Sept. 14, 1943. P. C. GOLDMARK 2,329,194

TELEVISION

Filed Jan. 9, 1941

Fig. 1.

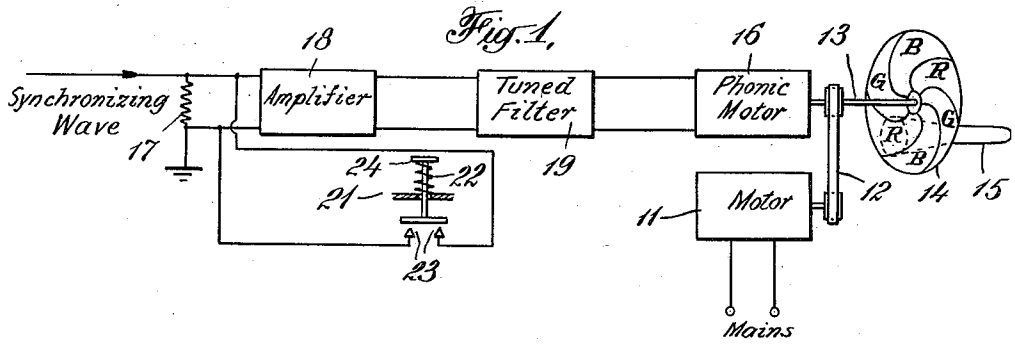


Fig. 2.

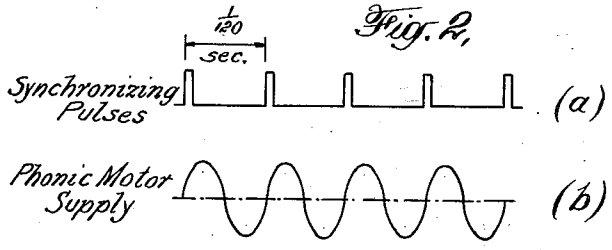


Fig. 3.

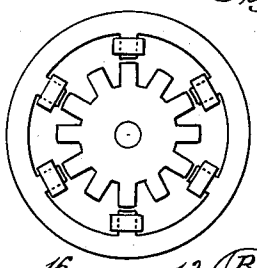


Fig. 4.

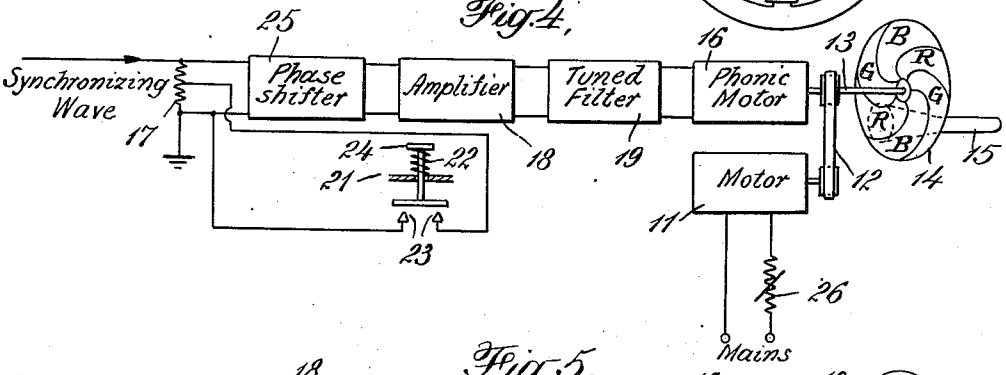
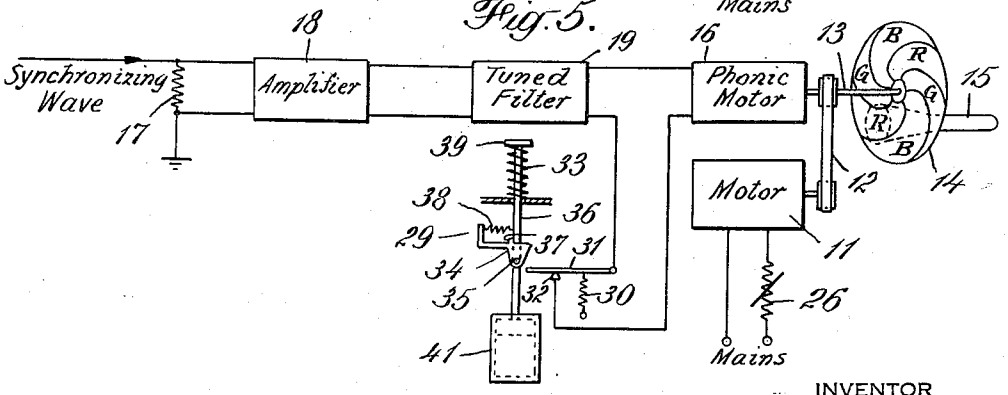


Fig. 5.



