June 25, 1957 W. H. GREATBATCH, JR., ET AL 2,797,408

PROTECTIVE SHIELDS FOR ELECTRONIC TUBES

Filed Feb. 11, 1955 2 Sheets-Sheet 1

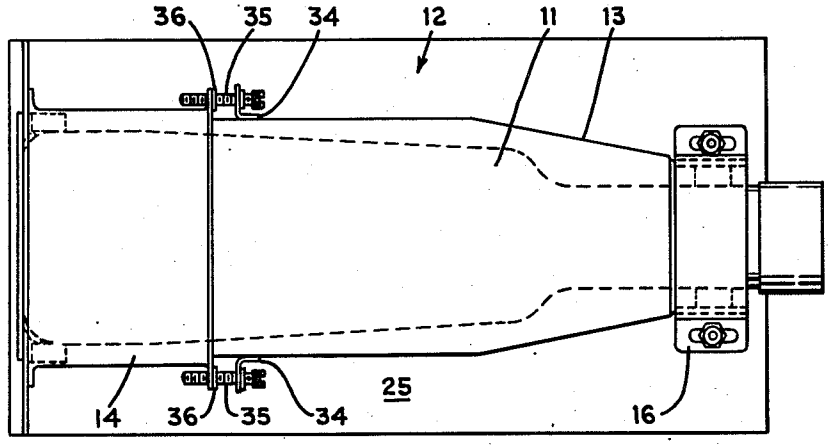


FIG. 1

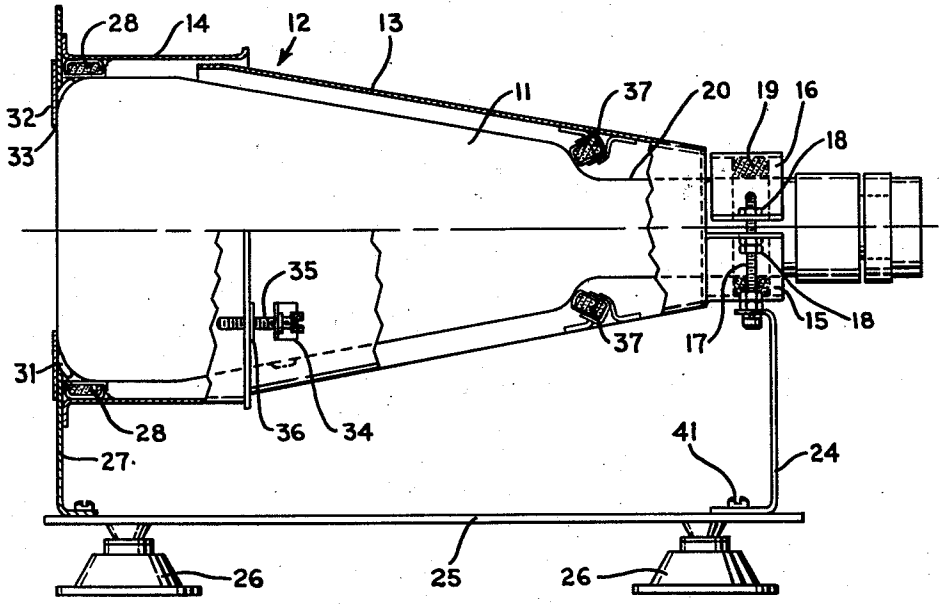


FIG. 2

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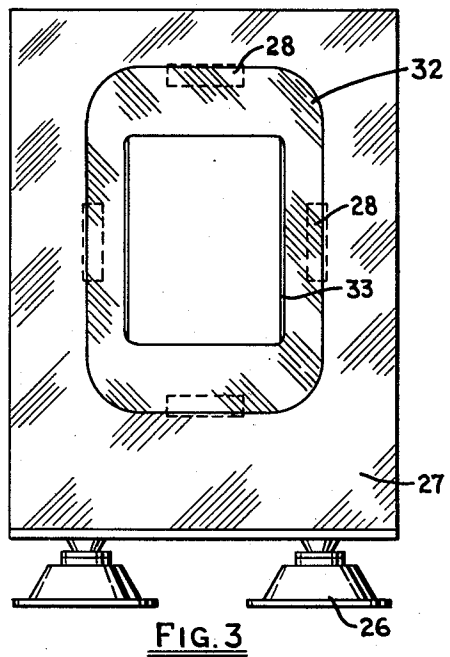


