

March 1, 1938.

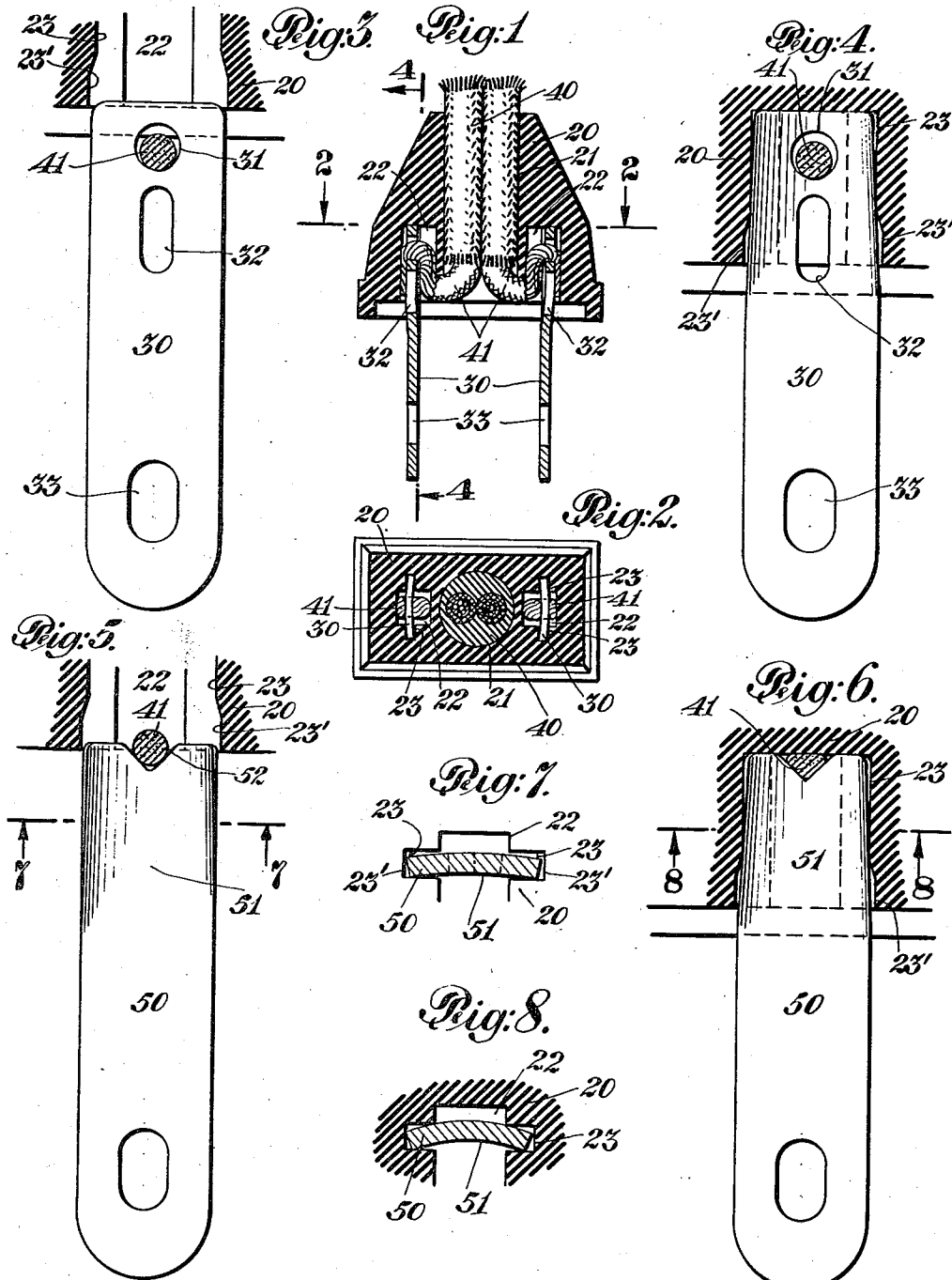
N. CHIRELSTEIN

2,110,035

ATTACHMENT PLUG

Filed June 4, 1936

2 Sheets-Sheet 1



