June 16, 1931. G. WALD 1,810,692

RECEIVING APPARATUS FOR TELEVISION

Filed June 24, 1929 2 Sheets-Sheet 1

Fig. 1.

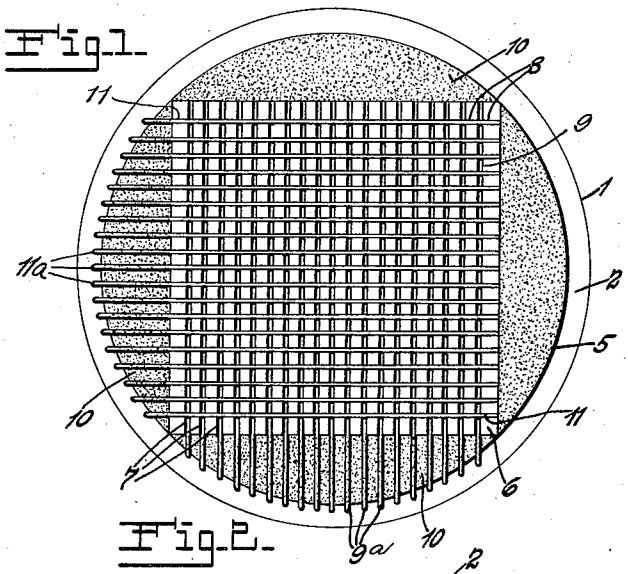


Fig. 2.

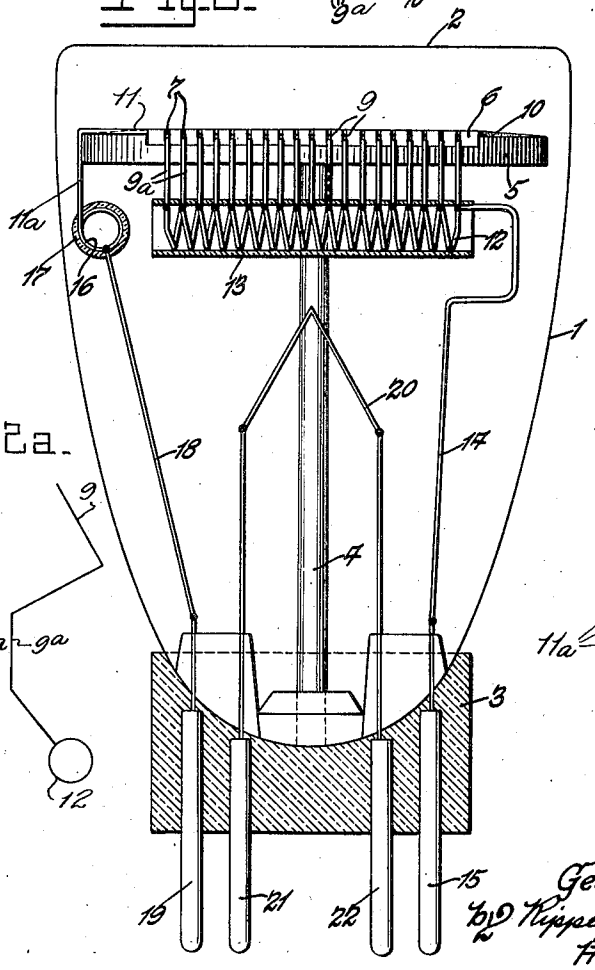


Fig. 2a.

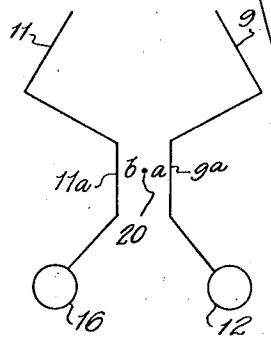
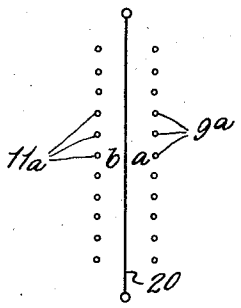


Fig. 2b



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RECEIVING APPARATUS FOR TELEVISION

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Fig. 3.

