

Dec. 19, 1961

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3,013,917

DRY TRANSFER SHEET AND METHOD

Filed June 9, 1960

2 Sheets-Sheet 1

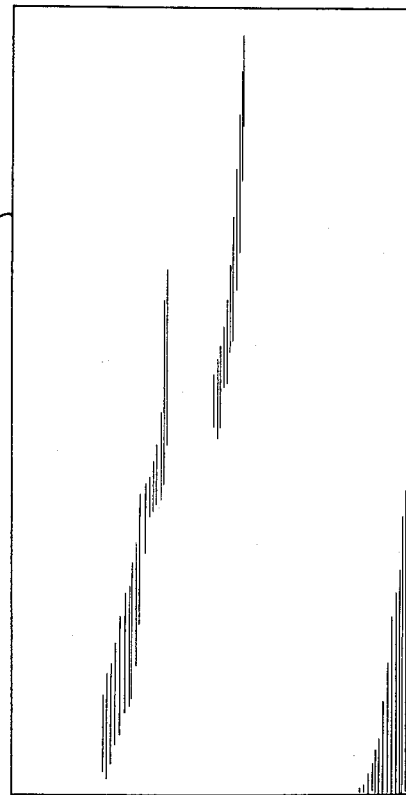
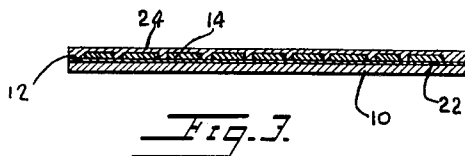


Fig. 2.



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2 Sheets-Sheet 2

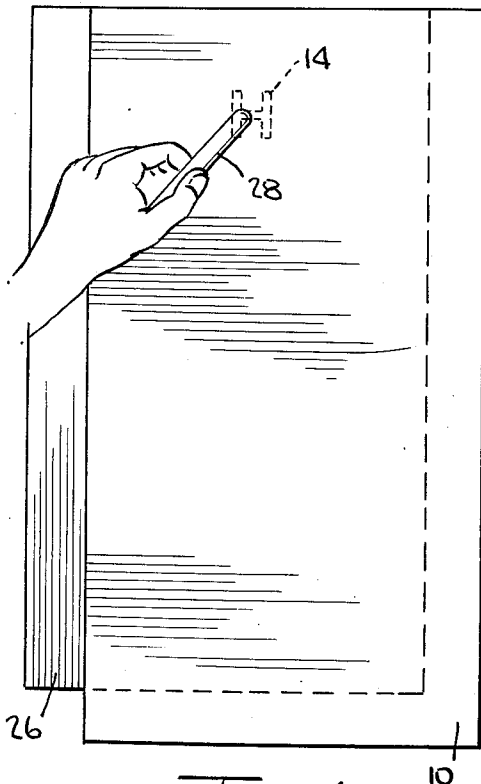


Fig. 4.

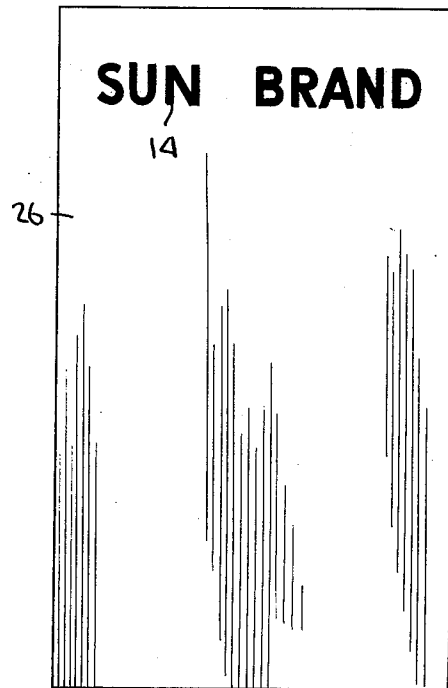


Fig. 5.

