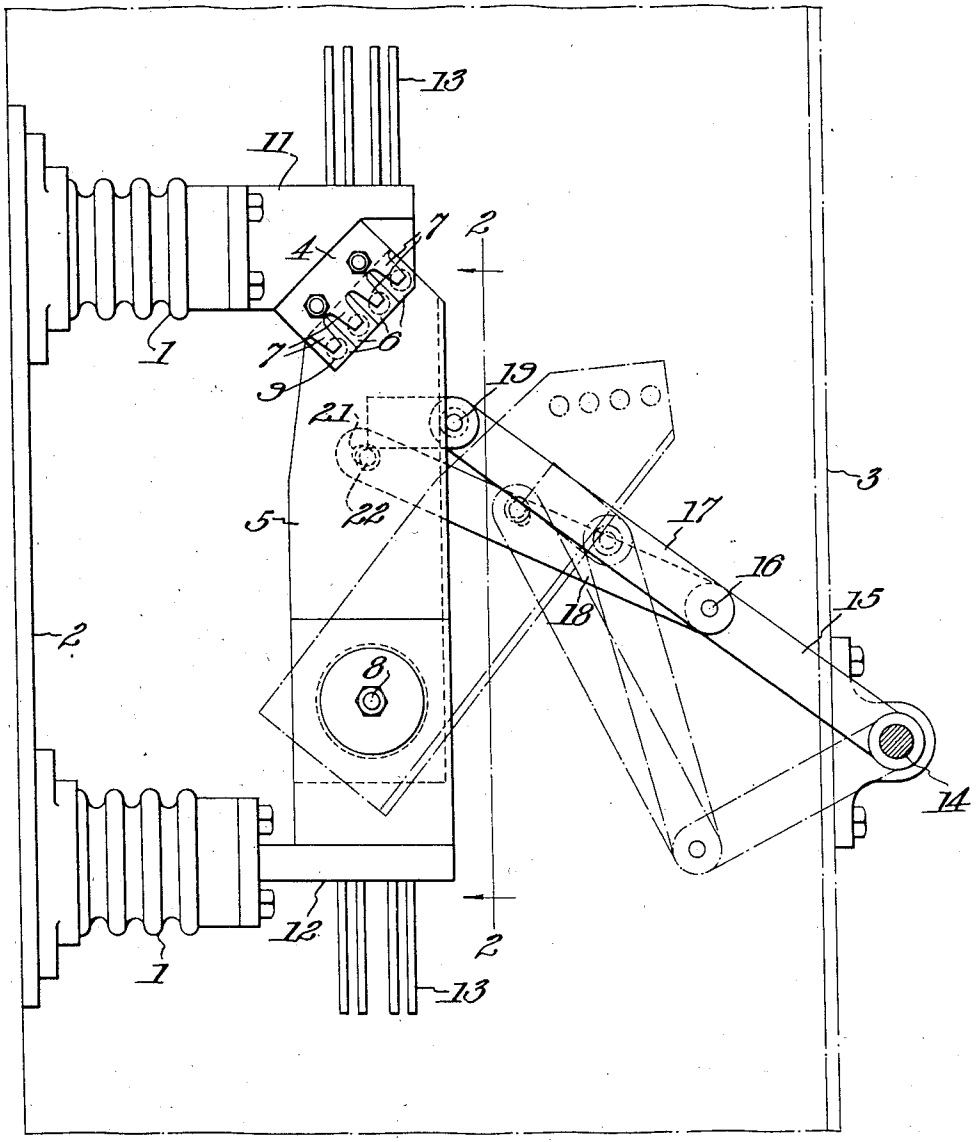
Feb. 21, 1933. H. B. MASSEY 1,898,135

OPERATING MECHANISM FOR SWITCHES

Filed Feb. 4, 1932 2 Sheets-Sheet 1

Fig. 1.



