

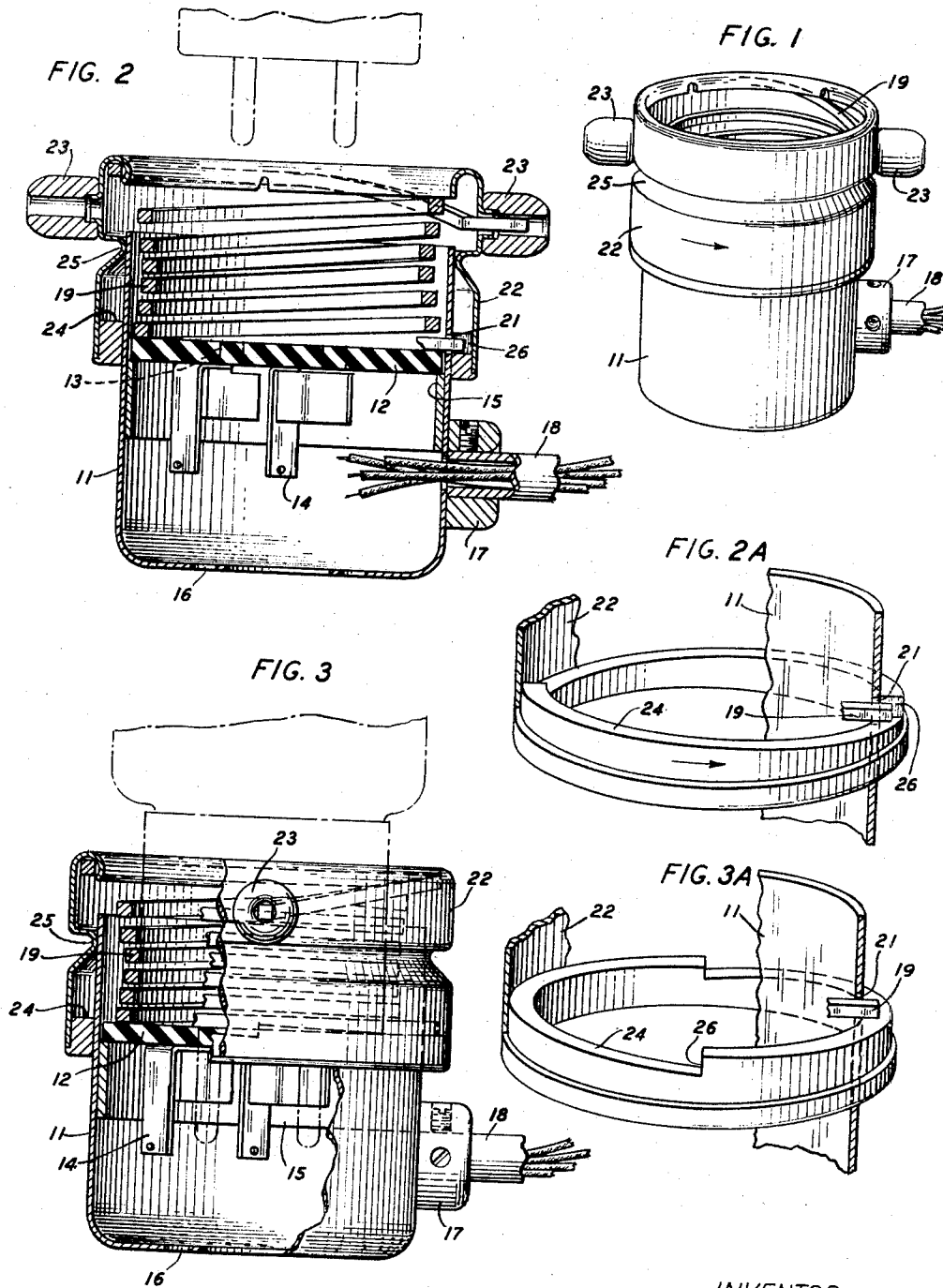
Nov. 11, 1958

H. J. SCAGNELLI

2,860,315

SPRING CLAMP ELECTRON TUBE SOCKET

Filed Sept. 27, 1956



INVENTOR
H. J. SCAGNELLI
BY
Walter M. Klee
ATTORNEY

1

2,860,315

SPRING CLAMP ELECTRON TUBE SOCKET

Henry J. Scagnelli, Upper Montclair, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application September 27, 1956, Serial No. 612,518

8 Claims. (Cl. 339—75)

The present invention relates to electron tube sockets and more particularly to a socket wherein a spring clamp is used to releasably but firmly secure an electron tube under conditions of shock and vibration.

