United States Patent

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[33] **Great Britain**
[31] **50762/69**

[54] **IMPLOSION-RESISTANT CATHODE-RAY TUBES**
6 Claims, No Drawings

[52] **U.S. Cl.** ..... **178/7.8,** 220/2.1 A
[51] **Int. Cl.** **H01j 29/02**
[50] **Field of Search** ..... 178/7.82, 7.8; 220/2.1 A, 2.3 A; 248/316 R

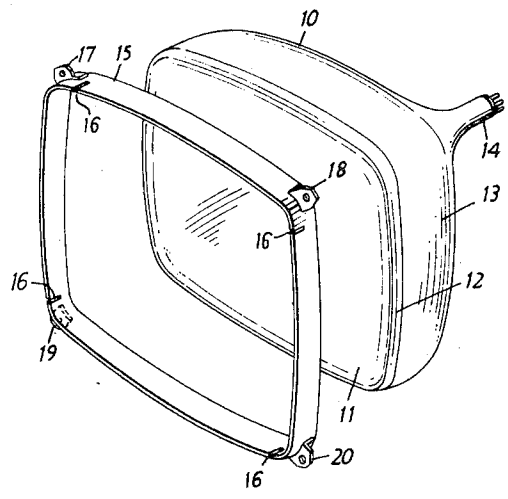
[56] **References Cited**

UNITED STATES PATENTS

3,512,234	5/1970	Bongenaar et al.	178/7.82 X
3,557,306	1/1971	Inglis	178/7.8

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ABSTRACT: An implosion-resistant cathode-ray tube includes a metal frame encircling the flange of the face plate and a tension band encircling the frame, in which a plurality of spaced-apart slots are formed in the front portion of the frame with one end of each slot opening at the front edge of the frame.



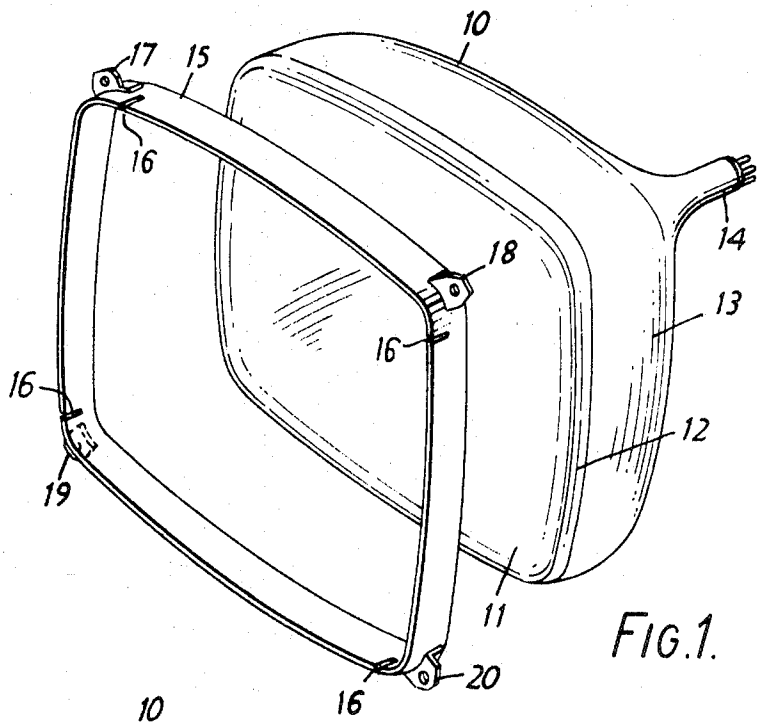


FIG. 1.

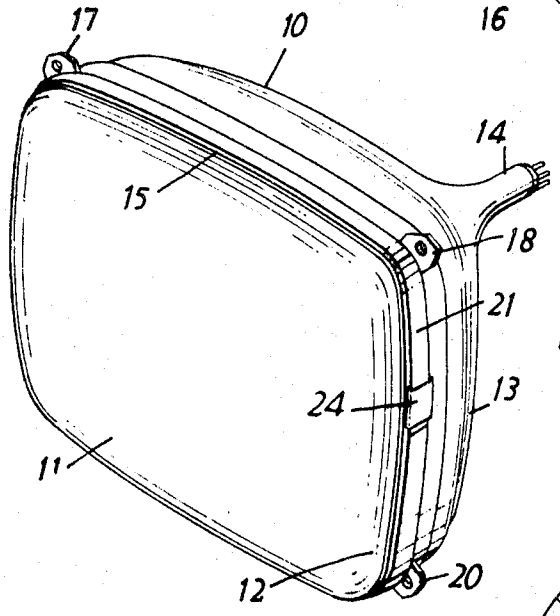


FIG. 2.

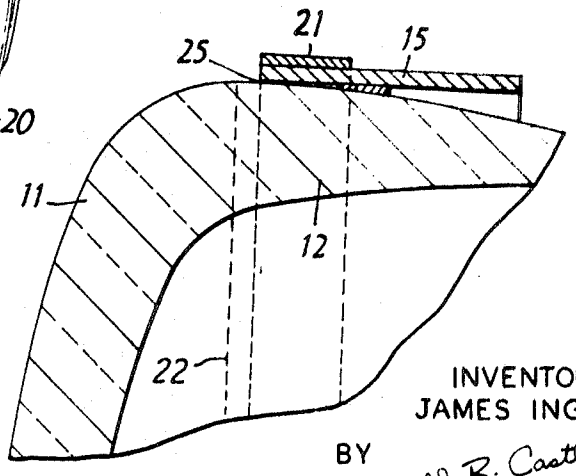


FIG. 3.