INVENTOR
Peter C. Goldmark
BY
Dennis, Davis, Marvin & Edmonds
ATTORNEYS

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TELEVISION

Peter C. Goldmark, New York, N. Y., assignor to Columbia Broadcasting System, Inc., New York, N. Y., a corporation of New York

Application January 9, 1941, Serial No. 373,713

17 Claims. (Cl. 178—5.4)

This invention relates to color television receivers, particularly to the type employing a rotating filter element, such as a trichromatic disk. It is an object of the invention to provide means for maintaining the rotating element in proper synchronism, and means for permitting a convenient change of the phase of the rotating filter element with respect to the reproduced images so that the different color filters may be correctly associated with their respective images.

To obtain television in natural colors it has been suggested to transmit successively images corresponding to the several primary color aspects of an object field, reproduce corresponding images at the receiver, and view successive images through successive filters of the corresponding colors. In one such system the images are successively formed on the same area of a cathode ray receiving tube and a rotating trichromatic disk is placed in front of the image area. Such a system requires not only that the disk rotate in proper synchronism with the successive images, but also requires that the disk be properly phased with respect to the images so that corresponding filters are associated with their respective images.

For example, the disk may be properly phased with respect to the scanning beam in the low frequency direction so that successive images are exposed through successive filters without having part of one image exposed through one filter and another part of the image exposed through another filter. Even so, while one image is being reproduced, say the image corresponding to the red aspect, a green filter may be in front of the image and hence the wrong color will be viewed.

The present invention accordingly provides means for maintaining synchronism between the rotating element and the reproduced images and also means for quickly and conveniently changing the phase between disk and image so that the proper color filter may be associated with the proper image.

In accordance with the invention a motor of the asynchronous type is coupled to the rotatable filter element and supplies a major portion of the power necessary to rotate the element. Also coupled to the filter element is a second motor of the synchronous type, which is advantageously a phonic motor. This motor is driven by a synchronizing alternating current having a frequency definitely related to that of the successive images. The synchronous motor maintains proper synchronism between the rotating element and the received images, while the major portion of the driving power is supplied by the asynchronous motor. Thus only a relatively small amount of power need be obtained from the incoming signal.

In order to permit changing the phase of the rotating element and thereby associating the proper color filters with corresponding images, means are provided for breaking the circuit to the synchronous motor, or for reducing the power supplied thereto to an extent sufficient to remove its synchronizing ability. The filter element will thereupon rotate at a non-synchronous speed, thus causing a filter of given color to be successively associated with images of different color aspect. The synchronizing circuit may be reestablished as soon as the filters are associated with images of corresponding color aspect. Proper association may be determined by means of a color chart transmitted from the transmitting station, or by observing scenes whose proper colors are readily apparent.

Advantageously the asynchronous motor is arranged so that when the synchronous motor circuit is broken, the filter element will rotate above synchronous speed. In such case the synchronous motor may actually act as a brake. Of course, if desired, the motors could be designed so that the asynchronous motor alone would rotate the disk somewhat under synchronous speed, and the synchronous motor would supply the additional power to bring it into synchronism.

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

Fig. 1 is a diagram illustrating a specific embodiment in which a pushbutton switch is provided for establishing the proper correlation between filter segments and successive images;

Fig. 2 is a diagram illustrating the derivation of the phonic motor supply current from the synchronizing pulses;

Fig. 3 is a cross section illustrating a form of phonic motor;

Fig. 4 is a diagram illustrating another specific embodiment in which means are provided for only partially reducing the synchronizing action of the phonic motor, and for shifting the phase of the disk with respect to incoming pulses; and

Fig. 5 is another modification employing a time delay switch for causing the phase to change

by fairly uniform amounts at each push of a control button.

