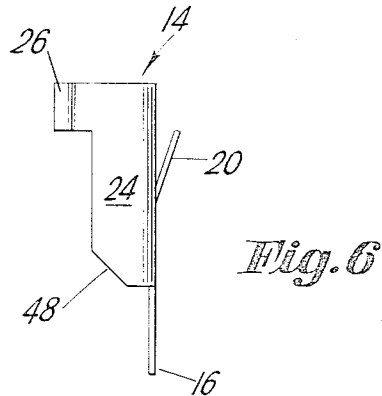
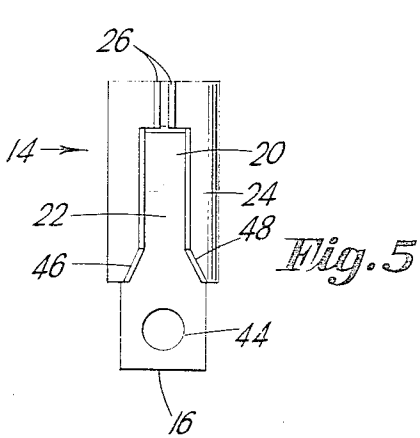
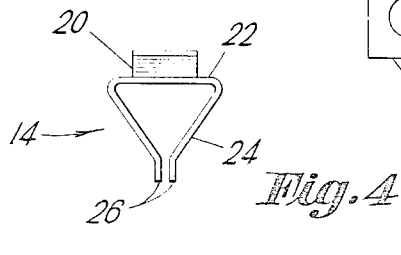
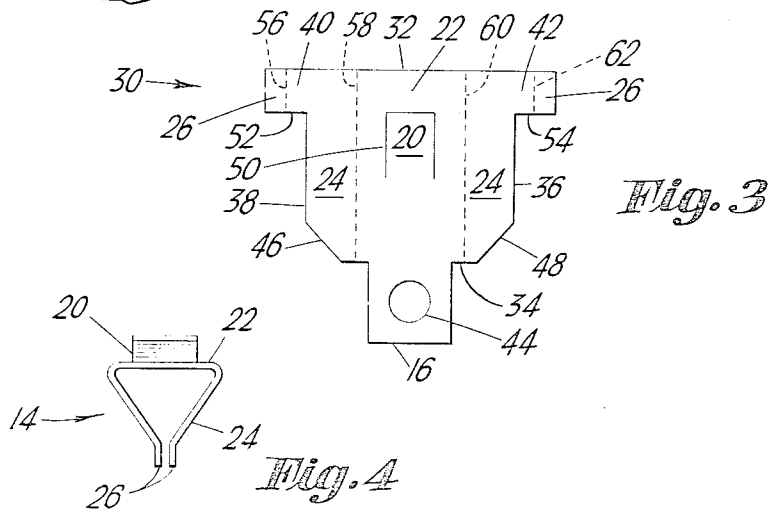
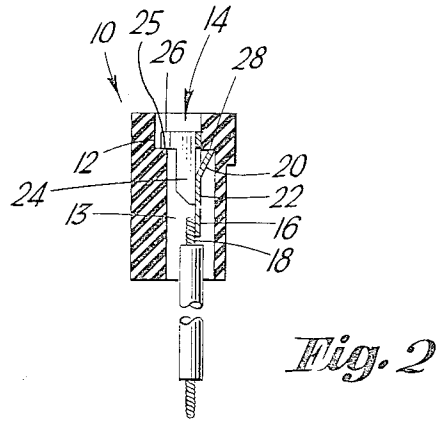
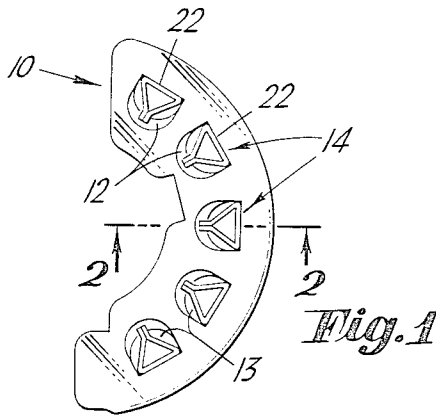


April 10, 1956

W. E. BARRE, JR
SOCKET TYPE CONNECTOR
Filed March 20, 1952

2,741,750



INVENTOR
WADE E. BARRE JR.

