Nov. 13, 1951 S. LANGLEY 2,574,745

ELECTRIC SWITCH

Filed Feb. 3, 1950 3 Sheets-Sheet 1

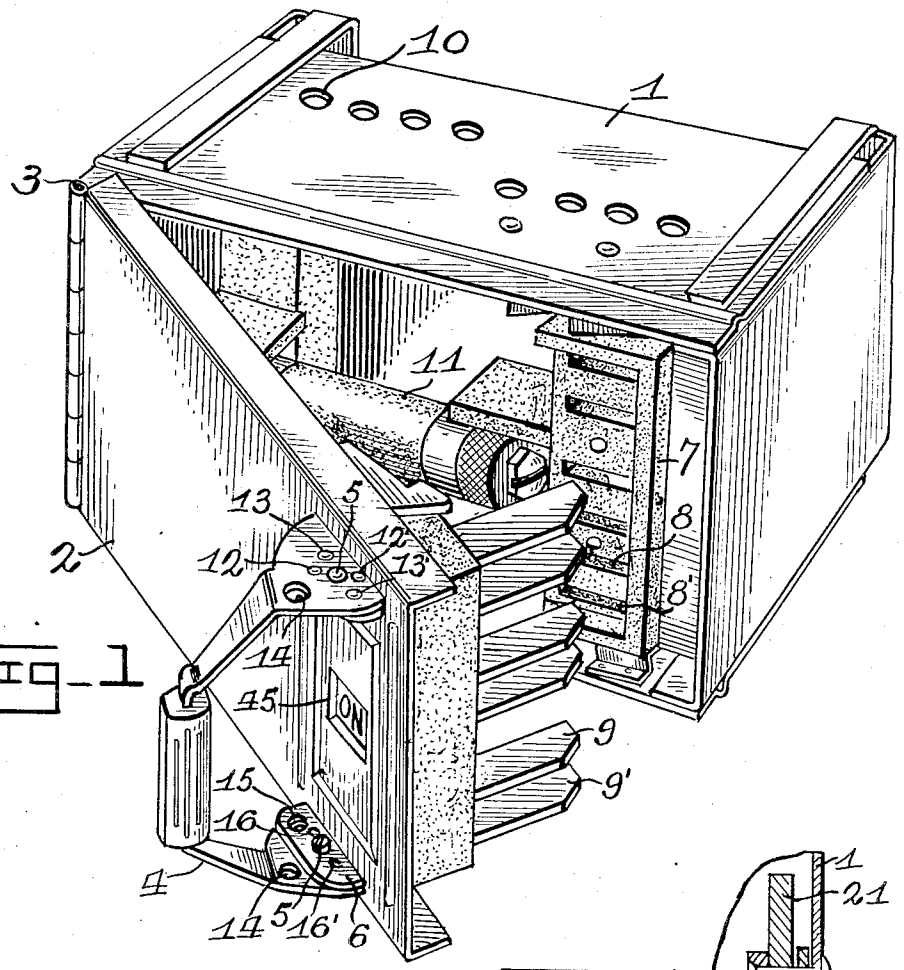



Fig. 1

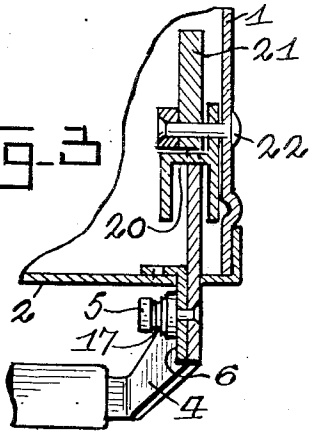



Fig. 3

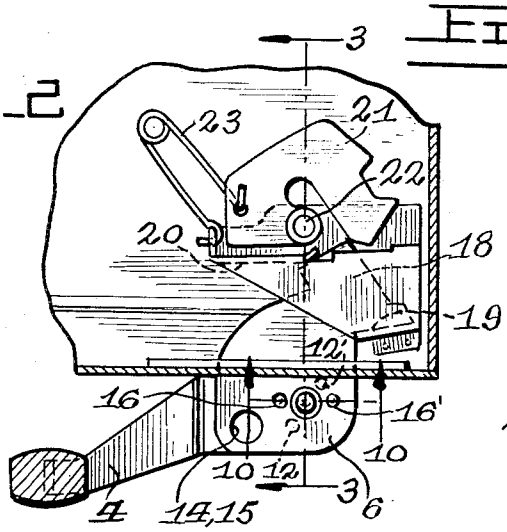



Fig. 2

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ELECTRIC SWITCH

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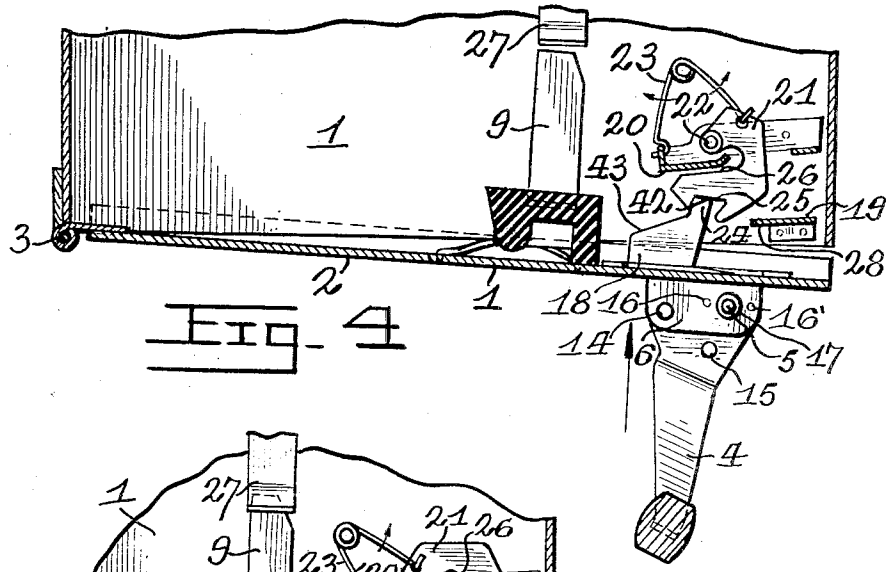



