March 4, 1958 H. F. CHARLOTTE 2,825,184

METHOD OF MAKING CATHODE RAY TUBE SCREEN

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Fig. 1.

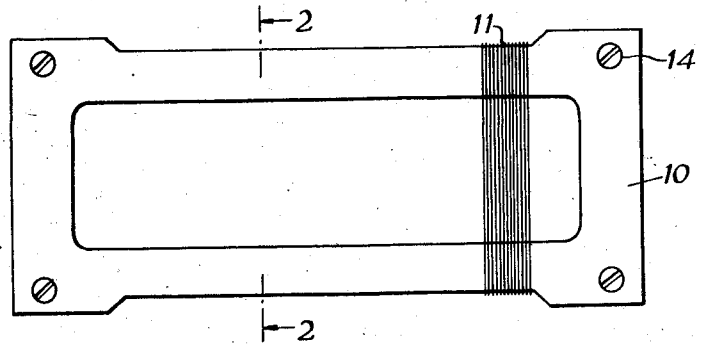



Fig. 2.

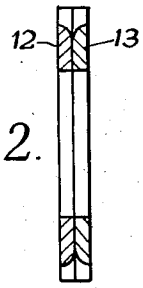



Fig. 3.

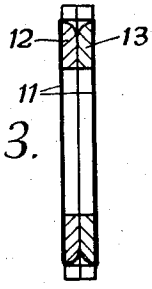



Fig. 4.

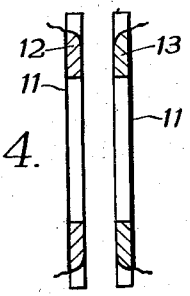
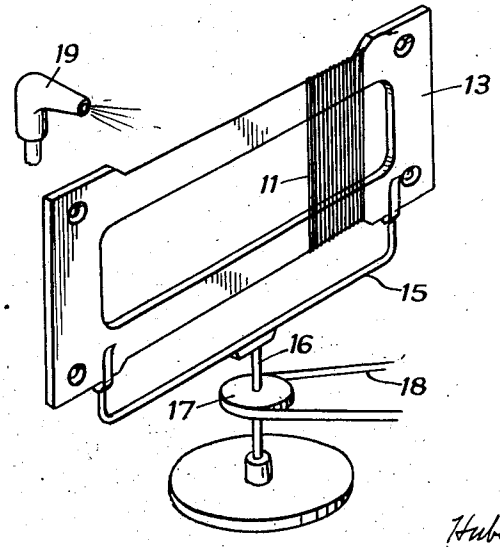



Fig. 5.




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Fig. 6.

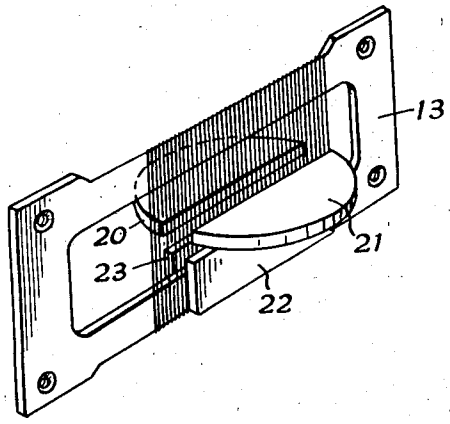



Fig. 7.

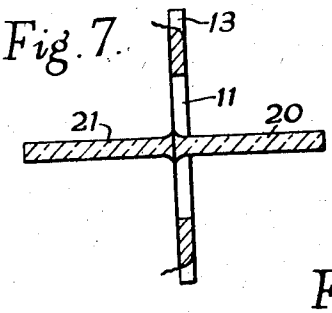



Fig. 8.

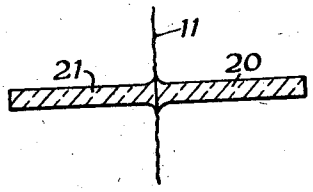



Fig. 9.

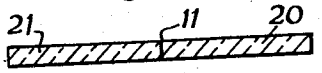
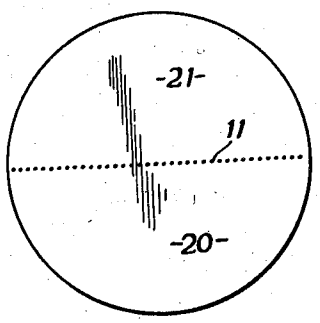



Fig. 10.




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# METHOD OF MAKING CATHODE RAY TUBE SCREEN

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Application December 28, 1956, Serial No. 631,268
2 Claims. (Cl. 49—81)

The present invention relates to cathode ray tube screens.

A requirement sometimes arises for a cathode ray tube having a screw which incorporates a row of conductors insulated from one another, each conductor passing from one face of the screen to the other face.

It is an object of the present invention to provide a method of producing such a screen.

