Jan. 27, 1970 W. KORNAKER 3,492,146

METHOD AND APPARATUS FOR APPLYING GLASS TO EDGE OF TELEVISION TUBE

Filed Dec. 3, 1965 2 Sheets-Sheet 1

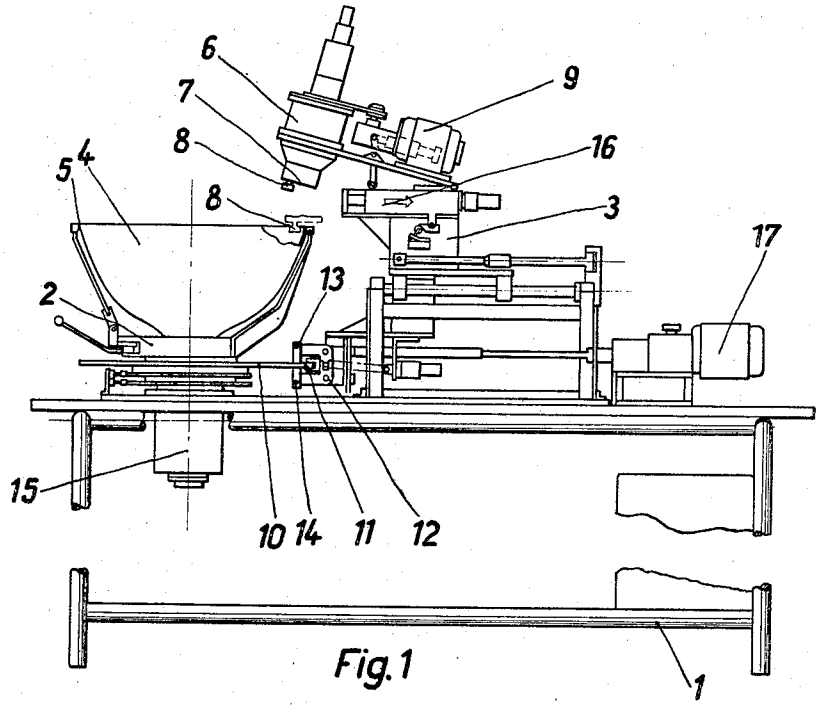


Fig. 1

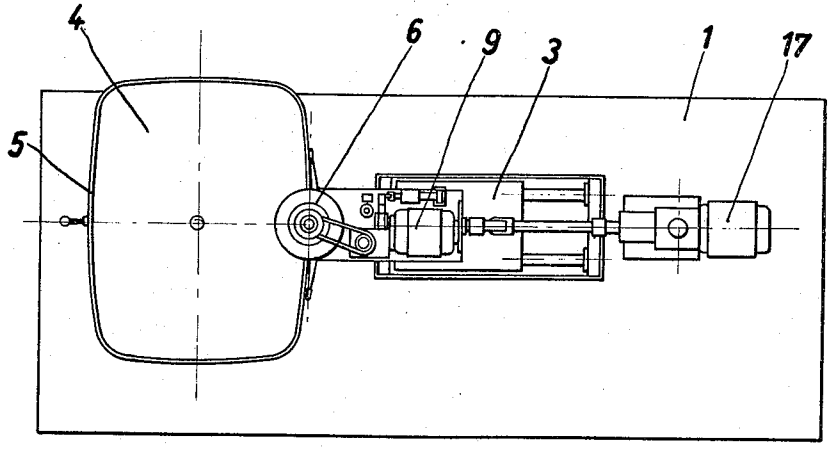


Fig. 2

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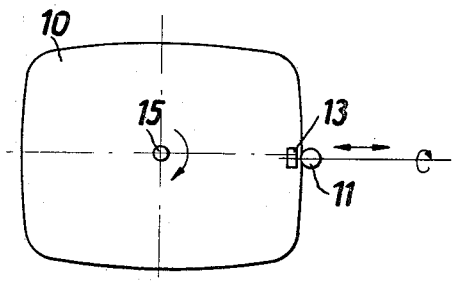


