April 28, 1942. C. E. WADE 2,281,186

CIRCUIT CONTINUING DEVICE

Filed Sept. 21, 1938

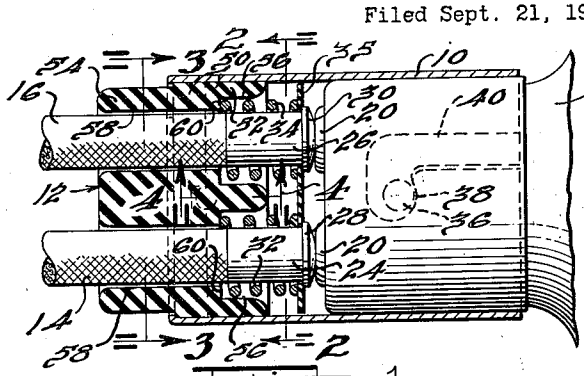


Fig. 1.

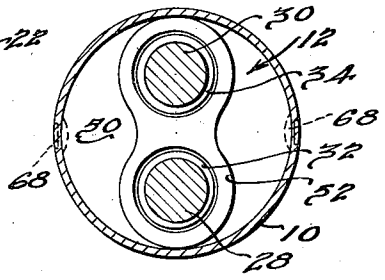


Fig. 2.

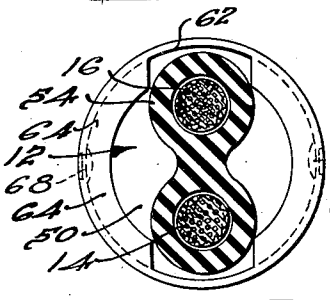


Fig. 3.

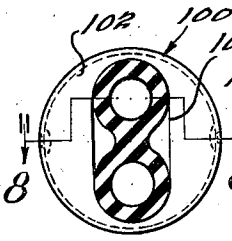


Fig. 7.

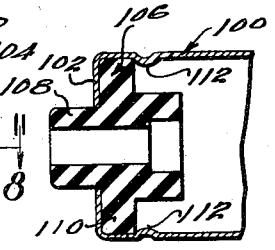


Fig. 8.

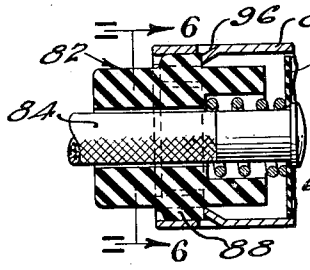


Fig. 5.

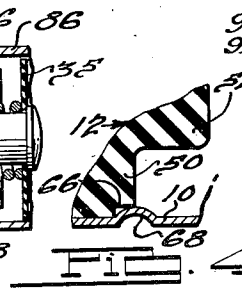


Fig. 4.

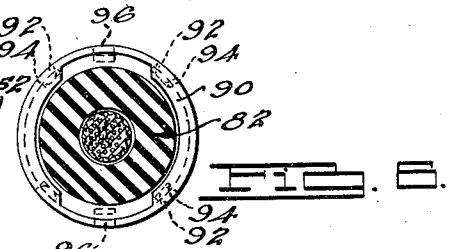


Fig. 6.

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# UNITED STATES PATENT OFFICE

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## CIRCUIT CONTINUING DEVICE

Charles E. Wade, Sturgis, Mich.

Application September 21, 1938, Serial No. 230,955

3 Claims. (Cl. 173—328)

The present invention relates to circuit continuing devices or the like and in the specific forms disclosed is directed to the provision of improved socket constructions.

The principal objects of the invention are to provide an improved circuit continuing device, which may be readily and economically manufactured and which is efficient and durable in service; to provide such a device comprising generally an insulating contact carrier secured within in a supporting body, the contact carrier being of improved form, and having improved means of connection to the supporting body; to provide such a device wherein one or more electrical contacts are supported in an enclosing body by means of an insulating member, the insulating member having means projecting inwardly of the supporting body for receiving biasing springs associated with the contact, and having means projecting outwardly of the supporting body for supporting the wires connected to the contacts and for protecting the wires; to provide such a device wherein the supporting body and the insulator are so formed as to have a readily made but extremely efficient and durable connection with each other, and to provide such a device embodying improved means for supporting the associated terminals inwardly of the socket body, so as to hold them out of contact with the walls of the supporting body.

