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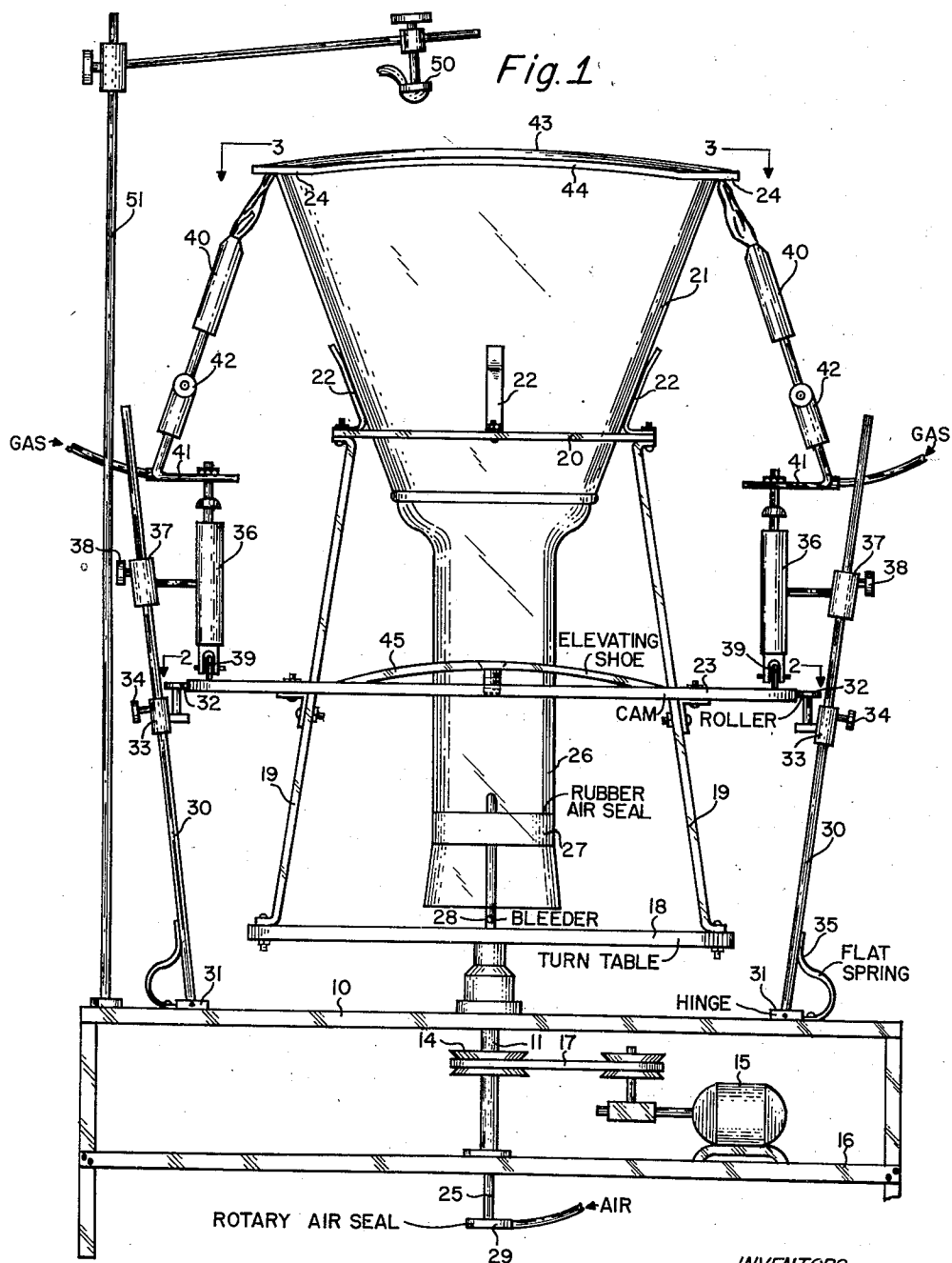
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SEALING APPARATUS FOR CATHODE-RAY TUBES

