Dec. 31, 1940. K. SCHLESINGER 2,226,990

DEFLECTING DEVICE

Filed July 17, 1934 2 Sheets-Sheet 1

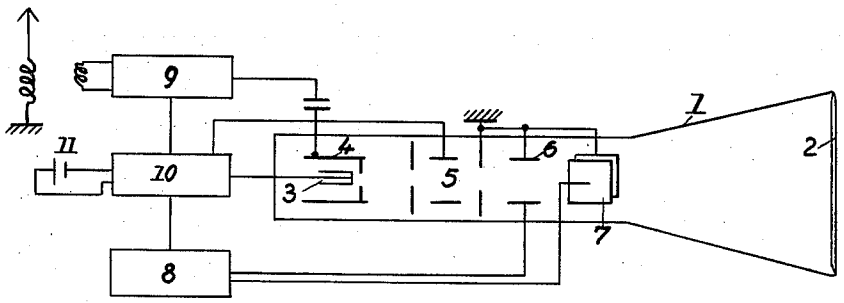


Fig 1.

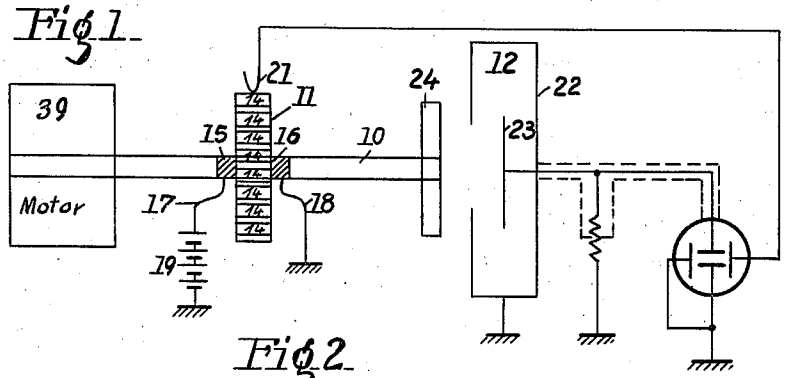


Fig 2.

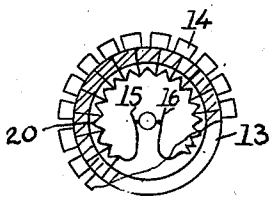


Fig 3.

Inventor:
Karl Schlesinger

Dec. 31, 1940. K. SCHLESINGER 2,226,990

DEFLECTING DEVICE

Filed July 17, 1934 2 Sheets-Sheet 2

Fig 4

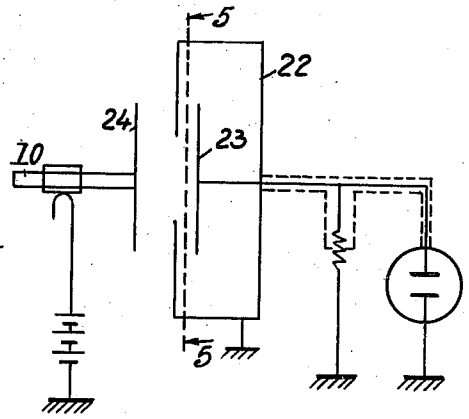


Fig 5

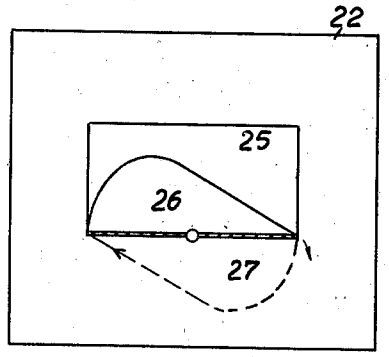


Fig 6

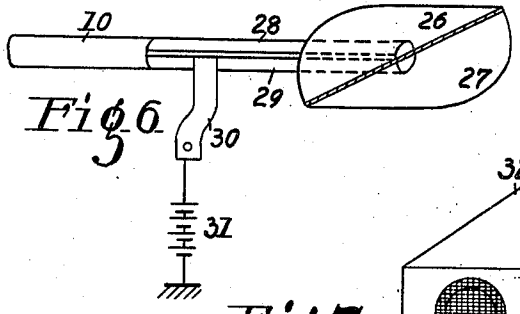
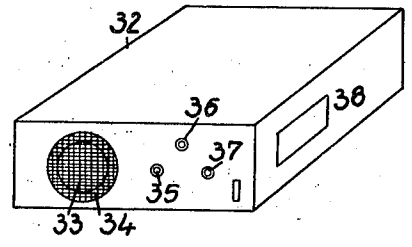


