Jan. 12, 1965 J. R. RUOCCO 3,165,371

SOCKET ADAPTER

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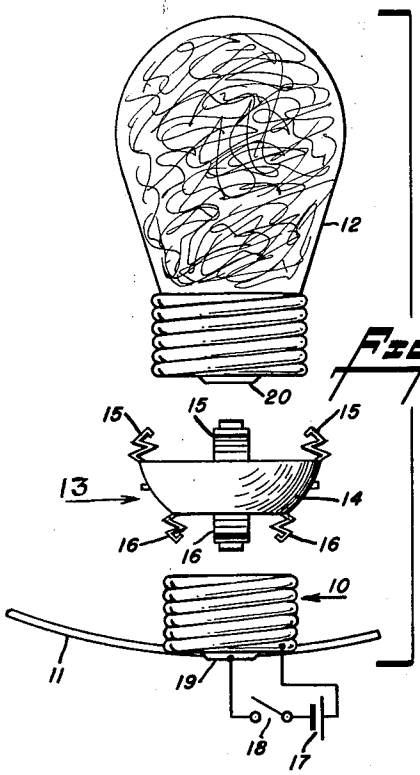


Fig-1

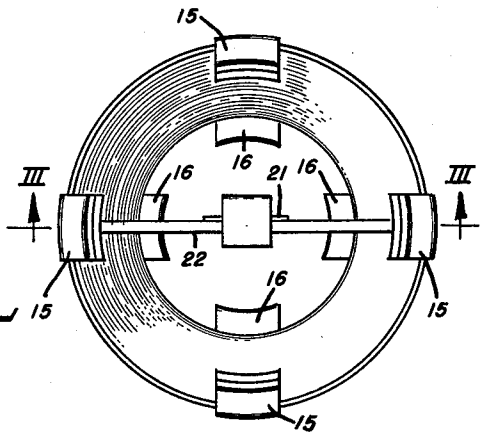


Fig-2

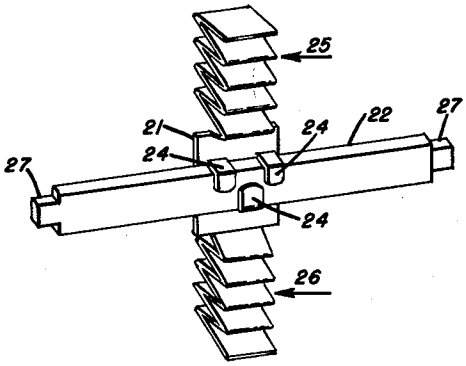


Fig-4

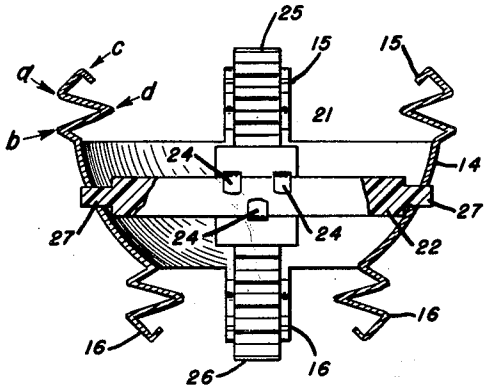


Fig-3

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SOCKET ADAPTER

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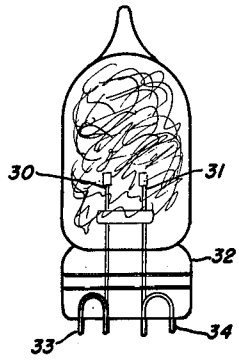


