Dec. 1, 1931. M. W. McARDLE ET AL 1,834,793

ATTACHMENT PLUG FOR ELECTRIC HEATING DEVICES

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Fig. 9.

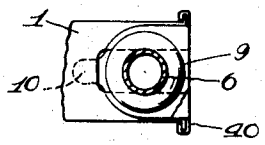


Fig. 12.

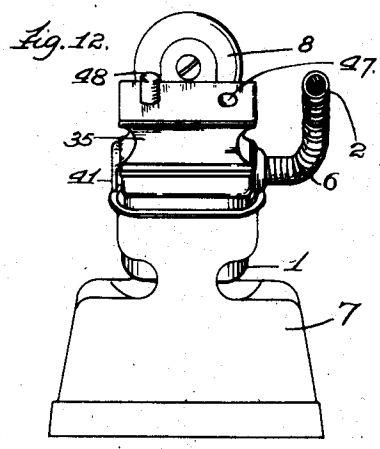


Fig. 1

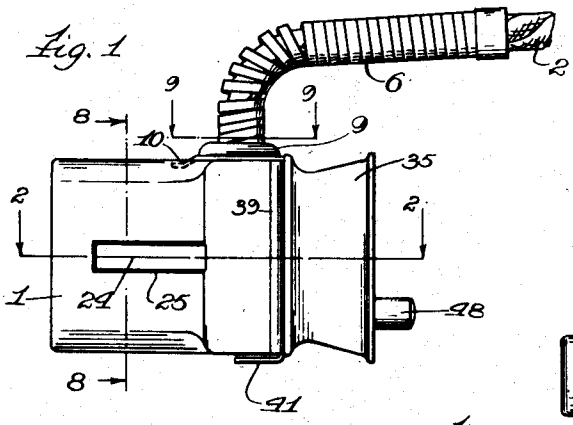


Fig. 3.

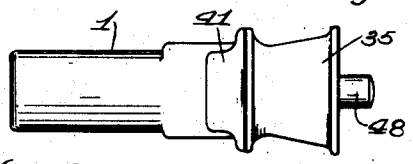
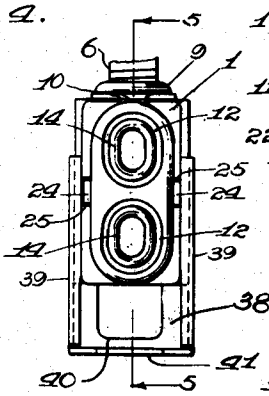


Fig. 4.



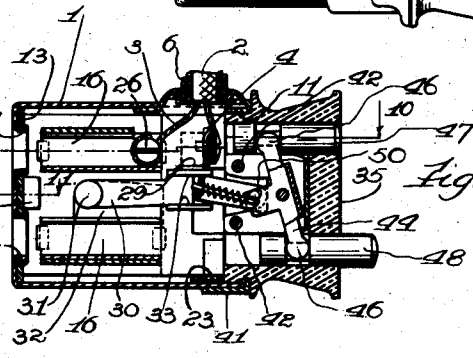


Fig. 5

Fig. 6.

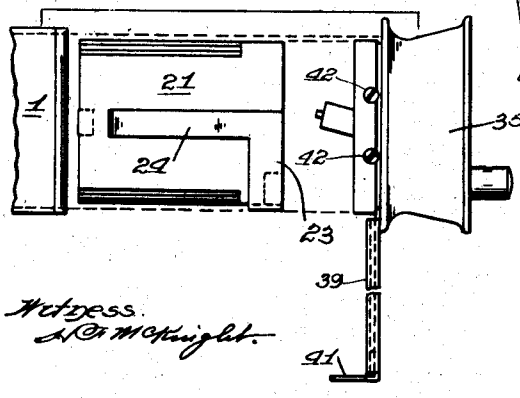
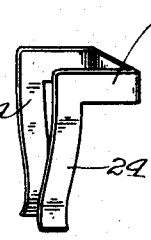


Fig. 7.



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ATTACHMENT PLUG FOR ELECTRIC HEATING DEVICES

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Fig. 2.

