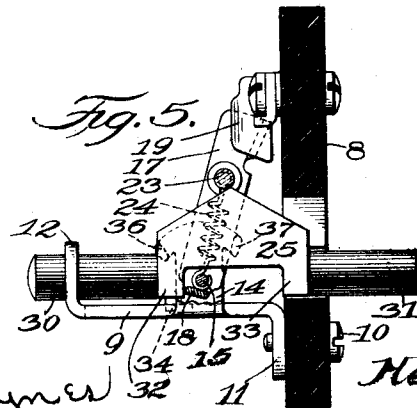
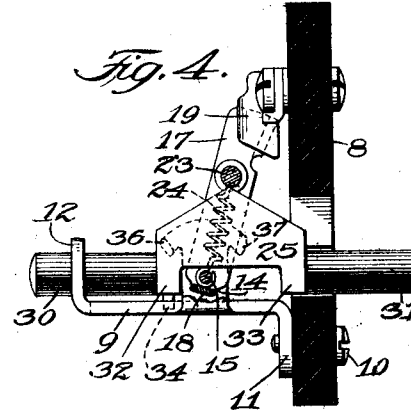
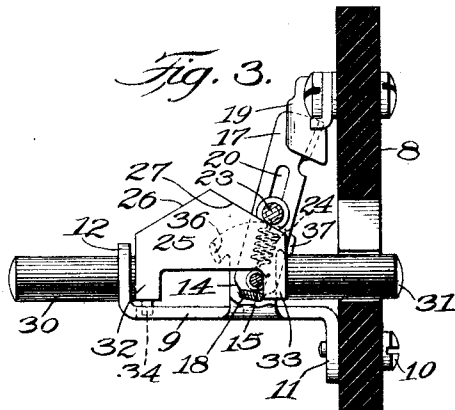
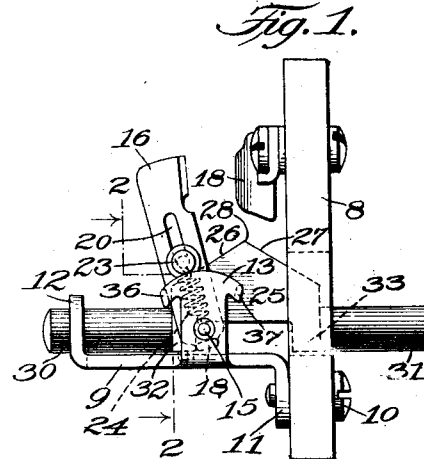
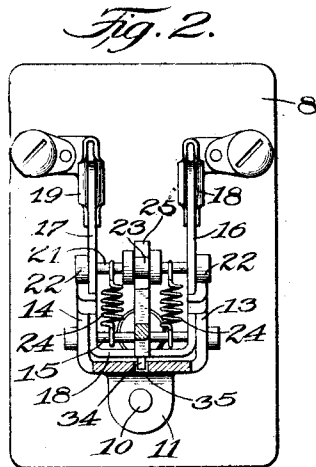


1,056,310.

H. J. WIEGAND.
ELECTRIC SWITCH.
APPLICATION FILED MAR. 24, 1910.

Patented Mar. 18, 1913.

2 SHEETS—SHEET 1.



Witnesses,
George Hayner
E. H. Hurrell

Inventor,
Henry J. Wiegand.
By Edwin B. H. Towner,
att'y.

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2 SHEETS—SHEET 2.

Fig. 6.