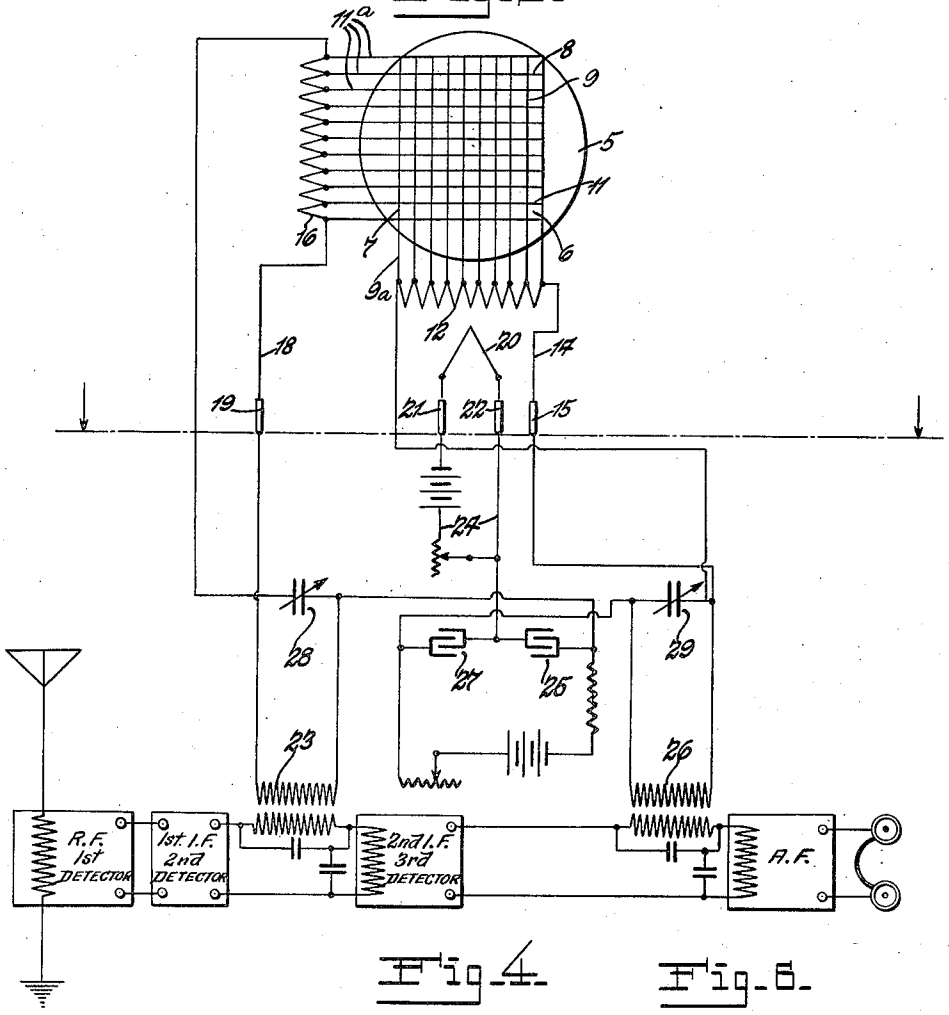


Fig. 4.

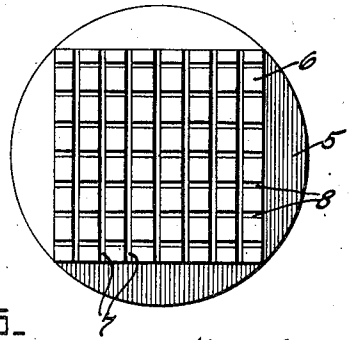


Fig. 6.

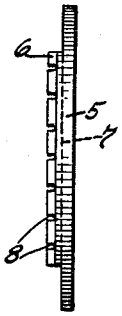


Fig. 7.

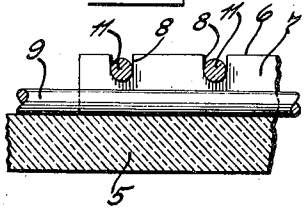
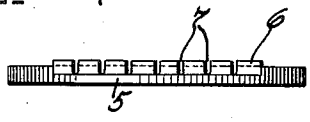


Fig. 5.



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Patented June 16, 1931 1,810,692

UNITED STATES PATENT OFFICE

GEORGE WALD, OF BELLEVILLE, ILLINOIS

RECEIVING APPARATUS FOR TELEVISION

Application filed June 24, 1929. Serial No. 373,076.

This invention relates to receiving apparatus for television, and more particularly to the receiving tube by which the image is reproduced.

