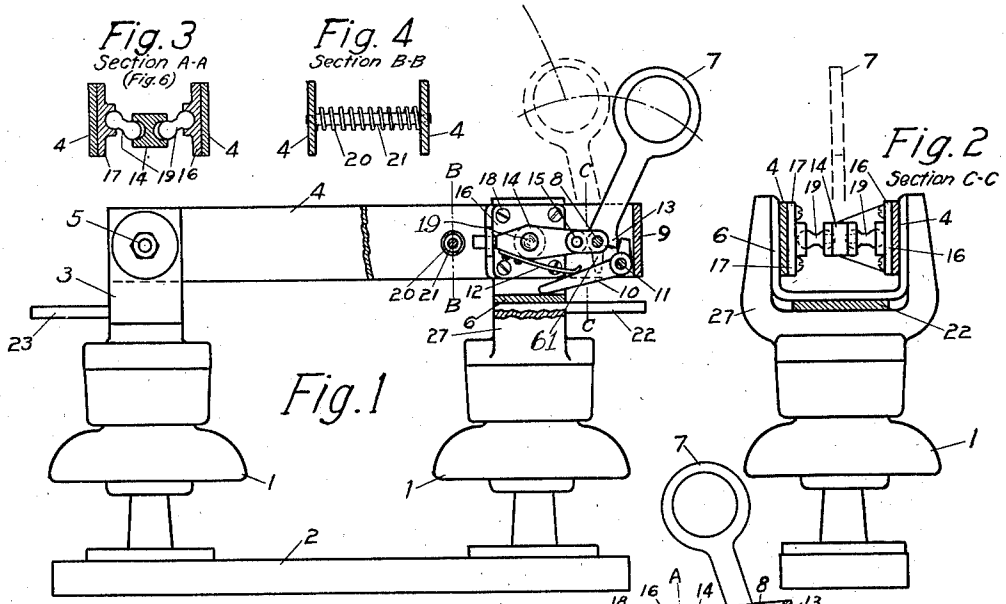
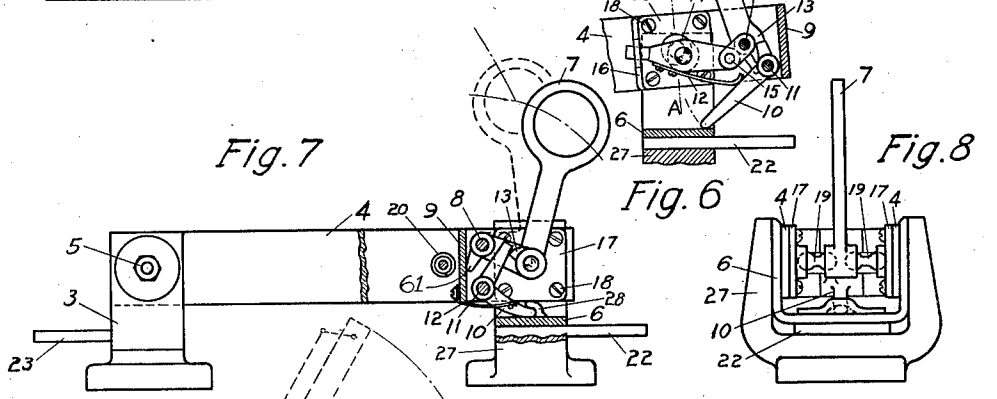
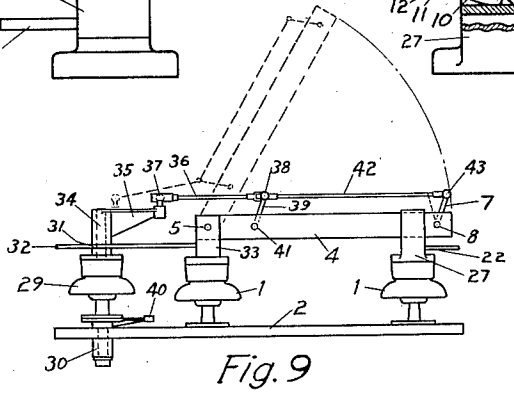
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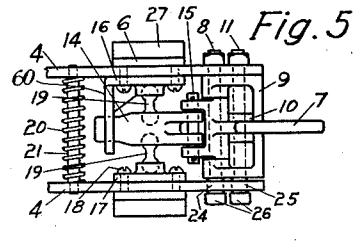
ELECTRIC SWITCH

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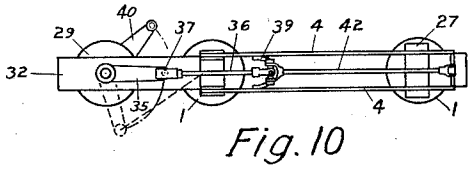








