April 17, 1951 A. J. SHABACK 2,549,134

LAMP SOCKET HAVING LEAF SPRING CONTACTS

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Fig. 1.

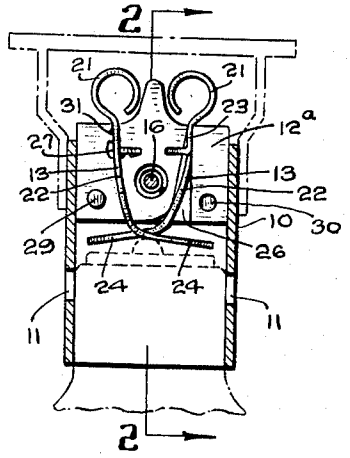


Fig. 2.

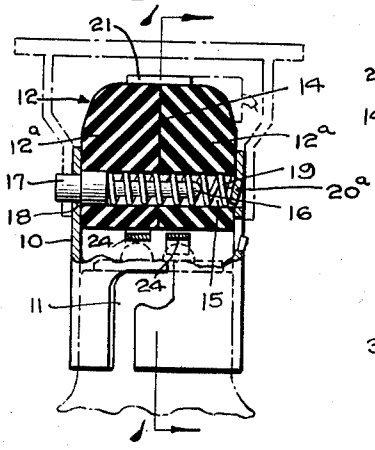


Fig. 11.

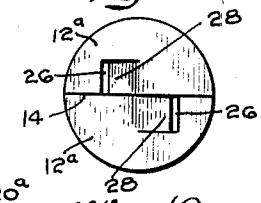


Fig. 10.

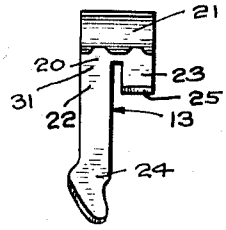


Fig. 3.

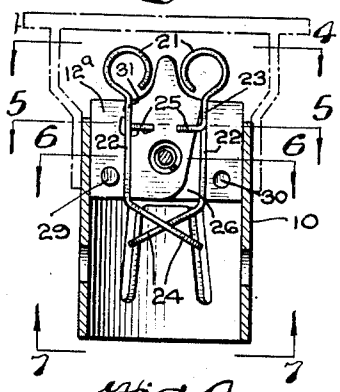


Fig. 7.

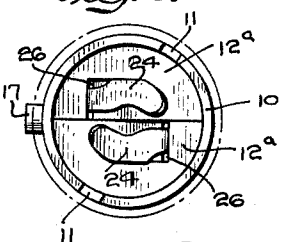


Fig. 9.

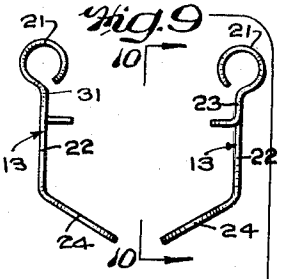


Fig. 4.

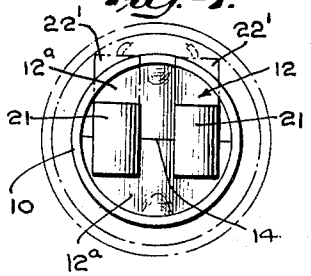
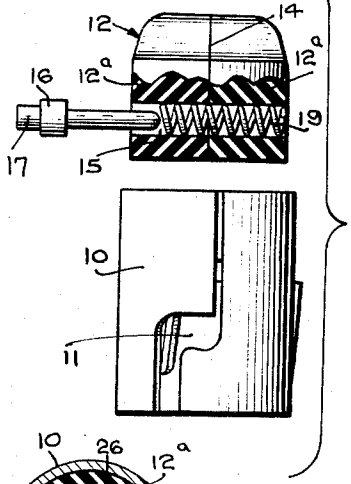


Fig. 8.



