

Jan. 6, 1948.

C. A. PONTI

2,434,012

SWITCH

Filed Jan. 31, 1946

2 Sheets-Sheet 1

Fig. 2.

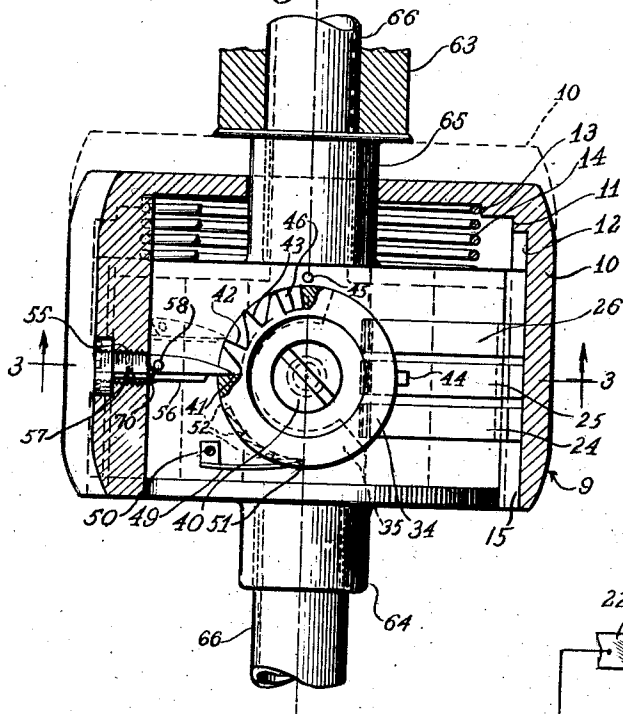


Fig. 1.

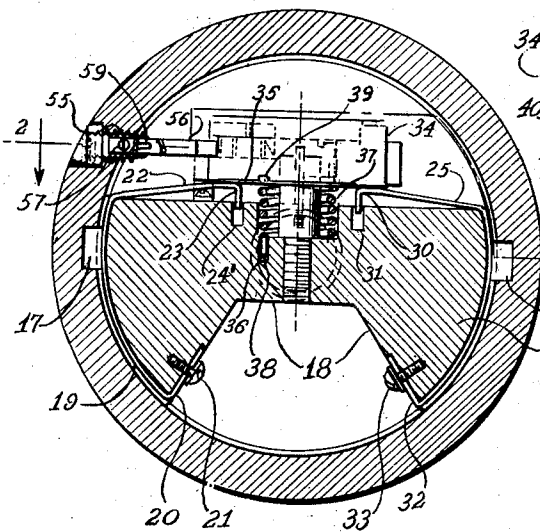
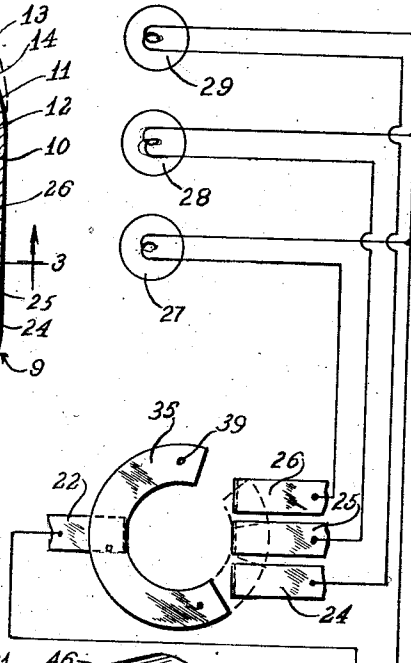


Fig. 3.

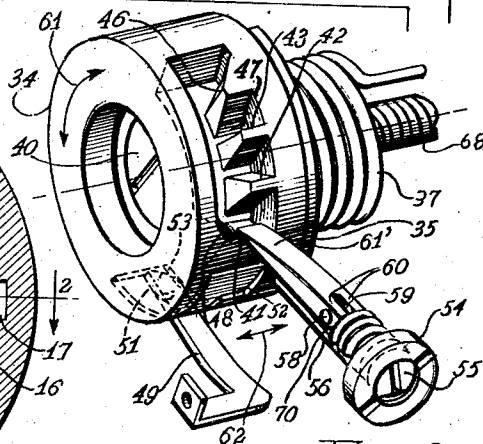


Fig. 6.

