

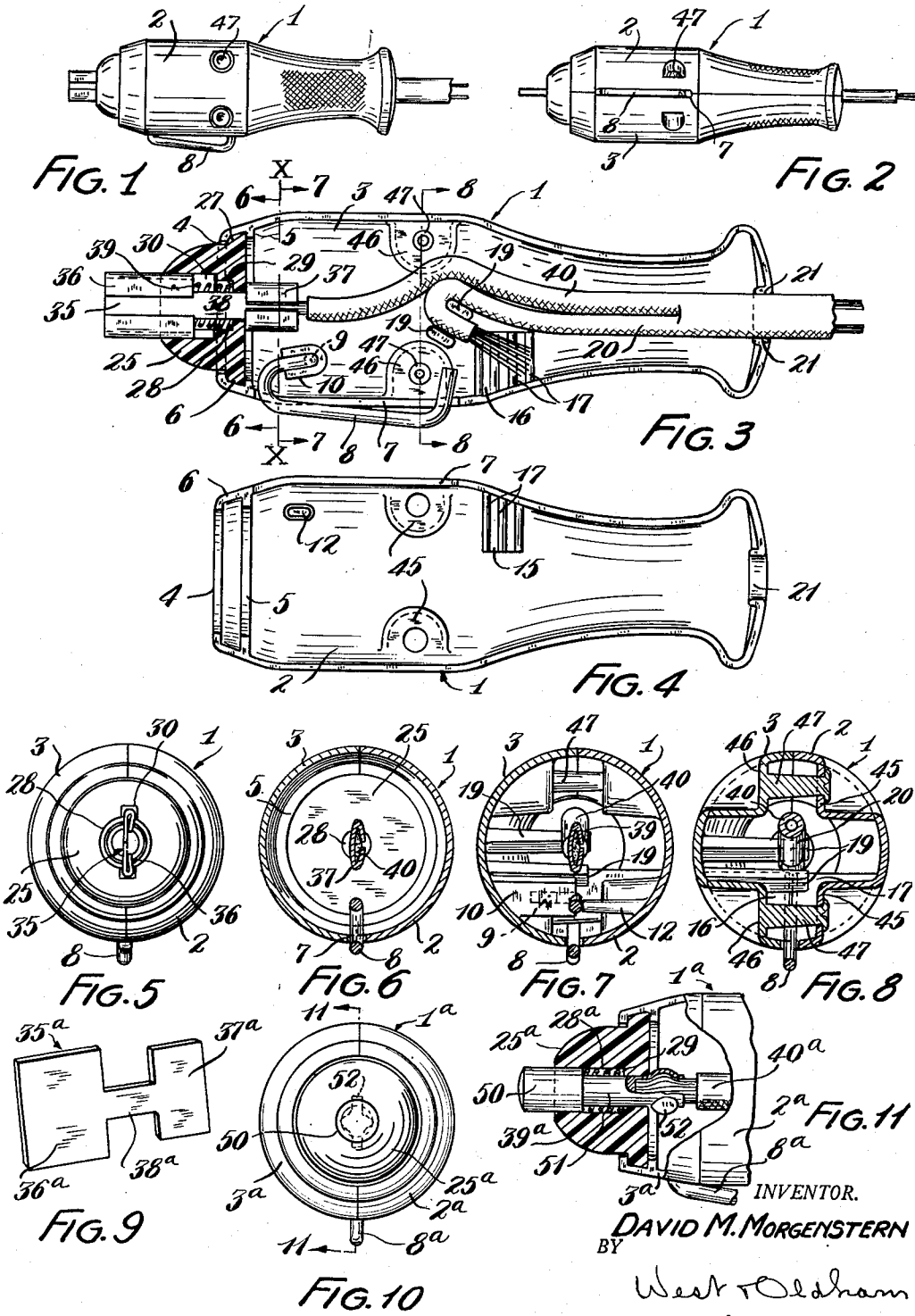
July 29, 1952

D. M. MORGENSTERN

2,605,318

ELECTRIC PLUG

Filed Jan. 4, 1951



# UNITED STATES PATENT OFFICE

2,605,318

## ELECTRIC PLUG

David M. Morgenstern, Euclid, Ohio

Application January 4, 1951, Serial No. 204,441

10 Claims. (Cl. 173-361)

1

This invention consists of improvements in electric plugs of the type adapted for insertion in the cigarette-lighter sockets that are common on the instrument panels of automotive vehicles. The plugs are used on the extension cords of trouble or portable spotlights, for example.

