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PROCESS OF PREPARING TARGET SCREENS FOR ORTHICON TUBES

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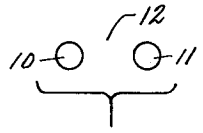


Fig 1

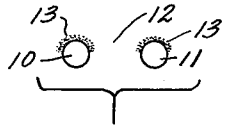


Fig 2

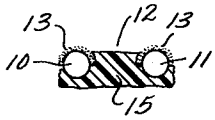
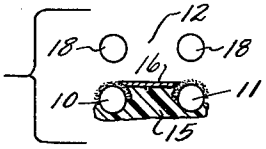


Fig 3

Fig 4



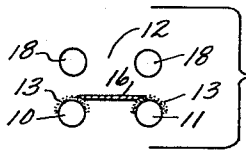


Fig 5

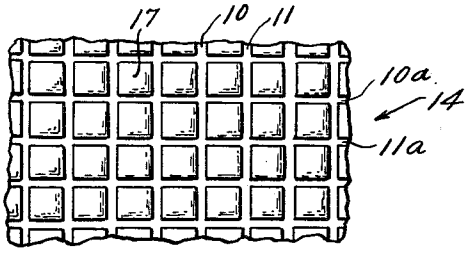


Fig 6

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PROCESS OF PREPARING TARGET SCREENS FOR ORTHICON TUBES

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2 Claims. (Cl. 117—210)

This invention relates to an improved target plate for Orthicon and related electronic tubes. These tubes are at present in use as the seeing tubes of television cameras, guided missiles and other electronic devices. The general purpose of this invention is to improve these tubes by improving their target plates. Such tube improvement has produced the signals by which it is possible to see distant terrestrial objects illuminated in nature solely by starlight with the same clarity and resolution as the average current television broadcast presentation.

The present weaknesses of conventional Orthicon tubes, which this invention is intended to overcome, are those which lead to poor contrast, necessitate high energy levels of illumination and result in a general lack of sensitivity. We have traced the greater part of these troubles to the characteristics of the conventional target plate, which does not have enough storage time because of low resistance between the active elements of which it is composed. The low resistance, which allows leakage of electrical potential to take place to neighboring active elements with the production of the bad effects above mentioned and a bright object with a background having a low light level creates halation. The undesired halation results from the comparatively slow bleeding out of high voltage areas produced by the bright object which are not completely neutralized during each scan, into the adjacent areas.

One object of the present invention is, therefore, to provide a target plate having such a high resistance between discrete areas of active elements so that the ability to leak to other areas is inhibited.

Another object is to provide a target plate of discrete areas of active materials of such a low resistance that the scan rate may be increased due to faster and better neutralization of charge. Extreme speed of scan is for example, greatly desired in the sensing systems of guided missiles.

Reference is now made to the accompanying drawings in which the first five views show end views of the wires of a screen of screens. Such presentation most easily illustrates the steps by which the target is produced. It is to be understood that the completed target comprises two screens, the rear or lower one of which is coated with active material while the front or top one is a bare metallic screen approximating the active one in all dimensions so as to produce a necessary capacity effect between the two. Such capacitance is conventional in present targets and we make no claim to it per se. While we do not limit ourselves to any particular wire size, meshes per inch or target dimensions or metals, we prefer to use a target comprising two pieces of stainless steel gauze approximately one inch by one inch made of one mil. stainless steel wire of approximately 200 meshes to the inch, the screens being mounted approximately 0.001 to 0.020 inch apart. The degree of capacitance aimed at is generally conventional, but not necessarily so.

In the drawings:

Figure 1 is an end view of two bare wires of the rear screen. Their size is exaggerated. Figure 2 is a corresponding view of the same two wires coated on their upper surfaces with a non-volatile compound of high dielectric strength. Figure 3 is a corresponding view of the same two wires as shown in Figure 2 with the addition of a backing of dried collodion or similar easily sublimated coating composition. Figure 4 in its lower part is a corresponding view of the same two wires shown in Figure 3 plus a continuous metal coating connecting them between the coatings of high dielectric strength compound to close that particular mesh of the screen bounded by the two wires. In addition, two wires above the lower two are shown in corresponding view. These wires are the bare metallic wires of the capacitance screen. Figure 5 corresponds to Figure 4 except that the collodion has been removed by evaporation or solution, leaving a thin metallic sheet connecting the lower two wires, thereby presenting only metal to the electron flow. Figure 6 is a front elevation of the lower screen alone; the capacitance grid is not shown in order to make the view clearer.