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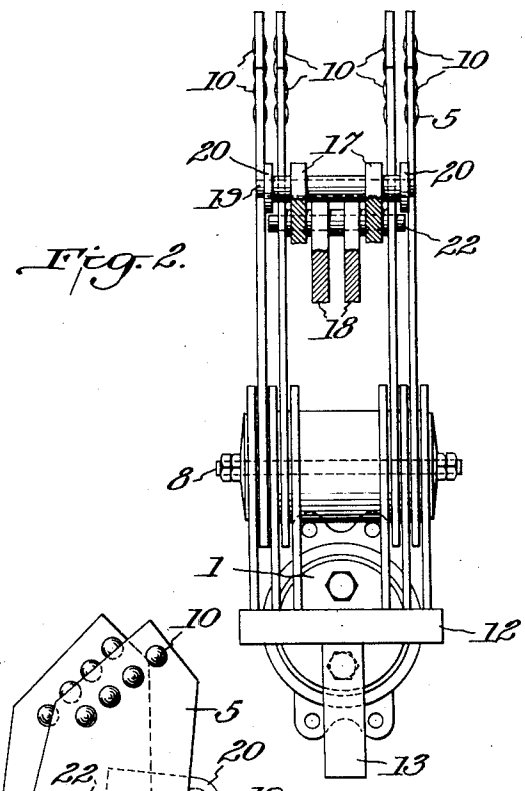


Fig. 2.

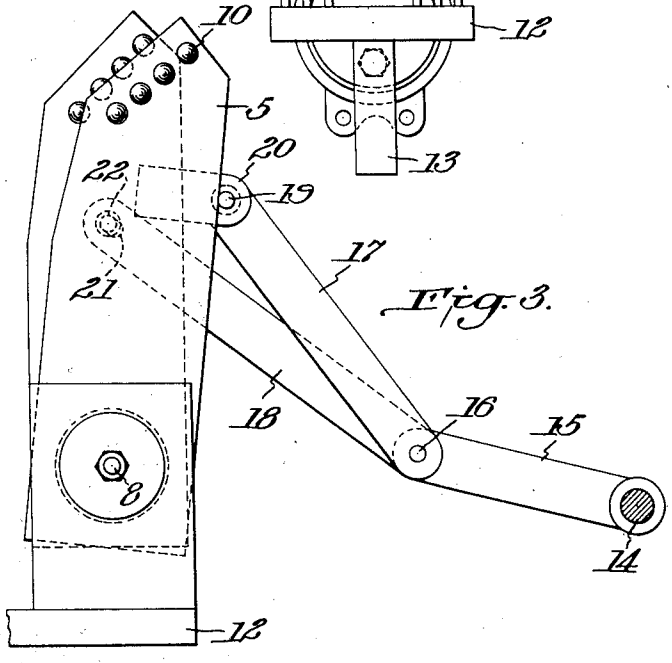


Fig. 3.

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UNITED STATES PATENT OFFICE

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OPERATING MECHANISM FOR SWITCHES

Application filed February 4, 1932. Serial No. 590,951.

This invention relates to disconnecting switches and more particularly to mechanism for operating heavy current, pressure contact, knife switches.

High capacity switches of this type usually have two or more blades. When in a closed position the jaws of the switch, in order to maintain an efficient contact, must exert a considerable pressure against the blades. The consequence is that it is exceedingly difficult to draw the blades from the jaws. Mechanical devices have been devised to facilitate the opening of such high capacity switches but these are cumbersome and expensive and in addition, do not relieve the strain on the insulators and other switch parts, incident to opening and closing.

An object of this invention is to solve the above problems by providing a mechanism that will open progressively the blades of a multi-blade switch.

Another object is to provide mechanism for opening progressively by groups, the blades of a multi-blade switch.

A further object is to reduce the stress upon the switch parts due to the opening and closing movements.

A still further object is to facilitate the opening and closing of the switch.

These and other objects will be clear from the following specification when taken with the drawings, in which

Fig. 1 is a side elevation of the switch in closed position, its open position being shown by broken lines,

Fig. 2 is a section taken on the line 2—2 of Fig. 1, and

Fig. 3 is a side elevation of the switch blades showing the two outer ones partially open and the two inner ones completely closed.

