

Feb. 6, 1962

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3,019,558

BEADING MACHINE

Filed May 15, 1957

3 Sheets-Sheet 1

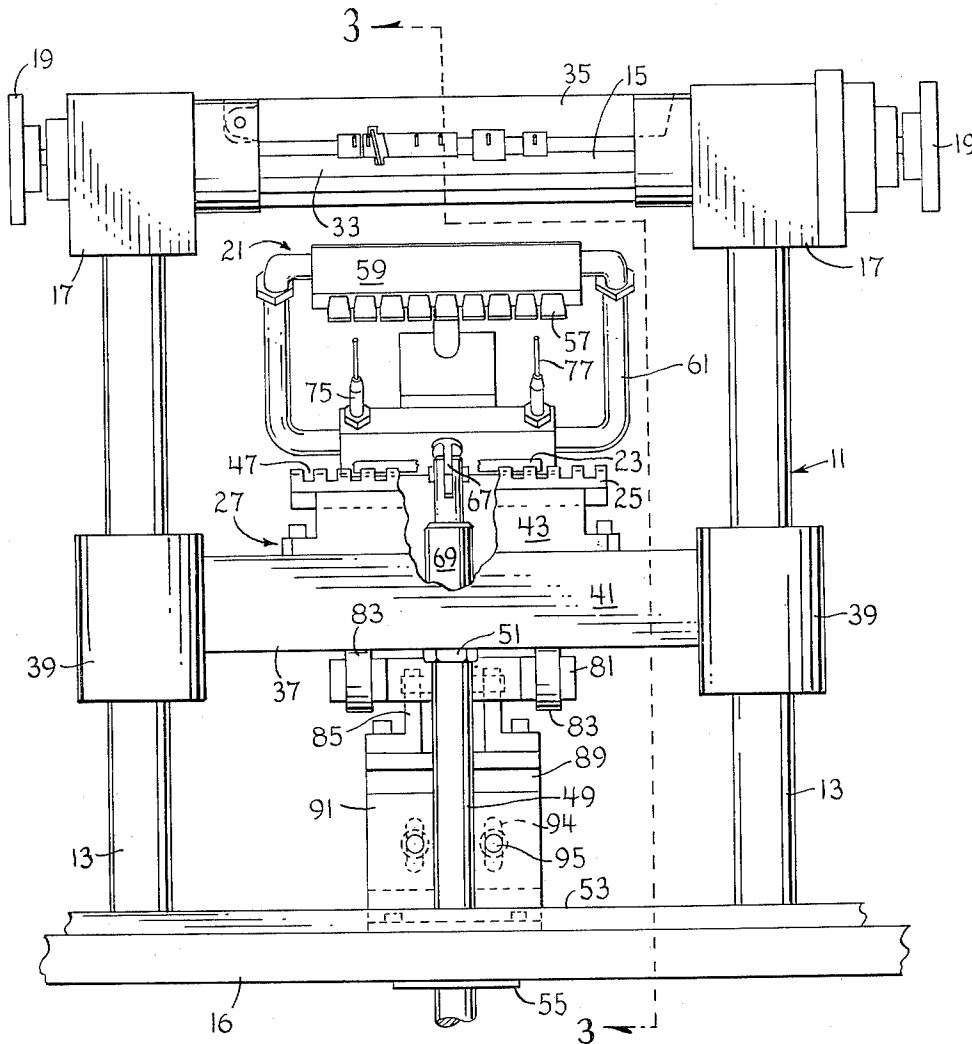


FIG. 1.

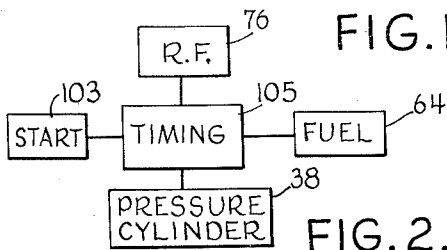


FIG. 2.

