March 25, 1958 K. R. HOYT 2,828,435

METHOD OF MAKING TELEVISION SCREEN AND DECALCOMANIA THEREFOR

Filed Jan. 4, 1954

FIG. 1.



FIG. 2.

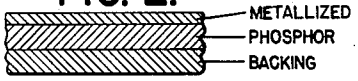


FIG. 3.

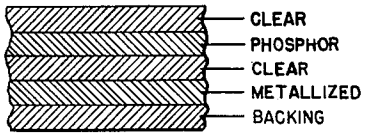


FIG. 4.

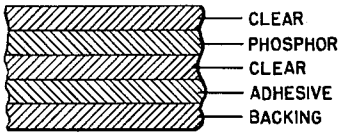


FIG. 5.

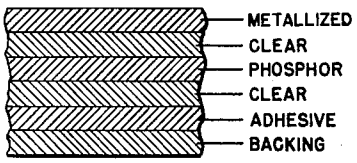


FIG. 6.

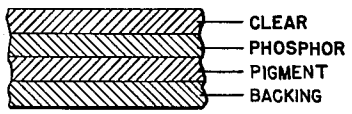


FIG. 7.

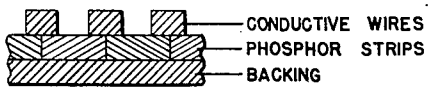


FIG. 8.

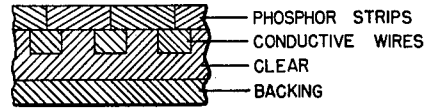


FIG. 9.

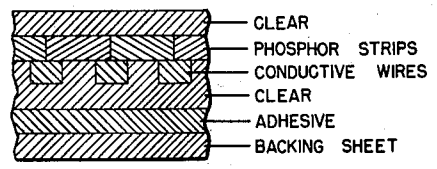


FIG. 10.

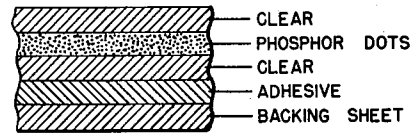


FIG. 11.

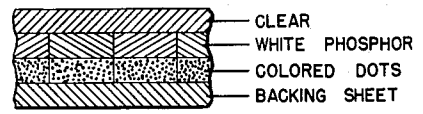
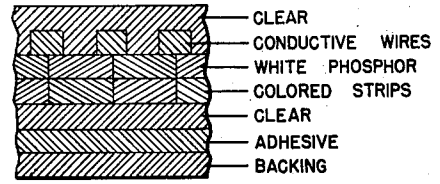


FIG. 12.



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HARRIS, KIECH, FOSTER & HARRIS

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METHOD OF MAKING TELEVISION SCREEN AND DECALCOMANIA THEREFOR

Karl Robert Hoyt, Newport Beach, Calif.

Application January 4, 1954, Serial No. 402,055

13 Claims. (Cl. 313—92)

The present invention relates to a new and improved method for forming face plates for cathode ray tubes and to articles used therefor.

Cathode ray tubes for black and white or color television and for industrial applications are commonly formed by fusing a pyramidal back section of metal or glass to a glass face plate containing the image-forming screen of the tube. The face plates used are normally provided with a peripheral flange and are convex outwardly, providing a concave inner face which is coated with an image-forming screen.

The precise nature of such screens is governed by their intended application. Black and white television screens, for example, are normally formed by settling a thin layer of a mixture of phosphors which have been blended so as to yield a white or slightly gray image when exposed to an electron stream upon an uncoated face plate, and then attaching such phosphors to this face plate, as through the use of an inorganic binder material. If desired, a metallized layer can be placed upon the back of the phosphor layer in order to form a very satisfactory black and white screen. Pigmented materials can be added to the face plate, if desired.

The construction of cathode ray tubes for color television depends upon which one of the various color television systems the color television tube is designed to be employed with. Television screens which are to be used with the so-called dot sequential system are composed of thousands of dots containing phosphors capable of emitting red, blue, or green light when hit by an electron beam, these dots being held to the face plate by a binder in the same manner in which the phosphors are attached in black and white tubes, and being disposed in a single layer. For the so-called line screen methods of color television, screens are provided which consist of a layer of accurately spaced lines of phosphors capable of emitting red, blue and green light disposed upon a face plate with the aid of an appropriate binder as previously indicated. Various forms of conductive grids are placed accurately with respect to such lines in the so-called line sequential system of color television.

