Nov. 26, 1963 H. E. BARNHART 3,112,146

ELECTRICAL CONNECTOR

Filed May 9, 1961 2 Sheets-Sheet 1

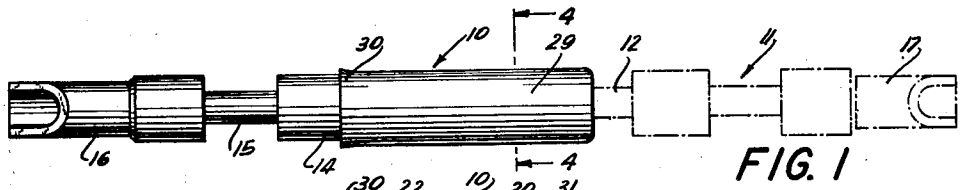


FIG. 1

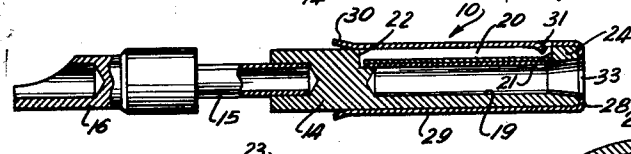


FIG. 2

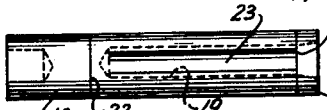


FIG. 3

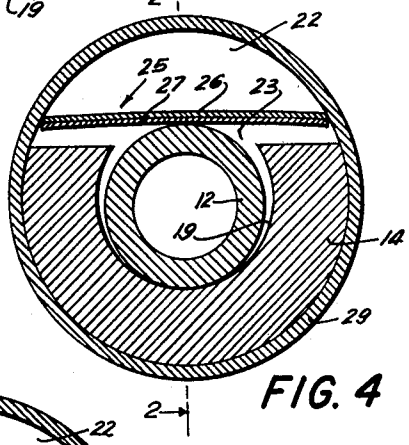


FIG. 4

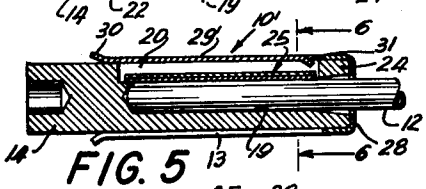


FIG. 5

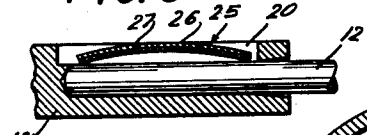


FIG. 5a

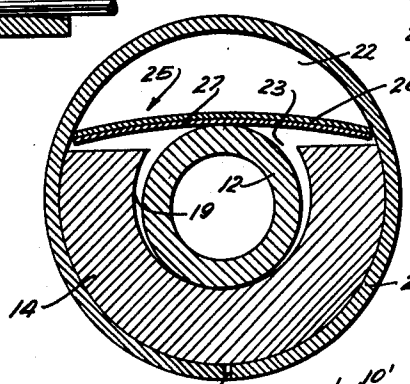


FIG. 6

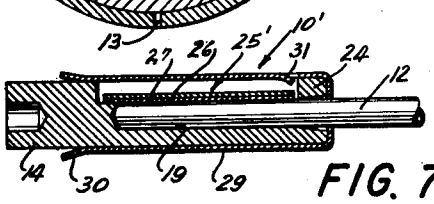


FIG. 7

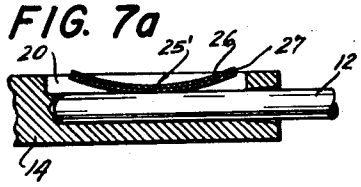


FIG. 7a

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FIG. 8

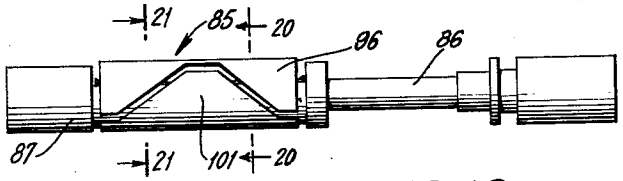


FIG. 9

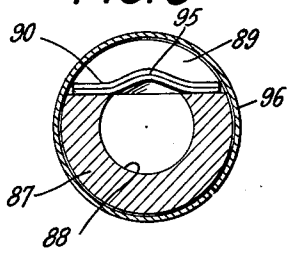
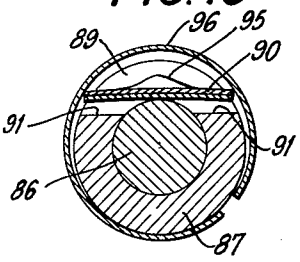