BY

J. Albert Hultquist
ATTORNEY

1

2,741,750

SOCKET TYPE CONNECTOR

Wade E. Barre, Jr., Warren, Pa., assignor to Sylvania Electric Products Inc., a corporation of Massachusetts

Application March 20, 1952, Serial No. 277,671

4 Claims. (Cl. 339—193)

This invention relates to electrical connectors, and more particularly to socket type electrical connectors adapted to receive the protruding pins of a complementary connector device.

An object of the invention is to provide a new and improved socket for receiving vacuum tubes having pin or other similar male type connector structures and to provide a new and improved contact therefor.

Another object of the invention is the provision of a socket in which the contacts are permanently retained so that the contact may not be withdrawn by mere removal of the connecting pin, nor will the contact be withdrawn by tension applied to the connecting wire on the base of the contact.

A further object of the invention is to provide a socket in which the contact, although permanently retained, still retains a high degree of lateral freedom to permit ready mating with the pin of a complementary connector.

Still another object of the present invention is to reliably secure contact clips within a socket body molding.

A still further object of the invention is the reduction in cost and simplification of construction of the socket and contact.

A further object of the invention is the elimination of tilting of a contact clip within a socket, thereby aiding retention of the clip in the socket.

Still another object of the invention relates to a socket in which electrical contacts, capable of being retained permanently in the socket, may be speedily inserted in the socket without the use of special tools.

A further object of the invention is the elimination of danger from short circuits around a socket, so that the contacts and the connections made thereto are protected by insulation, thereby avoiding accidental contact with external circuitry.

In an illustrative embodiment of the invention a vacuum tube socket is provided in which shelves formed by the parallel axial abutment of two holes forming a passage in the socket are disposed in a plane substantially perpendicular to the axis of the passage so as to provide means for engaging oppositely directed edges on suitable projections from a connecting clip mounted in the passage, so that the clip will be retained in the socket thereby.

Other purposes and advantages of the invention will be apparent to those skilled in the art from a consideration of the following detailed description, reference being had to the accompanying drawings in which:

Fig. 1 is a plan view of a segmental socket suitable for use on a cathode ray tube and represents one embodiment of the invention.

Fig. 2 is a view in cross section of the socket of Fig. 1 showing the arrangement of the contact clip in an aperture of the socket.

Fig. 3 shows a view of a contact clip blank of a preferred form of the invention prior to folding the contact into its final shape.

Fig. 4 shows a top view of the contact after forming.

2

Fig. 5 shows a front elevation view of the contact clip of Fig. 4.

Fig. 6 is a side view of the contact clip of Fig. 4.

Referring first to Figs. 1 and 2 in which is illustrated a type of vacuum tube socket particularly adapted for use on cathode ray tube bases where a small number of pins are present, it will be seen that the tube socket includes body 10, which may be made of molded plastic or other insulating compound and may be particularly shaped to conform to the configuration of a particular type of vacuum tube base in which are a series of D shaped holes 12 located in axial offset abutting relationship and passing through the socket, and a series of pin connecting clips 14 of triangular cross section individually located in each of said holes 12.

Looking at the cross section view of Fig. 2 it will be seen that clip 14 includes downward projecting tab 16, spring tab 20, back 22, side walls 24, and ears 26. Tab 16 is adapted to receive insulated connecting wire 18 supporting the uninsulated junction of wire 18 with tab 16 within lower space 13 thereby protecting the junction from possible contact with other circuit elements. Spring tab 20 projects outwardly from flat back 22 of clip 14 and seats on ledge, shelf, or step 28 in hole 12. Projecting outwardly from back 22 in the direction generally opposite to that of spring tab 20 are side walls 24 which serve to provide frictional engagement with a mating contact pin and to provide electrical contact along the length of the pin. Projecting from the outer edges of side walls 24 at the upper end of clip 14 and integral therewith are outward extending ears 26 which are adapted to rest on upward facing ledge, shelf, or step 25 in hole 12.

The substantially D shaped holes in which clip 14 is placed are specially adapted to receive and maintain clip 14 firmly in place. The passageway so formed in body 10 comprises upper hole portion 12 and lower hole portion 13 and has the appearance when viewed from the top as in Fig. 1, of a D shaped aperture partly closed at its bottom by crescent shaped ledge 25. Shelf 25 serves to support clip 14 by providing a resting place for forward extending ears 26 attached to the upper portion of clip 14. A second support for clip 14 is provided by the flattened back portion of upper D shaped bore 12 against which back 22 of clip 14 rests. Spring tab 20 rests against understep 28, understep 28 being formed as a result of the offset between the D shaped holes 12 and 13, as was ledge 25. It will be seen from the drawing that these three surfaces operating together serve to retain spring clip 14 in place within the resulting passageway in base 10, and that motion of the clip out of the holes in either direction, or rotational motion of the clip within the holes is effectively limited by the opposition to such motion provided by these surfaces.

