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H. C. RUBLY ET AL

2,347,969

CUSHION MOUNTING

Filed June 16, 1942

FIG. 1

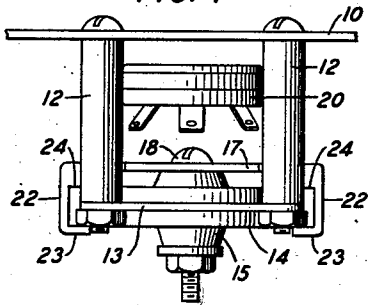


FIG. 2

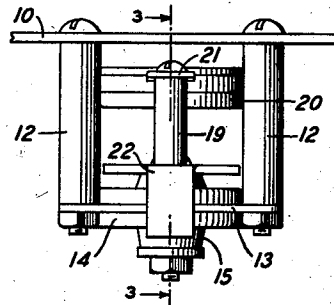


FIG. 3

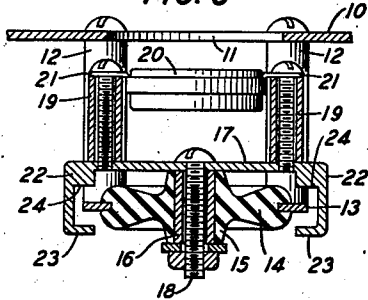


FIG. 4

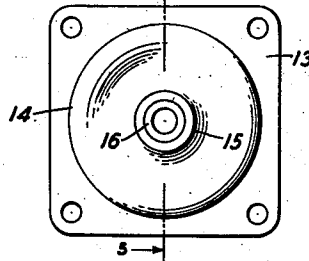


FIG. 5

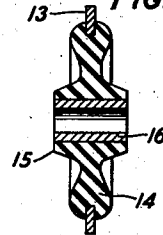


FIG. 6

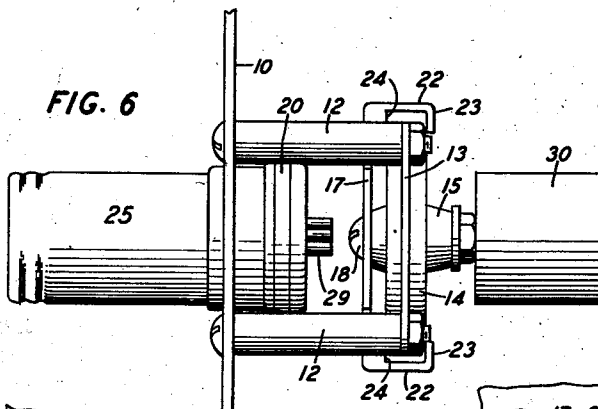


FIG. 8

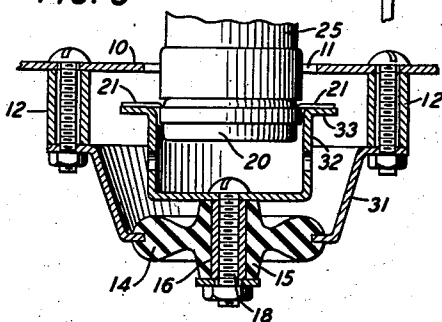
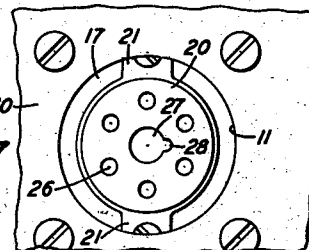


FIG. 7



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CUSHION MOUNTING

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10 Claims. (Cl. 248—358)

This invention relates to cushion mountings and more particularly to such mountings for electron discharge devices.

These devices usually contain a plurality of frail electrodes, such as a filamentary or equipotential type cathode and one or more wire wound grids which are uniformly spaced with respect to an output electrode or anode in an enclosing vessel, to attain appropriate electrical characteristics which must be maintained stable to realize the highest efficiency of operation of the device capable of being obtained therefrom.

