Oct. 19, 1948. D. B. KEIM 2,451,832

CATHODE-RAY TUBE SUPPORT AND POSITIONING MEANS

Filed Jan. 2, 1947

Fig. 1.

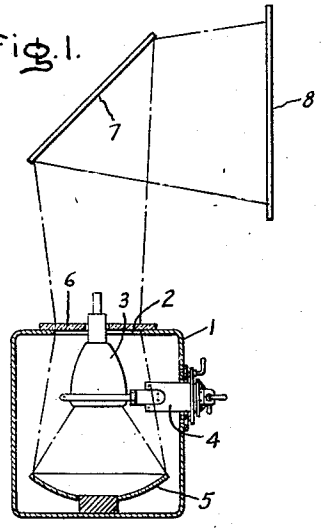


Fig. 4.

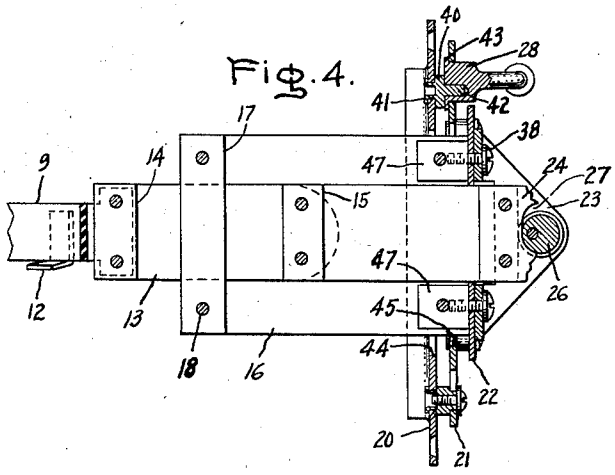


Fig. 2.

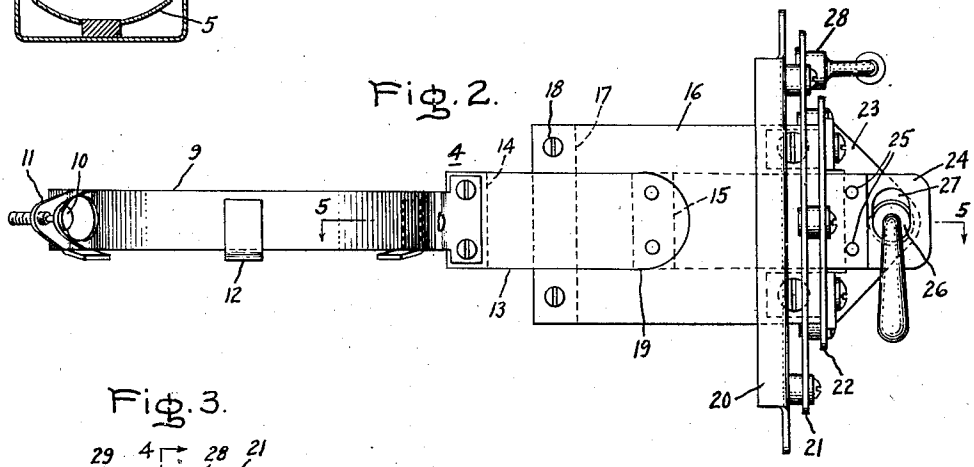


Fig. 3.

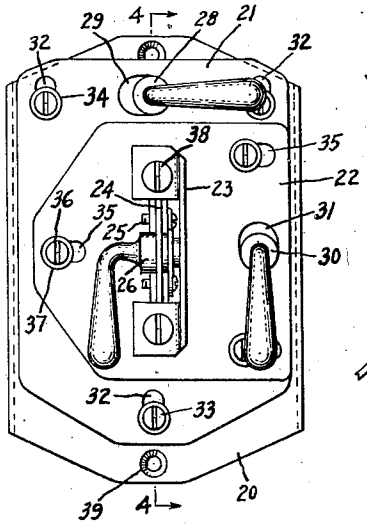
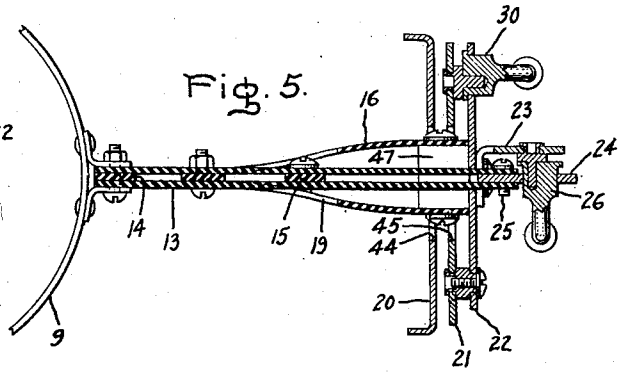


Fig. 5.