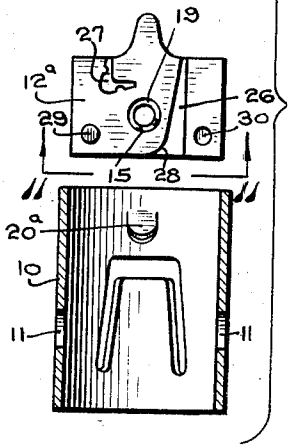
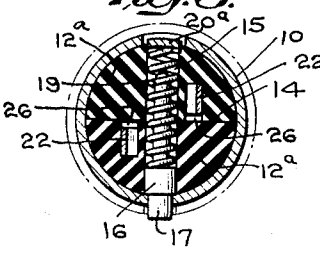


Fig. 6.



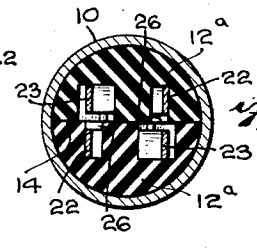


Fig. 5.

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Fig. 12.

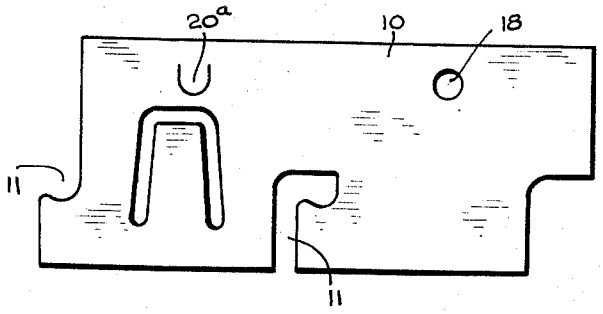


Fig. 13.

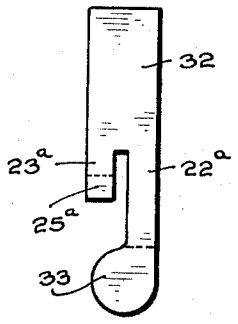


Fig. 14.

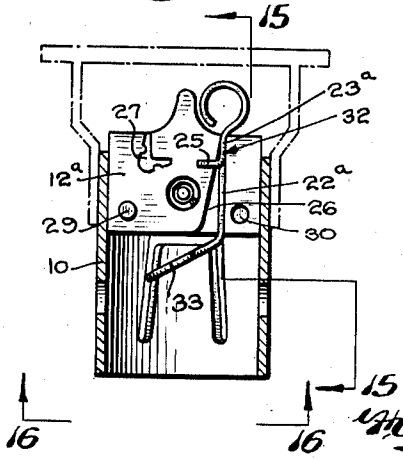


Fig. 15.

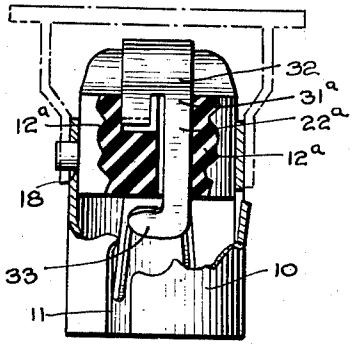
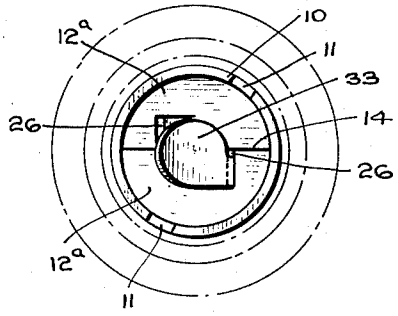


Fig. 16.



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Patented Apr. 17, 1951

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UNITED STATES PATENT OFFICE

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LAMP SOCKET HAVING LEAF SPRING CONTACTS

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Application December 15, 1947, Serial No. 791,895

7 Claims. (Cl. 173—328)

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This invention relates to electric lamp sockets and more particularly to improvements in the design and construction of that type of automotive socket commonly employed for receiving the bayonet type base of lamp.

Among the principal objects of the present invention is to provide a lamp socket having a contact element of such form and construction and so operatively mounted in the socket that the deflection thereof during normal operation of the socket is at all times maintained below the proportional limit of the metal of which the contact element is formed. To this end, the contact element of the present socket is in the form of a relatively long leaf spring constructed of suitable spring material and so anchored in the socket as to provide a flexing fulcrum for the element which is well removed from the zone of contact of the lamp terminal therewith, thereby preventing any possibility of the leaf spring developing a permanent set under repeated flexing thereof.

