March 23, 1954 J. C. SIMS, JR., ET AL 2,673,342

DEMOUNTABLE CHASSIS

Filed Dec. 2, 1949 3 Sheets-Sheet 1

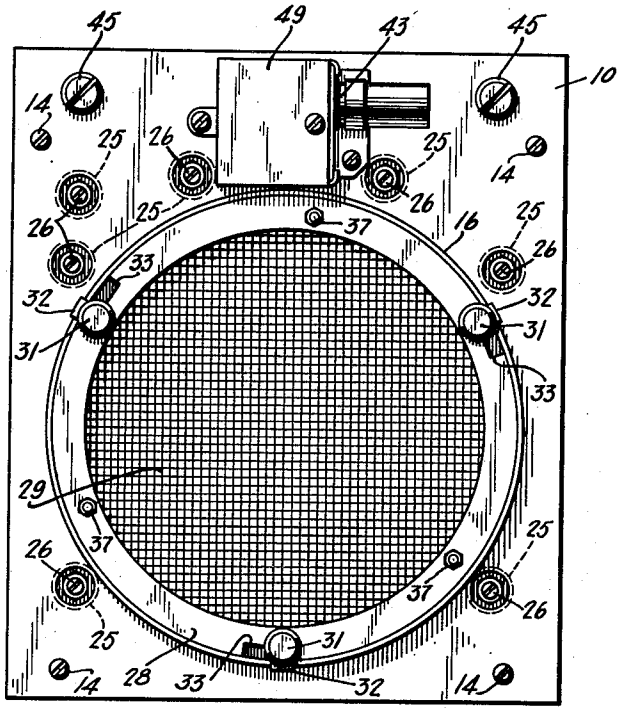


Fig. 1.

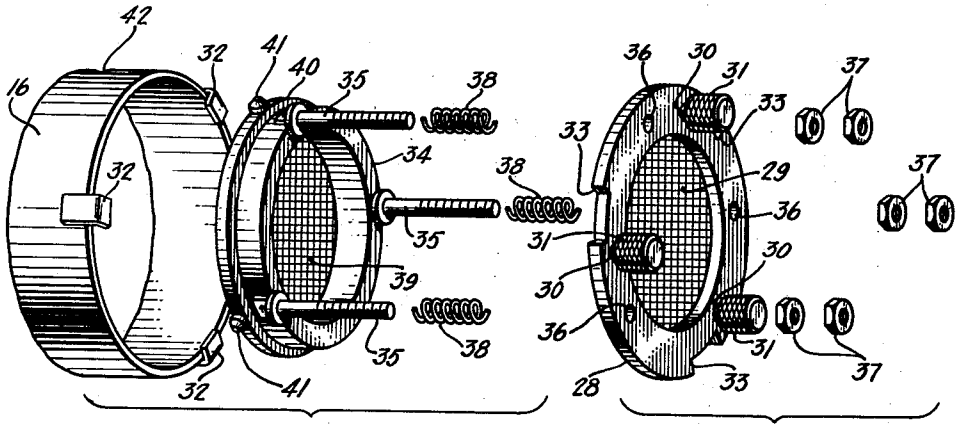


Fig. 6. Fig. 5.

INVENTORS.
John Presper Eckert Jr.
John C. Sims Jr.
By George V. Eltgroth
Attorney