Fig.3

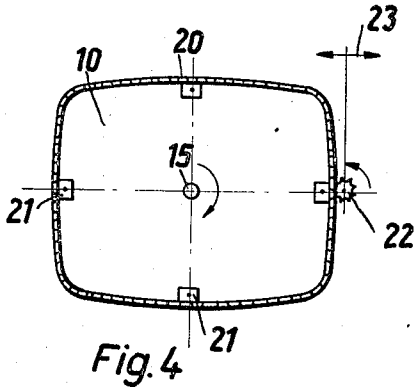


Fig.4

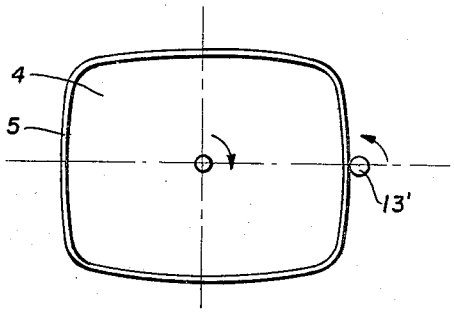


Fig. 5

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METHOD AND APPARATUS FOR APPLYING GLASS TO EDGE OF TELEVISION TUBE

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Int. Cl. C23d 5/60; B05c 5/00; B05b 13/02
U.S. Cl. 117—43 11 Claims

ABSTRACT OF THE DISCLOSURE

Method and apparatus for applying a glass connecting mass in the form of a continuous layer onto a connection surface of a picture tube screen. The glass connecting mass flows onto such surface from an outlet opening of a container. Such opening is arranged over the connection surface, which, itself, is carried by a turntable. Means are provided for rotating the turnable at such a speed that the relative speed, between the outlet opening and the portion of the picture tube connection surface positioned therebelow, is approximately constant.

The present invention relates to a method and apparatus for the application of a glass-connecting mass to the connection surface of a non-circular screen or envelope portion of a picture tube which is carried by a rotated turntable in such a way that the connection surface is facing upwardly, and more particularly, to a method and apparatus, wherein the glass-connecting mass flows continuously onto the connection surface from an outlet opening of a container, which opening is arranged vertically over a portion of the connection surface and which mass forms a continuous layer on this surface.

For certain types of cathode ray tubes, such as color picture tubes, it is necessary, to provide an electrode in front of the luminescent screen within the tube, which electrode has approximately the same size surface as the luminscent screen.

In this case it is necessary, to connect the principal parts of the vacuum envelope of such tube, i.e., the tube envelope with the tube neck and the front plate with the luminscent screen with each other, in a vacuum-tight manner subsequent to the installation of the electrode. The envelope parts of the tube conventionally comprise glass, so that a connection between two glass parts is necessary. For this purpose, one or both of the connection surfaces of the tube envelope parts that have to be connected to each other are covered with a so-called glass frit. The two parts are then placed on top of each other with the two connection surfaces facing each other, and subjected to a thermal process, in which a conversion of the glass frit produces the vacuum-tight connection between the two parts of the tube.

For the production of large quantities of such tubes it is advantageous to use a machine for the application of the glass frit onto the connection surface of the tube portion or portions and such a machine is known. In this machine, the corresponding envelope portion having the connection surface, is carried by a turntable with the connection surface facing upwardly. The container with the glass frit is mounted on a carriage so that the outlet opening of the container is positioned over the connection surface of the picture tube portion. Means are provided to guide the container by means of the carriage during the rotation of the turntable in such a way, that the outlet opening of the container is always vertically positioned with respect to the connection surface. In this prior art

machine there is further provided means for controlling the amount of glass frit that flows out of the outlet opening of the container in order to ensure that the layer of glass frit applied to the connection surface has an approximately uniform thickness, which uniformity is critical in the case of tubes in which the cross section of the picture tube envelope is other than circular.

Although such prior art devices have served the purpose, they have not proved entirely satisfactory in that when using such devices an even layer of glass frit can only be produced with many difficulties, because the controlling of the flow of the glass frit depends very much on the consistency of the generally paste-like glass frit.

It is therefore an object of the present invention to provide a new method and an improved device of the type described above for permitting a more even application of the layer of glass frit onto the connection surface of the picture tube portion.

Accordingly, the objects of the present invention are obtained by providing means for influencing the rotational speed of the turntable in such a way that the relative speed between the outlet opening for the glass frit container and the connection surface, which is positioned below it, is substantially constant.

Additional objects and advantages of the present invention will become apparent upon consideration of the following description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a lateral view of a device according to the invention.

FIGURE 2 is a plan of the device of FIGURE 1.

FIGURE 3 is a schematic view of a drive means for the turntable according to the invention.