Filed Nov. 30, 1950

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

Fig. 2

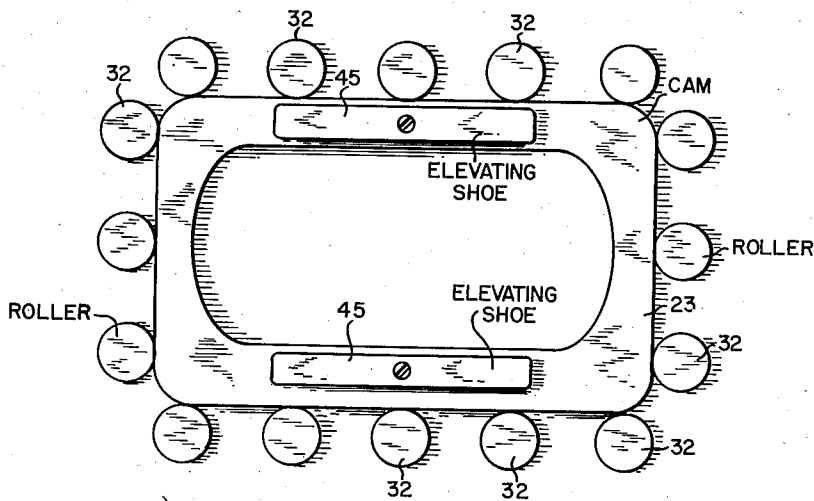
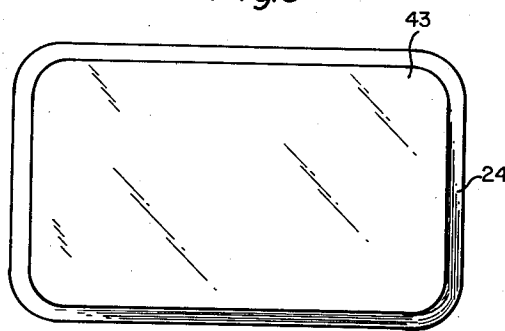


Fig. 3



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SEALING APPARATUS FOR CATHODE-
RAY TUBES

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6 Claims. (Cl. 49-1)

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This invention relates to improved apparatus for the fabrication of cathode-ray tubes of the type having an envelope comprising a neck portion of vitreous material such as glass or the like, a hollow flared or generally conical portion, and a window or viewing plate of glass or similar transparent material. More particularly, this invention is directed to improved apparatus for sealing the glass viewing plate to the conical portion of a cathode-ray tube in which these portions have a rectangular or other non-circular cross section.

In many cathode-ray tubes the conical portion of the envelope is composed of metal and is usually provided with a flange or lip at one end in which the glass window or face plate is fitted for sealing purposes. To obtain a satisfactory seal, it is preferable that the metallic cone be held with its axis in a vertical position and the window be placed on its upper end in contact with the flange. Gas burners may then be directed to the under portion of the flange and the assembly rotated about its axis for uniformity of heating. The heat from the burners causes the glass of the window to soften and settle in the flange, sealing the window to the metallic portion.

Heretofore in the art it has been usual that cathode-ray tube envelopes be composed of a tubular neck portion, a hollow conical portion of circular section and a circular face plate. As previously stated, the face plate may be sealed to the conical portion by placing the cone in a suitable apparatus with its large end upward and the face plate resting thereon. An array of sealing elements may be positioned to surround the conical portion and directed to its upper end. Relative rotation may then be imparted between the burners and the conical portion for uniform heating.

The advent of rectangular-screen cathode-ray tubes for use in television receivers has presented a serious sealing problem. That is, it has become necessary to provide apparatus by means of which heat may be applied uniformly to the sealing surface between the cone and face plate portions of a cathode-ray tube envelope when the sections of these portions are not circular. As long as these sections are circular, uniform heating may be obtained simply by arranging the sealing elements in an array surrounding the cone and effecting relative rotation between the cone and the sealing elements, as described above.