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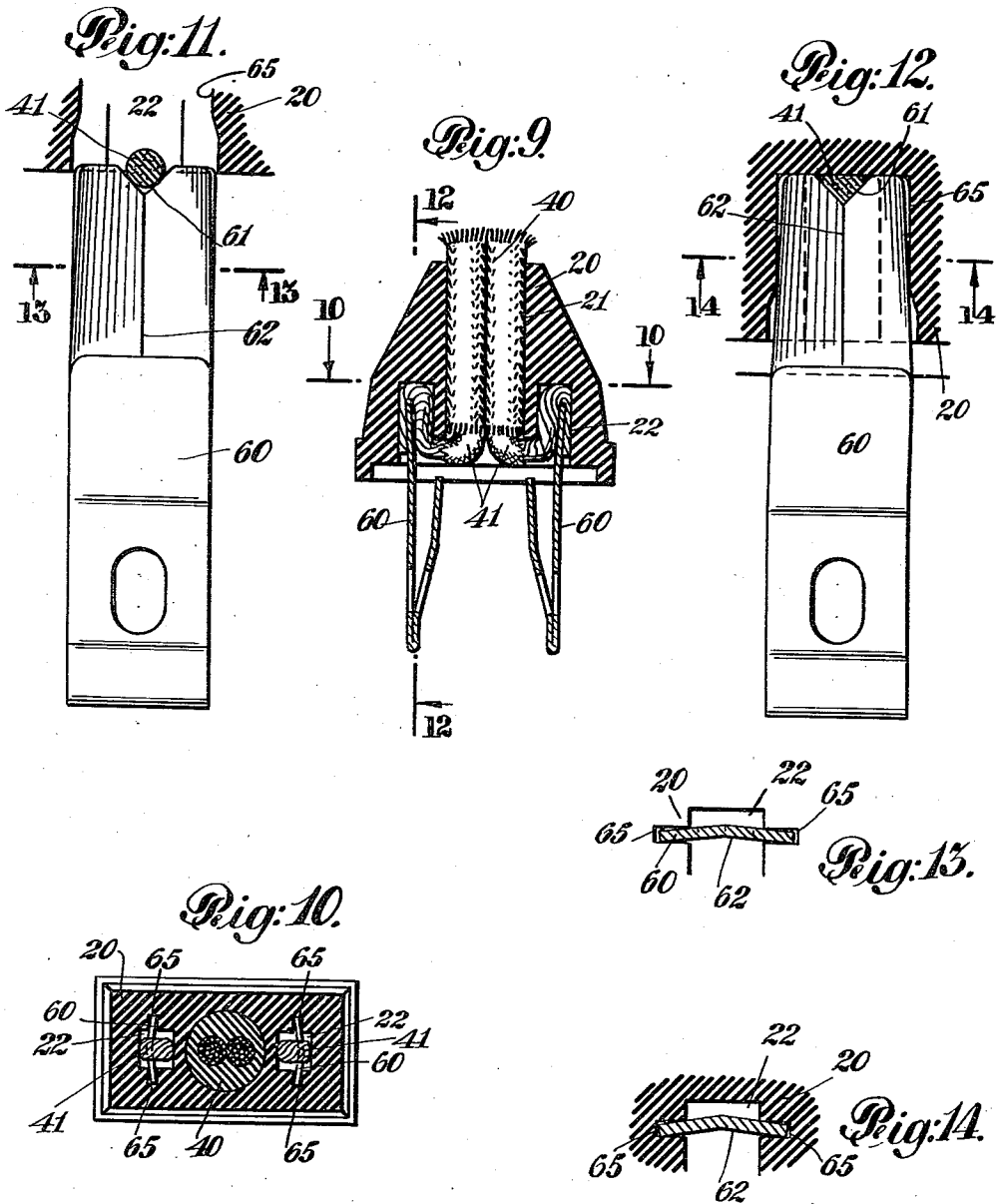
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2 Sheets-Sheet 2



