July 26, 1966 R. E. FITZ GERALD 3,263,204

SPRING LOADED SOCKET AND FLEXIBLE CONTACT

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Fig. 1.

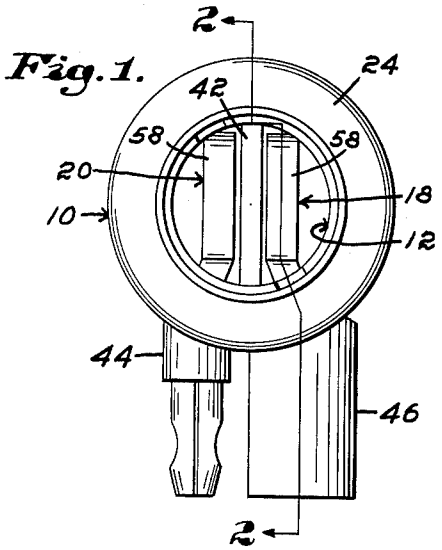


Fig. 2.

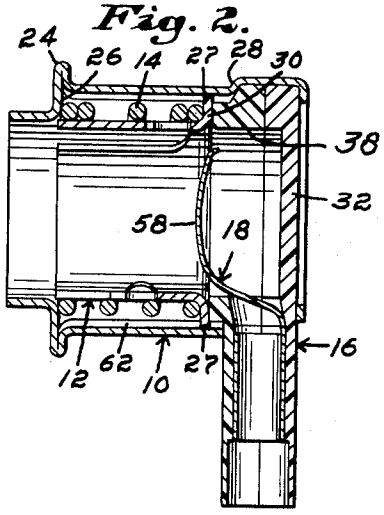


Fig. 3.

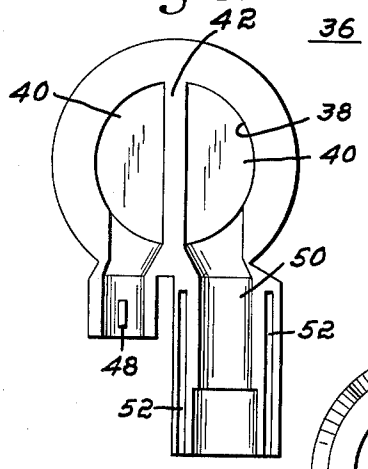
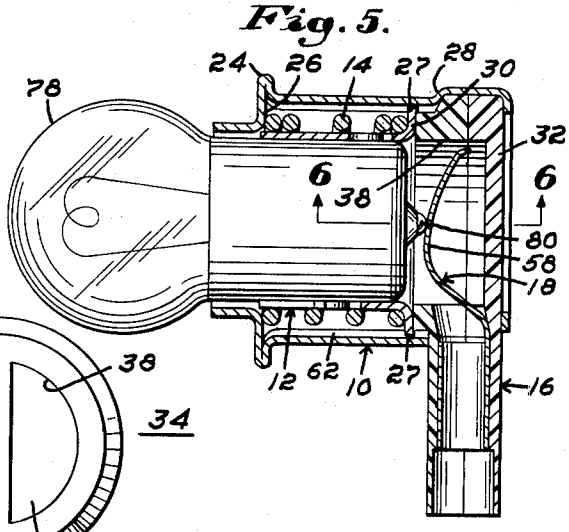


Fig. 5.



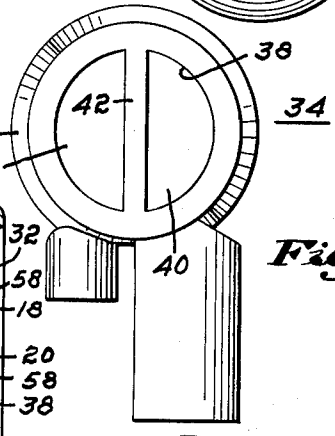


Fig. 6.

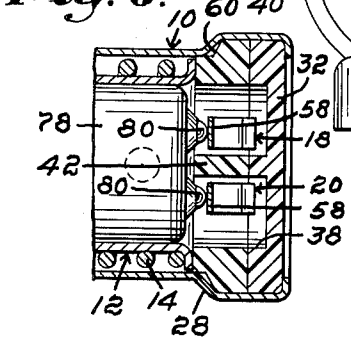


Fig. 4.