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BEADING MACHINE

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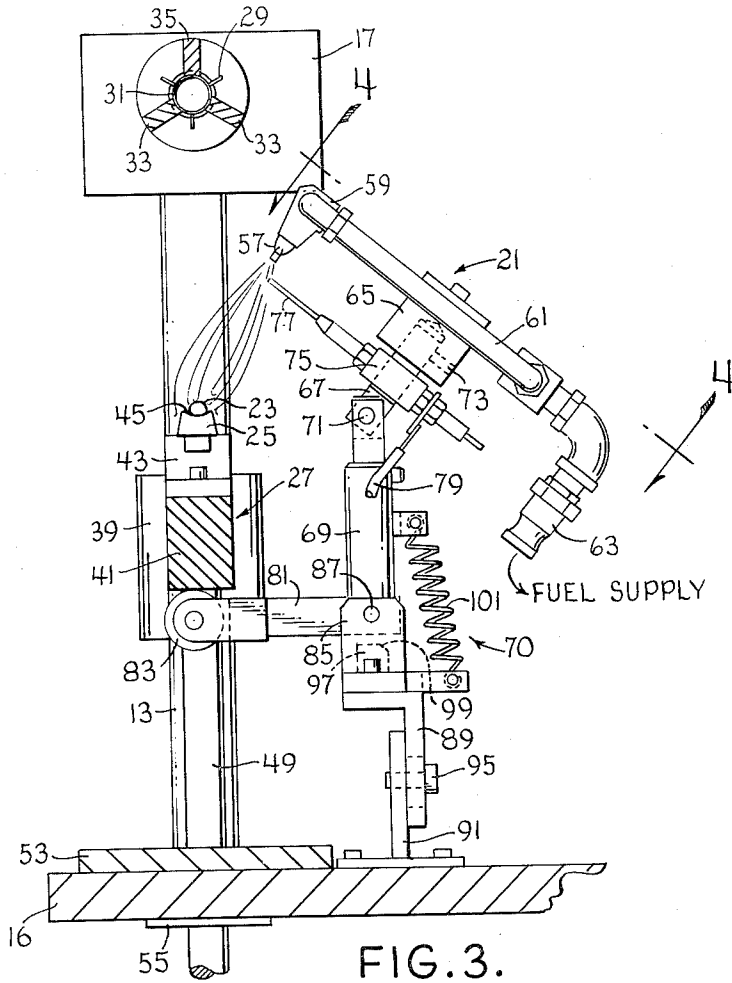


FIG. 3.

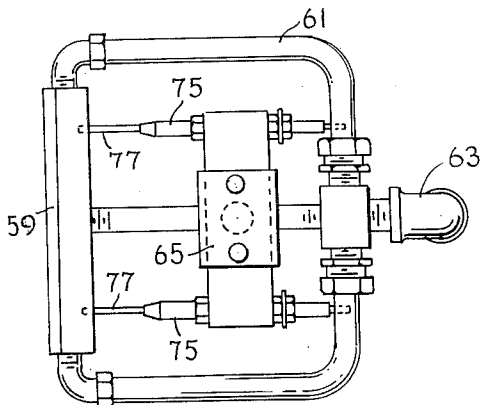


FIG. 4.

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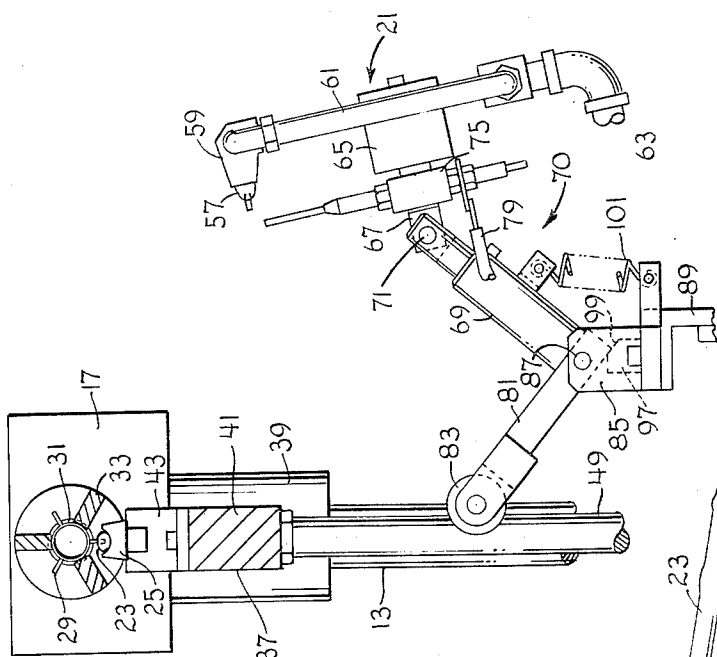
B. G. BROADBENT ET AL