The need for firmly securing electron tubes in their sockets under conditions of severe stress has long been recognized. During transportation, tubes are often subjected to sharp blows and jars and if not securely mounted in position will in all likelihood be dislodged and damaged by subsequent impact. Likewise, when operatively mounted in position aboard mobile craft the jars and vibrations to which they are frequently subjected may result in either damage thereto, due to dislodgment, or in their working loose from the tube sockets a sufficient degree to impair operation of the electronic device. Especially is this so in the case of the larger and heavier electron tubes. But, while it is necessary that electron tubes be firmly secured in their sockets, it is also essential that they be readily inserted or removed when desired.

It is an object of this invention therefore to prevent shock and vibration from dislodging an electron tube from its socket.

Another object of the invention is the provision of an electron tube clamping mechanism which permits ready insertion or removal of the electron tube from its socket.

A still further object of the invention is the provision of an electron tube clamping mechanism formed of a minimum number of component parts which may be fabricated into an integral assembly at low cost.

These objects are attained in accordance with this invention by a helical coil spring coaxially aligned with respect to the tube to be secured and which tightly contracts around the tube base to fix it firmly in the socket. A latching assembly coacts with the helical coil spring for releasably distending the same to increase the inner diameter thereof and thereby permit ready insertion or removal of the tube.

The advantages and features of the invention will become more apparent from the following detailed description which, together with the accompanying drawing, discloses a preferred embodiment.

In the drawing:

Fig. 1 is a perspective view of the spring clamp electron tube socket;

Fig. 2 is a cross-sectional elevation view of the device with the helical coil spring distended to receive an electron tube;

Fig. 2A is a diagrammatic view showing the relative position of the ratchet and spring end when the spring is in its distended condition;

Fig. 3 is an elevation view of the device, partly in cross-section, with the helical coil spring in its tube base engaging position; and

Fig. 3A is a diagrammatic view showing the relative position of the ratchet and spring end when the spring is in its tube base engaging position.

2

Referring to the drawing and particularly to Figs. 1 and 2, the embodiment of the invention is seen to include a housing 11 having a tube socket 12 mounted therein. The socket 12 is of the conventional wafer type having openings 13 adapted to receive the prongs of an electron tube and connector tabs 14 for electrical connection of the tube into a circuit. A rim member 15, having several inwardly bent shoulder elements (not shown), is secured to the inner surface of the housing 11 by spot welding or the like and socket 12 is mounted upon this rim member and attached thereto by means of screws engaging threaded holes in the several shoulder elements. Housing 11 is formed of thin sheet metal fabricated into a cylindrical shape with one end open and the other partially closed. Housing 11, as well as the other components forming the present device, could of course be produced by any of the other well known techniques, such as die casting, deep drawing, spinning and the like, the exact manner of fabrication forming no part of the present invention. Holes 16 are provided in the partially closed end for mounting the housing upon a chassis or other support. Boss 17 is fastened to the outer surface of the housing and is in coaxial alignment with a hole in the housing to permit passage of wire conductors to connecting tabs 14. The conductors are combined in a metallic flexible cable 18 which is secured in position by set screws. This cable or conduit serves as an electrical shield for the conductors.

Partially disposed within the housing 11 and projecting from the open end thereof, for a short distance, is a helical coil spring 19. The coil spring abuts the tube socket 12, being in axial alignment therewith and with housing 11, and has its one end projecting through a hole 21 in the housing. While the coil spring can be of any cross-sectional shape, a rectangular shape provides a greater degree of frictional holding for the sharp corners have a tendency to bite into the base of the tube.

