H. HANSEN.

ELECTRIC SWITCH.

APPLICATION FILED JUNE 7, 1915.

1,183,376.

Patented May 16, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

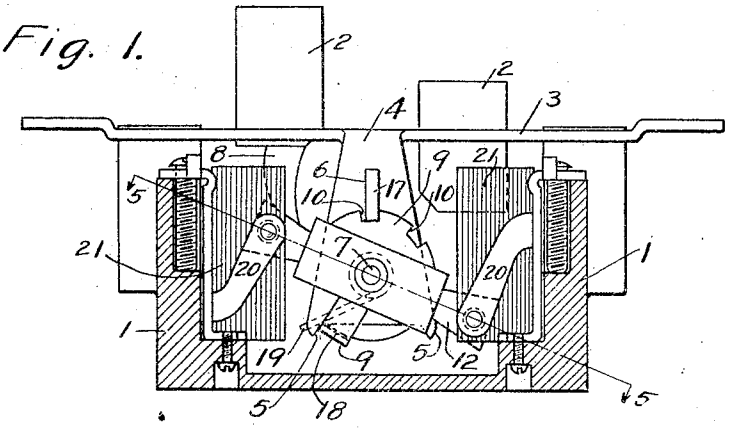


Fig. 2.

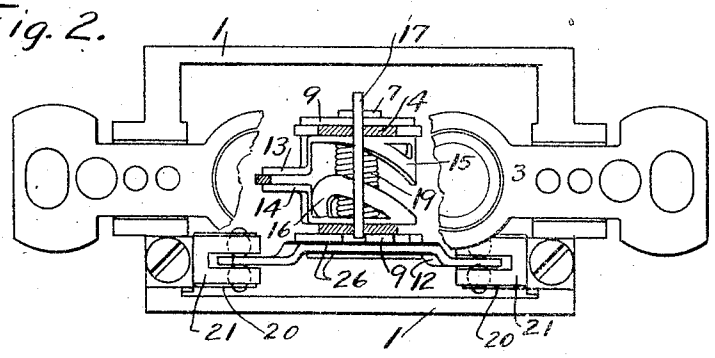


Fig. 3.

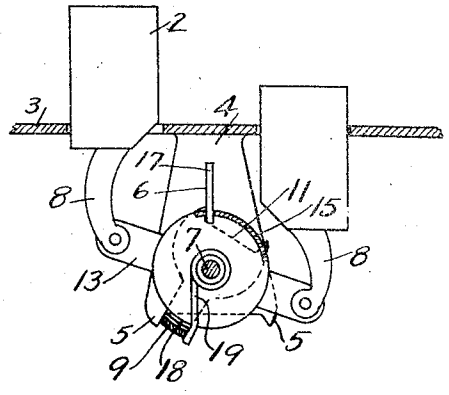
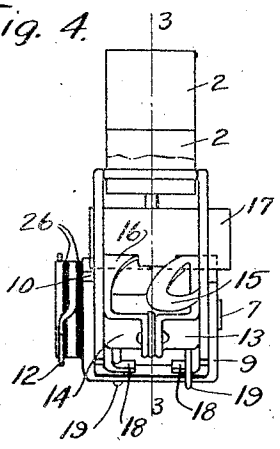


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

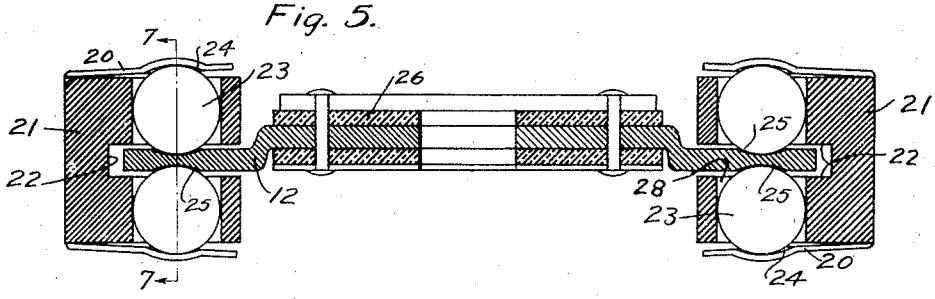


Fig. 6.

