May 27, 1947. G. SABOL 2,421,086

TELEVISION CATHODE RAY TUBE WITH ROTARY DEFLECTING PLATES

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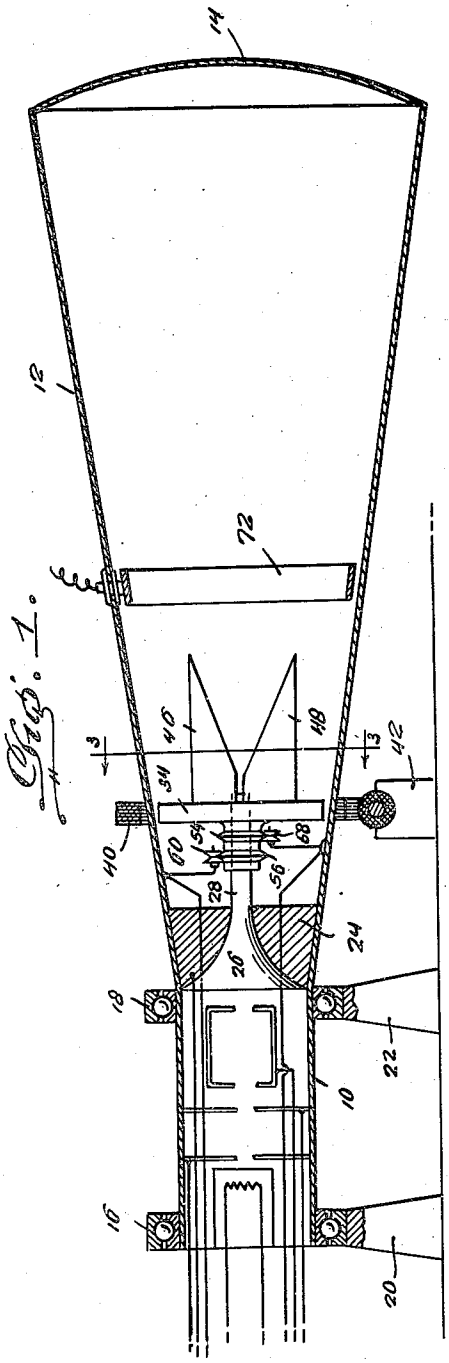


Fig. 1.

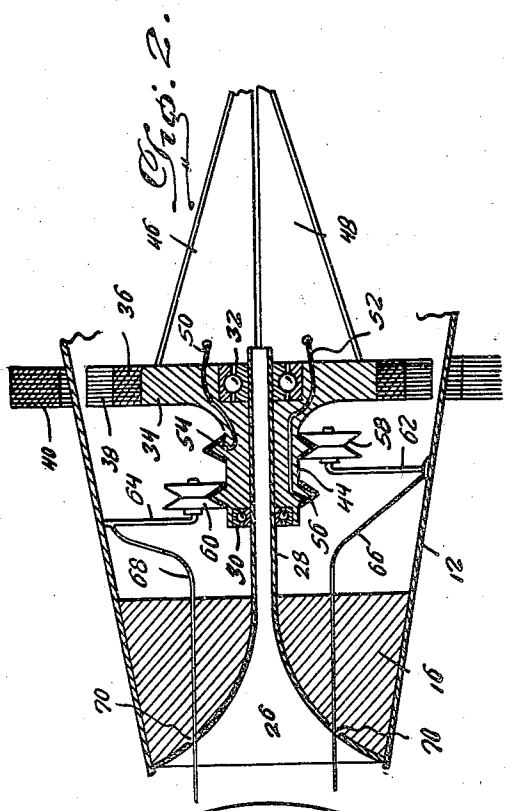


Fig. 2.

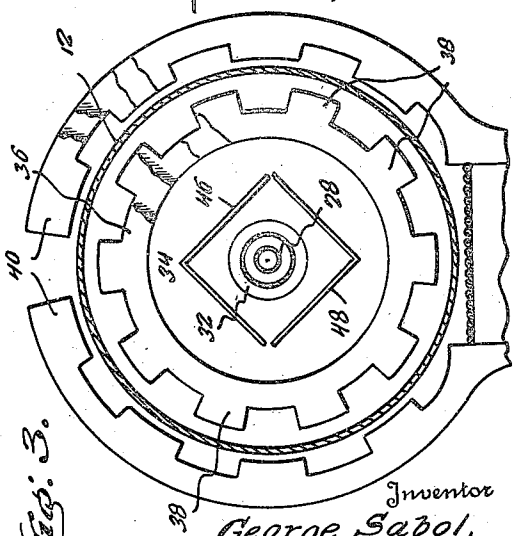


Fig. 3.

