

[54] ADAPTERS FOR THE TERMINAL PINS OF ELECTRON TUBES

[75] Inventors: Eiichi Yamazaki, Ichihara; Takao Kawamura, Mobarra, both of Japan

[73] Assignee: Hitachi, Ltd., Tokyo, Japan

[22] Filed: Feb. 23, 1972

[21] Appl. No.: 228,649

3,251,016	5/1966	Manetti et al.....	339/193 R X
3,388,210	6/1968	Babb .....	339/66 T
3,414,869	12/1968	Pascua .....	339/193 VS
3,184,532	5/1965	Spera .....	339/17 C X
3,601,699	8/1971	Norton, Jr. et al. ....	339/193 VS X
3,601,777	8/1971	Norton, Jr. et al.....	339/186 M
2,033,748	3/1936	Wallace .....	339/65 X

Primary Examiner—Marvin A. Champion  
 Assistant Examiner—Terrell P. Lewis  
 Attorney—C. Yardley Chittick et al.

[52] U.S. Cl..... 339/36, 339/66 T, 339/186, 339/193

[51] Int. Cl..... H01r 13/50, H01r 13/64

[58] Field of Search..... 324/158 F; 174/138.5, 52; 339/17 C, 17 CF, 17 N, 17 D, 36, 65, 66 T, 66, 75 T, 95, 93, 193, 192 T, 191, 186, 184, 176 L, 176 P, 154-156, 144, 145

[57] ABSTRACT

An adapter for protecting terminal pins of an electron tube is comprised by a cylindrical body having a central bore of a diameter sufficient to accommodate the exhaust member at the bottom of the electronic tube and a plurality of axially extending grooves provided on the periphery of the cylindrical body at positions corresponding to the terminal pins.

