C. J. KLEIN.

ELECTRIC ATTACHMENT DEVICE.

APPLICATION FILED NOV. 20, 1911.

1,160,619.

Patented Nov. 16, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

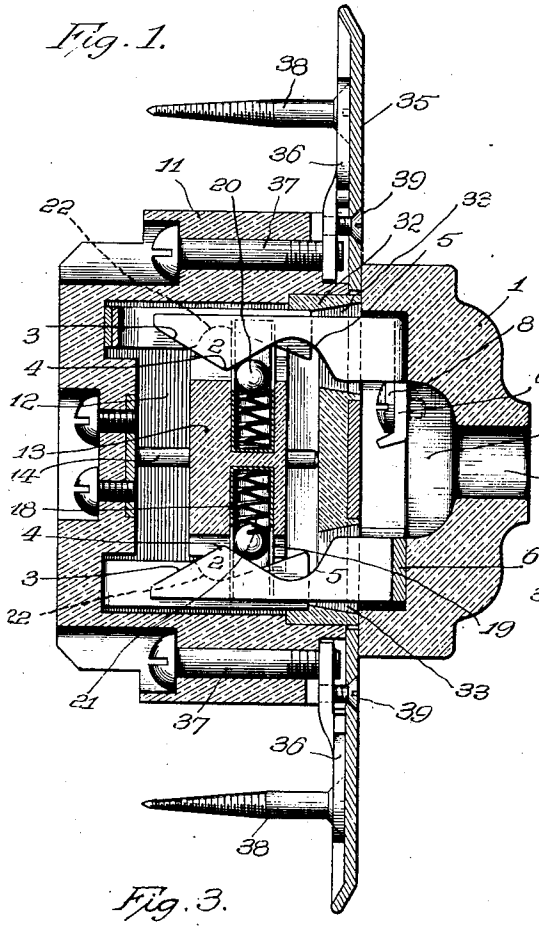


Fig. 2.

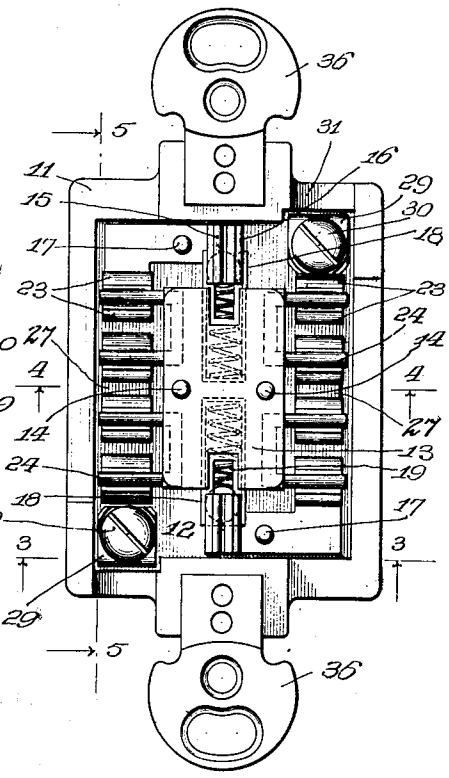


Fig. 3.

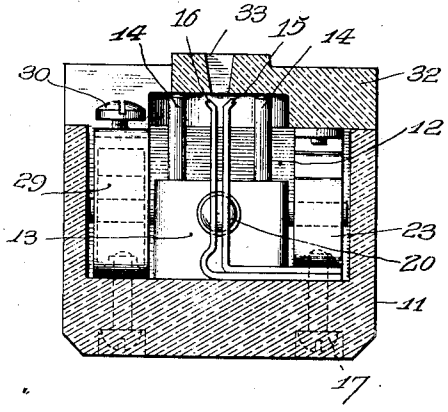
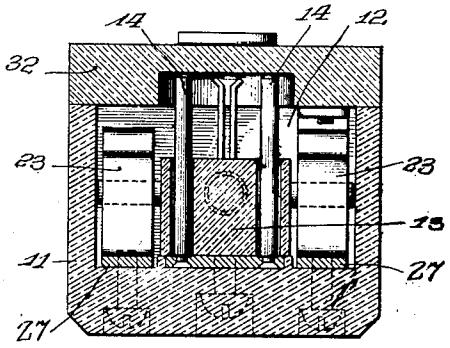