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Fig. 7

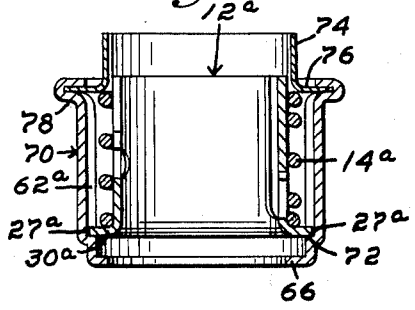


Fig. 8.

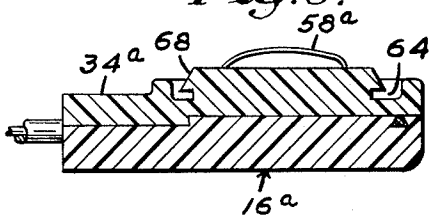
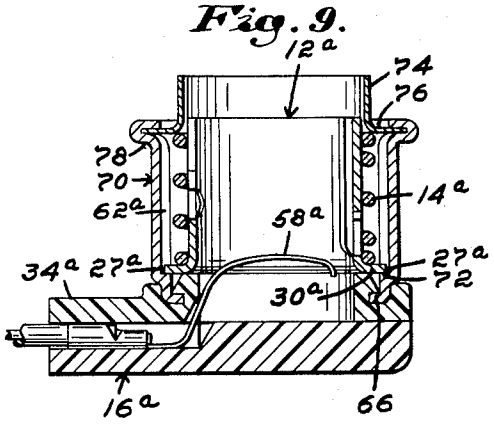


Fig. 9.



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3,263,204

SPRING LOADED SOCKET AND FLEXIBLE CONTACT

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1 Claim. (Cl. 339—154)

The present invention relates generally to lamp sockets and more specifically to a contact insert for lamp sockets.

An object of the present invention is to provide a base insert for lamp sockets having flexible leaf spring contacts engaged therewith.

A further object of the present invention is to provide a base insert for lamp sockets having flexible spring contacts as means of adjusting for variations in the solder ball connections on a lamp bulb.

A serious problem in multiple filament bulbs is the placing of the major filament at the plane on which the focal point of the bulb's optical system lies. In the conventional system, the position of the major filament is frequently dictated by the position of the J-slots of the socket alone. One of the improvements presented by the present invention is that the positioning of the major filament is provided by the upper surface of the channeled insert and the flexing of the leaf spring contacts working co-operatively in relation to the bulb as will be more fully set out hereinafter. Furthermore, the spring action of the contacts provides a means of adjusting for variations in height of the solder ball contacts of the bulb.

In the drawings:

FIG. 1 is a top plan view of the socket;

FIG. 2 is a section taken on line 2—2 of FIG. 1;

FIG. 3 is a top plan view of the base portion of the insert;

FIG. 4 is a top plan view of the cap portion of the insert;

FIG. 5 is a section similar to that shown in FIG. 2 showing a bulb engaged;

FIG. 6 is a section taken on line 6—6 of FIG. 5;

FIG. 7 is a cross sectional view of the shell unit of a variation of the socket shown in FIGS. 1–6;

FIG. 8 is a section of the insert of the variation; and

FIG. 9 is a section of the shell unit engaged with the insert of the variant with the contact and lead shown in full.

There is shown in the drawings a lamp socket having an outer shell **10**, an inner shell **12**, a helical compression spring **14**, an insert **16** and a pair of leaf contacts **18** and **20**. The outer shell **10** may be formed of a metal or plastic material and comprises a tubular body portion open at both ends and having an integral circumferential flange **24** extending in right angle relationship therewith. The external flange **24** integrally connects the upper part of the outer shell **10** with an intermediate part. The intermediate part has greater internal and external diameters than the upper part. The top surface of the flange **24** is thereby longer than the lower surface of the same providing an internal shouder **26**. The lower part of the body portion is connected integrally with the intermediate part remote from the upper part by a diverging circumferential land **28**. The lower part has greater internal and external diameters than the intermediate part of the outer shell **10**.