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ELECTRIC SWITCH

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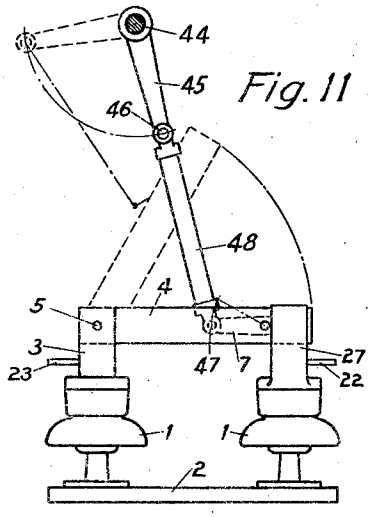
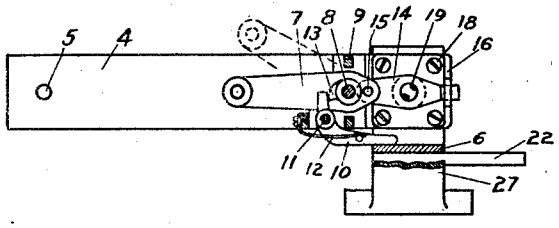


Fig. 11

Fig. 12



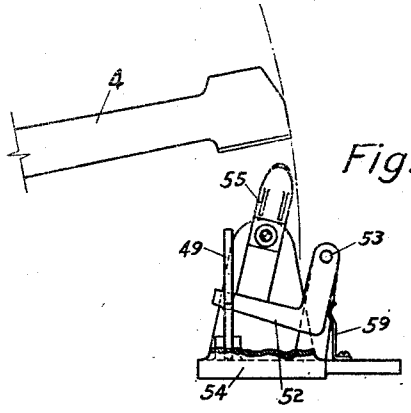


Fig. 14

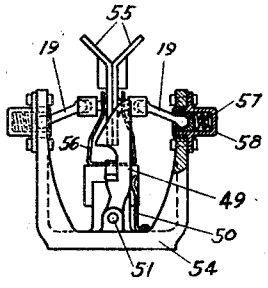


Fig. 13

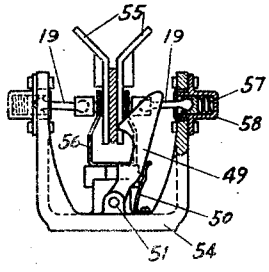


Fig. 15

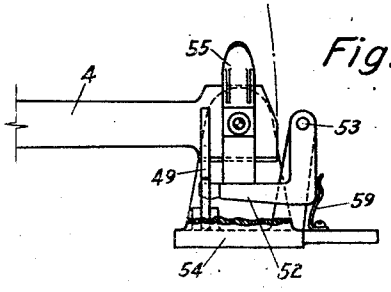


Fig. 16

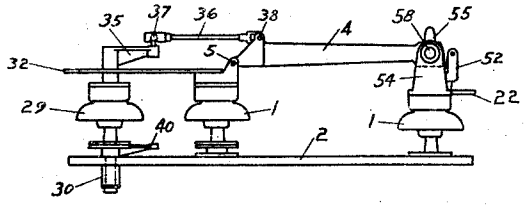


Fig. 17

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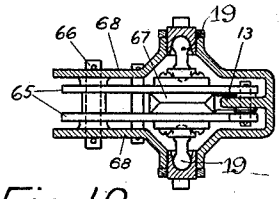