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DEMOUNTABLE CHASSIS

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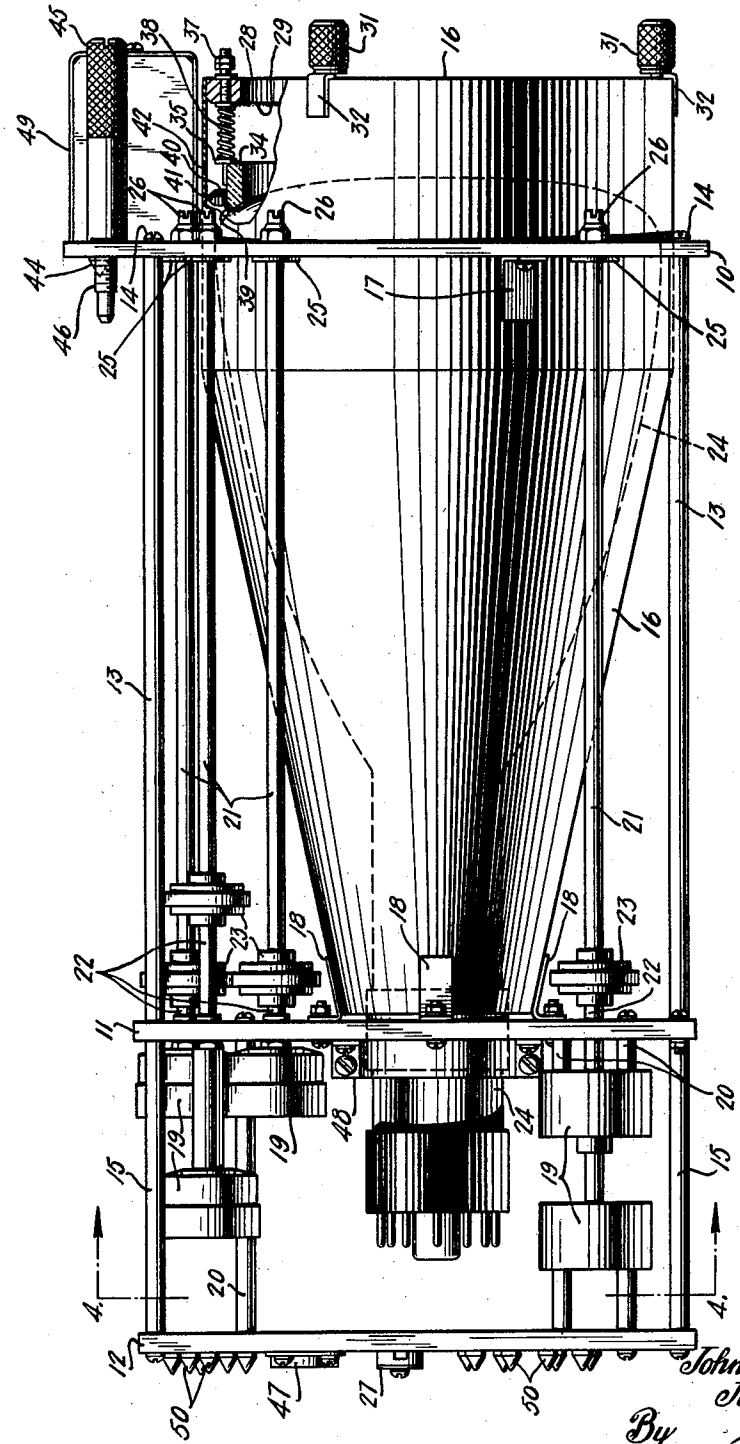


FIG. 2.

INVENTORS.
John Presper Eckert Jr.
John C. Sims Jr.
By George V. Blyth
Attorney

March 23, 1954 J. C. SIMS, JR., ET AL 2,673,342

DEMOUNTABLE CHASSIS

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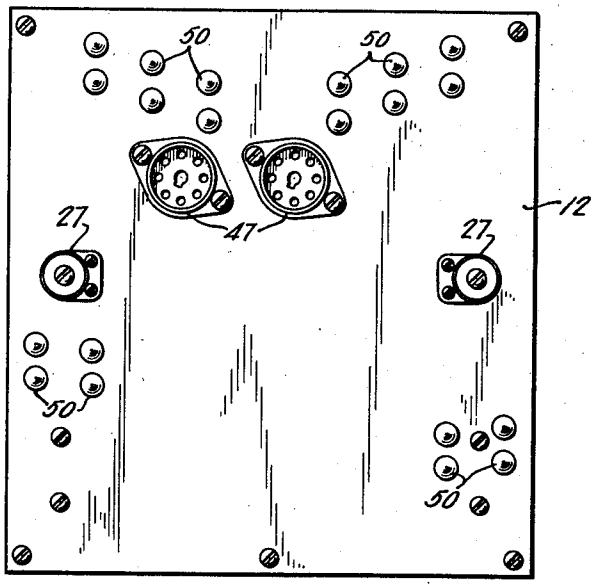


Fig. 3.