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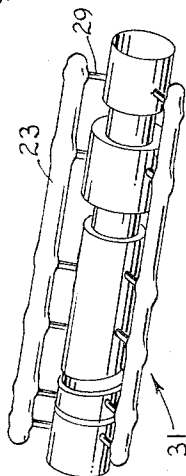
BEADING MACHINE

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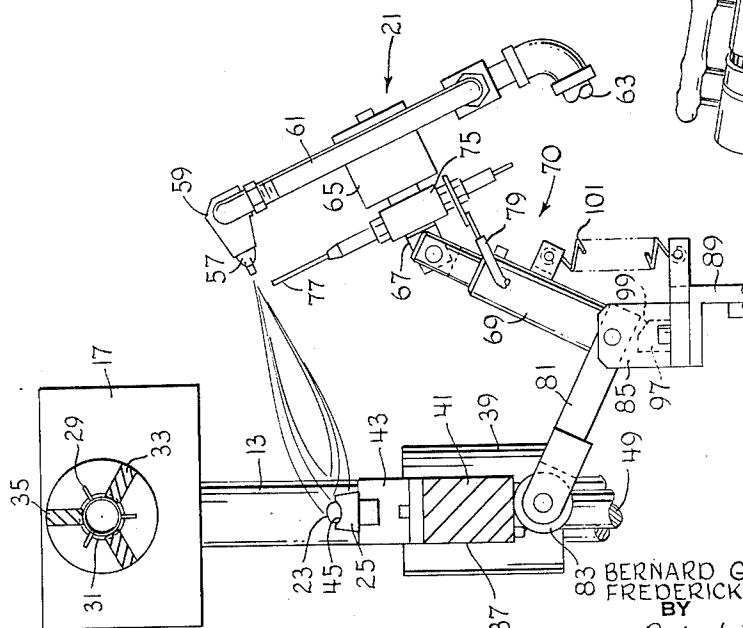
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FILE 7.



5.6.5.

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3,019,558 BEADING MACHINE

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Filed May 15, 1957, Ser. No. 659,260

5 Claims. (Cl. 49—1)

This invention relates to bead forming and mounting machines, and more particularly to apparatus for forming heat plasticizable material configurations and for mounting the configurations upon a structure such as a cathode ray tube electrode assembly.

It is an object of the invention to form efficiently heat plasticizable beads and assemble them upon a structure formed to receive the beads.

A further object is to accomplish the formation of a plasticizable material configuration having reduced amounts of undesirable contamination of the type generally deposited thereon during the plasticizing operation.

Another object is the achievement of a relatively strain free bead and electrode structure assembly.

A still further object is the provision of improved automatic means for forming a plasticizable material configuration and for mounting it upon an electrode structure.

The foregoing objects, as well as other objects which will be apparent upon reference to the following description and accompanying drawings, are achieved in one aspect of the invention by the provision of an apparatus having heat generating means formed to direct heat to a plasticizable material configuration, actuating means for moving the configuration from an initial position to a final position, and tracking means for moving the heat generating means relative to the actuating means to continue the direction of heat to the configuration while it is being moved.

For a better understanding of the invention, reference is made to the following description in which:

FIG. 1 is a plan view of the beading apparatus;

FIG. 2 is a diagram illustrating certain ignition and timing components employed with the machine shown in FIG. 1;

FIG. 3 is a view taken along line 3—3 of FIG. 1;

FIG. 4 is a view taken along line 4—4 of FIG. 3;

FIGS. 5 and 6 illustrate the movements of certain machine components; and

FIG. 7 illustrates a cathode ray tube structure formed by the machine.