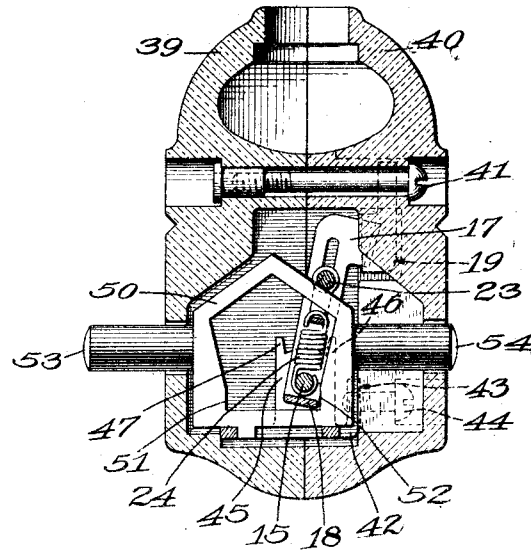
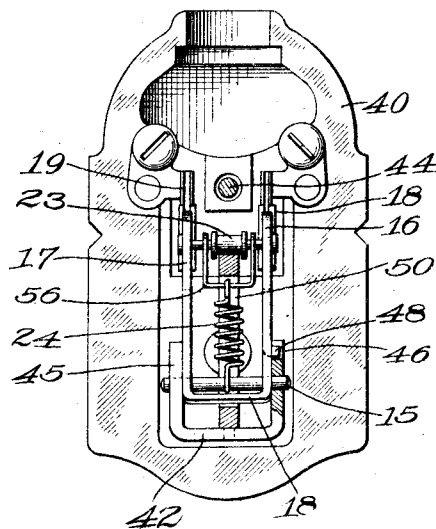


Fig. 7.



Witnesses:

George Haynes
E. H. Muscov

Inventor:

Henry J. Wiegand.

By Edmund B. Tower, Jr.
att'y.

UNITED STATES PATENT OFFICE.

HENRY J. WIEGAND, OF MILWAUKEE, WISCONSIN.

ELECTRIC SWITCH.

1,056,310.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed March 24, 1910. Serial No. 551,261.

To all whom it may concern:

Be it known that I, HENRY J. WIEGAND, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Electric Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in electric switches and more particularly to those adapted to operate with a snap action.

My invention has various objects and advantages which will be hereinafter clearly and fully set forth.

In order to fully disclose the nature and characteristic features of my invention, I shall describe the devices illustrated in the accompanying drawing which embody certain forms of my invention which I have worked out in practice.

Of course, my invention is not limited to the particular constructions illustrated, but is capable of various modifications within the scope of the appended claims.

The several views in the accompanying drawing are as follows:

Figure 1 is a side elevation of one form of switch mechanism; Fig. 2 is a sectional view taken on line 2-2, Fig. 1; Figs. 3, 4 and 5 are sectional views showing the progressive stages in the operation of the switch mechanism in one direction; Fig. 6 is a sectional view of a pendant switch provided with a modified form of the switch mechanism shown on Sheet 1; and Fig. 7 is a sectional view taken on line 7-7, Fig. 6.

In Figs. 1 to 5 I have merely shown the switch mechanism mounted upon an insulating supporting base 8; but, of course, it should be understood that this switch mechanism may be used in various other relations. The several parts of the switch mechanism are supported by a frame 9, secured to the base 8 by suitable means such as a screw 10. The frame 9, as illustrated, merely comprises a metallic plate having its end portions 11 and 12 bent substantially at right angles thereto and having intermediate of its ends and on opposite sides thereof upwardly extending parallel lugs 13 and 14. Extending through the lugs 13 and 14 is a pin 15. This pin is arranged to pivotally support the movable contact member, which, as illustrated, is substantially U-shaped, be-