More specifically, it is an important object of the present invention to provide a socket having leaf spring contacts respectively interposed directly between the lamp terminals and the conductors supplying current thereto wherein each leaf spring is anchored in such manner as to provide an extraordinarily long lever arm for the terminal end thereof whereby to reduce the bending moment and resulting stress of the leaf spring at its fulcrum point while at the same time providing adequate movement thereof at its lamp contact end.

More generally, it is an object of the present invention to provide a lamp socket of the type aforesaid wherein the conventional axially movable spring-pressed contacts are replaced by simple leaf spring elements having means formed integrally therewith for securely anchoring the same upon an insulating body fitted within the socket shell, the said insulating body and the leaf spring elements being so complementally formed as to insure that the required deflection of the leaf spring elements under pressure exerted thereon by the base of the lamp inserted in the socket is at all times well below the proportional limit of the leaf spring material.

A further object of the present invention is to provide a lamp socket which is simple in construction, economical of manufacture and which includes an easily assembled two-part insulating body which may be employed without structural modification for supporting either a pair of leaf springs to adapt the socket for use with a double-contact lamp or a simple leaf spring to adopt it for use as a single-contact lamp socket.

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Other objects and advantages of the present invention will appear more fully hereinafter, it being understood that said invention consists substantially in the combination, construction, location and relative arrangement of the parts, all as described in detail hereinafter, as shown in the accompanying drawings and as finally pointed out in the appended claims.

In the accompanying drawings which illustrate a preferred embodiment of the present invention,

Figure 1 is a view, partially in vertical section, of a socket constructed in accordance with the present invention, said view being as taken along the line 1—1 of Figure 2;

Figure 2 is a vertical sectional view of the socket as taken along the line 2—2 of Figure 1;

Figure 3 is a vertical sectional view similar to Figure 1 but showing the leaf spring contact elements thereof in their relaxed condition, as when the lamp is completely removed from the socket;

Figure 4 is an end view of the socket as viewed from the line 4—4 of Figure 3;

Figure 5 is a transverse sectional view as taken along the line 5—5 of Figure 3;

Figure 6 is an end view as viewed from the line 6—6 of Figure 3;

Figure 7 is a bottom view of the socket as viewed from line 7—7 of Figure 3;

Figure 8 is an exploded view showing in separated relation all of the several elements of the socket except the leaf spring contact elements;

Figure 9 is another exploded view taken at right angles to Figure 8 showing in separated relation all of the several elements of the socket including the leaf spring contact elements thereof;

Figure 10 is a side elevational view of a leaf spring contact element as viewed from the line 10—10 of Figure 9;

Figure 11 is a plan view of the insulating plug assembly as viewed from 11—11 of Figure 9;

Figure 12 is a plan view of the blank of which the socket shell is formed;

Figure 13 is a view of modified form of the leaf spring contact element;

Figure 14 is a view corresponding to Figure 3 showing the socket fitted with a single leaf spring contact of the form shown in Figure 13;

Figure 15 is a vertical sectional view as taken along the line 15—15 of Figure 14; and

Figure 16 is a bottom view of the single contact socket as viewed along the line 16—16 of Figure 14.

Referring now more particularly to the drawings, it will be observed that the socket of the

present invention includes an outer metallic cylindrical shell 10 of more or less conventional type formed of a single blank of sheet metal shown in Figure 12 and suitably stamped to provide a pair of diametrically opposed bayonet slots 11—11 formed in the portion thereof which receives the base of a lamp (shown dotted in Figures 1 and 2), this base being conventionally provided with opposed pins (not shown) respectively engageable within the bayonet slots to secure the lamp within the socket.

