Oct. 3, 1933. H. B. AUSTIN 1,929,049

DISCONNECTING SWITCH

Filed Nov. 4, 1930 5 Sheets-Sheet 1

Fig. 1.

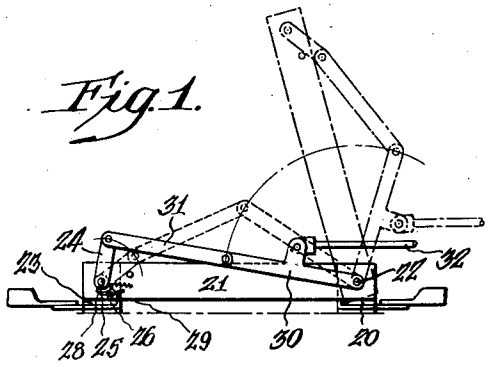


Fig. 2.

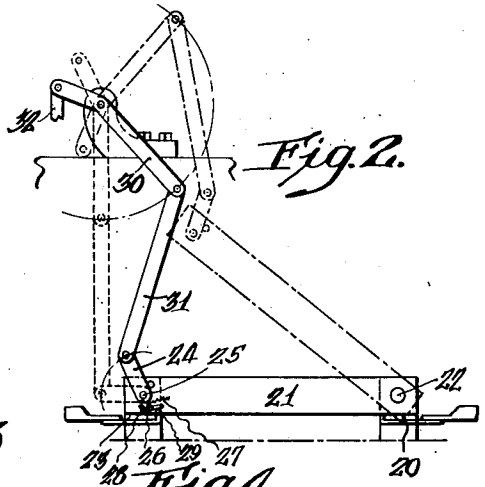


Fig. 1a.

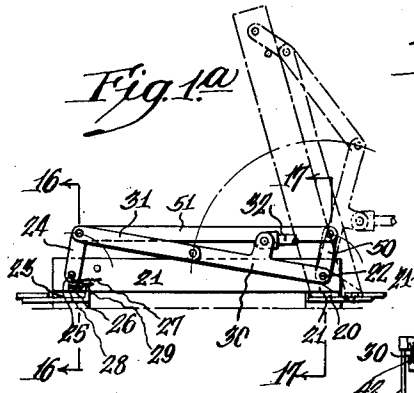


Fig. 3.

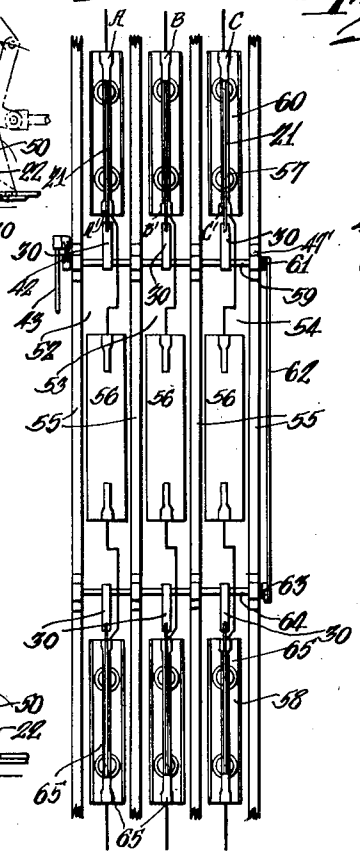


Fig. 4.

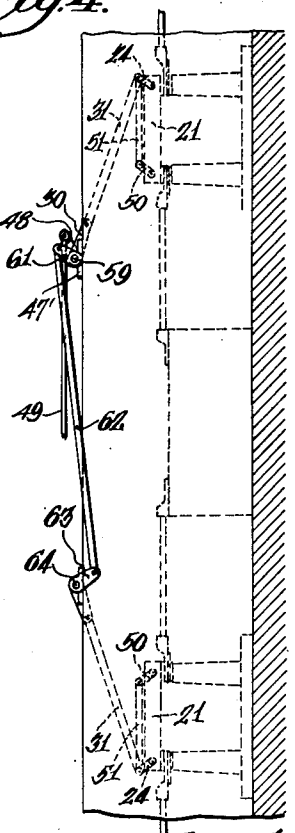
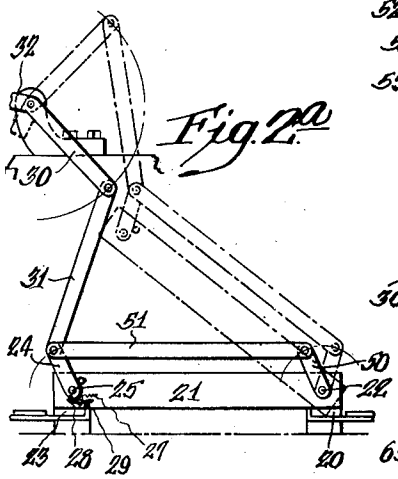


Fig. 2a.



Witnesses:
Geo. C. Jepson
Walter Chism.

Inventor:
Harvey B. Austin.
by
Attorneys.

Oct. 3, 1933. H. B. AUSTIN 1,929,049

DISCONNECTING SWITCH

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Fig. 6.

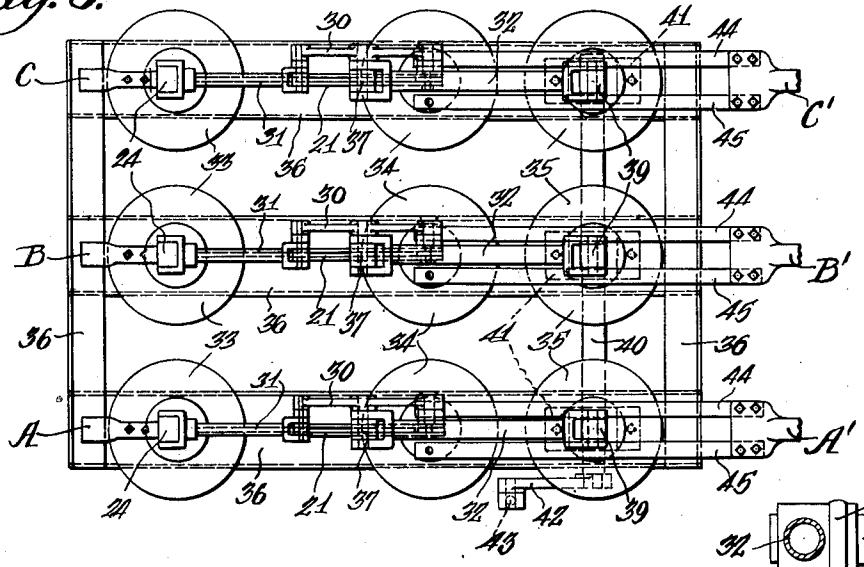


Fig. 5a.