Supported in position by the helical coil spring is a rotary shield 22, which encircles the upper or open end portion of the housing and is in substantial axial alignment therewith. The rotary shield is also fabricated from sheet metal and has its upper peripheral edge bent inwardly to secure the upper end of the coil spring in place. Mounted upon the rotary shield are a pair of outwardly projecting lugs 23 which can be grasped to provide a rotary motion to the shield 22 to expand spring 19. The upper end of the coil spring is secured within one of the lugs 23.

A latching mechanism in the form of a ratchet 24 is press-fit into position adjacent the lower peripheral edge of the rotary shield and serves to engage the lower end of the coil spring projecting through hole 21. The inner radial surface of ratchet 24 and the indented portion 25 of shield 22 act as bearing surfaces to maintain the housing 11 and shield 22 substantially coaxial.

With the parts assembled the coil spring will be slightly compressed along its axis, thus causing the rotary shield 22 to be urged upward and away from the housing 11 with the result that the ratchet 24 and the spring end projecting through hole 21 are normally held in engagement. It should further be noted that this spring end and ratchet 24 coact to maintain the housing 11 and shield 22 integral. That is, the spring end abuts the upper surface of the ratchet to limit the axial displacement of the housing and shield.

Should the tube to be secured require, or deliver, a high potential, the housing 11 would be mounted upon an insulating standoff. So mounted, the housing and rotary shield act as a high potential shield preventing corona discharge to ground. In this last regard, it will

be seen that all the outer surfaces have generously rounded contours and, in addition, are highly polished.

In its normal or completely contracted condition the helical coil spring possesses an innermost diameter smaller than the base diameter of the tube to be secured. In this condition the tube base of course cannot be passed through the coil to engage the tube socket. However, disregarding for the moment the action of ratchet 24, it is clear from the drawing that the spring end secured in lug 23 may be rotated relative to the spring end projecting through the small hole 21 in stationary housing 11 and this relative rotation has the effect of altering the diameter of the coil spring.

To increase the diameter of the coil a torsional force is applied, through lugs 23, in the counterclockwise direction (see arrow in Fig. 1). This rotation of the rotary shield and its associated spring end acts to unwind the coil spring and correspondingly increase its diameter. As rotation is continued, the ratchet 24, secured to rotary shield 22, advances to the position illustrated in Fig. 2A. This movement of the ratchet, relative to the stationary spring end, is indicated by an arrow in Fig. 2A. Throughout this movement, it will be recalled, the spring end is in constant engagement with the ratchet due to the upward force exerted on the rotary shield 22 by the compressed spring. With the various elements positioned as shown in Figs. 2 and 2A the coil spring is unwound sufficiently to permit passage of the tube base toward the socket 12.

The coil spring is retained in this distended or partially unwound condition by the ratchet 24 coacting with the stationary spring end projecting through hole 21. In this position the coil spring is applying a clockwise force, viewed from the top, to the rotary shield, due to its tendency to return to its untwisted or unwound condition, but, as shown in Fig. 2A, the vertically cut surface 26 of the ratchet 24 abuts the stationary spring end to counteract the force exerted by the spring, thus acting to maintain the same in the distended condition.

With the coil spring partially unwound, the base of the tube, shown in dotted outline in Figs. 2 and 3, is passed through the coil to engage the tube socket. To secure the tube in position it is then only necessary that a force be applied to lugs 23 to axially depress the rotary shield 22 downwardly with respect to housing 11, so that the stationary spring end projecting through hole 21 clears the vertical cut portion of the ratchet 26. The coil spring then attempts to return to its normal condition, but inasmuch as the tube base is of a greater diameter than the coil spring, in its normal contracted condition, the spring winds itself tightly around the tube base and thereby grasps it securely. In this tube securing position, as shown in Figs. 3 and 3A, the rotary shield and attached ratchet of course assume a new angular relationship with respect to the stationary housing and spring end. Were the tube not inserted in the tube socket 12 the spring would return to its normal contracted condition with the rotary shield and attached ratchet displaced, in a clockwise direction, viewed from the top, approximately 15 degrees to 25 degrees from the positions shown in Figs. 3 and 3A.