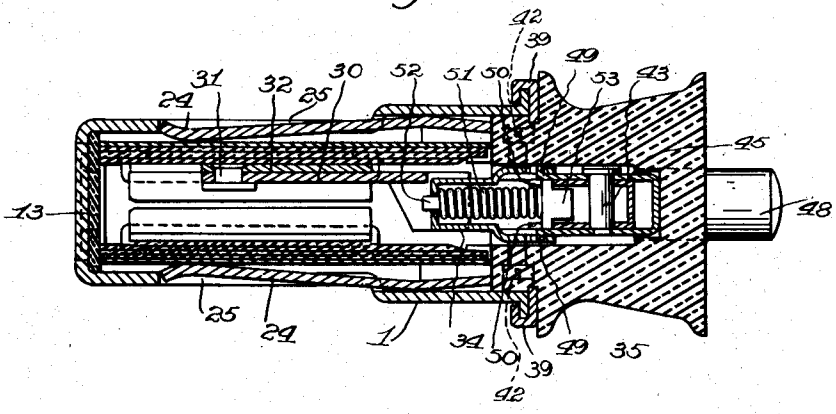


Fig. 10

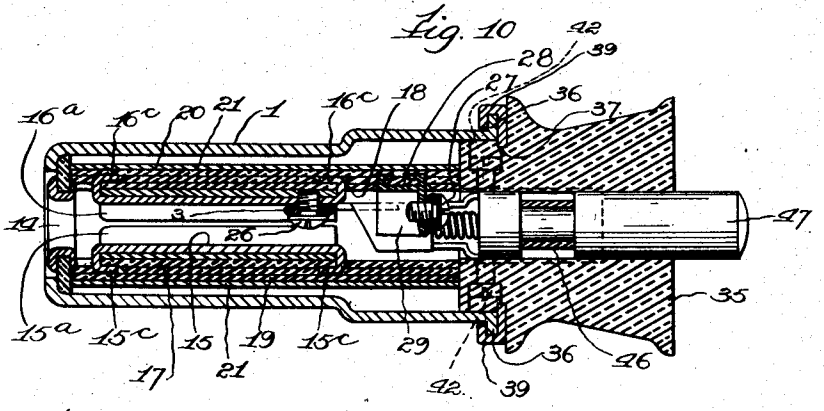
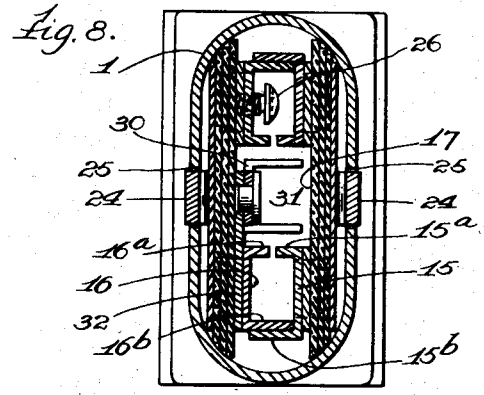
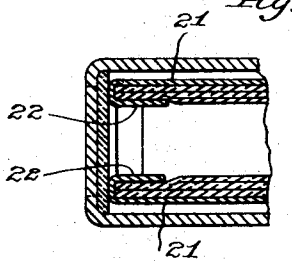


Fig. 8.



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Fig. 11.



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Patented Dec. 1. 1931 1,834,793

UNITED STATES PATENT OFFICE

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ATTACHMENT PLUG FOR ELECTRIC HEATING DEVICES

Application filed February 10, 1927. Serial No. 167,108.

This invention relates to attachment plugs of the type designed for use with portable electrical devices such as heaters, toaster stoves, flat irons and the like and the purpose of the invention is to provide a construction which shall be simple and economical both in the manufacture of the parts and in assembly of them and which shall combine with the attachment plug a control switch including a snap action arranged for ready removal and replacement if occasion should require. The invention therefore consists of certain elements and features of construction in combination, as herein shown and described and as indicated by the claims.

In the drawings:

Figure 1 is a front face view of a plug embodying this invention disconnected from the electrical device which it serves.

Figure 2 is a longitudinal section on a larger scale taken as indicated at line 2—2, on Figure 1.

Figure 3 is a side view of the plug shown in Figure 1.