Fig-5

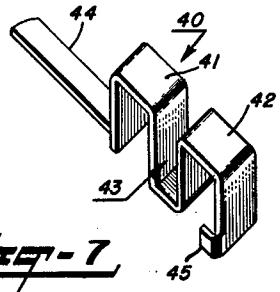


Fig-7

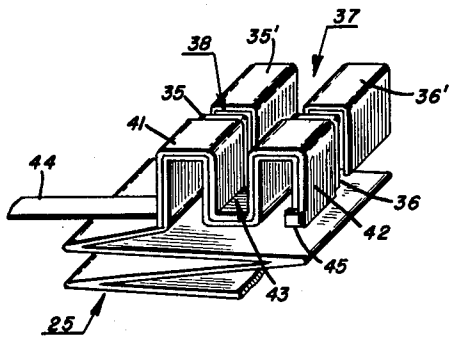


Fig-8

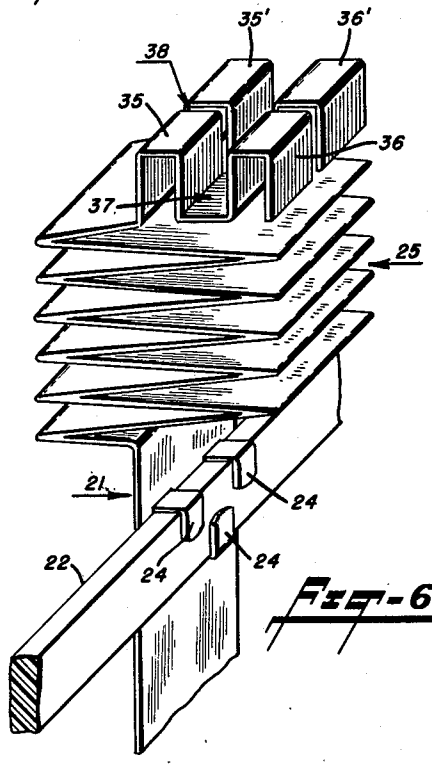


Fig-6

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SOCKET ADAPTER

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9 Claims. (Cl. 339—154)

This invention relates to a socket adapter and more particularly to an adapter for use in an electrical socket in order to adapt the particular socket for use with a lamp bulb of a different size than that for which the socket was designed.

Although a socket adapter made in accordance with this invention has general utility in the electrical field, it is particularly useful in connection with photoflash lamps employed in the art of photography.

Although certain modern flash guns are provided with what may be termed a universal socket, that is, a socket constructed for operation with flash bulbs of various sizes and base constructions, such universal sockets are of complex construction adding significantly to the purchase price of the device. The majority of flash guns presently sold, and those sold before the advent of the universal socket, are provided with a socket which is designed to receive a particular flash bulb. In many instances, the user finds it necessary or desirable to use bulbs of a different size. Specifically, the owner of a flash gun having a relatively large socket may desire to use one of the recently-developed flash bulbs which is smaller than those heretofore available. Conversely, the owner of a flash gun having a relatively small socket may wish to use a flash bulb of larger size in order to increase scene illumination or to use light of a different color composition. This necessitates carrying two flash guns.

Accordingly, the principal object of this invention is the provision of an adapter for an electrical socket which can be used quickly and effectively to condition the socket for use with a bulb of a size different from that for which the socket has been designed.

Another object of this invention is the provision of a socket adapter which is of simple construction and positive operation.

A further object of this invention is the provision of a socket adapter which can be used, in one or another manner, to accommodate bulbs which, respectively, are larger or smaller than the particular bulb for which the particular socket has been designed.

A still further object of the invention is the provision of a socket adapter for use in connection with sockets of various constructions thereby to adapt the socket for operation with either a bulb of a different size or a bulb having a different base.

These and other objects and advantages will become apparent from the following description when taken with the accompanying drawings. It will be understood, however, that the drawings are for purposes of illustration and are not to be construed as defining the scope or limits of the invention, reference being had for the latter purpose to the claims appended hereto.

In the drawings wherein like reference characters denote like parts in the several views:

FIGURE 1 is a side view showing a socket adapter made in accordance with this invention, together with a flash bulb and the reflector of a flash gun;

FIGURE 2 is a top view of the socket adapter drawn to a larger scale;

FIGURE 3 is a cross-sectional view taken along the line III—III of FIGURE 2;

FIGURE 4 is an isometric view showing the assembly of the center contact;

FIGURE 5 shows a modern, all-glass flush bulb;

FIGURE 6 is a fragmentary, isometric view drawn to an enlarged scale and showing a more universal construction of the center contact;

FIGURE 7 is an isometric view showing a clip for use with such center contact to condition the socket adapter for accommodation of an all-glass flash bulb; and

FIGURE 8 is a fragmentary, isometric view showing the clip attached to the center contact.

