Feb. 2, 1943. K. L. WOODMAN 2,310,142

ELECTRICAL APPLIANCE

Filed Jan. 29, 1941

Fig. 1.

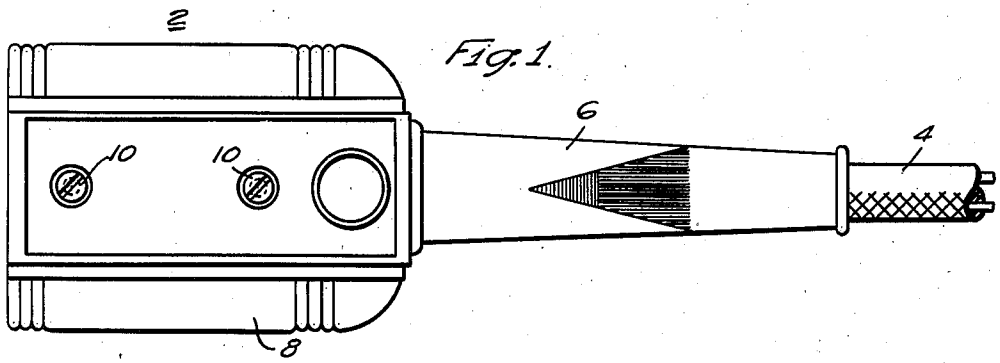


Fig. 2.

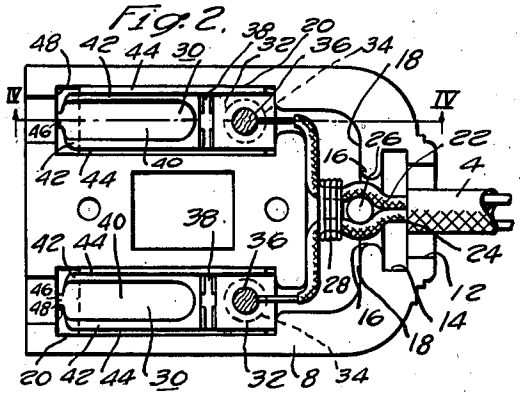


Fig. 3.

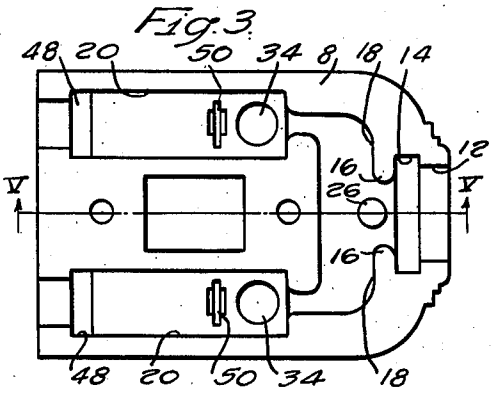


Fig. 4.

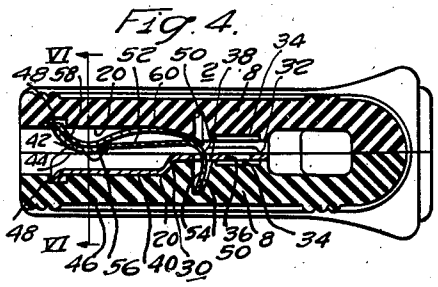


Fig. 5.

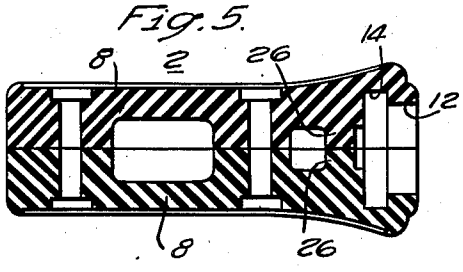
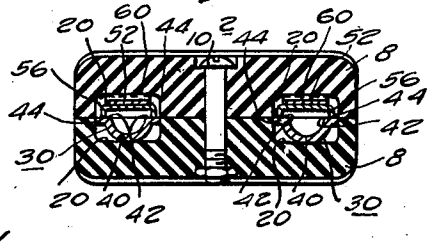


Fig. 6.



WITNESSES:

E. A. McElhiney.

A. T. Stratton

INVENTOR

Kenneth L. Woodman.

