

Dec. 22, 1936.

M. KNOLL

2,064,981

BRAUN TUBE FOR TELEVISION RECEIVER APPARATUS

Filed March 6, 1934

Fig. 1

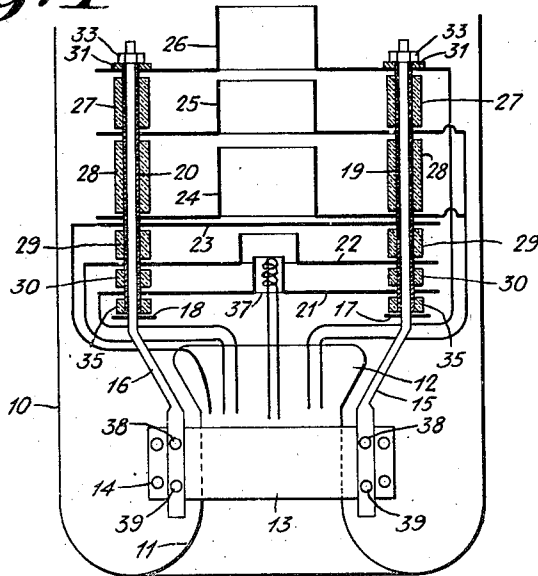
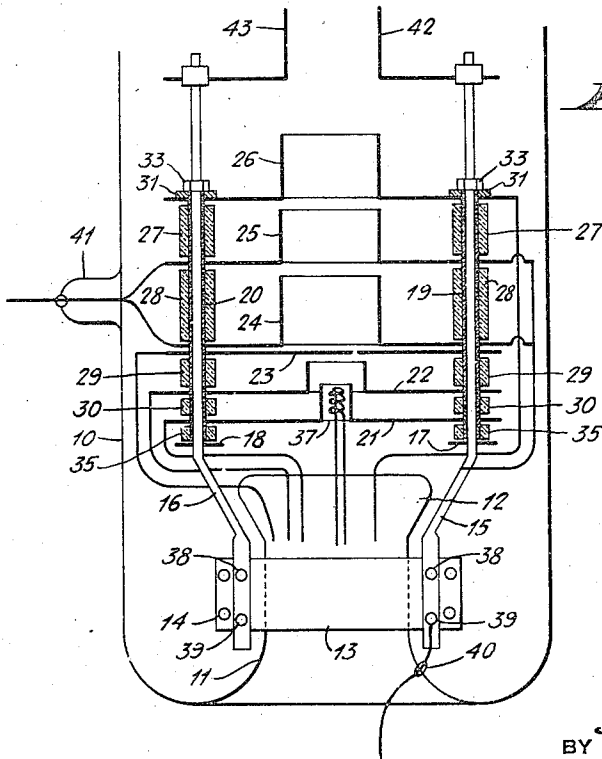


Fig. 2



INVENTOR
MAX KNOLL
BY *H. S. Swann*
ATTORNEY

UNITED STATES PATENT OFFICE

2,064,981

BRAUN TUBE FOR TELEVISION RECEIVER APPARATUS

Max Knoll, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie m. b. H., Berlin, Germany, a corporation of Germany

Application March 6, 1934, Serial No. 714,263
In Germany March 13, 1933

2 Claims. (Cl. 250—27.5)

The present invention is concerned with a Braun tube capable of use in a television receiver, and it concerns more particularly the ways and means by which the electrodes, which are confined inside the tube and intended for ray generation, ray control and optionally also for ray or pencil focussing, are to be disposed and secured with respect to one another. According to the earlier art these constituent parts were fastened by spot welding to the wires which are brought to the seals or lead-ins for the electrodes. However, this mode of support is attended with the drawback that it is rather difficult to cause the various electrodes to occupy the exact positions relative to one another which they are to occupy in the actual operation of the tube. Another factor is that during the heating of the tube, which is necessary before it is severed from the vacuum pump, the said wires are liable to bend or warp with the result that, no matter how careful the adjustment during the assembly and mounting of the tube, considerable and serious defects as regards adjustment arise or occur during operation and actual use.

Now, according to the present invention these drawbacks are obviated by that at least two of the electrodes serving for ray generation and modulation are fitted upon one or more common supporting rods or bolts and are spaced apart the requisite distances by suitable spacer members. This form of construction makes it possible to observe and insure the necessary distances during the work of mounting with the greatest accuracy, and it moreover represents a form of construction that will undergo only very slight and negligible deformation during the heating of the tube by high frequency currents for removing occluded gasses. Another object of the invention is to use the said supporting bolts also for the purpose of carrying the ray collector and focussing means. The spacing apart of these latter means and their distance from the anode of the tube is also secured by the aid of spacers.