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2,110,035

ATTACHMENT PLUG

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Application June 4, 1936, Serial No. 83,414

3 Claims. (Cl. 173—361)

My invention relates to wiring devices and particularly to attachment plugs of the type commonly known as end plugs or connector caps which are permanently connected to the ends of extension cords used to conduct current from a supply outlet to various types of electrically operated equipment. Such devices usually comprise an insulated housing and a pair of metal contact blades or prongs permanently secured in the housing together with the ends of the conducting wires of the extension cord. As conductor cords are sold complete at low prices, the end plugs attached to them must be produced very economically if the best quality of materials are to be used.

It is a broad principal object of my invention, therefore, to provide an improved end plug or connector cap which will require less material and fewer operations for its manufacture than similar devices heretofore known, while at the same time affording a strong and efficient structure for its purpose, thereby permitting the use of materials of the highest quality without increasing its cost.

The contact blades or prongs of end plugs are commonly secured in assembled relation to the insulated housing or cap by various means such as eyelets or rivets, or by press fitting the blades into recessed portions of the housing. The latter method is the most economical of material but since a press fit of sufficient tightness would ordinarily place too great a strain on the housing, it has heretofore been found necessary to make the housing unduly heavy and expensive or to supplement the frictional engagement of the parts by various interlocking arrangements. Such arrangements comprise shoulders or detents formed in the housing and engaging lugs, hooks or shoulders on the blades. I have found that these interlocking arrangements, in addition to increasing the amount of relatively expensive brass blade material required, are difficult to achieve because the undercut shoulders, abutments or detents in the moulded housing are difficult to form, requiring complicated moulds or depending for their formation on hit-or-miss moulding methods in which the housing material is relied upon to change its form after removal from the mould.

It is another principal object of my invention, therefore, to provide an improved attachment plug in which straight strip contact blades are more securely held in frictional engagement with recessed portions of a straight moulded housing, the frictional strain on the housing being dis-

tributed over a large area so that a light walled and comparatively inexpensive housing may be safely employed.

A further object is to provide a device embodying the foregoing improvements in which the conducting wires of an extension cord are securely and permanently connected to the contact blades in insulated relation to each other.

Referring to the drawings which form a part of this specification:

Figure 1 is a median vertical section of an end plug embodying my invention.

Figure 2 is a cross sectional view of the plug taken on line 2—2 of Figure 1.

Figure 3 is a view showing one of the contact blades in side elevation and a portion of the housing in cross section to illustrate the relationship of the parts as the blade is about to be assembled in the housing.

Figure 4 is a view similar to Figure 3 showing the relationship of the parts after assembly.

Figure 5 is a view similar to Figure 3 illustrating a modified form of contact blade.

Figure 6 illustrates the modified blade secured in the housing and is a view similar to Figure 4.

Figure 7 is a cross sectional view taken on line 7—7 of Figure 5.

Figure 8 is a sectional view taken on line 8—8 of Figure 6 and illustrates the improved press fit obtaining between walls of the housing and the modified blade.

Figure 9 is a vertical sectional view of a further embodiment of my invention.

Figure 10 is a cross sectional view taken on line 10—10 of Figure 9.

Figure 11 is a view showing one of the blades of Figure 9 in side elevation and illustrates the relationship of the parts as the blade is about to be fitted into the housing, a portion of which is shown in cross section.

Figure 12 is a vertical section taken on line 12—12 of Figure 9.

Figure 13 is a sectional view taken on line 13—13 of Figure 11, and

Figure 14 is a sectional view taken on line 14—14 of Figure 12 and illustrates the press fit effected between the walls of the housing and the blades.