FIG. 10



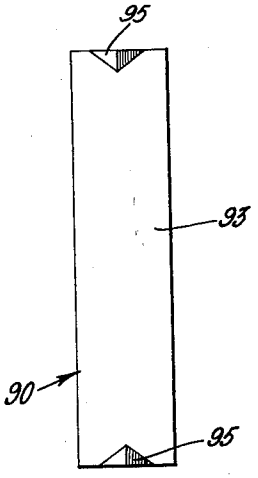


FIG. 11

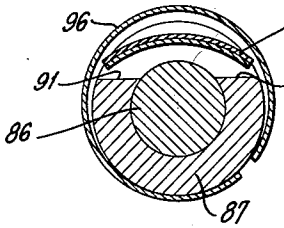


FIG. 12

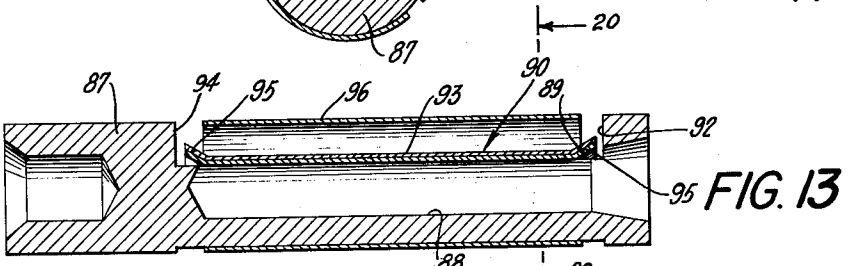


FIG. 13

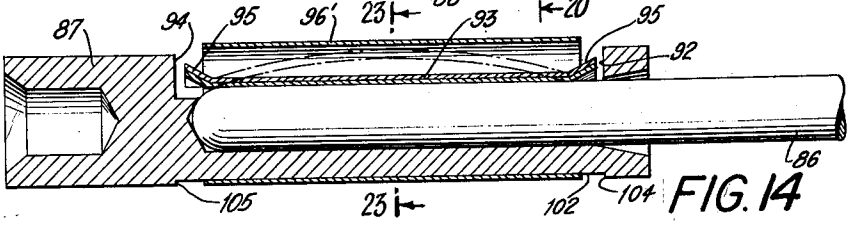


FIG. 14

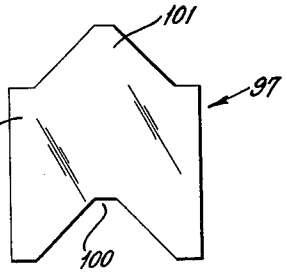


FIG. 15

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3,112,146
ELECTRICAL CONNECTOR

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Filed May 9, 1961, Ser. No. 108,832
11 Claims. (Cl. 339—30)

This invention relates to electrical apparatus and more particularly to electrical connectors of the type wherein electrical connections are made by interfitting plug and socket contacts.

This application is a continuation-in-part of application Serial No. 706,623, filed January 2, 1958, now abandoned.

One of the objects of the present invention is to provide a socket contact of novel construction for use in readily separable electrical connectors of the pin and socket type.

Another object of the invention is to provide a socket contact which provides sure and forcible electrical connection between the socket and the pin of an electrical connector throughout a wide range of temperatures.

Yet another object of the invention is to provide a socket contact which is useful throughout a temperature range from asmospheric or ambient temperatures to markedly elevated temperatures.

A further object is to provide a substantially rigid socket contact having a pin-retaining and contact-making spring means associated therewith, the body of the socket contact and the spring being of such construction that the spring means contacts the pin forcibly throughout an extended temperature range from atmospheric or elevated temperatures.

A still further object is to provide a novel socket contact assembly of the type described which has a long and effective operating life, during which it may be subjected to many marked changes in temperature.

Yet another object is to provide a novel socket contact of the type described which is characterized by its economy of weight and space.