With all of these types of television systems, there is a substantial problem as to how to satisfactorily, cheaply and easily provide image-forming screens of desired characteristics. In general, it is an object of the invention to teach the production of such screens by a broad method of which marks an improvement over the prior procedures with respect to the above general categories. More specifically, it is an object of the present disclosure to teach a procedure enabling the use of presently existent apparatus employed in the graphic or printing arts to be utilized in the production of articles from which image-forming screens for cathode ray tubes can be created.

Such equipment has previously not been satisfactory for this purpose for a variety of reasons. As indicated earlier, the glass face plates for cathode ray tubes are preferably manufactured so as to be provided with a concave inner face for holding the image-forming screen and

a side peripheral flange for attachment to a conical glass section. Inasmuch as modern high speed graphic arts equipment such as is used in printing colored pictures is designed for use on regular surfaces, such as for example, flat sheets, it cannot be satisfactorily utilized to position phosphors upon the inner faces of such face plates.

Various attempts have been made to create color television screens using the so-called "silk screen" method of printing to deposit strips of phosphors directly upon the surface of face plates. Because of the difficulties attendant to the use of separate screens for different phosphor strips, and the difficulty in forming screens for such process so that they can be readily positioned within a curved, flanged face plate, these efforts have not been considered to be successful.

The present invention differs from the prior procedures for coating the face plates for cathode ray tubes in that it involves placing the necessary components for a cathode ray tube screen upon a self-supporting backing sheet by the use of printing or like equipment, depositing the printed components upon the concave inner face of a face plate, and attaching permanently these components to the face plate while removing volatile materials therefrom. If desired, these volatile materials can include the self-supporting backing sheet, organic resins and various solvents employed as carriers or vehicles, temporary binders for such components, and organic materials forming protective coatings.

An object of the invention is, therefore, to create a procedure for forming cathode ray tube screens which comprises the steps of depositing the components of such a screen upon a self-supporting backing sheet, placing the deposited components upon the inner face of a face plate, and attaching these components to the face plate. More specifically, it is an object of the invention to deposit the components of an image-forming screen for cathode ray tubes and any necessary or desirable protective materials, carriers, temporary binders, permanent binders, pigments, reflective layers and/or conductive grids, or the like, upon a self-supporting backing sheet, placing the so-deposited materials upon the inner face of a cathode ray tube face plate, and attaching the components of the image-forming screen to the face plate while removing any nonpermanent or volatile materials therefrom. If desired, the backing sheet employed can either be removed with these nonpermanent materials, before or during placement of the deposited materials upon the face plate inner face. Further, the nonpermanent or volatile materials used can be removed from the face plate by means of heating, heating in a vacuum after the face plate has been attached to a pyramidal back in the formation of a cathode ray tube, by the use of an electron beam in a vacuum, or other equivalent means, although heat alone is the preferred means for this purpose.

A further, yet related object of the invention, is to produce coated backing sheets which can be used in the procedures indicated in the preceding paragraph. The particular items placed upon such backing sheets will vary depending upon whether it is desired to create a black and white image-forming screen or any specific type of a colored television screen. The materials from which such backing sheets are created will vary with the invention depending upon the method to be employed for removing such a backing sheet from the various items placed upon it.

If this removal is to take place prior to or during the placement of the deposited materials upon the inner face of the face plate, the precise materials from which the backing sheet is formed are not as critical as if the backing sheet is removed during the removal of the volatile materials present. In this latter case, the backing sheet is preferably formed of a comparatively vol-

atile resin sheet, such as, for example, a nitrocellulose sheet, a cellulose acetate sheet, a polyvinyl alcohol sheet, a polyvinyl chloride sheet, a polyethylene sheet, a polytetrafluoroethylene sheet, an acrylic polymer sheet, or the like. Other materials such as, for example, a good grade of paper, can be used for removal in this manner although they are not believed to be as desirable as the various resin sheets listed above. When the backing sheet is to be removed prior to or during the placement of the deposited materials, any of the backing materials listed in this paragraph can be employed.