Fig. 4

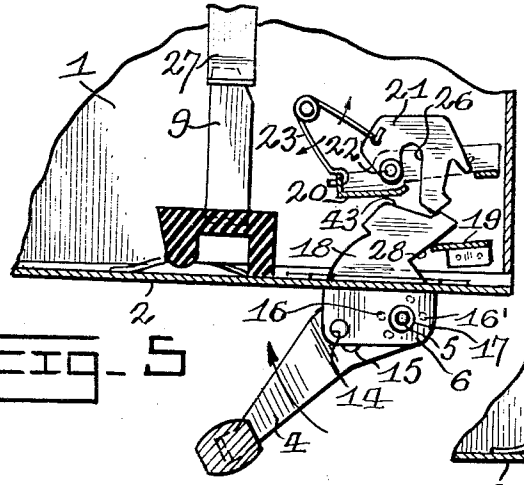



Fig. 5

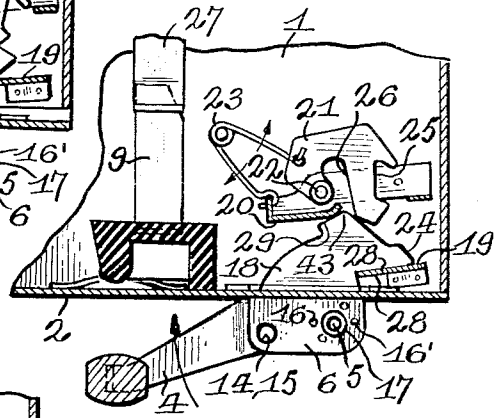



Fig. 6

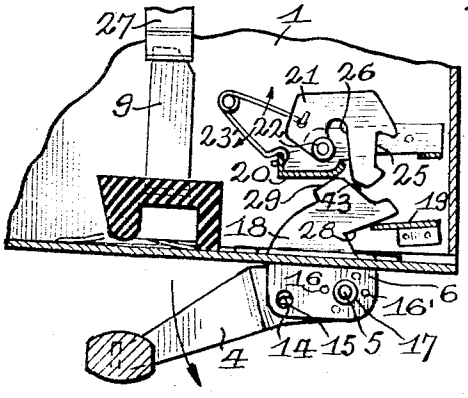



Fig. 7

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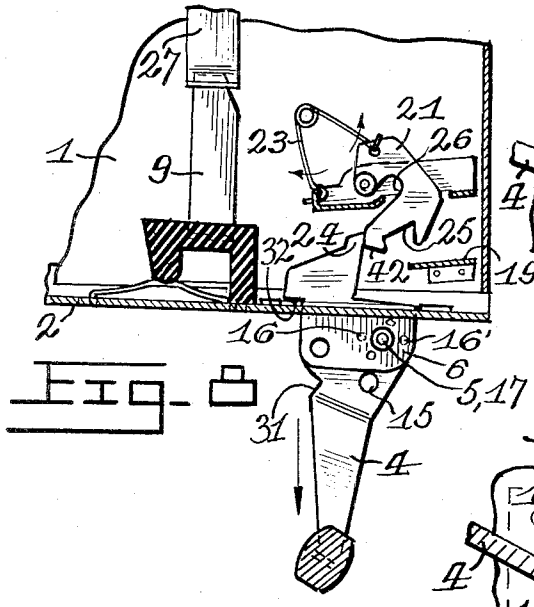



Fig. 8

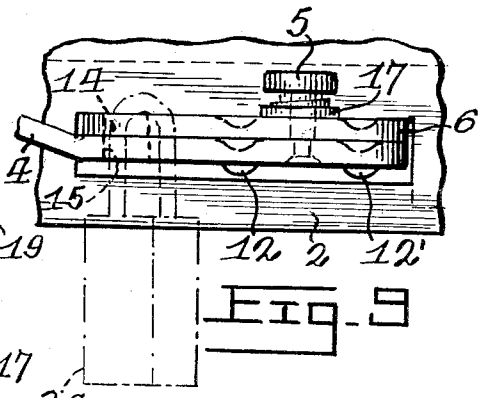



Fig. 9