Fig 7



Inventor:

Kurt Schlesinger

Patented Dec. 31, 1940 2,226,990

UNITED STATES PATENT OFFICE

2,226,990

DEFLECTING DEVICE

Kurt Schlesinger, Berlin, Germany, assignor, by mesne assignments, to Loewe Radio, Inc., a corporation of New York

Application July 17, 1934, Serial No. 735,603
In Germany July 21, 1933

2 Claims. (Cl. 178—7.7)

The object of the invention is a portable television apparatus with Braun tube, which requires a very low battery supply, is of low weight, and requires little space, and which, therefore, is particularly well suited for military and police purposes.

The arrangement according to the invention comprises:

1. A Braun tube with preferably small image screen and short bulb, which preferably may be completely enclosed,

2. A small wireless receiver (preferably of the audion type) of the kind known per se,

3. An apparatus driven by a small motor for producing exactly saw-tooth deflecting potentials for deflecting the cathode ray in two directions vertical to each other, and

4. A buzzer transformer which, in conjunction with a small low-volt battery, supplies all of the voltages necessary for operation of the arrangement.

According to the invention, the image deflecting voltage generator is so constructed that it is possible to begin the scanning of different sequent pictures with different lines (in correspondence with the transmitter) and to adjust as desired the sequence of the lines to be scanned, so that secret communications may be received without any difficulty.

A form of embodiment of the arrangement according to the invention is illustrated by way of example in the drawings, in which

Fig. 1 shows diagrammatically the disposal of all parts, whilst in

Fig. 2 there is illustrated the deflecting voltage generator employed according to the invention as a whole,

Fig. 3 shows the generator producing the image-deflecting voltage, whilst in

Figs. 4–6 there is shown the generator producing the line deflecting voltage. In the drawings:

1 is the Braun tube with the fluorescent screen 2, the cathode 3, the control element 4 controlling the intensity of the ray, the electron-optical system 5 comprising the negatively biased cylinder and a plate-shaped anode and the pairs of deflecting plates 6 and 7; 8 is the deflecting voltage generator producing the line and image deflecting voltages, 9 a wireless receiver, and 10 the buzzer transformer, which supplies the high potentials necessary for operation of the apparatus (for example, 1000 volts anode potential and all requisite biases). 11 is the low-volt battery, which satisfies the complete energy requirement of the apparatus. The transformer arrangement may for example consist of a low voltage source, an interrupter, a transformer and a preferably thermionic rectifier, the primary of the transformer being connected over said interrupter (which may preferably be of the known magnetic type) to said low voltage source, the secondary of said transformer being connected to the rectifier circuit. In the rectifier circuit there may be provided a resistance, and the different potentials necessary for the supply of the Braun tube, of the deflecting voltage generators, etc., may be tapped at different points of said resistance.

The deflecting voltage generator comprises a motor 39, which drives the shaft 10 which in turn actuates in direct fashion or if desired through the medium of an intermediate gear the apparatus 11 and 12 producing the deflecting voltages.

The apparatus producing the image deflecting voltage consists of a collector ring 13, which is furnished with a large number of segments 14 insulated one against the other. The segments 14 correspond in number with the number of lines in the television image to be produced. The single segments are connected with corresponding points of a resistance 20, which conveniently may be arranged within the ring, and the two ends of which are connected through the medium of the pick-up rings 15 and 16 and the wipers 17 and 18 with the potential source 19. At the single segments 14 there is accordingly a potential, which is equal to the potentials at the different connection points of the resistance 20. The connection points are preferably selected in such fashion that the potential of the single segments increases in strictly linear form in relation to each other, i. e. in such a way that between each two following segments there is normally the same difference in potential. In this manner it is possible without difficulty to produce an exactly steplike image-deflecting potential.