The device comprises an insulated housing or cap 20 and a pair of contact blades 30—30. The cap is moulded of hard rubber, Bakelite, or other suitable insulating material and has a central wire passage extending therethru from its top to its face at 21. On each side of the central wire passage a deep recess or pocket 22 extends in-

wardly from the face of the housing and a pair of blade channels 23—23 are formed in opposite walls of each recess, the lower portions of the channels being enlarged at 23', substantially as shown, to facilitate entry of the blades into the channels. The passage, the recesses and their channels are all parallel with each other so that the cap may be completely formed in a mould of simple construction.

The contact blades 30 each consist of a short straight strip of stiff resilient brass perforate centrally of its width adjacent its inner end at 31 to receive one of the wires 41 of the insulated extension cord 40 and to weaken the blade. Directly under the hole 31 a central longitudinal slot 32 is formed to further weaken the blade for longitudinal bending. The usual opening 33 is provided adjacent the lower contacting end of each blade whereby it is adapted to engage with the protuberance commonly found in the contacted portions of the current supply outlet.

The thickness of the blades is slightly less than the width of the channels 23 and the width of each blade is slightly greater than the channeled diameter of the recesses above the enlarged guiding portions 23' of the channels.

To assemble the parts, the cord 40 is introduced thru the passage 21 and the ends of the wires 41 are passed thru the openings 31 of the blades, whereupon the edge margins of the blades are driven or pressed into the channeled portions 23 of the pockets 22. As a blade is forced into one of the recesses, being wider than the channeled portions thereof, the pressure on its edges causes it to buckle over the areas weakened by the openings 31 and 32, thereby causing the inner end portion of the blade to become tapered in its over-all width, relieving the housing of undue strain in directions edgewise of the resilient blade and causing the blade edges to exert a more even pressure throughout their restricted portions. As shown, the width of the channels are preferably so proportioned to the thickness of the blade strips that the blade in buckling will exert pressure against the side walls of the channels in transverse directions.

In other words, each blade exerts pressure edgewise in both directions, its edge margins at the same time bearing against walls of the channels on one side and the convexed face formed in the buckling action bearing against the side walls of the channels on the other side, thereby obtaining a tight and secure press fit in which the pressure and strain on the housing walls is distributed in four directions throughout the full depth of the housing recess, above the guide portions of the channels at 23'.

As shown, the wires 41 are snubbed over the lower end of the shorter inner recess walls and are compressed between the walls and the blades, thereby obtaining good electrical connection between the current wires and the blades and securely assembling the cap to the conductor cord 40.

The inner ends of the blades may be weakened for lengthwise bending in ways other than by the perforations 31—32. For example, the transverse resilience of the pocketed blade ends may be reduced by initially bending them, as by arching, creasing or fluting, and I prefer this method of preparing the blades because they are then pre-disposed to buckle in the desired direction and less strain is placed on the housing walls when they are inserted.

As shown in Figures 5-8, the inner end portion

of each blade 50 may be stamped concavo-convex to form an initial camber at 51, the inner end of each blade being notched at 52 to accommodate one of the wires 41 and for weakening the inner end of the blade to facilitate the initial buckling thereof as it is inserted in the housing.

To assemble the blades 50 in the housing, the cord 40 is first passed thru the opening 21 and the ends of its wires 41 are passed over the notched ends of the blades, whereupon the blades are driven into the channeled portions of the pockets 22. In this operation, as soon as the side edges of a blade engages the bottoms of the channels 23, the pressure on its edges causes it to buckle transversely over the areas 51, increasing their camber, the convexed face of the blade impinging against the outer side walls of the channel and against the wire 41 which is thereby squeezed against the outer wall of the pocket. The blade being bent longitudinally, the portions thereof presented against the bottom walls of the channels are the relatively sharp corner edges adjacent the concave face of the blade which have a marked tendency to bite into the housing material, thereby enhancing the quality of the frictional fit.

