T. A. C. BOTH.

MECHANICAL MOVEMENT.

APPLICATION FILED OCT. 10, 1910.

1,015,869. Patented Jan. 30, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

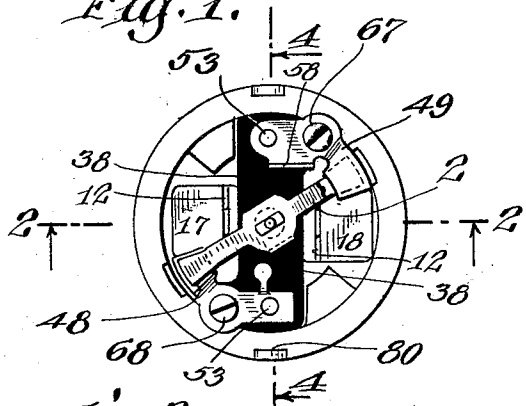


Fig. 3.

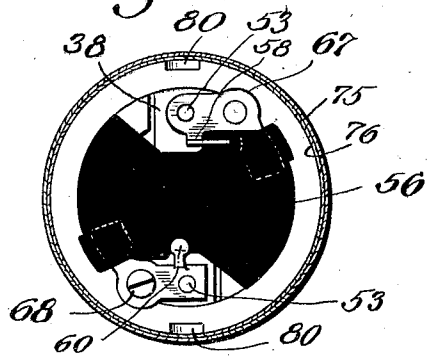


Fig. 2.

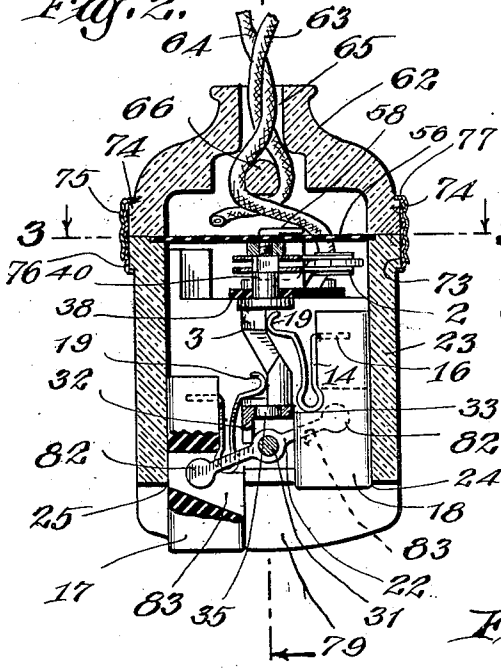


Fig. 4.

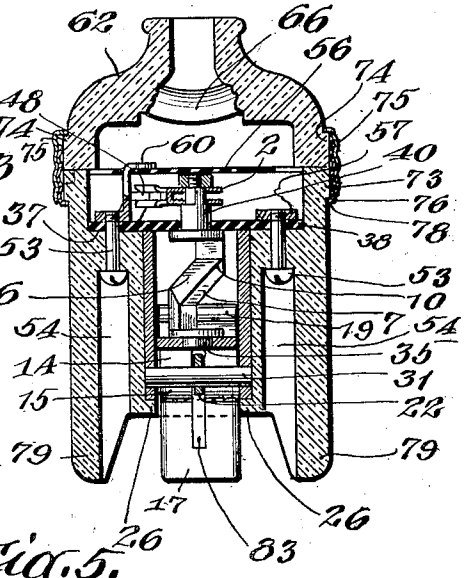
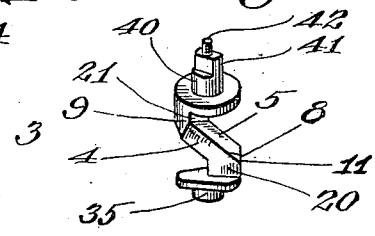


Fig. 5.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 6.