All of the articles prepared according to the invention by coating a backing sheet must contain at least one layer in which there is disposed either a phosphor or a phosphor mixture. If desired, this layer can be divided up into a plurality of strips or dots, as where it is desired to have strips or dots of individual phosphors as for color television purposes. Generally, several separate ingredients are employed in addition to phosphors in a layer of this type. The first of these are commonly termed "vehicles" and are used as suspending media. Suitable vehicles are various organic solvents, such as, for example, ethanol, butanol, pentanol, acetone, methyl Cellosolve, methyl ethyl ketone, xylene, toluene, benzene, or the like. If desired, quantities of organic resinous materials soluble within such vehicles may be added to them for the purpose of thickening in order that the vehicle phosphor mixtures may be satisfactorily applied by a specific printing equipment. Suitable resins for this purpose include nitrocellulose, cellulose acetate, carboxmethyl cellulose, vinyl chloride, vinyl acetate, acrylic resins, gum tragacanth, gum arabic, or the like. The precise proportions of phosphor and vehicle required for any application will be readily determined with a minimum of difficulty by those skilled in the art of manufacturing printing inks.

Usually, it is desired to add various secondary substituents to phosphor and vehicle compositions in order to impart desired properties of either a temporary or permanent nature. As an example of this, a small quantity of any of the organic resinous materials listed as possible thickeners for vehicles may be added over and above the normal thickening requirements in order to serve as a temporary binder serving to hold the phosphor layer in place upon a backing sheet until such time as it is applied to a cathode ray tube face plate. Obviously, if such resinous materials are used, they will in many cases serve simultaneously both as a temporary binder and as a thickener for the vehicle. It is also possible to add small quantities of permanent binder materials, such as, for example, sodium or potassium silicates, sodium metaborate, or the like, to such layers. These latter compounds are designed to serve in aiding to attach the phosphors employed to the glass inner face in the face plate. Also, various pigmented materials, such as, for example, ground colored glass, or common inorganic pigments, can be added to phosphor vehicle compositions for the obvious purpose of coloring the emission obtained from phosphor layers, once they are attached in a cathode ray tube.

A secondary layer which can be used with the invention to protect the phosphor layer employed is commonly termed a "clear" and consists of an organic lacquer and is created from a film-forming resin disposed within a suitable solvent. These protective clears can contain resinous film-forming materials, such as, for example, nitrocellulose, cellulose acetate, cellulose butyrate, polyvinyl chloride, polyvinyl acetate, various acrylic resins, and other related materials having similar properties including alkyd resins. The solvents used in the formation of synthetic lacquers employed as clears can be the same organic solvents indicated above as suitable vehicles for use with a phosphor layer.

The actual phosphors employed with the invention in such a phosphor layer can be varied widely depending upon the nature of the final image-forming screen desired. When the screen is to be of the black and white category, it is commonly created by mixing a number of phosphors together so as to obtain a composite phosphor mixture capable of emitting white light when struck by an electron beam. When a phosphor vehicle composition is to be used in the formation of dots or strips for colored television, it is generally preferred to employ a single phosphor within such composition. Suitable phosphors for both black and white and color use are indicated in the Leverenz text "An Introduction to Luminescence of Solids." One suitable green phosphor is willemite, which consists of

$$Zn_2SiO_4:Mn$$

A suitable blue phosphor is blue silicate, which consists of $CaMg(SiO_3)_2:Ti$. A suitable red emitting phosphor is red orange borate, which consists of

$$2CdO.B_2O_3:Mn$$

If desired, a black and white phosphor mixture can be obtained by admixing these three phosphors together.

When a series of phosphor strips is disposed upon a backing sheet to be used for color television, it is normally preferred to dispose over such sheet a plurality of conductive grids. These grids may be created from silver inks such as are commonly used in the art of making printed circuit components or other related conductive compositions. For reference to such silver inks, the reader is referred to the Bureau of Standards Circular 137, entitled "Printed Circuit Techniques" and the references cited therein. Other similar inks can also be used. It is also possible to produce conductive grids utilized with color television by metallizing a backing sheet employed with the invention in a particular pattern corresponding to the grids desired with the invention. The precise metallizing techniques employed for this purpose include various vacuum and cathode sputtering techniques used both in this country and abroad in the formation of subminiature capacitors. Suitable metals for this purpose are aluminum, silver, copper and zinc, although this list is not by any means to be considered as limiting as other metals and alloys may also be used.

