March 4, 1952 H. B. LAW 2,588,019

MONOSCOPE TARGET FOR PICKUP TUBES

Filed June 5, 1946

FIG. 1

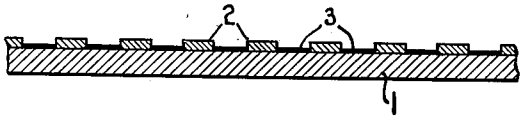
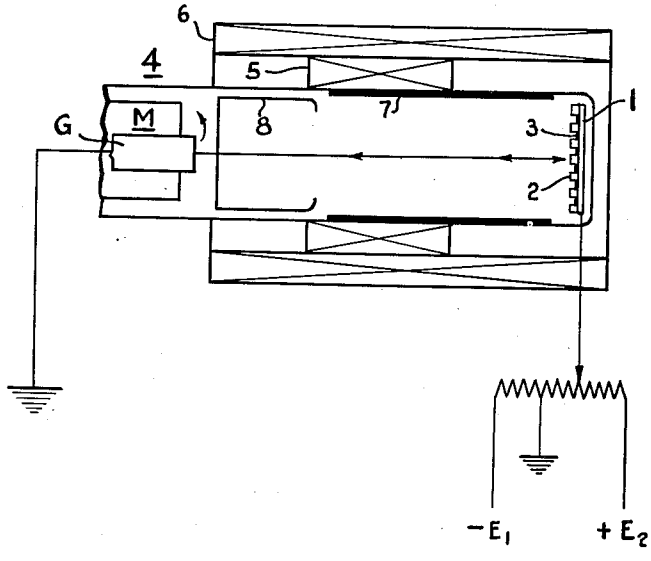


FIG. 2



INVENTOR.
HAROLD B. LAW

BY
William A. Jalesak

ATTORNEY

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MONOSCOPE TARGET FOR PICKUP TUBES

Harold B. Law, Princeton, N. J., assignor to Radio Corporation of America, a corporation of Delaware

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4 Claims. (Cl. 313—66)

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This invention relates to targets used in lining up television cameras and for experimental work with cathode ray beam transmitting tubes having beams of low velocity at the target and for broadcasters' call letter and resolution pattern monoscope when a low velocity camera is used.

In monoscope targets heretofore used, it has been the usual practice to etch a design on a steel or nickel plate and fill the crevices of the etching with printer's ink, which is dried or baked. The secondary emission of the carbon of the ink is quite different from the steel or nickel and thus the target gives suitable output signals for tests. These monoscopes were used in tubes having beams landing on the target at high velocity. Such monoscopes are unsuited for low velocity scanning.

It is an object of this invention to provide a monoscope that is suitable for low velocity scanning.

Another object of the invention is to provide a monoscope target in which the contrast between "white" and "black" elements may be varied at will.

Other objects of the invention will appear in the following description, reference being had to the drawings, in which:

Figure 1 illustrates an enlarged section of a completed target.

Figure 2 is a diagrammatic illustration of a cathode ray beam tube containing the invention.

The target consists of a metal, for example, aluminum or aluminum alloy, capable of being anodized, in the form of a plate or foil 1. This is given a mat surface by rubbing it lightly with a fine grinding compound. The mat surface is then given a coating of engraver's photographic enamel, such as "Bechak Superior Cold Top Enamel," produced by N. Bechak Company of New York, but other suitable photographic preparations may be used. The enameled surface is then exposed to light through a desired resolution pattern. It is immersed in a developing solution and then washed in water. The enamel of the pattern not exposed to the light is removed and leaves the metal exposed forming a negative of the resolution pattern used. To make the undissolved portions more resistant to subsequent treatment, the enameled foil is placed in a copper cyanide plating bath and the foil is made the cathode in a closed circuit for about one minute. No copper is plated by this treatment. The foil is removed from the bath, rinsed and dried. It is then immersed in a solution for depositing an alloy in the crevices between the