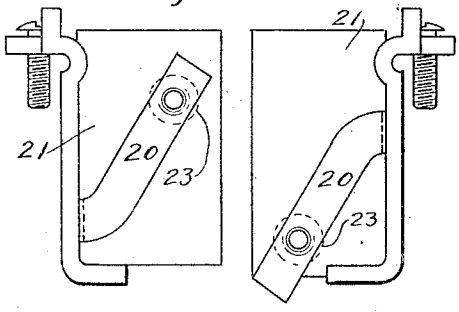


Fig. 7.

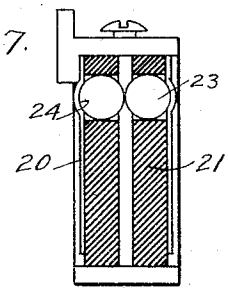


Fig. 8.

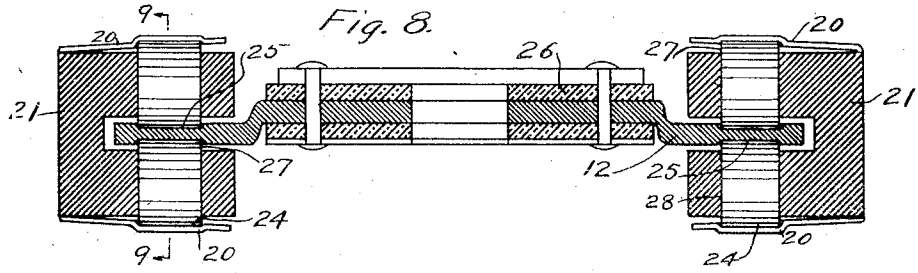
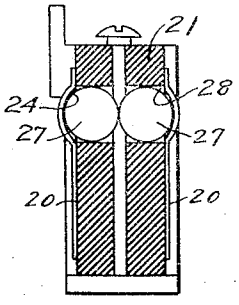


Fig. 9.



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Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,183,376. Specification of Letters Patent. Patented May 16, 1916.

Application filed June 7, 1915. Serial No. 32,570.

To all whom it may concern:

Be it known that I, HERMAN HANSEN, a citizen of the United States of America, and a resident of New York, in the county and State of New York, have invented a certain new and useful Improvement in Electric Switches, of which the following is a specification, the same being a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electric circuit-changing devices coming generally under the head of push button snap switches and designed for employment in the industrial application of electricity, as for example, in connection with electric lights and house wiring and for small power or heating purposes, etc., and in particular to a rolling-contact device preferably used in a switching mechanism of the class named by which the contact terminals may be positively and quickly locked in electric engagement with the main line terminals, or else locked in a position disengaged therefrom, without appreciable friction at the operative junction of the parts.

In the structure herein set forth the line terminals are protected by being spaced on a retainer therefor in which retainer the operative junction takes place, the parts being so arranged as to protect the said preferably spring terminals against possible fusion or grounding, on account of the said spacing and of the comparatively large size of the rolling-contact members located at the operative junction, whereby the friction ordinarily residing at the said contact point is avoided and greater ease of action of the parts is secured by the movement of the said automatically acting parts, the whole being of comparatively simple construction and operating with certainty and precision.

To attain the desired end, the invention consists in the construction, arrangement and operation of parts herein set forth.

In the accompanying drawings is illustrated one type of a switching mechanism in which the invention is embodied, in which the separate parts of the improvement are designated by suitable reference numerals in each of the views, and in which:

Figure 1 represents a side elevation, partly in section, of an instrument constructed according to my invention; Fig. 2 is a plan view of the same; Fig. 3 is a vertical section taken on the line 3—3 Fig. 4; Fig. 4 is an end elevation of the push buttons and parts adjacent thereto; Fig. 5 is a sectional view taken on the line 5—5 Fig. 1; Fig. 6 is a detail view of the terminals and supporting retainer; Fig. 7 is a detail view in section, taken on the line 7—7 Fig. 5; Fig. 8 is a sectional view, taken on a line similar to that of Fig. 5, of an instrument comprising another form of the embodiment of the invention; and Fig. 9 is a section taken on the line 9—9 Fig. 8.

Like reference numerals indicate like parts in all the views.

Referring particularly to the drawings, in which the preferred style of an electric switching mechanism is shown, it will be seen that the invention comprises the automatic rolling-contact elements herein set forth may be employed, as stated, not only with switches, whether snap or otherwise, but also in connection with any approved or suitable circuit changing device; but for the purpose of clearly explaining the operation of the same I have illustrated the invention as used in connection with an electric switch of the type patented by me on March 25, 1913, No. 1,057,147.