With the above, as well as other and more detailed objects in view, which appear in the following description and in the appended claims, preferred but illustrative embodiments of the invention are shown in the accompanying drawing in which:

Figure 1 is a view partly in longitudinal section of one embodiment of the invention;

Fig. 2 is a view taken along the line 2—2 of Fig. 1;

Fig. 3 is a view taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary view taken along the line 4—4 of Fig. 1;

Fig. 5 is a view in longitudinal section of a modified embodiment of the invention;

Fig. 6 is a view taken along the line 6—6 of Fig. 5;

Fig. 7 is a view in end elevation, partly in section, of a further modification of the invention; and

Fig. 8 is a view taken along the line 8—8 of Fig. 7.

It will be appreciated from a complete understanding of the present invention, that the improvements thereof may be embodied in circuit continuing devices of widely differing forms, and intended for widely differing applications. The invention is particularly well adapted, but is not limited, to use in sockets adapted to form, for example, an electrical connection between an electric lamp and one or more conductors through which the current is supplied to the lamp. In an illustrative but not in a limiting sense, the invention is so disclosed in the present application.

Referring first to the embodiment of Figs. 1 through 4, the improved socket comprises generally an outer socket body 10, an insulator designated as a whole as 12 which is secured to the body adjacent one end thereof, and a plurality of conductors, two being illustrated and designated 14 and 16, which extend through the insulator 12 into the body of the socket for engagement with corresponding contacts 20 formed at the base of a conventional electric lamp 22. The socket body 10 is preferably formed of metal, for example, by rolling a sheet of metal into cylindrical form, or by utilizing suitable lengths of preformed metal tubing. The insulator 12 is formed of a suitable insulating material, preferably by a molding operation, the insulating material being any recognized material such as the phenolic condensation products known commercially under the trade-names "Bakelite" or "Tenite." At their inner ends, the conductors 14 and 16 are provided with conventional terminals 24 and 26, the enlarged heads 28 and 30 whereof directly bear against the previously mentioned contacts 20, and also define shoulders for cooperation with the hereinafter described compression springs 32 and 34 and centering element 35. The other ends of the springs 32 and 34 bear against the bases of the hereinafter described pockets formed in the insulator 12 and so urge the terminals 24 and 26 into resilient engagement with the lamp contacts 20. The latter action also urges the lamp 22 outwardly of the socket, and so retains the bayonet pins such as 36 on the lamp in yielding engagement with the undercut bases 38 of the conventional bayonet slots 40 formed in the socket body.

A feature of the present invention resides in forming the insulator 12 as a single unitary molded member, which feature simplifies the assembly of the unit as a whole, and also materially reduces the number of parts required. In the illustrated form, the insulator 12 comprises a

circular central body portion 50, the diameter whereof is such that it is slidably but snugly received within the bore of the body 10. The insulator 12 also comprises an inner boss structure 52 and an outer boss structure 54.

The inner boss 52 extends generally diametrally of the body portion 50 of the insulator 12, and is provided with two pockets or recesses 56, the depth whereof is preferably somewhat less than the distance the boss 52 projects from the body portion 50. The pockets or recesses 56 are of a diameter somewhat in excess of the diameters of the bores 58 which extend entirely through the insulator 12 and which slidably and somewhat loosely receive the conductors 14 and 16. With this relation shoulders 60 are defined at the bases of the sockets or recesses, which act as seats for the inner ends of the compression springs 34. The walls of the pockets 56 thus lie in spaced relation to the sides of the terminals 24 and 26 and the conductors 14 and 16 by an amount sufficient to freely receive the springs 34. The just mentioned radial spacing is preferably so proportioned in relation to the diameter of the wire used in the springs 34 that the wire of the springs is prevented from coming into registry with and tending to bind in the relatively small spacing between the side of the conductors and the walls of the bores 58. With this relation, the springs are continually retained in free seating position relative to the insulator and to the conductors and terminals.

The outer boss element 54 also extends generally diametrally of the body of the insulator 12, as clearly appears in Fig. 3, and projects outwardly of the body 10 as clearly appears in Fig. 1. With this relation, it will be appreciated that the bores 58 in the insulator 12 are of rather substantial length, and this relation is of particular advantage in practice. It is, of course, desirable to provide a somewhat loose fit between the conductors 14 and 16 and the bores 58, so as to not interfere with the action of the springs 34 in forcing the terminals 24 and 26 into engagement with the contacts of the associated lamp. At the same time, it is desirable to give the conductors 14 and 16 and their associated terminals sufficient support within the insulator so as to prevent any appreciable cocking of the terminals and conductors relative to the socket as a whole. Any appreciable cocking action, as will be understood, tends to displace the terminals relative to the contacts from the full seating position shown in Fig. 1 to a position in which only a minimum area of contact is provided therebetween. The full seating contact relation is desirable in practice in that it reduces the voltage drop between the terminals and the contacts and also overcomes any otherwise existing tendency for the contact terminals to arc or burn. The relatively long bores 58 afford the desired guiding support for the conductors 14 and 16 without at the same time requiring an unduly tight sliding fit therebetween.