The present invention provides improved apparatus for effecting an efficient seal between the

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viewing-plate portion and hollow envelope portion of a cathode-ray tube when these portions have a non-circular section, and renders feasible the production of rectangular-screen cathode-ray tubes especially of the metallic type. The apparatus comprises a supporting table with a structure mounted on the table for supporting the hollow envelope portion which may be of generally conical shape with a flange formed at its large end. The cone is supported in the aforementioned structure with its flanged end upward and with the viewing plate resting thereon. An array of heating elements is movably supported by the table around the cone and directed to the flanged end. A cam member having a configuration corresponding to that of the flanged end is mounted on the supporting structure in coaxial relation with the cone, and the cone is supported so that the plane of the flanged end is parallel to the plane of the cam. Resilient means are provided for biasing the heating elements into engagement with the cam to conform the pattern of the array to the peripheral configuration of the flanged end. Finally, the apparatus includes a driving means for imparting relative rotational motion between the cam and the array of heating elements.

It is, accordingly, an object of this invention to provide improved apparatus for sealing the viewing-plate of a cathode-ray tube to a hollow envelope portion of the tube.

A more particular object of the invention is to provide improved apparatus for sealing the viewing plate of a cathode-ray tube to the flanged end of a hollow metallic envelope portion, the flanged end having a rectangular or other non-circular configuration.

The features of this invention which are believed to be new are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof may best be understood by reference to the following description when taken in conjunction with the accompanying drawings, in which:

Figure 1 shows one embodiment of the improved sealing apparatus of the invention,

Figure 2 shows a view of the apparatus of Figure 1 taken along the lines 2-2 of Figure 1, and,

Figure 3 shows a view of the window or viewing plate of the cathode-ray tube taken along the lines 3-3 of Figure 1.

The apparatus of Figure 1 includes a supporting means or table 10 having an upwardly-extending tubular driving member 11 rotatably

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mounted thereon. An electrical motor 15 is mounted on a shelf 16 of the supporting table and is mechanically coupled by a belt drive 17 to a driving wheel 14 which is secured to tubular member 11.

Driving member 11 has a turn-table 18 affixed to its upper end so that energization of motor 15 causes the turn table to rotate. Turn table 18 supports a plurality of upwardly-extending brackets 19 which support a cross-bracket 20, the cross-bracket 20 serving as a mounting means for the conical portion 21 of a cathode-ray tube envelope. Cone 21 rests in bracket 20 and is held in place by means of brackets 22, so that rotation of the turn table causes rotation of the cone. Brackets 19 additionally support a cam member 23 having a peripheral configuration corresponding to the configuration of the flanged end 24 of cone 21. Cone 21 is supported in coaxial relation with cam 23 and with the plane of its flanged end 24 parallel to the plane of the cam.

The apparatus also includes an air tube 25 mounted coaxially within tubular driving member 11 in frictional engagement therewith and extending upwardly through turn-table 18 and into the neck portion 26 of the cathode-ray tube envelope, the neck portion having been sealed to the lower extremity of metallic portion 21 in a previous sealing operation. Air tube 25 extends into neck portion 26 through a rubber air seal 27 and has a small aperture 28 formed therein which acts as a bleeder. Air is introduced into the air tube through a rotary air seal 29 of well-known construction.

A plurality of upwardly extending rods 30 are movably mounted on supporting table 10 by means of pivot members 31. Only two such rods are shown in the drawing for purposes of simplicity, but it is to be understood that a number of these rods are mounted on supporting table 10 surrounding cone 21. Rods 30 each have a roller 32 supported thereby for engagement with the periphery of cam 23, the axial position of the roller being adjustable on each rod by means of a sliding collar 33 and adjusting screw 34. The rods 30 are biased inwardly by means of flat springs 35 to bring rollers 32 into engagement with the cam periphery. Should it be found that insufficient tension is obtained by the flat springs, a coil spring may be mounted on the rods to encircle them and urge rollers 32 into firm engagement with the periphery of cam 23.