[56] References Cited  
 UNITED STATES PATENTS

3,325,772 6/1967 Suverkropp..... 339/193 R

2 Claims, 4 Drawing Figures

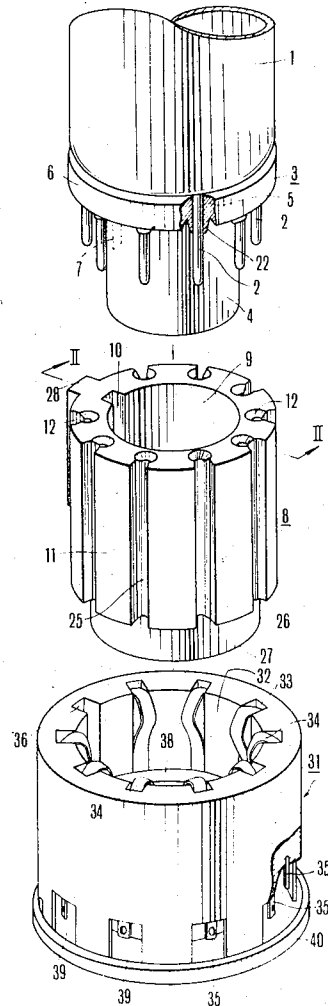


FIG. 1

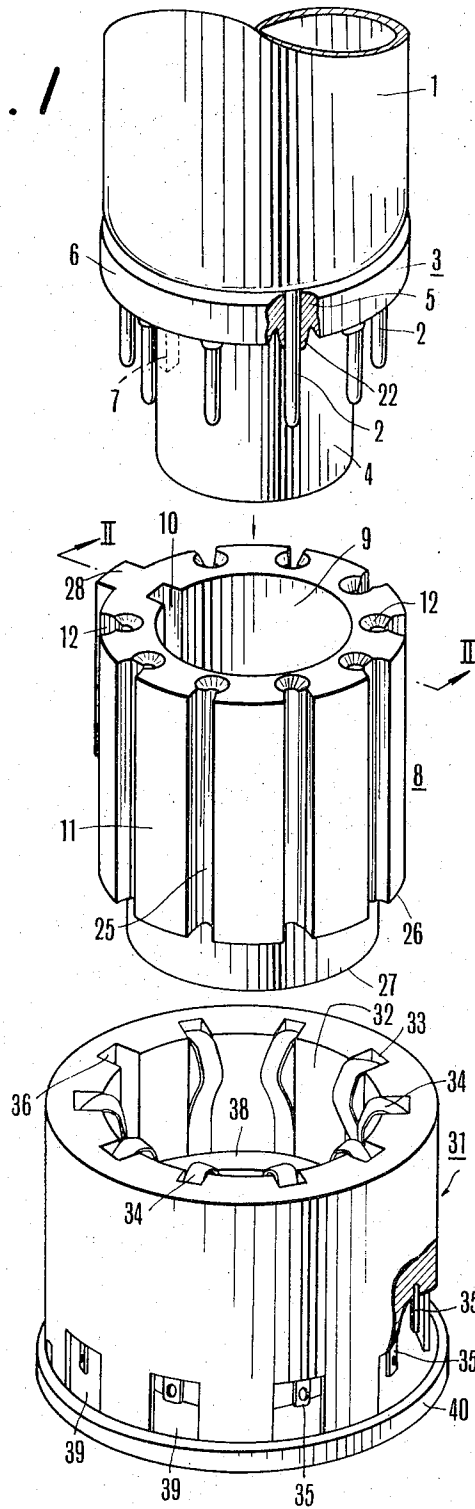


FIG. 2

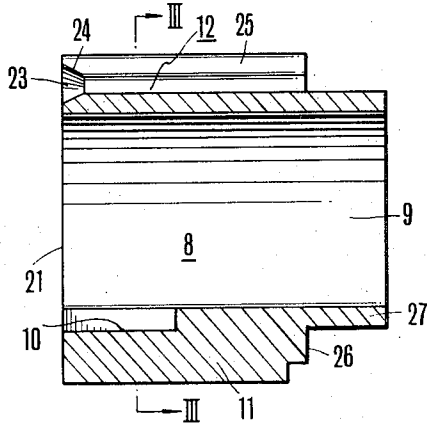


FIG. 3

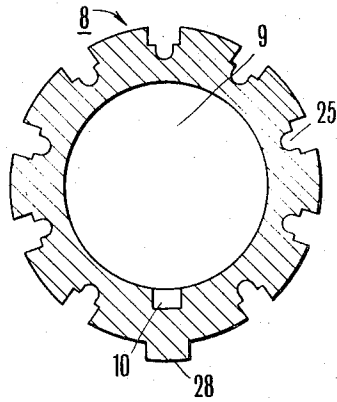
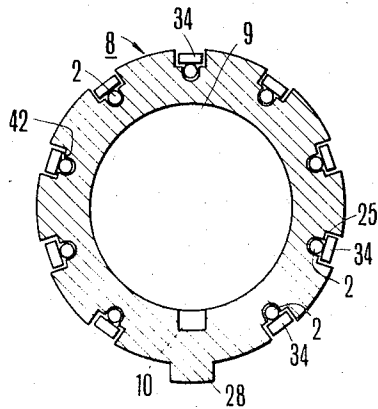


FIG. 4



## ADAPTERS FOR THE TERMINAL PINS OF ELECTRON TUBES

### BACKGROUND OF THE INVENTION

This invention relates to an adapter used to protect terminal pins or legs of an electron tube, for example, a cathode ray tube.

A cathode ray tube used in television receivers has a plurality of terminal pins or stem leads embedded in glass stem of the neck of the tube and each pin has a diameter of about 1 mm and a length of about 12 mm, for example, and extends outwardly of the glass stem.

Various types of sockets have been used for receiving such terminal pins having different constructions according to the design of the makers or standard specifications of various countries. In one type, terminal pins are received by the socket through a ferrule and in another type, the terminal pins are directly inserted in the socket with or without utilizing the ferrule dependent upon the type so that it is impossible to insert one type of terminal pins to a socket designed for another type of terminal pins. This trouble occurs when one tries to insert terminal pins of a cathode ray tube designed to be inserted in a socket through a ferrule into a socket having spring contact pieces disposed in the openings of the socket.

Usually the diameter of the neck of the cathode ray tube including the terminal pins is made much smaller than the diameter of the tube. In other words, the entire configuration of the cathode ray tube resembles a ferrule. Moreover, the weight of the cathode ray tube is substantial, and since the terminal pins are made of relatively soft metal they are liable to be bent or damaged during fabrication or transportation of the tube. Once bent, mounting of the terminal pins on the socket becomes difficult and forced fit results in cracking of the stem.

Several types of protective devices or adapters have been proposed to protect the terminal pins against bending or damage. One type of the protective device is provided with a relatively deep central bore adapted to receive the ferrule and a plurality of small openings arranged on a circle about the central bore for receiving respective terminal pins. In another type, a single central bore is formed having a diameter slightly larger than that of a circle on which the terminal pins are disposed for accommodating both the ferrule and the terminal pins so that outer sides of the terminal pins engage the side wall of the central bore.