Referring to Fig. 1, an asynchronous motor 11 is coupled by means of belt 12 to drive the shaft 13 of the color filter disk 14. Motor 11 is advantageously an induction motor, but may be an A. C.-D. C. motor, etc. as desired. The disk 14 may be of the type illustrated in my copending application Serial No. 355,839, filed September 7, 1940, and may be placed in front of a cathode ray tube 15 so that successive segments of the filter disk successively traverse the image area of the cathode ray tube in the low frequency direction. It will be understood however that the present invention is not confined to any specific type of disk, nor even to a rotating filter element in the form of a disk. For example, a rotating filter drum may be employed if desired.

A synchronous motor 16 here shown as a phonic motor, is also coupled to drive disk 14. It is advantageous to mount the disk on the shaft of the synchronous motor so that the orientation of the disk and rotor of the motor will not change after the initial assembly.

The power for driving the synchronous motor 16 is advantageously obtained from the received television signals. In accordance with present day standards, synchronizing pulses form a part of the transmitted signals, and are employed to generate or control the generation of corresponding sawtooth-scanning waves. The pulses used in the present invention are advantageously those corresponding to the field frequency, where it is desired to use a scanning system in which succcessive filters correspond to successive image fields. Of course the apparatus could be designed to operate with synchronizing pulses which are a multiple or a sub-multiple of the field frequency. The synchronizing pulses may be separated from the remainder of the television signal in any desired manner, and may then be supplied to the input resistance 17 and passed through the amplifier 18 and tuned filter 19 to the phonic motor 16. Amplifier 18 may be omitted if the synchronizing pulses have been previously amplified sufficiently.

In accordance with the well known Fourier analysis, a succession of synchronizing pulses as shown in Fig. 2*a* possess a fundamental frequency equal to that of the pulses, as shown in Fig. 2*b*. Therefore if filter 19 is sharply tuned to this fundamental frequency, the resultant wave supplied to the phonic motor will be approximately sinusoidal. However, a convenient manner of obtaining the synchronizing current is to make use of the low-frequency vertical sawtooth-scanning wave. This sawtooth wave is properly associated with the scanning of successive images, since it effects vertical scanning at field frequency. When such a sawtooth wave is applied to the amplifier 18 and tuned filter 19 a suitable alternating-current synchronizing wave for the phonic motor may readily be obtained. Other means for obtaining the synchronizing wave for the synchronous motor with a frequency definitely related to that of successive images may of course be employed if desired.

The present invention may be employed with the systems of color television disclosed in my copending application Serial No. 355,840, filed September 7, 1940. In Fig. 2 of that application a system is shown employing image fields which recur at the rate of 120 per second. Fig. 2*a* of the present application illustrates synchronizing pulses recurring at intervals of 1/120 second, and may be used in the system of the application just mentioned. The present invention is of course not limited to the systems described in this copending application. The successive images may be partial interlaced images or complete images.

A phonic motor is advantageous for use as the synchronous motor, since it functions satisfactorily on a relatively small input. Such a motor is shown in cross section in Fig. 3. With an image field frequency of 120 fields per second and a 6-segment disk as shown in Fig. 1, the shaft should rotate at 1200 R. P. M. With the phonic motor on the same shaft, it also should rotate at 1200 R. P. M. Thus, with an A. C. supply of 120 cycles per second, bearing in mind that a phonic motor normally moves two teeth per cycle, twelve teeth will be required on the rotor. Of course, a phonic motor can be operated on a multiple of the fundamental frequency, and hence a motor having only six teeth may be employed with more or less success.

With other scanning systems, the number of teeth may be selected in accordance with the frequency of the synchronizing pulses, the number of segments on the filter element, etc., to yield the proper speed of rotation of the filter element.

With twelve teeth on the rotor of the phonic wheel and six segments on the filter disk, as in Figs. 1 and 3, it is seen that the wheel may be synchronized with the incoming pulses so that the segments may be half way between their normal positions with respect to the successive images. With six teeth on the rotor and six segments on the disk, this possibility is avoided and only the proper color relationship need be obtained. In either case, however, the means for changing the phase hereafter described will permit obtaining the proper relationship.

Switch 21 is provided in order to change the phase of the disk with respect to the received images so that the proper filters may be associated with respective images. The switch is preferably positioned to be readily accessible to the user, for example on the front panel of the receiver. Switch 21 is normally held in the open position shown by suitable means such as compression spring 22, thus allowing the synchronizing pulses or sawtooth-scanning wave to pass to the amplifier 18. When the button 24 of the switch is depressed, contacts 23 close and short circuit resistance 17, thus removing the supply to the phonic motor 16. The synchronizing effect of the phonic motor is thereupon removed and the disk is rotated at a non-synchronous speed by motor 11.