In the said drawings, 3 denotes a stationary bridge piece or bar having in this instance openings or orifices through which work the push buttons 2, and also preferably having means for engagement with an electrically non-conducting porcelain or fireproof composition casing 1. The said bar 3 has depending extensions 4 at the extremities of which are formed shoulders 5, and it is also made with slots 6 and with journals for a shaft 7 around which is coiled a spring 19. Rigidly secured to the ends of the shaft 7, at the exterior faces of the extensions 4, is a U-shaped part or movable bridge piece 9, the side portions of the same lying adjacent to the said extensions 4 being enlarged and made with peripheral openings or slots 10 and 11 located at opposite sides of the part 9. The said enlarged portion of the part 9 also carries, at the front face thereof, switching contact blades or members 12 which are attached to, but preferably insulated as at 26, from a side

portion of the U-shaped piece 9 and which blades are oscillated when the said part is moved.

A rocking yoke, preferably made in two parts, 13, 14, and having the median portion of each part lying adjacent to the inner faces of an extension 4, works loose on the shaft 7, to the respective ends of which yoke are pivoted the extensions 8 of the push buttons 2. The elements 13, 14, each also carry a cam, as 15, 16, which cams project toward each other and are turned in opposite directions, and each engage slots formed in the lower edge of a sliding and longitudinally reciprocating detent 17 which works in the slots 5 in such a manner that, when one end of the yoke 13, 14 is depressed by a button, one cam, as 15, will push the detent laterally in one direction, and when the other end of the yoke is depressed the other cam, as 16, will force the detent in the opposite direction.

Each part 13, 14 has an ear 18 which ears extend inwardly or toward each other. The ends of the spring 19, which tend to approach one another and to normally lie near each other, lie respectively against one ear 18 lying in the same plane and also against one edge of the cross bar of the part 9, and at the other side of the switch against the opposite edges of the other ear 18 and cross bar of the part 9. The ends of the detent 17 are adapted and arranged to respectively lie either in one of the small slots 10 of the part 9 and against one of the shoulders formed by the long slot 11 located at the other side of the device, or else in the other small slot 10 and against the other shoulder of the slot 11.

It has been found in practice that heavy sparking takes place at the contact blades 12 when the circuit is opened and if this is not prevented, it soon burns and roughens the surface of the blades and one or both of the preferably insulated line terminals 20, and consequently the switch is thrown out of service. Repeated occurrences of these flashings will soon heat up the parts and even result in fusing the terminals sometimes, and in occasioning grounding. In order to obviate this objection I have devised means for protecting the contact blades 12 and terminals 20 from heavy sparking by providing a retaining member, as a block 21, constructed and arranged to space the said terminals from the point of operative junction. Each of these blocks 21 has a preferably centrally located pocket or groove 22 which lies in the path of a contact blade or member 12, and is preferably provided with one or more recesses 28 located at an angle to said pocket in which are held automatically moving parts as rotary movable bodies, as balls 23 or rollers 27 or other solid or massive bodies, which are constructed and arranged to be held in seats or concaved cup-shaped portions or indentions 24 of the terminals 20 which latter lie upon the outer faces of the said retainers 21; while as stated, the operative junction is located in the said pocket containing the balls 23, and in which one of the contact members 12, having one or more indentions or cup-shaped recesses 25, works, the operative junction taking place between each of the said contact members 12 and the rounding faces of one or more of the said balls 23. The said balls 23 are separated by the contact members when the circuit is closed thereby forcing the free ends of the terminals, which are engaged with the opposite sides of the balls, in an outward direction. This action causes a partial rotation of the solid or massive balls 23 which movement serves, as they turn within the inclosing recess 28, to withdraw laterally from the operative junction (in lieu of the ordinary operation of the rubbing of one piece of metal along another one and then drawing away the former in the same plane) to prevent any injury from occurring to the parts, while at the same time, by the said movement occasioned by the said rotation of the balls, friction is avoided to a great extent and the ease of action of the switch is greatly increased from what would otherwise be the case.