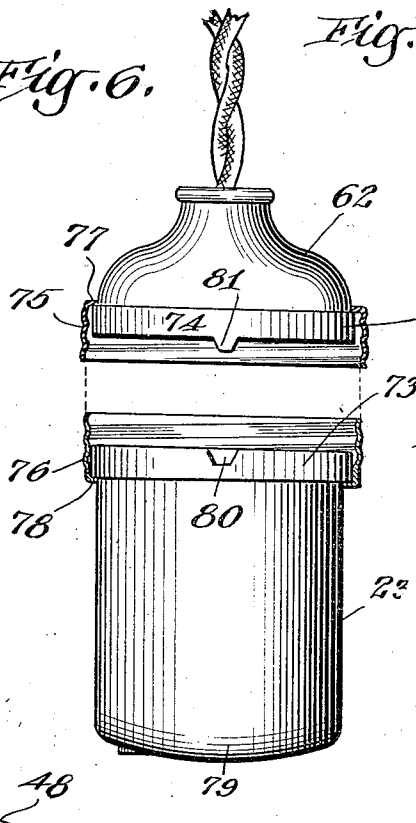

Fig. 13.

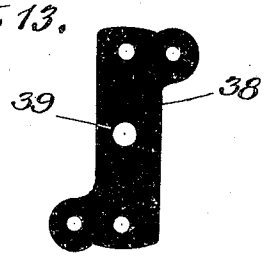

Fig. 7.

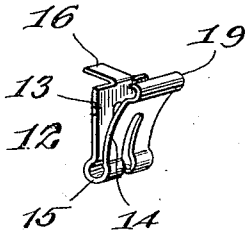

Fig. 8.

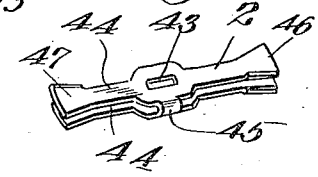

Fig. 9.

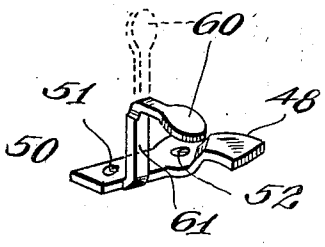

Fig. 10.

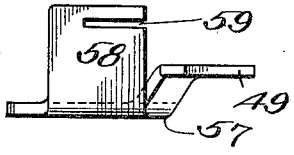

Fig. 11.

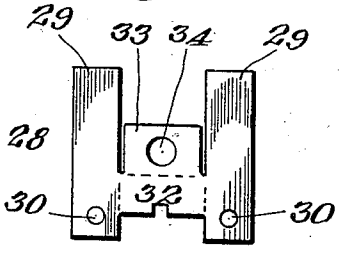

Fig. 12.

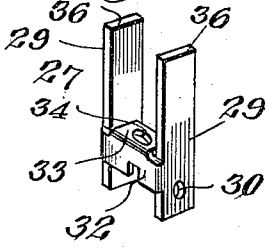

Fig. 14.

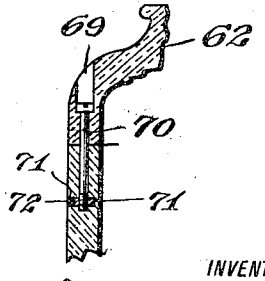

Fig. 15.

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MECHANICAL MOVEMENT.

1,015,869. Specification of Letters Patent. Patented Jan. 30, 1912.

Application filed October 10, 1910. Serial No. 586,290.

To all whom it may concern:

Be it known that I, TONJES AUGUST CARL BOTH, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Mechanical Movement or Means for Converting Motion, (Case H,) of which the following is a specification, taken in connection with the accompanying drawings, which form a part of the same.

This invention relates to mechanical movements adapted for universal application and more particularly for converting reciprocating to rotary or rocking motion, and is an improvement upon U. S. patent granted Jan. 30, 1906 to Ralph A. Schoenberg, as the assignee of Charles J. Klein, No. 811,410.

I have shown my mechanical movement operating a pendant switch and adapted to make and break the circuit therein, though it is to be distinctly understood that my invention is not to be limited to this or any other particular use.

My invention further relates to a pendant switch which includes my mechanical movement, all of which will be hereinafter described in the specification and pointed out in the claims.

