May 25, 1943. J. N. DYER 2,319,805

TELEVISION

Original Filed Feb. 24, 1941

Fig. 1,

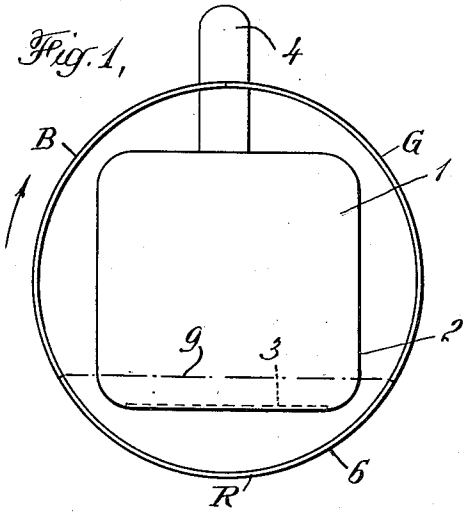


Fig. 4,

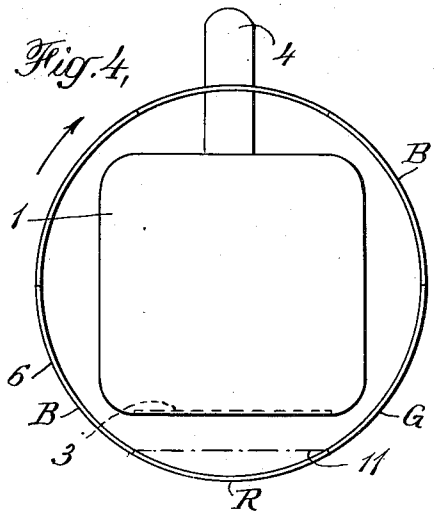


Fig. 2,

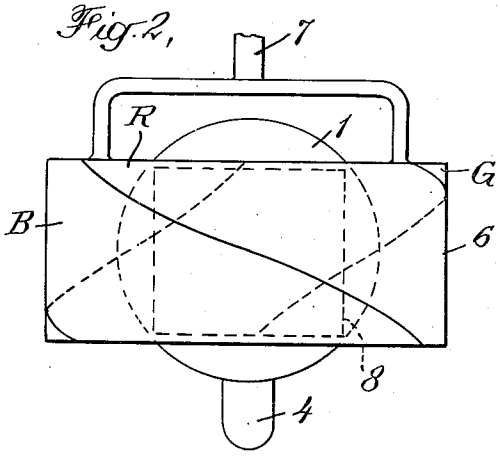


Fig. 5.

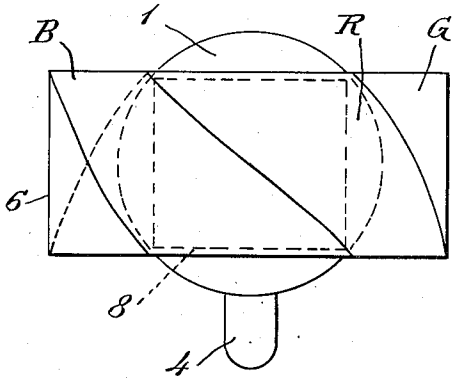
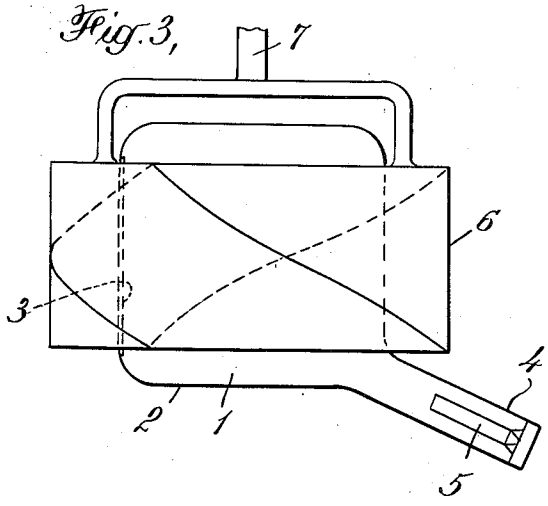


Fig. 3,



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2,319,805

TELEVISION

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Original application February 24, 1941, Serial No. 380,097. Divided and this application June 9, 1942, Serial No. 446,386

5 Claims. (Cl. 178—5.4)

This invention relates to television, especially to television in natural colors. The invention particularly relates to apparatus of the type employing rotating filter elements, and contemplates the provision of a form of rotating element and arrangement of the rotating element with respect to a cooperating scanning device which will yield a compact assembly adapted to be conveniently housed in a cabinet, etc.