In the first five figures the left hand circle is the end of a wire **10** which, cooperating with a right hand wire **11**, establishes the width of a mesh space **12** which must be filled in so that a target area may be formed. The top portion of the wires **10** and **11** are presented in the direction from which the stream of activating electrons is to come. These portions are now coated with an insulating compound of low vapor pressure at ordinary temperatures, namely calcium fluoride CaF_2. This coating **13** may be applied by vapor depositing or in the form of a fine water slurry by spraying, painting or rolling on, after the general usage of applying paint. Any known material of the stability and insulating properties of CaF_2 may be substituted. Just enough is applied to confer a high resistance to the bounded space **12**. High temperature evaporation techniques may also be employed to deposit the coating.

After the CaF_2 coating is thoroughly dry, the screen **14** shown in Figure 6, of which the wires **10** and **11** are members, is sprayed or painted from the rear with a collodion or celluloid solution of sufficient viscosity to be able to bridge the space **12** after a short period of application and drying, a rear coating **15** for the screen **14** is thus formed, substantially without coating the CaF_2. From the front of the screen **14**, then, so as to strike the coatings **13**, there is sprayed or evaporated a coating **16** of a highly conductive, non-corrodible metal. Gold is preferred, since it has the added desirability of being ductile and malleable. We have, then, an extremely thin sheet of gold supported on substantially a non-conductor, which divides the sheet into nearly discrete squares. Each square is quite well suited to retain an electrostatic charge for a considerable interval. This interval, while not indefinite, is still substantially longer than those associated with conventional target plates under comparable conditions. Immediate drainage does not take place, partially because all of the charges have the same sign. Aluminum or silver may be substituted for gold.

In use, a screen **18**, preferably of identical mesh and wire size is placed before the target plate **14** and suitably charged to direct the electron stream to the center of each metallic square **17** and to give a necessary capacitance effect. It is also used in the forming of the conducting squares forming a shield whose shadow creates the insulating grid on the target plate.

Since the screen becomes quite warm in use, and a vacuum must be maintained in the tube while the latter is in use, it is important that the collodion backing **15** be completely removed. This is most conveniently accomplished by immersing the target plate in a stream of a solvent for nitrocellulose, for example, acetone, or by

baking at a temperature capable of vaporizing the material away.

Referring now to Figure 6, the wires **10** and **11** are crossed by wires **10***a* and **11***a* to complete the squares. The mesh size and total area of the screen, as well as the wire diameter, is optional according to the kind of duty to be demanded of the tube in which it is to be mounted. The two screens **14** and **18** may be of an optional distance of separation and both may be mounted together in a single frame (not shown) which, of course, must be of a high dielectric character, at least as a portion thereof, so that electrical separation can be maintained between the two screens.

From the foregoing description, it is evident that a new and useful process for making target plates has been disclosed; in this process the steps are:

1. Coating one side of the wires of a screen with CaF_2 or equivalent.

2. Baking the screen with a film of collodion or equivalent.

3. Forming a conductive metallic coating over the CaF_2 and collodion in such a way as to cover the area between the wires.

4. Dissolving or otherwise removing the collodion.

We claim as our invention:

1. The process of preparing a target plate for Orthicon tubes and other electronic devices which comprises coating one side of a metallic screen with a slurry of a heat-resisting, electrically insulating substance in a volatile liquid vehicle, evaporating the vehicle, coating the untreated side of the screen with a solution of an easily soluble lacquer to close the screen meshes, depositing through a second screen a thin film of a highly electrically conductive malleable metal over the heat-resisting, electrically insulating substance and over the lacquer, after the latter has dried to a film, whereby to close completely the meshes of the screen while preserving uncoated the heat-resisting, electrically insulating substance, and then removing the lacquer.

2. The process of preparing a target screen for Orthicon tubes and other electronic devices, which comprises coating the wires of one side of a stainless steel screen with a slurry of CaF_2 in water, drying the so treated screen, coating the back surface of the screen with collodion solution to close the meshes thereof, depositing a thin film of gold over that side of the screen on which the CaF_2 is deposited through a second screen so as to close the meshes of the first screen while preserving the CaF_2 uncoated immediately under the wires of the second screen and then completely removing the collodion.

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