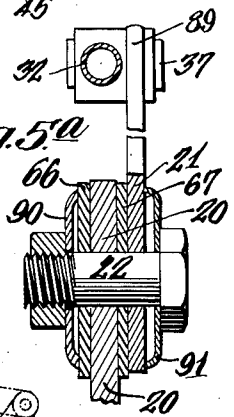
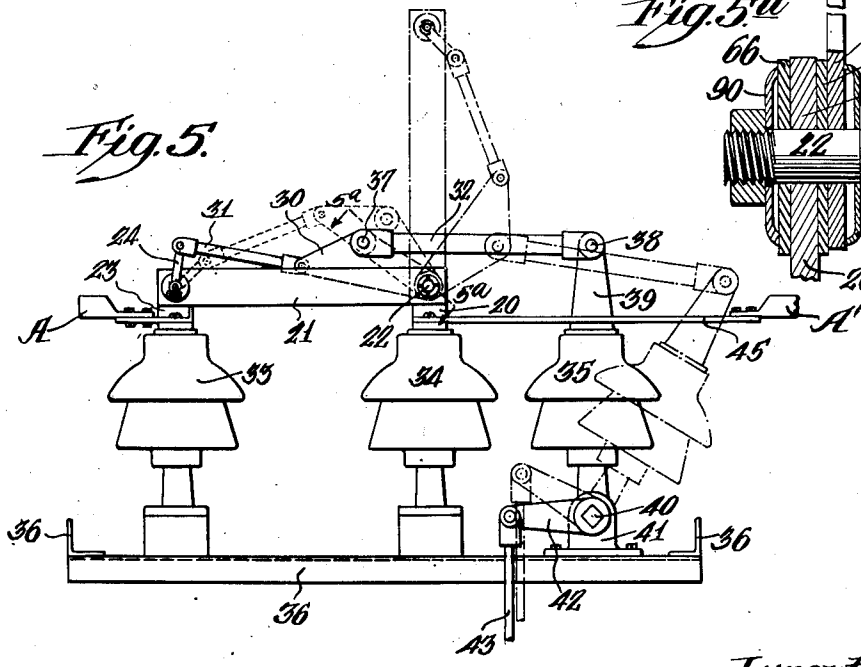


Fig. 5.



Inventor
Harvey B. Austin

Witnesses:
Geo. C. Jepson
Walter Chinn.

by Wm. Steell Jepson
Attorney.

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DISCONNECTING SWITCH

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Fig. 7.

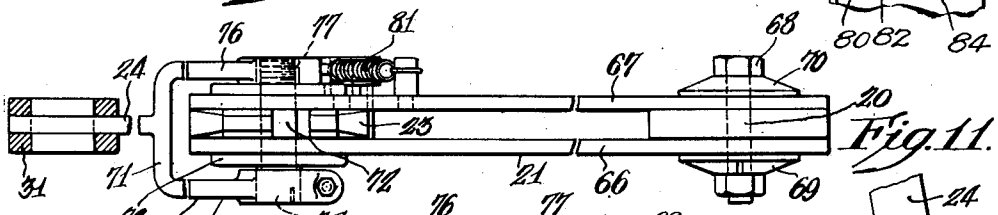


Fig. 11.a

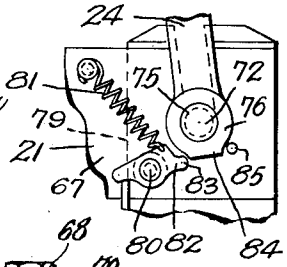


Fig. 11.

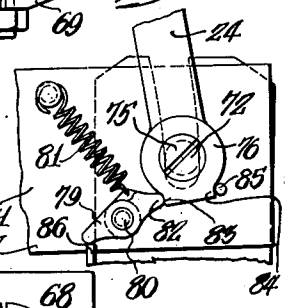


Fig. 10.

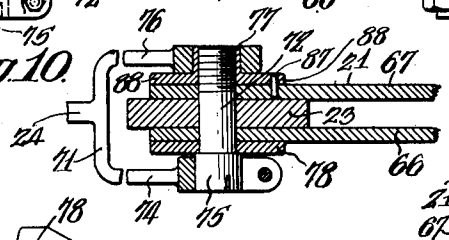


Fig. 8.