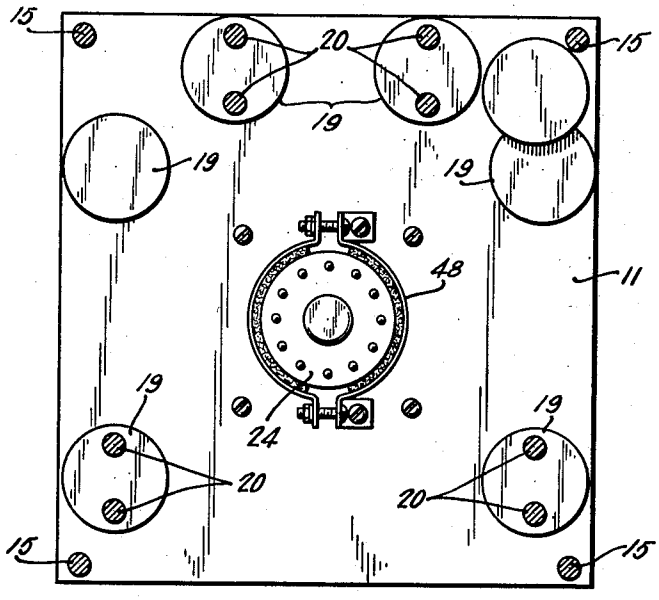


Fig. 4.

INVENTORS.
John Presper Eckert Jr.
John C. Sims Jr.
By George V Blatwood
Attorney

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DEMOUNTABLE CHASSIS

John C. Sims, Jr., Springhouse, and John Presper Eckert, Jr., Philadelphia, Pa., assignors to Eckert-Mauchly Computer Corporation, Philadelphia, Pa., a corporation of Pennsylvania

Application December 2, 1949, Serial No. 130,842

9 Claims. (Cl. 340—367)

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This invention relates generally to an electron tube chassis and more particularly to a demountable chassis adapted for use in a system for the electrical storage of intelligence.

Although the conventional cathode ray tube has been adapted to many diverse uses, it has not prior to this time been utilized as a memory storage unit for digital computers. Reference is had to U. S. application Serial Number 98,178 of John Presper Eckert, Jr., and Herman Lukoff, filed June 10, 1949, entitled Information Storage System, for a detailed description of the system to which the invention relates as a partial embodiment thereof.

The aforesaid information storage system requires a structure adapted to support and electrically shield a large electron discharge tube and certain new elements used in combination therewith, while still allowing a view of the face of said electron tube. Also required is a functionally new element which picks up intelligence from the face of an electron tube. The present invention described in detail below is a new and improved chassis providing all the aforesaid requirements.

Accordingly, it is a primary object of the present invention to provide a new and improved chassis for the mounting of electric discharge tubes.

Another object of the invention is to provide a new and improved chassis which is demountable and houses a cathode ray tube and the electrical components associated therewith.

Yet another object of the invention is to provide a new and improved demountable chassis for use in an information storage system which houses a cathode ray tube and circuits associated therewith and allows direct control of said circuits from the front panel of said chassis.

Still another object of this invention is to provide a chassis which has its electrical components disposed to give substantially improved operating performance.

A further object is to provide a new and improved chassis adapted to electrostatically pick up signals on the face of a conventional cathode ray tube or an electron tube similar thereto.

Yet another object of the invention is to provide a new and improved chassis which furnishes a substantially improved signal from the face of a conventional cathode ray tube.

Still another object of this invention is to provide a new and improved chassis which materially improves the signal to noise ratio in the signal output of electrical circuits contained therein.

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Another object of this invention is to provide a new and improved chassis which furnishes substantial magnetic and electric shielding for the face as well as the walls of a cathode ray tube.

A further object of the invention is to provide a new and improved chassis for use in an information storage system which is quickly and easily mounted and demounted with a minimum of effort from a frame containing a plurality of such said chassis.

Yet another object of the invention is to provide a new and improved demountable chassis having a rigid structure and a substantially reduced weight.

Still another object of this invention is to provide a demountable chassis for large electric discharge tubes having simplified mechanical construction.

Other objects and advantages of the invention will in part be obvious and in part be described when the following description is read in conjunction with the drawings, in which:

Figure 1 is a front view of a demountable chassis containing an electron tube,

Figure 2 is a side view of Figure 1 partially cut away,

Figure 3 is an end view of Figure 2,

Figure 4 is a sectional view of the supporting panel 11 shown along the line 4, 4 in Figure 2,

Figure 5 is an exploded view of the removable electron tube shield screen and shield ring, and a portion of the cylindrical shielding body shown in Figure 2, and,

Figure 6 is a view of the signal pickup screen and its supporting frame.

