July 13, 1943. K. M. McLAUGHLIN 2,324,166

ELECTRICAL CONNECTOR

Filed June 28, 1941

Fig. 1

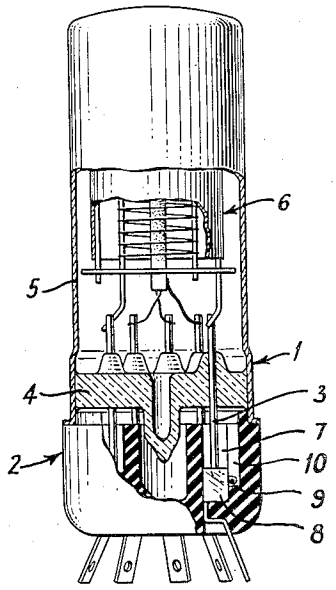


Fig. 2

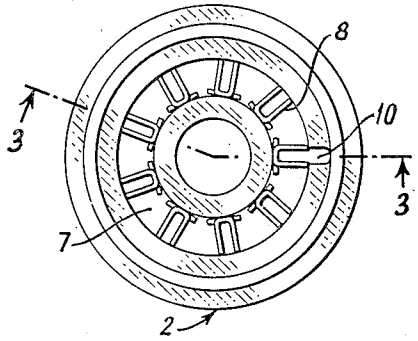


Fig. 3

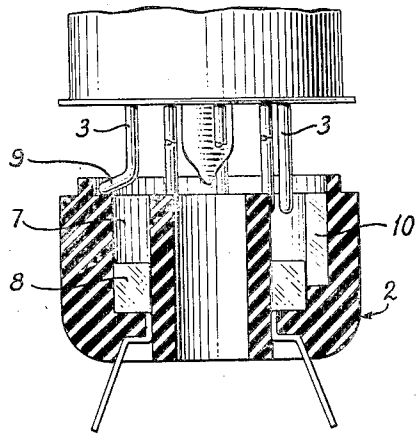
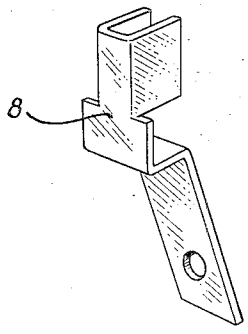


Fig. 4



INVENTOR.
KENNETH M. McLAUGHLIN
BY Charles McClair
ATTORNEY.

Patented July 13, 1943

2,324,166

UNITED STATES PATENT OFFICE

2,324,166

ELECTRICAL CONNECTOR

Kenneth M. McLaughlin, Summit, N. J., assignor to Radio Corporation of America, a corporation of Delaware

Application June 28, 1941, Serial No. 400,163

3 Claims. (Cl. 250—27.5)

My invention relates to electrical connectors of the type having male and female elements and exemplified in radio tube bases and sockets.

It is common practice to asymmetrically arrange the male contact pins of the base and the female contactors of a socket to rotationally orient the two members before electrical contact is made. Speed and ease of assembly, however, is much reduced by such combinations of bases and sockets because of the false starts that may be made before the base can be brought to its proper position for insertion. If the socket is inaccessible or out of sight, the sense of touch of the operator may be the only way of "finding" the socket with the base, but this is not feasible because the pins may be strained when forced into the wrong socket openings. In the application of Newell R. Smith, filed concurrently herewith, Serial No. 400,167, filed June 28, 1941 and assigned to the assignee of this application it is proposed to provide a deep groove or raceway in which the circle of contact pins may be journalled. A shoulder on one of the contact pins prevents full insertion of the pins until the shoulder, sliding along the rim of the groove, arrives at a keyway in the side of the groove.

An object of my invention is an improved combination of male and female connector elements for easy and speedy assembly.

A more specific object of my invention is an improved male and female connector which may be assembled without false starts of the contact pins into the socket.

A still more specific object of my invention is an improved male connector for rotationally orienting the connector with its socket.