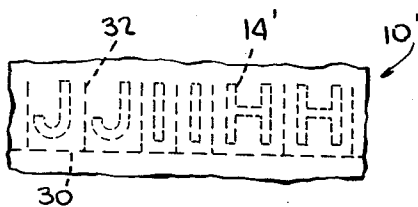


Fig. 6.

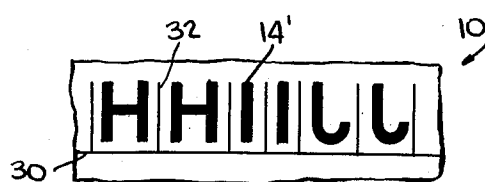


Fig. 7.

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DRY TRANSFER SHEET AND METHOD

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5 Claims. (Cl. 154-46.8)

This invention relates to the art of producing ink designs, e.g., symbols, indicia, emblems and the like, and, more particularly, to sheets with ink designs thereon adapted to be transferred dry (in the absence of liquids) to other sheets or objects by rubbing, e.g., burnishing, and to the method of transfer.

A principal object of the present invention is to provide a dry transfer sheet with transferable ink designs thereon in the form of characters such as the letters of the alphabet, punctuation marks, numbers, symbols, indicia, emblems, patterns, and the like.

Another object of the invention is to provide a dry transfer sheet with transferable ink designs thereon in the form of characters, such as the letters of the alphabet, punctuation marks, numbers, symbols, indicia, emblems, patterns and the like, the sheet being chemically treated so that the designs will adhere to a surface to which they are applied.

A further object of the invention is to provide a dry transfer sheet with transferable ink designs thereon in the form of characters such as the letters of the alphabet, punctuation marks, symbols, indicia, emblems, patterns and the like, the sheets being chemically treated to facilitate release of the designs from the transfer sheet and the designs being treated with adhesive to insure adherence thereof to a surface receiving the designs.

The invention also contemplates providing a dry transparent transfer sheet with transferable ink designs of the character described on one surface thereof and with horizontal and spaced vertical guide lines on a surface thereof, preferably the other surface, for arranging the transferred designs in a desired style or line-up, with particular reference to correct horizontal or vertical spacing of the separate characters upon a suitable background.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a rear view of a dry transfer transparent sheet with various inked characters thereon adapted to be transferred to a plain sheet,

FIG. 2 is a face view of a plain sheet to which the characters shown on the dry transfer sheet of FIG. 1 may be transferred,

FIG. 3 is a cross-sectional view of the dry transfer sheet shown in FIG. 1, the thickness of the various materials applied to the sheet being exaggerated,

FIG. 4 is a front view of the dry transfer transparent sheet overlying the plain sheet, and showing how the inked characters on the transfer sheet are dry transferred to the plain sheet,

FIG. 5 is a face view of the plain sheet shown in FIG. 2 and now bearing some of the transferred characters,

FIG. 6 is a fragmentary front view of a dry transfer transparent sheet embodying a modified form of the invention with various dry transferable inked characters on the rear surface thereof and with guide lines on the front surface thereof, and

FIG. 7 is a fragmentary rear view of the dry transfer sheet shown in FIG. 6.

Referring now in detail to the drawings, for the purpose of illustrating the invention, in FIG. 1 we have

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shown a rectangular base 10 of thin pellucid non-elastic sheet-like material, such as translucent paper, calendered parchment, onion skin paper, tough tissue paper, cellulose acetate sheeting, cellulose acetate butyrate sheeting, vinyl polymer (polyvinyl chloride or polyvinyl acetate) sheeting, or cellophane. Said sheet has printed on the rear surface 12 thereof, in reverse position as viewed from the rear of the sheet (FIG. 1) and in normal reading position as viewed from the front of the sheet, a number of designs or characters in the form of upper case letters 14 of the alphabet, lower case letters 16, punctuation marks 18 and numbers 20. The letters conveniently are arranged alphabetically and the numbers conveniently are arranged numerically. Each base sheet 10 preferably has two or more sets of letters, punctuation marks, numbers and the like. The designs or characters are printed in spaced rows on the sheet and the spacing between the rows of designs and between the individual designs is sufficient to permit each character to be worked upon by a rubbing or burnishing implement without interference with adjacent characters.

