Aug. 1, 1944. A. P. BEREJKOFF 2,354,661

CATHODE RAY TUBE AND ASSEMBLY

Filed March 18, 1942

Fig. 1.

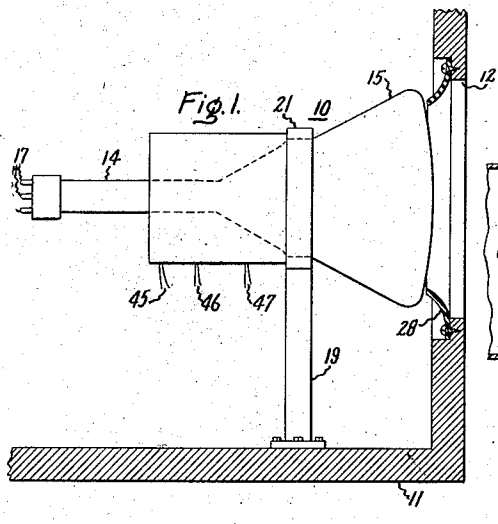


Fig. 2.

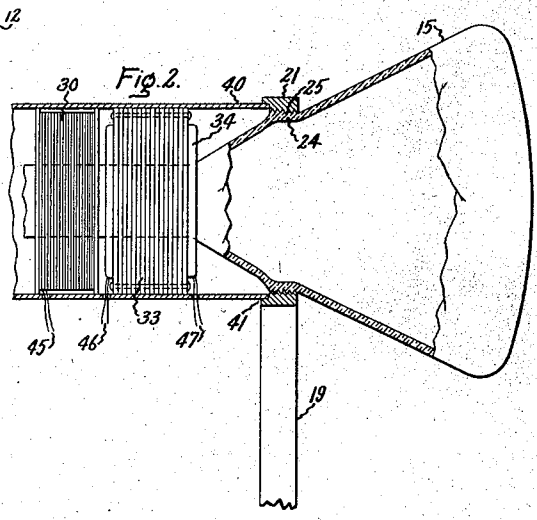


Fig. 3.

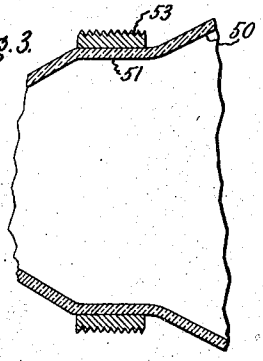


Fig. 4.

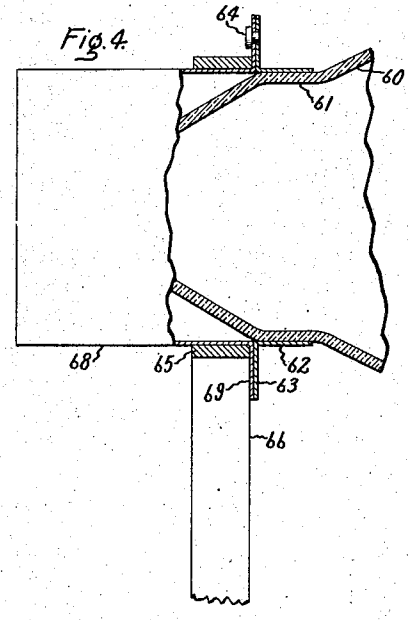
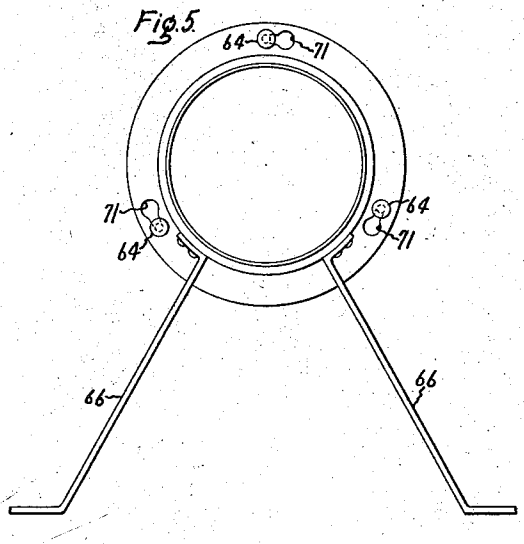


Fig. 5.



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CATHODE-RAY TUBE AND ASSEMBLY

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Application March 18, 1942, Serial No. 435,219

8 Claim. (Cl. 250—141)

The present invention relates to an improved form of cathode ray tube of the glass-enclosed type, and a mounting assembly for such a tube.

Because of their relatively large size and shape, considerable difficulty has been experienced in devising a satisfactory mounting for cathode ray tubes as used in television receivers and the like. In general, the arrangements hertofore employed for this purpose involve the use of resilient supports located at the extremities of the tube for holding it in a desired alignment and for providing some measure of cushioning against mechanical shocks. However, where the tube is required to be used in portable apparatus, as in control equipment for aircraft and the like, the method of endwise support frequently causes fracture because of excessive strains developed in the intermediate, unsupported portions of the tube structure. The difficulties of overcoming this problem are increased by the need for providing in proximity to the central portion of the tube operation-controlling agencies such as focusing and deflecting coils.