Fig. 3 shows a developed view of connector clip 14. It is made of an irregularly shaped metal stamping 30 which is bent at points indicated by dotted lines 56, 58, 60, and 62 to form a clip of generally prismatic shape. The stamping 30 in its preferred configuration may most conveniently be thought of as comprising a rectangle generally delimited by upper edge 32, lower edge 34, right edge 36, and left edge 38. Projecting laterally from edges 36 and 38 and having upper edges extending from edge 32 are tabs 40 and 42. Another projection 16 extends downward from bottom edge 34 and is centrally located on edge 34 to form the soldering tab 16. Hole 44 on tab 15 is provided for convenience in making electrical connection to the clip and may be omitted where so desired. The lower corners of the rectangle formed by edges 32, 34, 36 and 38 have been cut off leaving diagonals 46 and 48 which, as it will appear later, facilitate the assembly of the finished clip into the socket.

Located centrally in the stamping is an inverted U-shaped cut 50 having its sides generally parallel to sides 36 and 38 and having the central horizontal portion, or bottom, of the U, located in line and substantially parallel with the lower edges 52 and 54 of the tabs 40 and 42. Cut 50 provides the means by which the spring tab 20 may be struck out of the stamping itself.

The dashed lines 56, 58, 60, and 62, Fig. 3, indicate the bending lines which are used to form the completed clip as shown in Figs. 4, 5, and 6. The areas 26 on lateral projections 40 and 42 which are set off by bending lines 56 and 62 form the forward projecting ears 26 of the finished clip. The areas 24 between bending lines 56, 58 and between bending lines 60 and 62, form the side-walls of the finished clip. The remaining central area between bending lines 58 and 60, designated 22, forms back 22 of the clip as shown in Figs. 4, 5, and 6.

Figs. 4, 5, and 6 show the finished clip in a preferred form of the invention. It will be seen that sides 24 have been bent to form a roughly equilateral triangle open at one corner between ears 26. The tips of the lateral projections 40 of the blank have been bent so that they are generally perpendicularly to the back of clip 22, thereby forming forward projecting ears 26, spring tab 20 has been bent outward of the generally prismatic cylinder thus formed at an angle which causes the end of tab 20 to lie in the same plane as the lower edges of ears 26. The clip shown in Figs. 4, 5, and 6 is ready for assembly.

Assembly of the finished clip into the socket is accomplished by first soldering insulated connecting lead 18 to tab 16 at the bottom of the clip. The lead and clip assembly thus produced is then inserted into base 10 by passing lead 18 downward through holes 12 and 13 and thence out of the base. As lead 18 is drawn through holes 12 and 13, clip 14 is drawn down into the first hole 12 and then into hole 13. Diagonal cuts 46 and 48 then serve to help guide clip 14 over upward facing ledge 25, preventing clip edge 34 from catching on the ledge. During the process of inserting clip 14, spring tab 20 is compressed into back 22 as clip 14 is drawn into and through the constricted portion formed by ledges 25 and 28 at the junction of holes 12 and 13. As clip 14 is drawn towards its seated position, forward projecting ears 26 of clip 14 come to rest against ledge 25, thereby limiting further downward motion of clip 14, but permitting rotation of clip 14 around the point of contact of ears 26 and ledge 25 so that the end of spring tab 20 may pass beyond ledge 28. Once past the ledge 28, tab 20 is free to spring outward from back 22 and to rest at or near the intersection of the wall of hole 13 and downward facing ledge 28.

The location of ledge 25 and understep 28 in a plane substantially perpendicular to the longitudinal axes of hole portions 12 and 13 and the provision of projections on clip 14 adapted to engage the ledge and the step results in a socket in which clip 14 is retained against accidental or involuntary disengagement. Longitudinal motion of clip 14 in either direction of escape from the socket is barred by the abutment of the forward projecting ears 26 on ledge 25, in one case, and the abutment of spring tab 20 on understep 28 in the other case. Rotation of clip 14 in a plane including the axes of hole portions 12 and 13 and about the pivot point provided by the abutment of forward projecting ears 26 on ledge 25 is effectively limited by the walls of the holes 12 and 13, thereby preventing a disengagement of ears 26 from ledge 24 which would otherwise permit the escape of clip 14 from the socket.