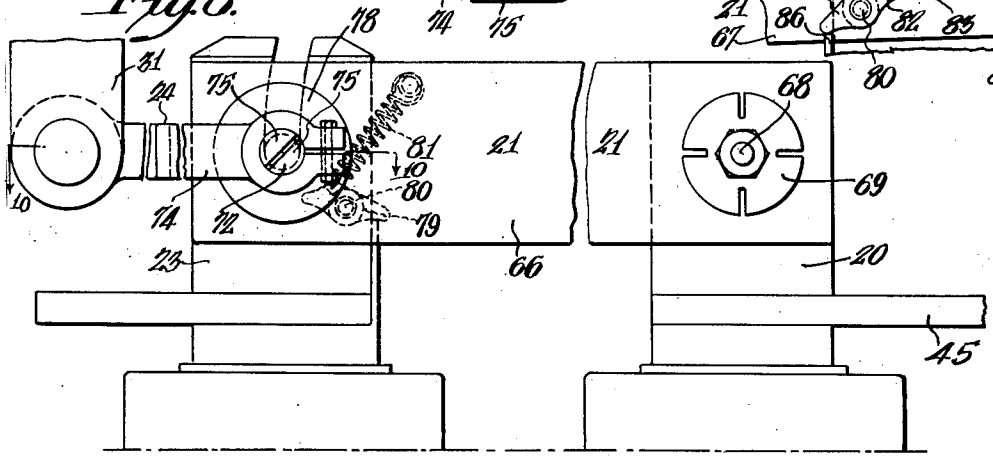
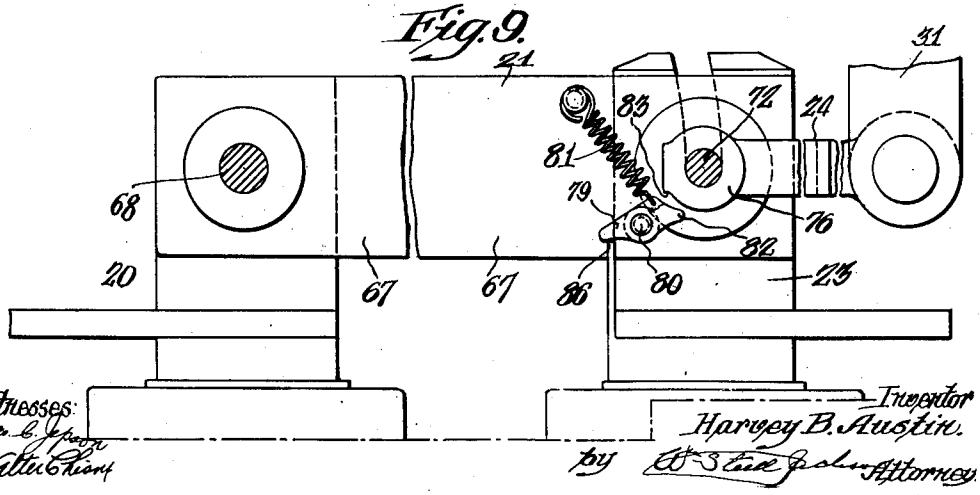


Fig. 9.



Witnesses:
Geo. C. Jepson
Walter Christ

Inventor
Harvey B. Austin.
by Cox & Eaton Jepson Attorneys

Oct. 3, 1933. H. B. AUSTIN 1,929,049

DISCONNECTING SWITCH

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Fig. 13.

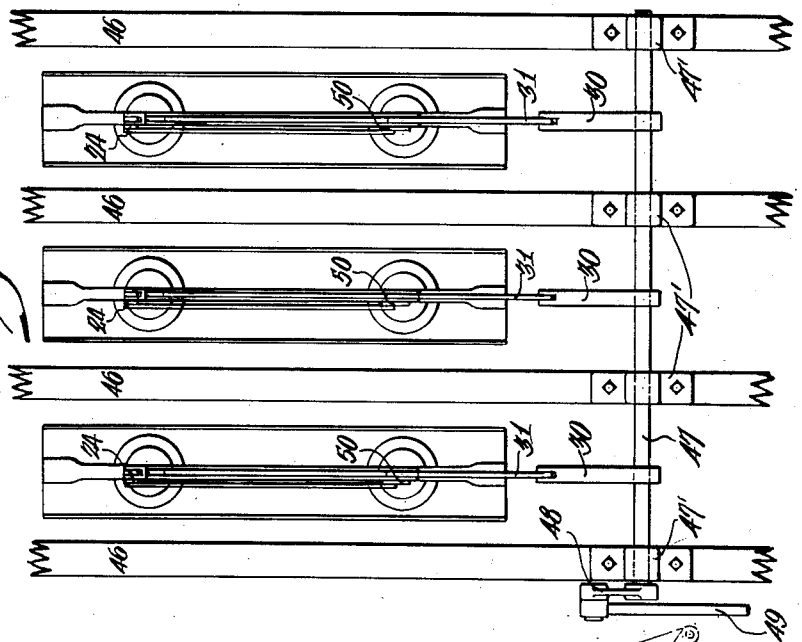
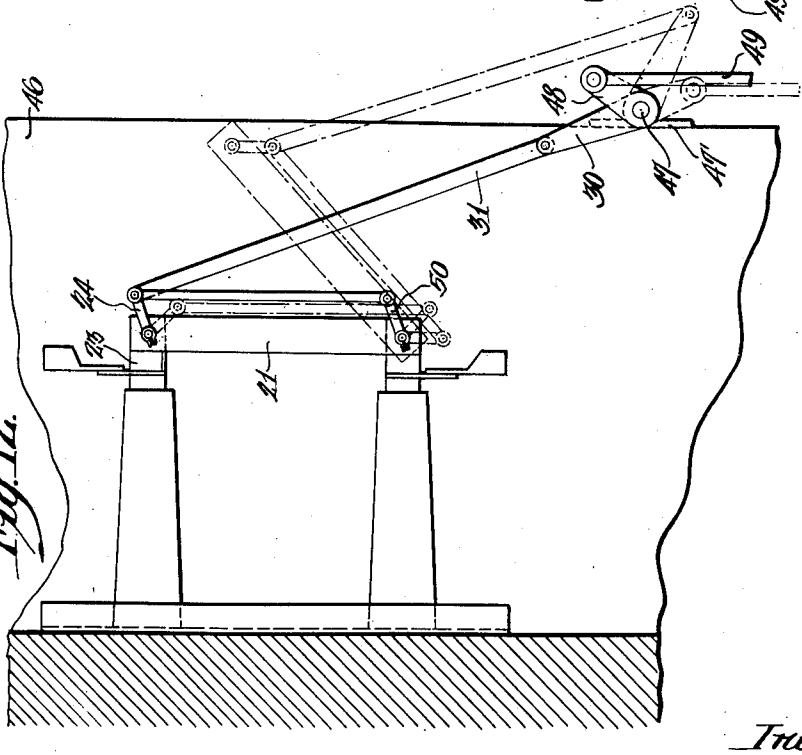


Fig. 12.



Witnesses:
Geo. C. Jepson
Walter Chism.