Fig. 19
SECTION A-A

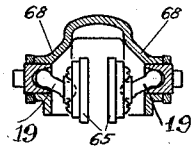


Fig. 21
SECTION B-B

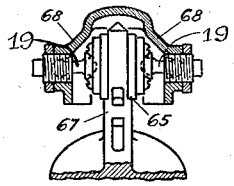


Fig. 20
SECTION C-C

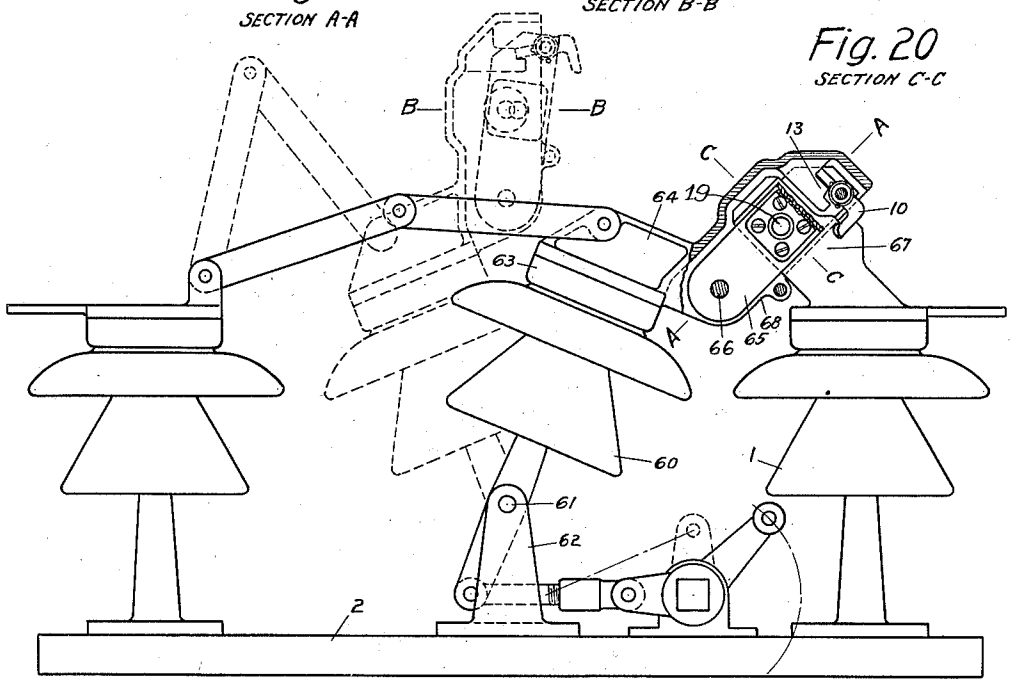


Fig. 18

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Patented June 12, 1934 1,962,293

UNITED STATES PATENT OFFICE

1,962,293

ELECTRIC SWITCH

Augustus Jesse Bowie, San Francisco, Calif.

Application September 16, 1931, Serial No. 563,096

13 Claims. (Cl. 200—48)

It is the object of this invention to provide improvements in electrical switches. To obtain increased pressure between the contacts of the switches different expedients have been developed, practically all of which, however, include the moving of the contact surfaces, which are generally in the form of a blade and clip under high pressure. In many cases means are taken to reduce the leverage on the operating parts of the switch in order to come within an allowable operating strain. All these methods, however, call for a considerable mechanical effort to move the contact surfaces under high pressure. This also is very objectionable from the standpoint of the necessary abrasion between the contact surfaces, which must occur from moving under high pressure, thus ruining the contacts.

My invention is based on the moving of the contacts into substantially full engagement either under no pressure or preferably moderate pressure between the contacts, making them therefore easy to operate, and after these contacts are in engagement mechanism is released the operation of which causes greatly increased pressure between the contact surfaces without substantial relative motion of the contact surfaces, thus avoiding a movement of the surfaces under high pressure.

By my construction I am therefore enabled to provide contacts having the benefits of both area and high pressure with a very moderate operating power. Some contacts have been in use employing high pressure with very small area, which are objectionable as they necessarily involve a relatively large amount of heat without the means of disposing of it which would be provided with large area, whereas with my contacts, involving both area and pressure, ideal conditions are obtained.

In one form of application, for example, with the single-pole switch, a common structure consists of a blade pivoted on one insulator engaging a clip on another insulator. To throw this switch closed there is provided an eye near the end of the blade. In my construction this eye would be pivoted and held against motion by a latch which would be released when the contact surfaces engaged fully. Then further pressure applied to the eye would cause the eye to move and to provide high pressure between the contact surfaces. Correspondingly, on opening, a pull on the eye would eliminate the high pressure and re-set the latch; and further motion would open the switch, which would thus be free of material contact pressure in separating the contacts.

An important feature of this invention consists in the application of a similar idea to a gang-operated switch, as described later.

Figure 1 shows a side elevation of a single-pole switch.

Figure 2 shows an end view thereof on the clip end looking toward the hinge end.

Figure 3 shows a cross-sectional view through the line A, A, Figure 6 looking from the hinge end, of the center of the clip toggle mechanism.

Figure 4 shows a cross-sectional view through the line B, B of a compression spring which keeps the blades separated, causing a contact wiping action when the switch closes.

Figure 5 shows a plan view of the clip end of the switch in Figure 1.

Figure 6 shows a side elevation of the switch shown in Figure 1, just before the latch which allows the high pressure to come into effect is released.

The above switches are all provided with double toggles.

Figure 7 shows in side elevation a switch with single toggle action. Lug 28 and latch 10 ensure the proper engagement of the working parts before the release of the blade from the clip ensuring the re-setting of latch 13.