Referring to the drawings, the beading apparatus is shown comprising a frame 11 having spaced bars 13 upon which a jig 15 is mounted. The jig is held in position by stop collars 17 and is constructed to be rotated about its longitudinal axis by manipulation of knobs 19. Bars 13 are threaded into the collars 17 so that the height of jig 15 relative to the other machine components may be regulated. The lower portion of the bars are mounted upon base 16. A gas burner or heat generating means 21 is affixed to frame 11 to direct heat to the plasticizable material configuration or glass rod 23, which is mounted upon bed 25 of actuating means 27. The actuating means are formed to reciprocate relative to jig 15 so that rod 23 may be assembled upon pins 29 of electrode structure 31.

Cathode ray tubes generally utilize a gun assembly such as that shown in FIG. 7 as structure 31. This assembly may comprise a plurality of serially arrayed electrodes having pins 29 extending therefrom in longitudinal alignment with one another. Each electrode generally has either two or three such pins spaced circumferentially about the electrode. It has been found that utilization of glass rods provides an acceptable structure for

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holding the electrodes relative to one another. These rods are plasticized to allow embedding of pins 29 therein. During cooling, the rod solidifies and maintains the electrodes in their proper positions.

Any suitable holding device such as the jig 15 may be used to maintain the electrodes of structure 31 in position during the beading operation. This jig may comprise segments 33 which are formed to contact and position the electrodes, while allowing free access to each group of pins 29. A rotatable cover 35 may be provided in the jig to allow insertion of parts and removal of assembly 31. With each operation of the beading machine, glass rod 23 is plasticized and moved up to a position whereat the pins 29 are embedded in the glass. The jig is then rotated to present the next group of exposed pins to the appropriate position for receiving the next plasticized rod.

Actuating means 27 serves to move the glass rod and guide its travel through the reciprocating movement to and from the assembly position. The actuating means comprises a carriage 37 formed with guide blocks 39, which slidably engage bars 13, and with a cross-arm 41. Affixed to the central portion of the cross-arm is a support member 43, which serves to position bed 25 upon the arm. Referring particularly to FIGURES 3, 5 and 6, it can be seen that the bed, which is made of heat resistant material, has a longitudinal depression 45 wherein the glass rod 23 is disposed. The sides of the bed are formed to provide a plurality of slots 47, FIG. 1, so that the heat from the heat generating means 21 can be directed more uniformly over the major portion of the rods.

Connected to the lower surface of cross-arm 41 is a shaft 49 providing the reciprocating movements for carriage 37. The shaft may be connected to any suitable motivating device such as a two-way acting air pressure cylinder 38. Shaft 49 is threaded into cross-arm 41 to allow, upon manipulation of nut 51, the adjustment of the initial position of carriage 37. Base 16 and plates 53 and 55 are provided with apertures to allow passage of shaft 49 therethrough.

Heat generating means 21 comprises a plurality of nozzles or burners 57, which are mounted upon manifold 59 and supplied with an appropriate gas mixture through tubing 61. An inlet pipe 63 connects the tubing with a suitable fuel supply 64. The gas burners are mounted upon a block 65, which has a linkage 67 connected thereto for adjustable connection to arm 69 of tracking means 70. The upper portions of the shaft are provided with prongs spaced to straddle linkage 67. A suitable bolt 71 is threaded through the prongs and linkage to securely fasten heat generating means 21 in the desired prescribed position relative to arm 69. This structure allows burners 57 to be adjusted in position so that they may initially direct the flames to glass rod 23 from a position above the rod or at some angle relative to a transverse axis of the rod. The distance of burners 57 from bolt 71 may be adjusted by alteration of the frictional engagement position between the upper portion of linkage 67 and pin 73. This versatility allows selection of the distance between burners 57 and glass rod 23.