When the correct phase relation has been obtained by observation, the pushbutton may be released, thereby automatically restoring the supply of synchronizing current to the phonic motor and causing the motor to re-establish synchronization. The disk will thereafter rotate in proper synchronism and phase with the images, thereby yielding the correct color rendition. It will be noted that the original orientation of the disk with respect to the rotor of the phonic motor insures that the segments traverse the image area in proper phase relation with the line scanning of the area, except for the possible displacement of one pole when a 12-pole rotor and a 6-segment disk are used. The one pole displacement, as well as the displacement necessary to yield correct colors, are readily taken care of by the means just described.

The speed of asynchronous motor 11 and the coupling between the motor and the shaft 13 are selected so that, when the phonic motor 16 is de-energized by depressing pushbutton 24, the disk will rotate at a non-synchronous speed. It is advantageous to have the non-synchronous speed only slightly different from synchronous speed so that the color of the images will be changed slowly, thereby facilitating the determination of when the filter segments are associated with images of corresponding color aspect. Obtaining a proper non-synchronous speed may be facilitated by employing a pulley of adjustable diameter on the motor shaft.

Referring now to Fig. 4, an arrangement is shown which is similar to that of Fig. 1. However, instead of having the switch completely cut off the synchronizing current to the phonic motor, the pushbutton switch 21 of Fig. 4 short circuits only a portion of the input resistance 17 when contacts 23 are closed. The portion of resistance 17 which is short circuited is selected to be sufficient to weaken the phonic motor to such an extent that it can no longer maintain synchronism. However, sufficient synchronizing current is supplied to the phonic motor so that the motor still has a tendency to maintain synchronism. With proper adjustment, the phonic motor may be caused to slip relatively slowly from pole to pole in jerks. This action assists in determining when the proper color relationship has been obtained, whereupon the pushbutton is released and the phonic motor re-establishes synchronization.

In Fig. 1 the orientation of the filter disk 14 on the shaft of the phonic motor 16 is relied upon to cause a given filter segment to traverse the image area in proper phase with the scanning of the lines of the corresponding image. In some cases, inaccuracies in securing the disk to the shaft may cause a given segment to traverse the image area somewhat out of phase with the lines being scanned. In Fig. 4, an electrical phase shifter 25 is provided to take care of this situation. This phase shifter may be of any suitable construction, and suitable designs are known in the art. It is preferably adjustable, at least by a service man.

In operation, the line-by-line scanning of a given image is definitely related to the incoming synchronizing pulses and vertical low-frequency sawtooth wave. Therefore, by shifting the phase of the alternating synchronizing current supplied to the phonic motor 16 with respect to the phase of the synchronizing pulses or sawtooth wave, the phase of the disk 14 may be adjusted with respect to the line-by-line scanning. Ordinarily the disk may be sufficiently accurately oriented on the shaft so that the phase shifter 25 may be designed to provide only a few degrees of shift.

The position of the phase shifter may of course be other than as shown. In general, it may be placed at any suitable point between the incoming synchronizing wave and the phonic motor, so that the relative phase between wave and current to the motor may be changed.

In Fig. 4 an impedance 26 is provided in the supply line to the asynchronous motor 11, for conveniently adjusting the speed of the motor. This impedance is conveniently a resistance, as shown, but may be a reactor, etc., if desired. It is advantageously of the semi-fixed variety which may be initially adjusted as desired, but is not intended to be continually adjusted by the user. The straight bar through resistance 26 is intended to represent this type of resistance. The impedance may be employed instead of a pulley of variable diameter. Or, both variable diameter pulley and impedance may be employed. In such case, the resistance could be calibrated to take care of different main voltages.

In Figs. 1 and 4, the current to the phonic motor is reduced by short circuiting all or part of the input resistance 17. This is very convenient, but it will be understood that other means for reducing the current to the motor (even to breaking the circuit) may be employed if desired.