Figure 4 is a view of the lower end of the plug showing the coupling member which secures the snap action in place as partially withdrawn in the process of removing the snap action assembly.

Figure 5 is a longitudinal section taken as indicated at line, 5—5, on Figure 4, except that the coupling member is shown in its normal operative position.

Figure 6 is a side view of certain of the parts in dis-assembled relation.

Figure 7 is a perspective view of a presser spring yoke.

Figure 8 is a transverse section taken as indicated at line, 8—8, on Figure 1.

Figure 9 is a detail section taken as indicated at line, 9—9, on Figure 1.

Figure 10 is a longitudinal section taken as indicated at line, 10—10, on Figure 5.

Figure 11 is a detail section taken as indicated at line 11—11 on Figure 5.

Figure 12 is a rear elevation of an electric flat iron fitted with the plug embodying this invention.

A serious problem in the design of attachment plugs for electrical devices, particularly for heating devices,—is to provide yielding pressure means for maintaining proper electrical contact at the connections between the plug and the appliance and at the same time protect such pressure means from deterioration by reason of the high temperatures to which they are subjected in use. In the present construction the spring element which furnishes this yielding pressure, instead of being housed within the plug is exteriorly exposed at all times so as to radiate heat and thus avoid acquiring an injuriously high temperature.

As shown in the drawings the contact elements are housed in a metallic shell, 1, from which the cable, 2, containing lead wires, 3 and 4, emerges at one side and extends in a coiled metallic sheath, 6, which is bent at right angles as indicated, so that when the plug is employed as shown in Figure 12 on an electric flat iron, 7, the cable, 2, will trend rearwardly and upwardly in a plane which is laterally offset from that of the handle, 8, and will thus be out of the way of the operator. The re-enforcing coil, 6, terminates in a fitting, 9, which is removably engaged with the shell, 1, by means of a tongue, 10, extending within the shell at one edge of the aperture which admits the lead wires, 3 and 4, and a hooked lug, 11, which embraces the upper edge of the shell as indicated on Fig. 5. At its lower end the shell, 1, is formed with apertures, 12, and this apertured end wall is lined at its inner side with a sheet of insulating material, 13, having similar but smaller registering apertures, each reenforced with an eyelet or bushing, 14, whose edges are spaced from the margins of the apertures, 12, to avoid contact with the shell. The openings in the eyelets, 14, serve to admit the usual contact prongs of the electrical appliance with which the plug is used, and therefore register with longitudinal spaces in the contact members within the shell. Each of these contacts consists of two metal parts, 15 and 16, enclosing a space of rectangular cross section. Said parts are of channel form having flanges, 15^a and 16^a, in abutting engagement, and flanges, 15^b and 16^b, which lap each other, as seen in Figure 8. The

parts, 15, are secured to a sheet of insulating material, 17, by lugs, 15^c, passing through said material and clinched over it. In a similar manner the parts, 16, are secured to a sheet of insulation, 18, by their lugs, 16^c. The clinched lugs are protected by overlying sheets of insulation at 19 and 20, and each of these laminated assemblies of insulating sheets is held together by a metal back plate, 21, having lugs, 22, clinched around the insulating sheets at their lower ends, and lugs, 23, similarly clinched over them at the upper corners. The sheets of insulation are of graduated width to fit the rounded contours of the shell, 1, as shown in Figure 8, and the two assemblies are arranged within the shell with the flanges, 15^a and 16^a, normally in engagement but with space for movement bodily of the two assemblies for slight separation of the contacts, 15 and 16, upon the entry of the contact prongs between said contacts. The two pairs of overlapping flanges, 15^b and 16^b, are disposed at opposite sides of the contact devices so as to prevent shifting of one assembly upon the other, the flanges, 15^b, having the effect of holding the two flanges, 16^b, between them in the spaced relation determined by the mounting of the parts on their respective insulating supports. In assembling the parts, the contacts, 15 and 16, thus secured in proper position upon their supporting sheets, 17 and 18, with the metal back plates, 21, applied, are easily assembled by merely fitting them together in the relation indicated in Figure 6. They are then secured in this position by means of a yoke member, 23, having spring arms, 24, disposed opposite each other and arranged to press against the back plates, 21, at the middle of their width so as to yieldingly hold the contact members, 15 and 16, toward each other while permitting a slight separation of said contacts when the prongs of the appliance are introduced between them.