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2 Sheets-Sheet 2

Fig. 4

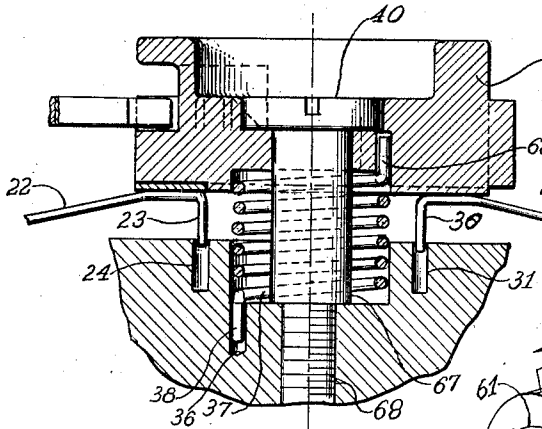


Fig. 5

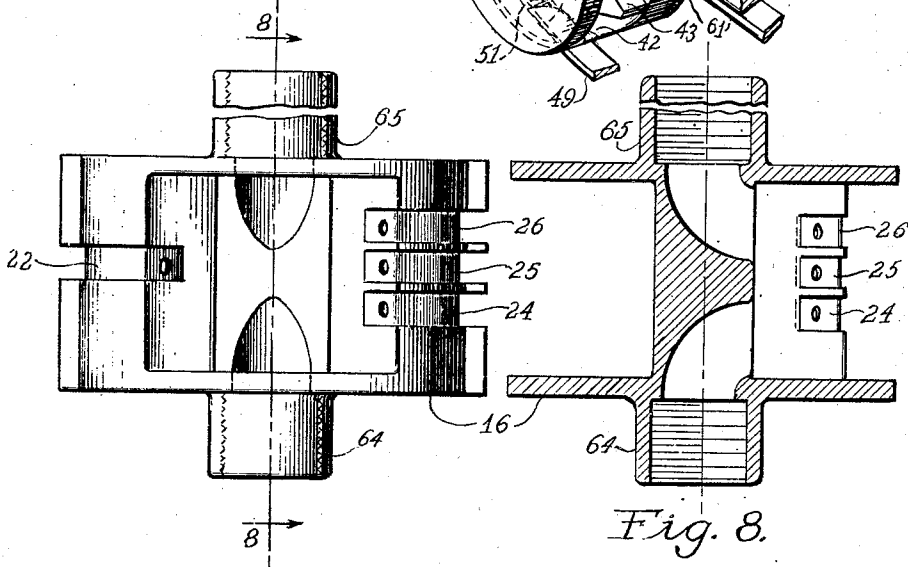
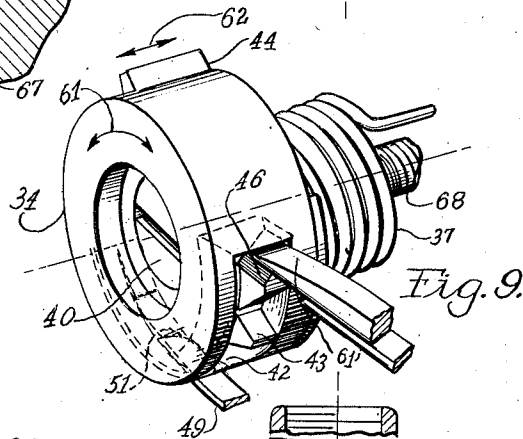
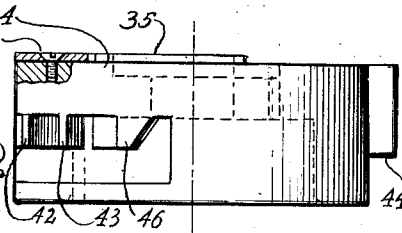


Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE

2,434,012

SWITCH

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Application January 31, 1946, Serial No. 644,527

10 Claims. (Cl. 200-6)

1

My invention relates to electrical switches.