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

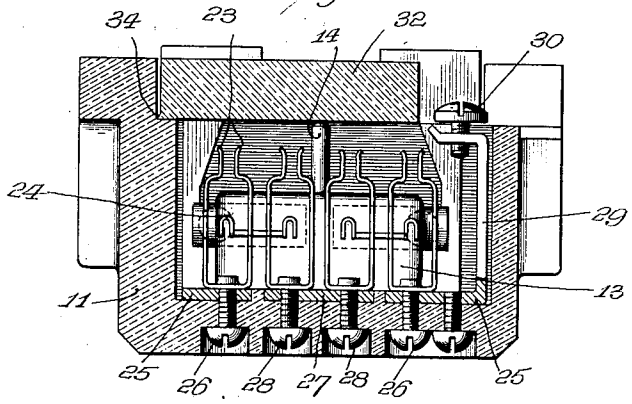


Fig. 6.

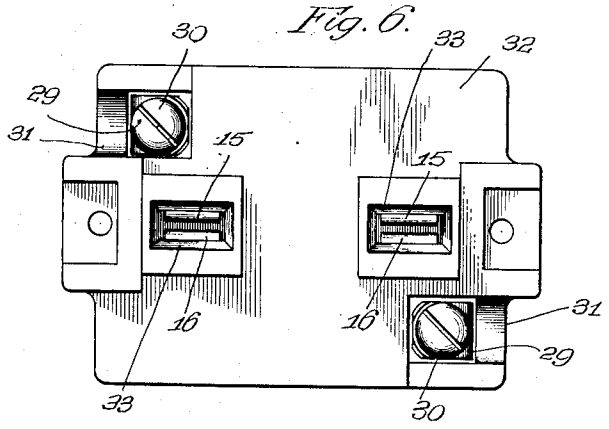
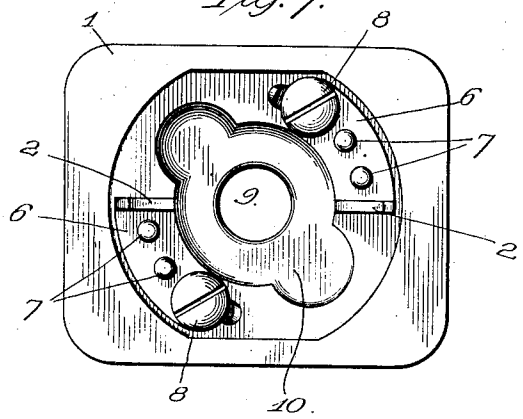


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES J. KLEIN, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE CUTLER-HAMMER MFG. CO., OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

ELECTRIC ATTACHMENT DEVICE.

1,160,619. Specification of Letters Patent. Patented Nov. 16, 1915.

Application filed November 20, 1911. Serial No. 661,253.

To all whom it may concern:

Be it known that I, CHARLES J. KLEIN, 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 Attachment Devices, 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 electric attachment devices.

It has among its objects to provide an improved electric attachment device of the type described in my copending application Serial No. 661,252, filed Nov. 20, 1911, wherein the contacts on the attachment plug do not carry the current as they are inserted or withdrawn from the receptacle but during their movement into the receptacle or from the same serve to actuate a snap switch mechanism which makes or breaks the circuit with a quick snap action and with a minimum of sparking.

A further object of my invention is to provide an improved reciprocating switch mechanism which, upon the insertion or removal of the plug member, is arranged to make or break the circuit with a quick snap action at a plurality of points in such a manner as to divide up the arc and materially reduce the amount of sparking at the contacts.

Other objects and advantages of my improved construction will hereinafter appear.

The accompanying drawings show one form which my invention may assume in practice. My invention is not, however, limited to this embodiment but may assume other forms.

In the views of these drawings:—Figure 1 shows a central sectional view of this form of device. Fig. 2 shows a top plan view of the receptacle with the cover plate removed. Fig. 3 shows a transverse sectional view on line 3—3 of Fig. 2. Fig. 4 shows a transverse sectional view on line 4—4 of Fig. 2. Fig. 5 shows a longitudinal sectional view on line 5—5 of Fig. 2 with a cover plate in position. Fig. 6 shows a top plan view of the receptacle with the face plate removed. Fig. 7 shows an end elevation of the plug member.

In the construction illustrated in the drawings I have shown a modification of the structure described and claimed in my co-pending application, Serial No. 661,252, filed Nov. 20, 1911. In this construction, instead of using a rotatable block or contact carrying member, which is continuously rotated upon the insertion or removal of the plug member to make or break the circuit at a plurality of points, I employ a reciprocating movable contact member which is actuated by the plug member to make or break the circuit at a plurality of points as the plug member is moved.