Radio frequency spark generating coils 75 have probes 77 mounted upon linkage 67 so that the ends of the probes are positioned relative to nozzles 57. Upon energization of coils 75 by radio frequency generators 76 through a lead 79, sparks are created in the region of the tips of probes 77. The sparks instantly ignite the gas or fuel issuing from nozzles 57 to provide the flames necessary to plasticize rod 23. This process of ignition is much more efficient than other devices such as pilot flames. Also there is no contamination deposited on nozzles 57 from the spark as there is when using a pilot flame. It has been found that the contamination or soot which ac-

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accumulates on the burners when using a pilot flame is blown into or upon the glass rod 23 while it is being heated. When such a structure is sealed into the cathode ray tube envelope, it becomes a source of contamination for the cathode and screen of the tube.

Arm 69 of tracking device 70 is affixed to a lever arm 81, which has spaced rollers 83 disposed to engage the lower surface of cross-arm 41. Lever arm 81, arm 69, and the heat generating means 21 are all pivotally mounted upon the spaced plates 85 by means of pin 87. A brace 89 and bracket 91 supports the entire assembly upon base 16. Elongated openings 94 are provided in brace 89 to allow the tracking means 70 and heat generating means 21 to be raised or lowered upon adjustment of threaded bolt 95.

A block 97 having a tapered surface 99 formed on one edge thereof is affixed to brace 89. A spring 101 is connected between arm 69 and brace 89 to impart a clockwise bias to the tracking means 70 and heat generating means 21, see FIGURES 3, 5 and 6. Accordingly, as carriage 37 moves upwardly, rollers 83 follow cross-arm 41 to cause the burners 57 to track and direct heat to rod 23. Since the rod remains in a plastic state due to this continuous heat until it is only a short distance from the pins 29 of electrode assembly 31, the pins are easily embedded in the glass without creating an undesirable strain pattern in the rod or any torque or twisting effect on the electrodes.

Three positions of tracking means 70 are shown in FIGURES 3, 5 and 6. Initially, the nozzles 57 may be directed toward glass rod 23 from a position directly above it or at some angle with a transverse axis of the rod as shown in FIG. 3. As carriage 37 moves upwardly, the heat generating means 21 is rotated by tracking device 70 to the position shown in FIG. 5. The rotational movement is stopped when the lower edge of lever arm 81 contacts the tapered edge 99 of block 97 as shown in FIG. 6. When carriage 37 reciprocates downward, it again picks up rollers 83, thereby returning tracking means 70 and heat generating means 21 to their initial positions shown in FIG. 3.

Referring to FIG. 2, a starting device such as a hand operated switch 103 functions to cause the beading machine components to begin operation. After a glass rod 23 has been loaded into bed 25, the switch is energized to cause timing mechanism 105 to open an appropriate valve in the fuel supply 64. At approximately the same time, the radio frequency coil 75 is energized through generators 76 to ignite the gas issuing from nozzle 57. The radio frequency coil subsequently ceases to operate, and, after a pre-determined time wherein the glass rods are heated by the flames, the actuating means 27 with its shaft 49 and carriage 37, are moved upwardly by means of cylinder 38. When tracking means 70 reaches the limit of its rotative movement, timing device 105 closes the valve in the fuel supply 64 to extinguish the flames. The carriage continues to move rod 23 to its assembly position upon pins 29. Subsequently, the actuating means 27 reciprocates with the reverse action of cylinder 38 to cause carriage 37 to return to its initial position in readiness for a repeat operation.

Although one embodiment of the invention has been shown and described, 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.

What is claimed is:

1. An apparatus for mounting a heat plasticizable material configuration upon a structure formed to receive the configuration, said apparatus comprising a fixed support, a movable support member, a bed on said support member, said bed being adapted to support a configuration, a jig mounted on said fixed support for positioning the structure to which the configuration is to be applied, actuating means connected to said movable support mem-

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ber for moving the said support member and bed from an initial position to a position where the configuration engages the structure, heat generating means in the initial position of the bed having its heat generating means directed onto said configurations on the bed and tracking means pivotally mounted on the part carried by said support, said tracking means having two portions, one portion supporting the heat generating means and the other portion maintained in engagement with the movable support member to continue the application of heat to said configuration during movement thereof toward the structure.