Figure 8 shows an end view thereof at the clip end of Figure 7.

Figure 9 shows in side elevation a single-pole element of a gang-operated switch embodying similar features of high-pressure contact.

Figure 10 shows a plan view of the same.

The construction in Figures 9 and 10 can apply to either single or double toggle switches.

Figure 11 shows in side elevation one pole of another form of gang-operated switch with a corresponding high-pressure contact.

Figure 12 shows an enlarged view thereof, illustrating the toggle mechanism, the switch being similar to that shown in Figure 1.

Figure 13 shows a toggle principle applied to a moving clip type of switch, obtaining the desired high-pressure contact. The view therein is a part sectional end view of the clip when the blade is out.

Figure 14 shows a side view at the blade end before the blade engages.

Figure 15 shows an end view in part cross-section with the blade engaged with the clip.

Figure 16 shows a side view of the same.

Figure 17 shows a type of switch to which this construction may be applied.

Figure 18 is a side elevation in part section of a pole of a gang operated switch.

Figure 19 is a cross-section at A, A looking downward.

Figure 20 is a cross-section of C, C looking upward.

Figure 21 is a cross-section at B, B looking down.

1, 1 are insulators mounted on base 2. 3, 3 are hinge clips in which blades 4, 4 mount on hinge pin 5. 6 is a contact clip, which as shown is a U-shaped piece of copper. 7 is an operating lever mounted on pin 8, which is supported in turn on the end casting 9, or else it may be mounted on the blade if desired. 10 is a latch mounted on pin 11, which spring 12 engages. 27 is a rigid yoke supporting clip 6 against high internal pressure.

When the switch is open the upper end of latch 10 engages lug 13, which is on the lever 7. See Figure 6.

In Figure 1, 14 is a floating lever which is attached through pin 15 to lever 7. One end of 14 is guided in a hole, preferably rectangular, in a bracket projecting from shoe 16. 17 is another shoe opposing 16. These shoes are fastened to blades 4, 4 by screws 18, 18. 19, 19 are toggle links made preferably with ball ends, which play in sockets, one end of each socket for the links being in shoes 16 and 17, and the other ends in lever 14.

The dotted lever 7 in Figure 1 shows the lever position after the blade has entered the clip 6 but before the high pressure obtains. This is shown more clearly in Figure 6, showing the upper end of the latch 10 engaging lug 13 on lever 7. The toggle links 19, 19 have not begun to act as yet, as is shown in Figure 3.

20 is a spring mounted on pin 21, which tends to force the blades 4, 4 lightly apart so that in entering the clips they will have just sufficient pressure to clean the clip surfaces.

22 and 23 are bus connections for attaching switch leads, the clip contact being taken through bus support 22 and clip 6. 24, 25 Figure 5, are shoulders on the pins 8 and 11.

The construction is such that one blade 4 is attached rigidly to end casting 9, and the other blade member 4 floats on pins 24, 25. The casting 9, which acts merely as an operating means for controlling the second blade 4, floating freely on it into position, is not used as a spacing member. Bolt heads 26, 26 Figure 5, may, if desired, be used as an outer limit to prevent the blades 4, 4 being pushed to an undesirable width before entering the clip. The operation then is as follows:

When the switch is partly closed, as shown in Figure 6, spring 20 presses the blades 4, 4 apart sufficiently strongly to give the necessary rubbing action to clean the faces of clip 6. The switch is closed by pulling on lever 7 until clip and blade are fully engaged. The latch 10 will strike on the clip 6, unlatching lug 13. Further pull on lever 7 will throw the member 14 into a position preferably just beyond a direct toggle with the pin 15 and its arm of lever 7, as shown in Figure 1. In this position members 19, 19 are practically on dead center, resulting in pressing the blades 4, 4 firmly against clip 6. The toggle at pin 15 is slightly over center and hence locks the switch in this position. The toggle links 19, 19 being on center will furnish thus a compound toggle with a correspondingly high pressure.

To open the switch a reversed pull on lever 7 first releases the toggle mechanism until lug 13 clears latch 10, and lever 7 comes against a stop 61 striking the hub of 10, whereon further pull on lever 7 will open the switch blade. Spring 12 will then re-set latch 10 with lug 13. This construction shows a compound lever which is highly desirable where high pressures are to be obtained. Yoke 27 is made sufficiently rigid to obtain the necessary pressure, which is accomplished without over-stressing the mechanism. The heavy toggle pressure will ensure the switch remaining closed without the usual mechanical latch.