Inventor:
Harvey B. Austin
by [illegible] Attorney.

Oct. 3, 1933. H. B. AUSTIN 1,929,049

DISCONNECTING SWITCH

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Fig. 16.

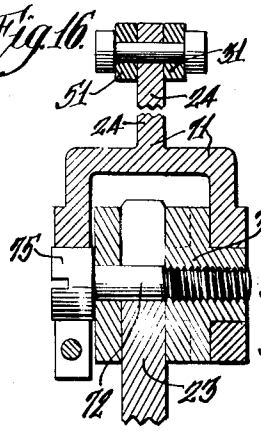
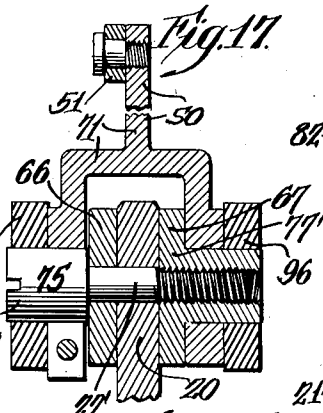


Fig. 17.



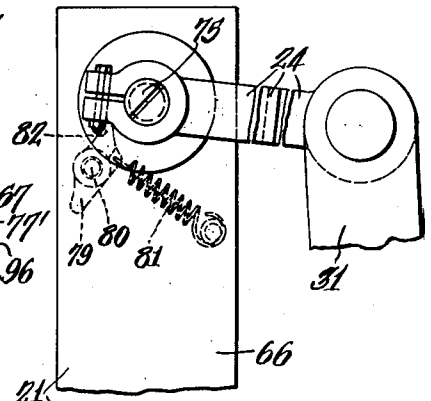


Fig. 15.

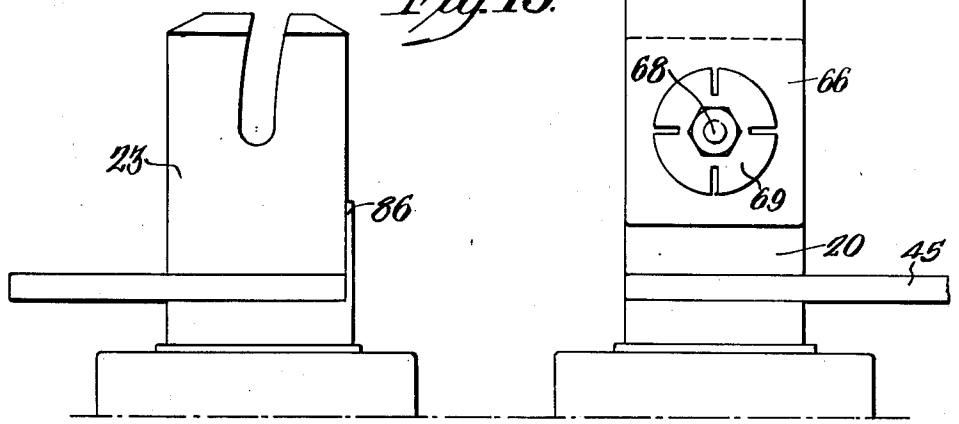
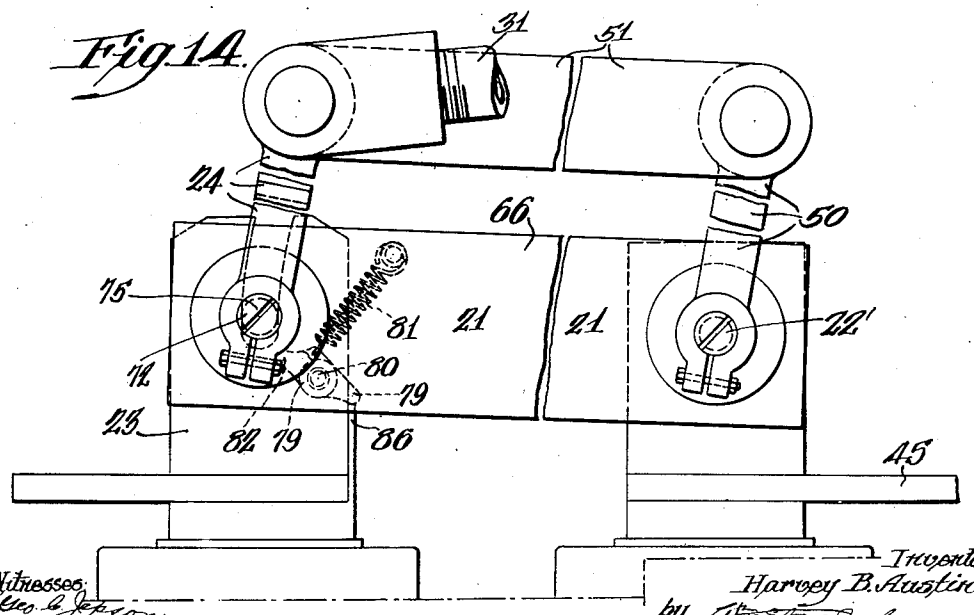


Fig. 14.



Witnesses:
Geo. L. Jepson
Walter Chase.

Inventor
Harvey B. Austin
by W. Stuart Jackson
Attorney

Patented Oct. 3, 1933

1,929,049

UNITED STATES PATENT OFFICE

1,929,049

DISCONNECTING SWITCH

Harvey Bancroft Austin, Narberth, Pa., assignor of one-half to George Andros Thomson, Somerville, N. J.

Application November 4, 1930. Serial No. 492,436

3 Claims. (Cl. 200—48)

My invention relates to switches, and is thought to have its widest application with disconnecting switches and other switches for use with high currents, particularly switches having a wide spacing between the switch terminals.

A purpose of my invention is to combine switch throwing mechanism with novel and efficient mechanism for automatically screw clamping and unclamping the laterally spaced and laterally movable blades of a two-plate switch upon one or both of the spaced terminals of the switch while the two-plate switch element is angularly stationary at its position of closure, clamping and unclamping respectively at the end of and preparatory to the throwing of the switch element shut or open.