With clip 14 thus retained in socket 10, it is clear that a limited freedom of motion of the clip in any direction remains, due to the looseness of fit of the clip within the socket. Lateral motion of the clip within the socket, or rotation of the clip about an axis through holes 12 or 13 of the socket is limited by pressure of back 22 against

the flat portion of hole 12 or by contact between the curved surface of hole 12 and lips 26.

The resulting socket and clip combination thus provides sufficient dimensional flexibility for the clip to mate correctly with a pin which may be presented to it so that a number of the clips working together to form a socket may accommodate themselves to the discrepancies in parallelism and location between the various pins of a cooperating male connector device. It should be observed that the arrangement also provides for a large useful line contact between clip walls 24 and clip back 22 and the cylindrical surface of a mating pin. As much of the available space as possible is utilized in making contact with the tube pin which extends, when engaged by clip 14, through hole 12 well into hole 13.

Although the above illustrations and descriptions refer to a preferred embodiment of the invention, it is apparent that other embodiments of the invention will occur to the reader, and it is not intended that the scope of the invention should be limited thereby, rather that it should be limited by the following claims interpreted in accordance with the spirit of the invention.

What I claim is:

1. In a contact clip for use in an electrical connector a longitudinally split metallic tube having a back and two side portions extending away from said back and approaching each other, a number of ears projecting in one projection outwardly from and near one end of said tube, each of said ears having an edge furthest away from the said end of said tube lying substantially in a plane perpendicular to the axis of said tube, and a spring tab projecting from a central portion of said back and extending in an opposite direction and toward said plane, said tab having an edge lying in said plane.
2. An electrical socket comprising a body member of insulating material having a passage therethrough and a resilient pin-receiving contact clip retained therein, said passage comprising first and second substantially D shaped holes located in substantially parallel axial abutting relationship and terminated at the point of abutment by first and second shelves facing outwardly through said first and second holes respectively, said first and second shelves lying in a plane substantially perpendicular to the axis of said passage and being spaced apart to permit passage of a pin-receiving portion of said contact clip, said clip comprising a sheet of metal formed as a pin-receiving tube approximately triangular in cross-section and having a back and two sides, said sides approaching each other to form a corner of said tube and having coextensive ears projecting away from said tube to rest on said first shelf, and said back having a resilient tab extending outward from said tube to abut said second shelf.
3. An electrical socket comprising a body member of insulating material having a passage therethrough and having a resilient, pin-receiving, contact clip retained therein, said passage comprising first and second holes in parallel axial abutting relationship, said first hole having one substantially flat wall parallel to its axis and an oppositely located, outwardly facing, first shelf formed by the abutment of said holes, said second hole having an outwardly facing second shelf formed by the abutment of said holes and lying in substantially the same plane as said first shelf, said first and second shelves being spaced apart to permit passage of a pin-receiving portion of said resilient contact clip, said clip comprising a substantially tubular sheet of metal having a substantially flat back adapted to rest on said flat wall and having two side walls extending away from said back and towards each other, said tubular sheet of metal comprising a pin-receiving portion of said clip, said walls having outwardly extending ears engaging said first shelf, and said back having an outwardly extending spring tab engaging said second shelf.
4. An electrical socket comprising a body member of

5

insulating material having a passage therethrough and a resilient, pin-receiving, contact clip retained therein, said passage comprising first and second substantially D shaped holes located in a substantially parallel, axial, abutting relationship, whereby first and second shelves facing outwardly in opposite direction through said first and second holes and spaced apart to permit passage of a pin-receiving portion of said contact clip are formed in a plane substantially perpendicular to the axis of said passage, said clip comprising a sheet of metal formed as a pin-receiving tubular body having a substantially flat section parallel to the longitudinal axis of the tubular body, a first resilient tab projecting outwardly from said flat section and engaging said second shelf, and a second tab projecting outwardly from said body section and engaging in said first shelf.

6

References Cited in the file of this patent

UNITED STATES PATENTS

2,283,040	Brinkmann -----	May 12, 1942
2,304,808	Draving -----	Dec. 15, 1942
2,332,483	Doty -----	Oct. 19, 1943
2,514,562	Stickney -----	July 11, 1950
2,536,652	Metcalf -----	Jan. 2, 1951

FOREIGN PATENTS

369,019	Germany -----	Feb. 13, 1923
558,114	Great Britain -----	Dec. 22, 1943