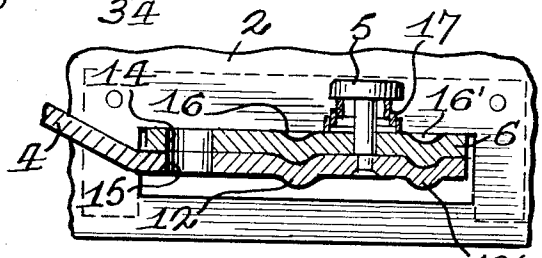



Fig. 10

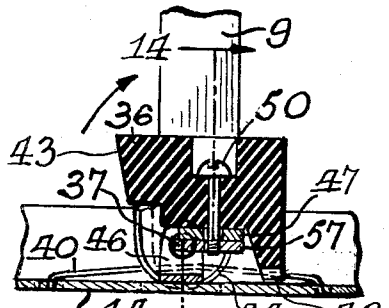



Fig. 12

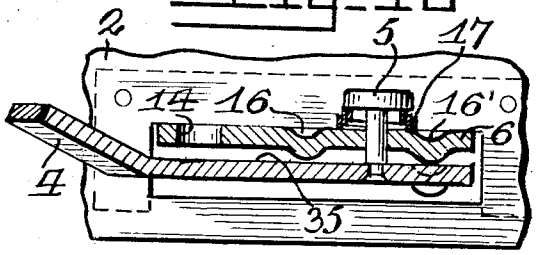



Fig. 11

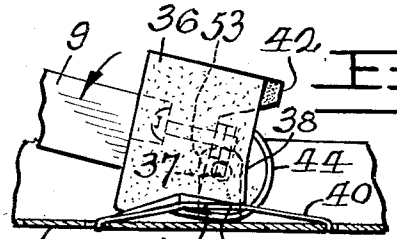



Fig. 13

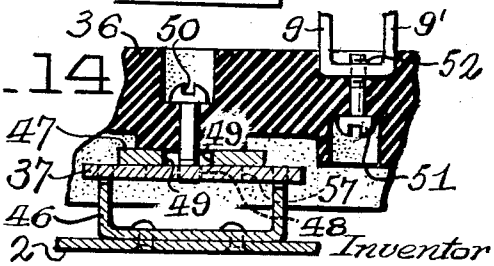



Fig. 14

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# UNITED STATES PATENT OFFICE