It is possible to form metallized layers such as of aluminum upon backing sheets which have been provided with a phosphor layer in the same manner in which grids as indicated in the preceding paragraph can be applied to backing sheets containing a phosphor layer consisting of a number of phosphor strips. This feature of the invention is quite important, inasmuch as it is possible to produce metallized black and white tubes of superior properties utilizing the backing sheets of the invention directly without requiring the expensive specially designed equipment which is normally used in metallizing face plates for cathode ray tubes which have already been coated with a phosphor layer. The equipment employed for such metallizing of backing sheets is essentially that employed in the condenser industry. In order to improve the adhesion of metallized films, whether these films are used to form conductive grids or as a composite backing, it is frequently desirable to place a small amount of a synthetic lacquer, such as is designated as a clear above, upon the surface to be metallized.

At times it is desirable to employ an adhesive with the present invention in order to aid in the positioning of the coatings created in accordance with this invention upon the inner face of a cathode ray tube. Such adhesives include any commonly found organic compositions used for this purpose including gum arabic in water or any of the lacquers indicated above as clears in which

the solvent content has been reduced to a point where such lacquers are extremely tacky in nature. At times permanent tackiness within them can be created by the use of a suitable high boiling solvent. Virtually all known adhesives, whether water or solvent soluble or pressure-sensitive in characteristics can be used, including water soluble silicates such as are sold under the common name "water glass." At times, such silicate adhesives can be used as permanent binders.

Further details of the invention, as well as further objects and advantages of it, will be more fully apparent from the balance of this specification, including the appended claims and the accompanying drawings, in which:

Figs. 1 to 12 show diagrammatic cross-sectional views of various constructions of the invention.

In Fig. 1 of the drawings, there is illustrated an enlarged fragmentary view of one article constructed in accordance with the present invention which is particularly adapted to be used in the manufacture of black and white cathode ray tubes. As is seen from this drawing, this construction consists of a backing sheet of any of the types previously indicated, upon which there is placed a phosphor layer, the phosphor layer containing a mixture of phosphors capable of emitting white light when struck by an electron beam, a temporary binder and traces of a vehicle. If desired, the phosphor layer shown in this construction can also include a small amount of a permanent binder, as described above. It is to be understood that all of these materials composing the phosphor layer are simultaneously applied to the backing sheet by the use of conventional printing processes. A construction such as is shown in Fig. 1 is primarily designed to be used in those instances where the backing sheet is removed with other volatile materials within the phosphor layer after the combined backing sheet and phosphor layer has been positioned upon the face plate of a cathode ray tube. If desired, a volatile adhesive, as indicated above, can be employed to aid in positioning the construction shown in Fig. 1 upon such a face plate.

In order to improve the quality of the black and white image achieved with a construction of the broad variety shown in Fig. 1, it is possible to modify the construction shown in this figure in the manner shown in Fig. 2 by placing a thin aluminum or other metal layer over the surface of the phosphor layer. In positioning a construction such as is shown in Fig. 2 upon the face plate of a cathode ray tube, the metallized layer must be placed away from the actual inner face of the face plate in order that it can satisfactorily serve its desired purpose in reflecting emitted light from the phosphor layer through the face plate.

In order to increase the adhesion of the metallized layer upon the backing sheet employed, it is usually desirable to place a thin layer of resinous material between this metallized layer and the next adjacent substantially non-resinous film. Such a resinous film may be any of the materials designated as clears above and, in many cases, can be the backing sheet itself, or, if the phosphor layer employed is particularly rich in resinous material, this phosphor layer alone can serve as a satisfactory base for a metallized coating as employed with the invention.

In Fig. 3 of the drawings, there is shown a construction in which the backing sheet is employed as a base for a metallized film which is then covered with a thin layer of a clear, a phosphor layer as indicated above in conjunction with Fig. 1, and another protective layer of a clear. A construction as shown in this figure is particularly designed to be placed with the top clear layer adjacent to the inner face of a face plate. If desired, a thin layer of a water or solvent soluble material or an adhesive can be placed between the metallized layer and the backing shown in this figure in order that the backing can be relatively easily removed from the layer construction built up in accordance with the invention while this layer construction is being placed upon a cathode ray tube face plate.