The object of this invention is to provide a variable frequency distributing device located within a glow lamp similar to that described in my United States Letters Patent No. 1,754,491, dated April 15, 1930, so that the lamp will include a plurality of contact points adapted to connect the lamp with the external circuit.

Another object of this invention is to simplify the construction of the image receiving frame for use in the apparatus as disclosed in my patent aforesaid.

The detailed improvements resulting from the present invention will be clearly apparent from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a plan view of the receiving tube.

Fig. 2 is an elevation of said tube.

Figs. 2*a* and 2*b* illustrate the space relation between the common filament and the coil taps of the electrodes between which resonance is produced by the variable frequency applied to the lamp circuit.

Fig. 3 is a general diagrammatic view of the receiving circuit connected into the tube.

Fig. 4 is a detailed view of the support for the anode and cathode elements.

Fig. 5 is an edge view of said support in horizontal position.

Fig. 6 is an edge view at right angles to Fig. 5.

Fig. 7 is an enlarged detail view showing the mounting of the anode and cathode wires in the support.

In the embodiment of the invention illustrated in the drawings, the receiving element is shown as including a glow lamp comprising a glass tube 1 having a flat upper face 2, the bottom of said tube being supported in a base 3, adapted to be used in a standard type of socket. The tube 1 is either exhausted to provide a vacuum tube or is filled with helium or similar gas to a pressure of a few millimeters. Within the tube is an upright support 4 secured in the base member and at the top of said upright support is a table 5. The table 5 is arranged to carry a reproducing frame on its upper face, which frame comprises a member 6 formed from insulating and non-combustible material having a spaced series of longitudinal slots 7 running in one direction and a spaced series of transverse slots 8 running in the opposite direction.

The slots 7 are substantially twice the depth of the slots 8 with a small margin for clearance between the anode and cathode wires. The anode wires 9 are laid in the slots 7 and have their ends 9*a* imbedded in insulating material 10 extending around the frame member 6. In the slots 8 are a series of transverse wires 11 likewise having their ends imbedded in the insulating material 10.

Due to the proportioning of the slots 7 and 8 there is a slight clearance between the intersecting wires. The wires 9 constitute the anode elements, and the wires 11 constitute the cathode elements. Each of the anode wires extends out from the end of the frame and is connected in a choke coil 12 so that the several anode wires tap into said coil at different points. The choke coil 12 is an impedance coil designed so that when impressed with a variable frequency current, a resonance is produced from the first to the last tap in succession. The coil 12 is encased in a shell 13 of fire-proof insulating material and shielded so as to exclude any external magnetic or static action. The lead 14 from the coil extends downwardly through the tube and through the base piece 3 and terminates in a contact prong 15.

The cathode wires connect separately into the choke coil 16, of the same design as the coil 12, and insulated by an insulating shell 17 similar to the shell 13. The lead-off wire 18 from the coil 16 terminates in a contact prong 19 that extends through the base of the tube. Within the tube 1 is a filament 20 connected with contact prongs 21 and 22. The tube thus described includes in a unitary structure the reproducing frame, the cathode and anode elements, the choke coils for said elements, and the filament 20. Since the anodes and cathodes and the filament internal

circuits terminate in contact prongs the tube may be mounted in a socket whereby the internal elements are connected with the external circuits.

The electrodes 9*a* and 11*a* from the impedance coils 12 and 16, respectively, are preferably arranged in the tube 1 in two parallel lines, as shown in Figs. 2*a* and 2*b*. The filament 20 is located between the electrodes and spaced equidistant from said electrodes 9*a* and 11*a*.

The circuit as disclosed in my U. S. Patent No. 1,754,491, has been modified to a slight extent due to the inclusion of choke coils for controlling the anode and cathode elements. Therefore, it will lend to clearance briefly to trace the circuit of the present application. A current for example of 200 to 205 kilocycles is received at a secondary 23, which circuit is completed through the choke coil 16, then, by selection, through the several cathode taps 11*a* successively, then through the by-pass filament circuit, thence to the condenser 25 and back to the secondary 23. The variable frequency current received across the transformer 23 requires different impedance in its circuit to produce resonance and this is supplied through the choke coil 16. The various taps of the coil 16 connected with the cathode wires produce the variable impedance, each cathode wire being in parallel with the remaining cathode wires but having a successively increasing impedance in their circuit. Therefore, it follows that the first tap of the coil will take the highest frequency and the last tap the lowest frequency to produce resonance through it, or to cause a maximum current to flow through its circuit.