Referring now to Fig. 5, an embodiment is shown in which the circuit of the phonic motor is broken for a predetermined time interval for each push of the pushbutton switch 29. Switch 29 has a contact arm 31 and cooperating contact point 32 which are normally held in closed position by tension spring 30. The switch shaft 36 is normally held in the raised position shown by the compression spring 33. A switch actuating segment 34 is pivoted at 35 to the shaft 36 of the switch. Segment 34 has an abutment 37 which is normally held against the shaft 36 by tension in spring 38. When the button 39 is depressed, the switch actuating segment 34 passes below the switch contact arm 31, spring 38 allowing the segment 34 to pivot so as to pass by the arm 31. When the pushbutton is released, the switch actuating segment 34 bears against the lower side of switch arm 31 and breaks the circuit between 31 and 32. The proportions of the elements are selected so that when the switch returns to its original position as shown, the switch arm 31 has slipped past the end of segment 34 and contact is re-established with switch point 32. A dash pot arrangement 41 is provided to delay the upward motion of the switch when the pushbutton 39 is released, thereby providing a definite time interval between the opening and closing of the circuit between the switch arm 31 and switch point 32.

It will therefore be seen that when the pushbutton has been pressed and released, the circuit to the phonic motor is broken for a definite time interval. The duration of the interval may be selected at will by properly proportioning the elements of the switch, particularly the strength of the restoring spring 33 and the resistance of the dash pot 41. In the case of the 12-pole, 6-segment arrangement of Figs. 1 and 3, it is advantageous to select the time interval so that the rotor will slip two poles at each actuation of the switch, thereby shifting the disk by one color segment at each actuation of the pushbutton. With a 6-pole, 6-segment arrangement, slipping one pole per actuation would be advantageous. Generally it is advantageous to shift a sufficient number of poles to cause the segments of a given color to shift successively to images of different color aspect at successive actuations of the switch. If desired, of course, the time interval can be selected to shift any desired number of poles per actuation.

It will be understood that the specific form of the delay switch 29 shown in Fig. 5 is given by way of example only. Many forms of such switches are known to those in the art and a suitable one may be selected as desired. Instead of completely breaking the circuit to the phonic motor, the delay switch could be employed to merely reduce the synchronizing action of the phonic motor as explained in connection with Fig. 4. If the delay action switch 29 were em-

ployed to short circuit the whole or a portion of the input resistance 17, as in Figs. 1 or 4, the switch would be constructed so that the contacts are normally open, and are closed for a definite interval by the pressing and releasing of the pushbutton.

In the foregoing figures, instead of mounting the disk on the shaft of the synchronous motor, the disk could be mounted on a separate shaft and coupled to the motor. Preferably a fixed coupling is employed, gears for example, so that a constant phase relationship between disk and synchronous motor is maintained. It is desirable to select the number of poles of the synchronous motor and the coupling to the disk so that by slipping one or more poles a shift from one to another color filter is obtained without changing the phase of the color filters with respect to the line-by-line scanning of the images with which they are associated. With a 6-segment disk and 1:1 coupling, a 6-pole or 12-pole phonic motor gives this result.

Various features shown or described in connection with one figure of the drawing may be combined with those of the other figures, as will be apparent from the discussion hereinbefore.

Instead of obtaining the synchronizing current for the phonic motor by simple amplification and filtering of the synchronizing pulses or sawtooth wave, a synchronizing current can be obtained in other ways if desired. Broadly, the synchronizing current should be so related to the image frequency that synchronizing the rotation of the filter element with the synchronizing current will yield the proper synchronization between filter element and the succession of images. Similarly, many circuits may be devised for removing or reducing the synchronizing action of the synchronous motor.

In the foregoing the term "synchronous motor" has been employed to include a braking as well as a driving action, as will be understood from the description.

Pushbutton switches have been shown and described since they are especially suitable for the purpose. However, other types of switches may 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. In a television cathode-ray tube receiver adapted to receive television signals, having electronic means for reproducing successive images to be viewed and a rotatable element to be rotated in synchronism with said successive images, the combination which comprises an asynchronous motor coupled to drive said rotatable element, a synchronous motor coupled to said rotatable element, means for deriving from received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing means for alternatively removing and reestablishing the synchronizing action of said synchronous motor, said phasing means being biased to establish said synchronizing action, the speed of the rotatable element during said removing of the synchronizing action being non-synchronous so as to permit proper phasing of the rotatable element with respect to said successive images.