Each of the rods 30 supports a cylinder and piston assembly 36, the cylinder portion of the assembly being secured to the rod by means of a slidable collar 37 and adjusting screw 38. The piston portion of the assembly is spring-urged downwardly so that a roller 39, mounted at the lower end of the piston, engages the upper surface of cam 23. The upper end of the piston supports a burner 40 which is secured thereto by means of an L-shaped bracket 41. The burner is mounted on a pivot 42 which frictionally holds the burner in any desired radial position. Bracket 41 is slotted to allow lateral adjustment of the position of the burner.

To perform the sealing operation, cone 21 and neck portion 26 of the cathode-ray tube are placed in bracket 20, as shown, and a viewing plate 43 is placed on flanged end 24 of the cone. Rubber air seal 27 is then inserted into the neck portion, as shown. Electric motor 15 is energized to rotate turn table 18 and, therefore, the cathode-ray tube assembly. Burners 40 are ignited

and directed to the underside of flanged end 24 of the cone. Rotation of the turn table causes cam 23 to rotate which, in turn, causes the burners to follow the contour of the flanged end. Air is introduced through air tube 25 into the interior of the tube to prevent the edge of viewing plate 43 from sagging during the sealing operation. The aperture 28 in the air tube allows some of this air to escape and avoids excessive pressure in the interior of the cathode-ray tube envelope.

It is sometimes desirable that viewing plate 43 be heated prior to the sealing process to prevent cracking. This may be accomplished by the provision of a burner 50 adjustably supported by a rod 51 for directing a soft flame to the top of the viewing plate.

In some instances flanged end 24 of the cone may have an irregular elevational configuration, for example, it may be curved upwardly as shown at 44. Accordingly, it is desirable that burners 40 may also be elevated so that they may follow curve 44 and provide uniform heating of the flanged end. This is accomplished by the provision of elevating shoes, such as 45, on the surface of cam 23. These shoes have a curvature corresponding to curvature 44 of the flanged end and the rollers 39 ride along the elevating shoe and thus enable the burners 40 to follow the curvature.

Figure 2 shows one configuration of cam 23 which may be used when it is desired to seal a rectangular face plate to a generally conical envelope portion of rectangular section. The cam has a pair of elevating shoes 45 mounted thereon to perform the afore-described elevating function. The plurality of rollers 32 engage the peripheral surface of cam 23 and are mounted on a corresponding plurality of upwardly extending rods 30, as shown in Figure 1.

Figure 3 represents a top view of the rectangular cathode-ray tube envelope with the viewing plate 43 mounted on flanged end 24 of the conical portion.

This invention provides, therefore, improved apparatus for sealing the viewing plate of a cathode-ray tube envelope to a hollow envelope portion of generally conical configuration having a flanged end with a given configuration. It is apparent that the apparatus may be used to perform its sealing function on envelopes having any given cross sectional configuration, it being merely necessary that cam 23 have a corresponding configuration. Regardless of the configuration of the flanged end of metallic portion 21, the burners are caused to follow its contour and provide uniform heating around its periphery so that a satisfactory seal may be obtained. Moreover, when so desired, the apparatus is readily adaptable for sealing the viewing plate to the conical portion of a cathode-ray tube envelope of well-known circular section, it being merely necessary to provide cam 23 with a corresponding circular section.

While a particular embodiment of the invention has been shown and described, modifications may be made, and it is intended in the appended claims to cover all such modifications as may fall within the true spirit and scope of the invention.

We claim:

1. Apparatus for sealing the viewing plate of a cathode-ray tube to a hollow envelope portion having a flanged end of a given configuration comprising: a structure for supporting said en-

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velope portion with its flanged end upward to receive said viewing plate; an array of heating elements movably supported by said structure around said envelope portion and directed toward said flanged end; a cam positioned within said array and having a configuration corresponding to that of said flanged end; means for biasing said heating elements into engagement with said cam to conform the pattern of said array to the configuration of said flanged end; and means for effecting relative rotation between said array of heating elements and said cam.