2. An apparatus for mounting a heat plasticizable material configuration upon a structure formed to receive the configuration, said apparatus comprising a fixed support, a movable support member, a bed on said support member, said bed being adapted to support a configuration, a jig mounted on said fixed support for positioning the structure to which the configuration is to be applied, actuating means connected to said movable support member for moving the said support member and bed from an initial position to a position where the configuration engages the structure, tracking means pivotally mounted on said support having a lever arm biased into contact with said movable support member and a second arm, a heat generating means mounted on said second arm, said heat generating means in one limit of the motion of the bed being directed onto the configuration supported on the bed, said tracking means maintaining the heat generating means on the configuration as the bed moves toward the jig.

3. An apparatus for mounting a heat plasticizable material configuration upon a structure formed to receive the configuration, said apparatus comprising a fixed support, a movable support member, a bed on said support member, said bed being adapted to support a configuration, a jig mounted on said fixed support for positioning the structure to which the configuration is to be applied, actuating means connected to said movable support member for moving the said support member and bed from an initial position to a position where the configuration engages the structure, tracking means pivotally mounted on said support having a lever arm biased into contact with said support member and a second arm, a heat generating means mounted on said second arm, said heat generating means in one limit of the motion of the bed being directed onto the configuration supported on the bed, said tracking means maintaining the heat generating means on the configuration as the bed moves toward the jig and limiting means comprising a part fixed relative to the support and a second part fixed relative to the arm, for stopping the movement of the tracking means before said configuration reaches said structure.

4. An apparatus for mounting a heat plasticizable material configuration upon a structure formed to receive the configuration, said apparatus comprising a fixed support, a movable support member, a bed on said support member, said bed being adapted to support a configuration, a jig mounted on said fixed support for positioning the structure to which the configuration is to be applied, actuating means connected to said movable support member for moving the said movable support member and bed from an initial position to a position where the configuration engages the structure, tracking means pivotally mounted on said support having a lever arm biased into contact with said support member and a second arm, a heat generating means mounted on said second arm, said heat generating means in one limit of the motion of the bed being directed onto the configuration supported on the bed, said tracking means maintaining the heat generating means on the configuration as the bed moves toward the jig, said heat generating means comprising gas burners, and radio frequency operated spark means fixed with relation to the gas burners and having a probe adjacent the gas burners for igniting the gas burners.

5. An apparatus for mounting a heat plasticizable material configuration upon a structure formed to receive the configuration, said apparatus comprising a fixed support, a movable support member, a bed on said moveable support member, said bed being adapted to support a configuration, a rotatable jig mounted on said fixed support for positioning the structure to which the configuration is to be applied, means connected with the jig for rotating the same relative to the support, actuating means connected to said movable support member for moving the said support member and bed from an initial position to a position where the configuration engages the structure, tracking means pivotally mounted on said support having a lever arm biased into contact with said support member and a second arm, a heat generating means mounted on said second arm, said heat generating means in one limit of the motion of the bed being directed onto the configuration supported on the bed, said tracking means maintain-

ing the heat generating means on the configuration as the bed moves toward the jig.

References Cited in the file of this patent

UNITED STATES PATENTS

1,591,716	Madden et al. -----	July 6, 1926
1,789,011	Mailey et al. -----	Jan. 13, 1931
1,833,774	Cronk -----	Nov. 24, 1931
2,156,884	Sykes -----	May 2, 1939
2,444,239	Aubert et al. -----	June 29, 1948
2,527,669	Yenni et al. -----	Oct. 31, 1950
2,545,945	Ensign et al. -----	Mar. 20, 1951
2,573,266	Melcher et al. -----	Oct. 30, 1951
2,575,746	Cartun -----	Nov. 20, 1951
2,654,181	Lucarelli -----	Oct. 6, 1953
2,707,848	Pityo -----	May 12, 1955
2,721,422	Baker et al. -----	Oct. 25, 1955