The characteristic features of my invention are defined in the appended claims and the preferred embodiment thereof is described in the following specification and shown in the accompanying drawing in which:

Figure 1 shows in section an assembled base and socket constructed according to my invention;

Figure 2 is a top plan view of the socket of my novel connector combination;

Figure 3 is a view of my novel socket sectioned along the line 3—3 of Figure 2 and shows the relation of the socket and base at the beginning of assembly; and

Figure 4 shows in perspective the details of one female contactor that may be used with my novel socket.

The base or male element 1 which cooperates with the socket 2 of my novel connector combination is illustrated as the base of a radio tube although this male element may comprise, for example, the plug of a cable connector. The contact pins 3 of the base are parallel and circularly arranged and are supported in the tube of Figure 1 in the glass disc header 4 which is sealed in the end of the envelope 5. The inner ends of the pins are connected to various electrodes 6 in the envelope. The pins may, if desired, be uniformly spaced in the pin circle.

The socket 2 comprises a body of insulating material having a circular groove 7 in its top surface, the groove being only wide enough to receive the end of the contact pins, and having a mean diameter substantially equal to the mean diameter of the pin circle. Spaced female contactors 8 are arranged in the bottom of the groove, the contactors corresponding in spacing and number with the pins of the base. One contactor which may be used in my socket and which is shown in Figure 4 comprises a U-shaped clip formed integrally with a shank which may be inserted through openings in the bottom of the groove and crimped over to hold the contactors in place. According to one of the characteristic features of my invention, one of the contact pins is provided with a projection 9 extending radially beyond the pin circle, this projection being spaced inwardly from the plane through the ends of the pins. This projection, according to my invention, comprises the bent end of one of the pins. The pin, if desired, may be bent inwardly or outwardly a sufficient distance so that the bent pin will ride on the surface of the socket body on either side of the groove. A keyway or slot 10 is formed in the wall of the groove and extends vertically from the top surface of the socket body to a selected one of the female contactors. The keyway is of such width and radial depth as to receive the projection or bent end of the indexing or locating pin.

To assemble, the pins of the base are inserted into the groove in any random rotational position with the projection 9 riding on the rim of the groove. The partially inserted ends of the pins are then rotated until the projection passes over the end of the keyway whereupon the base drops and rotation is stopped. Since the ends of the pins do not touch the bottom of the groove, entrance of the indexing pin into its keyway is the first and only interruption in the smooth rotation of the base on the socket, and is a distinct indication to the operator that the base has arrived at its correct rotational position for insertion. Downward pressure on the base then

forces the pins into their proper female contactors. Good results have been obtained in making sockets for radio tubes of the type commercially known as the "Miniature metal," having nine contact pins of .040 inch wire projecting about .300 inch from the header of the tube and in which the pin circle is only .425 inch in diameter. In practice the tubes are placed in their sockets and quickly turned to their proper position for complete insertion without straining the rather delicate male and female elements on the base of the socket.

The bend in the indexing pin may be made without straining the glass-to-metal seal in the header by grasping the pin between the jaws of a die equal in width to the distance between the rim of the tube and the place to be bent. While so held the end of the pins are forced either inwardly or outwardly to the position shown.

My improved male and female connector materially speeds assembly of the connectors because the operator does not contend with false starts and because by sense of touch alone the base may easily "find" the socket.

I claim:

1. A male connector comprising a base, a plurality of parallel circularly arranged contact pins supported on said base, and an additional pin in the circle of pins, all of said pins being of uniform length, said additional pin being bent intermediate its outer end and said base to bring said end radially beyond the circle of said pins, and to bring the bend inwardly from the plane through the outer ends of said pins.

2. A tube base comprising a plurality of contact pins of uniform length supported in a circle on the base, one of said pins being bent outwardly, the bend being intermediate the ends of the pins to bring the end of said one pin outside said circle.

3. A tube base for a socket with circularly arranged female contactors in the bottom of a groove in the socket body, said base comprising a plurality of contact pins of uniform length supported in a circle and adapted to slide in the groove of the socket, one of said pins being bent outwardly intermediate its ends so that the end of said one pin is adapted to slide on the surface of said body along the rim of said groove.

KENNETH M. McLAUGHLIN.