A single toggle switch is shown in Figures 7 and 8, wherein 8 shows the pin on which the lever 7 operates, the arrangement being otherwise similar to that which was previously described in Figures 1 to 6, eliminating lever 14. When the switch is closed links 19, 19 are thrown into a position just beyond the center where they automatically latch and hold the switch closed. The toggle links 19, 19 play in sockets, one end of each socket for the links being in shoes 16 and 17 and the other ends in a hub in lever 7. 61 gives the limit stop extending from the hub of member 7 which limits the position of the lever when the switch is closed by striking against member 9.

In the single-toggle switch the pressure is obtained by straightening out into substantially dead-center position the pair of toggle links.

Figure 8 shows the closed position of the switch, the two toggles being on dead center, the detail construction in open position being similar to that shown in Figure 3. Member 14 shown in the double-toggle switch is omitted, the ball seats for the inner end of the toggle being carried on the lever 7.

28 is a lug on the base of the clip shown in Figure 7, which engages the end of latch 10. The dotted position in Figure 7 shows the lever position before engagement. With further motion of the lever to the position shown in full lines the end of latch 10 will slide on the clip 6 under lug 28, thereby giving a positive lock to the switch, as it is impossible for the blade to open without disengaging 10 and 28. Latch 10 is absolutely prevented from moving by lug 13, and at the same time when the switch is opened after pulling the lever 7 the lug 28 positively re-sets latch 10 and lug 13.

Various expedients have been tried to obtain high-pressure gang-operated switches, but all these resulted in a movement of the blade in the clips under very high pressure. By an extension of the principles herein high pressures may be correspondingly obtained in any gang-operated switch. The principle involved is similar to that used with single-pole switches, namely, the insertion of the blade in the clip under moderate pressure, the release of the latch and further motion causing high pressure to obtain. The corresponding inverse operation results in opening the switch, requiring the latch first to be re-set and then allowing the switch to open.

Figures 9 and 10 show a single-pole gang-operated switch. 29 is a rotating insulator rotating in bearings 30 and 31, the latter being in a bridge member 32 fast on hinge cap 33. The rotating insulator is provided with a shaft 34 and rotating crank 35 rigidly attached thereto. 36 is a connecting link connecting from between pins 37 and 38 to the blade.

39 is a blade arm which in the usual type of switch would be rigidly attached to the blade. Rotating motion of the moving insulator is

effected through a pull on arm 40, by which connecting rods give gang operating of the different switch units. Rotation of the insulator 29 hence causes the blade to be opened, and provided arm 39 were fixed in position on the blade it would be a well known type of switch. This invention, however, used lever 39 rotatably mounted on pin 41 which is rigidly supported by the blades 4, 4. 42 is a link connecting lever 7 through pin 43 to the moving arm 39.

Figure 9 shows the switch closed. To open the switch the first rotation of insulator 29 will pull back lever 7 to the dotted position and will correspondingly pull back lever 39 until the lever 7 stops as in the switch shown in Figure 7. Further motion of the rotating insulator will then open the switch blade to the dotted position, as shown in Figure 9. In closing, the reverse operation takes place. Levers 7 and 39 will remain locked, as shown in the dotted position (Figure 9) until the blade has fully bottomed, being retained by the latch 13. After this latch releases, when the blade bottoms, further pressure on levers 39 and 7 will result in a free motion thereof to the positions shown in full lines, the latter part of the stroke then causing the high pressure to come on the clips. The construction of the details of the end operating mechanism in Figure 9 is identical with that shown in Figure 1, although Figure 9 does not show the full details. The lever 7 is held from moving by the latch 13 impinging on the top member of member 10. Member 10 is released after the blade is closed by striking on the member 6.

Figures 11 and 12 show a single-pole unit of another type of gang-operated switch wherein 44 is a rock-shaft on which lever 45 is mounted, connecting through pins 46 and 47 to lever 7 on the blade. 48 is an insulating link. The principle of operation is very similar to that already described in connection with the previously mentioned gang-operated switch. The only material difference is that the lever 7 projects inward between the two blades rather than upward, as shown in Figure 1, all the other principles of operation being identical with those shown in Figure 1. The position of the latch is also reversed.

While Figure 11 shows a single-pole unit, a number of similar units mounted in different longitudinal positions connected to the common rock-shaft 44 will constitute a gang-operated switch. By similar mounting of a plurality of units, as shown in Figure 10, in parallel positions and inter-connecting the base levers 40 with a common connecting rod, gang operation will also obtain. The detail drawings showing the gang operation of these two types of switches have not been included, as this is common practice understood by anyone familiar with the subject of switches.