A further purpose is to laterally clamp a two plate switch blade directly to an intervening terminal by lateral clamping through means carried by the blade itself at the clamping point and preferably operate through an overthrow toggle mechanism which not only utilizes increasing intensity of toggle effect for the closing operation but uses the final and overthrow toggle movement for tightly gripping and locking the switch clamp.

A further purpose is to combine a screw clamp mounted on the outer end of a switch element with switch throw mechanism, using the throw mechanism to effect an over-throw toggle-locking of the screw clamp during switch closure, to open and to latch open the clamp preparatory to throwing open the switch and in switch closure using a stationary release member at the outer terminal to release the latch as the switch moves into its closure position, permitting the throw mechanism to tighten and toggle-lock the clamp after completing the closure throw of the switch.

A further purpose is to operate a screw that transversely connects and adjustably limits the lateral spacing between the outer ends of the plates of a two plate switch element by a yoke loosely spanning the spaced plates and having one arm outside one plate adjustably clamping the head of the screw and the other arm outside the other plate journalling on a boss thereof having threaded connection with the screw.

A further purpose is to use the final closing movement of an over-throw toggle to apply extreme pressure between engaging switch surfaces.

A further purpose is to provide switches that include widely spaced terminals and a two-plate switch element with operating mechanism adapted to screw clamp and unclamp the spaced blades to the widely spaced intermediate terminals when the two-plate switch is in its position of closure, the mechanism clamping at the end of its switch closing movement and unclamping at the beginning of its switch opening movement.

Further purposes will appear in the specification and in the claims.

I have elected to show a few only of the different forms of my invention, selecting forms which are practical, efficient in operation and which well illustrate the principles involved.

Figures 1 and 2 are views illustrating somewhat diagrammatically different desirable forms of an important feature of my invention.

Figures 1*a* and 2*a* are views corresponding generally to Figures 1 and 2 except that in Figures 1 and 2 I have provided screw clamp connection between the switch blade and one terminal only, while in Figures 1*a* and 2*a* I provide it at both terminals, the clamping and unclamping being effected in both forms while the blades are angularly stationary in position of closure.

Figures 3 and 4 are somewhat diagrammatic views, respectively front and side elevations, of multi-switch structure embodying additional important features of my invention.

Figure 5 is a side elevation of a switch mechanism of the type illustrated in Figure 1 embodying an outdoor high tension switch with details of the structure in Figure 1 and including also another important feature of my invention.

Figure 5*a* is a detail section of Figure 5 taken upon the line 5*a*—5*a* thereof to enlarged scale.

Figure 6 is a top plan view of Figure 5.

Figure 7 is a broken, partly sectioned longitudinal detail of switch mechanism corresponding to structure illustrated in Figure 2 and, except with respect to the angular placement of an operating clamp member, corresponding equally well to the structures shown in Figures 3 to 6.

Figure 8 is a front elevation of structure shown in Figure 7.

Figure 9 is a rear elevation of structure shown in Figure 7 to illustrate mechanism for latching the clamping member in its position of release except when the switch is closed.

Figure 10 is a fragmentary section taken from the line 10—10 of Figure 8.

Figure 11 is a fragmentary view corresponding to a portion of Figure 9 but with the clamp shown latched into its release position in Figure 11 while shown in its locking position in Figure 9.

Figure 12 is an enlarged scale view of switch

cell mechanism and corresponds to an enlarged scale fragment of Figure 4.

Figure 13 is a front elevation of structure shown in Figure 12.

Figure 14 is a fragmentary large scale view illustrating mechanism that may be considered as substantially that shown in Figure 12, the switch element being shown in closed position but the clamp mechanism in position of release preparatory to opening the switch.

Figure 15 is a view corresponding to Figure 14 but with the switch open instead of closed.

Figures 16 and 17 are detail sections illustrating desirable mechanism respectively at the outer terminal and pivot terminal of the switch element for clamping and unclamping the switch element to the terminals, the views corresponding to sections upon the lines 16—16 and 17—17 of Figure 1*a*.

Like numerals refer to like parts in all figures.

Describing in illustration and not in limitation and referring to the drawings:—

The switch in each of the illustrated embodiments of my invention includes a terminal plate 20, a blade 21 pivotally mounted thereon at 22 and a cooperating terminal plate 23 suitably spaced from the terminal 20.

When the switch is for high tension outdoor disconnecting service, which is one of the more important applications of the invention, the spacing between the terminal plates will usually be considerable, as twelve feet and upwards, and the invention includes features that are particularly desirable when the switches need to be widely spaced.

I provide cooperating mechanism at the terminal plate 23 and on the outer end of the blade 21 for operation by switch throwing mechanism to clamp and unclamp the blade to the terminal 23 while the blade is between the terminals respectively at the end of a closing throw of the blade and preparatory to an opening throw thereof.

The mechanism includes in all the illustrated forms a clamp rocker 24 pivotally mounted on the outer end of the blade and angularly movable between a position of release and a position of clamping about an axis at 25 transverse to the plane of the switch.

The clamping rocker 24 is preferably always in its release position when the blade is open, as indicated in dot-and-dash in Figure 1 to 2*a*, 5 and 12 and is moved to its clamping position, shown in full lines in Figures 1, 1*a*, 5, 8, 9 and 12 by continued movement of switch throwing mechanism after this mechanism has moved the blade to closure, to be again opened by an initial movement of the switch throwing mechanism preparatory to its throwing open the blade.

I desirably latch the clamping rocker 24 in its release position as long as the switch blade is open, releasing the latch by an engagement between the latch and a suitable stop at the terminal 23 when the blade is closed.

This latch is intended to be shown conventionally in Figures 1 to 2*a* as comprising a member 26 pivoted on the outer end of the blade 21 spring pressed at 27 to present a toe 28 to the clamping rocker 24 unless retracted away from the rocker by an upwardly directed stop 29 from the stationary structure at the terminal 23.