Now according to the invention the arrangement is such, that it is possible to interchange the connection points of the single segments as desired. It is sufficient, for example, for this purpose to furnish the segments with connection bushes, and to weld on to the single connection points of the resistance wires furnished with plugs, in order by simply exchanging the plugs to obtain a desired sequence of the lines, and accordingly to permit of the reception of transmissions in cipher, i. e. the reception of transmissions wherein for keeping the transmission secret, in the transmitter the single pictures to be transmitted are scanned in such a way that

not adjacent lines are scanned one after the other, for example in such a way that at first there is scanned line 12th, then line 1st, then line 3rd and so on. The sequence of the lines to be scanned being known only to the desired receiver, the reception of the transmission by undesired receivers is safely prevented.

Since the adjustment to a certain combination does not call for anything else beyond the changing about of a few plugs, an adjustment of this nature may always be performed without trouble with the requisite speed.

Naturally the adjustment of different combinations may also be performed in other fashion structurally, based on the idea according to the invention.

The image deflecting potential is picked up at the segments 14 by the wiper 21 and passed in direct fashion to the deflecting plates of the Braun tube.

The line voltage generator 12 may consist of a condenser with a stationary plate 23 screened by an earthed casing 22, and a plate 24, which is set into rotation by the shaft 10.

As disclosed by Fig. 5, the side of the casing 22 directed towards the rotating plate 24 possesses a recess 25. The rotating plate 24—as shown in Fig. 6—consists of two preferably reniform plates 26 and 27, which are insulated against each other and are conductively connected with contacts 28 and 29 mounted on the shaft 10 and likewise insulated one against the other. The wiper 30 is connected with the battery 31, which supplies the line-deflecting potential (i. e., with corresponding points of the transformer arrangement 10).

The operation of the arrangement is as follows:

The potential at the stationary plate 23 connected with the deflecting plate of the Braun tube is determined by the size of the particular part of the plate 24 that is not screened off at the respective moment. In the position of the plate 24 shown in Fig. 5 the part 26 is connected to the potential source 31 and completely visible. In consequence at this moment there is the maximum deflecting voltage at the deflecting plates of the Braun tube. When the plate 24 additionally rotates in the direction of the arrow the wiper 30 passes from the contact 28 to the contact 29. In consequence the plate 26 is disconnected from and the plate 27 connected to 31. The potential at the deflecting plates accordingly drops instantaneously to zero, to increase gradually by the extent to which the now connected plate 27 is rotated into the field of view, etc., etc.

By suitable shaping of the plates 26 and 27 it is possible to accomplish without difficulty that the potential at the deflecting increases in perfectly linear fashion, so that an exactly sawtooth deflecting potential is produced.

The adjustment of the phase occurs in the most simple fashion by rotation of the components, i. e., possibly the casing 22 or the wiper 21.

With correct embodiment of the motor it is quite possible without difficulty to keep the reception correct in phase over a relatively long period.

It is also possible to provide special means for synchronising the motor, for example to provide a Thyratron, which is controlled by the synchronising impulses, and the discharge of which controls the motor 39 by the use of an auxiliary winding or the like. The use of synchronising means of this nature, however, represents a comparatively considerable complication of the arrangement and is not absolutely essential.

The total arrangement may be mounted in a comparatively small casing, which is either screened off itself, or the single parts of which are employed as screening means.

One of the essential advantages of the arrangement according to the invention resides in the high insensitiveness thereof against thermal and mechanical strains.

In Fig. 7 there is shown in perspective a form of embodiment of the arrangement according to the invention.

In the same:

32 is the preferably metallic container, 33 the Braun tube which is arranged somewhat to recede and is protected by the grid 34. 35, 36 and 37 are operating buttons; at 38 there is shown the arrangement for adjustment of the cipher. This device may conveniently be arranged to recede in the apparatus casing. In the recess there is conveniently provided an incandescent lamp, which facilitates the adjustment.