Snugly fitted within the inner end portion of the socket shell 10 is an insulating body 12 serving as a support or mounting for a pair of leaf spring contact elements 13—13, said insulating body being formed of a pair of semi-cylindrical members 12^a—12^a separable from each other along a diametrical plane 14. The members 12^a—12^a are commonly bored, as at 15, normal to the plane of their separation, this bore 15 being fitted with a spring-pressed detent 16 having a reduced outer end 17 which projects through an opening 18 suitably provided in the wall of the cylindrical shell 10. A coiled compression spring 19 interposed between the detent 16 and the opposite wall of the shell 10 imparts a normal outward bias upon the detent 16, which thus serves conjointly with a struck-in tab 20^a engageable in the opposite end of the plug bore 15 to retain the insulating body 12 within the lamp socket shell 10, the detent 16 serving further to removably mount the socket assembly within a suitable support therefor such as is shown in dotted line representation in Figures 1 to 4.

As appears most clearly in Figures 1, 2, 9 and 10, the leaf spring contact elements 13—13 are of identical form and construction, each being formed of suitable springly material, such as phosphor bronze, nickel silver, steel or the like, to provide a bifurcated, flat body portion 20 terminating at one end thereof in a looped portion 21 adapted to frictionally receive a suitable terminal plug secured to the end of a conductor wire, such plug being conventional in the art and being represented in Figure 4 by the dotted line element designated 22^1. The bifurcated main body portion 20 of each contact element 13 includes a pair of laterally spaced legs 22 and 23 of unequal length, the longer leg 22 being provided with an extension 24 forming an obtuse angle with the leg 22. The shorter leg 23 is also provided with an extension 25 bent substantially at right angles to the leg 23. It will be noted that the extensions 24 and 25 are both bent in the same general direction relatively to their respective supporting legs 22 and 23 and that the longer extension 24 is spaced from the shorter extension 25 both laterally and longitudinally of the main body portion 20 of the leaf spring contact.

The complemental semi-cylindrical parts 12^a—12^a forming the insulating body 12 in which are operatively mounted the contact elements 13—13 are each provided in the inner flat face thereof with a groove 26 extending longitudinally of the plug and with a right angle notch 27 spaced laterally from the groove 26, the groove 26 and the notch 27 being thus disposed to either side of the vertical central axis of the insulating body 12. The groove 26 of each member 12^a is of gradually increasing width so that the inner end thereof is of enlarged width, this gradual increase in effective width of the groove 27 being obtained by tapering the inner wall of this groove relatively to its outer wall, all as appears most clearly in Figure 9. The lower extremity of the inner wall of the groove 26 is rounded off, preferably, as at 28.

The effective length of the grooves 26 formed in each of the members 12^a is slightly less than the length of the normally flat or undeflected body portion of the leaf spring contact terminal 13, while the effective depth of each of said grooves is approximately equal to one-half the width of said body portion 20 of the contact element. In the case of the notches 27, they are of a size and shape to snugly accommodate therein the short leg of the leaf spring and its right angular extension 25, these notches 27 being also of depth approximately equal to one-half the overall width of the contact element 13. The positional relation of the grove 26 and notch 27 in each of the plug parts 12^a—12^a is such that when these parts are assembled to form the cylindrical body 12 for insertion into the rear or outer end of the socket shell 10, the grooves 26—26 of said members 12^a are respectively in registery with the notches 27—27 thereof. Thus, the cylindrical insulating body 12, when properly fitted within the socket shell 10, is provided with a pair of laterally spaced recesses, each of which extends transversely across the diametric plane 14 of the insulating body, one-half of each recess, disposed in one of the plug parts 12^a, being of tapered cross-section having its larger end presenting inwardly of the socket shell and the other half, disposed in the opposite plug part, being of right angular form. The tapered halves of the recesses extending vertically through the insulating body 12 are disposed on opposite sides of the diametric plane 14 of said body, said halves being thus located in diametrically spaced quadrants of the cylindrical body, as see Figure 11.