In the accompanying drawings showing illustrative embodiments of my invention, and in which the same reference numerals refer to similar parts in the several figures, Figure 1 is a top view of my invention used as a pendant switch, the cap and insulating disk being removed; Fig. 2 is a vertical section on the line 2—2 of Fig. 1, illustrating my invention used as a pendant switch; Fig. 3 is a horizontal section on line 3—3 of Fig. 2; Fig. 4 is a vertical section substantially on the line 4—4 of Fig. 2; Fig. 5 is a detail perspective view of the rotary or rocking body driven member; Fig. 6 is a side elevation of my pendant switch, the cap being removed from the insulating protecting base, the locking rings being shown in section; Fig. 7 is a detail perspective view of one of the tension members; Fig. 8 is a detail perspective view of the preferred form of movable contact; Fig. 9 is a detail view of one of the binding posts; Fig. 10 is a side elevation of the other binding post; Fig. 11 is a plan view of the blank from which the support is made; Fig. 12 is a perspective view of the support made from the blank shown in Fig. 11; Fig. 13 is a detail plan view of the fiber bridge piece; Fig. 14 is a fragmentary detail sectional view of a modified form showing a different manner of connecting the cap to the base; and Fig. 15 is a perspective view of the screw threaded plate or nut which is used in the construction shown in Fig. 14.

In the illustrative embodiments of the invention shown in the drawing, 1 is a pendant switch which includes my mechanical movement to operate the movable contact 2, Figs. 1 and 8. It is, of course to be understood, however, that my mechanical movement is not to be limited in use to operating a movable contact of an electric switch.

My mechanical movement consists essentially of a rocking driven member 3, Figs. 2, 4 and 5 which is provided between its ends with a pair of coöperating inclined surfaces 4 and 5 having a common meeting edge 8. I also preferably provide the rocking driven member with another pair of coöperating inclined surfaces 6 and 7 having a similar common meeting edge 10.

Upon preferably each pair of inclined surfaces 4, 5 and 6, 7, a resilient member 12 is caused to operate, one resilient member for each pair of inclined surfaces, Figs. 2 and 7; though it is to be understood, of course, that my invention will operate successfully with only one pair of inclined surfaces and one resilient member coöperating with both inclined surfaces. These resilient members 12 are preferably formed out of a single piece of metal such as spring metal, preferably stamped out of a single piece and bent into the position shown so that they will preferably, though not necessarily, be composed of two side members 13 and 14, the meeting surfaces of these two side members being preferably formed in a segment of a circle 15, to add additional strength to the resilient member 12 and to increase its resiliency and longevity. One of the side members 13 is provided with a laterally extending finger 16 which lies in an aperture within the reciprocating member 17 or 18 which is the preferred means of securing the resilient member to the reciprocating member. The other side member 14 has its end 19 preferably bent slightly

back upon itself to form a curved engaging surface to contact with the inclined surfaces 4, 5 and 6, 7 of the rocking driven member 5, it being understood that the end 19 of one resilient member will coöperate with only each pair of inclined surfaces passing over their meeting edges to get from one inclined surface to the other inclined surface of that pair. It is, of course, to be understood that the rounded end of the tension member 12 may be omitted and that the signal integral spring may be otherwise shaped or formed without departing from my invention.

The rocking driven member 3 is supported in any suitable manner which will permit it to have free rocking movement, but prevent any lateral movement on its part. One or both, if two are used, of the resilient members 12 are reciprocated so that the spring member or members will contact with each pair of inclined surfaces 4, 5, and 6, 7 which will cause the rocking driven member 3 to alternately rock with a quick snap, which can be used for many different purposes and in many locations where such a movement is desirable. For purposes of illustration I have shown the alternate rocking of the rocking driven member 3 alternately rocking the movable electrical contact 2.

In using simply one of the resilient members 12 with the rocking driven member 3, the reciprocation of the tension member, which for purposes of illustration we will assume has its member 19 resting upon the surface 20, Fig. 5, of the rocking driven member 3 will cause this member 19 to slide upon the inclined surface 4 until it reaches substantially the edge or point 9 when the member 19 of the resilient member 12 will instantly fly over or snap onto the point 21 on the surface 5. While this resilient member is moving from the point 20 to the point 9, the side member 14 is made to approach the side member 13 and store up energy in the resilient member. This energy is instantly released by the side member 14 springing away from the side member 13 the moment that the engaging surface 19 of the resilient member passes or snaps from the point 9, Fig. 5, to the point 21 on the surface 5. This movement, of course, will cause the rocking driven member 3 to rock with an instantaneous snap.