The engagement between the toe 28 and the rocker 24 locks the rocker from movement toward its clamping position, and the holding of the toe member away from the rocker by the stop 29 when the blade 21 is closed leaves the rocker free to move between its release and clamping positions as long as the switch blade is closed.

An important feature of my invention includes an operating connection between the clamping rocker 24 and a switch throwing lever 30 that adapts the lever to toggle lock the clamping rocker 24 in its clamping position while the switch is closed.

I use the clamping lever 24 as a connection between the switch blade 21 and the blade throwing mechanism. This mechanism includes the link 31 and the throw rocker 30, the throw rocker being adapted to be swung about a fixed pivot that may or may not be coincident with the pivot 22 of the switch blade, by any suitable longitudinally movable operating rod 32 pivotally connected to the throw rocker 30.

I select the range of movement of the clamping lever 24 and the dimensions and placing of the throw lever 30 and link 31 so that the lever 30 and link 31 are alined and substantially perpendicular to the arm of the clamping lever 24 when the latter is in its clamping position, as indicated in full lines in Figures 1, 1*a*, 5 and 12, and in dot in Figure 2.

This arrangement secures for the throw mechanism a progressively greater leverage upon the clamping rocker 24 as this rocker approaches its "dead center" and over-throw locking position, making it easy to move the clamping rocker between its positions of release and clamping, permitting stronger clamping than would otherwise be possible and thereby avoiding danger of retractive movement incident to vibration frequently present in disconnecting switch mechanism.

The over-throw toggle locking of the clamping lever in its locking position is also a safety feature that provides the clamping rocker with effective support against any sudden loosening stresses incident to sudden abnormal and extremely heavy currents through the switch, due for example to an inadvertent short or the sudden opening of a circuit breaker.

I may pivot the throw lever 30 on a pivot substantially coaxial with the pivot of the switch blade, as indicated in Figures 1, 1*a* 5, and 17 or may pivot it at a suitable external point, as in Figures 2, 2*a*, 4 and 7 to 15, either arrangement being preferable, according to circumstance. In the multicell type and normally in all cases where the toggle is separated from the switch pivot link 31 should be an insulator.

The pivoting of the throw lever 30 at the pivotal axis of the blade 21 is particularly advantageous when, as in outdoor disconnecting switches the individual switches are not situated between the laterally spaced walls of a switch cell.

In Figures 5 and 6 three similar outdoor disconnecting switches are in the horizontal bus lines of a three-phase-high-voltage-high-current circuit, A, B and C indicating the bus connections going to the outer switch terminals 23 and A', B' and C' the corresponding connections to the inner terminals 20.

Each switch is carried upon three insulators 33, 34 and 35 that are in turn carried upon a suitable stationary structural frame work 36 supported in any suitable way not shown.

The upwardly directed switch terminals 20 and 23 of each switch are mounted respectively on the stationary vertical insulators 34 and 33, the blade 21 and throw lever 30 being supported on the terminal 20 with a common pivotal axis at 22.

The rod 32 for operating the throw rocker 30

has one end pivotally connected at 37 to the throw rocker and the other end pivotally connected at 38 to the upper end of a vertical plate extension 39 from the insulator 35 which is rigidly fastened at its lower end to a rocker shaft 40 common to all three switches.

The rocker shaft 40 is carried in journals 41 on the frame structure 36 and carries a crank arm 42 pivotally connected to a suitable downwardly extending rod 43, up and down movement of this rod between its full line and dot-and-dash line positions of Figure 5 opening and closing all of the switches simultaneously, the release of the clamping connection between the outer terminals and the individual blades making the resistance to this movement relatively small.

The three insulators 33, 34 and 35 are preferably in horizontal alinement, with one another and with their respective bus lines, connection between the bus lines A', B' and C' with the individual terminals 20 being preferably effected by flat laterally spaced conducting plates 44 and 45, that are parallel to the alinement of the three insulators on opposite sides of the plate extension 39 of the insulator 35, the spacing between the conducting plates 44 and 45 to the individual terminals 20 affording clearance for the rocking movement of the individual insulators 35.

It will be seen that the combination of mounting of the throw rocker 30 upon the pivot portion of the blade, operating this rocker by an insulator 35 rocking in the vertical plane of the three insulators and the direct straight line stationary connection between the individual terminals 20 and the bus lines A', B' and C' respectively, results in a great economy with respect to the requisite supporting structure of the switch and switch operating mechanism and that the release of frictional engagement between the switch blades and switch terminals incident to the over-throw toggle clamping and unclamping while the blades are in their closed position results in a very easy opening and closure of the blades, permitting a relatively large number of switches to be readily operated simultaneously by a single operating rod 43.

When the bus lines and switches are located within a switch cell, as is frequently the case with indoor connections, with the bus lines and switches thereof of the individual A, B and C phases of a three-phase circuit separated as illustrated in Figures 12 and 13, by outwardly directed cell walls 46, I may locate the throw levers 3 of the individual switches upon a rocker shaft 47 that journals at 47' across the outwardly directed walls of the cell.

In this event the rocker shaft 47 carries the individual throw rockers 30 rigidly fastened to it, the throw rockers being operatively connected, as already described, to the individual switches through intermediate links 31 and clamping rockers 24. The rocker shaft 47 carries a suitable crank 48 for operation by longitudinal movement of a rod 49 between positions shown respectively full line and dot-and-dash line in Figure 12, the full line position corresponding to that for closed switches with clamp connection between the blades 21 and terminals 23 and the dot-and-dash line to that for open switches.

In Figures 1, 2 and 5 and 6 I have provided a clamping rocker 24 on the outer ends only of the individual switch elements 21 and in this event, may desirably provide continuous resilient clamping engagements between the blade 21 and the terminal 20 at the pivot end of the switch, for example, as illustrated in Figure 7, described later.

The resilient connection between the blade 21 and terminal 20 at the pivot end of the blade should press the adjacent surfaces of the blade and terminal together with very considerable force and as a result these surfaces during throw movements of the blade offer considerable frictional resistance to angular movement of the blade.