This use of adhesive is perhaps most clearly shown in Fig. 4 of the drawings. Here, there is shown a backing sheet coated with an adhesive layer, a thin clear layer, a phosphor layer as described in conjunction with Fig. 1, and a top protective clear layer. This construction is, in and of itself, very similar to the constructions of decals commonly sold for decorative purposes. In use, it is preferred to remove the backing sheet from the other materials by soaking in water or another solvent, and then sliding or otherwise positioning the phosphor layer which is protected by the various clear layers in position upon a cathode ray tube face plate. Either side of the layer construction derived from the composite construction shown in Fig. 4 of the drawings may be positioned face downward upon the inner face. During the soaking prior to the removal of the backing sheet, the phosphor layer is protected against damage due to the clears present.

It is possible to modify the construction shown in Fig. 4 of the drawings by placing a metallized layer upon either of the sides of the phosphor layer, depending upon which side the phosphor layer is to be positioned against the inner face of a face plate. In Fig. 5 of the drawings, such a metallized layer is illustrated as being positioned on top of the clear furthest removed from the backing sheet employed. Except for this minor change in construction, Fig. 5 discloses an identical construction to that employed in Fig. 4 of the drawings.

When it is desired to slightly shade or color the image of cathode ray tubes produced from coated articles, as described in this specification, it is possible to incorporate within such articles a pigment material. Such material can be incorporated within the phosphor layer, but preferably, in order to avoid lessening the intensity of the electron beam, is positioned in the form of a separate layer disposed in a suitable vehicle and/or temporary binder on one side or the other of the phosphor layer, this side being chosen so as to be adjacent to the inner face of a face plate as the composite coated construction is positioned upon such an inner face. A suitable pigment layer containing a construction for this purpose is illustrated in Fig. 6 of the drawings as consisting of a backing sheet surmounted by a pigment layer, a phosphor layer as described in conjunction with Fig. 1 of the drawings, and a protective clear surface layer.

The invention described in this application as indicated above can be applied quite easily to the production of cathode ray tubes which are designed for use on color television. In Fig. 7 of the drawings, an article designed to be used in manufacturing color television tubes of the so-called line sequential system is indicated as consisting of a backing, a phosphor layer containing parallel strips of red, blue and green phosphors, and a surmounting layer of conductive wires, these conductive wires being accurately spaced with respect to the individual phosphor layers so that when charged by an electric current, they can serve to direct electrons towards specific phosphor layers. The individual materials found in the phosphor strips are substantially the same as those found in the phosphor strips shown in the construction in the initial figure of the drawings. Further, the construction shown in Fig. 7 can be applied in any of the manners in which the construction of Fig. 1 of the drawings is applied to the inner face of a face plate, it being substantially immaterial whether the conductive wires are placed between the phosphor layer and the face plate or on top of the phosphor layer, inasmuch as during the subsequent removal of volatiles, the conductive material will diffuse to the surface of the phosphor layer so as not to distort any image apparent upon the cathode ray tube screen. The construction as shown in Fig. 8 of the drawings differs from that shown in Fig. 7 primarily in that con-

ductive wires are placed between the phosphor strips used and the backing, and are separated from this backing by means of a clear layer. If desired to form a colored television tube, using a decal-like construction, the article shown in Fig. 8 can be modified so as to insert an adhesive sheet between the backing sheet and the adjacent clear layer shown in Fig. 8 of the drawings. Further, a clear can be provided over the phosphor layer in order to protect this layer. Such a composite layer construction is shown in Fig. 9 and can be applied to the face plate of a cathode ray tube by any of the procedures indicated in conjunction with the discussion on Figs. 4 and 5 of the drawings.