Another object is to provide a novel socket contact assembly which may be economically made, which is easy to assemble, and which may be advantageously employed in a multiple socket assembly.

The above and further objects and novel features of the invention will more fully appear from the following description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the invention.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

FIG. 1 is a view in plan of a first illustrative form of socket contact embodying the present invention, a male or contact pin, shown in phantom lines, cooperating therewith;

FIG. 2 is a longitudinal sectional view of the socket member of FIG. 1 as it appears at atmospheric temperature, the section being taken generally on the line 2—2 of FIG. 4, certain parts being shown in elevation;

FIG. 3 is a fragmentary view in plan of the body of the socket member, the spring and sleeve means being omitted therefrom;

FIG. 4 is an enlarged view in vertical transverse section on line 4—4 of FIG. 1 through the socket member with

a contact pin inserted in the bore thereof, the socket member being shown as it appears at atmospheric temperature;

FIG. 5 is a view similar to FIG. 2 of a modified socket member with a contact pin inserted in the bore thereof, the bimetallic contact spring being positioned with its higher expansion component positioned radially outwardly of the other component relative to the bore in the socket body;

FIG. 5*a* is a schematic view in longitudinal section through the socket member of FIG. 5 with the contact spring-retaining sleeve omitted, the contact spring of the socket member being shown somewhat schematically as it would appear at elevated temperature in the absence of such sleeve;

FIG. 6 is an enlarged view in vertical transverse section taken generally along the line 6—6 of FIG. 5;

FIG. 7 is a view generally similar to FIG. 5 but with the spring-retaining sleeve of the socket member unslotted, as in FIGS. 2 and 4, and with the bimetallic contact spring positioned with the higher expansion component thereof radially inwardly of the other component relative to the bore in the socket body;

FIG. 7*a* is a schematic view in longitudinal section through the socket member of FIG. 7 with the contact spring-retaining sleeve omitted, the contact spring of the socket member being shown somewhat schematically as it would appear at elevated temperature in the absence of such sleeve;

FIG. 8 is a view in side elevation of a third illustrative form of socket contact embodying the present invention, there being shown a contact pin matingly cooperating therewith at atmospheric temperature;

FIG. 9 is an enlarged view in vertical transverse section through the socket member of FIG. 8 with the contact spring in end view and the parts of the socket contact in the position they assume at atmospheric temperature in the absence of a contact pin in the socket, the section being taken along line 20—20 of FIGS. 8 and 13;

FIG. 10 is an enlarged view in vertical section through the mating socket and contact pin members of FIG. 8 at atmospheric temperature, the section being taken along line 21—21 of FIG. 8;

FIG. 11 is a view in plan of the bimetallic contact element of the socket contact of the fourth embodiment of the invention;

FIG. 12 is a view in vertical transverse section through the mating socket and pin with the parts in the positions they assume when the socket and contact pin are heated to elevated temperature, the section being taken generally at the position of line 23—23 of FIG. 14;

FIG. 13 is a view in longitudinal axial section of the socket contact of FIG. 9 as it appears at atmospheric temperature;

FIG. 14 is a view in longitudinal axial section of the socket contact of FIG. 9 having a contact pin therein, the contact pin being shown in elevation, the parts being shown in full lines in the positions which they assume when the socket and contact pin are at atmospheric temperature, the bimetallic contact element being shown in phantom lines in the position which it would assume at elevated temperature with the spring-retaining sleeve removed; and

FIG. 15 is a view in plan of the blank from which the contact element retaining sleeve is formed.

The socket contact of the present invention may be advantageously employed in close association with a jet, ram-jet, or rocket engine, and/or in a thermocouple circuit, whereby it is heated from atmospheric or ambient temperature to high temperatures during use. A socket contact, in a typical application of this kind, may reach temperatures as high as 1000–1750° F. In many of such applications it is necessary to maintain good electrical contact between the pin and socket of the connector throughout the temperature range from atmospheric to elevated temperatures. It is also necessary that the connector be such as to maintain such electrical connection throughout a large number of cycles involving heating and cooling of the connector.