With the former construction, however, it is not easy to insert terminal pins into the small openings arranged on a circle. Moreover, thickness of the wall between the central bore and the array of small openings is small so that it is difficult to manufacture such a protective device. Sometimes, terminal pins received in small openings are bent. But it is difficult to find out such bent pins because the protective device is ordinarily made of opaque synthetic resin.

With the latter construction, since the inner sides of the terminal pins are not supported, the force acting upon the terminal pins toward the center of the bore tends to bend inwardly the terminal pins, and such bent condition is also difficult to find out because of the opaque resin.

### SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to pro-

vide an improved adapter or protective device for terminal pins of an electron tube.

A further object of this invention is to provide a new and improved adapter making it possible to insert terminal pins of an electron tube into sockets of different types.

Still further object of this invention is to provide an improved adapter capable of readily accommodating the terminal pins of an electron tube.

Another object of this invention is to provide a novel adapter wherein it is easy to observe from outside the state of the terminal pins of an electron tube received in the adapter.

Still another object of this invention is to provide an improved adapter for the terminal pins of an electron tube which can readily accommodate the terminal pins even when they are bent slightly.

Further object of this invention is to provide an adapter for the terminal pins of an electron tube capable of preventing the terminal pins from bending radially outwardly when they are received in the adapter.

According to this invention there is provided an adapter for protecting terminal pins arranged to surround the central exhaust member of an electron tube. The adapter of this invention comprises a cylindrical body having a central bore of a diameter sufficient to accommodate the exhaust member and a plurality of axially extending grooves provided on the periphery of the cylindrical body at portions corresponding to the terminal pins. Each groove is shaped such that it prevents radially outward movement of the terminal pin received therein but permits to observe from outside the condition of the terminal pin.

### BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing:

FIG. 1 is a perspective view, partly broken away, showing the relative position of the novel adapter, the terminal pins of an electron tube and a socket;

FIG. 2 shows a longitudinal section of the adapter shown in FIG. 1 taken along a line II—II;

FIG. 3 shows a cross-sectional view taken along a line III—III in FIG. 2; and

FIG. 4 shows a diagrammatic sectional view showing the engagement when the terminal pins are inserted in the socket by utilizing the novel adapter.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference first to FIG. 1, the neck 1 of a cathode ray tube is provided with a plurality of terminal pins 2 or stem leads connected to various electrodes contained in the tube and arranged on a circle concentric with the axis thereof. A ferrule 3 is mounted on the lower end of the neck 1 for protecting the same. Ferrule 3 includes a cylindrical portion 4 containing an exhaust pipe (not shown) for the tube, a base 6 having openings 5 through which the terminal pins extend and a guide projection or key 7. When the ferrule 3 is mounted on the neck of the cathode ray tube, as shown in FIG. 1, the terminal pins extend outwardly through openings 5 of base 6 to surround cylindrical portion 4.

Adapter or protective device 8 embodying the invention is moulded from a synthetic resin, for example. The adapter takes the form of a cylinder having a central bore 9 adapted to accommodate cylindrical portion 4. On the inner wall of the central bore 9 is formed a

slot 10 for receiving key 7 of the ferrule 3. On the periphery of the adapter 8 are formed a plurality of circumferentially spaced apart axial grooves 12 separated by radial projections 11 of the axial length slightly longer than the projected length of the terminal pins 2. The grooves 12 serves to accommodate respective terminal pins 2 in a manner to be described later.

The configuration of the grooves will be described with reference to FIGS. 2 and 3. As shown in FIG. 2, one end surface of the adapter adapted to engage the bottom surface of neck 1 of the cathode ray tube is formed as a flat surface 21 perpendicular to the axis of the tube. The radial projections 11 extend axially from this end surface toward the opposite end. Frustoconical openings 23 having a sufficient dimension to accommodate projections 22 (FIG. 1) surrounding respective terminal pins at the bottom of ferrule 3 are formed on the end surface 21. Each opening 23 is located at the inlet end of each groove 12 and is provided with a tapered side wall 24. As shown in FIG. 3 the side of each groove 12 is communicated to a slot 25 positioned on the radially outer side thereof. The groove 12 and slot 25 are shaped such that once a terminal pin 2 is received in groove 12, the pin cannot move radially outward. As shown in FIGS. 1 and 2, the other end 26 of radial projections 11 is terminated a little short of the opposite end surface 27 of the adapter and this end 26 acts as a stop when the adapter is mounted on a socket as will be described later. As shown in FIGS. 1 and 3, the adapter is provided with an axial key 28 on its periphery for correctly mounting the adapter on the socket.