The toggle mechanisms heretofore described show a pair of blades pushed outwardly by the toggles, but the same idea can be employed by putting the toggles on the outside and surrounding the blades with a pair of moving yokes pivoted thereon and pressing the blades inwardly against a tongue of the well known tongue type of switch, in any case the principle of operation being identical, the yokes taking the outward thrust in place of member 27.

Figures 13 to 17 show another application of a somewhat similar principle of operation. In this type of switch the blade is pivoted as shown in Figure 17, and enters the clips fully before the clips are depressed. The clips are mounted on the carriage 52 pivoted on pivot 53 supported on base 54. The latch 49 actuated by spring 50 prevents the depression of the clip carriage until the blade has fully entered the clips and has unlatched the holding latch 49, which prevents motion of the carriage 52. After this latch is released, further motion of the blade depresses the carriage 52 to the position shown in Figure 15. The toggle-link principle is similar to that shown in Figure 3, the links 19, 19 in the up position, as shown in Figure 13, being free of blade pressure and in the closed position in Figure 15 causing a high pressure on the blade through the clip faces 55, 55 which are mounted on spring 56. In the view shown the clip faces 55, 55 are held together by the spring 56 in order to keep them in contact and free from atmospheric deterioration. When the blade enters it pushes the clip faces apart against the pressure of spring 56. The links 19, 19 are loose in this position and allow the ready entrance of the blade without opposing any resistance thereto. Strong springs 57, which are adjusted for high pressure in the socket 58, render any desired pressure obtainable. These sockets are mounted on the extensions of the clip cap 54. In the construction shown the clip carriage 52 being pivoted, gives the blade and clip carriages a slight rotational motion while the high-pressure contact is being obtained. The clip faces are freely rotatable through a small angle in the clip spring 56, which will allow them to move through a small angle after contacting with the blade, but if it is desired to eliminate practically entirely the rotational action after the blade engages, this may be correspondingly accomplished by having a guided clip carriage movable in a straight line parallel to the motion of the blade end. It is very desirable in a switch of this type that high pressure cannot exist until the blade is practically bottomed in the clip, and for this reason the positive latch 49 holds the clip carriage in definite position until the blade has bottomed. In opening, the clip carriage is readily pulled up by the blade and is held in the upright position by spring 59 as well as by the motion of the blade. Latch 49 holds the carriage 52 until the blade engages the clip positively. It is an important consideration that the blades, as far as possible, should not have to enter the clips under a high pressure which will cause abrasion, and to accomplish this result a latch of corresponding means must be provided to prevent the pressure application until the blade and clip have substantially engaged. Moreover it is also essential that definite provision be made that the latch and blade not only do not disengage until the blade and clip are engaged, but also re-set and engage each other before the blade leaves the clip.

The toggle links 19, 19 shown in Figures 13 and 15 abut on the heavy springs 57. This construction is quite important in the practical operation of the high-pressure switches, and although not shown in the drawings is equally applicable to any of the other figures. For example, the extension of the same idea to Figures 1 and 2 could be obtained by having the near ends of the toggle links 19, 19 press against a spring member, which would thus give a yielding support.

While the rigid abutments will suffice for a very exact spacing, the spring-mounted abutments form a highly important feature for practical switch operation. For example, in Figure 13, when the blade enters the clip faces 55, 55 by distending the spring 56, no spring pressure is

initially given by the toggle links 19, 19 wh... are still somewhat loose until the switch clip starts to be depressed. After a slight depression the spring pressure is applied to the clip faces and continues over a wide angular motion of toggles 19, 19.

With the single-pole switches, while fairly exact adjustment may be attained, with gang operated switches on the other hand there is inevitably a variation between the different poles of the switch, and if the toggles 19, 19 require to be in fairly exact central position it is difficult to make a gang operated switch give high-pressure contact on all phases. But where the spring-pressed toggle links are provided, a considerable angular difference of toggle link positions will give satisfactory high-pressure contact.

In the claims, the phrase "yieldable pressure means" is used specifically to cover this situation, and to differentiate from any rigid type of pressure means, which would require very exact adjustment. It is highly desirable that these yieldable pressure means be applied directly to exerting pressure on the clip faces themselves, since any other application is liable to render very uncertain the pressure obtained on the clip faces, which should be within reasonably accurate limits.

In the claims where reference is made to the engagement of the contacts this signifies the practically or nearly complete engagement, not a mere preliminary contact. It is one of the objects of this invention not to make a material movement of the blades and clips after material pressure exists between the contacts.