Any variation in space relation of the electrodes due to vibration or shock by reason of external environment, such as may occur in aircraft, mobile equipment, on board ship or in other applications where the filament or the grids are liable to vibrate or be permanently distorted to change the stable space relation of the electrodes will produce corresponding changes in space current and therefore have a detrimental effect on the operation of the device by causing undesired current variations and loss in efficiency.

The primary object of this invention is to substantially prevent vibrational interference being transmitted to electron discharge devices mounted in electrical energy translating apparatus.

Another object of the invention is to diminish the effect of sudden shock on the electron discharge device to avoid variation in operating characteristics thereof.

A further object of the invention is to facilitate the mounting of the device in a compact and highly efficient structure in which mechanical vibration and shock are substantially absorbed before reaching the discharge device.

These objects are attained in accordance with a particular aspect of this invention wherein the device is placed in a cushion mounting which employs a soft rubber cushion and damping member having metallic inserts bonded thereto for direct connection to associated parts of the assembly in which the rubber exhibits a shear strain characteristic, which provides the maximum degree of protection from disturbing vibrational frequencies by utilizing the low natural period and high deflection characteristics of the soft rubber. The mounting also involves a platform coupled to the damping member which supports a socket intermediate the platform and a base or panel for supporting the discharge device.

A feature of the assembly relates to a cushion mounting of the shear type in which excessive

rupture stresses on the rubber cushion are avoided by limiting the range of movement of the cushion primarily when inserting or removing the discharge device with respect to the mounting. This is accomplished by providing extensions on the platform which form limit stops for the socket carried by the platform.

Another feature of the invention relates to the arrangement of the limit stops with respect to the damping member of the assembly. In a preferred arrangement, the extensions on the platform encompass a flange plate of the damping member so that the stress on the rubber cushion is equalized and disruptive stress is avoided.

A further feature of the invention relates to equalizing the loading of the mounting when a discharge device is placed therein and positioned at an angle to a vertical plane. This construction involves the addition of an adjustable counterweight on the side of the cushion member opposite to the device to balance various sizes of discharge devices and prevent contact with the panel or other rigid surface which will communicate mechanical vibration to the discharge device.

These and other features of the invention will be more clearly understood from the following detailed description when considered with the accompanying drawing:

Fig. 1 is a side view in elevation of the cushion mounting in accordance with this invention;

Fig. 2 is a side view rotated 90 degrees in elevation of the mounting shown in Fig. 1;

Fig. 3 shows the mounting in the same relation as in Fig. 1, but partly in cross section taken on line 3—3 of Fig. 2, to show the detailed arrangement of the various parts of the mounting;

Fig. 4 is a plan view of the cushion damping member;

Fig. 5 is a cross-sectional view of the damping member taken on line 5—5 of Fig. 4;

Fig. 6 shows the mounting on the rear of a vertical panel with the adjustable counterweight to offset the weight of the discharge device supported in the mounting;

Fig. 7 is a front view of the mounting showing the socket for supporting the discharge device; and

Fig. 8 shows a modified structure of the mounting in cross section in which the socket is shielded.

The cushion mounting of this invention is shown in the drawing in its preferred form as applied to a base plate or panel 10 having a large circular opening 11 for inserting an elec-

tron discharge device in the mounting. This mounting is disposed at the rear of the panel so that the panel presents a substantially unobstructed surface from the front thereof when installed in operating position in any energy translating or communicating equipment. Of course, the invention is not limited to this specific application since the cushion mounting may be disposed in other appropriate locations depending on the use of the equipment and the effect desired in the equipment. As shown in Fig. 1, the specific mounting of this invention is applied to the rear of the panel 10 by mounting a plurality of rearwardly extending posts 12 disposed in equally spaced relation around the opening 11 in the panel. These posts are secured to one of the main elements of the mounting by being attached to the four corners of a rectangular flange member 13 which is embedded in the periphery of a disc of soft rubber cushion material 14 having a central hub portion 15 of increased thickness with a metallic sleeve 16 extending therethrough and rigidly bonded to the hub portion, as shown in Figs. 3 and 5. The circular disc 14 is also formed with an annular intermediate portion of reduced thickness between the periphery and the hub to render the soft rubber more resilient and elastic to deflection forces in all directions.