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TELEVISION CATHODE-RAY TUBE WITH ROTARY DEFLECTING PLATES

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11 Claims. (Cl. 250—158)

1

This invention appertains to improvements in cathode ray tube construction and mode of the operation thereof in a system of television transmission and reception.

Among the several objects of the invention is the provision of a cathode ray tube which involves more or less radical, but important and valuable, refinements in construction and mode of operation, with the advantages that it is capable of use with present television equipment without any change over in the makeup thereof; eliminates the usual vertical sweep mechanism, its circuit and signal; eliminates flicker, common to back and forth linear scanning, by reason of its scanning performance with a continuous rotary motion; admits of greater perfection in picture condensing and enlarging by reason of all lines being concentric with respect to the center of the same; permits of an appreciable reduction in tube length; and utilizes the entire area of the tube screen.

With these and other objects and advantages in view, the invention resides in the certain new and useful combination, construction, and arrangement of parts, as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawing, in which:

Figure 1 is a vertical longitudinal section through a cathode ray tube and its mounting, in accordance with the invention;

Figure 2 is an enlarged fragmentary sectional detail, showing the modus operandi of the tube for its rotary scanning performance; and

Figure 3 is an enlarged vertical transverse section, taken through the line 3—3 on Figure 1.

Referring to the drawing, wherein like characters of reference denote corresponding parts in the several views thereof, the embodiment of the invention, as it is exemplified therein, is comprised in a rather long glass bulb, of a more or less conventional form, shaped to provide a rearwardly directed cylindrical portion 10 and a forwardly directed flared portion 12, the latter having its larger end closed by a concavo-convex wall 14, the inner surface of which is provided with a fluorescent coating or screen (not shown). Positioned within the rear end portion 10, of the bulb or tube, is an electron gun, of standard construction, that has its components electrically connected to proper potential sources.

In carrying out the invention, the cathode ray tube is to be mounted for the rotary scanning of an object or subject and, to such end, the rearwardly directed end 10 is fitted into the inner ele-

2

ments of a pair of spaced anti-friction bearings 16 and 18, which are mounted in supporting bases 20 and 22, respectively; an electrically operated means, preferably in the form of synchronous motor, being employed for its rotation, as will be presently explained.

Fitted within the connected, smaller, end of the flared portion 12, of the bulb or tube, is a centrally apertured supporting member or plug 24, the aperture of which is flared rearwardly to the full circumference of the member or plug to seat within the same a funnel-shaped member 26, of metal construction, which has a tubular extension 28 projecting forwardly through the aperture to act as a support for a pair of spaced anti-friction bearings 30 and 32, the outer annular elements of which carry the rotor of the synchronous motor. The rotor is comprised in a circular body portion 34 and a cylindrical hub portion 44 offset rearwardly therefrom, both of which portions, together with the supporting member or plug 24, are formed of an insulating material, such as a plastic or the like. The body portion 34 has its periphery fitted with a laminated ring assembly 36, of a magnetic metal, such as hard steel, and this, in turn, has its periphery formed to provide an even number of salient poles 38, the path of movement of which is in close proximity to the wall of the bulb or tube for their polarization by the magnetic flux of a 2 pole stator 40 that is engaged about the bulb or tube and is provided with a magnetizing coil 42, which is connected with a suitable potential source. The polar ring 36 may be made in one piece, if desired, in lieu of being made out of a series of laminations.