As shown in Fig. 3, only the central portion of the helix engages the tube base and under most conditions this amount of holding is sufficient. However, it should be obvious that the coil configuration might readily be altered to have more of the individual spirals of the helix engage and grasp the base to thereby increase the holding action.

While the instant device possesses a primary utility in preventing the dislodging of tubes from their sockets, it should be clear from the drawing that the coil spring also acts to absorb components of a shock wave parallel to the axis of the coil. In this last regard, the spring acts as a compression coil type, shock isolator to cushion

most of the shock wave subsequent to the initial phase front.

The electron tube clamping socket disclosed herein possesses its greatest utility in the securing of jumbo size tubes such as the 4B31 and 4C35. However, the proportions of the socket assembly can easily be modified for other type tubes.

It is understood, of course, that the foregoing disclosure relates to only a preferred embodiment of the invention and that numerous modifications or alterations may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A spring clamp electron tube socket comprising a housing having conventional means therein for receiving an electron tube, a helical coil spring secured within said housing and coaxially disposed with respect to the axis of a tube to be received thereby, said spring having a normal inside diameter smaller than the outside diameter of the base of said tube, and means engaging the opposite ends of said spring for partially unwinding it to increase its diameter to receive said tube, said spring serving to wind itself tightly around the base of said tube when returning to its normal condition.
2. A spring clamp electron tube socket comprising a housing having a tube socket mounted therein for receiving an electron tube, a helical coil spring secured within said housing and coaxially disposed with respect to the axis of a tube to be received thereby, said spring having a normal inside diameter smaller than the outside diameter of the base of said tube, means engaging the opposite ends of said coil spring for partially unwinding it to increase its diameter to receive said tube, and means for releasably retaining said spring in its partially unwound condition.
3. A spring clamp electron tube socket comprising a housing having conventional means therein for receiving an electron tube, a helical coil spring mounted within said housing and coaxially disposed with respect to the axis of a tube to be received thereby, said spring having a normal inside diameter smaller than the outside diameter of the base of said tube, a rotary shield disposed around a portion of said housing and secured to one end of said coil spring, said rotary shield serving upon rotation thereof with respect to said housing to partially unwind said spring to increase its diameter for receiving said tube, and releasable retaining means for retaining said spring in its partially unwound condition.
4. A spring clamp electron tube socket comprising a housing having a tube socket mounted therein for receiving an electron tube, a helical coil spring mounted within said housing and coaxially disposed with respect to the axis of a tube to be received thereby, said spring having a normal inside diameter smaller than the outside diameter of the base of said tube, a rotatable member disposed externally of said housing and secured to one end portion of said coil spring, rotation of said member serving to partially unwind said spring to increase its diameter for receiving said tube, and latching means mounted upon said rotatable member engaging the other end portion of said spring for releasably retaining said spring in its partially unwound condition.
5. A spring clamp electron tube socket comprising a housing having a tube socket mounted therein adapted to receive an electron tube, a helical coil spring disposed partially within said housing in axial alignment therewith and extending for a distance therebeyond, a rotary shield supported by said coil spring and disposed around a portion of said housing, said rotary shield having an internal ratchet, one end of said coil spring being fastened to said rotary shield and the other end thereof extending through a hole in said housing to engage said internal ratchet, said ratchet serving to retain said coil spring in a predetermined distended position when the rotary shield is turned relative to said housing and serving further to

5

release said coil spring to permit the same to wind itself around the base of said electron tube upon depression of said rotary shield with respect to said housing.

6. An electron tube socket as defined in claim 5 wherein said coil spring is of a rectangular cross section.

7. A spring clamp electron tube socket comprising a housing having a tube socket mounted therein adapted to receive an electron tube, a helical coil spring disposed partially within said housing in axial alignment therewith and extending for a distance therebeyond, a rotary shield supported by said coil spring and disposed around a portion of said housing, said rotary shield having a latching

6

means, one end of said coil spring being fastened to said rotary shield and the other end being secured by said housing, and means secured by said housing for cooperating with said latching means to releasably retain said spring in a distended position upon rotation of the shield, said latching means when released permitting said spring to wrap securely around the base of a tube.

8. The combination of claim 7 wherein the spring material is of rectangular cross section.

No references cited.