Like reference numerals designate like parts throughout the several views.

Referring now to the drawings, the numeral 10 designates the chassis front panel which has a rectangular outer configuration and is made of electrically conductive material. Likewise 11 and 12 designate an intermediate panel and an end panel, respectively, which, however, are made of an electrically non-conductive material.

The front panel 10 and intermediate panel 11 have their respective corners connected by a set of four risers 13. Each riser 13 has one end tapped for attachment to the front panel 10 by machine screw 14 which passes through a corresponding aperture in the front panel 10. The other extremity of each of said risers 13 has a threaded portion on a reduced diameter which passes through an aperture in a corner of said intermediate panel 11. The said riser ends 13 are secured to the said intermediate panel 11 by an-

other set of four insulating risers 15 which are adapted to threadedly engage to the protruding studs of said risers 13. The remaining ends of said four risers 15 are secured to said end panel 12 in the same manner in which said front panel 10 is attached to said risers 13 as shown in Figure 2. The panels 10, 11 and 12 are rigidly positioned by risers 13 and 15 so that they respectively lie behind each other in essentially parallel planes.

A conductive magnetic shielding body 16 is formed by welding a cylindrical section to a conical section along two of their edges of equal configuration. The said body 16, being formed from sheet metal, is a hollow and shell like structure, which is positioned by two apertures which are found, respectively, in panels 10 and 11. The body 16 is attached by means of brackets 17 and 18, respectively, to panels 10 and 11. A clamp 48 is supported by panel 11 in alignment with the aperture in said panel 11. By this means the neck of an electron tube 24, which rests within the body 16, is clamped in a fixed position as it passes through said aperture in panel 11.

Insulating panel 11 as well as insulating panel 12, supports a number of potentiometers 19 either by their shanks or by means of stand-offs 20. The said potentiometers 19 are controlled from the front panel by means of shaft extensions 21 which are connected to the potentiometer shafts 22 by flexible insulating couplings 23. Said shaft extensions are rotatably mounted in the front panel 10 by means of fittings 25 which allow said extension shaft ends 26 to project through said panel 10. The said projecting extension shaft ends 26 are slotted to provide for rotation of said shaft 21 by means of a screw driver.

Referring to Figure 3, end panel 12 supports two sockets 47 for receiving a pair of electron tubes used in the blanking and deflection circuits for electron tube 24, trimmers 27 and a plurality of male contact points 50 which respectively contact their female counterpart when the above described mechanical structure or chassis is mounted in a frame adapted therefor (not shown). The said male and female contacts are more particularly described in pending U. S. application of John Presper Eckert, Jr., John C. Sims, Jr., and Isaac L. Auerbach, entitled Structure for Electrical Apparatus, Serial Number 77,132, filed February 18, 1949, now Patent No. 2,579,141.

Referring to Figure 2, it can be seen that the base of electron tube 24, the terminals of potentiometers 19, the lugs of electron tube sockets 47, terminals of trimmers 27, and male contact point connections are all localized in the region between panels 11 and 12. This localization which is advantageous from both mechanical and electrical considerations, yet allows front panel control of potentiometers 19 through the utilization of said extension shafts 21.

Referring to Figures 1 and 2, the above said body 16 is designed so that a portion of its cylindrical section extends beyond the surface of panel 10 and the face of electron tube 24 so that a shield ring and screen ring assembly, 28 and 34 respectively, can be contained therein.

Figure 5 shows in greater detail shield ring 28 and metallic shield screen 29 which is soldered to said ring 28. The shield ring 28 has three tapped holes 30 spaced 120 degrees apart, each receiving a thumb screw 31. The said shield ring 28, which has an outside diameter equal to the inside diameter of said extended cylindrical portion of body 16 is supported within said cylindrical portion, enclosing end of said body 16.

Three L-brackets 32 are spot welded at points evenly spaced around the periphery and along the outer edge of the extended portion of said body 16. The shield ring 28 is held above said position by clamping the L-brackets 32 between the shield ring 28 and thumb screws 31 by means of tightening thumb screws 31. The shield ring has three cut-out portions 33 around its circumference to allow for the clearance of said brackets 32 when the shield ring 28 is replaced or removed. Substantially complete shielding of electron tube 24 against interference from external electrostatic magnetic fields is provided when said electron tube 24 is contained within body 16, and shield ring 28 containing a shielding electrode or shield screen 29 is in place.