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IMPLOSION-RESISTANT CATHODE-RAY TUBES

BACKGROUND OF THE INVENTION

This invention relates to implosion-resistant cathode-ray tubes.

A known implosion-resistant cathode-ray tube includes a metal structure surrounding the tube envelope, which structure includes a discontinuous frame surrounded by a tension band.

OBJECTS AND SUMMARY OF THE INVENTION

An object of this invention is to provide a cathode-ray tube having improved implosion resistance.

Another object of this invention is to provide a cathode-ray tube with a continuous encircling frame having increased transmission of the tension in the tension band into the tube face.

Another object of the invention is to provide a cathode-ray tube in which the frame is allowed to collapse into intimate contact with the tube irrespective of the variation in tube/frame peripheral dimensions to give increased consistency of compression.

Another object of the invention is to provide a cathode-ray tube having increased "push-through" capability for television receiver presentation.

Another object of the invention is to provide a cathode-ray tube in which the amount of adhesive or filler which squeezes forwardly of the frame on application of the tension band during manufacture is reduced.

The foregoing objects are achieved in one aspect of the invention by providing a cathode-ray tube including a glass envelope having a glass faceplate with a rearwardly extending flange. The flange is jointed at its periphery to a flared glass portion terminating in a neck which houses an electron gun or guns. A metal frame encircles and is bonded to the flange, and a tension band encircles the front portion of the frame. In accordance with the invention the front portion of the frame is formed with slots which are open towards the front of the frame.

Conveniently the frame and tension band are formed of steel, and the front portion of the frame is bonded to the flange by means of a synthetic resin.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a cathode-ray tube and a frame ready for fitting thereto;

FIG. 2 shows the cathode-ray tube of FIG. 1 with a frame and a tension band in place; and

FIG. 3 is a cross section through part of the tube of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following specification and appended claims in connection with the aforedescribed drawings.

One embodiment of the invention, a glass cathode-ray tube envelope **10** as shown in FIG. 1, has a faceplate **11** with a rearwardly extending flange **12**. A flared portion **13** of the envelope **10** is sealed to the periphery of the flange **12** and terminates in a neck **14** which houses an electron gun or guns.

With the aim of preventing implosion of the tube or substantially reducing the severity of an implosion an encircling metal frame **15** formed of steel strip is provided. The frame **15** is shown in FIG. 1 separated from the tube and ready for fixing around the flange **12**. Conveniently the frame **15** may be formed of two U-shaped strips. Unlike some proposals which employ two U-shaped strips which are not connected to each other, so as to allow the strips to be pressed firmly against the flange, the strips in this instance are welded together at their ends to form the continuous generally rectangular frame having an internal periphery which is substantially the same as the periphery of the flange **12**.

The frame **15** has four apertured lugs **17** to **20** for use in mounting the tube in a container such as the cabinet of a television receiver.

The front edge of the frame **15** has a number of open narrow slots **16** cut in it. In the tube illustrated, there are four such slots, one in each side of the frame adjacent the corners of the frame. The depth of the slots for a conventional television tube is conveniently of the order of five-eighths to three-quarters of an inch.

Before fitting to the flange **12**, an adhesive **25** (FIG. 3) such as an epoxy resin is applied to the inside of the frame **15** near the front edge. The frame **15** is then placed over the flange **12** of the tube **10** and positioned at a predetermined location relative to the front of the tube, which, in the example shown, is just behind the mold match line **22**, being the line formed at the join of the two halves of the mold used in making the faceplate **11**. A high-tensile steel tension band **21** (FIGS. **2** and **3**) is then positioned around the front portion of the frame **15** such that the front edges of the frame **15** and tension band **21** are substantially adjacent, as shown in FIG. **3**. The width of the tension band is approximately equal to the depth of the slots **16**. The tension band **21** is tensioned to a suitable predetermined value and a clip **24** is crimped around the band to hold the tension, the assembly being then as shown in FIG. **2**.

The effect of tensioning the band **21** is to apply a compressive stress to the frame which yields slightly due to the slots **16** closing slightly. This provides a good transmission of the tension from the tension band into the tube, and also aids consistency of compression, allowing the front portion of the frame to collapse into contact with the tube despite the variation in the peripheral dimensions of the frame **15** and flange **12**. Additionally, the amount of resin which squeezes forward on the application of the tension band, and subsequently, is minimized by having the slots **16** in the frame and by the method of assembly.

While there have been shown and described what are at present considered the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as defined by the appended claims.

I claim:

1. A cathode-ray tube comprising:

a glass envelope having a glass faceplate with a rearwardly extending flange and a flared glass portion joined to the periphery of said flange and terminating in a neck for housing at least one electron gun;

a metal frame encircling said flange, the front portion of said frame being formed with slots open towards the front of said frame and being bonded to said flange; and

a tension band encircling said front portion of said frame.

2. A cathode-ray tube according to claim **1**, wherein said frame and said tension band are formed of steel.

3. A cathode-ray tube according to claim **1**, wherein said front portion of said frame is bonded to said flange by means of a synthetic resin.

4. A cathode-ray tube according to claim **1**, wherein said faceplate is generally rectangular, and wherein there are at least four slots in said frame, with at least one slot being in each side of said frame adjacent the corners of said frame.

5. A cathode-ray tube according to claim **4**, wherein said frame is continuous and is formed of two U-shaped strips joined together at their ends.

6. A cathode-ray tube according to claim **5**, wherein said frame and said tension band are formed of steel, said front portion of said frame being bonded to said flange by means of a synthetic resin, and wherein the front edge of said frame lies behind the mold match line of the tube.

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