Objects of the invention are to provide a plug of this kind that consists of few parts, capable of being easily and quickly assembled, and in the assembling of which effective electrical connections are made without the need of solder; to provide a plug of the type aforesaid including, as its major parts, two casing sections that are secured together by integral fastening means, and which sections cooperate to hold other parts of the plug in place; and to provide a plug of this nature that is thoroughly reliable and serviceable, and wherein electrical contact of increased area between the plug body and socket wall is effected.

The foregoing and other objects are attained in the embodiments of the invention illustrated in the accompanying drawing wherein like reference characters designate like parts throughout the several views.

In the drawings, Figs. 1 and 2 are side elevational views of my improved plug, taken at right angles to each other; Fig. 3 is an elevational view of one of the casing sections, looking into the open side of the same, showing it wired and as having emplaced in its front end a button of insulating material, shown in central section, and supporting a contact member or plunger, this, and the following views, being on a scale considerably enlarged over actual size; Fig. 4 is a similar view of the other casing section; Fig. 5 is a front elevational view of the plug; Figs. 6 and 7 are sections on the line X-X of Fig. 3, looking in the directions of the arrows 6-6 and 7-7, respectively; Fig. 8 is a section on the line 8-8 of Fig. 3; Fig. 9 is a perspective view of the blank from which the contact member or plunger appearing in the former views is formed, and Figs. 10 and 11 are, respectively, a front elevation and a fragmentary sectional side elevation of a modification of the invention.

I will first describe the invention as illustrated in Figs. 1 to 9. The casing of the plug, designated generally by the reference numeral 1, is made up of metallic sections 2 and 3, desirably consisting of die castings. The two sections of the casing are shown as symmetrical and substantially identical on their exteriors, and their mating edges meet in the plane of the longitudinal axis of the casing. At its forward end,

2

each section is provided with semi-annular internal flanges 4 and 5 that set off channels 6. To the rear of the flange 5, one edge of each section is provided with an elongated shallow notch 7, and when the sections are assembled in proper relation to each other, these notches form a slot for the accommodation of a spring 8. This spring is formed from wire of suitable gauge and has its rear end turned inwardly at substantially right angles to its body while its forward end is given a reverse bend and then turned abruptly downwardly to provide a shank 9, shown in dotted lines in Figs. 3 and 7. This shank is received by a bore in a post 10 that extends from the semi-cylindrical wall of the casing section 3. The post has a depression at its outer end within which the adjacent portion of the spring 8 is confined by an overlying abutment 12 on the casing section 2 when the casing sections are in assembled relation, as shown in Fig. 17. Thus, the spring 8 is held firmly in place with the greater part of its body portion projecting through the beforementioned slot in rearwardly divergent relation to the adjacent side of the casing.

The casing sections 2 and 3 are formed on their interiors, rearwardly of the notches 7, with clamping jaws 15 and 16, respectively. The faces of these jaws are provided with ribs 17, those of one jaw alternating with the ribs of the other jaw. Near the inner front corner of the jaw 16, the casing section 3 is provided with spaced lugs 19, and extended rearwardly between the lugs is the front end portion of an insulating conductor 20 that is led in through an opening in the rear end of the plug, said opening being formed by registering notches 21 of the two casing sections. The end portion of the conductor is stripped of insulation and is adapted to be compressed between the clamping jaws 15 and 16 when the casing sections are secured together. The conductor commonly employed with this type of plug is made up of wire strands enclosed in a jacket of suitable insulating material, and the exposed ends of the strands are fanned out between the clamping jaws. Inasmuch as the ribs on one jaw are staggered with respect to those on the other, the strands are kinked about the ribs to insure proper mechanical as well as electrical connection between the conductor and the casing of the plug, and with the conductor 20 wrapped about one and engaged between both of the lugs 19 in the manner shown in Fig. 3, any pull on the conductor 20 exterior of the casing

would not be imparted to the clamped terminal portion of the conductor.