To avoid burning of the luminous screen means are provided, which prevent the cathode ray to be switched on before the deflecting circuit begins to function.

Since the deflecting potentials in the arrangement according to the invention are produced by the motor 39, the arrangement may be such that by means of the operating lever merely the motor is connected, and that this itself switches on the cathode ray.

This may be obtained for example by providing on the wheel of the motor a member, which, for example a metallic brush, upon rotation of the wheel is pressed outwards by the centrifugal force and which in this case presses against a metallic ring surrounding said wheel and being arranged in operative relationship to said member. The metallic member may be connected with the potential source and said ring may be connected to the cathode or to the anode of the Braun tube. Conveniently a spring may be provided attracting said metallic member to said wheel as long as the wheel is not rotated.

Further, the arrangement may be such, that the Wehnelt cylinder can at no time become more positive than the cathode.

In order to avoid safely any unnecessary consumption of power, an arrangement may also be provided (for example a time switch), which stops the arrangement automatically after a certain time when the radio apparatus does not supply the potentials necessary for reception (for example, therefore, when the transmitter is disconnected).

Time switches which may be used for the purpose of the invention are already, however, and form per se no part of the invention.

Preferably the Braun tube is mounted elastically in the container and is closed off towards the outside by a wire netting or by a sheet of bullet-proof glass.

All of the tubes of the receiver should be mounted elastically for example with the use of holders consisting of rubber and be particularly protected against the microphone effect, for example with the use of elastic caps consisting of a metal or of rubber and coating preferably the whole of the glass bulb of the valves.

The whole of the box containing the Braun tube and the electronic valves as well as the deflecting voltage generator and the other parts of

the arrangement should be constructed as far as possible to be soundproof. For this purpose all of the parts of the box should be tightly fitting and provided at the inside with a coating of sound proof material such as for example cork.

According to the invention the entire arrangement may be arranged in a container, which should not exceed the size of 30.20.15 cm.

I claim:

1. A device for producing deflection voltage variations for a cathode ray beam which is developed in a cathode ray tube comprising a pair of beam deflecting electrodes, a conducting shield member having a rectangular opening therein, a stationary condenser plate positioned at one side of the shield member and opposite the rectangular opening, a second condenser plate positioned at the other side of the shield member, said second condenser plate including two separate conducting portions of similar shape and area insulated from each other along a substantially straight line, means for rotating the second condenser plate about an axis normal to the plane of the plate and passing through approximately the middle of the line of separation between the two separate portions of the plate, the axis substantially coinciding with one edge of the rectangular opening in the shield, each of said portions having an area less than the area of the rectangular opening, a source of potential, means for connecting one terminal of the source of potential to one of the beam deflecting electrodes, and to the shield, means for connecting the stationary condenser plate to the other beam deflecting electrode, and means including a commutator for intermittently and alternately connecting the other terminal of the source of potential to the two separate portions of the said second condenser plate.

2. A device for producing deflection voltage variations for a cathode ray beam which is developed in a cathode ray tube comprising a pair of beam deflecting electrodes, a conducting shield member having an opening therein, the opening being bounded by at least one straight edge of a predetermined length, a stationary condenser plate positioned at one side of the shield member and opposite the opening therein, a second condenser plate positioned at the other side of the shield member, said second condenser plate including two separate conducting portions of similar shape and area insulated from each other along a substantially straight line of a length substantially corresponding to the length of the straight edge of the opening in the shield, means for rotating the second condenser plate about an axis normal to the plane of the plate and passing through approximately the middle of the line of separation between the two separate portions of the plate, the axis substantially coinciding with the straight edge of the opening in the shield, a source of potential, means for connecting one terminal of the source of potential to one of the beam deflecting electrodes and to the shield, means for connecting the stationary condenser plate to the other beam deflecting electrode, and means including a commutator for intermittently and alternately connecting the other terminal of the source of potential to the two separate portions of the said second condenser plate.

KURT SCHLESINGER.