PUBLISHED
MAY 25, 1943.
BY A. P. C.

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DEVICE FOR ENLARGING THE IMAGE OF RAPID OCCURRENCES, PARTICULARLY OF THE OSCILLOGRAM OF A BRAUN TUBE
Filed Nov. 26, 1940

Serial No.
367,194

Fig.1

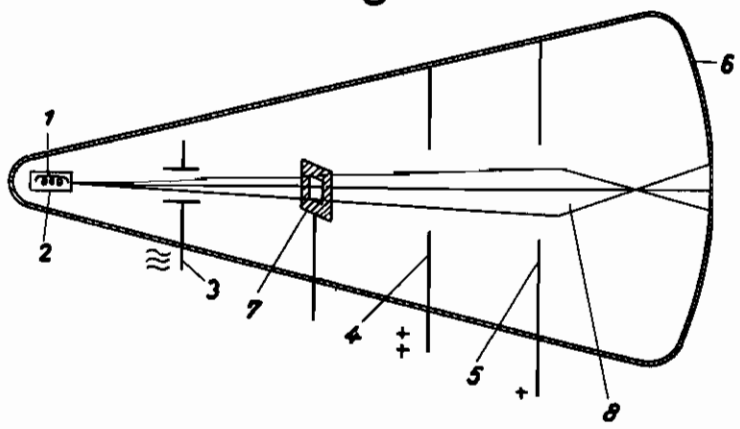
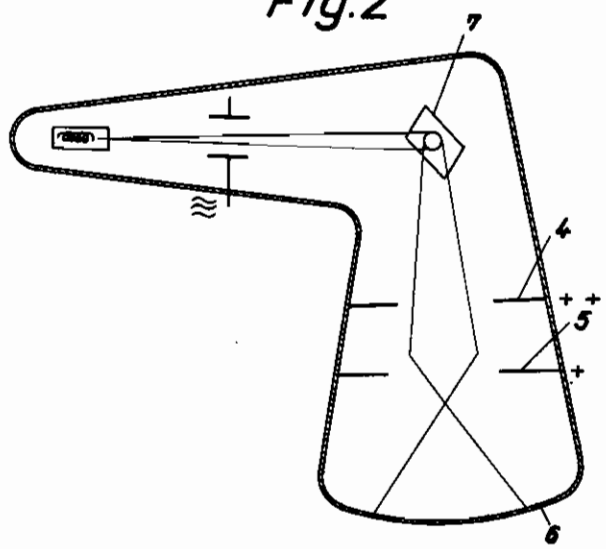


Fig.2



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Published May 25, 1943

Serial No. 367,194

ALIEN PROPERTY CUSTODIAN

DEVICE FOR ENLARGING THE IMAGE OF RAPID OCCURRENCES, PARTICULARLY OF THE OSCILLOGRAM OF A ~~BRAUM~~ BRAUN TUBE

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Application filed November 26, 1940

It is known to make electric occurrences visible by letting an electron current of a Braun tube strike a luminous screen and by subjecting the ray itself, while it passes through the tube, to a deflection or intensity control. These methods are of importance principally in television in which the Braun tube has proved to be a particularly suitable reproducing means. However, the control of the electron ray requires a certain amplitude of the control voltage or makes it necessary to amplify control voltages if they are too small. In some cases, for example in ultra high frequency occurrences, suitable amplifiers are not known so that, hitherto, it has practically not been possible to form more exact ideas of the oscillation occurrences in ultra high frequency oscillations.

The invention provides means for solving the problem mentioned above. It relates to a device for enlarging the image of rapid occurrences, particularly of the oscillogram of a Braun tube. The invention consists in making visible the magnified oscillogram produced by the cathode ray of the Braun tube by means of an electron microscope or amplified by a relay. Preferably, the oscillogram is produced by the cathode ray of the Braun tube on an intermediate screen with additional secondary emission. The intermediate screen may be constructed as a fine grid or as a foil of such thinness that the striking electron ray releases a corresponding secondary emission at the back of the intermediate screen. However, the electrodes, particularly those of the electron microscope system, may be arranged at the side so that the secondary emission issued at the front of the intermediate screen is received by the electron microscope arrangement. Before reaching the intermediate screen, the electron current may, if necessary by omitting the screen, be subjected to an intensity or deflection control. Instead of a receiving screen, a corresponding electrode or a system of electrodes may be provided, whose received current intensity is used for releasing relay or amplifier actions.

The invention is illustrated by way of examples in the accompanying drawing in which:

Fig. 1 shows a cathode **1** of usual construction, for example in the shape of a cylinder, in which the axis coincides with the axis of the emitted ray. **2** is a concentration cylinder. In the tube there are arranged electrodes **3**, **4**, **5**, to which suitable electric potentials are applied and which cause the electron ray to be projected through corresponding openings in these electrodes upon the screen **6**. **3** is a control electrode to which is applied the potential to be examined. Of course, instead of one electrode, several electrodes may be provided for the control. **7** represents a thin foil or a grid made of a substance emitting secondary electrons when being hit by an electron ray. These secondary electrons, naturally, travel in the direction of the maximum potential and are, therefore, drawn to the right, since the electrode **4** on the right, as indicated, has the maximum potential ++. But, owing to the high velocity imparted to the electrons, they fly through the electrode **4** as well as through the electrode **5**, which has a somewhat lower potential than the electrode **4**, and finally they hit the screen **6** mentioned above. Now, the electrodes **4** and **5** act like a system of electron microscope lenses as, owing to their presence, the ray **8** formed by the secondary electrons will, similar to a light ray passing through a glass lens, produce on the screen **6** an enlarged image of the original place of the secondary electron ray. Of course, the foil **7** must be very thin so that the secondary electrons are emitted sufficiently concentrated on the side facing the screen **6**.

Fig. 2 shows a modification in which the surface **7** of the screen **8** is arranged so that the secondary electrons released at the front of the surface **7** will be received by the electron microscope **4**, **5** and will appear on the screen **6** as an enlarged image.

On the other hand, an electron microscope arrangement may be provided between the control electrode or control electrodes **3** and the surface **7**. If desired, the surface **7** may be replaced by the receiving screen **6**. With the means described above, it is possible to make electric occurrences sufficiently visible even with the smallest control amplitudes and independent of the wave length or frequency employed. As this is connected with an amplification, the arrangement may be used as a regular amplifier or relay arrangement. In the last mentioned cases it is, for example, possible to use a regular electrode instead of the screen **6** or, if necessary, a system of several electrodes whose currents are influenced by the increased deflection or intensity control. Therefore, the new arrangement may be employed not only in television and the like, but may also serve any other purposes of amplification and releasing of relays.

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