In a preferred form I provide a plug member 1 formed of insulating material and carrying a plurality of contact plugs 2 located substantially opposite each other and in the same plane. These plug members are preferably substantially flat and are provided with sloping cam surfaces 3 near their ends which converge at crests 4. In a preferred form one of the surfaces 3 on each contact plug is slightly curved or rounded at the bottom as shown at 5 in Fig. 1. As illustrated in that figure, the plug members 2 are preferably provided with extensions 6 on their inner ends bent substantially at right angles and attached to the body of the plug member 1 by any suitable means, as by rivets 7. In a preferred form these extensions 6 carry binding screws 8 arranged to receive the ends of the conductors which may be brought in through a suitable recess 9 in the body 1, and be knotted, if desired, in a suitable irregular shaped recess 10 in the inner face of the body portion.

The plug receptacle 11 is preferably formed of insulating material and is provided with a suitable chamber 12 arranged to receive and permit the reciprocation of a movable contact carrying member 13 which is actuated by the contact plugs 2. In a preferred form the chamber 12 is substantially rectangular in shape and carries within it a plurality of spindles or guiding members 14 which extend upward through the same and a bottom plate attached thereto, preferably substantially opposite each other as shown in Fig. 2. The movable contact member 13 is preferably arranged to be reciprocated upon and guided in its movement by these spindles 14. In a preferred form, the body portion of the movable contact carrying member 13 is formed of insulating material and is substantially rectangular in shape.

In a preferred form stationary terminal contacts 15 and 16 are seated in the recess or chamber 12 in the body portion 11 of the receptacle at the opposite ends of the movable contact carrying member 13. These terminal contacts are preferably formed of a plurality of strips of resilient sheet metal constructed as shown in Fig. 3, and are connected to the bottom of the base 11 by means of suitable screws or bolts 17. The contact plugs 2, when inserted in the receptacle, preferably pass down between these contacts 15 and 16. The circuit through these contacts to the line, however, is not completed so that upon the removal or insertion of the plug member the arcing is not taken at these contacts.

The movable contact carrying member 13 is preferably provided with a recess in each end arranged to receive cylindrical members 18 which in a preferred form have one end closed, while the other end is open and slotted as at 19 in order to permit the contact plugs 2 to pass through the same. Within each of the members 18 a steel ball 20 is preferably adapted to compress a coil spring 21 carried between the ball and the inner end of the raceway. This ball is preferably engaged by the cam surfaces on the plug members 2 and is forced in the raceways as the contact plug is inserted, to compress the spring.

In a preferred form the inner edges of the terminal contacts 15 and 16 are likewise provided with a cam surface 22. In a preferred form this cam surface is shaped substantially as shown in Fig. 1 so that its cam surface is substantially the opposite of one-half of the cam surface on the plug members 2. As illustrated in Fig. 5, these contact members preferably face the movable plug members 2. Thus when the movable contact member is in its normal position in the receptacle, the balls 20 are on the lower half of this cam surface as shown in that figure. When the plug member is inserted these balls ride upward on the lower edges of the cams 3 compressing their springs until they pass their crest, when they suddenly spring out and down the opposite slope of the same with a quick movement. As the plug member is still being inserted, the effect of the continued downward movement of the plug member is to cause the movable contact member 13 to be reciprocated in an upward direction with a quick snap action. Upon the completion of this movement, due to the location and arrangement of the balls and cam surfaces, the contact plugs are snugly held in position within the receptacle against accidental removal. Likewise, when the plug is removed, the balls 20 move down the upper slope of the cam on the members 2 and are forced inward until the crest of the cam is passed, when they suddenly spring outward and, as the cam member is withdrawn, pass quickly down the opposite slope. The effect of this movement is to cause the movable contact carrying member to be reciprocated downward with a quick movement until it occupies the position shown in Fig. 5, wherein the balls rest against the lower edge of the cam surface 22 on the contacts 15 and 16.

In order that the arcing may not be taken upon the contacts 15 and 16 and that the circuit may not be closed until the contact plugs are practically all the way in or out of the receptacle, I provide between the sets of contacts 15 and 16 a plurality of series of intermediate contacts 23 arranged to divide up the arc. These contacts are preferably arranged on opposite sides of the movable contact carrying member 13 in parallel rows and are preferably all of substantially the same construction as shown in Fig. 5, including two U-shaped arms which are formed of resilient material and are drawn closer together at their free ends in order to receive with a wiping contact, substantially U-shaped contacts 24 carried upon the opposite sides of the reciprocable contact carrying member 13.