25 denotes a button of insulating material. The button is generally semi-spherical in shape and its circular end is surrounded by a flange 27 that fits within the channels 6 of the two casing sections, when said sections are in assembled relation. The button is provided with an axial bore 28, reduced in diameter at its inner end to provide a shoulder 29, and diametrically opposed guideways 30 extend along the forward portion of the bore. 35 is a contact member or plunger that has a contact head 36 at its forward end, a connecting sleeve 37 at its rear end, and a neck 38 intermediate said head and sleeve that is guided within the reduced inner end of the bore 28. Surrounding said neck, and confined between the aforesaid shoulder 29 and the head of the plunger, is a spring 39 that tends to hold the contact member or plunger in projected position with the sleeve 37 engaged with the inner end of the button 25. It should be explained that the contact member or plunger, in the present embodiment, is fabricated of sheet metal from the blank shown in Fig. 9; and that the sleeve 37, in its original condition, is cylindrical and of a size to pass through the reduced end of the bore 28. A second insulated conductor 40 is led in through the opening in the rear end of the casing, and its forward end is stripped of insulation and inserted into the sleeve 37 after which the sleeve is flattened, as shown in Figs. 3, 6 and 7, so as to produce a secure mechanical and effective electrical connection between the conductor and the contact member or plunger 35. With the sleeve 37 spread out in the manner described, it is considerably wider than the diameter of the reduced end of the bore 28 so that it will serve as a stop to limit the outward movement of the contact member or plunger.

Near the rear end of the cylindrical portion of the casing 1, the sections 2 and 3 are formed with depressions of a shape to provide parallel wall portions 45 and 46, respectively, from the latter of which extend integral rivets 47 that have their ends projected through holes in the wall portions 45 and beyond which the rivets are headed, as best illustrated in Fig. 8, thereby to securely and permanently fasten the casing sections together.

In Fig. 9, where the blank from which the contact member or plunger 35 is formed, the blank is designated, generally, 35<sup>a</sup>, and the parts from which the head, sleeve and neck are formed are designated, respectively, 36<sup>a</sup>, 37<sup>a</sup> and 38<sup>a</sup>.

In the modification illustrated in Figs. 10 and 11, a contact member or plunger is employed having a cylindrical head 50, shown as rounded at its forward end, and an axial cylindrical neck 51 extending rearwardly therefrom. The portion of the bore 28<sup>a</sup> of the present button 25<sup>a</sup> of insulating material, is of a diameter to receive for free movement therein the head 50, and the rear end of the bore is reduced in diameter to near that of the shank 51 providing an annular shoulder 29<sup>a</sup> between which and the head 50 of the plunger is confined a helical spring 39<sup>a</sup>. The rear end of the neck 51 has an axial recess into which is inserted the stripped forward terminal portion of an insulated conductor 40<sup>a</sup>, said terminal portion of the conductor being secured within the recess by deforming or pinching the sides of the neck rearwardly of the button 25<sup>a</sup>, as indicated at 52. Thus, a stop is provided for limiting the forward movement of

the contact plunger. The sections of the casing 1<sup>a</sup>, in Figs. 10 and 11, are designated 2<sup>a</sup> and 3<sup>a</sup>, and the spring adjacent the side of the casing, 8<sup>a</sup>.

The manner of assembling the plug will be clear from the foregoing description, and in its use, the plug, grasped by the handle constituted of the rear end of the casing, is inserted into a cigarette-lighter socket in the customary manner so that the contact member or plunger 35 engages the axial contact at the inner end of the socket, while the spring 8, compressed against one side of the peripheral wall of the socket will urge the opposite side of the casing against the adjacent portion of said peripheral wall, thereby to ground the plug both through the metal casing 1 and the spring 8, thus greatly increasing the area of such contact over that of plugs wherein the casing is constructed of plastic having insulating properties, the sole grounding contact, in such instances, being through the spring.

Having thus described my invention, what I claim is:

1. An electric plug comprising a casing made up of two metallic sections, a button of insulating material confined between the front ends of said sections, a contact member extending through the button and exposed beyond the front and rear ends thereof, two insulated conductors leading into the rear portion of the casing, one having electrical connection with the inner end of the contact member and the other having its terminal portion uninsulated and clamped between opposed parts of the casing sections, fastening means securing the casing sections together, and a spring attached to the casing at one side thereof for contact with a side wall of a socket.

2. An electric plug according to claim 1, wherein said fastening means comprises a rivet formed integral with one section, the other section having an aperture through which the rivet is extended and beyond which it is headed.

3. An electric plug comprising a casing made up of two metallic sections, the casing having an opening at its forward end that is divided between the two sections, a button of insulating material in said opening and having parts inter-engaged with parts of the casing for holding the button in place, the button having an axial bore, a contact member disposed within said bore and exposed beyond the front and rear ends of the button, two insulated conductors leading into the rear portion of the casing, one having electrical connection with the inner end of the contact member and the other having its terminal portion uninsulated and clamped between opposed parts of the casing sections, fastening means securing the casing sections together, and a spring attached to the casing at one side thereof for contact with a side wall of a socket.