In color television systems in which the object field is scanned successively in a plurality of colors and the signals transmitted to the receiver for reproduction, the use of rotating disks have heretofore been suggested. Suitable disks having segments of novel design are described in an application of Peter C. Goldmark, Serial No. 355,839, filed September 7, 1940, for "Color television." Such disks have been found to be quite satisfactory from the standpoint of operation. However, the diameter of the disk must in general be at least twice that of the scanning area, and the axis must be at one side of the scanning area. Hence this requirement is a limiting factor in the design of a cabinet For example, in a receiver employing a cathode-ray tube, the tube must be located at one side of the axis of the disk. If the cabinet is kept down to minimum dimensions, this means that the viewing area will be at one side of the cabinet. Also, the diameter of the disk determines the minimum width of the cabinet.

The present invention especially contemplates the provision of apparatus which will permit more freedom in the design of a compact, attractive cabinet.

The use of rotating filter drums instead of disks has been suggested in an application of Peter C. Goldmark, Serial No. 370,008, filed December 13, 1940, and entitled "Television."

In accordance with the present invention, a drum is provided having filter segments arranged around the peripheral surface thereof in the form of helices. With this construction the axis of rotation of the drum may be placed at right angles to the position it would have if the boundaries between segments were parallel to the axis. This permits a more convenient mechanical arrangement in some cases.

This application is a division of my application Serial No. 380,097, filed February 24, 1941.

The invention will be more fully understood by reference to the specific embodiment illustrated in the drawing and the following description thereof. In the drawing:

Figs. 1, 2 and 3 are plan, front and side elevation views, respectively, of a preferred embodiment employing a drum with helically shaped filter segments; and

Figs. 4 and 5 are plan and front views, respectively, of an embodiment similar to Figs. 1–3, and in which a 6-segment drum is employed instead of a 3-segment drum.

Referring now to Figs. 1–3, a cathode-ray receiver tube 1 is employed comprising a bulbous portion 2 at one end of which is the luminescent screen 3, and an elongated neck 4 projecting at an angle from the other end of the bulbous portion. The electron gun structure 5 is arranged within the neck 4 for supplying a scanning cathode-ray beam. Suitable deflecting means (not shown) are of course employed, and causes the beam to scan the area 8 from top to bottom (or vice versa) in horizontal side-by-side lines. A color filter drum 6 is arranged to encircle the bulbous portion of the cathode-ray tube. This general construction and arrangement has been suggested by Peter C. Goldmark and is described in his copending application filed February 24, 1941, Ser. No. 380,144, for "Television."

In accordance with the present invention, the filter drum is arranged to rotate about a vertical axis 7 and the filter segments are arranged around the peripheral surface of the drum in the form of helices. This helical arrangement of filter segments permits the drum to be rotated about a vertical axis while a given filter segment follows the line scanning in the vertical direction so that the lines are exposed through the proper filter segment as they are scanned. Also, the cathode-ray tube can be arranged with its elongated neck 4 extending from the bottom of the drum (or the top, if desired), rather than from the side thereof. Thus the arrangement may be advantageous from the standpoint of mechanical design and cabinet design in many cases.

Any suitable number of filter segments may be employed as desired. For three color reproduction, multiples of three will usually be desirable. In general the number of segments and the angular twist of each segment should be such that as the drum rotates the scanning lines are covered progressively as they are scanned, and so that when one field scanning is completed a filter segment of different color is in proper position to begin the next scansion. Although the arrangement and proportions of the helical segments may be varied widely to suit various conditions, the specific construction illustrated in Figs. 1–3 will be described for puropses of completeness.

Assume that the height of the filter drum is equal to the height of the scanning pattern plus 10% to allow for blanking (present standards). Each helical segment is arranged to twist through an angle of 120° from the top to the bottom of the drum. Then, if the drum is rotated at a uniform speed through 120° during a field-scanning period, the lines of the scanning area 8 will be progressively covered by, say, the red filter R as the lines are scanned uniformly from top to bottom. At the beginning of the next field scansion the green filter G will be in the position occupied by the red filter R in Fig. 2. Thus the lines will be progressively exposed through the green filter during that scanning period. By making the chord 9 subtended by a given filter somewhat greater than the width of the scanning area, suitable tolerances in lateral viewing angle, phasing, etc., may be obtained. Desired tolerances in the vertical direction may be obtained by increasing the height of the drum and prolonging the helical segments without changing the angular twist.

With three filter segments, the angular twist through which the filter extends in a scanning period can be other than that shown. For example, each segment could extend through 240°, in which case the drum would be rotated through 240° in a scanning period. With this arrangement, after a field scansion with one filter has been completed, the next adjacent filter will not be in position for the beginning of a scansion, but the second succeeding filter segment will be.

In general, it is believed preferable to arrange the filter segments so that in a height equal to that of the scanning area plus an allowance for blanking, each segment twists through an angle equal to the angle between adjacent filter segments. In this manner, the filter segments operate in succession, the speed of rotation is lowest, and maximum tolerances are obtained. However, for any given conditions the number of segments, degree of twist, speed of rotation, etc., can be selected to yield the desired result.