Reference is first made to FIGURE 1, wherein there is shown a screw-type, or threaded, socket **10** carried by a reflector **11**. Such socket normally is designed to receive a flash bulb which has a smaller base diameter than the illustrated bulb **12**. The socket adapter **13** comprises a bowl-like body **14**, differing in diameter at opposite ends, with four integral prongs **15** extending from the top and four integral prongs **16** extending from the bottom and lying on circles of diameters generally corresponding with the diameters of the body ends from which they extend. The body and prongs are made of a suitable spring material and each of the prongs is folded, or reversely-creased along transverse lines whereby each prong is relatively rigid, yet, can be flexed inwardly or outwardly relative to the body axis.

Although each prong is reversely-folded, it preferably is generally convex about its vertical axis, as shown in FIGURE 2, thereby facilitating the attachment of the adapter either to the socket or the lamp. As illustrated in FIGURE 1, the bulb **12** has a base diameter larger than that of the socket **10**. In such case, the lower prongs **16** of the adapter are inserted, axially, into the socket thereby forming a good mechanical and electrical contact therewith. With the adapter so attached to the socket, the base of bulb **12** can be pressed, axially, between the four upper prongs **15** which lie on a diameter larger than that of the lower prongs **16**. On the other hand, assuming the socket **10** is of a larger size to receive directly the bulb **12** and it is desired to use a bulb with a smaller base diameter, the adapter is inverted, the prongs **15** inserted into the socket and the bulb inserted between the now-upper prongs **16**. It can also be seen that if the socket **10** is to be used with a bulb of smaller diameter, the larger-diameter prongs **15** can be inserted over the socket thereby engaging the outer socket wall. In a reverse sense, if the socket **10** is of smaller diameter than that shown, the smaller-diameter adapter prongs **16** can be inserted over the socket. It will be apparent that a socket adapter of a given size and constructed as shown (having two sets of generally axially-extending prongs lying on circles of two different diameters and the free end portions of which are deflectable toward or away from the adapter axis) can be used to establish electrical contact with the socket by axially inserting one or the other of the sets of prongs into or over the socket shell. Such construction also renders the adapter useful for attachment to sockets of types other than the screw-type socket illustrated in the drawing, specifically, bayonet-type sockets and the new ejector type socket having a circumferential groove formed in the shell.

As shown schematically in FIGURE 1, the electrical circuit between a battery **17** and the bulb (disposed within the socket) is completed upon closure of a switch **18** actuated by the camera shutter mechanism, one battery terminal being connected to the socket shell and the other to a center contact **19** disposed centrally of the socket base. When the adapter is attached to the socket, electrical continuity between the center socket contact **19** and the center bulb contact **20** is established by means of a vertically-disposed strip **21**, made of suitable conducting material such as, for example, Phosphor bronze (see FIGURE 2), which is supported within the shell and electrically insulated therefrom by a rod **22** of insulating material.

The assembly of the center contact strip **21** and the

supporting rod 22 is shown in FIGURE 4. Integral tabs 24 are punched out of the strip and folded over the rod thereby providing a rigid assembly. Each end of the strip 21 is reversely-folded a plurality of times to form springy, axially-compressible ends 25, 26. The rectangular rod 22 has ends 27 of reduced height but rectangular cross-section.

Reference, now, is made to FIGURE 3, which is a cross-sectional view taken along the line III—III of FIGURE 2. The adapter body 14 is provided with diametrically-opposed rectangular openings for snugly receiving the ends 27 of the rod 22. In the assembly operation, one rod end is passed through the associated body opening, after which the other rod end is slidably moved along the inner wall of the body 14 until it snaps into the other body opening. Inasmuch as the adapter is a relatively thin-walled member made of suitable spring material, such as Phosphor bronze, the described insertion of the rod to the illustrated, operative position is effected quite readily without permanent deformation of the bowl-shaped body. The disposition of the rectangular ends 27, of the rod 22, within the rectangular openings formed in the body wall, prevents rotation of the rod and the resulting rod shoulders prevent axial movement thereof, whereby the center contact strip 21 remains at all times centrally disposed within the body.

