May 30, 1939. J. P. LAICO 2,160,478

MOUNTING FOR ELECTRON DISCHARGE DEVICES

Filed Feb. 29, 1936

FIG. 1

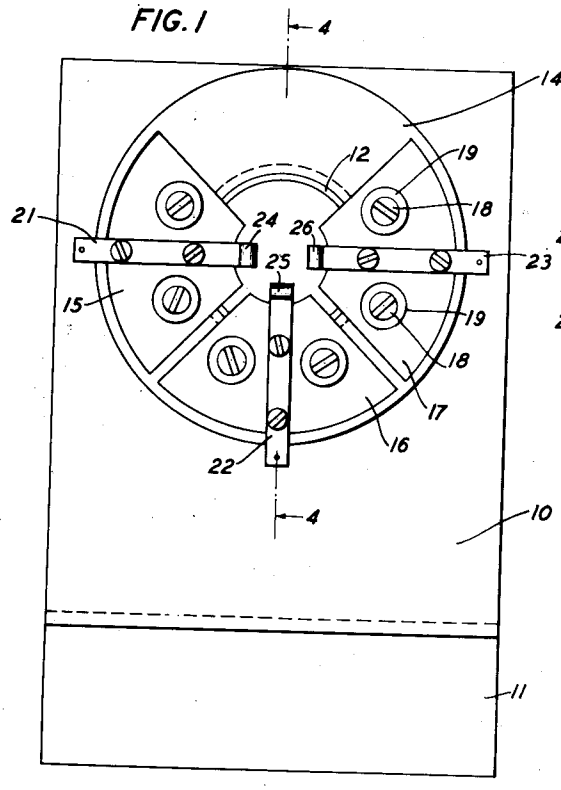


FIG. 2

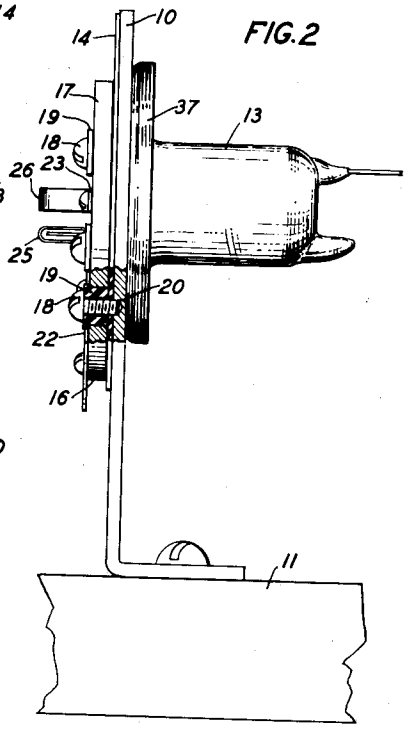


FIG. 3

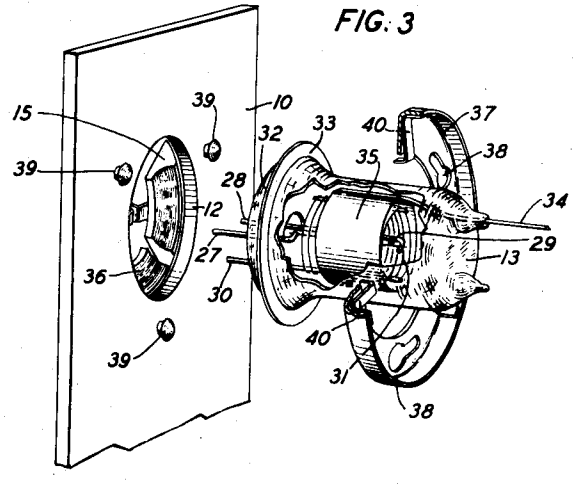
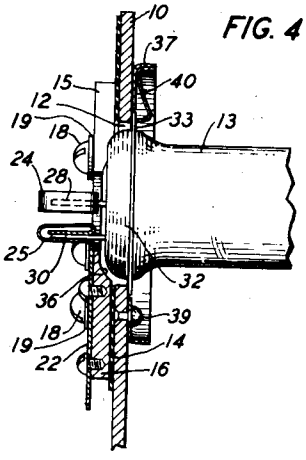


FIG. 4



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MOUNTING FOR ELECTRON DISCHARGE DEVICES

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12 Claims. (Cl. 250—16)

This invention relates to mountings for electron discharge devices and more particularly to such mountings employed in ultra-high frequency systems.