One object of my invention is to provide an electrical switch which has sleeve actuating means movable in one direction, and which will actuate an indexing type of contact, or terminal, and successively close on the first actuation one electrical circuit, on the second actuation a second electrical circuit in addition to the first, and on the third actuation close a third electrical circuit leaving three circuits in operation, and on the fourth movement in the same direction the contacts will be broken returning the indexing contact to normal position, simultaneously, opening all three circuits.

Another object of my invention is to provide a multiple switch means equipped to successively close several electrical circuits, it requiring but one actuation thereof to open all the said circuits, after the said circuits had been closed.

Another object of my invention is to provide an electrical switch of the aforementioned character which is simple in construction, practical and efficient in its uses and applications, and which is of such simple elemental construction as to lend itself readily to economical manufacture in quantity production.

Other features and objects, inherent in my invention will become apparent from an examination of the accompanying drawings, having further elucidation in the ensuing description, wherein like symbols are used to designate like parts, and in which;

Fig. 1 is a diagrammatic or schematic arrangement showing the electrical circuit connections, and the portions of my invention which permit the closing of electrical circuits successively, and the opening of all of them simultaneously by the same actuation or movement that is used for closing the circuits one at a time.

Fig. 2 is a transversal cross-sectional view taken, substantially, on the staggered line 2-2 of Figure 3.

Fig. 3 is a cross-sectional view taken, substantially, on the line 3-3 of Figure 2.

Fig. 4 is a fragmentary view showing in enlargement specific details of construction which are indicated in Figure 3.

Fig. 5 is a view of the indexing contact spool-like structure.

Fig. 6 is a fragmentary perspective view showing the indexing electrical contact, the check pawl, and the indexing pawl ready to initiate action.

Fig. 7 is a detailed view of the central support of my switch structure.

2

Fig. 8 is a cross-sectional view taken on the lines 8-8 of Figure 7, and

Fig. 9 is a perspective view showing the indexing pawl, and the check pawl in position, when the indexing contact is about to be returned, and prior to being returned to normal position for repetition of the cycle of operation, at a time when all the circuits are open.

Referring to the various views, 66, represents the tubular structure of a lamp or other like instrumentality, and to the same I secure the central core element, generally, designated 16, which has extensions 64 and 65 suitably threaded in order to attach to the tubular portion 66 heretofore mentioned. The stop collar 63 is secured to the upper tubular portion 66.

The movable element 10 of my invention, generally, designated 9, simulates a movable sleeve on the outside guided on a bored portion 15 on the tubular extension 65, being suitably recessed at 13 in order to seat the spring 14, which will normally urge the sleeve 10 to the dotted position in abutment with the lower portion of the arresting collar 63. The sleeve 10 is suitably counter-bored at 11 and provided with diametrically and oppositely disposed keyways 12, to function with the keys 17 provided on the core element 16. The said element 16 is suitably recessed as indicated at 18, in order to permit the contacts to be secured thereto. The common contact 22 is of arcuate shape as shown at 19, and is provided with a bent portion 20, anchoring the same to the core 16 by virtue of the screw or other securing elements 21, having a hook portion 23 operating in the slotted guideway 24' of the core 16. The said contact portion 22 is preferably of resilient material so that it will be urged normally in the direction and position shown by the full lines.

On the opposite side, are shown three similar contacts, namely 24, 25 and 26, which are bent over at 32, and secured by screws 33, the upper portions thereof being of resilient material and urged in contacting relationship with the horse-shoe shaped indexing contact 35. Like the resilient contact 22, the resilient contacts 24, 25, and 26 have bent lugs 30, operating in slotted guideways 31, in the core portion 16, which is, preferably, made of insulating material, as well as the perpendicular movable and operable sleeve 10 heretofore mentioned.

The indexing contact is composed of a spool-like structure 34, having a suitable counter-bored portion, for securing the same rotatably by means of the shoulder screw 40, having a shoulder por-

tion 67, and a reduced threaded shank portion 68 imbedded or secured in the core 16. About the shoulder portion 67, is coiled a spring 37, which has one end 38 thereof anchored in the core element 16, the spring coils being fitted into the counter-bore 36 in the element 16, the other end 69 thereof being anchored in the indexing contact wheel 34. The said wheel is provided with teeth 41, 42 and 43, and an angularly bevelled portion 46, contiguous to the aforementioned teeth, the said teeth, and angular portion 46 being formed within a recess 47, having a cam-like arcuate portion 48 at the bottom thereof the operation and function of which will be hereinafter, more clearly, disclosed.