When the engaging surface 19 of the resilient member 12 is reciprocated from the point designated 21 on the surface 5 to the point designated 20, Fig. 5, on the surface 4, it will travel along the inclined surface 5 until it reaches substantially the point 11, the side member 14 being meanwhile caused to approach the side member 13, when the engaging surface 19 of the side member 14 will fly or snap instantly over onto the point designated 20 on the other surface 4, thereby again rocking the member 3 with a quick snap but in the reverse direction from that previously described.

The coöperating inclined surfaces 4, 5 and 6, 7 are preferably formed as illustrated in the drawing to permit the cumulative action of the resilient members 12, 12 to positively operate the rocking driven member 3. This alternate, or reverse reciprocation, of the resilient members 12, 12 may be accomplished in various ways. For purposes of illustration I have shown each of them mounted upon the reciprocating members 17 and 18, which are, in turn, connected to each other in any suitable manner such as by a lever 22; this will insure that as one of the resilient members 12 is moved from the point 20 to the point 21, Fig. 5, the other resilient member 12 will be simultaneously operated in the reverse direction. The two ends 82, 82 of the lever 22 coöperate with enlarged apertures or openings 83, 83 in the reciprocating members 17 and 18. It is, of course, to be understood that the movement of the second resilient member on the second pair of inclined surfaces 6, 7 will be exactly similar to the action just described, except the reciprocation will be reversed.

While my mechanical movement or means for converting motion is adapted for general application, I have for the purpose of this application shown it in combination with and as the operating mechanism of a pendant. This pendant switch 1 includes a single hollow insulating base 23 in which my mechanical movement, and the movable contact 2 being all the operating mechanism of the pendant switch, are received and thoroughly protected. Preferably, though not necessarily, this insulating base is formed cylindrical and is provided at one end with two openings 24 and 25 within which operate the reciprocating members 18 and 17 which, when my invention is used as a pendant switch, are push buttons.

On the interior of the insulating base 23 I form an annular flange 26 upon which the support 27, Fig. 12, rests. This support is preferably formed out of stamped sheet metal and from a blank 28, Fig. 11. When this blank is bent into the shape shown in Fig. 12, to form the complete support, it comprises legs 29, 29 which are apertured at 30, 30 for the reception of the axle or arbor 31, Figs. 2 and 4, upon which the lever 22 is mounted. Connecting these legs 29, 29 is the cross piece 32 having an integral arm 33 which is bent down between the legs 29, 29 to be substantially at right angles to the cross piece 32 and furthermore it is apertured at 34 to form a bearing for the concentric trunnion 35 of the rotating or rocking body driven member 3, Figs. 2, 4 and 5,

it being understood that the pairs of coöperating inclined surfaces 4, 5 and 6, 7 are arranged eccentric to the trunnions 35 and 40.

To prevent the support 27 from having relative movement to the insulating base 23 within which it is mounted, which would be objectionable, I preferably form the legs 29, 29 of sufficient length to rest upon the inturned flange 26 and to let their other ends 36, 36 substantially coincide with the horizontal shelf 37 formed in the upper portion of the single insulating base 23. Resting upon this shelf 37 and contacting with the ends 36, 36 of the support 37, I mount any suitable holding plate, preferably in the form of a fiber bridge 38, Figs. 4 and 13. This bridge plate is apertured at 39 to form a bearing for the other concentric trunnion 40, Figs. 4 and 5. This trunnion 40 is extended and preferably formed with a non-circular portion 41, Fig. 5 and with a screw threaded portion 42. Upon the non-circular portion 41 I mount the movable contact 2 which is provided with a non-circular aperture 43, Fig. 8 to fit over the portion 41. This movable contact 2 is preferably formed of two plates 44, 44 of conducting material preferably stamped out of sheet metal and connecting by a piece 45, Fig. 8. It is therefore provided at each end 46, 47 with a bifurcated arm adapted to receive between the plates 44, 44 the fixed contacts 48 and 49.

