July 28, 1953 E. E. RITTER 2,647,248

SOCKET-TYPE CONTACT

Filed May 17, 1951

Fig. 1

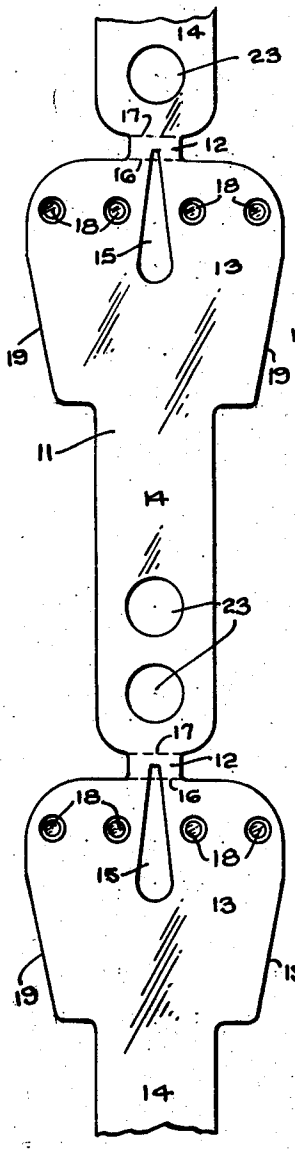


Fig. 2

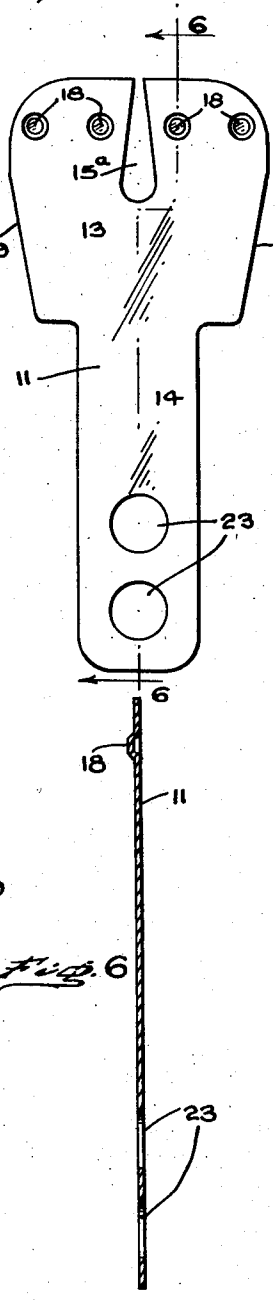


Fig. 5



Fig. 3

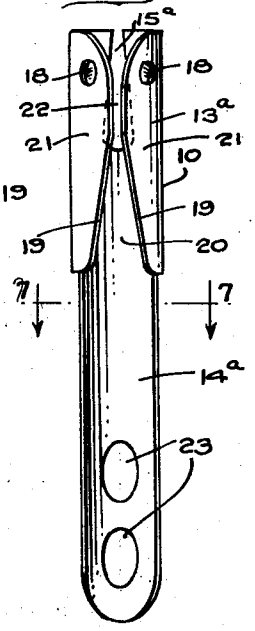


Fig. 4

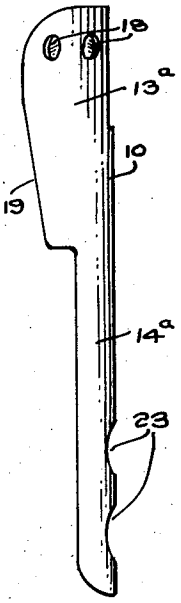


Fig. 7



Fig. 6

INVENTOR
EDWIN E. RITTER
BY
ATTORNEY

Patented July 28, 1953

2,647,248

UNITED STATES PATENT OFFICE

2,647,248

SOCKET-TYPE CONTACT

Edwin E. Ritter, Chalfonte, Pa., assignor to Hugh H. Eby, Inc., Philadelphia, Pa., a corporation of Pennsylvania

Application May 17, 1951, Serial No. 226,757

2 Claims. (Cl. 339—258)

1

This invention relates to electrical contacts and more particularly to a sleeve-type contact adaptable for a socket designed to receive the contact prongs of an electronic tube.

While heretofore and prior to the present invention tubular contact elements for receiving the pins of electronic tubes have been commonly employed in the tube socket, they have not been altogether satisfactory due to the fact that with repeated use the longitudinally split metal barrel of the contact element expands to such extent that unsatisfactory contact is established between the contact element and the tube pin inserted therein.

For example, for one type of tube, radio set manufacturers have required that the tube socket be provided with sleeve-type contact elements each capable of supporting a 0.090 inch diameter pin having a 3 ounce weight suspended from it after a 0.096 inch diameter pin had been inserted and removed from the contact element at least ten times.