2. In a color television cathode-ray tube receiver for receiving television signals, having electronic means for reproducing successive images to be viewed and a rotatable color filter element having successive sections adapted to present successive images in successive colors, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing means for alternatively removing and reestablishing the synchronizing action of said synchronous motor, said phasing means being biased to establish said synchronizing action, the speed of the rotatable element during said removing of the synchronizing action being non-synchronous so as to permit correlating said sections with the corresponding images.

3. In a color television cathode-ray tube receiver for receiving television signals including synchronizing pulses, having electronic means for reproducing images corresponding to different color aspects successively on a selected image area and a rotatable color filter element having a plurality of different color filter sections arranged therearound and positioned so that said sections successively traverse said image area, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from the synchronizing pulses of said received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, mans for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing means for alternatively removing and reestablishing the synchronizing action of said synchronous motor, the speed of the rotatable element during said removing of the synchronizing action being non-synchronous, said phasing means being biased to establish said synchronizing action, whereby the filter sections of the rotatable element may be associated with images of corresponding color aspect.

4. In a color television cathode-ray tube receiver for receiving television signals including synchronizing pulses, having electronic means for reproducing images corresponding to different color aspects successively on a selected image area and a rotatable color filter element having a plurality of different color filter sections arranged therearound and positioned so that said sections successively traverse said image area, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from the synchronizing pulses of said received television signals an alternating-current synchronizing wave having a frequency definitely

related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing switch means for alternatively reducing the value of the synchronizing wave supplied to the synchronous motor below that necessary to maintain synchronization and reestablishing the value necessary to effect synchronization, the speed of the rotatable element during said reducing being non-synchronous, said phasing switch means being biased to establish the value necessary to effect synchronization, whereby the filter sections of the rotatable element may be associated with images of corresponding color aspect.

5. In a color television cathode-ray tube receiver for receiving television signals, having electronic means for reproducing images corresponding to different color aspects successively on a selected image area and a rotatable color filter element having a plurality of different color filter sections arranged therearound and positioned so that said sections successively traverse said image area, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element to cause the filter sections to traverse the image area at the frequency of successive images, a phasing switch means for alternatively reducing the value of the synchronizing wave supplied to the synchronous motor below that necessary to maintain synchronization and reestablishing the value necessary to effect synchronization, the speed of the rotatable element during said reducing being non-synchronous, said phasing switch means being biased to establish the value necessary to effect synchronization, the number of poles of said synchronous motor being selected so that slipping an integral number of poles associates the filter sections with images of different color aspects with the filter sections in phase with the line-by-line scanning of respective associated images, whereby the filter sections of the rotatable element may be associated with images of corresponding color aspect.

6. In a color television cathode-ray tube receiver for receiving television signals including synchronizing pulses, having electronic means for reproducing images corresponding to different color aspects successively on a selected image area and a rotatable color filter element having a plurality of different color filter sections arranged therearound and positioned so that said sections successively traverse said image area, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a phonic motor coupled to said rotatable color filter element, means for deriving from the synchronizing pulses of said received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said phonic motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing switch means for alternatively reducing the value of the synchronizing wave supplied to the phonic motor below that necessary to maintain synchronization and reestablishing the value necessary to effect synchronization, the speed of the rotatable element during said reducing being non-synchronous, said phasing switch means being biased to establish the value necessary to effect synchronization, whereby the filter sections of the rotatable element may be associated with images of corresponding color aspect.

7. In a color television cathode-ray tube receiver for receiving television signals including synchronizing impulses, having electronic means for reproducing images corresponding to different color aspects successively on substantially the same image area and a rotatable color filter disk having a plurality of different color filter segments arranged therearound and positioned so that said segments successively traverse said image area, in which color filter segments are to be associated with images of corresponding color aspect, the combination which comprises an asynchronous motor coupled to drive the filter disk, a phonic motor fixedly coupled to the filter disk, said asynchronous motor supplying the major portion of the driving power for said disk, means for deriving from the synchronizing pulses of said received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said phonic motor to thereby synchronize the disk with said images and cause the filter segments to traverse the image area at the frequency of successive images, and phasing switch means for alternatively reducing the value of the synchronizing wave supplied to the phonic motor below that necessary to maintain synchronization and reestablishing the value necessary to effect synchronization, the speed of the disk during said reducing being non-synchronous, said phasing switch means being biased to establish the value necessary to effect synchronization, whereby the filter sections of the disk may be associated with images of corresponding color aspect.