In the embodiment of the invention shown in Figs. 8 and 9, I have illustrated solid or massive rollers 27 preferably held within the free ends of the terminals 20 which answer the purpose of the rolling-contact device already described, although I prefer to use in lieu thereof the balls 23 as hereinbefore set forth. An essential feature of the invention in this particular is the means by which the intermediate movable devices located within the retainer shall work with a rolling-contact in the movement thereof at the operative junction of the parts, the said intermediate devices being constructed and arranged to be displaced by the contact member when engaged therewith and to resume their normal positions again when disengaged therefrom.

The operation of parts is as follows, the same being in the position shown in Figs. 1 to 4, where the circuit is shown as being closed. By gradually pushing the raised button 2 in a downward direction, in order to open the circuit, the extension 8 thereof forces the left hand end of the rock yoke 13, 14 downwardly and the ear 18 of the part 13, which was previously in alinement with the horizontal portion of the bridge piece 9 (as shown in Fig. 3) will move one end of the spring 19 toward the right, thereby increasing the tension of the same, the other end of the spring being prevented from moving, with its ear 18, by being held immovable by resting against the opposite edge of the

opposite end of the horizontal portion of the bridge 9 which latter still rests against the left hand shoulders 5 of the depending extensions 4, the ends of the spring being on opposite sides of their adjacent ears 18 and of the horizontal part of the element 9. Upon the continued depression of the button, the rock yoke 13, 14, is swung farther around, which movement causes the cams 15, 16, to force the detent 17 to the left (in the position shown in Fig. 4) until it passes through the slot 10 at the right hand of the side part of the bridge 9 far enough for the slot in the same (out of which the cam 16 has in the meantime passed) to register with the left hand side piece of the said bridge piece, and for the right hand end of the detent 17 to no longer project out from the slot 6 at the right hand side of the part 4. The bridge piece 9 being now free to move is forced ahead by the left hand leg of the spring and swings around toward the rising button, thereby moving the contact members to an inoperative position, farther movement being prevented by the impingement of the right hand shoulder of the slot 11 with the detent 17 and that of the horizontal part of the bridge 9 against the right hand ears 5 of the extensions 4, the other end of the detent 17 now registering with the other slot 10. When the pressure on the depressed button is released, the rock yoke 13, 14, has sufficient play to swing around slightly in the opposite direction, thereby causing the ears 15, 16, to force the detent 17 to move a sufficient distance to engage the said slot 10. When the newly raised button is now again depressed the parts are moved in the opposite directions to those already described and the detent 17 is pushed to the right (in the position shown in Fig. 4) a sufficient distance for the left hand edge of the same to clear the slot 10 in the side part of the bridge 9, whereupon the parts will again assume the positions shown in the drawings. In the first operation described of depressing a button, in order to open the circuit, the contact members 12 enter their respective pockets 22 and engage the balls 23 in the recesses 28, all of the parts being so inclosed that there is no opportunity for the electric fluid to leap across an open gap as would otherwise be the case. The said operation serves to move the terminals 20 outwardly by the impact of the separated balls 23, a good contact being thereby secured. Upon the manipulation of the other button, however, the contact members are removed from the retainer and the terminals and balls resume their original normal positions. The line terminals are tangentially arranged as regards the path of the oscillating or rotary movable circuit changer, as are also the insulating members. The rotary electrically conducting members, which may be either balls or rollers, are inclosed in the insulating members which in turn are inclosed by the line terminals which serve to press the said rotary bodies together.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications within the scope of the claims will occur to persons skilled in the art.

What I claim as my invention is:—

1. In a device of the class described, an oscillating circuit changer, an adjacent insulating member, a line terminal, rotary electrically conducting members supported by the insulating member and located so as to lie in the path of the circuit changer, one at least of said rotary members being electrically connected with the line terminal.

2. In a device of the class described, a movable circuit changer, an adjacent insulating member formed with a channel through which the circuit changer travels, a line terminal supported by the insulating member, rotary electrically conducting members also supported by the insulating member and located in the same so as to lie in the path of the circuit changer, one at least of said rotary members being electrically connected with the line terminal.

3. In a device of the class described, an oscillating circuit changer, an adjacent insulating member, a line terminal tangenitally arranged as regards the path of the circuit changer and the insulating material, rotary electrically conducting members supported by the insulating member and located so as to lie in the path of the said circuit changer, one at least of said rotary members being electrically connected with the line terminal.

In testimony of the foregoing specification I do hereby sign the same in the city of New York, county and State of New York, this 2nd day of June, 1915.

HERMAN HANSEN.

Witnesses:
F. A. Wurzbach.
Henry F. Keil.