The tubular inner shell **12** comprises an upstanding tubular wall portion open at both ends and an integral circumferential flange **30** extending outwardly from the wall portion adjacent one of the open ends. The flange **30** has a pair of tabs **27** extending from opposite sides thereof as indicated in FIGS. 2 and 5.

The insert **16** comprises a circular portion **32** and two integral extensions. The insert **16** is assembled by placing a cap portion **34** and a base portion **36** into engagement along a mutual plane as shown in FIGS. 2 and 5. The circular portion **32** includes an upstanding wall **38** defining an opening which is separated into two semicircular openings or wells **40** by a bar of bridging element **42** as shown in FIG. 1. The upper surface of the assembled bar element **42** lies on the same plane as the upper surface of the upstanding wall **38**. The two tubular extensions which protrude from the circular portion **32** comprise a short extension **44** and a longer extension **46**.

The portion of the short extension **44** supplied by the base portion **36** includes a rectangular stud **48** which protrudes upwardly from its base as shown in FIG. 3 for a purpose to be described hereinafter. The portion of the longer extension **46** supplied by the base portion **36** includes a portion of smaller annular internal diameter to form a shelf **50** spaced from the end of the extension **46** as shown in FIG. 3. A shallow groove **52** is formed along each portion of the upper surface of the part of the longer extension **46** supplied by the base portion **36** as shown in FIG. 3. The grooves **52** are in spaced parallel relation to each other and the axis of the larger extension **46**. A pair of ribs (not shown) extend from the surfaces of the portion of the longer extension **46** supplied by the cap portion **34** to mate with their respective grooves **52** on engagement of the two parts. Each of the extensions **44** and **46** opens into the semicircular well **40** on its side of the insert **16** as indicated in FIG. 3.

The leaf contacts **18** and **20** are for the most part similar in construction although there are certain specific structural differences. Generally speaking, they comprise a tubular portion open at both ends and a flat spring leaf **58** integral with the bottom of the tubular portion arced upwardly to a plane above the upper surface of the tubular portion and then bent in a shallow arc while extending away from the tubular portion on a plane generally parallel with the axis of the tubular portion as shown in FIGS. 2 and 5. The leaf contacts **18** and **20** are formed of a material which is capable of conducting electrical current. The variations in the two leaf contacts **18** and **20** are found first in the fact that the contact **20** is longer than the other and second in the fact that the end of the contact **20** at a point remote from its leaf spring **58** is formed into a bullet terminal to engage a contact channel in a plug (not shown). The plug (not shown) would also carry a bullet terminal to engage the shorter leaf contact **18** within its tubular portion.

The insert **16** is assembled with the leaf contacts **18** and **20** by placing the longer leaf contact **20** into the portion of the shorter extension **44** supplied by the base portion **36** of the insert **16** prior to assembly with the cap portion **34**. To facilitate this engagement the rectangular stud **48** is inserted into a slot formed in the tubular body of the longer leaf contact **20**. The bullet end of the leaf contact **20** extends beyond the short extension **44** to the plane of the terminal end of the longer extension **46**. The shorter leaf contact **18** is placed within the portion of the longer extension **46** supplied by the base portion **36** on to the shelf **50** with the free end of the tubular portion of the same horizontal plane as the edge of the shelf **50** closest to the end of the laregr extension **46**. Each of the spring leaves **58** of the leaf contacts **18** and **20** protrude into its respective half of the circular portion **32** provided by the base portion **36**. The part of the circular portion **32** supplied by the cap portion **34** is provided with a sloping external engagement shoulder **60** as shown in FIGS. 4 and 6. The cap portion **34** then continues with an external wall in spaced relation to the axis of the circular part circumscribing an external cir-

cumference of less diameter than the receiving portion of the circular part. After both the leaf contacts **18** and **20** have been placed in their proper extension the cap portion **34** is placed into engagement with and on top of the base portion **36**. Grooves and ribs may be placed to co-operate with each other to provide a better mating engagement of the two parts as set forth hereinbefore. When the assembly is complete, the spring leaf **58** of the leaf contacts **18** and **20** lie partially within the areas defined by the semicircular wells **40** and their upper arced surfaces extend above the plane of the top surface of the circular portion **32** as shown in FIG. 2.