It is an object of my present invention to provide an improved cathode ray tube construction and mounting assembly by which fracture-producing strains incidental to use may be reduced to a minimum.

It is a further object to provide a simplified tube mounting assembly by means of which both the tube and its associated magnetic devices may be supported by a single mounting element.

It is a still further object to provide a mounting from which the supported tube may be readily detached upon need and by which adjustment of the position of the tube with respect to its focusing means may be readily accomplished.

In general, the foregoing objects are accomplished by forming a cathode ray tube so that its bulbous part possesses an externally engageable shoulder at a region which corresponds to the center of gravity of the tube. By attaching a mounting fixture to a shoulder so placed it proves possible to support the tube by this means alone, that is to say, without dependence upon any other form of mounting agency. Because of its favorable location such a mounting attachment introduces a minimum of strain and provides maximum protection against shocks encountered in use Moreover, as will appear in the following, it may be made readily adjustable and demountable. Finally, it provides an excellent anchorage for supporting magnetic focusing and deflecting coils in cooperative relation with respect to the smaller dimensioned or stem portion of the tube.

The features of the invention desired to be protected herein are pointed out in the appended claims. The invention itself, together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the drawing in which Fig. 1 is a side view partly in section of a portion of an apparatus embodying the invention; Fig. 2 is an enlarged view in partial section showing certain details of the construction of Fig. 1; Fig. 3 is a fragmentary sectional view illustrating one modification of the invention; Fig. 4 is a further fragmentary view illustrating a second modification of the invention; and Fig. 5 is another view of the structure of Fig. 4 taken in a different plane.

Referring particularly to Fig. 1 there is shown a portion of an apparatus (e. g. a television receiver) which includes a cathode ray tube 10. This tube is enclosed within a cabinet 11, being supported by a mounting arrangement to be described in the following. The cabinet is provided in one of its walls with an opening 12 through which the screen end of the cathode ray tube may be viewed.

The tube 10 includes a relatively slender glass stem portion 14 within which there are mounted electrodes (not shown) for producing a beam of electrons. Terminals for the beam-producing electrodes are provided at the extermity of the tube as indicated at 17. Abutting the stem portion of the tube there is a bulbous or tapered portion 15 also of glass which has its end wall coated internally with a fluorescent material adapted to be scanned by the electron beam. The tube is supported by means of a mounting fixture including a standard 19 which is secured to the floor of the cabinet 11 and which connects with a ring portion 21 engaging the tube in a manner shortly to be described.

As is illustrated in Fig. 2, the bulbous portion of the tube 10 is provided at an intermediate region thereof with an outwardly facing shoulder 24 formed by deformation of the wall of the envelope. This shoulder is preferably located so that it surrounds the region which includes the center of gravity of the tube. It may be produced by an appropriate configuration of the mould into which the tube is blown during its fabrication.

The shoulder 24 is provided on its outer surface with a screw-thread as indicated at 25. By this means the tube is enabled to engage a corresponding thread formed on the inner surface of the mounting ring 21 so that the tube may be

readily put in place in the mounting assembly. Once in place, it may be easily demounted when the need arises.

By supporting the tube in the manner indicated it becomes wholly unnecessary to provide supplementary means of support at the ends of the tube. In fact, the use of additional means is undesirable since the procedure of supporting the tube exclusively at its center of gravity is the best possible protection against shocks encountered during use and especially during transportation of the apparatus in which the tube is incorporated. For this reason in the illustrated construction the screen end of the tube is not rigidly fitted into the cabinet window 12 but, on the contrary, is simply framed by a shield 28 which is of flexible material such as rubber or synthetic resin and which has no supporting function.

For the purpose of controlling the operation of the tube it is necessary to associate with it beam-focusing and beam-deflecting means. In the present instance, the focusing function is performed by a solenoidal coil 30 (see Fig. 2) which surrounds the shaft portion of the tube. The beam-deflecting function is accomplished by a magnetic deflecting yoke comprising a laminated ferro-magnetic core 33 upon which are wound suitable deflecting coils as indicated at 34. Because of the relatively great weight of the magnetic structures 30 and 33 it is undesirable that these be supported from the body of the cathode ray tube itself, although they must be accurately positioned with respect to it. These conditions are both satisfied by the use of a tubular shell 40 which is supported at one end by attachment to the mounting ring 21, as indicated at 41. This shell extends around and along the shaft portion 14 of the cathode ray tube and is preferably of such size as to conform to the outer dimensions of the coil 30 and the magnetic structure 33. By this means, these elements are provided with a rigid support which is wholly independent of the cathode ray tube itself. Moreover, since both the tube and the magnetic devices referred to are in fixed position with respect to the common mounting element 21, no difficulty is encountered in assuring their positional correlation. As a matter of fact, the arrangement described makes it quite easy to focus the electron beam on the screen end of the cathode ray tube by rotating the tube in the screw threaded support 25 until its optimum location with respect to the relatively fixed focusing coil 30 is attained. This is an operation which can be performed in the factory if desired, since the mounting structure described is adapted to permit factory installation of the cathode ray tube rather than requiring such installation to be accomplished at the time the apparatus is set up for use on the premises of the purchaser. Terminals 45 for the focusing coil 30 and further terminals 46 and 47 for the deflecting coils are brought out through openings provided for that purpose in the tubular shell 40.