ing provided with parallel contact arms 16 and 17, and a cross member 18, said pin passing through the arms at a slight distance above the cross member. The contact arms 16 and 17 are adapted to be moved into and out of engagement with stationary contact clips 18 and 19 respectively suitably secured to the insulating base 8. The contact arms 16 and 17 are provided with longitudinal slots 20, through which extends a pin 21, having suitable heads 22 thereon for retaining the same in place. The pin 21 has loosely mounted thereon a roller 23, which roller is preferably provided with flanged ends for a purpose hereinafter set forth. Connected to the pin 21 on opposite sides of the roller 23 are coil springs 24, having their opposite ends connected to the pivot pin 15. The springs 24 tend to yieldingly hold the roller 23 against a sliding cam member 25, said cam member having oppositely inclined surfaces 26 and 27 which meet to form a peak or crest 28 over which the roller 23 is adapted to ride. The cam member is preferably made flat and of such a thickness as to freely fit between the flanged ends of the roller 23, thereby holding the roller against lateral movement. Connected to opposite ends of the cam member are elongated push buttons 30 and 31, the former being arranged to pass through a correspondingly shaped aperture in the upwardly extending portion 12 of the frame 9, while the latter extends through a correspondingly shaped aperture in the insulating base 8. The portion 12 of the frame 9 and the insulating base 8 thus form sliding bearings for the push buttons 30 and 31, and, consequently, for the cam member 25. Of course, the cam member must be so arranged as to clear the pivot pin 15 and the cross member 18 connecting the contact arms. In practice, however, I prefer to provide the cam member at opposite ends with downwardly extending lugs 32 and 33 arranged to engage the cross piece of the movable contact member under the conditions and for the purposes hereinafter set forth. I also prefer to provide the cam member with a projection 34 arranged to work in a slot 35 in the frame 9 to maintain the cam member in a vertical position.

As will be hereinafter more fully set forth, to insure proper operation of the movable contact member, it is essential to provide fixed stops for limiting the move-

ment thereof in both directions. I, therefore, prefer to arrange the stops on the supporting frame and integral therewith to prevent the possibility of any variations in the range of movement allowed to said contact member. A convenient way of accomplishing this is to provide each of the upwardly extending lugs 13 and 14 of the frame 9 with inwardly projecting stops 36 and 37 disposed in the path of the arms of the contact member in such a manner as to precisely limit the movement thereof in both directions. This and other details of construction will be hereinafter more fully disclosed after describing the operation of the switch mechanism.

In describing the operation, I shall assume that the parts are in the position illustrated in Fig. 3 wherein the arms of the movable contact member are in engagement with their respective stationary contacts and also in engagement with the stops 37 on the frame 9. Under these conditions, to move the arms 37 out of engagement with the stationary contact, pressure should be exerted upon the push button 30 to move the cam member 25 to the right. This movement of the cam member causes the inclined surface 27 thereof to force the roller 23 upwardly, thereby tensioning the springs 24 until the crest of the cam member passes the axial line of the roller, whereupon the springs contract, causing the roller to quickly travel down the inclined face 36 and move the contact member away from the stationary contacts with a snap action, until it assumes the position illustrated in Fig. 1. In practice, however, it sometimes occurs that owing to binding of the contact arms 40 on the stationary contacts, the springs 24 are unable to move the contact member in the manner just described. It is for meeting this and other emergencies that I provide the lugs 32 and 33 on the cam member. Assuming that the contact member fails to move away from the stationary contacts when the cam member is moved to the position illustrated in Fig. 4, continued movement of said cam member, as illustrated in Fig. 5, will cause the lug 32 to engage the cross piece 18 of said contact member, thus giving the same a positive impulse after which the springs 24 will operate to move said contact member with a snap action as previously described. Furthermore, by so constructing the cam member that the lug 32 will engage the cross piece of the contact member just after the roller 23 passes the crest 28 of said cam member, if the contact member sticks, the force of the springs is transferred from the contact member to the cam member with the result that a quick impulse is given to the latter, which causes the same to impart a hammerlike blow to the former. This, of course, gives the con-

tact member a quick impulse which, further assisted by the springs 24, quickly moves said contact member to open position. Also, it sometimes occurs, in practice, that the springs break or lose their resiliency, thus rendering the same ineffective to operate the switch. Again, this contingency is met by the provision of the lugs 33 and 34. As will be seen in Figs. 1 and 3, the lug 34 engages the portion 18 of the contact member when the same is in full open position, while the lug 33 engages said portion when said member is in full closed position, which shows that if the springs should utterly fail, said lugs, upon full operation of the cam member, would positively move the contact member to full open or closed position. The operation of the switch from open to closed position is similar to the operation previously set forth, and, therefore, requires no further description.