The socket is assembled by first dropping the helical spring **14** into the outer shell **10** until it rests on the internal shoulder **26**. The diameter described in the spring **14** is less than the internal diameter described by the shoulder **26**. A pair of shallow grooves **62** are formed on the inside wall of the outer shell **10** from the land **28** to the plane of the external flange **24** and on opposite sides of the outer shell **10** as shown in FIGS. 2 and 5. The tabs **27** of the inner shell **12** have a width slightly less than the width of the grooves **62**. The tabs **27** are fitted within the grooves **62** and the inner shell **12** is slid within the outer shell **10** until the flange **30** abuts the spring **14**. The assembled insert **16** is then placed within the larger open end of the outer shell **10** until the engagement shoulder **60** of the cap portion **34** is in abutting relationship with the circumferential land **28** of the outer shell **10**. An opening is provided in the outer shell **10** whereby the extensions **44** and **46** of the insert protrude beyond the periphery of the outer shell **10** as shown in FIGS. 1, 2 and 5. The free terminal end of the outer shell **10** may now be crimped over and into abutting engagement with the lower surface of the base portion **36** of the insert **16** thereby securely holding the insert **16** in engagement with the assembled socket.

The bulb **78** having studs for engagement with J-slots formed in the inner wall of the inner shell **12** and having a pair of solder ball connections **80** is engaged in the socket in a conventional manner. However, the difference is that when the solder ball comes into superposed abutting relationship with the leaf springs **58**, the leaf springs would flex downward until the base of the bulb comes in close proximity to the upper surface of the bridging element **42**.

The variant shown in FIGS. 7, 8 and 9 discloses an assembled shell unit and an insert, which can be engaged together subsequent to their individual assembly.

The insert **16***a* is similar to the insert **16** except that the cap portion **34***a* has an external circumferential groove **64** formed in it for engagement with a lip **66** formed in a housing **70**. A circumferential ramp **68** is formed adjacent the grove **64** and is somewhat flexible for purpose to be described hereinafter.

The tubular housing **70** of the variant is open at both ends and has a converging inner circumferential shoulder **72** spaced from the end providing the lip **66**. The spring **14***a* of the variant is similar to the spring **14** of the first construction and the inner shell **12***a* is similar to the inner shell **12**. The variant is also provided with a shell

element **74** having an integral annular flange **76** extending away from the axis of the shell element **74** adjacent an opening thereof.

The shell unit is assembled in the following manner. The inner shell **12***a* is dropped within the housing **70** with the tabs **27***a* sliding within the grooves **62***a*, formed in the inner wall of the housing **70**, until the flange **30***a* abuts the engagement shoulder **72**. The spring **14***a* is then dropped in between the inner shell **12***a* and the housing **70** into abutting relationship with the flange **30***a*. The shell element **74** is then placed against an outwardly bent portion **78** which provides a circumferential flange at the opening in the housing **70** opposite to that provided by the lip **66**. This outwardly extending circumferential portion **78** can then be clamped over the annular flange **76** of the shell element **74** completing the assembly of the shell unit as shown in FIGS. 7 and 9. The lip **66** can then be pressed against the ramp **68** which will give way and allow the lip **66** to engage within the groove **64** of the insert **16***a* thereby completing the assembly of the insert and the shell unit.

While there has been illustrated and described a preferred embodiment of the invention, it should be understood that the invention is best described by the following claim.

What is claimed:

A lamp socket, including a tubular outer shell open at both ends, an inner tubular shell, also open at both ends, said inner shell having an integral circumferential flange, extending therefrom adjacent one of said openings, said flange having at least one tab extending therefrom and means formed on said outer shell for engaging said tabs, a helical compression spring engaged with said inner shell aligned between said inner shell and said outer shell and in abutting relation with said flange, an insert engaged with said outer shell at one of its open ends, said insert including an insulating housing having a circular portion of at least two integral extensions extending therefrom, one of said extensions being shorter than the other, and two contacts, each of said contacts having a tubular portion and an integral flexible leaf spring extending therefrom, each of said tubular portions of said contacts being circumscribed by at least a portion of one of said extensions and each of said flexible leaves extending partially within a component, formed in a circular portion by at least one rib, and a portion of each of said leaves extending above the plane of said housing and within the area defined by said outer shell.

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