In the embodiment now being described, the connection between the socket body 10 and the insulator 12 is provided by forming notches 62 in the wall of the body 10, so as to define diametrically opposed flanges 64. The flanges 64 are turned over onto the outer surface of the body 50 of the insulator 12 by a suitable spinning or equivalent operation, and in the flanged over position, afford substantial support for the insulator and effectually prevent axial movement of the latter out of the body 10. The flanges 64 also define an opening within which the outer boss 54 is non-rotatable, thus preventing rotation of the insulator 12 relative to the body 10. In addition, in order to further prevent such rotation, and also so as to prevent inward movement of the insulator 12 relative to the body 10, it is preferred to provide the peripheral surface of the body portion 50 with a plurality of notches 66, two being shown in the present instance, and to stake the body of the socket 10 into the notches 66 by providing indentations 68 in the body 10. As will be appreciated from Fig. 4 the indentations 68 are received in and interlock with the recesses 66, so as to positively hold the insulator 12 in place.

In addition to giving additional length to the bores 58, so as to provide the improved guiding relation for the conductors 14 and 16 as previously described, the provision of the outer boss 54 in outwardly projecting relation to the end of the socket body 10, serves to maintain a substantial spacing between the conductors 14 and 16 and the flanged over portions 64 of the socket body, thus overcoming any otherwise existing objection to the practice of flanging the socket body 10 over onto the outer surface of the insulator.

It will be appreciated that upon removal of the lamp 22, the conductors 14 and 16 are urged inwardly of the socket body to a certain extent by the springs 32 and 34 associated therewith, and, assuming sufficient slack exists in the wires 14 and 16 externally of the socket, these wires may be moved inwardly a substantial distance further. In certain instances, it is found that the wires tend to move inwardly of the socket body far enough to permit them to bend and bring one or both of the terminals 24 and 26 into direct contact with the body 10, thus creating a short circuit condition. This condition is effectively overcome, in accordance with the present invention, by interposing the disc 35 in the relation shown in Fig. 1. The disc 35 is shown as of generally circular form having a relatively loose fit in the body 10, and being provided with two openings which receive the terminals 24 and 26, but which are smaller than the heads 28 and 30 of these terminals. The disc 35 is interposed between the terminal heads and the associated springs. The fit between the terminals and the openings provided therefor in the disc is preferably loose enough to permit the terminals to be readily passed therethrough, but tight enough to give the disc a tendency to move with the terminals in the event such terminals move away from the associated springs 32 and 34. With this relation, and assuming the lamp 22 is removed, the disc 35 becomes effective to hold the terminals 24 and 26 in centered relation to the body 10 unless such terminals are withdrawn entirely from the open end of the socket body or unless the disc is forcibly moved inwardly so as to expose the terminals. Under all normal conditions, accordingly, the disc 35 cooperates with the insulator to retain the terminals in centered relation and substantially spaced from the wall of the body, thus effectively overcoming the usual tendency to produce a short circuit. It will be noticed also that the disc 35 acts, when the lamp 22 is in place, in cooperation with the insulator 12, to hold the terminals in accurately centered relation, so as to effectively avoid the cocking tendency described above.

In the construction shown in Figs. 5 and 6, the insulator 82 is formed to accommodate a single conductor 84, so that the inner and outer

boss formations thereof are single in form. The socket body 86 associated with the insulator 82 is slidably fitted over the body portion 83 of the insulator, and the spaced flanges 90 thereon are turned over on the outer face of such body portion. In order to prevent rotation of the insulator within the socket body, the socket body is staked to the insulator by indenting the socket body at the points 92 into the peripheral recesses 94 on the body 88 of the insulator. To further secure the insulator within the socket body, so as to positively prevent the insulator from moving inwardly thereof, it is preferred to additionally stake the socket body to the insulator by piercing one or more tongues 96 in the socket body which overlie and abut the inner surface of the body portion 88 of the insulator.

In the further modified embodiment of Figs. 7 and 8, the arrangement is one wherein the base of the socket body and the insulator are so formed as to have a seating relation whereby rotation of the insulator is prevented and whereby movement of the insulator outwardly of the socket body is also prevented. In addition, to complete the connection between the insulator and the socket body, the latter is preferably staked at one or more points circumferentially thereof, so as to prevent movement of the insulator inwardly of the body.