The socket contact of the invention is of such construction, as will appear hereinafter, that it adds very little to the size and weight of the socket contact, as compared to prior socket contacts such as, for example, that shown in Swanson et al. Patent No. 2,716,744. The contact socket of the present invention is simple and economical in construction, and easy to assemble. Because of this, it lends itself admirably to use in a multiple contact assembly wherein a plurality of sockets are arranged in an insulating insert in one connector part. It will be understood that the above suggested manners of use of the socket contact of the invention are illustrative and not limiting.

As will be seen from the above, three embodiments of socket contact in accordance with the invention are illustrated and described herein. The first such embodiment is shown in FIGS. 1 to 4, inclusive, and 7; the second embodiment is shown in FIGS. 5 and 6; and the third embodiment is shown in FIGS. 8 to 13, inclusive.

Turning now to the two embodiments of electrical socket contact shown in FIGS. 1 to 7, inclusive, the socket contact, generally designated **10**, includes only three parts—a body or a socket member **14**, a contact spring **25**, and a spring-retaining sleeve **29** telescoped over the forward end of socket member **14**. In the embodiment shown, the body **10** is made in the form of a rigid cylindrical metallic bar suitably machined as by drilling and milling, in a manner to be described. The spring **25** is made of bimetallic stock and is retained in a groove **20** in body **14** by the sleeve **29**. The socket member is designed to receive a pin **12** of a plug member **11** so as to make secure, non-arcing contact therewith, while permitting the ready separation of the pin and the socket member by movement of the two axially away from each other.

Socket or body member **14** is preferably made of a heat resistant metal such as, for example, nickel or nickel plated steel. The forward, outer end of body member **14** is drilled to provide a bore **19** for slidably receiving the pin **12** of the aforementioned plug member **11**. The open end or mouth of bore **19** is preferably made bell-shaped at **24** to facilitate the entry of the pin **12**, which has a diameter only slightly less, usually about .002 to .005", than the diameter of bore **19**. The other, rear end of member **14** is drilled to a substantial depth to receive the forward end of a tube **15**, the other end of tube **15** being connected to the enlarged cylindrical member **16** having a suitable recess at its rear end to provide a solder well. Tube **15** is preferably formed of a heat resistant metal, a typical one of which is a nickel, cobalt, iron alloy known as "Kovar." If desired, tube **15**, when made of "Kovar," may be nickel plated. Tube **15** may be secured to body **14** by being copper brazed thereto in a hydrogen atmosphere. Other suitable metals for tube **15** as well as sleeve **29** or **29'** include various very high heat resistant alloys, such as alloys of nickel and chromium, of which "Inconel" and "Inconel 'X'" are typical.

The body **14** is provided with a flat-bottomed groove **20** extending transversely thereacross and having such width that it extends from the rear of bell-mouthed portion **24** to somewhat beyond the inner end of the bore **19**. Groove **20** may be formed, for example, by passing a milling cutter transversely through the body **14**. The radial depth of groove **20** is such that the groove intersects the bore **19** so as to form an open-sided slot **23** as shown in FIGS. 3, 4, and 6, through which the groove communicates with bore **19**. The side edges of such slot are spaced apart a distance substantially less than the diameter of pin **12**, whereby to eliminate any tendency of the pin to escape from the bore.

The bimetallic leaf spring **25** is of such width that when no pin **12** is in bore **19** the spring lies flat upon the flat side edge portion of groove **20** with the side edges of the leaf spring lying slightly radially inward of the periphery of body **14**. The leaf spring is held in groove **20** by the above-mentioned sleeve **29** which snugly fits over the forward end of body **14**. The rear end of sleeve **29** or **29'** is preferably flared at **30** to facilitate assembly of the sleeve upon the body **14**. The forward end of sleeve **29** or **29'** is provided with a centrally open flange **28** which overlies the forward edge of body **14**. Flange **28** has a central opening **33** therethrough aligned with the outer end of the opening through bell-mouth **24**. When sleeve **29** is of such diameter as to tightly embrace body **14**, no added means is necessary to retain the sleeve on the body. In some cases. however, it may be desired to provide a somewhat more positive means for retaining the sleeve. One such means is shown in FIG. 2, wherein the sleeve **29** is shown as having a tang **31** lanced from the sleeve in such manner that the root of the tang lies rearwardly thereof, the forward end of the tang being bent radially inwardly. The tang is so located, and is of such width, that when the sleeve is telescoped over the body **14** in a direction from right to left in FIG. 2, the tang is momentarily bent outwardly as it passes over bell-mouthed portion **24**, the tang, when the sleeve has been fully assembled upon body **14**, snapping radially inwardly to confront the forward radially directed wall **21** of groove **20**. Sleeve **29** may be made of a heat resistant metal such as, for example, "Kovar" or nickel-plated "Kovar," or of other suitable high heat resistant metals, as above indicated.