The rear surface 12 of the sheet is treated to provide a pellucid release coating as indicated at 22 before the characters are applied thereon, so as to facilitate release of said characters from the treated rear surface in a manner which will be described hereinafter. The release coating can be applied to said rear surface 12 of the pellucid sheet 10 in any well known manner, for example, by spraying, brushing, dipping, casting, silk-screening, calendering, or doctor-blading. Chemicals for release coatings are well known per se, as are their applications as release coatings to paper and sheetings, in general release chemicals being employed which are compatible with the sheet 10. Typical chemicals for release coatings 22 which are satisfactory in the practice of the instant invention are silicones and quilon. The former are organopolysiloxanes and the latter is a stearato-chromic chloride made by E. I. du Pont de Nemours & Co., Inc., Grasselli Chemical Division, of Wilmington, Delaware. Any of the silicones may be employed, e.g., the one obtained by spray coating a pellucid calendered parchment base sheet 10 with dimethyldichlorosilane, drying the sheet and then heat calendering the same. Also modified silicones can be utilized, e.g., "Syl-Off 23," a solution of a silicone-rubber polymer in xylene, made by Dow Corning Corp. of Midland, Michigan, the same being heat cured on a tough tissue paper sheet after spray coating.

The designs or character are printed over the release coating with a coherent-film-forming transferable-when-dry ink, which may be black, white or any desired color. The ink is non-soluble in water.

The rear (exposed) surfaces of the designs or characters on the release coated sheet 10, or, more simply, the rear coated and printed surface of the dry transfer sheet are coated with a dry pressure-sensitive pellucid adhesive as indicated at 24, so that said characters can be adhered to a sheet 26 adapted to receive the same (the margin of the rear surface of the sheet 10 may be left uncoated by adhesive to simplify handling). For the dry pressure-sensitive adhesive there preferably is employed, pursuant to the instant invention, a natural or synthetic wax, these substances having a greater (preferential) attraction, i.e. adhesion, to the characters constituting coherent shaped areas of film formed by the ink than does the base sheet after treatment with the release chemical. Phrased differently, the coherent film characters formed by the ink adhere to the rear release coated surface of the transparent base sheet, and also adhere to the wax adhesive coating, but the adherence to the wax coating constitutes a considerably stronger bond than the adherence to the release coated rear surface of the transfer sheet 10.

As indicated above, the ink which is employed in accordance with the present invention is one which will form a coherent film upon drying. Suitable inks for this purpose are: lacquers in acetone; alkyd-based and rubber-based inks in a mineral spirits solvent; synthetic enamels, either high-gloss or low-gloss, in a solvent constituting mineral spirits, toluol or xylol; polyvinyl and polystyrene based paints in acetone; and slow-drying enamels with a small percentage, e.g. 5%, of cobalt blue as a dryer. The ink after application to the release coated rear surface of the transfer sheet is permitted to dry thoroughly into a film of the desired outline constituting, for example, a character, before the adhesive wax coating is applied, so that the film is stable and coherent, and thus will be able to maintain its shape against the mild stresses which are created therein during dry transfer, as will be described hereinafter. For example, good results are secured where the ink is permitted to dry for 24 hours before the application of the adhesive wax coating. It will be understood that the word "dry" as used herein with respect to the formation (setting) of the solid ink film is used in the sense ascribed to it in paint technology, to wit, to form a set solid film in which no appreciable amount of liquid is present. The drying may be by evaporation of solvents, oxidation or polymerization and at room temperatures or with the aid of heat. It is desirable to employ inks of a high solids content, as is well known, so as to form a film capable of withstanding stress as aforesaid. The inks may include the usual opacifying and coloring agents.

The ink is applied to the release coated rear surface of the dry transfer sheet in the desired outline of the designs to be made (symbols, characters, etc.) in any well known manner, e.g., by printing in a flat or rotary press. However, preferably the ink is applied in a fashion which will permit a reasonably thick, i.e., heavy deposit, thereof, so as to obtain a stable coherent film upon drying of the ink. For this purpose it is desirable to use, instead of press printing by type or plates, a mode of printing which will deposit a somewhat thicker layer. Such alternate mode of printing may comprise hand-printing, i.e., with a printing brush, but for commercial purposes it is better to use a more rapid method, such, for instance, as printing with the aid of a silk screen stencil.