In the assembled adapter, the free ends 25 and 26, of the center contact strip 21, are disposed in planes recessed from the free ends of the associated prongs 15 and 16, respectively. When the adapter is attached to a socket, one of the ends (25 or 26) compressively abuts against the center contact of the socket. Similarly, when a bulb is inserted into the adapter, the center contact of the bulb compressively abuts against the other strip end.

It is pointed out that the outer surfaces of the two bends formed in each prong (identified by the letters *"a"* and *"b"* in FIGURE 3) have a common radius whereas the free end *"c"* of each prong terminates along a radial line greater than the inner bend *"d."* Thus, when the prongs are axially inserted into a socket, two bends, or threads, of each prong engage the cooperating socket threads. However, when a bulb is inserted between the prongs, the base thereof is engaged by only a single thread of each prong. Consequently, the bulb, after use, can be removed from the adapter while the adapter remains affiixed to the socket.

There have recently been made available all-glass flash bulbs generally referred to as type AG bulbs. As shown in FIGURE 5, such bulbs do not have a metal base. The inner filament, or ignition wires 30, 31, have ends passing through the generally-rectangular base portion 32, the end of the wire 30 being bent into a loop 33 along the front surface of the base portion and the end of the wire 31 being formed into a loop 34 along the rear surface of the base portion. Sockets which are designed for use with lamps of this type include separate contact members for completing the circuit between the battery and the two loops 33, 34.

By modifying the free end of the center contact strip, a socket adapter made in accordance with this invention can be conditioned for use either with lamps having a conventional metal base or the all-glass type. The modified form of the contact strip is shown in the fragmentary, isometric view of FIGURE 6, to which reference now is made.

The free end of the axially-compressible end 25 (of the center contact strip 21) is formed to provide a generally rectangular ledge portion 35 separated from a similar ledge portion 36 by a channel 37. Preferably, a thin, transverse slot 38 is cut through the ledge portions, resulting in similar rectangular ledge portions 35, 35' and 36, 36' for purposes which will be explained hereinbelow.

The longitudinal center line of the rectangular ledge portions 35, 35' lies substantially in the vertical plane of the central portion of the contact strip 21. Thus, when a conventional bulb (such as the bulb 12 shown in FIGURE 1) is inserted into the socket adapter, the center contact of the bulb will engage one, or both, of the rectangular ledge portions 35, 35', to establish good electrical contact therewith. The configuration of the channel 37 is such that the channel will snugly receive the base portion 32 of the all-glass bulb.

Reference, now, is made to FIGURE 7, which is an isometric view showing a clip 40 made of thin, spring material, such as Phosphor bronze. Such clip, which is designed to electrically isolate the ledge portions 35 and 36 from the similar ledge portions 35' and 36' (see FIGURE 6) has an integral stem 44 extending therefrom and an integral, inwardly-directed tab 45 formed at the forward end of the arcuate portion 42. It is here pointed out that the thickness of the clip 40 is exaggerated in the drawings. Actually, the clip is very thin so that it can be snapped into position over the ledge portions 35 and 36, as shown in FIGURE 8, with the rectangular clip portion 41 snugly embracing the rectangular ledge portion 35, the rectangular clip portion 42 snugly embracing the ledge portion 36, and the clip channel 43 engaging the surfaces forming the channel 37. In order to electrically isolate the clip from the center contact member the entire undersurfaces of the clip are covered with a thin coating of suitable insulating material such as, for example, a plastic.

When the user has occasion to use an all-glass flash bulb, he snaps the clip into position on the center contact strip and slides the clip along the supporting ledges 35, 36 until the clip tab 45 engages the forward end of the ledge portion 36. This properly positions the clip. It will be noted that the width of the clip is somewhat less than that of the supporting ledges 35 and 36, thereby eliminating any possibility of the electrical continuity between the clip and the ledge portions 35' and 36'. Since the clip is made of thin material, its insertion into position on the center contact strip results in a relatively minor amount of spreading of the channel 37 but such spreading is not transmitted to that portion of the channel lying between the ledge portions 35', 36' because of the transverse slot 38.