According to the present invention a method of producing a cathode ray tube screen which incorporates a row of conductors insulated from one another and each passing from one face of the screen to the other face, comprises the steps of coating a grid of wires with finely powdered glass, bringing two glass members together edge-to-edge on opposite sides of the grid, applying heat to fuse the said edges of the two glass members and the powdered glass on the grid, and subsequently removing those parts of the grid which lie outside the screen so formed.

The grid may be produced by winding wire round a former comprising a pair of like rectangular frames held together in register with one another. The wire is soldered to the frames along the longer edges of their outer faces and is cut between the resulting twin lines of solder. The frames are then separated to produce two grids, each of which may be used to produce a screen.

The coating of the grids with finely powdered glass may be achieved by spraying the grid with a suspension of powdered glass in distilled water or other medium and drying, the particle size of the powdered glass being not more than a few microns.

After fusion, the screen is annealed and the frame removed by cutting the grid. The surfaces of the screen are ground flat and polished. It is then ready for sealing into a cathode ray tube envelope.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which

Fig. 1 is an elevation of a frame with wire wound thereon,

Fig. 2 is a cross-section of the frame of Fig. 1 taken along the line 2—2,

Fig. 3 is a cross-section corresponding to Fig. 2 with wire wound thereon,

Fig. 4 is a cross-section of the frame and winding of Fig. 2 split into two parts to form two grids,

Fig. 5 shows one of the grids of Fig. 5 being sprayed with a suspension of powdered glass,

Fig. 6 shows two pieces of glass being fused to the sprayed grid of Fig. 5,

Fig. 7 is a cross-section showing the grid of Fig. 6 fused to the two pieces of glass,

Fig. 8 corresponds to Fig. 7 with the grid frame removed,

Fig. 9 corresponds to Fig. 8 after grinding, and

Fig. 10 is a plan view of the finished product shown in cross-section in Fig. 9.

In Fig. 1 a rectangular frame **10** has 1,000 turns of fine wire **11** wound thereon as shown.

A cross-section of the frame **10** is shown in Figure 2 and comprises two parts **12** and **13** which are held together by means of the screws shown at **14** in Fig. 1.

Fig. 3 shows the winding in position, and it will be seen that the upper edge of each part and the corresponding lower edge are bevelled so that the wire in passing over the top and bottom of the frame is clear of the metal of the frame except at the two outer edges.

The wire is fixed, for example by soldering, to each of these four edges of the frame and subsequently the wire is cut between each pair of soldered edges and the frame parts are separated as shown in Fig. 4 to provide two grids, each grid having 1,000 wires. The wire for example may be of "Kovar" lightly oxidised and the diameter of the wire may be such that 1,000 turns can be accommodated within a length of 10 cms., each turn being spaced from the other.

The assembly of one grid from Fig. 4 is mounted in a suitable rotatable holder such as that shown at **15** in Fig. 5, the holder being mounted on a spindle **16** and rotated by means of a pulley **17** and a belt **18** coupled to a driving motor not shown. With the drive applied so as to rotate the frame **13** at slow speed, for example one revolution every few seconds, a suspension of finely powdered glass is sprayed on to the grid wires by means of a spray **19**. The glass particle size is of the order of one or two microns and the glass particles are suspended in distilled water.

Spraying is continued for a time adequate to ensure that the grid wires are completely coated with the suspension of powdered glass. This is then dried, leaving dry glass particles clinging to the grid wires.

Referring now to Fig. 6, this shows the grid arranged so as to receive two glass half-discs **20** and **21**. These are preheated in a suitable pre-heating furnace, not shown, and brought towards the wires of the grid from opposite sides. Two line heaters **22** and **23** are arranged below the line junction and heat is applied along the junction of the two half-discs with the grid wires to fuse the glass at the junction on the grid wires and in the half-discs themselves to provide a seal as shown in the cross-section of Fig. 7. The frame **13** is then removed by cutting the grid wires as shown in Fig. 8 and the excess glass and grid wires are ground off to provide the finished product of Fig. 9 and Fig. 10.

The temperature to which the glass half-discs is raised by the pre-heating is approximately 600° C. and the line heaters may conveniently be of the type providing a strip flame. The disc may then be sealed into a metal or glass cathode ray tube envelope and the tube may then be subjected to the normal processes of cathode ray tube production. Annealing of the screen may be effected before or after the grinding operation, or both.

I claim:

1. A method of producing a cathode ray tube screen incorporating a row of conductors insulated from one another and each passing from one face of the screen to the other, the method comprising the steps of coating a grid of wires with finely powdered glass, bringing two glass members together edge-to-edge on opposite sides of the grid, applying heat to fuse the said edges of the two glass members and the powdered glass on the grid, and subsequently removing those parts of the grid which lie outside the screen so formed.

2. A method according to claim 1, wherein the grid is coated by spraying with a suspension of glass particles in a liquid medium and subsequently evaporating off the medium.

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