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2,790,161

TUNING INDICATOR

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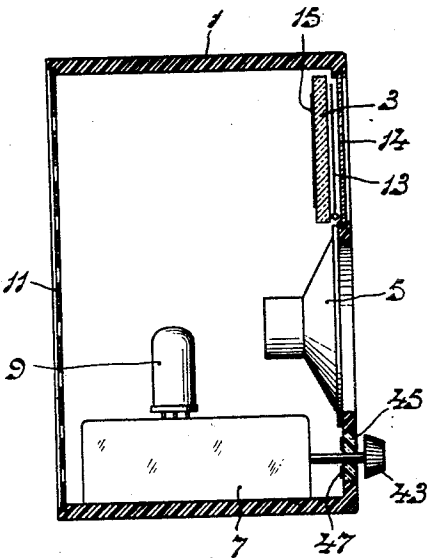


Fig. 1

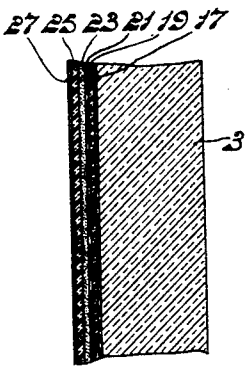


Fig. 2

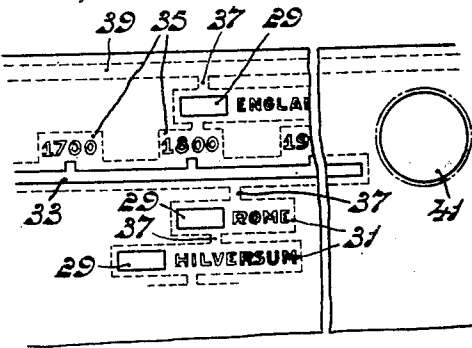


Fig. 3

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AGENT

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TUNING INDICATOR

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2 Claims. (Cl. 340—202)

This invention relates to illuminated sign-bearing plates, particularly suitable as scale dials for use in radio receivers.

Such scale dials and illuminated name plates, illuminated signs, clock dials or the like are usually illuminated by means of light entering the dial laterally or by means of one or more light sources fitted in a light chamber arranged behind the dial. In such devices, uniform and sufficiently bright illumination of the whole dial usually involves a considerable power consumption and, moreover, the fairly large size of such a chamber frequently constitutes a disadvantage.

According to the invention said disadvantages are avoided by illuminating the plate through the radiation of a layer of solid material (a phosphor) in an electrical alternating field set up between two conducting layers acting as electrode (electro-luminescence), a mask in the form of the negative of the desired sign being arranged in front of the layer of solid material. The use of electro-luminescence secures a perfectly even illumination and the negative mask yields a quiet, non-dazzling, sharp image. Moreover, the power consumption is reduced as will be explained hereinafter.

To this end the electrical alternating field preferably acts on the layer of solid material substantially only where the mask passes light. This is achieved by providing that at least one of the layers acting as electrode mainly extends only where the mask passes light.

In order that the invention may be readily carried into effect it will now be described in greater detail with reference to the accompanying drawing, given by way of example, in which—

Fig. 1 shows in vertical cross-section a radio-receiver equipped with a scale dial according to the invention, and Figures 2 and 3 are detail views of said dial.

The receiver shown in Fig. 1 comprises a cabinet 1 made, for example, from synthetic resin. The upper portion of the front panel of this cabinet is provided with a rectangular opening behind which a glass scale dial 3 is provided. The cabinet 1 further contains the usual component parts such as a loudspeaker 5, a chassis 7 for electron-discharge tubes 9 and is closed at the back by means of a rear panel 11, for example consisting of cardboard. In front of the scale dial 3 a pointer 13 is movable in the usual manner and protected by a glass plate 14 fitting the opening of the cabinet 1.

Provided on the back of the scale dial 3 is a system of thin layers 15 shown on an exaggerated scale in cross-section in Fig. 2. From right to left this system successively comprises a very thin (less than 1μ) transparent electrically conductive layer 17 of tin oxide, a layer of insulating, transparent synthetic resin 19 (10 to 20 μ thick), a mask consisting of a thin, opaque and non-conductive lacquer layer 21 in the form of a negative sign of the scale, a luminescent layer 23 ("phosphor" layer) which may, for example, mainly consist of zinc sulphide embedded in a suitable binder, a second insulating layer

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25 of synthetic resin and an electrically highly conducting layer, for example a silver layer 27.