BY

F. W. Lyle.

ATTORNEY.

Patented Feb. 2, 1943 2,310,142

UNITED STATES PATENT OFFICE

2,310,142

ELECTRICAL APPLIANCE

Kenneth L. Woodman, Mansfield, Ohio, assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application January 29, 1941, Serial No. 376,425

7 Claims. (Cl. 173—332)

This invention relates, in general, to readily detachable electrical connections and, more particularly, to appliance plug connector elements.

In appliance plug parts of the female type, it is important to not only obtain good electrical contact with a male plug part when inserted therein, but it is also important to provide a construction which is extremely rugged in construction, and will have a long life without impairment of the holding ability of the plug part. This is especially important where these plugs are used with electric heating appliances and, therefore, may be subjected to wide variations in temperature.

Accordingly, one object of this invention is to provide a novel plug construction of the famale type having resilient holding means outside of the electric circuit through the plug.

Another object of this invention is to provide a novel plug construction of the type described wherein the parts thereof are especially susceptible to easy assembly so as to be locked in operative position upon securement of the plug halves together.

Another object of this arrangement is to provide a novel arrangement in a plug of the type described for anchoring conductors leading into the plug against forces tending to move the conductors outwardly of the plug.

A still further object of this invention is to provide a novel plug construction of the type described which may be easily assembled, and which at the same time will be capable of efficient operation, and have a long life.

These and other objects of this invention will become more apparent upon consideration of the following detailed description of a preferred embodiment thereof when taken in connection with the attached drawing, in which:

Figure 1 is a plan view of a connector plug constructed in accordance with this invention and showing a portion of a conductor associated therewith;

Fig. 2 is a plan view of the plug shown in Fig. 1 with one-half of the plug body removed;

Fig. 3 is a plan view of one half of the plug body with all contacts and other parts removed;

Fig. 4 is a sectional view taken substantially on the line IV—IV of Fig. 2;

Fig. 5 is a substantially central sectional view through an assembled plug body, for example, on the line V—V of Fig. 3; and

Fig. 6 is a transverse sectional view taken substantially on the line VI—VI of Fig. 4.

In Fig. 1 there is illustrated a plug generally indicated by the numeral 2 having a plural conductor cord 4 associated therewith, together with a reinforcing sleeve 6 secured to the plug 2 for distributing the bending of cord 6 adjacent plug 2. The plug 2 comprises a pair of identical plug halves 8 secured together in face-to-face relation by a pair of screws or rivets 10 passing through aligned apertures in the plug halves. Inasmuch as the plug halves 8 are identical in form, only one will be described in detail.

Referring to Fig. 2 of the drawing, it can be seen that each plug half 8 is provided at one end with a single central, semi-circular groove 12, which when the plug halves are assembled will form a central opening for receiving cord 4, and one end of reinforcing sleeve 6. Inwardly of groove 12 of each plug half there is provided an enlarged grooved portion 14 for receiving an anchoring flange or the like (not shown) integral with reinforcing sleeve 6. The sleeve 6 is preferably of resilient material, such, for example, as rubber or the like, so that it may be compressed slightly when the plug halves are assembled on one end thereof. Inwardly of the enlarged groove portion 14 in each plug half there is provided a pair of spaced opposed shoulders 16, forming a restricted passageway which opens into a transversely extending passageway 18, at the ends of which are provided spaced substantially parallel, longitudinally extending grooves 20, forming when the plug halves are assembled, branch passageways for the reception of spring contacts. These branch passageways formed by grooves 20 are identical in form.

As can be seen in Fig. 2 of the drawing, the conductors 22 and 24 of cord 4 extend into the grooves 12, 14 formed in the plug body and are separated by integral cylindrical projections 26 formed on each plug half and bent around these projections to be secured together on the opposite side thereof by a binding 28 which may be of wire or cord. The binding 28 effectively prevents withdrawal of cord 4 with respect to plug body 2. The conductors 22 and 24 inwardly of binding 28 are separated to extend in opposite directions along the transverse groove passage 18 and into grooves 20 in the branch passageways, to be secured to one end of contact strips 30 in the branch passages, respectively. As shown, each contact strip 30 is preferably of a relatively rigid conducting material, such, for example, as copper, brass, or the like, and is provided at the inner end thereof with a flat terminal portion 32 having an aperture 36 to se-