At times, it is desirable to modify the specific constructions employed in order that the invention can be applied in the so-called dot sequential system of television. For such use, any of the phosphor layers indicated in Figs. 1 through 6 of the drawings can be replaced by a layer consisting of a plurality of dots of red, blue and green phosphors disposed in appropriate materials as previously discussed. One such construction of this type is shown in Fig. 10 of the drawings as consisting of a backing sheet upon which there is positioned an adhesive, a clear layer, a phosphor layer containing dots of colored phosphors as indicated and then a top clear protective layer. This construction is designed to be applied to the face plate of a cathode ray tube by removing the backing sheet and then simply placing the composite layer construction in place upon such a face plate. A modified system for forming a color television screen in the so-called dot sequential system is shown in Fig. 11. Here there is illustrated a backing sheet upon which there has been placed a plurality of colored dots acting as filters consisting of various inorganic pigments disposed within a vehicle and a binder, as indicated above. These colored dots correspond to the dots required by the dot sequential system of television. Immediately above them is placed a layer of white phosphor which, in turn, can be protected with a clear layer, as shown.

The broad feature of using a white phosphor in conjunction with various colored strips for use in the line sequential system of color television is shown in Fig. 12. Here there is illustrated a backing upon which there is positioned an adhesive, a clear layer, a layer of colored strips acting as filters of approximately the same composition as the various colored dots indicated in conjunction with Fig. 11 of the drawings, a layer of white phosphor such as is discussed in conjunction with Figs. 1 through 6 of the drawings, and then a layer of conductive grids. These grids are accurately spaced with respect to the colored strips and the entire assembly is surmounted by a protective clear layer. This composite construction is designed to be used by merely being placed upon the inner face of a cathode ray tube if the backing sheet employed has been separated from it as by soaking an appropriate liquid or solvent.

Those skilled in the art will realize that the articles described in Figs. 1 through 12 of the drawings are not by any means inclusive of all of the articles created in accordance with this invention for use in the formation of satisfactory image screens upon the face plates of cathode ray tubes. As an example of such other constructions which can be employed, various metallized layers can be placed upon any of the constructions shown in Figs. 7 through 12 of the drawings, on the portion of the various layer constructions created which is designed to be positioned removed from the face plate of the cathode ray tubes as created.

Once the various articles indicated in the preceding discussion have been placed upon the face plate of a cathode ray tube, as indicated, the composite face plate structure is treated in any one of several manners so as to remove any volatile materials present and so as to attach the phosphors and other permanent materials present within the above articles to the face place.

The preferred method of the present invention for accomplishing this purpose is to heat the so-covered face plates at a temperature in excess of about 450° C. for a sufficient period to remove any volatile materials present. Inasmuch as the removal of such volatiles is in part dependent upon the pressure, it is frequently advisable to carry out such heating under reduced pressure conditions. Further, when any of the volatile materials present are prone to form undesirable oxidation products at the temperatures employed during such heating, it is advisable to carry out such heating in the presence of an inert gas, such as, for example, nitrogen, or the like.

When the materials placed upon the face plate of a cathode ray tube contain materials such as, for example, permanent binders as indicated above, or other materials capable of being fused directly to the face plate of a cathode ray tube, it is preferred to carry out the heating during the removal of volatile materials at such a temperature and for such a period as to fuse these materials to the face plate. The precise temperatures required for such fusion will, of course, vary depending upon the specific materials present. In general, however, temperatures in excess of 450° C. are acceptable for this purpose. Obviously, the specific ingredients present upon a face plate for attachment to the face plate must be stable under the atmospheric conditions present during such heating, and must not be volatile because of such reduced pressure if reduced pressure is employed during the heating.

If the materials placed upon the face plate of a cathode ray tube do not contain permanent binder materials, it is normally necessary to affix these materials to the face plate by the use of conventional procedures, such as, for example, exposing such permanent materials to a fine mist of an alkaline metal silicate of the type of sodium silicate. The precise procedures employed for this purpose are known to the art, and, therefore, it is not considered necessary to give further details with respect to this feature relating to the present invention.

Another method which can be used for removing the volatile materials from an article, as indicated, placed upon the face plate of a cathode ray tube, is to attach this face plate to a conical back and to exhaust the air within such a tube and to remove the volatiles from the face plate during such exhaustion by the use of heat to any desired extent, or by the use of an electron beam, or by the use of a combination of both of these means. This method is primarily satisfactory when the article applied to the face plate of a cathode ray tube contains at least one substance acting as a permanent binder.