The anode elements are similarly controlled from a secondary 26 in which circuit is connected the condenser 27, which is in series with the by-pass filament 20, and the several anode elements through the choke coil 12.

Therefore, for example, a current of 100 to 105 kilocycles impressed on the secondary 26 is completed through the choke coil 12 then, by selection, through the several anode wires successively, then through the by-pass filament circuit 24, thence to the condenser 27 and back to the secondary 26.

It will be noted that the secondary 23 has a variable condenser 28 connected across its terminals and that the secondary 26 has a variable condenser 29 connected across its terminals. The purpose of the variable condensers 28 and 29 is to synchronize the receiving circuits with the sending circuit so that, by adjustment of said condensers, the image may be centered in the reproducing frame by coordinating the variable frequency impressed on the secondaries in synchronism with the sending circuit.

It will therefore be apparent that the small spaces between the intersecting points of the anode elements 9 and the cathode elements 11 constitute ohmic resistances which are connected in parallel with the ohmic resistances between the taps 9*a*, the space *a*, filament 20, the space *b*, and the taps 11*a* (Fig. 2*a*). The current in the main circuits, therefore, will divide itself between the former and the latter paths producing glow points across the intersection of the anodes 9 and the cathodes 11. As the frequency supplied to the circuits is variable, only a single crossing point will have the maximum current flowing across it, and, hence, only one glow point at a time will be brighter than the remaining glow points, but since the resonant current will at all times be proportional to the television current it follows that the image will be reproduced by a series of bright points on the frame 6.

It will be unnecessary to describe in detail the primary circuit of the transformers, for impressing the variable frequencies on the secondaries 23 and 26 respectively, as the same has been fully described in my U. S. Patent No. 1,754,491.

It should be understood that while I have illustrated a radio receiving primary circuit, that the variable frequency may be impressed upon the secondaries 23 and 26 by a direct wire connection between the primaries of the receiving apparatus and the secondaries of the transmitting apparatus, the said primaries of the receiving apparatus cooperating with said secondaries 23 and 26. Therefore, the invention is applicable to the transmission of pictures by radio or by direct wire connections between the transmitter and receiver. The invention is also applicable to the transmission of still pictures as well as to television and to the transmission either by radio or direct wire connection, and it should be understood that this scope of the invention is contemplated.

I am aware that the invention may be modified without departing from the spirit and scope thereof. I do not limit myself to the exact construction shown and described, nor to the exact circuits mentioned in the specification, but what I claim and desire to secure by Letters Patent is:—

1. A receiving element for reproducing images comprising a sealed tube, a frame supported in said tube, a plurality of intersecting wires supported in said frame, one series of wires constituting anode elements and the other series constituting cathode elements, choke coils within the tube connected respectively with the said anode and cathode elements, terminals for said coils extending exteriorly of said tube, and means for connecting said terminals into an external energizing circuit.

2. A receiving element for reproducing images comprising a sealed tube, a frame supported in said tube, a plurality of intersecting wires supported in said frame, one series of

wires constituting anode elements and the other series constituting cathode elements, choke coils within the tube connected respectively with the said anode and cathode elements, a by-pass filament supported within the tube, terminals for said coils and for said filament supported exteriorly of said tube, and means for connecting said terminals into an external energizing circuit.

3. A receiving element for reproducing images comprising a sealed gas filled tube having its upper wall flat and constituting a screen, a frame supported horizontally in the tube near the top thereof and below the flat wall of the tube, a longitudinal series of wires supported in said frame, transverse series of wires supported in said frame, said wires constituting anode and cathode elements respectively, a choke coil tap-connected to the several anode elements, a choke coil tap-connected to said cathode elements, and contact prongs extending exteriorly of the tube and connected respectively with said coils, whereby said coils may be connected with an external energizing circuit.

4. A receiving tube for receiving electrically transmitted images, comprising a gas filled tube, a base member connected with said tube, intersecting series of anode and cathode wires supported in the tube, an impedance coil having taps thereof connected with the anode wires respectively, an impedance coil having taps thereof connected with said cathode wires respectively, and means for connecting said coils externally of the tube with a variable frequency energizing circuit.

GEORGE WALD.