An object of the invention is to insure a low capacity coupling of the discharge device with associated apparatus in the system.

Another object of the invention is to facilitate the insertion and removal of the device from the mounting.

A further object of the invention is to combine the device and mounting in such a manner that deleterious influences are held at a minimum.

In accordance with this invention the mounting comprises a metallic plate or platform which may form a base or shelf for supporting other associated apparatus. The platform is also employed as part of the electrostatic and magnetic shielding of the apparatus and therefore forms an integral part of the translating unit in the system. The platform is provided with an opening to receive a high frequency discharge device, for example, a device of the acorn type in which the electrode assembly is enclosed in a small evacuated vessel having a shell portion supporting the anode from the top thereof and a cap portion supporting the remaining electrodes by short rigid conductors which extend from the cap portion. The shell and cap portions are joined together by a metallic disc seal which is seated on the upper surface of the platform with the cap portion extending into the opening to locate the rigid conductors below the platform while the shell portion is located above the platform.

A feature of the invention relates to the security of the device in the mounting to overcome high resistance leakage in the system and to maintain stability in the operation of the device. In accordance with this feature of the invention a locking ring securely fastens the device to the platform and the ring is provided with a plurality of pressure fingers which force the sealing disc of the device into positive contact with the base or metallic platform.

Another feature of the invention relates to the removability of the device from the mounting in order to make rapid replacement in case of failure or to substitute a device of different characteristics. This feature comprises a plurality of yieldable contact springs mounted below the platform in alignment with the rigid conductors of the discharge device, the contact springs being permanently connected to associated apparatus.

A further feature involves the combination of suitable capacity elements with the mounting whereby the insertion of the rigid conductors of the discharge device in engagement with the contact springs associates the required capacity value between the respective electrodes and the platform shield which is usually maintained at ground potential. This arrangement comprises a number of segmental condenser plates equal to the number of contacts provided on the platform, each plate being associated with an individual contact and arranged radially in a plane parallel to the lower surface of the platform. An insulating layer is arranged intermediate the plates and platform to provide a capacity coupling, the plates being insulatingly supported from the platform while the contact springs are rigidly secured to the segmental plates.

These and other features and advantages of the invention will be more clearly understood from the following detailed description in connection with the accompanying drawing in which:

Fig. 1 is a rear view in elevation of one embodiment of the mounting of this invention showing the arrangement of the contact springs and the condenser plates associated therewith;

Fig. 2 is a side view of the mounting with an acorn type device held in place, a portion of the mounting being broken away to show details of assembly;

Fig. 3 is a perspective view of the elements of the mounting showing the relationship of the ring and the device to the mounting with parts broken away to show details of construction; and

Fig. 4 illustrates in cross-section a view taken on the line 4—4 of Fig. 1 and showing the association of the device with the mounting.

Referring to the drawing, the mounting of this invention comprises a metallic platform, shelf or base 10 in the position of an upright panel which is secured to a support 11. Of course, it is understood that the platform of this invention is not limited to the specific shape and form disclosed in the drawing since it is intended that the platform will accommodate other associated apparatus of the high frequency translating unit usually combined with the discharge device. The base 10, in effect, performs the function of supporting the apparatus of the unit and also serves as an electrostatic and magnetic barrier or shield

in the system to segregate interfering electric fields, such as the fields present in the input and output circuits of the system. The base is provided with a large circular aperture 12 to receive the base end of an electron discharge device 13, such as a miniature high frequency three-electrode tube of the acorn type. An annular ring 14, of insulating material, such as mica, is placed on the rear surface of the base 10.

A number of segmental metallic plates 15, 16 and 17 are arranged at equal radial positions in abutting relation to the insulating ring 14 with the longitudinal axes of the plates being spaced apart approximately 90 degrees and the angular edges of plate 16 being spaced from the adjacent edges of the plates 15 and 17. These plates are secured to the base 10 by screws 18 passing through insulating bushings 19, the bushing and ring 14 completely insulating the segmental plates from the base, as shown clearly at 20 in Fig. 2. The segmental plates which are arranged in planary relation to the base 10 constitute individual capacity elements, the value of which is determined by the shape, thickness and area of the segmental plate and the thickness of the base 10, the base forming a common element for the plurality of segmental plates.