The formation of the contacts, 15 and 16, with the flanges, 15^a and 15^b, as described, it may be observed, adapts them for co-operation with different forms of contacts in the implement to be connected; contacts consisting of round prongs being accommodated in the rectangular sockets formed by the two opposed laterally flanged contacts of the plug as most clearly understood from Figure 8; and contacts consisting of flat or knife-blade prongs being accommodated by entering between the opposed and co-operating flanges, 15^a and 16^a, of the sockets formed by said flanged contacts. To facilitate the co-operation with flat or knife-blade contacts the contacts, 15 and 16, are desirably dimensioned in respect to their flanges so that when the flange, 16^b, is seated at the bottom of the channel form of the opposed contact the flanges, 15^a and 16^a, are slightly separated for affording easy entry between them of the flat or knife-blade; and/or the foremost corners of the flanges, 15^a and 16^a, are slightly beveled to facilitate such entry as seen at 16^x in Figure 2.

The insulating bottom plate, 13, having been dropped into the shell, 1, the contact assembly with its spring yoke, 23, is slipped into the shell against the bottom plate, the yoke portion, 23, entering the upper part of the shell and the spring arms, 24, extending in registration with slots, 25, formed midway in the sides of the shell to permit free action of the spring arms while at the same time exposing them to the outer air so as to allow the radiation of heat from said arms before their temperature can rise to a degree likely to injure the temper of said springs.

The spring arms, 24, are slightly flexed at their end portions to afford definite points of bearing on the respective contact assemblies midway between the contact areas of the two contacts, 15 and 16, and at an intermediate point in the length of said contact areas. These details of the construction and the feature consisting in the freedom of the contact assemblies for bodily movement (as distinguished from the pivotal mounting) have the purpose of ensuring the contact of both contact prongs with the respective contacts, 15 and 16, and that such contact shall extend substantially over the entire length of the prongs.

One of the contact members, 16, carries a binding screw, 26, to which the lead wire, 3, is directly attached. The other lead wire, 4, is connected by a binding screw, 27, to the lug, 28, of a fitting anchored on the insulating sheet, 18, and having an up-standing contact lug, 29, for engagement with a swinging switch arm, 30, which is electrically connected with the other contact member, 16. Said arm, 30, is pivoted at 31, to a support, 32, extending from the under side of the part, 16, as seen in Figure 8, said support being clamped in position by the securement of the part, 16, to its insulating base sheet, 18.

The switch arm, 30, has spaced up-turned lugs, 33, at its movable end, one of said lugs serving for contact with the part, 29, and the space between them accommodating an actuator in the form of a U-shaped lever, 34, which is a part of a "snap action" assembly carried in the cap block, 35. Said block is of insulating material being molded in a form to serve as a convenient finger grip in applying or withdrawing the plug from the electrical device which it serves, and the block, 35, is secured to the upper end of the shell, 1, in a manner to permit of its easy removal therefrom.

The upper end of the shell, 1, is made with laterally projecting flanges, 36, while the lower portion of the cap block, 35, is formed with grooves, 37. When the reduced end

portion of the cap block, 35, is inserted in the upper end of the shell, 1, it abuts the laminated parts, 17, 19, 21 and 18, 20, 21, at such a position that its groove, 37, is just exposed above the flange 36. A rectangularly U-shaped locking member, 38, is formed with channel arms, 39, which fit over the flanges, 36, and simultaneously extend into the grooves, 37, when said member is slid laterally into position; its connecting yoke, 40, is formed with a finger piece, 41, by which the member may be pushed into position or removed when it is desired to detach the cap block, 35, from the shell, 1.