In a preferred form the contacts 24 are connected in pairs in any suitable manner, preferably within the molded block 13 and are formed of single pieces of resilient metal which are bent into a substantial U shape as shown in Fig. 5, so that the arms of the U extend downward in the opposite direction of the arms of the U-shaped contacts 23. These contacts 23 are preferably mounted upon the bottom of chamber 12 as shown in Fig. 5, the end contacts being attached singly to conducting plates 25 by means of suitable screws 26, while the two center contacts are connected in pairs to one or more conducting plates 27 by means of suitable screw 28. In a preferred form one of the end contacts on each side of the movable contact member is connected to a terminal post 29 which carries on its upper end a binding screw 30, to which the circuit connections for the device may be made, while the diagonally located end contact is connected to the lower ends of the contacts 15 and 16. In a preferred form the end walls of the base 11 are cut away or recessed as at 31 to permit the ends of the conductors to be attached to these binding screws.

In a preferred form the receptacle 11 is provided with a cover plate adapted to close the chamber 12 and arranged to permit the reciprocation of the plug members through the same. If desired, I may use a cover plate similar to that shown in Figs. 5 and 6, wherein an insulating plate or base 32 is provided with suitable openings 33 arranged to permit the entry of the contact plugs 2, and is adapted to fit snugly within

a correspondingly shaped recessed portion 34 of the base 11. This base is preferably recessed as shown in Fig. 3.

In a preferred form the receptacle 11 is also provided with a face plate 35 which may be of the usual construction and may serve as a means for holding the plate 32 in position. The receptacle 11 may also be provided with a set of intermediate end plates 36 which are screwed to the outer surface of the same by means of bolts 37 and serve as a means for attaching the receptacle to its support as by means of suitable screws 38. As in the usual construction, the face plate 35 may be attached to the plate 36 by means of suitable screws 39 if desired. In a preferred form the outer ends of the bolts 37 and all the other screws extending through to the outer surface of the receptacle, are housed in suitable recesses.

When it is desired to close the circuit of the device to which the device or devices is connected, all that it is necessary to do is to insert the plug member. As the contact plugs are moved inward, the spring pressed balls 20 of the movable contact member 13 are forced into their runways by the cams 3 and energy is stored in the springs. When the balls pass over the crest of the cams, the springs move outward, throwing the balls rapidly down the opposite slopes of the cams. This, combined with the continuing inward movement of the cam members, tends to reciprocate the movable contact member with a quick snap action upon the spindles or supports 14, bringing the contact members 24 into engagement with the resilient contacts 23 with a quick sliding movement. As the movable contact member is not actuated until the contact plugs have nearly reached the downward limit of their movement, the circuit is thus not made or broken through these contact plugs but is first made or broken through a plurality of separate contacts connected together in series at a plurality of points on each side of the receptacle. By the provision of the multiple break the arc is, therefore, divided so that the injurious effects of the same on the contacts is materially reduced. Obviously I may by provision of a number of breaks divide up this arc to any desired degree. With the plug members 2 in their in-position the balls 20 rest on the upper slopes of the cam surfaces 3 and are held in contact with these surfaces by the extended springs 21 so that they have a firm grip, which tends to prevent the accidental removal of the contact plugs. When it is desired to remove the contact plugs, all that it is necessary to do is to pull out the base 1, which carries with it the contact plugs 2. As the contact plugs 2 are drawn out, the balls 20 ride down one side of the cams and are forced inward against the springs until the crest of the cam passes the same, when they suddenly spring outward and pass quickly down the opposite slope of the cam with a quick snap action, throwing the contact carrying member 13 downward upon the spindles 14 to break the circuit at the contacts 23. When in its lowermost position, the movable contact members 13 rest in substantially the position shown in Fig. 5, wherein the balls 20 engage the lower curved surface of the cam surfaces on the contact members 15 and 16, and the circuit of the device may not be again closed until the contact members 2 are re-inserted in the openings 33.