Each of the segmental plates is provided with a contact member which extends across the central portion thereof. These contact members 21, 22 and 23 are supported on and secured to the segmental plates 15, 16 and 17, respectively, with their outer ends formed to serve as terminals and their inner ends 24, 25 and 26, folded transversely to form resilient or yielding contact portions which are arranged within the boundary of the opening provided by the aperture 12 of the base 10 and the inner edges of the segmental plates 15, 16 and 17. The yielding portions of the contact members are mounted in spaced relation and in such alignment that they positively engage the terminal prongs projecting from the device 13 which is adapted to be supported in the mounting. Referring to Fig. 3, the terminal prongs 27 and 28 are connected to the cathode 29 in the device 13 and these terminals engage the resilient portions 24 and 26 of the contact members 21 and 23. The remaining terminal prong 30 is connected to the grid or control electrode 31 in the vessel and this terminal engages the resilient portion 25 of the contact member 22. These terminal prongs extend through and are sealed in a cap portion 32 which is joined to the vessel by a disc shield 33 having a skirt portion or annular rim extending outside the boundary of the vessel and cap portion of the device. This device which simulates the configuration of an acorn is more clearly disclosed in my U. S. Patent No. 2,129,849, issued September 13, 1938. A feature of this type of discharge device is the interposition of an electrostatic shield such as the disc 33 between the input terminals of the electrodes, such as the terminal prongs 27, 28 and 30, and the output terminal prong, such as 34, extending from the end of the vessel 13, which supports the anode or output electrode 35 within the vessel.

This shield, in accordance with this invention, is intimately associated or connected to the base 10 which serves as the shielding of the translating unit. This result is attained, in accordance with this invention, by forming the aperture in the base 10 of sufficient diameter to permit the insertion of the cap portion 32 of the device and in view of the fact that the annular rim of the disc 33 of the discharge device is of greater diameter than the aperture 12 in the base 10, it is obvious that when the device is inserted in the mounting the terminal prongs are engaged by the resilient portions of the contact members. The annular rim or flange of the disc shield 33 will be placed in abutting relation with the peripheral surface of the mounting around the aperture 12. In view of the fact that the cap 32 of the device projects beyond the base 10 it is desirable to taper the ends of the segmental plates as shown at 36 in Figs. 3 and 4, to provide a clearance for the cap portion 32.

In order to insure positive contact between the disc shield 33 and the base 10 and at the same time securely lock the device in the mounting, a clamping ring 37 in the form of an annular cup is rotatably secured to the mounting or base by aligning the slots 38 with a plurality of spaced headed pins 39 secured to the base 10 and rotating the ring to lock it in position. The ring 37 is provided with a plurality of resilient metallic fingers 40 having downwardly extending ends which exert a pressure on the flange of the device when the ring is in locking position and therefore the flange is intimately in engagement with the metallic base 10.

This arrangement insures a convenient mounting for the discharge device so that the device may be readily removed. Furthermore, the mounting of this invention insures a low resistance contact between the disc shield 33 of the device and the shielding base 10 of the unit whereby the input and output circuits of the device are electrically segregated to insure freedom from interfering electrical fields between these circuits. Moreover, the arrangement of the segmental condenser elements closely associated with the terminal prongs of the device insures accurate capacitive constants for the input circuit and materially enhances the operation of the device, due to the absence of inductive factors which would materially change the characteristics of the device in the translating unit.

While the invention has been described with respect to a particular arrangement and combination of elements, it is, of course, understood that it is not essential to employ all these elements in each combination. For instance, it is of course apparent that one of the features of this invention may be obtained by the combination of the locking ring, base and contact members to form an efficient mounting. In another embodiment the mounting may include the base, contact springs and condenser element with other means than that shown for locking the device in position. Therefore, it should be understood that the invention is only to be limited within the scope of the appended claims.

What is claimed is:

1. A mounting for an electron discharge device comprising a base having an opening to receive the discharge device, said device having an annular metallic portion projecting from the periphery thereof and having a plurality of terminals extending from one end, means for clamping said annular portion to one side of said base, contact members on the other side of said base and engaging said terminals, and a condenser element interposed between each contact member and said base.

2. A mounting for an electron discharge device comprising a metallic base having an opening to receive the discharge device, said device having

an annular metallic portion projecting from the periphery thereof and having a plurality of terminals extending from one end, means for clamping said annular portion to one side of said base, contact members on the other side of said base and engaging said terminals, and a condenser element associated with each contact member and secured to said base in planary relation thereto.

3. In combination, a mounting having a central aperture for an electron discharge device, a segmental condenser plate secured to said mounting and having a portion extending beyond the inner edge of the apertured mounting, an insulator interposed between said plate and mounting, and a contact spring for a terminal of said device carried by said condenser plate and extending beyond the inner edge of said condenser plate.