The switch is mounted on insulators 1 attached to a back board 2 and is controlled from a panel 3. The jaws 4 and the blades 5 are of known construction, the jaws comprising tongues 6 pressed inwardly by spring fingers 7 and the blades being pivoted at 8, having contact bosses or buttons 9 corresponding to similar bosses or buttons 10 on the blades 5. The jaw support 11 and the blade support 12 each connected to the insulators 1, are provided with bars 13 for connecting the switch in the power line in which it is to operate.

The switch in the modification shown has four blades, the operating mechanism which comprises the subject of this invention, initially moving together the outer two blades before the inner two. However, for simplicity, the description will be given for the outer and the inner blades which appear in Fig. 3 although it is to be understood that Fig. 3 includes four blades, another outer and another inner blade being hidden behind those shown.

The operating mechanism is actuated from a shaft 14 fixed on the outside of the panel 3 and which may be rotated in any suitable manner. One end of a crank arm 15 is rigidly connected to the shaft 14 and the other end is pivoted by a pin 16 to two links 17 and 18 of insulating material. The link 17 is pivoted to the outer blade 5 by a pin 19 in a lug 20 fixed to the blade. The link 18, provided with a slot 21, is pivoted to the inner blade by a pin 22 slidably fitting in the slot 21. For purposes hereinafter explained, the distance between the pin 22 and the pivot 8 is less than the distance between the pin 19 and the pivot 8.

The operation is as follows:

In order to open the switch, the shaft 14 is moved in a counter-clockwise direction, carrying with it the crank arm 15. As the crank arm 15 and the link 17 are exactly on dead center when the switch is closed, the link 17 immediately begins to open the outer blade to which it is connected. During this initial opening movement, the crank arm 15 and the link 18 pass through dead center, but there is no movement of the inner blade until the outer end of the slot 21 meets the pin 22. At this moment the inner blade begins to open but by this time the outer blade has moved until it is partially open as shown in Fig. 3. By opening the switch in this manner, the frictional resistance to movement is reduced as not all of the blades initially are moved at the same time, resulting in comparative ease in operation and conse-

quent elimination of severe strains on the insulators and other switch parts.

Upon further counter-clockwise rotation of the shaft 14, both inner and outer blades are rotated further about the pivot 8 until they are wholly free from the jaws 4. Inasmuch as the distance between the pivot point of the link 18 on the inner blade and the pivot 8 is shorter than the corresponding distance between the pivot point of the link 17 on the outer blade and the pivot 8, the rate of rotation of the inner blade is more rapid than that of the outer blade. The parts are operably so related that when the switch has reached its fully open position, the inner blade which at first lagged behind the outer blade will have caught up with the outer blade so that the inner and outer blades are directly opposite each other as shown by broken lines in Fig. 1.

The closing of the switch is the reverse of opening. Upon clockwise movement of shaft 14 and therefore of the crank arm 15, the inner blade, for the reason given above, moves more rapidly than the outer one and after the initial closing movement slides link 18 on the pin 22 to take up the lost motion. Then, due to the more rapid rotation of the inner blade, it contacts with the jaws before the outer blade. When the link 18 and the crank arm 15 are in dead center position, the inner blade is completely closed. As the dead center position is passed, the link 18 is slightly withdrawn but the movement is taken up by the slot 22 as the blade is held in position by the friction due to the pressure of the jaws. When the link 18 and crank arm 15 have passed dead center, the link 17 and crank arm go into dead center position. The switch is then completely closed and locked closed by the link 17 and crank arm 15 in dead center position.

In construction it has been found more satisfactory to locate the pin 22 substantially on the axis of the inner blade. Also, in order to conserve space and maintain appearance, it is desirable that the mechanism be designed in such a manner that the inner and outer blades are parallel in both open and closed positions. This result is accomplished by making the distance between pin 16 and the pivot 8 the same in both open and closed positions.

My copending application Ser. No. 478,181, filed Aug. 27, 1930, discloses and claims a multiple-blade switch and operating mechanism for effecting a progressive opening of the several blades of the switch.