FIG. 4 shows the condition of the parts when a connector pin **14** is in bore **19** and the socket contact is at atmospheric temperature. The contact spring **25**, under such conditions, is flexed slightly upwardly in its longitudinal central portion by the pin **12** so as to make secure contact therewith and to press the pin firmly against the opposite wall of bore **19**. The spring **25** is held against any substantial rearward movement by the radially directed rear wall **22** of the groove **20**, and is retained against marked movement radially outwardly of body **14** by engagement between the radially outer longitudinal side edges of strip **25** with the inner wall of sleeve **29**.

As will appear hereinafter, the contact spring **25** functions to maintain sure and forcible contact between it and pin **12** throughout an extended range of temperatures from atmospheric to markedly elevated temperatures. Such result is obtained regardless of whether the high expansion component **26** of contact spring **25** is mounted radially outwardly or radially inwardly in groove **20** with respect to the lower expansion component **27** of the spring. As a consequence, unless a particular type of contact between the members is desired, no particular care need be taken as regards the relative location of the components of spring **25** in the placement of the spring in the groove.

FIGS. 5 and 6 serve both to illustrate the second embodiment of the socket member of the invention, wherein the sleeve **29'** is longitudinally slotted at **13**, and to show the action of the contact spring, when assembled with its higher expansion metal component radially outwardly, in the embodiments of both FIGS. 1–4, inclusive, and FIGS. 5 and 6, when such socket member is sub-

jected to elevated temperature. Assuming that the assembly shown in FIG. 4 is now heated from atmospheric to a markedly elevated temperature, the higher expansion of layer **26** causes spring **25** to tend to bow so that if it were unrestrained (FIG. 5*a*) it would become longitudinally convex in a radially outward direction. The sleeve **29**, however, restrains spring **25** from any pronounced bowing at elevated temperatures. Upon a sufficient rise in temperature, the edges of the longitudinal central portion of spring **25** will contact the inner wall of sleeve **29**, which forms an abutment therefor, more forcibly so that further expansion of member **25** causes the central, radially inner portion of the forward edge of the spring to engage pin **12** with greater force. At elevated temperatures spring **25** also tends to bow transversely, as shown in FIG. 6, but such latter bowing is insufficient to offset the increased pressure between the forward edge of spring **25** and pin **12** caused by the described tendency to longitudinal bowing of the spring.

The spring member may be placed in groove **20** so that the higher expansion component **26** lies radially inwardly of the other component **27** with respect to bore **19**. When thus placed the spring member is designated **25'**. Spring member **25'** would assume the position shown in FIG. 7*a*, upon the heating of the socket member to an elevated temperature, if the retaining sleeve **29** were omitted. In the assembly of FIG. 7 the expansion of component **26** causes spring member **25'** to tend to bow so as to assume a longitudinally outwardly concave shape Upon a sufficient temperature rise, both ends of spring member **25** will contact more forcibly the inner side wall of sleeve **29**, the sleeve functioning as abutments for the ends of member **25**, so that the central portion of the latter member is strongly pressed radially inwardly into contact with an upper zone of pin **12** and the pin, in turn, is strongly thrust against the bottom portion of the wall of bore **19**.

The bimetallic stock from which spring **25** is made may be any one of a number of commercially available bimetallic materials suitable for the purpose. Among these is that sold under the trade-name "Aquaflex," made by the H. A. Wilson Co., Union, New Jersey. Another suitable bimetallic material is that sold under the name "Auto-flex" bimetal.

When the socket member is to be subjected to very high temperatures, it is preferred that the sleeve **29'** shown in FIGS. 5 and 6 be employed. Sleeve **29'** is longitudinally slotted at **13**, so that the sleeve may yield resiliently somewhat when subjected to the described radially outwardly directed thrust by spring **25** when the socket member is at elevated temperatures.