4. A mounting for electron discharge devices comprising a metallic platform having an opening adapted to receive one end of said device, the boundary of the opening forming a seat for a metallic ring seal of said device, a plurality of spring contact members carried by said platform and adapted to engage individual terminal prongs extending from said device, and a flanged annular ring removably attached to said platform and having radially arranged resilient fingers for locking said ring seal to said platform.

5. A mounting for an electron discharge device of the acorn type having a projecting annular metallic flange adjacent the terminals thereof, comprising a base having an aperture, a plurality of segmental condenser plates radially disposed with respect to the aperture in said base, a plurality of contact springs carried by said plates, said springs having yielding portions adapted to engage the terminals of said device, and a locking ring on the opposite side of said base engaging said metallic flange and said base.

6. A mounting for a discharge device of the acorn type having a projecting annular metallic flange adjacent the terminals thereof, comprising a metallic base having an aperture, a plurality of segmental condenser plates radially disposed with respect to the aperture in said base, means for insulatingly supporting said plates on said base, a plurality of contact springs carried by said plates, said springs having resilient portions adapted to engage the terminals of said device, and a removable locking ring on the opposite side of said base engaging said metallic flange and said base.

7. A mounting for a discharge device of the acorn type having a projecting annular metallic flange adjacent the terminals thereof, comprising a metallic base having an aperture, a plurality of segmental condenser plates radially disposed with respect to the aperture in said base, means for insulatingly supporting said plates on said base, a plurality of contact springs carried by said plates, said springs having resilient portions adapted to engage the terminals of said device, a locking ring on the opposite side of said base adapted to engage said metallic flange and said base, and resilient fingers carried by said ring adapted to exert pressure on said flange whereby said flange is intimately in contact with said base adjacent the periphery of the aperture therein.

8. A mounting for a discharge device of the acorn type having a projecting annular metallic flange adjacent the terminals thereof, comprising a metallic base having an aperture, a plurality of segmental condenser plates radially disposed with respect to the aperture in said base, means for insulatingly supporting said plates on said base, said plates having portions projecting inwardly beyond the periphery of said aperture, a plurality of contact springs associated with said plates, each being disposed centrally with its respective condenser plate, said springs having transverse portions adapted to receive the terminals of said device, a removable metallic ring on the opposite side of said base, means on said base for locking said ring thereto, and resilient fingers on said ring adapted to press said flange into engagement with said base.

9. A mounting for an electron discharge device of the acorn type having a projecting metallic flange between a cap portion and a receptacle of glass, the cap portion being provided with a plurality of parallel terminal prongs for the electrodes in said receptacle, comprising a metallic base having an aperture of such size to permit the entrance of said cap portion but preventing the passage of said flange therein, a plurality of segmental metallic plates parallel to said base and arranged at different radial angles with respect to the axis of said base, an insulating ring interposed between said plates and said base, means insulatingly supporting said plates by said base, said plates and base forming condenser elements adapted to be coupled to the electrodes of said device, a plurality of contact members associated with said plates, said contact members having resilient portions adapted to receive the terminal prongs projecting through said base, the ends of said plates adjacent said resilient portions of said contact members being tapered away from said base to form a clearance for the cap of said device, a plurality of pins extending from said base on the side opposite to said plates, a rotatable locking ring engaging said pins, and a plurality of springs carried by said ring and adapted to press said flange into engagement with said base.

10. In combination, a central apertured metallic mounting, a plurality of metallic condenser plates secured to the rear of said mounting, said plates having the configuration of segments of an annulus, an insulating ring interposed between said plates and said mounting, and a contact spring secured to the central portion of each of said plates, said spring having a resilient portion extending into the central aperture of said mounting.

11. In combination, a central apertured metallic mounting, a plurality of metallic condenser plates insulatingly attached to said mounting, said plates having the configuration of segments of an annulus, portions of said plates overhanging the inner edge of said apertured mounting, said portion being beveled to form a stop for a discharge device, and leaf contacts extending radially of said condenser plates and secured thereto, said contacts having resilient portions extending beyond the beveled edges of said condenser plates.

12. A mounting for an electron discharge device having an annular portion projecting from the periphery thereof, comprising an apertured plate, a plurality of pins in said plate surrounding said aperture, and a ring member having a peripheral flanged portion and slots adapted to cooperate with said pins and inwardly extending resilient fingers adapted to engage said annular portion to lock said device to said plate, said fingers being anchored to said flanged portion.

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