Referring to Figures 2 and 6, the inner screen ring 34 is made of an insulating material and proportioned to fit into shield-body 16. Three brackets 35 are attached to said inner ring 34 being evenly spaced (120° apart) along its outer circumference. The ends of said three brackets 35, pass through three holes 36 in shield ring 28 and have a nut and lock nut 37 securely fixed upon the threaded end portion of the said brackets 35. (Figure 2.) The springs 38 which coil about the cylindrical portion of brackets 35 exert a force tending to keep the nuts 37 against the face of said shield ring 28.

Referring to Figure 6 for greater detail, a signal pickup electrode which may be a fine meshed metallic screen 39 which is stretched over the inner ring 34 and held in position by being wedged between the outer circumference of inner screen ring 34 and the inner circumference of an outer screen ring 40. Said outer screen ring is made of an insulating material and has three guide pins 41 around its periphery which help to center said outer screen ring 40 inside the shielding body 16.

The position of the nuts 37 on the bracket 35 can be adjusted so that said meshed screen 39 will be forced under the tension of springs 38 to contact with the glass face of the electron tube 24.

A small hole 42 is drilled in the upper portion of the shielding body 16 nearest the meshed screen 39 to allow an electrical connection between said meshed screen 39 and a preamplifier 43 (shielded by cover 49) mounted on the front panel 10 directly above the shielding body 16. A male contact 44, similar to said contacts 50, is located on panel 10 behind said preamplifier 43. By this arrangement a signal picked up on meshed screen 39 is shielded first within body 16, passes almost directly into the shielded preamplifier 43, and then through the contact point 44 when the chassis is mounted, into a shielded transmission line (not shown), thus minimizing signal distortion due to interference from external magnetic electrostatic fields.

Considering the herein described demountable chassis in its entirety, it is mounted in a chassis receiving frame (not shown) by first placing the end panel 12 in an opening provided in said frame and then sliding the said chassis into said opening in a direction perpendicular to the face of said end panel 12 until male contact points 50 and 44, respectively, contact their female counterparts in said frame. The chassis is then fixed in its mounted position by means of two handles 45 having threaded ends 46 which turn into the said receiving frame. This insures that a contact pressure will be maintained at said

contacts 50 and 44, thus maintaing good electrical connections between the electrical circuits of the chassis and those circuits external to said chassis. The two handles 45 also serve to electrically connect the shielding body 16 to the receiving frame through the electrically conductive panel 10, and brackets 17.

The demountable chassis is a complete unit in itself, having contained within it all circuits associated with the operation and control of a cathode ray tube. For instance, it contains electrical circuits which amplify the signals received through contacts 50, so their intensity is suitable for the proper operation of the electron tube 24. Control of the electrical circuits is possible from the front panel 10 while the chassis is mounted and in operation by shafts 21, as described previously. The chassis also provides for picking up a signal from the face of said electron tube 24 and preamplifying it before it passes from said chassis to a transmission line.

Although magnetically and electrostatically shielded the face of electron tube 24 is, however, still visible from the front of the chassis through shield screen 29 and meshed screen 39, thereby allowing the necessary adjustments to be made in the electrical control circuits to insure proper operation of said electron tube 24.

All components mounted in the chassis are easily accessible for quick repair or replacement. Electron tube 24 is removed from the chassis by first removing the shield ring 28 and screen ring 34 assemblies, loosening clamp 48 around the neck of electron tube 24, and the tube socket (not shown) connected to the base of said electron tube 24. Now the said electron tube 24 can be moved forward out of the chassis through the front panel 10. The electron tube 24 can now be replaced in said chassis and said other components made to reassume their former operative positions.

Any number of chassis can be placed in a receiving frame depending on the needs of the electrical system in which they may be utilized. Each chassis may be quickly and easily removed and replaced by a spare chassis for nearly uninterrupted operation of said system in the case of the malfunctioning of one of said chassis.

It will be obvious to those skilled in the art that many modifications and variations of this invention are possible without essentially departing from the spirit of the invention.