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## ELECTRIC SWITCH

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Application February 3, 1950, Serial No. 142,211
In Canada January 10, 1950

7 Claims. (Cl. 200—50)

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This invention relates to power distribution switches of the safety type, and more particularly to the switch enclosure and means for operating.

It is an object of this invention to provide an enclosed switch whereby the switch contacts can be closed only by closing the cover.

It is a further object of this invention to provide an enclosed switch whereby the switch contacts are opened by opening the cover.

It is a further object of this invention to provide an enclosed switch with means for closing the cover with the switch in the off position.

It is a further object of this invention to provide an enclosed switch having an operating handle on the cover which provides a mechanical advantage in forcing the contacts closed or open.

It is a further object of this invention to provide an enclosed switch having a guard which prevents closing the cover except in predetermined fashion.

It is a further object of this invention to provide an enclosed switch having means for making a quick break.

A further understanding of the invention may be had by reference to the drawings in which:

Fig. 1 is a perspective view of the switch with the cover ajar.

Fig. 2 is a detail of the operating mechanism with section 3—3 shown in Fig. 3 and section 10—10 shown in Fig. 10.

Fig. 3 is section 3—3 of Fig. 2.

Fig. 4 is a detail of the operating mechanism with the operating handle in the position necessary to initiate closing.

Fig. 5 is a detail of the operating mechanism with the operating handle moved a part of its closing rotary travel.

Fig. 6 is a detail of the operating mechanism in the fully closed position.

Fig. 7 is a detail of the operating mechanism with the operating handle commencing its opening rotary travel.

Fig. 8 is a detail of the operating mechanism with the operating handle moved its full opening rotary travel.

Fig. 9 is a detail of the operating handle indexing mechanism.

Figs. 10 and 11 are details in section of the operating handle indexing mechanism in an indexed and non-indexed position, respectively.

Figs. 12 and 13 are details of the contacts mounted on the cover with the contacts in the on and off position, respectively.

Section 14—14 of Fig. 12 is shown in Fig. 14.

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The same numerals are used to designate particular parts throughout the illustrative figures.

Referring now to Fig. 1, the enclosure 1 has a cover 2 hinged at 3. The operating handle 4 is pivotally mounted by pin 5 on handle mounting 6 attached to cover 2. Insulating baffle 7 has openings 8—8' which allow the movable contacts 9—9', mounted on cover 2, to enter and engage live contacts mounted on the enclosure behind baffle openings 8—8'. Baffle 7 provides a dead front when the cover is open and also serves as an arc quench when breaking an energized circuit. Contacts 9—9' are conductively connected so that engagement with the live contacts closes the circuit between those live contacts. Ventilating holes 10 on the top and bottom of enclosure 1 have a staggered relation to permit mounting several switches adjacently on a rack without forming a continuous passage from one switch to the next. In the embodiment of Fig. 1, space is provided in the enclosure for mounting fuses 11. Access to the cable connector is from the side of the enclosure and is not shown.

Operating handle 4 has embossments 12—12' and 13—13' which form part of the indexing mechanism described below. Drillings 15 in the handle mounting and 14 in the operating handle provide means for applying a locking device when the switch is in the closed position, as for example, by means of a padlock 34 illustrated in Fig. 9.

Referring to Figs. 2 and 3 embossments 16—16' and spring 17 cooperate with embossments 12—12' and 13—13' of Fig. 1 to index the operating handle in a manner described below. Operating handle 4 has an extension 18 which bears against fulcrum surfaces 19 and 20 to lever the switch closed and open respectively. Guard member 21 is pivotally mounted on enclosure 1 by pin 22 and equipped with restoring spring 23.