The embodiment shown in Figures 9-14 permits the employment of an extremely light walled housing, the pocketed ends of the blades 60 being only one-half the usual thickness and, having less resilient strength, they exert less strain on the housing walls. The outer contacting ends of the blades are formed as shown to obtain spring pressed contact and good mechanical connection with the standard female outlet or receptacle in which the blades are adapted to be inserted as taught in my U. S. Patent No. 2,037,562 granted April 14, 1936.

Like the blades 30 and 50, the prongs 60 are preferably formed from straight strips of resilient brass of thickness slightly less than the width of the channels 65 of the housing and slightly greater in width than the channeled diameter of the pockets 22. Each of the blades is creased or fluted longitudinally adjacent its pocketed end at 62, or it may be cambered in the manner taught in describing the blade 50, the inner end of each blade being notched at 61 in the same manner and for the same purposes as described in connection with the blade 50.

In connection with the preferred embodiments of my invention illustrated in Figures 5-14, the initial camber or convexity of the blades may be greater than illustrated and described and the over-all width of the blades at their inner ends may be no greater than the channeled diameter of the recesses. In such instances, where the width of the channels is only slightly greater than the thickness of the blade strips, the edge margins of the blades adjacent the concave face thereof will bear against the channel walls on one side and the convex faces of the blades will bear against the channel walls on the opposite side, thereby compressing the resilient blades to reduce their convexity and forcing the side edges thereof outwardly toward or against the bottom walls of the channels.

From the foregoing it will be understood that the embodiment of my invention to be employed in any particular case will depend upon the relative size, strength and resilience of the blade material and the size, weight and strength of the housing into which the blade is to be assembled. Also, the blades may be bent or prepared for lengthwise bending in ways other than I have

described, such modifications being within the scope of my invention as defined in the here appended claims.

I claim:

5 1. An attachment plug comprising an insulated housing having a wire passage therethru and recesses formed therein on opposite sides of said passage, insulated wires extending thru the pas-
10 sage, one of said wires extending into each of said recesses, and a contact blade carried in each of the recesses and projecting therefrom, said blades each comprising a straight strip of resilient metal having width greater than the
15 corresponding dimensions of the recesses, the inner portions of the blades being tapered and bent on a central longitudinal line, the edges of the blade being compressed between opposite walls of the recesses, and the convexed faces of the blades bearing against uninsulated end por-
20 tions of said wires to contact therewith and to compress the same against the recess walls.

2. An attachment plug comprising an insu-
lated housing having a wire passage therethru and recesses formed therein on opposite sides of
25 said passage, insulated wires extending into each of said recesses, a contact blade carried in each of said recesses and projecting therefrom, said blades each comprising a straight strip of resilient metal having width greater than the cor-
30 responding dimensions of the recesses, the inner portions of the blades being tapered and bent on

a central longitudinal line, the edges thereof being compressed between opposite recess walls, the said inner portions of the blades being per-
forate to reduce their resilient strength and thereby relieve excessive strain on the housing
5 walls, the convexed faces of the blades bearing against uninsulated end portions of said wires to contact therewith and to compress the same against the recess walls.

3. An attachment plug comprising an insu-
10 lated housing having a wire passage therethru and recesses formed therein on opposite sides of said passage, insulated wires extending thru the passage, a contact blade carried in each of said recesses and projecting therefrom, the inner end
15 of each blade being notched, whereby its resilient strength is reduced and excessive strain on the housing walls is relieved, one of said wires extending into each of the recesses and bent
20 over the notched end of one of the blades, said blades each comprising a straight strip of resilient metal having width greater than the diameter of the recesses, the inner portion of the blades being tapered and bent on a central longitudinal line
25 and the edges thereof compressed between opposite walls of the recesses, the convexed faces of the bent portions of the blades bearing against uninsulated end portions of said wires to contact therewith and to compress the same against a
30 recess wall.

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