The indexing contact wheel 34 is, preferably, made of insulated material and operates in the direction of the arrows 61, clockwise, and counterclockwise, as well as in the direction of the arrows at 62, that is to the right, and left, as indicated in Figure 6. Thus it can be seen that the spring 37 serves a dual function, namely, that of a torsional spring on the one hand, and a compression spring on the other.

The actuation of the index wheel 34 is limited also in its motion by the check pawl 49, having the toothed portion 51 engaging successively any of a number of teeth 52, the indexing movement being limited, in this particular instance to four divisions, after which the wheel or spool 34 is returned to align the tooth 41 with the motivating pawl designated 61'. For safety purposes a pin stop 45 is driven into the core element 16, which engages the stop lug 44 on the indexing wheel. The horse-shoe shaped contact 35 is secured to the index wheel 34 by fastenings 39, and is of such magnitude as to effectively bridge contacts 24, 25 and 26 with common contact 22.

The motivating pawl 61' is comprised of a screw element 55, having a certain portion thereof cut away so as to provide a flat portion for securing the flat spring 56 thereto, the assemblage occupying the circular confines of the threaded portion in which the screw 55 fits. The screw 55 is also provided with a tongue extension 59, engaging the fork portions 60 of the pawl 61' which is pivotably secured by virtue of the pin 58, the flat spring urging the heel 70 so as to maintain the pawl rigid during its downward movement, from the dotted position to the full position shown in Figure 2. On the return stroke, the spring 56 is caused to flex thus permitting the tip 61' of the pawl to pass the next tooth 42, without motivating the index wheel 34, which is held in check by the tooth 51 of the check pawl 49 engaging one of the teeth 52. The check pawl 49 is secured to the core 16 by virtue of fastening 59. A nut 54 locks screw 55 in place.

It is to be noted that the toothed portions 52 are also within an enlarged recess so as to permit the index wheel 34 to move to the right as indicated by the arrows 62 (Figures 6 and 9), causing the pawl to ride off the teeth 52 when this should be necessary.

The actuation of my device is as follows: When the sleeve 10 is moved to the position shown in Figure 2, pawl 61' will have indexed the wheel to the position whereby the horse-shoe segment 35, shown at Figure 1, will have been indexed to the first dotted position to bridge contacts 22 and 24, when the said sleeve is released the spring 14 will return it to the dotted normal position, thus lighting one or more lamps 27, or closing one electrical circuit.

On a second downward actuation, the pawl

61' will move the index wheel 34 so that the horseshoe-shaped contacts 35 will be advanced to cause a bridging contact between contacts 24, 25 and 22 closing the second circuit and lighting one or more of a series of lamps 28.

On a third actuation downwardly of the sleeve 10, the horseshoe-shaped contacts will have been advanced to ultimate position of its travel so as to bridge contacting relationship between the contacts 24, 25, 26, and 22, thus closing the third circuit and lighting one or more lamps 29. Thus it can be seen, that by actuation of the sleeve downwardly in one direction intermittently and repeatedly a series of circuits will be closed progressively.

Referring to Figures 9 and 6, Figure 9 represents the action of the pawl 61 prior to the movement downwardly of the sleeve 10 for the fourth time consecutively, when it will engage the angular cam portion 46, causing the spring 37 to be depressed, it already having been subjected to torsional action by the repeated triple indexing movements of the teeth 41, 42 and 43. The movement of the pawl downwardly at this time will cause the index wheel 34 to be moved to the right as indicated by the arrows 62 at Figure 6, causing the pawl 61' to become aligned with the open recess 47, the torsional action in the spring tending to return the same to normal will rotate the index wheel 34 in a counterclockwise direction and the pawl 61' upon reaching the cam portion 48, will be caused to align itself with the ledge of the first tooth 41, while simultaneously, and auxiliary being aided by the tendency of the spring 37 to expand to normal, urging the wheel 34 to the left as indicated by the arrows 62.