4. An electric plug comprising a casing made up of two metallic sections, a button of insulating material confined between the front ends of said sections, a contact member extending through the button and exposed beyond the front and rear ends thereof, two insulated conductors leading into the rear portion of the casing, the first conductor having electrical connection with the inner end of the contact member and the second conductor having its terminal portion uninsulated and clamped between opposed parts of the casing sections, spaced lugs on the interior of the casing between which a return bend of the second conductor is engaged to resist any pull exerted on the second conductor exterior of the

5

casing, fastening means securing the casing sections together, and a spring attached to the casing at one side thereof for contact with a side wall of a socket.

5. An electric plug comprising a casing made up of two metallic sections, a button of insulating material confined between the front ends of said sections, a contact member extending through the button and exposed beyond the front and rear ends thereof, each casing section incorporating a clamping jaw in opposed relation to the clamping jaw of the other section, two insulated conductors leading into the rear portion of the casing, one having electrical connection with the inner end of the contact member and the other having its terminal portion uninsulated and clamped between the aforesaid jaws, fastening means securing the casing sections together, and a spring attached to the casing at one side thereof for contact with a side wall of a socket.

6. An electric plug according to claim 5, wherein the clamping faces of said jaw are provided with ribs, the ribs of one jaw being substantially parallel to and alternating with the ribs of the other jaw.

7. An electric plug comprising a casing made up of two metallic sections, a button of insulating material confined between the front ends of said sections, a contact member extending through the button and exposed beyond the front and rear ends thereof, a clamping jaw incorporated in each of the casing sections adjacent one side thereof, each jaw having a clamping face in opposed relation to the clamping face of the other jaw when the casing sections are in assembled relation, spaced lugs on the interior of one of the casing sections forwardly and inwardly of the clamping jaw of said section, two insulated conductors leading into the rear portion of the casing, the first conductor having electrical connection with the inner end of the contact member and the second conductor having a return bend adjacent its forward end that is engaged between said lugs, the terminal portion of the second conductor being uninsulated and clamped between said jaws, fastening means securing the casing sections together, and a spring attached to the casing at one side thereof for contact with the side wall of a socket.

8. An electric plug comprising a casing made up of two metallic sections, a button of insulating material confined between the front ends of said sections, a contact member extending through the button and exposed beyond the front and rear ends thereof, two insulated conductors leading into the rear portion of the casing, one having electrical connection with the inner end of the contact member and the other having its terminal portion uninsulated and clamped between opposed parts of the casing sections, the

6

casing having an elongated slot at one side thereof defined by opposed edge portions of the two casing sections, a part on the interior of one of the casing sections adjacent the slot having a bore at substantially right angles to the plane of the slot, a wire spring having a laterally extending shank confined within said bore and shaped to extend outwardly through the slot and rearwardly along the side of the casing in divergent relation thereto and having its rear end turned inwardly for engagement through the adjacent end of the slot, the aforesaid part of the casing section being provided with positioning means between which the portion of the spring adjacent said shank is confined against lateral movement, the other casing section having an abutment overlying the last mentioned portion of the spring for confining said portion against dislodgment from between said positioning means, and fastening means securing the casing sections together.

9. An electric plug comprising a casing including a body of insulating material at its forward end, said body having an axial bore reduced in diameter adjacent its rear end to provide a shoulder, and having, also, diametrically opposed longitudinal guideways opening into the front portion of the bore, a contact plunger fabricated of sheet metal and having a relatively wide flat head at its forward end and a sleeve formation at its inner end and a flat neck intermediate the head and sleeve consisting of a single thickness of the sheet metal, the plunger extending through said bore and arranged with the lateral edges of the head disposed within the aforesaid guideways, a spring surrounding the neck and confined between the aforesaid shoulder and the head of the plunger and tending to urge the plunger forwardly, two conductors leading into the rear portion of the casing, one having its forward end inserted into the aforesaid sleeve, the sleeve being flattened to secure the conductor to the plunger, the flattened sleeve serving as a stop to limit the forward movement of the plunger, and means through which the other conductor is grounded.

10. An electric plug according to claim 9, wherein the lateral side portions of the head of the plunger are turned over upon themselves.

DAVID M. MORGENSTERN.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
1,803,709	Johnson	May 5, 1931
2,470,280	Ackerman	May 17, 1949