The contact terminals 13 are respectively disposed within the insulating body 12 so that while the short leg portion 23 of each such element is accommodate within the notch 27 of one of the insulating body members 12^a, the longer leg 22 of the other contact terminal is accommodated within the tapered groove 26 of said contact member 12^a. In other words, the mounting of the contact terminal 13—13 within the insulating body 12 is such that the short legs 23—23 of the terminals respectively fit in the notches 27—27 of the insulating body, while the longer legs 22—22 respectively fit in the tapered grooves 26—26 of the insulating body. When so assembled within the insulating body, the contact terminals 13—13 are secured against removal therefrom by reason of the fact that the inturned flanges 25 at the lower ends of the short legs 23—23 are respectively lodged in the laterally extending portions of the notches 27—27, thereby securing the terminals 13—13 against vertical displacement from the insulating body. In this secured condition of the parts, the extensions 24—24 of the contact terminals 13—13 are disposed in laterally spaced relation, the contact elements 13—13 being completely insulated from each other.

In order to most expeditiously effect assembly of the contact elements 13 within the insulating body 12 prior to insertion of the latter into the rear end of the socket shell 10, each of the elements 13 is mounted in one of the complementally formed semi-cylindrical members 12^a by inserting the short leg 23 of the terminal laterally into the notch 27 of the member 12^a. The longer leg 22 of the contact element and its angularly bent extension 24 will then be disposed externally of

said notch 27. Upon assembly of the two halves 12a—12a of the insulating body each fitted with a leaf spring contact element as just described, the longer leg 22 of each element will be received within the tapered groove 26 of the associated plug member 12a. In order to facilitate proper registry of the body parts 12a—12a with each other, each may be provided with an integral pilot pin 29 and a laterally spaced recess 30, the pin 29 of one part being entered into the registering recess of the other part to insure that the said plug parts are in axial coincidence for proper insertion into and retention by the socket shell 10.

As most clearly appears in Figures 1 and 3, the terminal elements 13—13 each provides a direct single connection between the terminal of a lamp received in the socket and the conductor for supplying current to said lamp terminal. Further, and more importantly, it will be observed that in the lamp socket of the construction just described each contact terminal 13 thereof is provided with a leaf spring portion formed of the leg 22 and its angularly bent extension 24, the leg portion 22 being free for flexing movement within the limits provided therefor by its accommodating tapered groove 26. It will be noted in this connection that in its normal unflexed condition each leg portion 22 of the contact terminals 13—13 is disposed in coplanar relation with respect to the anchoring leg 23 of the contact terminals, as shown in Figure 3. However, when a lamp is inserted into the socket so as to present its terminals in engagement with the extensions 24—24 of the legs 22—22 of the contact terminals, said legs are each flexed into a position as shown in Figure 1, such flexure occurring about a fulcrum 31 located at the base of the leaf spring immediately adjacent the looped end portion thereof.

Because of the relatively long character of the leaf spring contact elements 13—13 employed in the socket of the present invention, affording as they do primary flexing at the fulcrum points 31—31, it becomes possible to limit deflection of the leaf spring contact to a degree insuring that the stress to which the leaf spring is subjected during normal operation of the socket is at all times well below the proportional limit of the spring material of which the leaf spring is formed. Thus, in the socket of the present invention, the leaf spring contact members do not acquire a permanent set under continued flexing thereof, in consequence of which the life of the socket is materially prolonged.

In the socket construction of the present invention the anchoring extremity 25 of the leg 23 of each contact element is so disposed inwardly of the end surface of the insulating body 12 and insulatingly encased by the plug body that the possibility of inadvertently short-circuiting the contact members 13 through engagement of the extension 24 of one of said elements with the anchoring extremity 25 of the other of said elements is entirely eliminated.

Figures 13 to 16, inclusive, show a modified construction of the socket wherein a single leaf spring contact element 32 is employed to adapt the socket for use with a lamp of the type having a single contact centered in the end of the lamp base. Except for this contact element 32, the socket of Figures 13 to 16 is identical in construction with that of Figures 1 to 11, the two-part plug thereof being employed to support the single leaf spring element 32 instead of the pair of laterally spaced elements 13—13. Obviously, this is a decided advantage in the manufacture of the socket inasmuch as the plug parts, socket shell and spring-pressed detent may be interchangeably employed in the construction of single or double contact types of sockets.