The toothed portion of the check pawl is cut away as at 53 in order to facilitate registry and alignment of the first tooth 52 when the index wheel is returning to normal. The contact portions 22 and 24, 25 and 26 are spring-like in nature so as to coact and cooperate with the movements of the spool in accordance with the indicated directions of the arrows 62, the spring-like structures 24, 25, 26 and 22 always maintaining a contactual relationship with that portion of the horseshoe contact 35 that is brought into contactual alignment with a respective contact, 24, 25 or 26. In neutral position, the segmental contact 35 is in contact only with the common contact 22.

In Figure 1, in full lines, the horseshoe contact 35 is shown contacting the common contact 22 thus opening all the circuits, the bridging is effectuated by the progressive rotation of the horseshoe contact 35, to the three dotted positions indicated, either closing one circuit, closing two circuits, or closing three circuits depending on the position of the horseshoe contact 35.

Thus, I believe, I have shown and indicated what constitutes my invention, namely, a switch which is adapted to operate and close a multiple number of circuits, one at a time, the closing of the circuits occurring by actuating an element of the said switch in one direction, repeated movement thereof causing progressively circuits to be closed consecutively. It requiring but an identical movement to open all circuits simultaneously. The movement for closing all circuits being the next successive movement beyond the number of circuits involved, or connected to the switching means. That is, if there are four circuits, the fifth movement of the element will open all circuits, whereas the first four will each successively close, a circuit in addition to those

that have already been closed prior to the said movement.

Although I have herein described succinctly the nature and operation of my invention, and inasmuch as the same is susceptible of modifications and improvements, I hereby reserve the right to all modifications and improvements coming within the scope and spirit of my invention, as well as any that may be embraced in the accompanying drawings, and all those that may fall within the purview of the foregoing description.

Having thus disclosed and described my invention, what I claim as novel and desire to secure by Letters Patent, is:

1. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common terminal secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, and cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means.

2. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, and positive stop means associated with the said core element and the said indexing contact to limit the motion thereof.

3. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciproca-

tory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, and cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, the said actuating pawl means constructed and arranged to be rigid during its operative movement and yieldable in its return movement.

4. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, and positive stop means associated with the said core element and the said indexing contact to limit the motion thereof, the said actuating pawl means constructed and arranged to be rigid during its operative movement and yieldable in its return movement.

5. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the

movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, and cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, the said indexing contact being provided with auxiliary cam means to aid in locating the said actuating pawl means in its normal position with respect to the said indexing contact.

6. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, and positive stop means associated with the said core element and the said indexing contact to limit the motion thereof, the said indexing contact being provided with auxiliary cam means to aid in locating the said actuating pawl means in its normal position with respect to the said indexing contact.

7. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, and cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, the said actuating pawl means constructed and arranged to be rigid during its operative movement and yieldable in its return movement, the said indexing contact being provided with auxiliary cam means to aid in locating the said actuating

pawl means in its normal position with respect to the said indexing contact.

8. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, and positive stop means associated with the said core element and the said indexing contact to limit the motion thereof, the said actuating pawl means constructed and arranged to be rigid during its operative movement and yieldable in its return movement, the said indexing contact being provided with auxiliary cam means to aid in locating the said actuating pawl means in its normal position with respect to the said indexing contact.

9. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact, compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, and cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, the said check pawl means provided with a cut-away toothed portion to aid in locating it in its normal position with respect to the said indexing contact.

10. A multiple electrical switch comprising, a core element provided with extensions adapted to attach it to an electrical appliance, an actuator sleeve telescopically mounted on the said core element and movable in longitudinal reciprocatory movement with respect thereto, spring means interposed between the said core element

and the said actuator sleeve urging the said sleeve to inoperative position, an indexing contact rotatably secured to the said core element, actuating pawl means secured to the said actuator sleeve and adapted to advance the said indexing contact, a common contact secured to the said core element in contacting relationship with the said indexing contact, a multiple number of mating contacts secured to the said core element normally maintained out of contact with the said indexing contact, check pawl means secured to the said core element and adapted to check the movement of the said indexing contact,

compression and torsional means having its ends anchored respectively to the said indexing contact and to the said core element, cam means on the said indexing contact adapted to return the said indexing contact to normal position when actuated by the said actuating pawl means, and positive stop means associated with the said core element and the said indexing contact to limit the motion thereof, the said check pawl means provided with a cut-away toothed portion to aid in locating it in its normal position with respect to the said indexing contact.

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