FIGURE 4 is a schematic view of a preferred further embodiment of the drive means for the turntable according to the present invention.

FIGURE 5 is a schematic plan view of another embodiment of the drive means for the turntable.

Referring now to the drawings, there is shown in FIGURE 1 a frame **1** having a turntable **2** and a carriage **3** arranged thereon. The turntable **2** is rotatable about a vertical axis **15** and is designed in such a way that a picture tube portion which in the present case is the envelope portion **4** of the tube, can be mounted thereon so that the connection surface **5**, which has to be covered with glass frit, faces upwardly.

On the carriage **3**, there is provided a container **6** for the glass frit having an outlet opening **7** at its lower end. The outlet opening **7** is always positioned vertically with respect to the connection surface **5** of the tube envelope **4** during the rotation of the turntable **2**, The carriage **3** is slidably arranged with respect to the frame **1**. A motor **9** serves for driving a mixer within the container **6** in order to provide for a more uniform mixture.

In order to ensure a flow of a constant amount of glass frit from the outlet opening **7** to form a layer having even thickness on the connection surface **5** of the non-circular picture tube portion **4**, the present invention provides means which control the speed of rotation of the turntable **2** in dependency upon the shape of the picture tube portion.

In the represented embodiments of the invention, these control means include a disk-shaped cam plate **10** which is fastened to the turntable **2**. The cam plate **10** has a shape which corresponds to the shape of the tube portion, i.e., to the circumferential shape of the connection surface **5** of the tube portion as exactly as possible.

According to the embodiment shown in FIGURES 1 and 3, a follower roller **11** rolls along the circumferential edge of the cam disk **10** in such a way, that the drive unit **12** is closer or further away from the vertical axis of rotation of the turntable depending upon the position of the

turntable and thereby also of the cam disk **10**. The drive unit **12** is further provided with a friction wheel **13** and a friction wheel **14**, which wheels contact the planar surface of the cam disk **10**. Due to the friction wheel **13** being driven by a motor **17** at a constant rotational speed, the turntable **2** is rotated. The angular speed of the turntable **2** is, however, not constant, because the friction wheel **13** changes its distance from the vertical axis of rotation **15** of the turntable continually due to the follower roller **11**, but the peripheral speed of the cam disk **10** is constant since the wheel **13** is always driving the cam **10** at the periphery thereof.

If the circumferential shape of the cam disk **10** corresponds to at least a reduced or magnified scale versions of the circumferential shape of the connection surfaces **5**, the movement of the connection surface **5** under the outlet opening **7** of the container **6** will always be maintained at a constant speed. If the amount of glass frit applied to the connection surface **5** is constant per unit of time, the layer of glass frit will have a uniform thickness.

According to a further development of the present invention the cam disk **10**, together with the follower roller **11**, further serve for moving the carriage **3** in such manner so as to position the outlet opening **7** of the container **6** approximately vertically with respect to the connection surface **5** of the tube portion **4** in every rotational position of the turntable **2**. For this purpose, the carriage **3** is mechanically connected, preferably by a rigid connection with the drive unit. The fine adjusting of the outlet opening **7** with respect to the connection surface **5** is achieved by means of a guide roller **8** provided on the container. The container **6** is preferably not rigidly fastened to the carriage **3** but is connected to the carriage **3** by means of a sliding mechanism **16**, which permits a slight displacement of the container **6** on the carriage **3**. The slight displacement of the container **6** on the carriage **3** is used to compensate for the unavoidable deviations of the connection surface **5** of the tube portion **4** with respect to the ideal shape represented by the cam disk. In order to be able to exchange the tube portion **4**, the container **6** is furthermore pivotably secured to the sliding device **16** as shown in FIGURE 1.

FIGURE 4 shows another embodiment of a drive means for the turntable according to the present invention which is well suited for ths purpose. Instead of the friction drive having the friction rollers **13** and **14** and the follower roller **11** shown in FIGURES 1 and 3, a toothwheel drive is provided in which the cam disk **10** is toothed at its circumference and as in FIGURE 3 is arranged on the axis **15** of the turntable **2**. The toothing preferably comprises a chain **20**, which is connected to the cam disk **10**, by any suitable means such as clips **21**. A sprocket wheel **22** is driven by a motor and engages the chain **20**, and thereby rotates the cam disk **10**. As has already been stated in connection with FIGURES 1 to 3, the sprocket wheel **22** is connected to a carriage by means of its drive, which carriage also carries the container **6** and which is arranged so as to be slidable in the direction of the double arrow **23**. The distance between the axis **15** of the turntable and the axis of the chain wheel **22** changes continuously due to the engagement of the sprocket wheel **22** with the chain **20** at the circumference of the cam disk **10**. Thus, the sprocket wheel **22** replaces in an advantageous manner the friction rollers **13** and **14** and the follower roller **11** of the friction drive shown in FIGURES 1 and 3.