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enameled portions that will more readily copper plate than aluminum. I have found a very satisfactory solution to be "Alumon," marketed by the Enthone Company of New Haven, Connecticut. The alloy is deposited out of this solution on the exposed aluminum. The foil is now placed in a copper cyanide bath with the aluminum connected up in the circuit as the cathode and copper is plated at 2 on top of the alloy, not indicated in the drawing, until it has reached the desired thickness. After plating the copper, the remainder of the enamel is removed, as by rubbing the target with fine grinding compound, which exposes the aluminum mat surface not covered by deposited copper. The foil may now be anodized in a solution containing per liter 60 grams of a 5 to 1½ sodium chromate mixture and 0.06 to 0.10 gram of dry sodium silicate or 2.5 to 3.5 grams of sodium fluoride. The anodizing is carried out by placing the aluminum foil in the solution for about ten minutes with the bath at from 90° C. to 100° C. This oxidizes the aluminum surface exposed by removal of the remainder of the enamel and forms non-conducting areas 3 between the conducting areas, which latter are of course in good conducting relation with the target body 1. This target is next placed in a tube containing a small pellet of silver, which is heated until the silver evaporates and condenses on the copper particles to make uniform the contact potential of the conducting part of the pattern. Not enough silver is used to make the aluminum oxide conducting.

In operating a cathode ray beam tube 4 containing the improved monoscope target, the potential of the target body 1 is adjusted to obtain the desired "high light" potential on the conducting areas 2 in respect to the "low light" potential areas 3. Any desired contrast may be obtained between the signals produced by the beam landing on the aluminum oxide and the signals landing on the metal part of the target, that is, between the blacks and whites, by varying the potential of the aluminum foil 1 in respect to the potential of the cathode of gun G which is grounded. This is true because electrons landing on the non-conducting areas 3 cannot leak off to any extent during the scanning period and hence these areas are driven by the beam electrons to, and maintained at, substantially the potential of the cathode of the gun G, regardless of the variation of the potential applied to the conducting target plate 1 on which the pattern is formed. The conducting areas 2, on the other hand, cannot be lowered in potential by the beam

electrons landing thereon because they are in conducting contact with the plate 1 and take the potential between ground and the adjustable terminal which may be varied between $-E_1$ and $+E_2$ to vary the high lights.

The tube 4 is of the orthicon type and has the usual electromagnetic deflecting unit 5, electromagnetic focusing coil 6, wall coating 7 and persuader electrode 8 for directing into multiplier M the secondaries produced by the returning beam. All these parts are well known and reference is made to the application of Paul K. Weimer, filed September 16, 1944, Serial No. 554,494, now United States Patent 2,433,941, January 6, 1948, for further description thereof.

While I have disclosed use of certain metals and materials, this has been by way of example and other metals may be used to form conducting high light areas on a conducting target body with non-conducting low light areas thereon, so as to enable one to apply desired potentials to the target body for controlling contrast.

I claim:

1. A television transmitting tube of the orthicon type comprising an envelope containing a cathode ray beam gun, a target for the beam of the gun comprising an aluminum plate, a pattern on said plate having copper areas in electrical contact with the plate and aluminum oxide on said aluminum plate between the copper areas.

2. A television transmitting tube system comprising a cathode ray beam tube of the orthicon type having a cathode ray beam gun, and a monoscope target comprising a conducting plate, having a pattern on the gun side thereof with conducting areas in electrical contact with the plate and insulation areas between the conducting areas and a source of variable voltage connected between the conducting plate and cathode of said gun to vary the number of beam electrons landing on the conducting areas without varying those landing on the insulation areas.

3. A target electrode for an electron discharge device, said target comprising a metal plate, a plurality of spaced copper deposits on one surface of and in contact with said plate, and aluminum oxide material on said one surface of said plate and coating said plate between said spaced copper deposits.

4. An electron discharge device comprising, an electron gun including a cathode and accelerating electrodes for forming an electron beam along a normal path, a metal target plate mounted transversely to said beam path, spaced metal deposits on the surface of said target plate facing said electron gun, said deposits arranged to form a pattern, and aluminum oxide on said target surface and coating said target plate between said metal deposits, and a source of variable voltage connected between said target plate and said gun cathode to vary the potential of said target plate about the potential of said cathode.

HAROLD B. LAW.

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