8. In a color television cathode-ray tube receiver for receiving television signals including field frequency synchronizing pulses, having electronic means for reproducing images corresponding to different color aspects successively on substantially the same image area and a rotatable color filter disk having a plurality of different color filter segments arranged therearound and positioned so that said segments successively traverse said image area, the combination which comprises an asynchronous motor coupled to drive the filter disk, a phonic motor fixedly coupled to the filter disk, means for deriving from said field frequency synchronizing pulses an alternating-current synchronizing wave of corresponding frequency, means for normally supplying said synchronizing wave to said phonic motor to thereby synchronize the disk with said images and cause the filter segments to traverse the image area at the frequency of successive images, and phasing switch means manually operable to reduce the value of the synchronizing wave supplied to the phonic motor below that necessary to maintain synchronization and automatically operating on the release thereof to reestablish the value necessary to effect synchronization, the speed of the disk during said reducing being above synchronous speed, the number of poles of said phonic motor being selected so that slipping an integral number of poles associates the filter segments with images

of different color aspects with the filter segments in phase with the line-by-line scanning of respective associated images, whereby the filter sections of the disk may be associated with images of corresponding color aspect.

9. In a color television cathode-ray tube receiver for receiving television signals, having electronic means for reproducing successive images to be viewed and a rotatable color filter element having successive sections adapted to present successive images in successive colors, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, an electrical phase shifter connected in the circuit of said synchronizing wave to shift the phase of the rotatable element with respect to said images, and phasing means for alternatively removing and reestablishing the synchronizing action of said synchronous motor, said phasing means being biased to establish said synchronizing action, the speed of the rotatable element during said removing of the synchronizing action being non-synchronous so as to permit correlating said sections with the corresponding images.

10. In a color television cathode-ray tube receiver for receiving television signals including field frequency synchronizing pulses, having electronic means for reproducing images successively on a selected image area and a rotatable color filter disk having a plurality of different color filter segments arranged therearound and positioned so that said segments successively traverse said image area, in which different color filter segments are to be associated with images of corresponding color aspect, the combination which comprises an asynchronous motor coupled to drive the filter disk, a phonic motor fixedly coupled to the filter disk, means for deriving from said field frequency synchronizing pulses an alternating-current synchronizing wave, means for normally supplying said synchronizing wave to said phonic motor to thereby synchronize the disk with said images and cause the filter segments to traverse the image area at the frequency of successive images, an electrical phase shifter in circuit with the supply to said phonic motor to shift the phase of the disk with respect to said images, and phasing switch means for alternatively reducing the value of the synchronizing wave to the phonic motor below that necessary to maintain synchronization and reestablishing the value necessary to effect synchronization, the speed of the disk during said reducing being non-synchronous, said phasing switch means being biased to establish the value necessary to effect synchronization, whereby the filter segments of the disk may be associated with images of corresponding color aspect.

11. In a color television cathode-ray tube receiver for receiving television signals, having electronic means for reproducing successive images to be viewed and a rotatable color filter element having succesive sections adapted to present successive images in successive colors, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing means for alternatively reducing and reestablishing the synchronizing action of said synchronous motor, said phasing means being biased to establish said synchronizing action, the synchronizing action of the synchronous motor during said reducing being insufficient to maintain synchronization but sufficient to limit substantially the difference between the non-synchronous speed at which the asynchronous motor drives the filter element and synchronous speed, whereby the filter sections may be readily associated with the corresponding images.

12. In a color television cathode-ray tube receiver for receiving television signals including synchronizing pulses, having electronic means for reproducing images corresponding to different color aspects successively on a selected image area and a rotatable color filter element having a plurality of different color filter sections arranged therearound and positioned so that said sections successively traverse said image area, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a phonic motor coupled to said rotatable color filter element, means for deriving from the synchronizing pulses of said received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said phonic motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing switch means for alternatively reducing the value of the synchronizing wave to the phonic motor below that necessary to maintain synchronization and reestablishing the value necessary to effect synchronization, said phasing switch means being biased to establish the value necessary to effect synchronization, the value of the synchronizing wave during said reducing being sufficient to limit substantially the difference between the non-synchronous speed at which the asynchronous motor drives the filter element and synchronous speed, whereby the filter sections of the rotatable element may be associated with images of corresponding color aspect.