While this invention, as shown, is applied to a four blade switch, it is evident that it may be applied to any switch having a plurality of blades. Also it is within the contemplation of this invention that the blades be moved singly or in groups of any number.

I claim:

1. An operating mechanism for a multiple blade disconnecting switch comprising a shaft, a crank arm fixed to said shaft, and link means connected to the crank arm to progressively open blades of the switch.

2. An operating mechanism for a multiple-blade disconnecting switch comprising a shaft, a crank arm fixed to said shaft and a plurality of links, each pivotally connecting the crank arm to different blades of the switch.

3. An operating mechanism for a multiple blade disconnecting switch comprising a shaft, a crank arm fixed to said shaft, a plurality of links each pivotally connecting the crank arm to a different switch blade, and a slot in one of said links.

4. An operating mechanism for a multiple blade disconnecting switch comprising a shaft spaced from said blades, a crank arm fixed to said shaft, and means including a lost motion arrangement connected to the crank arm to progressively open blades of the switch.

5. An operating mechanism for a multiple blade disconnecting switch comprising a shaft, a crank arm fixed to said shaft, a plurality of links, each pivotally connecting the crank arm to a different switch blade, and a pivot about which the blades oscillate, the distances between said pivot and points at which the links are pivoted to their corresponding blades being different.

6. An operating mechanism for a multiple blade disconnecting switch comprising a shaft, a crank arm fixed to said shaft, a plurality of links each pivotally connecting the crank arm to a different switch blade, a slot in one of said links providing for lost motion and a pivot about which the blades oscillate, the distances between said pivot and points at which the links are pivoted to their corresponding blades being different.

7. An operating mechanism for a multiple-blade disconnecting switch comprising a shaft, a crank arm fixed to said shaft and means connected to the crank arm to progressively open the blades of the switch, said means including means to lock the blades in closed position.

8. An operating mechanism for a multiple blade disconnecting switch comprising a shaft, a crank arm fixed to said shaft and means including a lost motion arrangement connected to the crank arm to progressively open blades of the switch, said means including means to lock the blades in closed position.

9. In a disconnecting switch and operating mechanism therefor, the combination of a plurality of blades, a pivot about which said blades oscillate, a link pivoted to each blade, and means for moving said links to open the switch.

10. In a disconnecting switch and operating mechanism therefor, the combination of a plurality of blades, a pivot about which said blades oscillate, a link pivoted to each of said blades, a pin connecting the free ends of said links, and means to move said links to open the switch, the distance between the pivot and the pin being the same in both open and closed positions of the switch.

11. In a disconnecting switch and operating mechanism therefor, the combination of a plurality of blades, a pivot about which said blades oscillate, a link pivoted to each of said blades, a slot in one of said links providing for lost motion, and means for moving said links to open the switch.

12. In a disconnecting switch and operating mechanism therefor the combination of a plurality of blades, a pivot about which said blades oscillate, a link pivoted to each of said blades, a slot in one of said links providing for lost motion, a pin connecting the free ends of said links and means to move said links to open the switch whereby the distance between the pivot and the pin is the same in both open and closed positions of the switch.

13. In a disconnecting switch and operating mechanism therefor, the combination of a plurality of blades, a pivot about which said blades oscillate, a link for each blade, means for each blade pivotally connecting a link to each blade, the distance between the pivot and each of said means being different, and means to move said links to open the switch.

14. In a disconnecting switch and operating mechanism therefor, the combination of a plurality of blades, a pivot about which said blades oscillate, a link for each blade, a slot in one of said links providing for lost motion, means for each blade pivotally connecting a link to each blade, the distance between the pivot and each of said means being different, and means to move said links to open the switch.

15. In a multi-blade disconnecting switch and an operating mechanism for progressively opening the blades, the combination of a shaft, a crank arm fixed to said shaft, a plurality of blades, a pivot about which said blades oscillate, a link pivotally connected to each of said blades and means pivotally connecting the free ends of said links to said crank arm, the distances between the pivot and the points of connection of the links with the blades being different for each blade and the distance between the pivot and said means being the same in both open and closed position.

In testimony whereof, I affix my signature.

HEMSLEY B. MASSEY.