cure one of the conductors 22, 24 therefor, for example, as by welding or riveting. The aperture 36 in terminal portion 32 of each contact strip is adapted to be positioned on a relatively raised portion of a plug half having a relatively shallow circular depression 34 in the upper surface thereof, underlying the aperture 36 in the contact strip. The terminal portion 32 of each contact strip is further provided with a transversely extending slot 38 for a purpose to be hereinafter described. The outer end of each contact strip 30 is offset from the terminal portion 32 and transversely curved or grooved, as shown in Fig. 6 at 40, to provide shoulder portions 42 at opposite sides thereof, and laterally extending flanges 44 at the outer side of each shoulder 42. The extreme outer end of each contact strip 30 is bent laterally outwardly as at 46 to be seated in a depression 48 formed in its associated plug body half.

The slot 38 formed in terminal portion 32 of each contact strip is adapted to overlie a relatively deep depression 50 in its associated plug body half 8, to receive the laterally bent end 54 of a spring strip 52, as shown in Fig. 4. Spring strip 52 may be of any desired resilient material, and is preferably constructed of stainless steel. The main portion of spring strip 52 extends in overlying relation with respect to contact strip 30 and is provided adjacent the outer end thereof with side ears 56 extending towards the contact strip 30 and positioned to rest on shoulders 42 of the contact strip inside of flanges 44, as shown more particularly in Fig. 6. The extreme outer end of spring strip 52 is flared outwardly as at 58 to be received in depression 48 of the upper plug body, as viewed in Fig. 4, and the material of the strip is then reversely bent back along the outwardly flared portion and bowed outwardly as at 60, to engage the bottom of groove 20 in upper plug body half 8.

From the foregoing description of the structure of the parts of the plug body constituting this invention, the advantage of this construction from an assembling point of view may be readily appreciated. Thus, in assembling a plug constructed in accordance with this invention, it will first be noted that the plug body halves are of identical construction, and, accordingly, only one style of plug body half need be stocked. Obviously the contact strips 30 may be assembled to conductors 22 and 24, and the conductors separated and bound at 28 prior to their assembly with the plug body. The contact strips 30 may be then positioned in grooves 20 in one plug body half 8, as shown in Fig. 2, for example, and the conductors 22 and 24 positioned along grooves 18 and about pin 26 in the manner shown, whereupon spring strips 52 may then be merely placed over each contact strip 30 with the angularly directed end 54 of each spring strip inserted through slot 38 of each contact strip. The other plug body half may be then placed over this structure and secured in position by screws 10, or by rivets if desired, and the assembly is then complete. From the foregoing, it is obvious that the entire assembly of the plug may be completed without any special tools after the conductors 22 and 24 have been secured to contact strips 30. Furthermore, this assembly consists mainly in placing parts in grooves provided therefor in one plug body in the proper sequence, and thereafter merely securing the two halves of the plug body together.

In use, the plug constituting this invention is adapted to receive between each contact strip 30 and spring strip 52, a contact prong which may be provided on an electrical appliance such, for example, as a toaster, roaster, or hot plate. It is obvious that such a prong may readily enter between each contact strip and its associated spring strip due to the flared outer end construction of these strips, and that entry of such a prong into the plug body will cause strip 52 to move away from contact strip 30 to flatten out the reversely bent bowed portion 60 of spring strip 52 and bend the strip as a whole to thereby stress the spring strip to maintain the contact prong into firm engagement with contact strip 30.

It should be noted that the spring strips 52 are not connected in the electric circuit through the plug so that they are not subject to deterioration caused by alternating heating and cooling upon passage of various currents therethrough. This is of particular advantage in providing a plug which will have a long life and yet be efficient in operation. It should also be noted that all the parts are secured within the plug body and assembled therewith without the aid of any securing means other than cooperating recesses and projections provided on the plug body parts and the contact and spring strips. It should also be noted that cord 4, by virtue of binding 28 is prevented from moving outwardly with respect to the plug in the event a pull is exerted on the cord to detach the plug with respect to appliance prong contacts.