In Fig. 4, the operating handle 4 is in the particular position required to initiate closing. Finger 24 of handle extension 18 enters indent 25 of guard 21 and forces stop surface 26 of guard 21 against fulcrum surface 20, preventing contact 9 from engaging live contact 27. Also, with the handle 4 in any other position, extension 18 interferes with guard 21 and/or projection 28 preventing closure of the cover and maintaining a separation of contacts 9 and 27. Entry of finger 24 in indent 25 permits operating handle 4 to mesh with guard 21 so that clockwise rotation of handle 4 displaces guard 21 in a counterclockwise direction. Projection 42 of guard 21 rides on surface 43 of handle extension 18 maintaining

separation of contacts 9 and 27 during the initial rotation of handle 4. Rotation of the handle 4 as described brings the mechanism to the position illustrated in Fig. 5. Contact 9 begins to engage contact 27 and lever surface 28 of handle extension 18 bears on fulcrum surface 19. Further rotation of handle 4 levers the switch fully closed with contacts 9 and 27 engaged as shown in Fig. 6.

Starting from the closed position of Fig. 6, the operation of opening the switch is illustrated by Fig. 7. Counterclockwise rotation of handle 4 brings lever surface 29 of handle extension 18 to bear on fulcrum surface 20, forcing contacts 9 and 27 to partially disengage. Full counterclockwise rotation of handle 4 brings the mechanism to the position illustrated in Fig. 8. Contacts 9 and 27 are left sufficiently engaged to carry current temporarily. Pulling the handle completes the disengagement of the contacts, and their sudden release provides a quick break. The rotary motion of the handle 4 is followed by guard 21 by virtue of restoring spring 23. Completing the opening operation by means of a pull allows the guard 21 to restore to the guard position, as shown in Fig. 4.

Operation of the switch is facilitated by positively indexing the operating handle 4 in the position required to initiate closing and in the fully closed position. The rotary travel of the operating handle 4 is confined by stop surfaces 31 and 32, Fig. 8, coming into contact with the cover. Positive indexing at these extremes of handle travel is provided by embossments 16—16', Fig. 2, on the handle mounting nesting in embossments 13—13' and 12—12', Fig. 1, on the handle. Fig. 10 shows helical spring 17 extended when the handle is in an indexed position with embossments 16—16' nesting in embossments 12—12', Fig. 11 shows helical spring 17 compressed when embossments 16—16' ride on the flat surface 35 of handle 4 when the handle is at a position intermediate between its extremes of travel.

In Figs. 4, 5, 6, 7 and 8, contacts 9 and 27 have been displaced laterally toward the hinge 3 in order to illustrate the relative positions of the contacts with respect to the operating mechanism.

A section, transverse to the axis of rotation of the movable contact mounting, is shown in Fig. 12. Contact 9 has a support 36 of insulating material hinged on cover 2 by pin 37 working turnably in bracket 46. Screw 50 clamps support 36, spacer 47 and pin 37 together by means of a tapped hole in projection 57 of pin 37. Support 36 has stop surfaces 42 and 43 which act on the cover to limit rotation. When contact 9 is approximately normal to the cover, as in Fig. 12, closing the cover engages contact 9 with its mating contact mounted on the enclosure. When contact 9 is approximately parallel to the cover, as in Fig. 13, the mating contacts cannot engage. These two positions of contact 9 correspond, respectively, to the on and off conditions of the switch.

Referring again to Fig. 12, support 36 has fastened to it an arcuate indicator 44 viewable from outside the cover 2 through aperture 45, which indicates the on or off condition.

Referring to Fig. 1, aperture 45 exposes the indicator in the "on" position.

Referring now to Fig. 13, cover 2 has mounted on it a spring member 40 having a flat portion 41. Cam surfaces 38 and 39 acting on the flat



spring portion 41 serve to positively index contact 9 in the "on" and "off" positions respectively.