The socket member of the invention in the embodiments shown is of such construction that the contact spring and the spring-retaining sleeve may be added to the socket body in the assembly of the socket member after the processing of the socket body. Such processing may include the subjection of the body to operations at extremely high temperatures, as in the brazing of connections to the body. Thus the spring and sleeve need not incur the danger of damage by temperatures higher than those for which they were designed, since they are assembled in the body after such operations have been completed.

In FIGS. 8–15, inclusive, there is illustrated a third embodiment of socket contact in accordance with the invention. Such socket contact incorporates a resilient sleeve member which retains the bimetallic contact member on the body of the socket contact, the sleeve member having thermal expansion and relaxation properties correlated with the thermal expansion properties of the bimetallic contact member. The relationship between the sleeve member and the bimetallic contact member is such that in the lower temperature range, for example from −100 to +100° F., the combined thermal expansion effects of the sleeve and bimetallic element maintain the force necessary to disengage the contact pin generally constant. In the upper temperature range, for example from +100 to 1200° F. (and beyond), as expansion of the bimetallic contact element tends to increase such disengaging force, the relaxation of the sleeve member tends to decrease it. The two effects are thus in the opposite direction, the net result being such as to prevent the development of unduly high contact pressures between the bimetallic contact element and the contact pin, and to obviate any possibility of the tendency of the bimetallic contact to become overstressed by being held for a long period at elevated temperature in engagement with a contact pin in the contact socket.

In the embodiment of socket contact shown in FIGS. 8–15, inclusive, the body **87** of such socket contact **85** is generally similar to that designated **14** in the embodiment of FIGS. 1–7*a*, inclusive. A contact pin generally designated **86** is adapted selectively to cooperate with socket contact **85** in the manner shown in FIGS. 8, 10, 12, and 14. The body **87** has an elongated axially extending bore **88** therein, there being an elongated transverse slot **89** in the body intersecting bore **88** as shown. An elongated bimetallic contact element, generally designated **90**, which is generally flat in shape, is adapted to be placed in slot **89** as shown in FIGS. 9–14, inclusive. In the described embodiment the metal layer of the bimetallic strip having the higher coefficient of thermal expansion is disposed radially outwardly. When no contact pin is disposed in bore **88** and the socket contact is at atmospheric temperature, the body **93** of the contact element **90** lies substantially flat with its side edges in contact with the flat surfaces **91** lying along each side of the bore **88** and defining the bottom of the slot **89**. The contact element **90** preferably has a length at least slightly less than that of slot **89** as shown in FIGS. 24 and 25 wherein the ends of the contact strip are shown spaced somewhat from the forward and rear ends **92** and **94**, respectively, of the slot **89**. Such relationship of the lengths of the slot and the contact strip allows the parts readily to be assembled by machine. To facilitate the entry of the contact pin **86** into bore **88**, the forward end of the contact element **90** is provided with a centrally located up-bent zone **95**. Preferably, as shown, the contact element **90** has a similar up-bent portion **95** at the rear end thereof, so that both ends of the contact element are of similar shape. With such construction the contact element may be placed in slot **89** in either direction.

The contact element **90** is retained on the body **87** of the socket contact in the position shown by means of a resilient retaining sleeve **96**. Such sleeve, which in the illustrative embodiment is made of a nickel alloy designated "AMS 5542," is shown as having been formed from a sheet metal blank such as that shown in FIG. 15 and there designated **97**. Such blank has a flat main portion **99**, a broad central generally V-shaped slot **100** at one end thereof, and a central generally complementary broad V-shaped projection **101** on the other end thereof. It is preferred that the direction of the grain formed in the rolling of blank **97** extend in the direction vertically of FIG. 15. The blank **97** is formed into the sleeve **96** by being bent around a suitable mandrel. Following the forming of the sleeve **96** it is telescoped over the body **87** of the socket contact so as to lie within a broad shallow groove **102** thereon and to overlie the contact element **90** throughout substantially the entire length of the latter. Preferably the sleeve **96** has a length somewhat less than the length of groove **102** as shown in FIGS. 8, 13, and 14, wherein the forward and rear edges of the sleeve lie somewhat spaced from the forward and rear ends **104** and **105**, respecitvely, of groove **102**. Preferably the sleeve **96** has a relaxed inner diameter at room temperature which is substantially equal to the diameter of the root of groove **102** on body **87**.