Figs. 4 and 5 illustrate a drum having six filter segments each twisting through ⅙ of the circumference of the drum in a height equal to that of the scanning area plus a distance to allow for blanking. In this specific embodiment the chord 11 of the segments is made substantially equal to the width of the scanning area to keep the diameter of the drum as small as possible. In general it will be desirable to somewhat increase the diameter of the drum and circumferential length of the segments in order to provide desired tolerances.

When drums having helically shaped segments are employed with receiver tubes possessing substantial after-glow, the circumferential width of the segments may be made sufficient so that width of the scanning area viewed through the segment is greater than the length of a scanning line. This causes the full length of a number of lines to be observed simultaneously through the same filter, and provides a tolerance for after-glow, phasing, viewing angle, etc.

It will be apparent that the drums having helically shaped segments are not confined to the particular assemblies shown. In general, any type of scanning device could be employed. If desired the drums could be arranged to completely encircle the tube or arranged so that the tube is entirely outside the drum. They could also be employed with transmitter scanning devices such as electronic tubes. Also, instead of true helices, approximate forms could be employed.

Broadly, the drum has helical segments of different optical characteristics, and is arranged so that the segments traverse the scanning area in a direction which makes a substantial angle with the direction of low-frequency scanning, and the boundaries between segments are at a substantial angle with respect to the direction of movement of the segments. Although a drum is preferred, other moving elements could be employed if desired.

It will be understood that the present invention is not limited to the mere details of construction and arrangement of the parts disclosed, since many modifications may be made by those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. Color television apparatus which comprises, in combination, a scanning device adapted to scan a two-dimensional scanning area in a plurality of side-by-side lines at field-scanning frequency, a movable element having a plurality of color filter segments arranged therealong, means for continuously moving said element to cause said segments to successively traverse said scanning area at a substantial angle with respect to the direction of low-frequency scanning and at substantially field-scanning frequency, the length of said segments in the direction of said lines being at least equal to the length of the lines and the boundaries between segments being at an angle with respect to the direction of movement thereof so that lines of said area are progressively obscured by a segment as it traverses the scanning area.

2. Color television apparatus which comprises, in combination, a scanning device adapted to scan a two-dimensional scanning area in a plurality of side-by-side lines at field-scanning frequency, a rotatable color filter drum having a plurality of different color filter segments arranged along the peripheral surface thereof, said drum being positioned so that as it rotates said segments traverse said scanning area in a direction which is at a substantial angle with respect to the direction of low-frequency scanning, the length of said segments in the direction of said lines being at least equal to the length of the lines and the boundaries between segments being at an angle with respect to the direction of movement thereof so that lines of said area are progressively obscured by a segment as it traverses the scanning area.

3. Color television apparatus which comprises, in combination, a scanning device adapted to scan a two-dimensional scanning area in a plurality of side-by-side lines at field-scanning frequency, a rotatable color filter drum having a plurality of different color filter segments arranged along the peripheral surface thereof, said drum being positioned to rotate about an axis substantially parallel with the direction of the low-frequency scanning with the peripheral surface thereof adjacent the scanning area, the circumferential length of each of said segments being adapted to obscure a complete line at the scanning area and the segments being arranged substantially helically so that lines of said area are progressively obscured by a segment as it traverses the area.

4. In a color television receiver, in combination, a cathode-ray receiver tube having a luminescent screen therein and means for successive-

ly reproducing images on said screen in a plurality of side-by-side lines at field-scanning frequency, a rotatable color filter drum having a plurality of different color filter segments arranged along the peripheral surface thereof, said drum being positioned to rotate about an axis substantially parallel with the direction of the low-frequency scanning with the peripheral surface thereof adjacent the scanning area, means for driving said drum at a substantially uniform speed, the circumferential length of each of said segments being adapted to obscure a complete line at the scanning area and the segments being arranged substantially helically, the angular twist of said helical segments being selected to cause lines of said area to be progressively obscured by a segment at substantially the speed at which the scanning beam traverses the area in the low-frequency direction.

5. In a color television receiver, in combination, a cathode-ray receiver tube having a luminescent screen therein and means for successively reproducing images on said screen in a plurality of side-by-side lines at field-scanning frequency, a rotatable color filter drum having a plurality of different color filter segments arranged along the peripheral surface thereof, said drum encircling at least a portion of said cathode-ray tube and being positioned to rotate about an axis substantially parallel with the direction of the low-frequency scanning with the peripheral surface thereof adjacent the scanning area, means for driving said drum at a substantially uniform speed selected to cause said segments to traverse said image area at substantially field-scanning frequency, the circumferential length of each of said segments being adapted to obscure a complete line at the scanning area and the segments being arranged substantially helically, the angular twist of said helical segments being selected to cause lines of said area to be progressively obscured by a segment at substantially the speed at which the scanning beam traverses the area in the low-frequency direction.

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