actuation of adjacent plungers only. That is, the non-interfering mechanism will not permit simultaneous actuation of adjacent plungers as A and B but will permit simultaneous actuation of plungers which are not adjacent as A and C or B and D. The present device is also arranged with indicating and effective positions as the devices of Sheet 1. This will be readily understood from the reference characters used which correspond to the reference characters indicating like parts on sheet 1. In the present device the plunger stop 29 is an annular rib as distinguishing from the pin stop 29 used in the previous devices. A pivoting locking plate 60 spans each pair of adjacent plungers, having fingers 64, 65 normally resting upon the stops 29. Said locking plate is pivotally attached to a bracket 62 and a flat tension spring 63 is provided for pressing the locking plate 60 inwardly so that its stop 61 may be brought in the path of plunger stop 29 when the corresponding plungers are simultaneously depressed. Assuming all of the actuating members at normal and that member D is actuated, upon being depressed its cam 23 is moved beneath the common locking plate 21 as shown in Figs. 15, 16. The downward movement of plunger D carries its stop 29 away from finger 64 but as finger 65 is resting upon the stop 29 of member E, plate 60 remains stationary. To actuate the contacts 9, 10, plunger D is depressed to its fullest extent which is its effective position, whereby its insulating sleeve 18 closes contact between springs 9, 10, but upon the operator removing the pressure upon plunger D it restores to its indicating position as shown in Fig. 15. Should the operator depress any of the other plungers, locking plate 21 is moved to allow the release or restoration of the previously actuated member, unless it is wilfully held down. But should the operator accidentally depress two of the adjacent plungers as D and E in operating the device, upon moving these plungers downwardly the stops 29 of members D and E move free of fingers 64, 65 allowing plate 60 to move inwardly and place stop pins 61 in the path of the plunger stops 29 as shown in Fig. 17 thereby preventing an effective operation of said plungers D, E.

Fig. 18: In Fig. 18 I have illustrated diagrammatically a non-interfering switch device in which electrical circuits are involved in the control of the non-interfering mechanism. A control magnet 70 is provided which is adapted when two or more actuating members are simultaneously depressed, to prevent an effective operation of said members. A pair of contacts 71, 72 are provided for each plunger and adapted to close the circuit through corresponding resistance 73 and the winding of magnet 70 to battery. The resistances 73 and magnet 70 are so arranged that when a single set of contacts 71, 72 are closed, sufficient current is not permitted to flow through the winding of magnet 70 to cause its operation but if two or more sets of contacts 71, 72 are simultaneously closed, then sufficient current is permitted to flow through the connected resistances 73 to permit an effective operation of magnet 70. A pivoted arm 74 is provided for each plunger rod, said member 74 having a yielding locking stop 75 fastened thereto and adapted to be moved into the path of the plunger stop 29 when the armature 76 of magnet 70 is attracted. A link 77 connects armature 76 to the pivoted mem-

bers 74 whereby all of said members 74 are moved by the operation of magnet 70.

For the purpose of illustrating an application of my invention, I have shown four operating magnets *a*, *b*, *c*, *d*, corresponding to the actuating members A, B, C, D, these magnets *a*, *b*, *c*, *d* being adapted for use in various ways. Connected in circuit with each of said magnets are corresponding contacts 9, 10, and the common conductor 78 to ground at normal contact 79. This last described path which includes the normal contact 79 of magnet 70 is an alternate means to prevent a simultaneous effective operation of the magnets *a*, *b*, *c*, *d*. That is, when magnet 70 is energized due to a simultaneous operation of several actuating members, normal contact 79 is interrupted thereby removing ground from the common conductor 78 and preventing energization of the magnets *a*, *b*, *c*, *d*.

In operating the device of Fig. 18, assuming the actuating member D is depressed, contacts 71, 72 thereof are closed thereby establishing a circuit through the corresponding resistance 73 and the winding of magnet 70 to battery. This circuit will not allow sufficient current to flow through the winding of magnet 70 to attract its armature. Therefore a continued movement of plunger D is permitted and its locking cam 23 is moved beneath the common locking plate 21 and corresponding contacts 9, 10 are closed thereby establishing a circuit for magnet *d*, traced from battery through the winding of said magnet *d*, contacts 9, 10, conductor 78 and normal contact 79 to ground. Magnet *d* is thus energized. Should another plunger as C be depressed, its cam 23 will release the previously actuated plunger D before its contacts 71, 72 are closed so that the previously actuated plunger D will restore and open its contacts 71, 72, and 9, 10 whereby the continued advance of member C is permitted as sufficient current is not permitted to flow through magnet 70 to cause its operation.