Those skilled in the art will realize that the instant invention is capable of wide modification within the broad scope of the inventive concept herein described. As an example of such modification, the metallized layer employed with the invention can consist of a layer of a metal applied by actually spraying molten metal instead of a layer of a metal applied by cathode sputtering or other similar techniques. All modifications of this broad category are to be considered as part of the inventive concept insofar as they are defined by the appended claims.

I claim as my invention:

1. A process for forming a cathode ray tube face plate, which comprises the steps of: placing a backing sheet which has been coated with a phosphor-binder layer upon the inner face of a cathode ray tube face plate; and simultaneously removing said backing sheet and any volatile materials thereon while attaching the phosphor within the phosphor-binder layer to said inner face.

2. A process for forming a cathode ray tube face plate, which comprises the steps of: removing a phosphor-binder layer from a backing sheet; placing said phosphor-binder layer upon the inner face of a cathode ray tube; and simultaneously removing any volatile materials within

said layer and attaching said phosphor within said phosphor-binder layer to said inner face.

3. A process for forming a cathode ray tube face plate, which comprises the steps of: placing a layer comprising a plurality of strips of colored phosphors admixed with binders and a plurality of conductive layers upon the inner face of a cathode ray tube face plate; and removing any volatiles from said layer while attaching said phosphors and said binder to said face plate.

4. A process for forming a cathode ray tube face plate, which comprises the steps of: placing a backing sheet which has been coated with a plurality of strips of colored phosphors admixed with binders and a plurality of conductive layers upon the inner face of a cathode ray tube face plate; and simultaneously removing said backing sheet and any volatile materials thereon while attaching said phosphors and said conductive layers to said inner face.

5. A process for forming a cathode ray tube face plate, which comprises the steps of: removing a layer containing a plurality of phosphor-binder strips and conductive strips from a backing sheet; placing said strips upon the inner face of a cathode ray tube face plate; and attaching said strips to said inner face while removing any volatile materials from said layer.

6. A process for forming a cathode ray tube face plate, which comprises the steps of: placing a layer comprising a plurality of areas of colored phosphors admixed with binders upon the inner face of a cathode ray tube face plate; and attaching said phosphors to said inner face while removing volatile materials from said layer.

7. A process for forming a cathode ray tube face plate, which comprises the steps of: placing a layer of a phosphor and a binder upon the inner face of a cathode ray tube face plate and a metallic reflecting layer upon said phosphor layer; and removing volatiles from said layers while attaching said phosphor and said binder to said face plate and attaching the metal in said metallic reflecting layer to said phosphor and said binder.

8. A decalcomania for the manufacture of an electronically excitable television screen which comprises a layer of minute areas of different phosphors capable of emitting different colors, a layer of conductive strips spaced with respect to said phosphor areas so that when charged by an electric current they serve to direct electrons to specific areas of said phosphors, and a backing sheet on one side of which said layers are adhesively temporarily mounted so as to be applicable in precise relative spacing when said decalcomania is applied to a television screen.

9. A decalcomania as set forth in claim 8, including a thin metallized reflecting layer on said one side, and a clear insulating layer between said metallized layer and said layer of conductive strips.

10. A decalcomania for the manufacture of an electronically excitable television screen which comprises a layer of phosphor emitting white light when electronically excited, a layer of colored pigments of different colors arranged in minute areas, a layer of conductive strips spaced with respect to said pigment areas so that when charged by an electric current they serve to direct electrons to portions of said phopshor layer specific to certain areas of said pigments, and a backing sheet on one side of which said layers are adhesively temporarily mounted so as to be applicable in precise relative spacing when said decalcomania is applied to a television screen.

11. A decalcomania as set forth in claim 10, including a thin metallized reflecting layer on said one side and an insulating layer between said metallized layer and said layer of conductive strips.

12. A decalcomania for the manufacture of an electronically excitable television screen, which comprises a layer of phosphor, a layer of thin light-reflecting material capable of passing a stream of electrons, a backing sheet, and an adhesive for temporarily uniting said layers to said backing sheet on one side thereof, said adhesive being characterized in that it permits said backing sheet to be removed from said layers while permitting said layers to retain their precise relative spacing.

13. A decalcomania for the manufacture of an electronically excitable television screen which comprises a layer of phosphor, a layer of electroconductive material and a backing sheet on one side of which said layers are adhesively mounted, said backing sheet being adapted to be removed from said layers.

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