A rigid platform plate 17 is centrally affixed to the sleeve 16 of the cushion member 14 by a screw and nut 18. This platform carries a pair of posts 19 which extend toward the panel 10 to support a wafer type or other suitable socket 20 by oppositely disposed ears 21 to position the socket intermediate the panel and cushion member and in coaxial alignment with the opening 11 in the panel.

Since the peripheral flange 13 of the cushion member is rigidly fixed in the mounting and the platform and socket assembly which constitutes the movable mass is affixed to the center of the cushion member, any deflection forces acting on the assembly will be absorbed by the soft rubber cushion 14 which is yieldable in all directions due to its configuration and the strain imposed on the rubber cushion will place the rubber in shear with respect to the metallic insert bonded therein, whereby the maximum degree of protection is afforded against vibrational interference due to the low natural period of the rubber material and the high deflection characteristic thereof.

However, in order to protect the cushion member from abnormal disruptive stress, such as occurs when a discharge device is inserted in or removed from the socket member 20, as is usual in push type sockets, the platform plate 17 is provided with a pair of oppositely disposed extensions 22 which project downwardly and are bent inwardly to form limit stops 23 and 24, respectively, on opposite sides of the peripheral flange 13 of the cushion member. The limit stop 24 engages the flange 13 when a discharge device is inserted in the socket to prevent excessive strain on the cushion 14, while the limit stop 23 engages the flange when the device is removed from the socket.

The cushion mounting of this invention may also be applied to a vertical panel, as shown in Fig. 6, wherein a discharge device 25 is inserted in the push type socket 20, the socket being provided with a plurality of openings 26 for the terminal pins of the discharge device and a central index bore 27 having an offset slot 28 to receive

a cooperating index pin or extension 29 on the discharge device to properly locate the device in the socket with respect to the various terminal openings 26. As shown in Fig. 6 the index pin 29 of the discharge device projects through the socket so that the socket must be mounted in suitable space relation with respect to the platform 17 of the mounting. When the cushion mounting is employed in a vertical panel, the excess weight of the discharge device necessarily unbalances the mounting assembly which may result in a transmission of external vibrations to the electrodes of the discharge device, due to contact of the shell of the device with the lower edge of the panel through which it extends. In order to overcome this difficulty, in accordance with this invention, a counterweight 30 is affixed to the bottom of the screw 18 extending through the platform and the hub of the cushion member to reestablish the balance in the mounting, so that the discharge device is maintained coaxial with the opening 11 and entirely free from the edge of the opening in the panel. The counterweight 30 therefore maintains the axis of the mounting and the discharge device perpendicular to the panel 10 yet permits the cushion member 14 to efficiently dampen or absorb vibrations or shocks and thereby protects the discharge device from these extraneous disturbances. The counterweight 30 may be adjusted on the screw 18 for different sizes and weights of discharge devices supported in the socket 20 to compensate for differences in balance to maintain the discharge device free from contact with the panel.

A modification of the mounting of this invention is shown in Fig. 8, in which the rubber cushion is provided with a cup-shaped flange member 31 having its inner edge embedded in the peripheral portion of the cushion and the outer rim secured to the posts 12 on the panel. A hollow cup-shaped container 32 which forms a shielding structure for the socket 20 is rigidly affixed to the central hub of the cushion member by the screw 18 and is provided with an annular flange 33 for supporting the socket, by soldering the ears 21 thereto. Suitable flexible connections may be inserted in the cup shield 32 through side openings to be attached to the various terminals of the socket.