It is among the principal objects of the present invention to provide a sleeve-type contact element which more than meets the minimum requirement above set forth; which though made of extremely small size is, nevertheless, of the requisite strength and resiliency to insure good electrical contact with the tube pin inserted therein; which indefinitely retains its pin-gripping characteristic; and which is inexpensive and simple in construction.

It is further pointed out that the pins on standard electronic tubes have an inherent diametric tolerance of plus or minus 0.002 inch. For example, for a 0.093 inch diameter pin the diametric variation may be from 0.091 to 0.095 inch. However, when the lead-in wires are soldered to the inner ends of the tube pins in the course of manufacture of the tubes, the actual diameter of the tube pin may be increased approximately 0.001 inch due to the coating film of solder or oxide which is deposited on the film during the soldering operation, thereby increasing the range of diametric variation of the pin from 0.091 to 0.096 inch, a corresponding variation being present in pins of other diametric sizes.

Having the foregoing in mind, it is a further object of the present invention to provide a contact element which is capable of satisfactorily receiving and supporting therein a tube pin having the maximum range of diametric variation above noted, such contact element being further designed to permit frequent insertion and removal

2

of the tube pin into and out of its contact element without overstressing the same and without reducing or impairing the mechanical or electrical contact which the socket element exerts upon the tube pin inserted therein.

A further object of the invention is to provide a longitudinally-split sleeve-type contact element which is internally formed to provide localized zones of high pressure contact spaced uniformly about the circumference of a pin inserted into the socket element, each zone of contact being of such small surface area as to provide for a high concentration of mechanical pressure against the pin to thereby insure not only maximum mechanical and electrical engagement of the socket element with the pin, but also such good wiping contact with the pin as it is inserted into and removed from the socket element as to remove from the pin any severe oxide or other surface contamination which would normally result in excessive resistance and consequent loss of current.

Other objects and advantages of the invention will appear more fully hereinafter, it being understood that the present invention consists substantially in the combination, construction, location and relative arrangement of 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,

Figure 1 is a plan view of a portion of a continuous strip of blanks each of which is adapted to be formed into a contact element of the present invention;

Figure 2 is a plan view of a single blank as it would appear when severed from the strip shown in Figure 1;

Figure 3 is a front elevational view of a contact element formed in accordance with the present invention;

Figure 4 is a side elevational view thereof;

Figure 5 is a top plan view thereof;

Figure 6 is a longitudinal sectional view as taken along the line 6—6 of Figure 2; and

Figure 7 is a transverse sectional view as taken along the line 7—7 of Figure 3.

Referring now more particularly to the drawings, it will be observed that the contact element of the present invention, designated generally by the reference numeral 10, is formed of a sheet metal blank 11 of the shape best shown in Figure 2. Preferably a plurality of the blanks 11 are formed in continuous strip form, as shown in Figure 1, the several blanks being successively die-

punched out of a strip of flat sheet metal continuously fed through a suitable die-punching machine, the several blanks in the strip being held joined together during the die-punching operation by connecting cut-off tabs 12.

Each of the blanks 11 is die-punched to provide a relatively wide barrel-forming portion 13 from the lower end of which centrally extends an elongated portion 14 forming the conductor-connecting tail-piece of the contact element. The portion 13 of each blank is pierced to provide a tear drop opening 15, the reduced end of which extends into the area of the cut-off tab 12 so that when the contiguous blanks of the strip are severed from one another long the trim lines 16, the opening 15 forms an open-ended slot, such as is designated 15a in Figures 2, 3, and 4. The lower end of the portion 14 of the blank which forms the tail-piece of the contact element is trimmed free of its adjoining tab 12 by cutting along the trim line 17, which latter cutting operation may be performed simultaneously with or subsequent to the operation of shearing the blanks along the trim lines 16.

The tear drop slot 15a is preferably located centrally between the opposite side edges of the barrel-forming portion 13 of the blank 11 and is preferably of a length approximately equal to half the length of said portion 13. Pressed into the blank to either side of the slot 15a are a pair of indentations 18, each pair of these indentations being equally spaced so that when the blank is formed into final shape as a contact element (see Figures 3, 4 and 5), the several indentations are spaced more or less uniformly about the circumference of the barrel portion 13a of the contact. The indentations 18, which project internally of said barrel portion 13a, may be of round shape or they may be of square or other polygonal shape, the principal desideratum being that the inner end of each indentation is reduced to provide an extremely small, localized area of contact with the tube pin which is axially inserted into the barrel of the contact element.