The fixed contact 48 is preferably formed of an integral portion of the binding post 50, Figs. 1 and 9, the post having two screw threads 51, 52, the former to coöperate with the screw threads upon the locking screw 53, Fig. 4 which is passed up through the opening 54 in the base 23. Similar screws 53 are used to secure the binding post 57. The ends of these screws 53 pass through the plate or fiber bridge 38 which is immovably secured to the base 23 by the same binding screws 53, as hold the binding posts 50 and 57 in their proper position. The movable contact 2 is kept in its proper position on the non-circular portion 41 of the rotary or rocking body driven member in any suitable manner such as by the nut 55.

After the parts are all in their proper position in the single inclosing and protecting insulating base 23, I preferably mount over them an insulating disk 56 preferably of mica, Fig. 3. To secure this disk in position and prevent its displacement I use these binding posts which are of peculiar configuration.

The binding post 57 to which is connected the fixed contact 49 is provided with an upwardly extending arm 58 provided with a slot 59. In positioning the insulating disk of mica, or other suitable material 56, after the mechanism has been inserted in the insulating protecting base 23, I place one edge of it in the slot 59, bringing it substantially horizontal with the shelf 37 and then bend down the end 60 of an upwardly extending arm 61 preferably formed integral with the binding post 50, Fig. 9.

After my mechanical switch has been installed in the insulating base 23 so that it is thoroughly housed and protected, I close the upper portion of the insulating member 23 by means of a cap 62 preferably of insulating material and preferably the same as that of the base 23. The feed wires 63 and 64 are passed through the mouth 65 in the top of the cap and around a bridge piece 66, their ends being then connected with the respective binding screws 67 and 68. Instead of knotting the feed wires 63 and 64 forming a knot which ordinarily could not be easily pulled through the opening 65 in the cap 62 I preferably provide the bridge piece 66, usually casting it integral with the insulating cap 62. By placing the feed wires on alternate sides of this bridge piece and arranging the openings as shown, any strain or pull upon the feed wires, or upon the pendant switch will be transmitted to the bridge piece 66 and through it directly to the cap 62. It is found in practice that this is a considerable advantage in preventing the feed wires being pulled away from the binding screws 67 and 68 and materially reduces the cost of installation in that the time to connect the feed wires is reduced and consequently the cost of labor, besides saving the additional wire which would be used to form a knot.

The cap 62 may be connected to the insulating base 23 in various ways. I may for example provide the cap 62 with an opening 69 for the reception of the screw 70, Fig. 14, and provide the base with cross holes 71, one cross hole for each screw 70; it of course being understood that the construction shown in Fig. 14 is duplicated. Within these cross holes 71 I may mount any suitable plate or other member, such as a nut 72 which will coöperate with the screw threaded end of the screw 70, and in this manner connect the cap to the insulating base 23. I have found in practice, however, that it is much more expensive to cast porcelain or other insulating material of which the base 23 would be formed with cross holes, and furthermore it is very difficult to plug up the openings such as 69 and the cross holes 71 with wax, composition, or other material, which will have the same color as that of the cap 62 and base 23, it being understood, of course, that preferably the insulating cap and base are glazed to present a neat and handsome appearance and sometimes the glaze is given any desired color. Plugging up these different openings with materials varying in color or shade from the insulating base and cap, for it is impossible to absolutely match the color

of the glaze on the cap and base, mars the appearance of the pendant switch. To overcome this objection and to obtain a better and cheaper construction I, in the preferred form of my invention, form an annular flange 73 upon the insulating base 23 and a similar annular flange 74 upon the insulating cap 62, Figs. 2, 4 and 6. To cooperate with these flanges so that the cap 62 and base 23 may be positively connected together, I may use any suitable locking means. Preferably I use two locking rings 75 and 76, the ring 75 having a reduced portion 77 to fit over the flange 74 on the cap, and the ring 76 having a similar reduced portion 78 to perform the same function with the annular flange 73 on the insulating base 23. These rings may be formed with any suitable coöperating locking surfaces. I have found in practice that a very efficient coöperating locking surface are screw threads, the female thread being formed upon one of the locking rings, for example the locking ring 75, and the male locking screw thread being formed for example on the other locking ring 76, though of course this arrangement may be reversed, or any other suitable locking rings or members may be used.