Reference numeral 31 shows a socket on which the terminal pins 2 of the cathode ray tube are mounted by using the adapter of this invention. The socket 31 is formed as a cylindrical body having a central bore 32 of a diameter sufficient to accommodate the cylindrical adapter 8. A plurality of axially extending grooves 33 are formed on the peripheral wall of the central bore 32 at positions corresponding to grooves 25 of the adapter. A spring contact piece 34 is disposed in each groove 33. The lower end of each spring is moulded in the cylindrical body and is terminated in a terminal 35. Also an axially extending guide groove 36 is formed to receive key 28 of the adapter. A ring shaped stop 38 is positioned in the central bore 32 to receive the end surface 26 of the adapter. Further openings 39 are provided to pass conductors (not shown) to terminals 35 and the lower end of the socket is reinforced by a corner 40.

The adapter is used in the following manner. To mount the adapter 8 on the neck 1 of a cathode ray tube including ferrule 3, the free ends of the terminal pins 2 are brought to the end openings 23 of the adapter. After aligning key 7 with groove 10, the adapter is forced axially toward the neck 1. By the action of tapered openings 23, the terminal pins 2 are readily guided into grooves 12 even when they are bent slightly. When projections 22 at the root of terminal pins are received in openings 23, the adapter 8 is fully engaged with the cathode ray tube and the terminal pins thereof are protected perfectly. Thus, due to the construction of grooves 12 and slots 25, once received in grooves 12, the terminal pins 2 are prevented from

bending radially outwardly. Moreover, provision of slots 25 permits ready observation of the condition of the terminal pins.

To mount the cathode ray tube combined with the adapter as above described on the socket, key 28 of adapter 8 is aligned with guide groove 36 of socket 31 and then the socket is forced axially toward the adapter until the end surface 26 comes to engage stop 38 in the socket 31. At this time, the portion of the adapter between its end surfaces 26 and 27 is received in the opening of annular stop 38 to act as a guide.

FIG. 4 diagrammatically shows the state of mounting the terminal pins 2 on socket 31 by utilizing adapter 8. In this figure, only spring contact pieces 34 of the socket are shown. As shown, since each groove 12 is communicated with slot 25 via a restriction 42 the terminal pin is positively held in the adapter and its exposed side wall is engaged by the spring contact piece 34.

It will thus be clear that, use of the novel adapter permits easy mounting of terminal pins of a cathode ray tube utilizing a ferrule of the type for cooperating with a socket of a conventional construction on a socket having spring contact pieces disposed along the peripheral wall of the central opening of the socket.

It should be understood that, the invention is by no means limited to the particular construction illustrated. Thus for example, the configurations of grooves 12 and slots 25 may take other configurations so long as they can prevent radial deflection of the terminal pins and permit viewing of the condition thereof. It will also be clear that the novel adapter can equally be applied for an electron tube not using the ferrule.

What is claimed is:

1. For use with an electron tube having a central exhaust member and a plurality of terminal pins arranged to surround said central exhaust member and provided with a ferrule having a guide key, an adapter for protecting said terminal pins and positioning said pins in said adapter within the central bore of a socket comprising a cylindrical body having a central bore of a diameter sufficient to accommodate said exhaust member, a keyway formed on the inner wall of said central bore for accommodating said key and a plurality of axially extending grooves provided on said cylindrical body at positions corresponding to said terminal pins, an axial slot extending radially from each of said grooves through the outer surface of said body said grooves adapted to receive said pins and said slots adapted to expose a portion of the surface of each pin for contact with a leaf spring member in said socket and to retain said pins in said grooves to prevent outward bending thereof, one end surface of said cylindrical body facing said electron tube being substantially flat.

2. The adapter according to claim 1 for use with tubes having said terminal pins extending surrounded for a portion of their length by a conical collar, wherein each of said grooves has enlarged inlet opening with a frustoconical section and the side of each of said grooves is opened to permit viewing of the condition of the terminal pin received therein.

\* \* \* \* \*