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CATHODE-RAY TUBE SUPPORT AND POSITIONING MEANS

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4 Claims. (Cl. 178—7.5)

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My invention relates to television receivers and, particularly, to television receivers of the projection type. It is a primary object of my invention to provide improved means for supporting and adjusting the position of a picture tube in a projection television receiver.

In television receivers which employ an optical system of the Schmidt type in which the picture tube of the receiver is positioned above a mirror, it is essential that the position of the tube relative to the mirror be accurately adjusted for proper focusing of the picture. Accordingly, it is another object of my invention to provide a new and improved device of simple construction and arrangement whereby a picture tube may be precisely positioned in three different planes by relatively independent mechanisms.

It is a further object of my invention to provide a new and improved positioning device or manipulator in which a supported object may be moved in three rectilinearly disposed directions.

Briefly stated, in the illustrated embodiment of my invention, I provide a manipulator for controlling and supporting the picture tube of a projection television receiver and which is susceptible of producing three substantially independent movements. A pair of parallel supporting plates are movable in transverse directions and a third supporting member is movable in a third direction transverse to the pair of directions, all movements being obtained by rotation of three independently operable cams.

For a better understanding of my invention, reference may be had to the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims. Fig. 1 is a sketch diagrammatically illustrating the components of a projection television receiver employing a Schmidt type optical system; Fig. 2 is a side elevation view of my positioning device for a manipulator; Fig. 3 is a front elevation view of the manipulator of Fig. 2; Fig. 4 is a sectional view of the device of Fig. 3 taken along the lines 4—4, and Fig. 5 is a sectional view taken along the lines 5—5 of Fig. 2.

Referring now to Fig. 1, I have shown the optical components of a projection television receiver which comprises a metallic enclosing member 1 having an aperture 2 in its upper surface through which projects a picture tube 3, the tube 3 being supported by my improved manipulator 4 to be described in detail later. The picture tube 3 is supported with its fluorescent face or

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end wall facing a parabolic mirror 5 supported on the bottom or side wall of the enclosure 1. Light from the face of the picture tube 2 is reflected upwardly by mirror 5 and through a correcting lens 6 positioned around the neck of the tube 3. The light passes through the correcting lens 6 to a flat inclined mirror 7 near the top of the television cabinet (not shown) and is projected by the mirror 7 upon the back wall of a viewing screen 8.

In Fig. 2, the manipulator or positioning device 4 is shown as comprising a circular band 9 which is adapted to encircle the picture tube or a television receiver and to be fastened or tightened therearound by means of a clamp comprising a screw 10 which engages outwardly extending ears 11 on the band 9. The band 9 may be formed of any suitable material, such as fiber, and includes a plurality of tabs 12 supported thereby and extending inwardly to engage the bottom edge of the picture tube. The circular band 9 is attached to a supporting bracket and guide comprising two parallel strips 13 of a stiff insulating material maintained in spaced relation by means of vertical spacers 14, 15. The strips 13 are supported by a bracket comprising two opposing curved arms 16, likewise formed of a stiff insulating material. The left-hand ends of the arms 16 are maintained in spaced relation by means of a vertical spacer 17 and held in assembled relation by means of screws 18. The curved arms 16 have horizontal slots 19 therein which act as guides for the strips 13. The two strips 13 are spaced on opposite sides of the spacer 17 and are movable in a horizontal direction by means to be pointed out later.

The entire manipulator and the picture tube are supported by means of a metal plate 20 which is adapted to be fastened to the outer surface of the enclosing member 1. Supported on the outer surface of the plate 20 are two parallel plates 21, 22. A bracket 23 attached to the outer surface of the plate 22 has a portion which extends in a direction transverse to the plate 22 and parallel with the strips 13. A metal plate 24 is arranged parallel with the outwardly extending portion of the bracket 23 and is clamped between the left- and right-hand ends of the strips 13 by means of screws 25.

In order to permit adjustment of picture tube 3 in three mutually perpendicular directions, I provide a first rotatable cam 26 which engages a slot 27 in the plate 24 to reciprocate the strips 13 and the picture tube in a horizontal plane. As may be seen in Fig. 3, I provide likewise a

rotatable cam 28 which engages a slot 29 in the plate 21 to move the curved arms 16 and the picture tube upward and downward in a vertical plane. Finally, a third rotatable cam 30, which engages a slot 31 in plate 22, moves the picture tube and its supporting assembly in a horizontal plane in a direction transverse to the movement provided by cam 26. To permit movement of the plate 21 relative to the plate 20, I provide a plurality of slots 32 in the plate 21 which surround the screws 33 employed for supporting the plate 21 from the plate 20. Resilient washers 34 positioned between the heads of the screws 33 and the plate 21 assist in supporting the plate 21 in an adjusted position. Similarly, to permit movement of the plate 22 relative to the plate 21 by means of cam 30, I provide a plurality of slots 35 in the plate 22. Screws 36 passing through the slots 35 are attached to the plate 21 and resilient washers 37 assist in maintaining the plate 21 in adjusted position.