FIG. 3

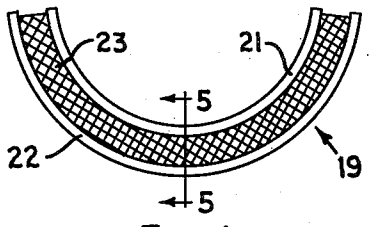


FIG. 4

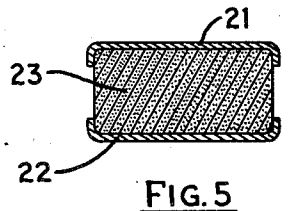


FIG. 5

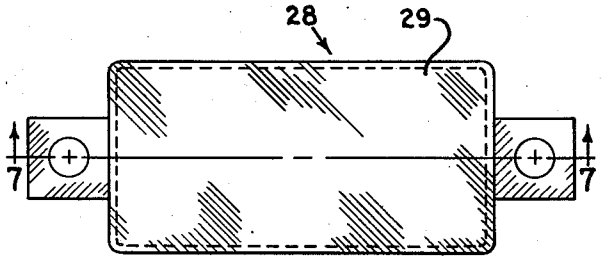


FIG 6

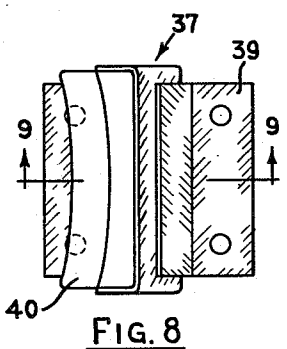


FIG. 8

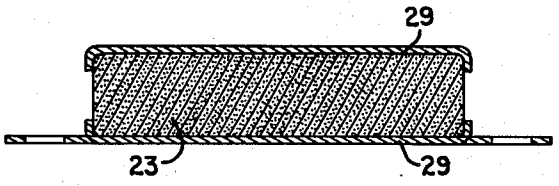


FIG. 7

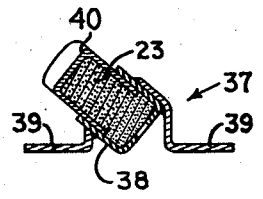


FIG. 9

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PROTECTIVE SHIELDS FOR ELECTRONIC TUBES

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Application February 11, 1955, Serial No. 487,723

3 Claims. (Cl. 340—367)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to protective shields for electronic tubes and more particularly to shields that will protect large tubes, such as cathode ray tubes, from magnetic and electrostatic influences and also provide an improved shock and vibration mount.

Various attempts have been made to protect cathode ray tubes from magnetic and electrostatic influences, one method being to apply finely divided metallic material suspended in a binder to the outer surface of the tube. The binder adheres to the surface of the tube and retains the metallic particles in place. This method does give the required electrostatic protection but affords no protection to the tubes from shocks and the tubes are readily broken.

Another method of protecting cathode ray tubes is to provide a covering or housing to enclose the tube and to separate this housing from the tube by rubber strips so that the tube is cushioned to give protection against shock and vibration. The use of the rubber in this application is unsatisfactory in that there is deterioration due to the heat of the tube. The rubber often takes a compressive set which reduces its effectiveness. Often the rubber becomes soft and tacky and adheres to both the tube and the housing and makes it extremely difficult to remove the tube.

The invention disclosed herein provides a housing to protect the tube from magnetic fields and damaging shocks, but overcomes the heretofore known disadvantages of this type of protector by providing an ingenious method of supporting the electronic tube inside the housing. The housing is of a novel telescoping design that permits the electronic tube to be snugged in resilient members that are made of metal mesh. This novel type of cushion provides the needed protection for the tube and is not affected by the heat that is dissipated from the tube.

It is therefore a general object of the present invention to provide an improved shield that will support an electronic tube and give protection from electrostatic influences and also protect the tube from breakage by giving the needed shock and vibration protection.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a top plan view of the complete invention;

Fig. 2 is a side view partially in section to illustrate a cathode ray tube supported in resilient members;

Fig. 3 is an end view showing an opening for viewing the front face of an electronic tube;

Fig. 4 is a side view of a radial absorbing cushion;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4;

Fig. 6 is a top plan view of an absorbing cushion;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 6;

Fig. 8 is a top plan view of another absorbing cushion; and

Fig. 9 is a sectional view taken on line 9—9 of Fig. 8.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is illustrated in Figs. 1 and 2 a cathode ray tube **11**, of the kind desired to be protected from electrostatic charges and damaging shock and vibration forces, arranged so that it is supported in a horizontal position inside a shielding case **12**. The shielding case **12**, which is made from any suitable electrical steel such as Mu-metal or Armco Iron, is constructed of a novel design that permits the aft section **13** of the shielding case **12** to telescope inside the forward section **14**.