It will be appreciated that the mechanism must be more or less finely adjusted, and that an important feature of the adjustment is the location of the stops for limiting the movement of the contact member whereby the roller 23 will be caused to pass over the crest of the cam member upon a prearranged movement of said cam member. Hence, should the contact member be stopped short of or permitted to pass beyond the prearranged limit, the operation would be seriously disturbed with the possible result that poor contact would be made and arcs drawn between the contact member and the stationary contacts. Should the switch mechanism be placed in a lamp socket, or the like, it would obviously be dangerous to mount the stops upon any parts which would be apt to warp, shrink or become displaced. Of course, the stops might be arranged in other ways than I have illustrated. However, in the construction herein disclosed, I am enabled to stamp the entire supporting frame from a single piece of metal, and am thus enabled to form the stops integral therewith and to locate said stops thereon with a fine degree of accuracy. The cam member and movable contact member may also be formed of stampings, thus rendering the structure of a simple and inexpensive form.

Another important feature of the structure illustrated is that it is self-contained. That is to say, should the mechanism be placed in a lamp socket, or the like, it might be completely adjusted before being placed therein, and, consequently, its operation would in no wise be affected by any inaccuracies in the formation of the base of the lamp socket, or any variations in the dimensions thereof, due to warp or shrinkage. To more clearly demonstrate this fact, I have shown, in Figs. 6 and 7, a slightly modified form of such mechanism applied to a pend-

ant switch. The casing of the switch is of a conventional type, being formed in two sections 39 and 40 secured together by a suitable screw 41. As in the device previously described, the several parts of the switch mechanism are mounted upon a supporting frame 42 of substantially the same construction as the frame 9. This frame is formed of a stamping having an upturned portion 43 which is secured to one section of the casing by a screw 44. Also the frame 42 has upwardly extending lugs 45 similar to the lugs 13 and 14, except that they have vertically disposed stops 46 and 47 instead of inwardly projecting stops. The contact member is of the same construction as the contact member previously described, with the exception that it has lugs 48 formed thereon to cooperate with the stops 46 and 47. In this structure I use a slightly different form of a cam member 50. The cam member 50 is in the nature of a hollow frame so formed that the portions 51 and 52 will perform the same functions as the lugs 32 and 33 of the cam member 25 previously described. The cam member 50 may be supported by push buttons 53 and 54 which pass through opposite sides of the casing or by the frame 42. This cam member is provided with the same form of guide as previously described. The purpose of making the cam 55 in the form of a hollow frame is to enable me to employ a yoke 56 connected to the pin carrying the roller 23. This yoke is substantially U-shaped, having its arms arranged on opposite sides of the roller and its cross portion passing through the opening in the cam member. With such an arrangement I am enabled to dispense with one of the springs 24 shown in the apparatus disclosed in Figs. 1 to 5, thus simplifying the mechanism and reducing the overall dimensions thereof. One spring 24 is connected at one end to the yoke 56 and at its other end to the pivot pin 15.

With the exception above pointed out, the switch mechanism illustrated in Figs. 6 and 7 is the same as that disclosed in Figs. 1 to 5, and the operation thereof is identical.

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

1. In an electric switch in combination, a contact member, a rectilinearly movable operating member adapted to directly engage said contact member to positively move the same, said members having directly engaging parts tending to cause a quick movement of said contact member prior to said operating member directly engaging the same.

2. In an electric switch in combination, a contact member, a rectilinearly movable operating member therefor having cooperating parts adapted after a predetermined movement of said operating member relative to said contact member to be brought into en-

gagement to insure positive operation of said contact member, said members also having directly engaging relatively movable parts tending to impart a quick movement to said contact member prior to engagement of said cooperating parts.

3. In an electric switch, in combination, a contact member, an operating member and operative connections between the same tending to actuate said contact member with a snap action upon a definite movement of said operating member and actuating said operating member to impart a hammerlike blow to said contact member upon failure of the latter to move under the influence of said connection.

4. In an electric switch in combination, a contact member, an operating member therefor, said members having directly engaging relatively movable parts tending to actuate said contact member with a quick action upon a partial movement of said operating member, said operating member upon continued movement directly engaging said contact member if the same fails to operate, said engaging parts under such conditions causing said contact member to impart a hammer like blow to said contact member.