It is not necessary that the screw threads employed for securing the cathode ray tube in the mounting fixture be formed directly in the glass of the tube and an alternative arrangement on this point is illustrated in Fig. 3. In this case as in that previously described, the bulbous portion of the tube (indicated in part at 50) is provided near its central region with an outwardly directed shoulder 51. However, this shoulder is of relatively smooth surface and is simply used as a base for a treated metal ring 53 which may be cemented to the shoulder in any appropriate fashion. In the use of the tube the ring 53 is to be threaded into a supporting bracket corresponding to the part 21 of Fig. 2.

A still further modification of the invention is shown in Fig. 4 wherein there is illustrated a section of the bulbous portion 60 of a cathode ray tube having an outwardly directed shoulder 61 formed on it. In this case a ring 62 having an outwardly extending flange 63 is secured by cement or otherwise to the outer surface of the shoulder 61. The flange 63 bears a number of bayonet studs 64 which are angularly displaced around the circumference of the flange. For engaging these studs and for thus supporting the cathode ray tube, there is provided a circular bracket 65 which is mounted upon standards 66 and which has associated with it a terminally flanged tubular shell 68. The flange of the shell (numbered 69) has a series of displaced openings 71 (Fig. 5) which are adapted to receive the studs 64 previously referred to. By passing the studs 64 through the larger portions of the apertures 71 and by thereafter rotating the tube to which the stud bearing flange 63 is connected, a relatively rigid assembly of the tube and mounting fixture may be obtained. Conversely, detachment of the tube and fixture is easily accomplished by reverse rotation of the tube. The shell 68 may be used as a supporting means for focusing and deflecting coils (not shown) in the manner described in connection with Fig. 2.

While the invention has been described by reference to particular embodiments thereof, it will be understood that numerous modifications may be made by those skilled in the art without departing from the invention. I, therefore, aim in the appended claims to cover all such equivalent modifications as come within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An apparatus assembly comprising a cathode ray tube which includes a stem portion and an enlarged bulbous portion, said bulbous portion being centrally deformed to provide an externally accessible shoulder formed integral with said stem portion and said bulbous portion at a region which surrounds the center of gravity of the tube, and means engaging the said shoulder for supporting the tube in the said assembly.

2. An apparatus assembly comprising a cathode ray tube which includes a bulbous portion and a relatively slender stem portion, said bulbous portion having an outwardly facing shoulder formed integral with said stem portion and said bulbous portion at a region corresponding at least approximately to the center of gravity of the tube and supporting means for the tube engaging the said shoulder, the tube being substantially unsupported in the assembly other than by the said supporting means.

3. An apparatus assembly comprising a cathode ray tube which includes a stem portion and an enlarged bulbous portion, a screw-threaded shoulder formed integral with said bulbous portion at an intermediate region thereof which corresponds at least approximately to the center of gravity of the tube, and a correspondingly threaded bracket engaging the said shoulder for supporting the tube in the assembly.

4. A cathode ray tube comprising a stem portion and an enlarged bulbous portion, an outwardly facing shoulder formed integral with said bulbous portion at an intermediate region thereof which corresponds at least approximately to

the center of gravity of the tube, and means on said shoulder for facilitating the engagement of the tube with a mounting fixture.

5. A cathode ray tube comprising a stem portion, an enlarged bulbous portion and an outwardly facing shoulder formed integral with said bulbous portion at an intermediate region thereof, said shoulder being screw-threaded to facilitate engagement of the tube with a mounting fixture.

6. An apparatus assembly comprising a cabinet structure, a cathode ray tube within the cabinet structure and comprising the combination of a shaft portion and an enlarged bulbous portion, an outwardly facing shoulder formed on said bulbous portion at an intermediate region thereof, a mounting fixture which is secured to the cabinet structure and which engages the said shoulder for supporting the tube, a tubular shell which is also supported from the said mounting fixture and which extends around and along the shaft portion of the tube, and magnetic agencies for governing the operation of the tube arranged within and supported by the said shell.

7. An assembly comprising the combination of an electrical discharge tube having an elongated stem portion, a substantially larger bulbous portion, an outwardly facing shoulder intermediate said stem and bulbous portions and formed integral with said bulbous portion, said shoulder being approximately at the center of gravity of said tube, and supporting means for the tube engaging with said shoulder.

8. An assembly comprising the combination of an electrical discharge tube which includes an elongated stem portion, an enlarged bulbous portion and an intermediate outwardly facing shoulder portion at approximately the center of gravity of said tube, supporting means for said tube externally embracing said shoulder, a tubular shell also supported by said means, and which extends around and along the said stem portion of the tube and means for governing the operation of the tube enclosed within and supported by said shell.

ANATOLE P. BEREJKOFF.