The cushion mounting of this invention forms a compact and easily assembled structure for the individual support of an electron discharge device in which the discharge device extends through an opening in a base plate or panel and is supported in a depressed position to eliminate capacitive and inductive disturbances which might affect the performance of the discharge device. Furthermore, the cushion mounting adequately protects the discharge device from extraneous vibration and shock which would materially affect the spacial relation of the electrodes therein and therefore maintains the discharge device in stable operating condition even under abnormal environmental circumstances, such as use in mobile equipment or in apparatus aboard ship where engine vibration is quite prevalent.

While the invention has been disclosed in a specific application and in a particular constructional assembly, it is, of course understood, that various modifications may be made in the elemental parts without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A cushion mounting for an electron discharge device comprising a base plate, a resilient damping member having a metallic rim bonded therein, means rigidly securing said rim to said plate, a platform rigidly attached to said member, and a socket adapted to receive said device mounted between said plate and said platform and supported by said platform.
2. A cushion mounting for an electron discharge device comprising a base plate, a yieldable damping member having metallic elements bonded therein, securing means extending between said plate and one of said metallic elements, a platform directly attached to the other of said metallic elements, and a socket adapted to receive said discharge device spaced from and mounted on said platform.
3. A resilient mounting for an electron discharge device comprising a base member, a cushion member having a peripheral flange embedded therein supported from said base member, a rigid member attached to said cushion member, a socket for said discharge device secured to said rigid member and positioned between said base member and rigid member, and means on said rigid member for limiting the stress placed upon said cushion member, said means being adapted to engage said flange.
4. A resilient mounting for an electron discharge device comprising an apertured base, a vibration damping member having a rigid peripheral flange embedded therein and supported on one side of said base in alignment with the aperture therein, a rigid member centrally attached to said damping member, said rigid member having limit means disposed on opposite sides of said flange, and a socket adapted to receive said discharge device through said apertured base and being supported on said rigid member between said base and said rigid member.
5. A resilient mounting for an electron discharge device comprising an apertured base, a vibration damping member having a rigid peripheral flange embedded therein and supported on one side of said base in alignment with the aperture therein, a rigid member centrally attached to said damping member, said rigid member having integral extensions encompassing said flange to limit reciprocal movement of said damping member, and a socket adapted to receive said discharge device through said apertured base being supported on said rigid member between said base and said rigid member.
6. A cushion mounting for an electron discharge device comprising a base plate, a damping member, means securing said member to said plate, a platform centrally attached to said member, a socket adapted to receive said discharge device supported between said platform and said plate, and a counterweight secured to said damping member on the side opposite said platform.
7. A cushion mounting for an electron discharge device comprising a base plate, a damping member, means securing said member to said plate, a cup member centrally connected to said damping member, and a socket carried by said cup member and forming a closure for said cup member.
8. In combination, a mounting panel having an opening, posts extending rearwardly from said panel around said opening, a circular cushion member of soft rubber material having a central sleeve and a peripheral flange bonded in said rubber material, said posts being secured to said flange, a platform plate interposed between said panel and said cushion member, means on said platform to limit the movement thereof with respect to said cushion member, a counterweight remote from said panel, a socket adapted to receive said discharge device spaced from said panel in coaxial alignment with said opening, and means fixedly securing said platform and counterweight to the sleeve of said cushion member.
9. In combination, a mounting panel having an opening, posts extending rearwardly from said panel around said opening, a circular cushion member of soft rubber material having a central sleeve and a peripheral flange bonded in said rubber material, said posts being secured to said flange, a platform plate interposed between said panel and said cushion member, said platform having integral extensions with portions located in uniform relation on opposite sides of said flange to limit reciprocal movement of said platform with respect to said cushion member, a counterweight remote from said panel, a socket adapted to receive said discharge device spaced from said panel in coaxial alignment with said opening, posts carried by said platform for supporting said socket, and a single member extending through said sleeve for connecting said platform and counterweight centrally to said cushion on opposite sides thereof.
10. A cushion mounting for an electron discharge device for mounting on a panel comprising a platform member, a socket on one side of said platform member and spaced therefrom, a resilient member on the other side of said platform having a metallic member peripherally secured thereto, and means for rigidly connecting said metallic member to said panel.

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