With the clip attached to the center contact strip, the base of the all-glass bulb can be inserted into the adapter, whereby one wire loop of the lamp will be in electrical contact with either of the ledge portions 35' or 36' and the other wire loop of the lamp will be in electrical contact with the clip. The depth of the channel 37 is made to accommodate all, or most of, the base portion of the lamp and the channel width is somewhat less than that of the lamp base portion, all for the purpose of retaining the lamp in operative position.

The stem 44, of the clip, has a length such that the free end thereof engages one of the prongs of the adapter (such as the rear prong 15 visible in FIGURE 3) when the clip is attached to the center contact strip. When the prong walls are arcuate, as described above, the end of the clip stem is also of corresponding arcuate form, thereby providing a substantial area of surface contact to assure electrical continuity between the clip and the prong. Thus, one side of the battery is connected to one of the wire loops of the lamp through the center contact strip, whereas the other side of the battery is connected to the other wire loop of the lamp through the body of the adapter, a prong and the clip.

Both ends of the center contact strip can be formed as shown in FIGURE 6. Alternatively, one end only need be so formed and the user can readily reverse the center contact strip within the adapter body, if necessary, upon specific occasions. Such reversal of the center contact strip is quite simple, as the strip is assembled to the adapter body by snapping the ends of the rectangular insulator strip 22 into the holes provided in the body.

Having now described the invention, various changes and modifications will become apparent to those skilled in this art. It is preferable to form the individual

adapter prongs along a circle that is concentric with the body axis in order to provide individual prongs of maximum width which, at the same time, can be axially pressed into a socket without requiring an excessive force. However, when the individual prongs are relatively narrow, they can be formed so that each prong lies in a single plane. The number and length of the prongs can be varied to meet specific requirements. Also, the flat, center contact strip 21 may be replaced by a simple coiled spring. It is contemplated that these and similar changes and modifications can be made without departing from the scope and spirit of the invention as recited in the following claims.

I claim:

1. A socket adapter comprising a unitary, bowl-shaped body portion, differing in diameter at opposite ends, having a plurality of peripherally-spaced prong members extending axially of the body portion and from each end thereof; the prong members at one end lying on a circle of diameter different from that on which those at the other end lie, generally corresponding with the differing diameters of the body ends, a center contact member disposed axially within the said body portion, and insulating means supporting the said contact member in fixed position within the body portion.

2. The invention as recited in claim 1, wherein each of the said prong members are reversely bent along transverse lines.

3. The invention as recited in claim 1, wherein the said center contact member includes axially-compressible free ends and the said insulator means comprises a rod member having ends extending through diametrically-opposed openings formed in the wall of said body portion.

4. The invention as recited in claim 1, wherein the center contact member has an axially-compressible end terminating in laterally-spaced ledge portions forming a longitudinal channel therebetween.

5. The invention as recited in claim 4, in combination with a clip member removably attachable to the said spaced ledge portions, said clip member having an integral stem extending therefrom and said clip member having an insulating coating thereon for the purpose of electrically insulating the clip member from the center contact member.

6. A socket adapter comprising,

(*a*) a bowl-shaped body,

(*b*) a first set of peripherally-spaced, resilient prong members extending axially from one end of the body, said prong members lying substantially on a circle of one diameter,

(*c*) a second set of peripherally-spaced, resilient prong members extending axially from the opposite end of the body, said prong members lying substantially on a circle of another diameter,

(*d*) a center contact member axially positioned within the body, said contact member having axially-compressible free ends, and

(*e*) an insulator rod secured to the said center contact member and having ends passing through openings formed in the said body.

7. The invention as recited in claim 6, wherein each of the said prong members includes a plurality of reverse bends formed along transverse lines.

8. The invention as recited in claim 6, wherein one end of the center contact member terminates in laterally-spaced ledge portions defining a longitudinal channel therebetween and means forming a central, transverse slot in the said ledge portions.

9. The invention as recited in claim 8, in combination with a clip member having a contour corresponding to that of the said ledge portions and channel, said clip member being removably attachable to the ledge portions and electrically insulated therefrom.

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