Section 14—14 of Fig. 12 is shown in Fig. 14. Pin 37 is turnably mounted in bracket 46. Projection 57 of pin 37 has a tapped hole 48 by which means screw 50 clamps support 36, spacer 47 and pin 37 together. Contacts 9—9' have a tapped hole 52 by which means screw 51 clamps contacts 9—9' to support 36.

In order to permit alignment of contacts 9—9' with the mating contacts on the enclosure, projection 57 is made narrower than the space between the uprights of bracket 46, and spacer 47 is made with an elongated hole 49. This permits adjustment of contacts 9—9' along the axis of pin 37 when screw 50 is slackened. When screw 50 is tightened, spacer 47 prevents subsequent lateral movement by acting on the upper portion of bracket 46, which upper portion is removed by the section of Fig. 14 but is shown in Fig. 13 at 53.

What is claimed is:

1. In a switch mechanism having an enclosure with first contacts mounted thereon and a cover hinged thereto with second contacts engageable with said first contacts mounted thereon, the combination of an operating member pivotally mounted on said cover, and a guard member displaceably mounted on said enclosure, projecting means on said operating member acting on said guard member to maintain separation of said first contacts from said second contacts when made to approach by motion of the cover, and means on said operating member meshable with means on said guard member whereby rotation of said operating member from a specific initial position displaces said guard member to a non-interfering position.

2. A switch mechanism as described in claim 1, said guard member having a profiled surface including projecting means acting on said operating member, whereby the spacing apart of said first contacts and said second contacts is maintained during an initial portion of the travel of said operating member.

3. A switch mechanism having an enclosure with a guard member mounted pivotally thereon, a cover hinged to said enclosure with an operating member pivotally mounted thereon, means on said operating member meshable with means on said guard member when said cover is swung towards said enclosure with said operating member in a specific position, said guard member being rotatable by rotation of said operating member when meshed, means on said operating member acting on said guard member when meshed whereby a spaced relation is maintained between first contacts mounted on said enclosure and second contacts mounted on said cover during an initial rotation of said operating member, and means on said operating member acting on means on said guard member to displace said guard member to a non-interfering position during a further rotation of said operating member, said displacement permitting said second contacts to approach and engage said first contacts at a position in which levering means on said operating member begins to engage a fulcrum fixed to said enclosure.

4. A switch mechanism as described in claim 3 having first contacts mounted on said enclosure and second contacts mounted on said cover and movable relative thereto, said first contacts and

said second contacts being brought into engagement or non-engagement by said further rotation depending on the setting of said second contacts relative to said cover.

5. In a switch mechanism having an enclosure with a cover hinged thereto, the combination of an operating member pivotally mounted on the cover and a guard member pivotally mounted on the enclosure, means on said operating member meshable with means on said guard member whereby rotation of said operating member from a specific position causes said guard member to rotate, profiled surfaces on said operating member in contact with profiled surfaces on said guard member during such rotation, said profiled surface on said guard member including in sequence a raised portion, and a portion recessed relative thereto, said raised portion maintaining a space relation between first contacts mounted on said enclosure and second contacts mounted on said cover during an initial rotation of said operating member, and said recessed portion acting on said operating member to displace said guard member to a non-interfering position during a further rotation, and means on said operating member acting on means on said enclosure whereby a further rotation of said operating member moves said second contacts closer to said first contacts.

6. In a switch mechanism as described in claim 5, means mounting said second contacts movably on said cover, said means permitting positioning of said second contacts for engagement or non-engagement with said first contacts during said further rotation of said operating member, and



means viewable exteriorly to the cover indicating said positioning of said second contacts.

7. A switch mechanism in which the relative position of first contacts mounted in an enclosure and second contacts mounted on a cover hinged to said enclosure, is controlled, during the initial closing rotary travel of an operating member pivotally mounted on said cover and projecting therethrough by said operating member acting on a displaceable guard member pivotally mounted on said enclosure; is controlled during a further closing rotary travel of said operating member by said operating member levering against a first fulcrum mounted in said enclosure, said guard member being displaced to a non-interfering position by said operating member; and is controlled during the opening rotary travel of said operating member by said operating member levering against a second fulcrum mounted in said enclosure.

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