In Figures 4 and 5 the spring 20 is shown forcing the blades apart for a wiping contact at the start, the pin 21 passes through the centers of the blades. If desired to limit the sidewise opening of the blades to secure proper clip engagement, the outer ends of the rod 21 could be provided with limit heads. However, in place of the spring 20 a rigid spacing support such as a tube fitting over rod 21 and serving as a limit collar can equally well be provided, which will allow the blades to be slightly wider than the distance between the contact shoes, and by widening the blades slightly further apart at the end an adequate wiping action can be secured over the whole clip face without the use of springs and without any spacing piece other than the definite riveted spacer which will allow the outside of the blades to be the same outside width as the clips.

Figures 18 and 19 show another type of application of the switch to the rocking insulator construction. 60 is a rocking insulator mounted on pin 61 in bearing 62. 63 is a cap on insulator 60 to which the support member 64 is rigidly attached. This member carries the pair of blades 65, 65 trunnioned on pin 66. 67 is a tongue type of clip mounted on the cap of insulator 1. The outer end of member 64 is provided with two arms 68, 68, which engage the outer ends of links 19, 19 in a ball seat. The arms 68, 68 show a rigid end piece supporting the outer ends of links 19, 19. In this construction dependence must be placed for the necessary spring on the yield of the arms 68, 68. However, to secure greater flexibility, the outer ends of these links may be supported by interposing springs next to the pole seats, similar to the springs 57, 57 shown in Figures 13 and 15, thus giving a spring support which presses directly on the contact surfaces. The inner ends of these links are carried in shoes 16, 17 on blades 65, 65, the latch 10 being similar to that shown in Figure 7. The outer ends of the links are carried in members 68, 68. The arrangement is very similar to that in Figure 7, but with a tongue type of clip. When the switch is open, lever 10 engages at its top end lug 13 which is kept in engagement therewith until the blade has fully covered the clip whereon lever 10 releases lug 13. Further motion of the insulator 60 will set the toggle links exerting a high pressure on the blade. As in Figure 7, the lever 10 when the switch is open has its upper end in engagement with lug 13 as shown in the dotted view Figure 18. This ensures the switch blades closing before the cooperating latch of 10 and 13 is released. When latch 10 strikes member 67 this releases the lug 13 and allows further motion in closing the switch to be applied to straightening out the toggle links 19, 19 to dead center, just as in Figure 7. In opening the switch the lever 10 engaging on the lower end the upper latch on member 67 ensures the engagement of the upper end of latch 10 and member 13 before allowing the switch to open, thus ensuring the engagement shown in the dotted line of Figure 18 before the blades are pulled away from the tongue.

It is one of the objects of this invention to bring the two switch contacts into substantially full engagement before the increased pressure between the contacts is applied, and, in the act of increasing this pressure, to make practically no material movement between the two contact surfaces under the high pressure.

In switches wherein the blade is carried substantially by the moving insulator, as in Fig. 18, this presents certain difficulties in that the further motion of the rocking insulator after the contacts engage will cause material blade motion in its clip while the pressure is being applied. However, in the arrangement as shown in Fig. 18 the increase in pressure is accompanied by a very small relative blade and clip motion at the contact location, by utilizing the principles shown in this figure. The principle lies in the fact that a line drawn thru the center of the rocking insulator and the clip contact shall pass thru a pivot on which the blade is pivotally mounted. Thus, a line thru the trunnion pin 61, on which the rocking insulator mounts, and the pivot 66, passes thru the center of the contacts. Hence a small motion of rotation of the rocking insulator causes the pivot 66 to move in a line perpendicular to the center line of the blade thru this pin and the center of the contact.

In other words, there is only a very slight rotational motion given to the blades 65 during the time that the high pressure is being applied, and there is substantially no other movement between the contact surfaces during the application of this high pressure. This results in the practical elimination of abrasion during the time the high pressure is being applied. In a normal motion of any corresponding customary switch contact under high pressure, on the other hand, material abrasion will occur, which is obviated by the method I employ. The fact that the blade is carried by the rocking insulator and obtains the above-mentioned results is a useful and novel improvement in switch construction.

What I claim is:

1. In an electric switch a pair of relatively movable cooperating contacts, positive operating means for bringing said contacts into full engagement, pressure means for increasing the pressure between said contacts after engage-

ment, said pressure means comprising a spring pressed means bearing directly on said contacts, means for positively preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are fully engaged, thereby allowing said pressure means to increase the pressure between said contacts.

2. In an electric switch a pair of relatively movable cooperating contacts, positive operating means for moving said contacts into full engagement, pressure means for increasing the pressure between said contacts after they are engaged, said pressure means comprising a spring pressed means bearing directly on said contacts, latching means for positively preventing the operation of said pressure means until said full contact engagement occurs, said latching means being adapted to be released after said contacts are in engagement, thereby allowing said pressure means to increase the pressure between said contacts.