It will be noted that the opposite side edges 19—19 of the barrel-forming portion 13 of each blank are relatively convergent toward the inner end of said portion so that when the blank is rolled into shape to form the contact element shown in Figures 3 to 5, these edges 19—19 form a tapered opening 20 between the opposite rounded wings 21—21 of the pin-receiving barrel portion 13a of the contact element. As most clearly appears in Figure 3, the tapered opening 20 constitutes a vertical continuation of the narrow opening 22 which extends longitudinally through the upper portion of the pin-receiving barrel 13a, the wall of the latter being thereby split for its full length along a vertical line diametrically opposite the tear drop slot 15a.

In forming the contact element from the blank 11, the latter is rolled or otherwise shaped to arrange the upper portion 13 thereof into the form of the longitudinally split tubular sleeve 13a (Figures 3 to 5) adapted to receive the pin of an electronic tube, the tail-piece extension 14a being correspondingly rounded in longitudinal continuation of the arcuate, unsplit portion of said tubular sleeve. Preferably, this tail-piece 14a is provided with one or more openings 23 for receiving the bared end of an electrical conductor soldered or otherwise secured to the tail-piece. The contact element of the present invention is preferably formed of Phosphor bronze, although any other suitable metal of requisite electrical conductivity and springiness may be employed. The contact elements are suitably mounted in the tube-receiving socket (not shown), the number of such elements mounted in a given socket being dependent, of course, upon the number of pins on the tube to be received in said socket.

The tear drop slot 15a operates conjointly with the diametrically opposed slit 20—22 to provide for maximum relative flexing of the top portions of the opposed rounded wing portions 21—21 and to insure maximum contact pressure of the indentations 18 against the tube pin inserted into the split barrel or sleeve of the contact element. The downwardly flared opening 20 formed on the split side of the pin-receiving barrel or sleeve provides a space in the region of the free end of the inserted tube pin which is sufficient in extent to accommodate said free end of the pin should the latter be bent or otherwise distorted to present its axis out of coincidence with that of the pin-receiving barrel of the contact element, thereby preventing springing apart of the wing portions 21—21 to an extent sufficient to reduce the pressure of the indentations 18 upon the tube pin inserted into the element. In addition, the flared opening 22, by providing an enlarged space for accommodating the free end of a bent tube-pin, eliminates to a large extent any possibility for contact between the tube pin and socket element except by way of the internal projections 18 of the latter bearing with positive pressure upon the tube pin, thereby insuring maximum mechanical and electrical engagement between the tube pin and its contact with resultant minimum current loss therebetween.

The several indentations 18 which project internally of the pin-receiving barrel portion 13a of the contact element not only insure multiple-point engagement of the contact with the pin inserted therein, but also permit rocking of the pin relatively to the contact without effectively reducing or impairing the mechanical and electrical engagement between the interfitted elements. Thus, even in the case of a tube pin which is not axially coincident with the socket element, good mechanical and electrical contact is assured by virtue of the indentations 18 each engaging the pin with positive pressure.

While in the construction of the contact element shown in the drawing only one open-ended slot 15a is employed, it will be apparent that two or even three such slots may be provided to further increase the effective resiliency of the upper part of the pin-receiving barrel. Where such a plurality of the slots 15a are employed, it would be preferable to space them equally with reference to each other and the longitudinal split 20—22 to provide a plurality of segmental portions uniformly spaced about the circumference of the pin-receiving barrel, each such segmental portion being then provided with a single indentation 18.

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 or real spirit thereof, and it is accordingly intended to claim the invention broadly, as well as specifically, as indicated in the appended claims.

What is claimed as new and useful is:

1. A sleeve-type contact element for an electronic tube socket comprising a one-piece sheet metal part stamped and rolled to provide a pin-

receiving tubular section and a conductor-connecting tail-piece in the form of a longitudinal extension of said tubular section, the wall of said tubular section in the region thereof opposite that from which said tail-piece extends being longitudinally split for its full length to provide a pair of opposed arcuately shaped wing elements which are resiliently biased toward each other, the wall of said tubular section being additionally partially split by at least one open-ended notch extending inwardly from the outer end of said tubular section to a point located between the opposite ends thereof whereby to provide the outer portion of said tubular section with relatively flexible segments, each of the latter being provided with at least one internally-projecting element adapted to locally engage and make point-contact with the tube-pin inserted into said tubular section.

2. In a sleeve-type contact element as defined in claim 1 wherein the opposed edges of said wing

elements are separated to form the said longitudinal split by an opening having a portion which flares outwardly toward the inner end of said tubular section, thereby providing an enlarged space for accommodating the free end of a bent tube-pin inserted into the tubular section of the contact element.

EDWIN E. RITTER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,068,230	Franklin	Jan. 19, 1937
2,290,172	Eby	July 21, 1942
2,468,368	Jackson	Apr. 26, 1949

FOREIGN PATENTS

Number	Country	Date
674,830	Germany	Apr. 22, 1939
944,875	France	Apr. 19, 1949