An exemplified embodiment of the present invention, in which all of the electrodes employed for ray generation and ray modulation as well as for focussing the ray-pencil are aligned on two supporting bolts and are kept apart by spacers, is illustrated schematically in Fig. 1 of the attached drawing which forms a part of the application. Referring to this figure, 10 denotes the glass envelope of a Braun tube which is provided at one end with a reentrant stem 11 and the press 12. Surrounding the stem 11 is a

metal collar 13 which, for instance, may consist of two semi-circular sheet-metal straps clamped fast by the aid of screws or rivets 14 to the stem 11. Attached to the said collar 13 are two supporting bolts or rods 15 and 16, which have portions that are exactly parallel to one another. Pins 17 and 18 pass through the parallel portions of the rods 15, 16 and lie in a plane perpendicular thereto. Abutting the pins 17, 18 and surrounding the bolts 15, 16 are insulation tubes 19 and 20 which, for instance, may consist of quartz, alumina or magnesia. The various electrodes of the Braun tube are each furnished with a flange provided with two bores through which project the supporting bolts or rods 15, 16, and the insulation tubes 19, 20. These electrodes are: a support 21 for the electron-emissive coat of the cathode, a control or Wehnelt cylinder 22 designed to influence the intensity of the stream of electrons, and a disc anode 23. Above these electrodes there is further shown in the drawing an electrostatic focussing device for the cathode-ray pencil passing through the anode 23. This focussing device consists of three cylindrical tubes 24, 25, 26, which are also furnished with flanges. These electrodes just like the ones before mentioned and serving for ray generation and ray-pencil modulation, are also mounted on the supporting bolts 15, 16. The means for relatively spacing apart the electrodes with respect to one another is insured by the agency of spacers 27, 28, 29, 30. Above the flange of the upper-most electrode 26 are insulation discs or washers 31, and nuts 33, which are screwed upon the ends of supporting bolts 15, 16. Also between the pins 17, 18 serving as abutments or bearing points, and the flange of cathode 21, there are interposed two insulation spacer pieces 35. The supply leads brought to the several electrodes fitted upon the supporting bolts are sealed into the squash 12 which also contains the supply leads for the heater winding 37 of the cathode. This form of construction is suited especially in the case where the several electrodes present a comparatively low potential difference therebetween.

In those cases where the voltages between the various electrodes are greater, a slightly different arrangement is used for the lead-in wires, and this arrangement is shown in Fig. 2 of the drawing, wherein those electrodes which are at a higher potential in reference to the anode are united, either with one of the supporting members, as for example 15, with the latter being united with a special lead-in or seal in-

licated at 40, or else distinct lateral lead-ins are provided as indicated at 41 by which the electrodes of higher potential are connected. In this latter instance, connection, for instance, between electrode 26 and the supporting member 15 is simply established by that the insulating piece 31 is omitted.

Deflector plates 42, 43 are also disclosed in Fig. 2 and these may be disposed and secured onto the supports 15, 16 in a manner similar to the mounting of the electrodes 21 to 26 inclusive.

Instead of the outwardly curved or offset form of the support rods or bolts 15, 16 shown in the drawing, they may take the form of straight rods if the collar 13 is furnished with two radial parts or flanges of such size that the supporting bolts are sufficiently spaced apart in the direction at right angles to the tube axis. In either instance the supporting bolts 15 and 16 are preferably secured on the collar 13 in such a way that their mutual position, at least so far as that in longitudinal sense is concerned, can be adjusted to each other. This is feasible, for instance, by that the supporting bolts are fastened to the radial flanges of the collar 13 by the aid of screws, and by that the bores for one of the screws is slot-shaped as shown in the drawing. Any deviation that may be found from exact parallelism in the sense of the longitudinal axis of the two supporter bolts may then be corrected by turning one of the bolts about the circular screw holes 38, while the screw passing through the slot-formed bore 39 must be loosened slightly. Any departure from the true parallel position in the direction at right angles to the plane laid through the drawing is eliminated by that thin spacers are inserted at the place of bore 38 or bore 39.

The flanges of the electrodes shown in the drawing need not necessarily be circular, indeed, they may be of any shape other than circular or

be provided with bores of the kind found in perforated sheets. In this manner the aggregate surface of the metal parts contained in the Braun tube can be diminished, and this means a correspondingly reduced risk of evolution of gases from these parts and greater ease in heating the tube during the outgassing process.

What I claim is:

1. A Braun cathode-ray tube comprising a plurality of vertically disposed support rods, a cylindrical indirectly-heated cathode disposed with its axis in parallel relation to the support rods and having a laterally-extending flange in engagement with each of said support rods, a plurality of cooperating electrodes mounted above said cathode in spaced axial alignment and having laterally-extending flanges for engagement with the same support rods, and means carried by said support rods and interposed between the flanges of successive electrodes for insulating the several electrodes from each other and maintaining them in fixed spaced relation.

2. A Braun cathode-ray tube comprising a plurality of vertically disposed metal support rods, tubular sleeves of insulating material surrounding said support rods, a cylindrical indirectly-heated cathode disposed with its axis in parallel relation to the support rods and having a plurality of laterally-extending flanges, each flange being provided with an opening through which a support rod and its insulating sleeve are passed, a plurality of cooperating electrodes mounted above said cathode in spaced axial alignment and having laterally-extending flanges similar to those of the cathode and similarly mounted on the same support rod insulated sleeves, and means carried by said support rod insulating sleeves and interposed between the flanges of successive electrodes for insulating the several electrodes from each other and maintaining them in fixed spaced relation.

MAX KNOLL.