At room temperature, with no contact pin in the bore 88, the parts 87, 90, and 96 are disposed with respect to each other as shown in FIG. 9. When a contact pin 86 is inserted in the socket at room temperature, as shown in FIG. 10, the contact element 90 is raised somewhat by the contact pin, the sleeve 96 resiliently yielding to open up somewhat to the position indicated at 96' in FIG. 14 as shown. The forces exerted upon contact element 90 by the contact pin 86 and the sleeve 96 will cause the contact element to bow slightly about its longitudinal axis, as shown in FIG. 10.

When the mating socket contact and pin are subjected to elevated temperature, for example up to 1200° F., disposition of the parts changes from that of FIG. 10 to that of FIG. 12. Since the higher expansion metal of the bimetallic contact element, in the embodiment shown, is disposed radially outwardly, upon a rise of temperature the bimetallic element tends to bow somewhat further from its slightly bent position of FIG. 10, and the strip bows outwardly longitudinally as shown in phantom lines in FIG. 14 when unrestrained by sleeve 96. If the sleeve 96 were not of a yielding character, this would impose a high contact pressure between element 90 and pin 96. In accordance with the present embodiment of the invention, the resilient sleeve 96 is made to have such characteristics of thermal relaxation that its loss of radially inwardly directed force imposed upon contact element 90 generally compensates for what would otherwise be an unduly high contact-engaging force produced by the expansion of the bimetallic element 90. The bimetallic element 90, which may be made of a bimetallic metal such as "Aquaflex," thus acts together with the resilient sleeve 96 to preserve the contact pressure between the contact element 90 and the contact pin 86 within desired predetermined limits.

Although only a limited number of embodiments of the invention have been illustrated in the accompanying drawings and described in the foregoing specification, it is to be expressly understood that various changes, such as in the relative dimensions of the parts, materials used, and the like, as well as the suggested manner of use of the apparatus of the invention, may be made therein without departing from the spirit and scope of the invention as will now be apparent to those skilled in the art. Although the bimetallic metal contact strip 90 has been shown and described as being disposed with the metal component with the higher coefficient of expansion disposed radially outwardly, it is to be understood that the strip 90, with a reversal in the direction of projection of the portions 95, may be disposed with the metal component with the higher coefficient of expansion disposed radially inwardly. In such latter case, the bimetallic strip 90 would, upon being subjected to elevated temperature, bow in directions which are the reverse of those shown in FIGS. 12 and 14, such action being generally similar to that of contact strip 25' as shown in FIG. 7*a*. The longitudinally central portion of strip 90 would thus, under such conditions, engage the contact pin 86 most forcibly, and the opposite ends of strip 90 would be the portions thereof most strongly engaging retaining sleeve 96.

What is claimed is:

1. An electrical socket contact comprising an elongated metallic body having a longitudinally extending cylindrical bore in a first, forward end and terminating short of the second, rear end of the body, an elongated longitudinally extending slot in the wall thereof around said bore, said slot at one end terminating adjacent the closed end of the bore and at the other end terminating adjacent the open end of said bore, the slot communicating with the bore throughout an extended zone, a longitudinally extending resilient bimetallic contact strip disposed in the slot and transversely spanning the intersection of the bore and slot, said strip comprising two generally flat leaf springs having different thermal coefficients of expansion and being adapted to bend in response to elevated temperatures to compensate for thermal expansion of said body, and a cylindrical sleeve closely surrounding said body and overlying said strip to retain the latter in operative position in the slot, the width of said resilient strip being such that the side edges thereof engage the inner walls of said sleeve adjacent the base of said slot, whereby said strip resiliently compressively engages a pin contact having a close sliding fit in said bore.