To give a neater appearance to my pendant switch and to protect the push buttons 17 and 18 from accidental blows, and also to very largely conceal them, I provide the under surface of the insulating base or receptacle 23 with downwardly extending ears 79, 79, Figs. 4 and 2. These ears serve to very effectually conceal the push buttons except when the observer is in line with both push buttons.

To permit the cap to be readily seated and properly positioned with relation to the base 23, and also to prevent relative rotation between the cap and base, I preferably, though not necessarily, form a recess 80 on the upper portion of the base 23 and a tongue 81 on the lower portion of the cap 62 to fit within the recesses 80 of the base 23, though of course, it is to be understood that this arrangement may be reversed, or any other similar means may be used, or that such groove and tongue may be omitted without departing from my invention.

In my pendant switch preferably no metallic or other covering is used to incase the base 23 and cap 62, or any portion of them. On the contrary the insulating base and cap are preferably glazed as previously noted, or decorated in any suitable way so as to present an artistic appearance. The cost therefore of a metallic casing is dispensed with and if the base and cap are glazed they present a surface which can be easily cleaned. When locking rings are used such as 75 and 76, they may be formed of different material and if of metal they would tend to enhance the appearance and beauty of the pendant switch.

It will be further noted that the insulating inclosing base 3 in addition to inclosing and protecting the mechanical movement also serves as a guide for the push buttons 17 and 18.

By using my invention a quick or instantaneous make of the electrical current, as well as a quick or instantaneous break of it, is insured, preventing arcing or burning out of the mechanism.

Having thus described this invention in connection with the illustrative embodiments thereof to the details of which I do not desire to be limited, what is claimed as new and what is desired to secure by Letters Patent is set forth in the appended claims:

1. An article of manufacture for a pendant switch consisting of a push button provided with an opening and with a substantially V-shaped resilient member having two side members, one side member being provided with a laterally extending finger secured in the opening in the push button, the other member being provided with an operating surface.

2. In a pendant switch the combination of a hollow insulating receptacle adapted to receive and entirely protect the switch mechanism, a support mounted in the receptacle and provided with a bearing for the rocking driven member, a rocking driven member having coöperating inclined surfaces at an angle to the longitudinal axis of the driven member and having a common edge also at an angle to the longitudinal axis of the driven member, a bridge plate provided with an aperture to form the other bearing for the rocking driven member, a movable contact carried by the rocking driven member, fixed contacts with which it coöperates, means to hold the fixed contacts and the bridge piece within the insulating base or receptacle, connected push buttons, a resilient member carried by one of the push buttons and adapted to contact with both inclined surfaces on the driven member to store up energy in the resilient member to rock the driven member.

3. In a pendant switch the combination of a hollow insulating receptacle adapted to receive and entirely protect the switch mechanism, a support mounted in the receptacle and provided with a bearing for the rocking driven member, a rocking driven member having two pairs of coöperating inclined surfaces, each pair having a common meeting edge, a bridge plate provided with an aperture to form the other bearing for the rocking driven member, a movable contact carried by the rocking driven member, fixed contacts with which it coöperates, means to hold the fixed contacts and the bridge piece within the insulating base or receptacle,

connected push buttons, and a resilient member connected to each push button, one resilient member to coöperate with each pair of coöperating inclined surfaces on the rocking driven member, a hollow insulating cap, and means to secure the cap to the hollow insulating base.

4. In a pendant switch the combination of a rocking member, means to operate it, a movable contact mounted on the rocking member, a binding post provided with a fixed contact and an upwardly extending arm, a second binding post provided with a fixed contact and an upwardly extending slotted arm, and an insulating disk adapted to coöperate with the slot in one binding post and with the upwardly extending arm of the other binding post which is adapted to be bent down over it.

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Witnesses:
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