In lieu of the four horizontal and vertical deflecting plates as are usually employed in standard types of cathode ray tubes, but two angular deflecting plates 46 and 48 are here provided and these are mounted on the forward side of the rotor body 34 in centered and slightly spaced relation with respect to the forwardly directed end of the tubular rotor support 28 and to each other, the electron stream from the gun being directed through the tubular rotor support 20 to impinge on the image screen at the front end of the bulb or tube. These deflecting plates 46, 48, are supplied with sweep potentials through leads 50 and 52, respectively, which extend rearwardly through the rotor body 34 and connect with annular contacts 54 and 56, respectively, that are mounted on the hub 44, of the rotor. As shown, these contacts 54, 56, are shaped to fit over ribs formed in spaced relation on the hub portion 44,

for the rolling engagement therewith of grooved contact rollers 58 and 60, respectively. The roller contacts 58, 60, are mounted on resilient supports 62 and 64, respectively, extending inwardly from opposite points of securement to the wall of the bulb or tube. Leads 66 and 68 extend rearwardly from these supports 62, 64, respectively, through the supporting plug 24 and apertures 70, formed in the part 26 of the rotor support 28, for connection with suitable potential sources (not shown). Mounted within the bulb or tube part 12, is a metal band 72, which is positioned forwardly of the deflecting plates 46, 48, and constitutes a collector electrode to effect an electrostatic focusing of the image, an electrical connection 74 extending from the same, through the wall of the bulb or tube. The electrostatic effect produced by the band also tends to magnify the deflection of the electrons stream by the plates 46, 48.

In operation, with the bulb or tube arranged for turning in either direction through one revolution and its chargeable elements supplied with proper potentials, the moment of thus turning the bulb or tube will cause the rotor 34 to start up, the coil 42, of the stator 40, having been previously connected with a 60 cycle, A. C. source. With the rotation of the rotor 34, a sweep signal applied to the deflecting plates 46, 48, will likewise be rotated, without any accompanying flicker, and throughout the rotation of the rotor, it will cover the entire screen area, each complete revolution of the rotor completing two frames of the picture. The speed of rotation of the rotor 34 may range upward from 300 R. P. M., to produce any desired line and frame frequencies, and it can be varied by increasing the number of the poles 38, on the rotor 34, in the well known manner. After the image appears on the screen, it is only a matter of turning the bulb or tube, in the bearings 16, 18, until the image is right side up.

Having thus fully described my invention, it is to be understood that the disclosed embodiment of the same is subject to such limitations as may fall within the scope of the appended claims.

I claim:

1. In a television system of transmission and reception, a cathode ray tube mounted for turning movement, a pair of opposed deflecting plates mounted within the tube, and means for imparting a rotary motion to said deflector plates for likewise rotating a sweep signal impressed thereon during a turning movement of the cathode ray tube for producing circular scanning lines that are concentric to each other.

2. The invention as in claim 1, with the cathode ray tube mounted for turning movements in stationarily supported anti-friction bearings.

3. The invention as in claim 1, with the rotor of a synchronous motor mounted within the tube for imparting the required rotary motion to said deflecting plates.

4. The invention as in claim 1, with a tubular element supported axially within the tube for the passage of the electron stream emitted by the gun of the tube therethrough, and a rotor of a synchronous motor rotatable on said tubular element and having said deflecting plates mounted thereon to effect the required control of the electron stream.

5. In a television system of transmission and reception, a cathode ray tube supported for axial turning movements, a tubular element supported axially within the tube forwardly of the electron gun therein for the discharge of the electron stream from the gun therethrough, a rotor of a synchronous motor rotatable on said tubular element, and a pair of deflecting plates mounted on the forward side of said rotor about the like end of said tubular element, said deflecting plates rotating with said rotor for likewise rotating a sweep signal impressed thereon during a turning movement of said tube for producing circular scanning lines on the screen of the tube.

6. The invention as in claim 5, with the tube mounted for turning movements in stationarily supported anti-friction bearings and the said rotor mounted on like bearings supported on said tubular elements.

7. The invention as in claim 5, with the stator of the motor positioned exteriorly of the tube in cooperative relation with respect to the rotor thereof.

8. The invention as in claim 5, with a metal band positioned within said tube between the screen thereof and said deflecting plates for electrostatically focusing the image on the screen.

9. A cathode-ray tube mounted for axial turning movements, deflecting elements mounted for rotation within and relatively to said tube, and a synchronous motor for imparting motion to said deflecting elements to cause the electron stream generated within said tube to travel in concentric scanning paths.

10. The invention as in claim 9, with said cathode-ray tube supported in antifriction bearings.

11. The invention as in claim 9, with said deflecting elements mounted on the rotor of said motor and the rotor mounted in antifriction bearings within said tube.

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