By my improved construction I have provided an improved electric attachment device wherein upon the insertion of the plug member, the movable contact member is reciprocated with a quick snap action in such a manner as to make the circuit at a plurality of points. Upon the removal of the plug member this circuit is broken substantially simultaneously at a plurality of points and the arc is thus reduced to any desired degree. This arc is not taken by the plug members and the circuit is not closed until these plug members have been shoved nearly home so that the possibility of arcing at the plug members and the destruction of the same is removed. Furthermore, by the provision of my improved reciprocating contact member, I am able to provide a snap switch mechanism which, when the plug members reach a pre-determined position, acts promptly and exceedingly quickly to make or break the circuit as desired. As in my previous construction, I am able in this construction to gain the advantages of the delayed closing of the circuit, and I am able to provide a device which may not be tampered with in such a manner as to cause a short circuit since the contact parts which close the circuit may not be actuated until the plug member is inserted, as the entry to them is restricted and the contact members perform the added function of a key. Thus, a person not provided with the plug member may not maliciously interfere with the operation of the device. By my improved manner of inclosing and mounting the receptacle, I am able to readily adapt the same to a wide range of uses. For instance, it may be readily inserted within a wall in substantially the same manner as a flush switch. Further, by my improved construction I am able to provide an automatic switching mechanism actuated upon the insertion of an attachment plug which is very rugged and adapted to withstand long use in service, and is also of a type which may be readily and cheaply manufactured.

While I have in this application described one particular form which my invention may assume in practice, I do not wish to be

limited to the specific construction herein described for purposes of illustration, but wish rather to include within the scope of this application all of those forms and modifications of this construction falling within the spirit of my invention.

What I claim as new and desire to secure by Letters Patent is:—

1. In combination, a plug receptacle, a switch therein having a sliding contact actuating member, and a plug having contacts to be inserted in said receptacle, said sliding member and said contacts of said plug having directly engaging cam and resilient parts, to close and open said switch upon insertion and withdrawal of said plug.

2. In combination, a plug receptacle, a switch therein including a sliding contact actuating member provided with resilient parts and a plug having contacts to be inserted in said receptacle and provided with cam surfaces to engage said resilient parts of said sliding member to close and open said switch upon insertion and withdrawal of said plug.

3. In combination, a plug receptacle, a switch therein including a sliding contact actuating member provided with resilient parts, a plug having contacts to be inserted in said receptacle and provided with cam surfaces to engage said resilient parts of said sliding member to close and open said switch upon insertion and withdrawal of said plug and stationary cams within said receptacle for engaging said resilient parts of said sliding member to maintain said switch open after the withdrawal of said plug.

4. In combination, a plug receptacle, a switch mounted therein and having a sliding contact actuating member provided with resilient parts, a plug having contacts to be inserted in said receptacle and having cam surfaces coöperating with said resilient parts of said sliding switch member to open and close said switch, and contacts within said receptacle to be engaged by said plug contacts and having cam surfaces coöperating with the resilient parts of said sliding switch member to maintain said switch open upon removal of said plug.

5. In combination, a flush receptacle, a switch mechanism therein having an operated member with associated contacts and means to receive and store energy for moving said member, and a plug having parts to enter said receptacle and coöperate with said means for effecting a storage of energy in the latter and for timing the expenditure of such energy to move said member with a snap action.

6. In combination, a receptacle, a switch mechanism therein having an operated member with associated contacts, a plug member for said receptacle, means associated with one of said members to receive and store energy for moving said operated member, and means associated with the other of said members to coöperate with said first mentioned means for effecting a storage of energy in the latter during initial insertion or withdrawal of said plug member and for insuring a sudden expenditure of such energy to move said operated member with a snap operation independently of the rate of movement of said plug member.

7. In combination, a receptacle, a switch mechanism therein having an operated member with associated contacts and means to receive and store energy for moving said member, and a plug having parts to enter said receptacle and coöperate with said means for effecting a storage of energy in the latter and for timing the movement of said member under such energy, said plug parts upon insertion directing the movement or said member, and said receptacle having parts associated with said means for directing movement of said member upon removal of said plug parts.

8. In combination, a flush receptacle having a plurality of stationary contacts (such as a, b, c, d,), a switch mechanism in said receptacle having an operated member with conducting parts to control circuit between pairs of said contacts (such as a, b and c, d) and having means to receive and store energy for moving said member, and a plug having a pair of contacts to enter said receptacle and engage two of said stationary contacts (such as a and d) and to coöperate with said means for effecting a storage of energy in the latter during partial insertion in or removal from said receptacle and for insuring and timing the expenditure of such energy to move said member for completing circuit after the engagement of said plug and stationary contacts and to open circuit prior to dis-engagement thereof.

9. In combination, a receptacle, a switch mechanism therein having an operated contactor bodily movable toward and away from the front of said receptacle and a plug, said plug and said mechanism having cooperating means to effect bodily movement of said contactor toward the front of said receptacle upon insertion of said plug and movement away from the front of said receptacle upon removal of said plug.

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

CHARLES J. KLEIN.

Witnesses:
H. L. Rockwell,
Geo. Haynes.