13. In a color television cathode ray tube receiver for receiving television signals including field synchronizing pulses, having electronic means for reproducing images successively on a selected image area and a rotatable color filter disk having a plurality of different color filter segments arranged therearound and positioned so that said segments successively traverse said image area, in which different color filter segments are to be associated with images of corresponding color aspect, means for driving said filter disk which comprises an asynchronous motor coupled to drive the filter disk, a phonic motor coupled to the filter disk, means for deriving from said field synchronizing pulses an alternating-current synchronizing wave, means for normally supplying said synchronizing wave to said phonic motor to thereby synchronize the

disk with said images and cause the filter segments to traverse the image area at the frequency of successive images, said asynchronous motor being adapted to drive the disk at a speed substantially above synchronous speed in the absence of said synchronizing wave, and phasing switch means for alternatively reducing the value of the synchronizing wave to the phonic motor below that necessary to maintain synchronization and reestablishing the value necessary to effect synchronization, said phasing switch means being biased to establish the value necessary to effect synchronization, the value of the synchronizing wave during said reducing being sufficient to limit substantially the speed at which the asynchronous motor drives the disk, whereby the filter segments of the disk may be readily associated with images of corresponding color aspect.

14. In a color television cathode-ray tube receiver for receiving television signals, having electronic means for reproducing successive images to be viewed and a rotatable color filter element having successive sections adapted to present successive images in successive colors, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing switch means actuable to remove the synchronizing action of said synchronous motor, said phasing switch means being constructed and adapted to automatically reestablish the synchronizing action of the synchronous motor a selected interval after the removal thereof, the speed of the rotatable element during said removing of the synchronizing action being non-synchronous so as to permit correlating said sections with the corresponding images.

15. In a color television cathode-ray tube receiver for receiving television signals including synchronizing pulses, having electronic means for reproducing images successively on a selected image area and a rotatable color filter element having a plurality of different color filter sections arranged thereabout and positioned so that said sections successively traverse said image area, in which different color filter sections are to be associated with images of corresponding color aspect, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, a synchronous motor coupled to said rotatable color filter element, means for deriving from received television signals an alternating-current synchronizing wave having a frequency definitely related to the frequency of successive images, means for normally supplying said synchronizing wave to said synchronous motor to thereby synchronize the rotation of said element with the frequency of successive images, and phasing switch means actuable to reduce the value of the synchronizing wave to the synchronous motor below that necessary to maintain synchronism, said phasing switch means being constructed and adapted to automatically reestablish the value of the synchronizing wave necessary to effect synchronization a predetermined interval after said reducing, the speed of said rotatable element during said interval being non-synchronous and the interval being correlated with the non-synchronous speed so that successive actuations of the phasing switch means successively changes the color in which images of one color aspect are exhibited, whereby the filter sections of the rotatable element may be associated with images of corresponding color aspect.

16. In a television cathode-ray tube receiver adapted to receive television signals, having electronic means for reproducing successive images to be viewed and a rotatable element to be rotated in synchronism with said successive images, the combination which comprises an asynchronous motor coupled to drive said rotatable element, braking means coupled to said rotatable element, means utilizing received signals for producing a synchronizing current for said braking means, means for normally supplying said synchronizing current to said braking means, and phasing means for alternatively removing and reestablishing the synchronizing action of said braking means, said phasing means being biased to establish said synchronizing action, the speed of the rotatable element during said removing of the synchronizing action being non-synchronous so as to permit proper phasing of the rotatable element with respect to said successive images.

17. In a color television cathode-ray tube receiver for receiving television signals, having electronic means for reproducing images corresponding to different color aspects successively on a selected image area and a rotatable color filter element having a plurality of different color filter sections arranged therearound and positioned so that said sections successively traverse said image area, the combination which comprises an asynchronous motor coupled to drive said rotatable color filter element, braking means coupled to said rotatable element, means utilizing received signals for producing a synchronizing current for said braking means, means for normally supplying said synchronizing current to said braking means, and a phasing switch manually operative to alter the value of synchronizing current supplied to said braking means to thereby remove the synchronizing action thereof, said phasing switch being biased to supply normal synchronizing current to said braking means, the speed of the rotatable color filter element during said removal of the synchronizing action being non-synchronous so as to permit associating the filter sections thereof with images of corresponding color aspect.

PETER C. GOLDMARK.