Should an operator intentionally or by accident depress any two or more actuating members A, B, C, D, a corresponding number of resistances 73 are included in circuit of magnet 70 whereby sufficient current will flow through the winding of magnet 70 to cause its operation. Its armature is therefore attracted moving the locking stops 75 into the path of the plunger stops 29 before the contacts 9, 10, of the actuated plungers are engaged. Thus it will be seen that by the actuation of the locking stops 75 a simultaneous effective operation of the actuating members is prevented mechanically. Also responsive to the operation of magnet 70 as just described, its normal contact 79 is interrupted thereby preventing the closure of an operating circuit for the magnets *a*, *b*, *c*, or *d*. In this way an alternate non-interfering means are provided in addition to the mechanical means previously described. It will be apparent that in the particular arrangement shown in Fig. 18 either one or the other of the means may be dispensed with if desired and still a simultaneous effective operation of the plungers or magnets is prevented.

While I have illustrated several embodiments of my invention, I do not desire to be limited to the arrangements shown, neither do I desire to be limited to the application of my invention to electrical switching keys as the non-interfering features may be readily applied to other devices and I aim to cover all that which comes within the spirit and scope of the appended claims.

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

1. A switch device comprising three or more actuating members, means comprising a plurality of sliding bars for preventing a simultaneous effective operation of more than one actuating member, and means for locking an actuated member against restoration until a second member is actuated.

2. A switch device comprising three or more manually operated members, control mechanism individual to each of said manual members, means comprising a plurality of endwise movable elements for preventing a simultaneous effective operation of more than one manual member, and means for locking an actuated member against restoration until a second member is actuated.

3. A switch device comprising three or more manually operated members, a control device individual to each of said members and adapted to be operated thereby, means comprising sliding bars controlled by said manual members to prevent a simultaneous effective operation of more than one of said manual members, and means for locking an actuated member against restoration until a second member is actuated.

4. A device of the character described comprising three or more independently operable actuating members, control devices individual to said members and adapted to be operated thereby, means comprising a plurality of endwise slidable elements effective when more than one of said actuating members are moved to prevent an effective operation thereof, and means for locking an actuated member against restoration until a second member is actuated.

5. A device of the character described comprising three or more independently operable actuating members, switch contacts individual to said members and adapted to be operated thereby, means comprising a plurality of sliding bars for preventing a simultaneous operation of said switch con-

tacts, and means for locking an actuated member against restoration until a second member is actuated.

6. A switch device comprising three or more independent manually operable members, switch contacts individual to each of said members and adapted to be operated thereby, means comprising slidable bars controlled by said manual members to prevent a simultaneous effective operation of more than one of said manual members, and means for locking an actuated member against restoration until a second member is actuated.

7. A switch device comprising three or more independent manually operable members, switch contacts for each of said members and adapted to be operated thereby, means comprising a plurality of sliding bars effective when more than one of said actuating members are simultaneously moved, to prevent an effective operation thereof, and means for locking an actuated member against restoration until a second member is actuated.

8. A switching device comprising actuating members having operating and restoring movements, means for locking an actuated member against restoration and means comprising a plurality of bars whereby when a plurality of such members receive simultaneous operating movement effective operation thereof is prevented.

9. A switching device comprising a plurality of actuating members each having normal, indicating, and operative positions, switch contacts for said members actuated when a member is moved to its operative position, and means comprising a plurality of bars for preventing simultaneous actuation of more than one member to their operative positions.

10. A switching device comprising a plurality of actuating members each having normal, indicating, and operative positions, a switch contact for each of said members actuated when a member is moved to its operative position, and means comprising endwise slidable bars for preventing simultaneous actuation of more than one member to their operative positions.

11. A switching device comprising a plurality of actuating members each having normal, indicating, and operative positions, switch contacts for said members actuated when a member is moved to its operative position, means whereby the last member actuated is maintained in its indicating position, and means comprising endwise slidable elements for preventng simultaneous actuation of more than one member to their operative positions.

12. A switching device comprising a plurality of actuating members each having normal and operative positions, switch contacts for said members actuated when a member is moved to its operative position, means for locking an actuated member against restoration until a second member is actuated, and means including endwise slidable bars for preventing simultaneous actuation of more than one member to their said operative positions.

13. A switching device comprising a plurality of actuating members each having normal and operative positions, restoring means for said members tending to effect their restoration when moved from normal, switch contacts for said members actuated when a member is moved to its operative position, means for locking an actuated member to prevent its restoration by said restoring means until a second member is actuated, and means comprising a plurality of bars for preventing simultaneous actuation of more than one member to their operative positions.

14. A switching device comprising a plurality of actuating members each having normal and operative positions, restoring means for said members tending to effect their restoration when moved from normal, a switch contact for each of said members actuated when a member is moved to its operative position, means for locking an actuated member to prevent its restoration by said restoring means until a second member is actuated, and means including endwise slidable bars for preventing a simultaneous actuation of more than one switch contact.

15. A switching device comprising a plurality of actuating members for controlling contact devices, means for locking an actuated member against restoration until the second one of said members is operated, and means comprising a plurality of adjacent sliding bars for preventing the simultaneous operation of more than one of said members to operate said contact devices.

Signed by me at Chicago, county of Cook and State of Illinois, in the presence of two witnesses.

GEORGE E. MUELLER.

Witnesses:
M. R. Rochford,
Bessie O'Brien.