Upon applying a suitable A. C. voltage (excitation potential) to the layers 17 and 27, which acts as electrode, the layer 23 becomes luminescent by the action of the electrical alternating field set up between the electrodes 17 and 27. This phenomenon is generally termed "electroluminescence." The light passing through the apertures of the lacquer layer 21 forms a positive image of considerable and uniform brightness of the scale, which is visible at the front of the scale dial.

The excitation potential—which should preferably have a frequency of at least 1000 c./s.—may, for example, be produced by means of a separate oscillator, for example a tube oscillator supplied from the receiver, the capacitor made up of the two electrodes 17 and 27 and the intermediate layers constituting the capacity of the oscillatory circuit of this oscillator.

Without taking special steps, said capacity and the currents flowing in the oscillatory circuit and hence also the losses may be considerable. In order to reduce these losses in the plate it is advisable to expose the "phosphor" layer 23 to the alternating field only where the mask 21 passes light. This is achieved by providing the phosphor only at said areas and preferably by mainly confining thereto one of the electrode layers, preferably the layer 27, thus reducing the capacity at the same time.

Fig. 3 shows part of the scale dial with apertures in the mask 21 in the form of blocks 29 marking the transmitter stations, captions 31 and bands 33 with adjacent wavelength indications 35. The form of the electrode layer 27 is indicated in broken lines. As may be seen from the drawing, this layer is provided only at the blocks 29, captions 31 and so on, so that the surface of the electrode and the capacity of the layer system 10 can be much smaller. The parts of the layer 27 are electrically interconnected through narrow extensions 37 and may be connected to a supply strip 39 provided adjacent the edge of the glass plate 3. The transparent electrode 17 may constitute a continuous layer which preferably does not cover the strip 39.

In this manner the capacity of the layer system 15 can be kept so low as to permit the frequency of the supply voltage to be increased with impunity to above the range of reproduction of the receiver, for example above 10,000 c./s., thus substantially avoiding the risk of trouble due to the excitation potential.

The scale dial may carry an insulated part 41 of the layer 27, to which part is applied a voltage which depends upon the accuracy of the tuning to a transmitter, the brightness of the patch 41 being an indication of correct tuning.

If several wave-bands are marked on the dial, their associated parts of the electrode 27 may be insulated from one another and connected to contacts of the wave-range switch in order that solely the wave-band marking in use shall be illuminated each time. The use of different phosphors for marking permits particular parts to be illuminated in different colours.

The voltages set up between the electrodes 17 and 27 are preferably of the order of 200 to 300 volts. In connection with safety requirements it is desirable to mount the scale dial 3 in the cabinet in such a manner that its back is not accessible from without. In the case illustrated this is achieved by means of the glass plate 14 which also safeguards the pointer 13.

At variance with Fig. 2 the lacquer layer 21 may rest directly on the layer 17 acting as electrode and contact it electrically. The layer of lacquer then employed is electrically conductive and adds to the conductivity of the layer 17.

It is further possible to let in a transparent part 45 in

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the wall of the cabinet 1 behind the control knobs of the receiver, for example behind the knob 43, shown in Fig. 1, said part 45 carrying at the back a luminescent layer system 47 of the type similar to the system 15, thus providing a luminous back-ground against which the knob 43 is silhouetted, which may facilitate the control.

What is claimed is:

1. An illuminated legend-bearing scale dial plate for a radio receiver comprising at least two conductive layers, a solid radiation material therebetween, an electrical alternating field between said two conductive layers, a negative mask positioned in front of the layer of solid radiation material, said electrical alternating field acting on said layer of solid material only where said mask passes light to electro-luminesce the same, an insulated part on said scale dial serving as an indicator, the bright-

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ness thereof being the function of correct tuning, and a voltage being applied to said insulated part which depends upon the accuracy of the tuning of the receiver to a transmitter.

2. An illuminated legend-bearing scale dial plate for a radio receiver as set forth in claim 1 wherein said solid radiation material which is rendered luminous is provided as a background in the proximity of at least one of the control knobs of said receiver against which surface the knob is silhouetted.

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