5. In an electric switch in combination, a pivoted contact member, a reciprocable operating member therefor adapted after a predetermined degree of movement to directly engage and positively operate said contact member, a connection between said members including resilient means on one of said members and a cooperating cam on the other of said members tending to cause operation of said contact member with a snap action before said operating member directly engages the same and to cause said operating member to impart a hammer like blow to said contact member under certain conditions.

6. In an electric switch, in combination, a movable contact member, an operating member therefor, a resilient connection between the same including a cam for imparting a quick movement to said contact member from said operating member, said operating member being adapted, upon continued movement, to engage and positively move said contact member to give the same an initial impulse under certain conditions, and to move said contact member from one position to another under other conditions, said resilient means being adapted to cause said operating member, upon engaging said contact member, to impart a hammerlike blow thereto.

7. In an electric switch, in combination, a pivoted contact member, a sliding operating member therefor and a resilient connection between the same holding said contact member against operation during a definite movement of said operating member and

then imparting a snap movement to said contact member, said operating member being adapted to directly engage and positively operate said contact member upon failure of the same to operate under the influence of said connection.

8. In an electric switch, in combination, a pivoted contact member, a sliding operating member therefor adapted to engage and positively operate said contact member, and a resilient connection between said contact member and said operating member tending to impart a quick movement to the former from the latter prior to the engagement of said contact member by said operating member and tending to cause said operating member to impart a hammer like blow to said contact member under certain conditions.

9. In an electric switch, in combination, a movable contact member, a cam operating member, a member resiliently connected to said contact member and arranged to directly engage the cam surface of said operating member to move said contact member at an accelerated speed independent of the speed of said operating member upon said operating member being moved a predetermined distance, said operating member, upon further movement, being adapted to engage and positively operate said contact member under certain conditions.

10. In an electric switch, in combination, a movable contact member, a cam operating member therefor, a member resiliently connected to said contact member and arranged to directly engage the cam surface of said operating member to move said contact member at an accelerated speed independent of the speed of said operating member, said operating member having a portion adapted upon continued movement of said operating member to engage said contact member to positively move the same, said cam and its engaging member causing said operating member if the same engages said contact member to impart a hammer like blow thereto.

11. In an electric switch, in combination, a pivoted contact member, a sliding operating member having a cam surface, a member resiliently connected to said contact member and directly engaging the cam surface of said operating member to cause said contact member, upon a predetermined movement of said operating member, to move at an accelerated speed independent of the speed of and in an opposite direction to the movement of said operating member, said operating member, upon continued movement, being adapted to directly engage said contact member to positively operate the same under certain conditions.

12. In an electric switch, in combination, a supporting frame, a contact member piv-

oted thereon, stops on said frame for limiting the movement of said contact member in both directions, a sliding operating member having a cam surface formed by oppositely inclined faces, a member resiliently connected to said contact member and directly engaging the cam surface of said operating member to move said contact member in an opposite direction to the movement of said operating member and at an accelerated speed independent of the speed of said operating member.

13. In an electric switch, in combination, a supporting frame, a contact member pivoted thereon, stops on said frame for limiting the movement of said switch member in both directions, a sliding operating member having a cam surface formed by oppositely inclined faces, a resilient member connected to said contact member and directly engaging the cam, said operating member being constructed to directly engage said contact member to positively operate the same under predetermined conditions.

14. In an electric switch, in combination, a pivoted contact member, a sliding operating member having a cam surface provided with a crest having oppositely inclined faces extending therefrom, a roller slidably mounted on said contact member, and resilient means for maintaining said roller in engagement with the cam surface of said operating member to cause said contact member to move at an accelerated speed and in an opposite direction to the movement of said operating member when said roller has been forced onto the crest of the cam surface of said operating member.