I may advantageously eliminate all or a considerable portion of this resistance offered by the blades to their angular movement by providing rocker clamp members 50 at the pivot ends of the individual blades, these rocker clamp members desirably being substantially like those at the outer ends of the blade with the exception that duplication of locking and release mechanism is unnecessary.

I connect the two clamping rockers 24 and 50 with a link 51 so that movement applied by the throw rocker 24 through the link 31 to the clamping rocker 24 transmits a corresponding movement to the rocker 50 on the pivot end of the blade.

It is frequent practice to place a disconnecting switch upon each side of a circuit breaker and a switch cell such as that illustrated in Figures 3 and 4 carrying the three bus lines for the A, B and C phase currents of a three phase circuit may include vertical passages 52, 53 and 54 that are closed on three sides and open in front, with each passage including in series between laterally spaced walls 55 of the cell a circuit breaker 56 and disconnecting switches 57 and 58 upon opposite sides of the circuit breaker.

It will be understood that normally the disconnecting switches are not operated, whether to open or close, except when the circuit breakers are on open circuit.

The switch cell shown diagrammatically in Figures 3 and 4 is intended to be substantially the same as that shown in Figures 12 and 13 except that I have illustrated a greater portion of the length of the cell to show the circuit breakers 56 and disconnecting switches on both sides of the circuit breakers and further that I have provided means for simultaneously operating all six disconnecting switches of the three-phase current circuit, the rocker shaft 59 that carries rigidly fastened to it the individual throw rockers 30 to the individual switches 60 being operatively connected by a suitable crank 61, link 62 and crank 63 to a corresponding rocker shaft 64 controlling the opening and closing of the switches 65 upon the other side of the circuit breaker.

In order that the throw mechanism may offer minimum resistance, so that an operator may readily operate as many as six switches simultaneously, I have provided all of the individual switches with clamping rockers at both ends of each blade, and with a toggle-link operating connection between the clamping rockers 24 upon the outer ends of the blades and the throw levers 30 carried by the rocker shaft 59.

It will be seen that during the closure of the switch effected by upward movement of the operating rod 49 to the position shown in Figure 4 the switch elements 21 will have no strong engagements resisting the closing movement of the blades, the blades being loosely pivoted at their pivot ends until closure is complete and then compressed together with a progressively increasing leverage to the toggle-lock position of the figures.

Some features of my invention are adapted to use with any suitable type of switch elements carrying any suitable clamping for operation when the switch elements are closed across the terminals, for example switch blades and rockers such as those disclosed in the U. S. patent to Bolles, No. 528,900, but other important features are directed to advantageous and novel details of the switch element of the rocker clamp mechanism for securing clamping engagement between the blade and one or both of the terminals during the period of switch closure.

My switch blade 21 preferably includes spaced plates 66 and 67 that are adapted to relative lateral movement at one or both ends of the switch blade.

In the blade illustrated in Figures 7 to 8 the two-plate blade is pivotally mounted upon a bolt 68 carried by the terminal plate 20, spring washers 69 and 70 upon opposite ends of the bolt pressing the blade plates 66 and 67 resiliently together upon the intermediate terminal plate 20.

In this switch the clamping element 24 is mounted upon the outer end only of the blade and, as clearly indicated in Figure 10, comprises a yoke 71 and a transverse screw 72, that turns as a unit with the yoke to screw clamp the blade plates 66 and 67 upon the intermediate terminal 23 when the yoke is moved to its clamping position.

One arm 74 of the yoke adjustably clamps the head 75 of the screw while the other arm 76 of the yoke journals on an internally threaded boss 77 rigidly connected to the blade plate 67.

The screw head 75 presents its inner shoulder against the outside of a washer or boss 78 against the blade plate 66 while the other end of the screw threads into the sleeve or boss 77 that is rigidly connected with or may be an integral portion of the plate 67.

The yoke rocker which presents its arms 74 and 76 outside the plates 66 and 67 respectively includes the screw 72 adjustably clamped in the arm 74 of the yoke and threaded into the boss 77 that is in effect a rigid portion of the plate 67.

It will be seen that the yoke 71, screw 72 and the entire blade 21 normally move as a rigid unit during the throw movement of the blade, any angular movement of the yoke taking place only when the blade is angularly closed with the plates 66 and 67 of the blade on opposite sides of the terminal 23.

I show means latching the rocker 24 in its position of release throughout the period that the switch blade is open, the desirable form of this mechanism shown in Figures 8, 9 and 11 including a latch member 79 pivoted at 80 on the blade plate 67, spring pulled at 81 to present its toe 82 to a suitable projection 83 on the hub portion of one arm of the yoke member, the yoke and blade plate being provided with suitable cooperating projections 84 and 85, Figure 11, that limit the angular releasing movement of the yoke member from its clamping position to a predetermined magnitude suitable for properly releasing the clamping between the plates and intermediate terminal.

When the blade begins its opening throw the projection 84 on the clamping rocker has already stopped further releasing movement of the clamping lever 24 by coming against the pin projection 85 on the blade 21 and as soon as the blade 21, in beginning to move outwardly, reaches the position of Figure 11 the latch member spring retracts back of the projection 83 locking the clamping rocker from any further angular movement until the latch is again released by throwing the switch to closure.

The latch member 79 is released as the blade is moved from the position of Figure 11 to the complete closure of Figure 9 by engaging an upwardly extending member 86 at the terminal 23 so that the latch is released when the blade reaches its position of ultimate closure permitting continued movement of the switch-throw mechanism to throw the clamping rocker 24 to its clamping position.

As illustrated in Figure 10 the boss 78 between the head of the screw and the blade plate 66 is a washer, optionally of the spring type; however this boss may, if desired, be an integral portion of the plate.

In the same way, the sleeve 77 may or may not be integral with the blade plate 67 on the other side of the blade, but in either event is rigidly connected to the blade plate 67 as indicated by the pin 87. As illustrated, this sleeve includes a heavy flange 88 in addition to the hub portion that journals one arm of the yoke rocker.

When the throw rocker 30 is pivoted co-axially with the blade pivot 22 and the screw clamping mechanism at the pivot end of the blade is omitted, as illustrated in Figures 1 and 5, the spaced blade should be given continuous resilient strong engagement with the pivot terminal 20, for example as indicated in Figure 5*a*.