The carriage **3** which is connected to the drive wheel **13** or **22** and which also carries the container **6**, can, for example, be biassed toward the axis **15** by spring tension or compressed air, in such a way that the follower roller **11** or the sprocket wheel **22** is biassed against the circumference of the cam disk **10**.

As shown in FIGURE 5, the rotational speed of the turntable **2** can also be controlled by having the drive means of the turntable include a friction drive wheel **13'** which directly contacts and runs along the wall region of the picture tube portion **4** which is adjacent the connection surface **5**. This embodiment thereby eliminates the need for a cam disk because the drive wheel **13'** will cause the turntable to be rotated. In this case, however, the picture tube portion must be securely positioned on the turntable.

It is also noted that it is possible to drive the turntable directly by means of a motor and to change the rotational speed of the motor continuously. This can be achieved by changing a variable resistor which influences the rotational speed of the motor by means of a template.

It will be understood that the above description of the present invention is susceptible to various modifications, changes, and adaptations.

What is claimed is:

1. A method for the application of a glass connecting mass onto a connection surface of a non-circular screen or envelope portion of a picture tube comprising the steps of:

positioning the connection surface so that it is facing upwardly;

positioning the outlet opening of a container for the glass connecting mass over the connection surface;

rotating the connection surface;

applying a continuous flow of the glass connecting mass to the connection surface and forming a continuous layer of the mass on the connection surface; and

controlling the rotational speed of the connection surface so that the relative speed between the outlet opening and the connection surface is substantially constant.

2. A method as defined in claim **1** further comprising: the step of maintaining the flow of the glass connecting mass per unit of time approximately constant.

3. A device for applying a glass connecting mass to the connection surface of a non-circular screen or envelope portion of a picture tube comprising, in combination:

a frame;

a turntable for carrying a picture tube portion and supported by said frame;

a container for a glass connecting mass having an outlet opening for the exiting of the glass connecting mass therefrom;

a carriage arranged on said frame and having said container connected therewith, said carriage being movable with respect to said frame for positioning the outlet opening of said container over the connection surface of the picture tube portion; and

means for rotating said turntable and for influencing the rotational speed thereof so that the relative speed between the outlet opening of said container and the portion of the connection surface of the picture tube positioned therebelow is approximately constant.

4. A device as defined in claim **3** wherein said means for influencing the rotational speed of said turnable comprises a cam disk and a roller follower which engages the cam.

5. A device as defined in claim **4** wherein said cam is provided with a toothed circumference and said follower roller is a toothed wheel engaging the toothing of said cam.

6. A device as defined in claim **5** wherein said toothed circumference of said cam comprises a chain affixed to the circumference of said cam and said follower roller is a sprocket wheel.

7. A device as defined in claim **3** wherein said means for rotating said turntable includes a drive wheel engaging a further means having a circumferential surface corresponding to the circumference of the connection surface of the picture tube portion for driving said further means and thereby rotating said turntable.

8. A device as defined in claim **7** wherein said means having a corresponding circumferential surface is a cam

disk and said drive wheel is a friction wheel in frictional engagement therewith.

9. A device as defined in claim **7** wherein said drive wheel is a friction wheel in frictional contact with a part of the circumferential surface of the picture tube portion which is in close proximity to the connection surface of the picture tube portion.

10. A device as defined in claim **4** wherein said carriage is connected with said follower roller for movement with said roller.

11. A device as defined in claim **10** wherein said container is arranged for movement with respect to said carriage for a fine adjusting of the position of the outlet opening with respect to the connection surface.

References Cited

UNITED STATES PATENTS

2,880,697	4/1959	Blanding et al.	118—8 X
3,324,625	6/1967	Dulmage	118—323 X
3,339,522	9/1967	Shaffer et al.	118—320 X
3,342,158	9/1967	Bennett et al.	118—7

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65—43; 118—8, 320, 409