2. Apparatus for sealing the viewing plate of a cathode-ray tube to a hollow envelope portion having a flanged end of a given configuration comprising: a supporting means; a structure rotatably mounted on said supporting means for supporting said envelope portion with its flanged end upward to receive said viewing plate; a driving mechanism coupled to said structure for imparting rotational motion thereto; an array of heating elements pivotally mounted on said supporting means around said envelope portion and directed toward said flanged end; a cam positioned on said structure within said array and having a configuration corresponding to that of said flanged end; and means for biasing said heating elements into engagement with said cam to conform the pattern of said array to the configuration of said flanged end.

3. Apparatus for sealing the viewing plate of a cathode-ray tube to a hollow envelope portion having a flanged end of a given configuration comprising: a supporting means; a structure rotatably mounted on said supporting means for supporting said envelope portion with its flanged end upward to receive said viewing plate; a driving mechanism coupled to said structure for imparting rotational motion thereto; an array of heating elements pivotally mounted on said supporting means around said envelope portion and directed toward said flanged end; a cam positioned on said structure within said array in coaxial relation with said envelope portion in a plane parallel to the plane of said flanged end, and having a configuration corresponding to that of said flanged end; and means for biasing said heating elements into engagement with said cam to conform the pattern of said array to the configuration of said flanged end.

4. Apparatus for sealing the viewing plate of a cathode-ray tube to a hollow envelope portion having a flanged end of a given configuration comprising: a supporting means; a structure rotatably mounted on said supporting means for supporting said envelope portion with its flanged end upward to receive said viewing plate; a driving mechanism coupled to said structure for imparting rotational motion thereto; an array of support rods pivotally mounted on said supporting means around said envelope portion; a cam positioned on said structure within said array in coaxial relation with said envelope portion in a plane parallel to the plane of said flanged end, and having a configuration corresponding to

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that of said flanged end; a corresponding array of cam-engaging members respectively supported by said rods; resilient means for biasing said rods to bring said cam-engaging members into engagement with said cam; and a plurality of heating elements respectively supported by said rods and directed toward said flanged end.

5. Apparatus for sealing the viewing plate of a cathode-ray tube to a hollow envelope portion having a flanged end of a given configuration comprising: a supporting table; an upwardly-extending tubular member rotatably mounted on said table; a structure affixed to said tubular member for supporting said envelope portion with its flanged end upward to receive said viewing plate; a driving mechanism coupled to said tubular member for imparting rotational motion thereto; an array of upwardly-extending support rods pivotally mounted on said table around said envelope portion; a cam positioned on said structure within said array in coaxial relation with said envelope portion in a plane parallel to the plane of said flanged end, and having a configuration corresponding to that of said flanged end; a corresponding array of roller members respectively supported by said rods; resilient means for biasing said rods inwardly to bring said roller members into engagement with said cam; and a plurality of heating elements respectively supported by said rods and directed toward said flanged end.

6. Apparatus for sealing the viewing plate of a cathode-ray tube to a hollow envelope portion having a flanged end of a given sectional configuration and of a given elevational configuration, said apparatus comprising: a supporting table; an upwardly-extending tubular member rotatably mounted on said table; a structure affixed to said tubular member for supporting said envelope portion with its flanged end upward to receive said viewing plate; a driving mechanism coupled to said tubular member for imparting rotational motion thereto; an array of upwardly-extending support rods pivotally mounted on said table around said envelope portion; a cam positioned on said structure within said array in coaxial relation with said envelope portion in a plane parallel to the plane of said flanged end, said cam having a peripheral configuration corresponding to the sectional configuration of said flanged end and an elevational configuration corresponding to the elevational configuration of said flanged end; a corresponding array of roller members respectively supported by said rods; resilient means for biasing said rods inwardly to bring said roller members into engagement with the periphery of said cam; a plurality of heating elements reciprocally supported by said rods and directed toward said flanged end; and resilient means for urging said heating elements downwardly against the top surface of said cam.

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No references cited.