2. An electrical socket contact adapted for use throughout an extended temperature range comprising an elongated metallic body having a longitudinally extending cylindrical bore in a first, forward end and terminating short of the second, rear end of the body, an elongated longitudinally extending slot in the wall thereof around said bore, said slot being in the form of a groove extending transversely across the body and having a flat bottom wall intersecting the bore in the body, said slot at one end terminating adjacent the closed end of the bore and at the other end adjacent the open end of said bore, a longitudinally extending bimetallic contact strip disposed in the slot and comprising two generally flat leaf springs having different thermal coefficients of expansion and being adapted to bend in response to elevated temperatures, and a sheet metal cylindrical sleeve closely surrounding said body and overlying said contact strip to retain the latter in operative position in the groove, said strip having such width as to overlie the bottom wall of the groove at each side of the intersection between the bore and the groove and to engage the inner wall of said sleeve adjacent said bottom wall, whereby said strip resiliently, compressively engages a pin contact having a close sliding fit in said bore, the strip having a length such that the ends of the strip lie close to the ends of the slot for engagement with said pin.

3. An electrical socket contact as defined in claim 2, wherein the higher expansion metal component of said bimetallic contact strip lies radially outwardly of the other component of the strip.

4. An electrical socket contact as defined in claim 2, wherein the higher expansion metal component of said bimetallic contact strip lies radially inwardly of the other component of the strip.

5. An electrical socket contact as defined in claim 1, wherein said sleeve is a longitudinally split sleeve closely surrounding the forward end of the body and overlying the bimetallic contact strip.

6. An electrical socket contact as defined in claim 2, wherein said sleeve is a resilient split sleeve closely surrounding the forward end of the body and overlying the bimetallic contact strip.

7. An electrical socket contact as defined in claim 6, wherein the thermal relaxation properties of the resilient sleeve are so related to the thermal expansive properties of the bimetallic contact strip that the contact pin-engaging force of the bimetallic contact strip is maintained within a relatively narrow range of predetermined limits over a relatively wide range of operating temperatures.

8. An electrical socket contact as defined in claim 7, wherein the resilient sleeve is generally axially split.

9. An electrical socket contact as defined in claim 7, wherein the resilient sleeve is made of a single thickness of sheet metal, the confronting ends of the sleeve are spaced somewhat apart at room temperature, and the ends of the sleeve peripherally overlap at at least one zone angularly about the sleeve.

10. An electrical socket contact as defined in claim 9, wherein such zone of peripheral overlap of the confronting ends of the sleeve is located intermediate the length of the sleeve.

11. An electrical socket contact adapted for use throughout an extended temperature range comprising an elongated cylindrical metallic body having a longi-

tudinally extending cylindrical bore in a first, forward end and terminating short of the second, rear end of the body, an elongated longitudinally extending slot in the wall thereof around said bore, said slot being in the form of a groove extending transversely across the body and having a flat bottom wall intersecting the bore in the body, said slot at one end terminating adjacent the closed end of the bore and at the other end adjacent the open end of said bore, a longitudinally extending bimetallic contact strip disposed in the slot for resilient, compressive engagement with a contact pin receivable in said bore, said strip having such width as to overlie the bottom of the groove at each side of the intersection between the bore and the groove, the strip having a length such that the ends of the strip lie close to the ends of the slot, and means to retain the contact strip in operative position in the slot, whereby to retain such ends from marked displacement longitudinally of the body upon the flexing of the strip incident to a change in temperature of the socket contact, said last-named means comprising a resilient split sleeve closely surrounding the forward end of the body and overlying the bimetallic contact strip, said sleeve being engageable by the longitudinal edges of said strip and being adapted to resiliently expand circumferentially in response to the flexing force of said bimetallic strip at elevated temperatures, whereby the force applied to said pin by said strip is relatively constant throughout a wide range of operating temperatures.

References Cited in the file of this patent

UNITED STATES PATENTS

1,361,947	Whittaker	Dec. 14, 1920
1,603,681	Gagnon	Oct. 19, 1926
1,635,830	Gagnon	July 12, 1927
1,635,832	Gagnon	July 12, 1927
2,077,587	Rowe	Apr. 20, 1937
2,716,744	Swanson et al.	Aug. 30, 1955
2,740,942	Sprigg	Apr 3, 1956

FOREIGN PATENTS

982,410	France	Jan. 31, 1951
999,305	France	Oct. 3, 1951
1,228,728	France	Mar. 14, 1960
286,966	Great Britain	Mar. 15, 1928
375,922	Great Britain	July 7, 1932
520,028	Great Britain	Apr. 12, 1940
538,757	Great Britain	Aug. 15, 1941
571,900	Great Britain	Sept. 13, 1945