In Figure 5*a* the terminal 20 carries a pivot bolt 22, which in turn carries the pivot ends of the blade plates 66 and 67 on opposite sides of the terminal, the pivot end 89 of the throw rocker 30 outside of the plate 67 and spring washers 90 and 91 compressed at one side against the outside of the blade plate 66 and on the other side against the blade plate 67.

Figures 16 and 17 illustrate the detail mechanism that may be used at opposite ends of the blade when the blade carries clamping rocker mechanism at each end, the views corresponding respectively to sections taken upon the lines 16—16 and 17—17 of Figure 1*a*, Figure 1*a* however being intended as a conventional illustration for mechanism optionally widely variant with respect to details and Figures 16 and 17 illustrating therefore details of one form only of the structure intended to be illustrated broadly in Figure 1*a*.

The mechanism illustrated in Figure 16 is substantially the same as that illustrated in Figure 10, the yoke 71 adjustably clamping the head 75 of the transverse screw 72 on one side and on the other side journalling on a hub portion 77′ of a boss extension from the plate 67.

The yoke has a link connection at 31 to the throw rocker and a link connection at 51 for operating a corresponding clamping rocker yoke 50 at the pivot end of the blade.

As illustrated in Figure 17 the transverse screw 22′ has a longitudinally sliding fit through the terminal 20 and through the pivot ends of blade plates 66 and 67 on opposite sides of the terminal 20. The screw clamping rocker 50, is operatively connected by the link 51 to the clamping rocker 24 to which it is closely similar, comprising a yoke having one arm adjustably clamping the head of the screw 22′ and the other arm journalling on a boss extension 77′ from the blade plate 67, with the boss 77′ rigidly connected with the plate 67 and threading with the end of the screw 22′, as already described.

The opposite arms of the yoke are respectively adjustably clamped to the head of the screw and

journalled on the outwardly extending boss of the plate 67.

The throw rocker 50 is illustrated as comprising a yoke having one arm 94 journalling on an extending portion 95 of the head of the screw and the other arm 96 journalling on a lateral extension of the boss 77' that journals one arm of the clamping rocker.

It will be seen that corresponding sections through Figure 2*a* would show structure at the outer end of the blade similar to that illustrated in Figure 16 and that a section through the pivot end of the blade could be as illustrated in Figure 17 except that the throw rocker and therefore its pivot extensions from the head of the screw 22 and from the boss 77' would be omitted, the throw rocker being pivoted externally at 59 as indicated in Figure 2*a* or 4.

A notable feature of the invention is the extreme ease of adjustment that can be used with mechanism for simultaneously operating a plurality of switches, desirably for example, the six switches of a three-phase-high-tension-high-current circuit, three disconnecting switches being mounted on each side of the three circuit breakers of the circuit.

To secure adjustment all that is necessary is to loosen the adjustable clamping connection between the clamping rockers 24 and 50 and their screws 72 and 22', then place the throw lever 30 in its position of closure so that the blades of all six switches present their laterally spaced plates in position of closure upon opposite sides of the switch terminals, then tighten the individual screws 72 and 22' until the blade plates press together upon the intermediate terminals to any desired degree of tightness and finally retighten the clamping connection of the yoke members upon the individual screw heads, after which all of the rocker clamp members are in proper adjustment.

Though any new switch will give good contact between the metal faces it will be evident that with age and long oxidation—particularly with excessive oxidation due to exposure—, as in outdoor switches, pressure becomes quite important and intense pressure may easily make the difference between pronounced success and failure. Use of the toggle for completion of the clamping movement makes high pressures available without complication of mechanism.

The intensity of the pressure available is thus within the control of the designer, depending largely upon the distance between the toggle centers, the leverage exerted upon the toggle and the distance of lateral movement given to the clamping elements for a given movement of the toggle links.

It will be evident that my toggle closing mechanism is further advantageous in giving relatively rapid switch closing movement of the switch blade, and relatively slow movement with high pressure for the subsequent clamping of the contacts.

It will be further evident that the complete assemblage of each clamp used upon the end of the blade or blades by which it is carried is especially valuable to long switches in which the switch pivot and terminal and contact terminal are widely separated as in high tension switches.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

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

1. A pair of spaced terminals, a two-plate blade, pivotal support for the plates of the blade on opposite sides of one terminal, said plates being adapted to engage in closed position opposite sides of the other terminal, and mechanism including a clamp mounted on the outer end of the blade for closing and opening the switch and laterally clamping the blade plates upon the said other terminal when the switch is in its closed position, said clamp including a yoke having arms spanning the blade, and a screw adjustably clamped in one arm of the yoke and effectively threading the plate adjacent the other arm of the yoke.

2. A pair of spaced terminals, a two-plate blade, a pivot for the plates of the blade mounted on one of the terminals adapting the plates in closed position to engage opposite sides of the other terminal and including a transverse screw having a head presenting a shoulder against the outside of one plate and a thread effectively threading the other plate at the terminal laterally moving the two plates toward each other to tighten and away from each other to loosen the plates a screw at the outer end of the blade threading one plate and presenting its shoulder against the other plate, a yoke at each screw having spaced arms spanning the blade, one arm adjustably fastening to the screw and the other arm having journal support at the other plate substantially coaxial with the screw and operating connection between the yokes, in combination with switch throw mechanism operatively connected to one of the yokes tightening the screws at the end of its closing throw and loosening the screws at the beginning of its opening throw.

3. In an electric switch, a pair of plates comprising a switch blade, a pivot therefor, a terminal with which the blade engages, a clamp adapted to be tightened in the terminal position to draw the plates together against the terminal, a lever arm for tightening the clamp, said lever arm being provided with an angularly adjustable rigid connection with the clamp, an operating lever, an operating link, a loose link connecting the operating link and the clamp operating arm and adapted in final position to form an overthrow toggle-lock with the operating link and means for throwing the operating link.

HARVEY BANCROFT AUSTIN.