15. In an electric switch, in combination, a pivoted contact member, a sliding operating member having a cam surface provided with a crest having oppositely inclined faces extending therefrom, a roller slidably mounted on said contact member, and resilient means for maintaining said roller in engagement with the cam surface of said operating member to cause said contact member to move at an accelerated speed and in an opposite direction to the movement of said operating member when said roller has been forced onto the crest of the cam surface thereof, said operating member being adapted, upon continued movement, to directly engage said contact member to positively operate the same under predetermined conditions.

16. In an electric switch, in combination, a supporting frame, a contact member pivotally mounted thereon, stops on said frame for limiting the movement of said contact member in both directions, a sliding operating member having a double inclined cam surface, a roller slidably mounted on said contact member, and resilient means for maintaining said roller in engagement

with the cam surface of said operating member to move said contact member in an opposite direction to the movement of said operating member and at an accelerated speed independent of the speed of said operating member.

17. In an electric switch, in combination, a supporting frame having upwardly extending lugs thereon, a pin supported by said lugs, a U-shaped contact member pivoted upon said pin, stops on said lugs for limiting the movement of said contact member in both directions, a pin adapted to work in slots in said contact member, a roller carried by said pin, a sliding operating member arranged between the arms of said contact member and having a double inclined cam surface, coil springs on opposite sides of said operating member and each having one end thereof connected to said pivot pin and its other end connected to the pin carrying said roller for resiliently holding said roller against the cam surface of said operating member, said springs and said roller being adapted to co-act with the cam surface of said operating member to move said contact member in an opposite direction to the movement of said operating member and at an accelerated speed independent of the speed of said operating member.

18. In an electric switch, in combination, a supporting frame having upwardly extending lugs thereon, a pin supported by said lugs, a U-shaped contact member pivoted upon said pin, stops on said lugs for limiting the movement of said contact member in both directions, a pin adapted to work in slots in said contact member, a roller carried by said pin, a sliding operating member arranged between the arms of said contact member and having a double inclined cam surface, coil springs arranged on opposite sides of said cam member and each having one end thereof connected to said pivot pin and its other end connected to the pin carrying said roller for resiliently holding said roller against the cam surface of said operating member, said springs and said roller being adapted to co-act with the cam surface of said operating member to move said contact member in an opposite direction to the movement of said operating member and at an accelerated speed independent of the speed of said operating member, said operating member having portions adapted to engage the cross portion of said contact member to positively actuate the same under predetermined conditions.

19. In an electric switch, in combination, a substantially U-shaped pivoted contact member, a sliding operating member having

a double inclined cam surface, said operating member having an enlarged opening therein through which extends the cross portion and pivot of said contact member, a pin adapted to work in longitudinal slots in the arms of said contact member, a roller carried by said pin, a yoke having arms pivotally connected to said pin on opposite sides of said roller, and a cross portion passing through the recess in said operating member, and a coil spring connected to the cross member of said yoke and to the pivot of said contact member for resiliently holding said roller in engagement with the cam surface of said operating member, said spring and said roller being adapted to co-act with the cam surface of said operating member to move said contact member in an opposite direction to the movement of said operating member and at an accelerated speed independent of the speed of said operating member.

20. In an electric switch, in combination, a supporting frame having parallel lugs formed thereon, a pivot pin carried by said lugs, a substantially U-shaped contact member pivotally mounted on said pin, stops on said lugs for limiting the movement of said contact member in both directions, a sliding operating member including a hollow frame having a double inclined cam surface, the cross portion of said contact member and its pivot pin being arranged to pass through said frame, a pin working in slots in the arms of said contact member, a roller carried by said pin, a yoke having arms pivotally connected to said pin on opposite sides of said roller, the cross portion of said yoke extending through said operating frame, and a coil spring connected at one end to said yoke and at its other end to the pivot of said contact member for resiliently holding said roller against the cam surface of said operating member, said spring and said roller being arranged to coöperate with the cam surface of said operating member to move said contact member in an opposite direction to the movement of said operating member and at an accelerated speed independent of the speed of said operating member, said operating member having portions adapted to engage the cross portion of said contact member to positively operate the same under certain conditions.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

HENRY J. WIEGAND.

Witnesses:

ALFRED HALVERSON,
M. R. FENNO.