The leaf spring contact element 32 necessarily differs somewhat in construction from the elements 13—13 in that its lamp-engaging end 33 extends laterally of the flexing leg portion 22a thereof for proper engagement with the single lamp contact centered in the base of the lamp. As in the case of the contact elements 13—13, the single type leaf spring element 32 is provided with a short anchoring leg portion 23a having a right angular extension 25a which is received within the notch 27 of one of the plug parts 12a, while the leg portion 22a is disposed within the tapered groove 26 in the other of said plug parts for flexing about a fulcrum point 31a.

It will be understood, of course, that the present invention is susceptible of various changes and modifications which may be made from time to time without departing from the general principles and real spirit thereof and it is, accordingly, intended to claim the same broadly as well as specifically, as indicated in the appended claims.

What is claimed as new and useful is:

1. In a lamp socket of the character described, a cylindrical lamp-receiving shell, a plug of electrical insulating material fitted in one end of said shell, said plug having a tapered recess spaced laterally of the longitudinal axis of the plug and extending longitudinally therethrough with its enlarged end opening into said shell, and a leaf-spring contact element disposed in said recess and anchored in said plug for flexing movement about a fulcrum located in the immediate region of the reduced end of the recess, said element having a freely extending lamp-engaging portion disposed externally of the enlarged end of said recess and bent angularly with respect to the portion of the element disposed in said recess.

2. In a lamp socket of the character defined in claim 1 wherein said leaf-spring contact element includes an integral part adapted for interlocking engagement with said plug to prevent longitudinal displacement of said element from said plug.

3. In a lamp socket of the character defined in claim 1 wherein said plug includes a pair of said tapered recesses respectively disposed to either side of the longitudinal axis of the plug, and wherein each of said recesses is fitted with one of said leaf-spring contact elements, the freely extending portions of the latter being disposed in crossed relation externally of the plug and being spaced to either side of the longitudinal axis of the plug.

4. In a lamp socket of the character described, a cylindrical lamp-receiving shell, a plug assembly of insulating material fitted in one end of said shell, said plug comprising a pair of complementally formed semi-cylindrical parts adapted for assembly with the flat sides thereof disposed in a common plane extending diametrically of the shell, each of said plug parts being provided with a tapered groove extending lengthwise thereof and with a notch, said groove and notch being disposed to either side of the longitudinally extending median plane of said plug part, and a pair of leaf-spring contact elements bound in spaced relation between said assembled plug parts, each of said elements including co-planar portions respectively disposed edgewise in the tapered

groove of one plug part and in the notch of the other plug part.

5. In a lamp socket of the character described, a cylindrical lamp-receiving shell, a plug assembly of insulating material fitted in one end of said shell, said plug comprising a pair of complementally formed semi-cylindrical parts adapted for assembly with the flat sides thereof disposed in substantial coincidence with a plane extending diametrically of said shell, each of said plug parts being provided with a pair of recesses formed in the flat face thereof and spaced to either side of the longitudinally extending median plane of the assembled plug parts, at least one of said pair of recesses extending the full length of the assembled plug parts and the recesses of one plug part being adapted for respective registry with those of the other plug part the pair of recesses extending the full length of the plug parts being each longitudinally tapered and disposed with its enlarged end opening into said lamp-receiving shell, and a leaf-spring contact element confined between the assembled plug parts with one portion thereof disposed edgewise in the recess extending the full length of one of said plug parts and a second portion thereof disposed in the registering recess of the other plug part, the portion of said element disposed in said full-length recess being adapted for flexing movement about a fulcrum located in the immediate region of the outer end of said plug assembly and having an angularly bent extension at the inner

end of said plug assembly projecting transversely across the plane of separation of said plug parts.

6. In a socket of the character defined in claim 5 wherein the recess in registry with said full-length recess is formed with an angular extension and wherein said second portion of the leaf-spring element is provided with a complementally shaped angular extension to secure the element against longitudinal displacement with respect to the plug assembly.

7. In a lamp socket of the character defined in claim 5 wherein the recess in one plug part for receiving said second portion of the leaf-spring element is in the form of a notch having a pair of angularly related branches one of which is substantially co-planar with the full-length recess in the other plug part.

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