Referring more particularly to Figures 7 and 8, the socket body 100 is of generally cylindrical form, as in the previously described embodiment, and is provided with a partially enclosing base portion 102, having a diametrally extending slot 104 formed therein. The insulator 106 may, and preferably is, of identically the same construction described with reference to Figures 1, 2, and 3, with the exception, however, that the previously described locating recesses 66 are not required. The slot 104 in the base of the socket body is of a width and length corresponding to the width and diametral length of the outer boss formation 108 formed on the insulator 106, so that such boss formation is freely insertable through but is snugly retained by the walls of such slot when the insulator is moved into abutting relation of the base 102 of the socket body. With this relation, it will be appreciated that the outer face of the intermediate body portion 110 of the insulator directly seats against the base 102 of the socket body, thereby positively preventing outward movement of the insulator. In turn, the outer boss formation 108 projects outwardly through the slot 104, and, by engaging the marginal edge of such slot, positively prevents rotation of the insulator relative to the socket body. As previously mentioned, the connection between the socket body and the insulator is completed in a relatively simple manner, by staking the insulator body at one or more points circumferentially thereof to produce the indentations 112. The indentations 112 are, of course, positioned immediately adjacent the inner face of the intermediate portion 110 of the insulator, and constitute abutments which prevent inward movement thereof.

In Figs. 7 and 8, the previously described conductors, terminals, and biasing springs are not shown. It will be appreciated, however, that these elements are associated with the insulator in the manner previously described. It will also be understood that the arrangement of Figs. 9 and 10 may be used in the manufacture of devices arranged to provide for more or less than two conductors. In the same sense, it will be understood that the arrangements of the other figures may correspondingly be adapted to accommodate more than or fewer than the number of conductors specifically illustrated in connection therewith.

It will be noticed that in one sense, each of the above described structures may be characterized in that the end of the socket body is closed by a body of insulating material, which body of insulating material, in cooperation with the biasing springs, forms the sole supporting connection between the individual conductors and the socket bodies. The parts directly associated with the springs and providing seats therefor are integral with the insulator body. In turn, the outwardly projecting parts which guide and further support the conductors are integral with the insulator body.

In this way, the total number of parts required in the manufacture of the device is materially reduced, since no additional metallic parts are required to be interposed between the conductors and the insulator. Moreover, the absence of such cooperating metallic parts materially reduces the likelihood of shorts developing between the conductors and the socket body. It is, therefore, evident that extremely simple and effective constructions have been provided.

It will be understood, of course, that various changes in the form, number, and arrangement of parts may be made without departing from the spirit and scope of the invention and that the above described embodiments are to be considered in an illustrative and not in a limiting sense.

What is claimed is:

1. In a circuit continuing device, the combination of a tubular body; an insulator positioned adjacent one end of said body and having an intermediate body portion, an outer boss formation extending outwardly from the outer face of said body portion and an inner counterbored boss formation extending inwardly from the inner face of said body portion into said tubular body, said insulator having a bore extending axially through said inner and outer boss and body portions to slidably receive and guide an associated conductor; a spring seated in said counterbore in surrounding relation to said conductor for urging the conductor inwardly of the tubular body; said insulator body portion being slidably received in said tubular body and said tubular body having portions flanged over the outer face of said insulator to hold the insulator against movement outwardly of the tubular body; said insulator having one or more peripheral notches formed in said body portion which open into said inner face thereof, and said tubular body having one or more indentations extending into said notches and interlocking therewith, to prevent movement of the insulator into the tubular body.

2. In a circuit continuing device, the combination of a tubular body; an insulator positioned adjacent one end of said body and having an intermediate body portion, an outer boss formation extending outwardly from the outer face of said body portion and an inner counterbored boss formation extending inwardly from the inner face of said body portion into said tubular body, said insulator having a bore extending axially through said inner and outer boss and body portions to slidably receive and guide an associated conductor; a spring seated in said counterbore in surrounding relation to said conductor for urging the conductor inwardly of the tubular body; said insulator having axially extending peripheral

notches formed on said body portion thereof; and said tubular body being disposed to slidably receive said body portion, and having portions turned over the outer face of said body portion and indentations extending into said notches, so as to hold said insulator in place in said tubular body.

3. In a circuit continuing device, the combination of a tubular body; an insulator positioned adjacent one end of said body and having an intermediate body portion, an outer boss formation extending outwardly from the outer face of said body portion and an inner boss formation extending inwardly of said body portion into said tubular body, said insulator having a bore extending axially through said inner and outer boss formations and body portion to slidably receive and guide an associated conductor; a spring acting against said inner formation for urging the conductor inwardly of the tubular body, said tubular body having a base against which said outer face seats and provided with a non-circular opening therein; and said outer boss formation being formed to non-rotatively project through said opening.

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