Referring particularly to Fig. 2 of the drawings, it can be seen that the aft section **13** is conical in shape to more nearly conform to the shape of the cathode ray tube **11** and that a lower clamp **15** is fastened, as by welding, to the smaller end of the aft section **13**. A top clamp **16** is connected to the lower clamp **15** by means of screws **17** and nuts **18**, and a radial absorbing cushion **19** is placed between each clamp to firmly hold the neck portion **20** of the cathode ray tube **11**.

In Figs. 4 and 5 of the drawings, it can be seen that the radial absorbing cushion **19** has an inner casing **21** and an outer casing **22** and that a filler **23**, which is of resilient metal material, is bonded to these two casings to form a resilient member. The use of resilient metal such as steel wool or other metal mesh provides a resilient member that is stable and unaffected by the extreme heat that is dissipated by the cathode ray tube **11**.

Referring again to Fig. 2 of the drawings, there is shown a support bracket **24** that is connected to the lower clamp **15** by means of screws **17** and nuts **18**. The support bracket **24** is attached to a base plate **25** which is mounted on standard shock and vibration mounts **26**. A front panel bracket **27** is also mounted to the base plate **25** and is used to support the viewing end of the cathode ray tube **11**. The forward section **14** of the shielding case **12** is fastened, as by welding or screws, to the front panel bracket **27** and four vibration absorbing cushions **28** are used to resiliently support the viewing end of the cathode ray tube **11**. It being understood that either a lesser or greater number of absorbing cushions **28** could be employed without departing from the scope of the invention.

In Figs. 6 and 7 of the drawings it can be seen that the vibration absorbing cushions **28** are similar in design to the radial absorbing cushions **19**, there being a resilient metal filler **23** bonded between two casings **29**.

Referring again to Fig. 2 of the drawings, there is shown a flat, circular ring **31** which is used to cushion the front portion of the cathode ray tube **11** and prevent a glass to metal contact. A bezel plate **32**, which has an opening **33**, is fastened to the front panel bracket **27** and is used to provide a proper ratio of width to height of the viewing area. A pair of lugs **34** are fastened to the aft section **13**, and adjustable screws **35**, which pass through the lugs **34** engage with threaded portions **36** on the forward section **14** of the shielding case **12**. The aft section **13** has a pair of vibration absorbing cushions **37** that resiliently engage the shoulder of the cathode ray tube **11**.

The vibration absorbing cushions **37**, as shown in Figs. 8 and 9 of the drawing consist of a container **38** that is attached to two mounting flanges **39**. Resilient metal filler **23** is bonded to the inside of the container

38 and a cap portion 40, which is curved to fit the contour of the cathode ray tube 11 is fitted inside the container 38 and the metal filler 23 is also bonded to the cap portion 40 to form an assembled unit.

Figs. 1 and 2 of the drawings illustrate a cathode ray tube 11 in position inside the shielding case 12. The tube can readily be put in position or removed. When putting the cathode ray tube in the shielding case, the aft section 13 is first put in the approximate position as shown, and then the top clamp 16 is loosely attached to the lower clamp 15. The support bracket 24 is next attached to the lower clamp 15 by means of screws 17 and nuts 18. The cathode ray tube 11 and aft section 13 are then telescoped inside the forward section 14 and the adjusting screws 35 are then tightened causing the absorbing cushions 37, which engage the shoulder of the tube, to move the tube until it is firmly positioned in the absorbing cushions 28. The support bracket 24 is then attached to the base plate 25 by means of a screw 41 and then the top clamp 16 is tightened, thus locking the tube in position.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A shield and shock mount for a cathode ray tube of the type having a large viewing end and a small neck portion on the opposite end comprising; a first section flared in shape and corresponding substantially to the shape of a cathode ray tube, said first section being of material having magnetic and electrostatic shielding properties; a lower collar attached to said first section and adaptable for fitting the neck portion of a cathode ray tube; a second section for shielding the viewing end of a cathode ray tube; adjustable means for adjustably telescoping said first section inside said second section; thermally stable resilient supporting means comprised of metal mesh material bonded between inner and outer casings in each said first and second section for resiliently cushioning a cathode ray tube; a resiliently mounted base plate; and means for mounting each said first and second sections to said base plate.

2. A shield and shock mount for a cathode ray tube as set forth in claim 1 wherein said means for mounting each said first and second sections to said base plate includes clamping means adaptable for supporting the neck portion end of a cathode ray tube and thermally stable resilient cushions comprised of metal mesh material positioned between said clamping means and the neck portion of a cathode ray tube.

3. A shield and shock mount for a cathode ray tube as set forth in claim 1 wherein said thermally stable resilient mounting means in said first section are adaptable for engaging the shoulder adjacent said neck portion of a cathode ray tube.

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