Within the cap, 35, the snap action for operating the switch arm, 30, is secured by transverse screws, 42, whose heads are slightly sunken to avoid danger of short-circuiting, and which extend through a U-shaped mounting frame, 43, accommodated in a suitable recess in the block and entered therein from the under side. A rocking lever, 44, is pivoted at 45 in said frame with its two arms, 46, engaged respectively with push buttons, 47 and 48 which are slidably carried in suitable ports in the block, 35. The frame, 43, has out-turned lugs, 49, which serve as pivots for the swinging actuator member, 34, which engages the switch arm, 30, and re-acting between the lower end of said actuator, 34, and a yoke at the end of the short middle arm, 50, of the lever, 44, a spring, 51, on a guide stem, 52, stresses the parts to hold them at one limit or the other of their range of movement and acts to carry them past the middle position when one or the other button is depressed. The actuator 34, being merely inserted between the lugs, 33, of the switch lever, 30, is readily withdrawn when the cap block, 35, is removed and if the snap action should require repair it can be removed from the block upon merely withdrawing the screws, 42, which hold the frame, 43, in place.

We claim:—

1. In an attachment plug, a shell apertured at one end to receive contact prongs and apertured at one side near the other end to admit circuit lead wires for connection with contact devices within the shell, together with tubular supporting means for said lead wires rigidly attached to the shell at its lateral aperture, said tubular support projecting laterally a short distance from said aperture to a substantially right angle bend from which it tends longitudinally of the plug and away from its said apertured end.

2. In an attachment plug, a pair of opposing supports of insulating material, contact members carried on the opposing faces of said supports and spring means urging the supports toward each other, said supports comprising flat sheets of insulating material and the contact members having lugs clinched through said material with protecting sheets of insulation overlying such clinched lugs.

3. In an attachment plug, a pair of supports of insulating material, and means by which they are mounted facing each other; contacts carried respectively on the proximate opposed faces of said facing supports, said contacts having flanges projecting away from the supports of the respective contacts toward the opposite supports, the flanges of the contacts mounted on one support being positioned and spaced for lapping and embracing the flanges of the oppositely mounted contacts, thereby positioning the parts with capacity for movement toward and from each other, and spring means urging the supports toward each other.

4. In the combination defined in claim 3, said contacts having mutually abutting projections which space their contacting surfaces apart by an initial distance to permit entry of a conducting member between them.

5. In the combination defined in claim 3, said contact comprising two contact members on each support spaced from each other, each of said members providing one of the lapping flanges.

6. In the combination defined in claim 3, said spring means comprising a pair of spring arms arranged to press against said supports at opposite portions thereof, and a yoke extending around said supports connecting the arms together.

7. In an attachment plug, a pair of opposing supports of insulating sheet material, contact members carried on the opposing faces of said supports and spring means therefor comprising a yoke fitted around one side of the assembled supports with spring arms extending from said yoke reacting to urge the supports toward each other and an enclosing shell formed with lateral openings to register with said arms allowing free movement thereof and radiation of heat therefrom.

8. In the construction defined in claim 3, flanges extending from the edges of the respective contacts opposite those from which the overlapping flanges extend dimensioned for slight spacing apart of their proximate edges when the opposed and co-operating flange contacts are stopped as to their approach by the inner-lapping flanges.

9. In an attachment plug, a pair of opposing supports made of insulating material, conductive contact members carried on the opposed faces of said supports and spring means urging the supports toward each other, said contact means having projections toward each other formed for interlocking said contact means in their relative spreading movement for admitting contact pins, said interlocking projections being arranged for limiting the approach of the contact members and spacing them apart to permit entry of the contact pins between said surfaces.

10. In an attachment plug, a pair of opposed supports made of insulating material, conductive contact members carried on the opposed faces of said supports respectively; an enclosing shell in which the two assemblies consisting each of an insulating support and a conductive contact member are mounted, the shell cavity being dimensioned longitudinally for accommodating said assemblies, the shell having means stopping said assemblies endwise in the shell, the shell cavity being dimensioned transversely for accommodating said assemblies with freedom for lateral movement, and spring means carried by the shell reacting on said assemblies respectively at their outer sides for stressing them yieldingly toward each other.

11. In the construction defined in claim 10, said contact assemblies being enclosed in the shell between the resilient means, devoid of fixed attachment to the shell at any point in their length other than that afforded by said resilient means, said resilient means engaging said assemblies respectively at intermediate points in the length of the contact members in a manner permitting the assemblies to rock longitudinally pivotally over the points of said engagement with the resilient means.

In testimony whereof, we have hereunto set our hands, this 3rd day of February, 1927.

MICHAEL W. McARDLE.
GEORGE BROWNING.