Fig. 3 likewise shows the manner in which the bracket 23 is supported from plate 22 by means of screws 38, as well as the holes 39 provided in the supporting plate 20 for attaching the supporting plate to the enclosing member 1.

In Fig. 4 there is shown a sectional view taken along the lines 4—4 of Fig. 3. This figure illustrates the manner in which the cams 26, 28, 30 are attached, respectively, to the bracket 23 and plates 20, 21. Thus, each of the cams comprises a base portion 40 having on one side a rivet portion 41 which is attached to the respective supporting plate or bracket. On the opposite side of the base 40 there is provided a pin 42 which extends into an eccentric hole in respective cams and provides means for rotating the respective cams to obtain a reciprocating movement of their associated plates or followers. Each of the cams includes a flange 43 which lies between the base portion 40 and the plate which the cam is adapted to reciprocate. The flange 43 likewise maintains the cam in its associated slot in the plane which it reciprocates.

Fig. 4 likewise illustrates that the plates 20—21 are provided with respective overlapping apertures 44—45, the strips 13 extending through all of these apertures. The curved arms 16 extend through the apertures provided in plates 20, 21 and are attached to metallic blocks 47 secured to the rear surface of the plate 22 by screws 38.

In Fig. 5 there is illustrated the construction and relative positions of the strips 13 and supporting arms 16, together with the spacers which guide the strips 13 in their longitudinal movement relative to the arms 16 as the cam 26 is rotated. In this figure, there is further illustrated the simplicity of construction of the three cams and follower plate arrangement by which the supporting ring 9 and a picture tube supported therein are adjusted in three mutually perpendicular directions.

One of the principal advantages of the manipulator or positioning device which I provide is the facility with which, by the rotation of three simple cams, there is obtained three independent directions of movement of the picture tube. This type of mechanism offers decided advantage in positioning a picture tube in a television receiver in that all of the movements are rectilinear so that adjustment of the focus of the picture tube 3 relative to the mirror 5 in one direction has no effect on the focus in two transverse directions.

Another advantage of my invention is that long insulating paths are provided between the picture tube with its high potentials and all the mechanisms employed for positioning the tubes for focusing purposes.

While I have shown and described my invention as applied to a particular device, it will be obvious to those skilled in the art that changes and modifications may be made without departing from my invention. I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a projection television receiver of the type having a picture tube and a mirror positioned opposite the fluorescent end wall of said tube, a device for controlling the position of said tube relative to said mirror comprising a supporting plate, a pair of plates mounted on said supporting plate and parallel therewith, said supporting plate and said pair of plates having overlying apertures, an arm extending through said apertures and arranged to support said tube, a rotatable cam connected with said arm for movement of said arm and said tube in a direction perpendicular to said plates, a rotatable cam mounted on said supporting plate for reciprocating the one of said plates adjacent thereto in a direction parallel with said plates, and a rotary cam mounted on said one plate for adjusting the other of said pair of plates in a direction transverse to said last direction.

2. A device for positioning the cathode ray tube in a television receiver comprising a supporting plate, a pair of plates arranged parallel with said supporting plate, the outer of said plates being supported from the other of said plates and the other of said pair of plates being supported by said supporting plate, and said pair of plates having overlapping apertures therein, an insulating arm extending through said apertures and engaging said tube, means supported by the outer of said plates for adjusting the position of said arm and said tube in a first direction transverse to said plates, and means supported respectively by said supporting plate and the other of said plates for moving said other plate and said outer plate in two mutually perpendicular directions transverse to said first direction.

3. In a television receiver of the type having a cathode ray tube and an enclosure for said tube having an aperture therein, means external to said enclosure for insulatingly supporting said tube and adjusting the position of said tube comprising, a pair of metallic plates having apertures overlying the aperture of said enclosure, a dielectric arm extending through said apertures and arranged to support said tube, means including a rotatable cam supported by one of said plates for moving said arm in a first direction, said plates having transverse slots therein, and a pair of rotatable cams positioned respectively in different of said slots for moving said plates in two mutually perpendicular directions transverse to said first direction.

4. A device for insulatingly supporting and positioning a cathode ray tube of a television receiver comprising a supporting plate, a pair of plates arranged parallel with said supporting plate, rotary cam means positioned between one of said parallel plates and said supporting plate for moving said one plate in a first direction, rotary cam means positioned between said pair of plates for moving the other of said plates in

a direction transverse to said first direction, a member attached to said other plate extending in a direction transverse to said first and second directions, insulating supporting means for said tube attached to said other plate, and rotary cam means connected with said member for moving said supporting means in a direction transverse to said first and second directions.

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