What is claimed is:

1. In apparatus adapted to utilize an electric discharge valve having an envelope with an information receiving face, an electrically conductive body adapted to magnetically shield said valve, a first electrically conductive transparent electrode secured at one end of said magnetic shield and in electrical engagement therewith, a second electrically conductive transparent electrode insulatedly secured within the volume bounded by said magnetic shield and said first electrode, and adapted to externally engage the face of said electron valve in a region in which said second electrode is rendered electrically responsive to the information appearing at said face and is rendered non-responsive to ambient electromagnetic disturbances, and a conductive connection to said second electrode leading outside said volume.

2. In apparatus adapted to utilize an electric discharge valve having an envelope with an information receiving face, first and second relatively spaced apertured members, an open ended electrically conductive magnetic shield for said valve disposed within said apertures and supported from said first and second members, a first electrically conductive transparent electrode overlappingly secured at one end of said magnetic shield and in electrical engagement therewith, a second electrically conductive transparent electrode insulatedly and resiliently secured on the shield side of said first electrode in a region in which said second electrode is rendered electrically responsive to the information appearing at said face and is rendered non-responsive to ambient electromagnetic disturbances, and a conductive connection to said second electrode adapted for cooperation with apparatus external to the shield assembly.

3. In apparatus adapted to utilize an electric discharge valve having an envelope with an information receiving face, a first apertured body adapted to electrically shield the walls of said valve, a second conductive electrostatic shielding body enclosing an aperture in said first body, a signal pick up electrode shielded with respect to ambient electromagnetic disturbances by said first and second bodies and adapted to receive signals from said face, an electrical circuit operatively connected with said signal pick up electrode, and a common member supporting said first and second bodies and said signal pick up electrode.

4. In apparatus adapted to utilize an electric discharge valve having an envelope with an information receiving face, a first apertured body adapted to magnetically and electrostatically shield the walls of said valve, a second conductive electrostatic shielding body enclosing an aperture in said first body, an electrically conductive mesh screen shielded with respect to ambient electromagnetic disturbances and supported by said first and second bodies, a removable frame adapted for holding said meshed screen in physical contact with said face, a shielded preamplifier operatively connected with said meshed screen, means coupled to said first and second bodies and said shielded preamplifier to maintain said bodies and said preamplifier at a constant potential, and a common member supporting said first and second bodies and also supporting said preamplifier adjoining said signal pick up electrode.

5. In apparatus adapted to utilize an electric discharge valve having an envelope with an information receiving face, an apertured body adapted to magnetically and electrostatically shield the walls of said valve, an electrically conductive mesh screen, a removable frame supporting said meshed screen in the aperture of said body, a signal pick up electrode shielded with respect to ambient electromagnetic disturbances and supported by said body and adapted to engage said face, a shielded preamplifier operatively connected with said signal pick up electrode, means coupled to said body, said screen and said preamplifier to maintain said body, said screen and said preamplifier at a constant potential, and a common member supporting said apertured body and said preamplifier.

6. In combination, an electric discharge valve comprising an envelope defining a working chamber and a source of mobile electric charge carriers disposed within said chamber, said envelope including an information receiving face subject to charge carrier bombardment, a signal pick up electrode resiliently urged into mechanical engagement with the side of said face lying

without said chamber, a shielding electrode insulatedly supported in spaced shielding relationship with a surface of said signal pick up electrode remote from said face to shield said signal pick up electrode from ambient electromagnetic disturbances, and a common structure supporting said valve and both electrodes.

7. The combination as set forth in claim 6 wherein both said signal pick up electrode and said shielding electrode are transparent.

8. In an electric valve housing structure combining shielding and sensing properties and adapted for cooperation with a valve having an information receiving face, an electrically conductive body surrounding and magnetically shielding said valve and provided with an aperture exposing said face, a first electrically conductive shielding electrode urged into mechanical and electrical engagement with said body and mounted about said aperture to define a region which is bounded by said first electrode and said face and which is free from ambient electromagnetic disturbances, and a second electrically conductive electrode responsive to information appearing at said face disposed and insulatedly secured within said region.

9. The electric valve housing structure as set forth in claim 8 wherein both said first and second electrodes are transparent.

JOHN C. SIMS, JR.
JOHN PRESPER ECKERT, JR.

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