Having described preferred embodiments of the invention in accordance with the patent statutes, it should be understood that the invention is not to be limited to the particular embodiment disclosed herein, inasmuch as it will be obvious, particularly to persons skilled in the art, that many changes and modifications may be made therein without departing from the broad spirit and scope of the invention. Therefore, it is desired that the following claims be interpreted as broadly as possible, and that they be limited only by the prior art and by what is expressly set forth therein.

I claim as my invention:

1. In a device of the type described, means of insulating material defining a passageway open at opposite ends thereof, a conducting strip positioned at one side of said passageway adjacent one end thereof, conducting means adapted to be connected to said strip and extend out through the other end of said passageway, and an outwardly bowed, resilient strip in said one end of said passageway and having at least one end thereof adapted to cooperate with a contact inserted in said one end of said passageway to maintain said contact in pressure engagement with said strip, and having the other end thereof extending through an aperture in said strip and into a cavity in the wall of said passageway.

2. In a plug, an insulating body structure including a pair of identical plug halves adapted to be secured together in face to face relation, each of said plug halves having in its confronting face a pair of spaced substantially parallel grooves therein for freely receiving a contact strip, each of said strips having an opening adapted to be aligned with a depression in the bottom wall of each groove, a resilient strip for cooperation with each contact strip and having one end transversely disposed to extend through the opening and into said depression the groove receiving said contact strips, an intermediate

portion of each resilient strip being spaced from its associated contact strip, and the other end thereof being in engagement with said contact strip, whereby when said plug halves are secured together said resilient strip is operable to urge and maintain contact prongs inserted in said groove into engagement with said contact strips.

3. In a plug, an insulating body structure including a pair of identical plug halves adapted to be secured together in face to face relation, each of said plug halves having in its confronting face a pair of spaced substantially parallel grooves therein for freely receiving a contact strip, each of said strips having an opening adapted to be aligned with a depression in the bottom wall of its associated groove, a resilient strip for cooperation with each contact strip and having one end transversely disposed to extend through said opening and into said depression, an intermediate portion of each resilient strip being spaced from its associated contact strip, and the other end thereof being in engagement with said contact strip, whereby when said plug halves are secured together said resilient strip is operable to urge and maintain contact prongs inserted in said grooves into engagement with said contact strips, said strips having relatively outwardly flared outer end portions for facilitating the entrance of contact prongs therebetween, and transverse grooves at the outer end of said spaced plug grooves for receiving said flared ends of said strips.

4. In a contact construction, an elongated strip of conducting material having means adjacent one end thereof for facilitating connection of a conductor thereto, the other end of said conducting strip being grooved for cooperation with a contact prong, an intermediate transversely extending opening in said conducting strip, a resilient strip having an angularly disposed end adapted to be received in said opening, the other end of said resilient strip adapted to engage the grooved portion of said conducting strip, and at least intermediate portions of said strips being spaced from each other.

5. In a contact construction, a flat strip of conducting material having means adjacent one end thereof for facilitating connection of a conductor thereto, the other end of said conducting strip being grooved for cooperation with a contact prong, a resilient strip adapted to be in opposed relation to said contact strip, the outer end of said resilient strip having flanges to engage the grooved portion of said conducting strip at opposite sides of said groove, to maintain said strips spaced an amount sufficient to permit the entrance of a contact prong therebetween.

6. In a device of the type described, means of insulating material defining a passageway open at opposite ends thereof, a conducting strip positioned at one side of said passageway adjacent one end thereof, conducting means adapted to be connected to said strip and extend out through the other end of said passageway, and a resilient strip in said one end of said passageway having at least one end thereof adapted to cooperate with a contact inserted in said one end of said passageway to maintain said contact in pressure engagement with said strip, and having the other end thereof extending through an aperture in said strip to prevent relative movement of said strips.

7. In a contact construction, a flat strip of conducting material having side flanges and means adjacent one end thereof for facilitating connection of a conductor thereto, the other end of said conducting strip being grooved for cooperation with a contact prong a resilient strip adapted to be in opposed relation to said contact strip, the outer end of said resilient strip having flanges to engage the grooved portion of said conducting strip at opposite sides of said groove and between said side flanges to prevent relative lateral movement of said strips and to maintain said strips spaced an amount sufficient to permit the entrance of a contact prong therebetween.

KENNETH L. WOODMAN.