3. In an electric switch a pair of relatively movable cooperating contacts, operating means for moving said contacts into engagement, pressure means for increasing the pressure between said contacts after they are engaged, latching means for positively preventing the operation of said pressure means until said contact engagement occurs, said latching means being adapted to be released after said contacts are in engagement, thereby allowing said pressure means to increase the pressure between said contacts, said latching means including means for preventing the separation of said contacts until the pressure operated by said pressure means is released.

4. In an electric switch a pair of relatively movable cooperating contacts, operating means for bringing said contacts into engagement, spring pressed means for increasing the pressure between said contacts after engagement, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are engaged, said pressure means comprising a toggle member adapted to be substantially on dead center when said pressure means has increased the pressure between said contacts.

5. In an electric switch a pair of relatively movable cooperating contacts, operating means for bringing said contacts into engagement, spring pressed means for increasing the pressure between said contacts after engagement, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are engaged, said pressure means comprising a toggle member adapted to be substantially on dead center when said pressure means has increased the pressure between said contacts, said pressure means comprising a toggle member pressing substantially transversely to the surfaces of said contacts when said pressure has been increased.

6. In an electric switch a pair of relatively movable cooperating contacts, one of which consists of a pair of blades substantially parallel, operating means for moving said contacts into engagement, spring pressed means for increasing the pressure between said contacts after they are engaged, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are engaged, said pressure means comprising a toggle member adapted to be on dead center when said pressure means is fully effective.

7. In an electric switch a pair of relatively movable cooperating contacts, one of which consists of a pair of blades substantially parallel, operating means for moving said contacts into engagement, spring pressed means for increasing the pressure between said contacts after their engagement, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are engaged, said pressure means comprising a toggle member adapted to be on dead center when said pressure means is fully effective, said toggle means pressing transversely to said contact faces and being adapted to be on dead center when said pressure means is fully effective.

8. In an electric switch a pair of relatively movable cooperating contacts, one of which consists of a pair of blades substantially parallel, operating means for moving said contacts into engagement, spring pressed means for increasing the pressure between said contacts after engagement, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are engaged, said pressure means comprising a toggle member adapted to be on dead center and pressing transversely to said contact faces and when said pressure means is in full engagement, said pressure means constituting a pair of toggle links.

9. In an electric switch a pair of relatively movable cooperating contacts comprising a pair of substantially parallel blades, a contact clip engaging with said blades, operating means for moving said contacts into engagement, pressure means for increasing the pressure between said contacts after their engagement, said pressure means comprising a spring pressed means bearing directly on said contacts, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are engaged.

10. In an electric switch a pair of relatively movable cooperating contacts, one of said contacts consisting of a pair of substantially parallel blades, operating means for moving said contacts into engagement, spring pressed means for increasing the pressure between said contacts after their engagement, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapted to be released after said contacts are engaged, said pressure means comprising toggle members adapted to be on dead center when said pressure means are fully engaged, and a reinforcing yoke external to said toggle members adapted to withstand the pressure created thereby.

11. In an electric switch a pair of relatively movable cooperating contacts, one of said contacts comprising a pair of substantially parallel blades, an operating member mounted on said blades for moving said contacts into and out of engagement, pressure means for increasing the pressure between said contacts after their engagement, said pressure means comprising a spring pressed means bearing directly on said contacts, means for preventing the operation of said pressure means until said contact engagement occurs, said preventing means being adapt-

ed to be released after said contacts are engaged, thereby allowing said pressure means to increase the pressure between said contacts.

12. In an electric switch a pair of relatively movable cooperating contacts one of said contacts comprising a pair of blades mounted on a hinge, operating means comprising a pair of levers mounted on said blades, a connecting link between said operating levers, pressure means for increasing the pressure between said contacts after they are engaged, said pressure means comprising a spring pressed means bearing directly on said contacts, latching means for preventing the operation of said pressure means until said contact engagement occurs, said latching means being adapted to be released when said contacts are engaged, thereby allowing the application of pressure to the contacts to be actuated through the movement of said levers.

13. In an electric switch a pair of relatively movable co-operating contacts, operating means for bringing said contacts into substantially full engagement, pressure means for increasing the pressure between said contacts after said full engagement, a rocking insulator on which one of said contacts is pivotally mounted, a pivot for mounting said contact on said insulator, said pivot and the axis about which said insulator moves being substantially in line with the center of the contact surfaces of said pair of contacts when fully engaged, the resulting combination allowing increased pressure to come on said contacts after said engagement with a substantial minimum of relative contact motion during the application of said increasing pressure.

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