The wax which is applied as a coating 24 over the rear release coated surface of the base sheet 10 and over the rear exposed surfaces of the characters after they have dried, is applied in any well known fashion, e.g. by brushing, silk screening, roller coating or spraying. The thickness of the wax film is not critical. However, it is preferred that a comparatively thin film be employed as this is more economically desirable and will create less interference on the finished sheet to which the characters have been applied by dry transfer.

Any of the waxes may be employed, both natural and synthetic. It is most desirable to use a clear, i.e., water-white or a white wax, such for instance as a microcrystalline wax, spermaceti wax or carnauba wax. However, although these waxes are to be preferred, other waxes can be used, such for instance, as animal, vegetable or mineral waxes of any kind. Typical thereof are petroleum waxes, paraffin waxes, paraffinic-naphthenic waxes, beeswax, castor wax, candelilla wax. The wax is applied in liquid form so as to minimize disturbance of the coherent film formed by the dried ink. For liquefaction, the wax can be heated to fluidity or dissolved in a solvent. Suitable solvents for the waxes described are methylene dichloride or dichloroethyl ether. Another suitable solvent is "Chlorox P-255," a product of Zophar Mills of Brooklyn, New York.

The dry wax adhesive coat 24 thus deposited forms an excellent bond with the coherent ink film, as already has been pointed out, and no special steps need be taken to effect this bond. The bond is considerably stronger than

the bond between the coherent ink film and the release coated rear surface of the non-elastic pellucid transfer base sheet 10.

By way of specific example, a dry transfer sheet embodying the present invention comprises a base sheet 10 of a parchment paper, a quilon release coating on the rear surface thereof, dried inked characters formed from a slow drying China oil enamel with an additive of about 5% cobalt blue as a dryer, and microcrystalline adhesive wax coating over the dried ink characters, as well as the release coated rear surface of the base sheet 10 where no characters are present, and exclusive of the margins.

By placing the back of the dry transfer sheet 10, with the ink characters thus downwardly, upon another sheet such as the sheet 26 shown in FIG. 2, the sheet 26 can have selected coherent dried ink film characters on the sheet 10 applied or transferred to the sheet 26 by rubbing, i.e., burnishing, the front surface of the ink bearing dry transfer sheet over the characters to be transferred without the aid of chemicals, water, heat, liquids of any nature, or electricity. That is to say, various selected ink characters can be accurately applied to a plain sheet 26, or any other surface, by a dry transfer method only involving rubbing. This is shown by way of example by reference to FIG. 4 in which it is seen that the character "H" is being transferred to the sheet 26 by rubbing the face of the transfer wheel 10 with a burnishing tool 28.

Any desired character on the sheet 10 may be transferred to the sheet 26 by rubbing the front surface of the dry transfer sheet 10 at the place occupied on the rear surface by the character selected. By placing the dry transfer sheet 10 over the sheet 26, with the rear surface downward and positioning the selected character at the place on the sheet 26 that is desired, and then merely by rubbing the front surface of the dry transfer sheet 10, the desired coherent dried ink film character will be transferred to the sheet 26 at the desirable place.

Any suitable available implement 28 may be used for effecting the rubbing, provided it has a smooth yet hard and preferably blunt and rounded end. The sheet 26 should not be permitted to move while the rubbing process is being effected, and preferably is held down firmly by hand or by drawing pins or other convenient method.

The sheet 26 shown in FIG. 5 illustrates the appearance of a series of transferred characters.

In the modified form of the invention shown in FIGS. 6 and 7, a non-elastic pellucid dry transfer sheet 10' has printed on the rear surface 12' thereof a set of coherent film dried ink designs or characters 14' in the manner described in detail hereinabove with respect to the dry transfer sheet 10. In addition, on the front surface of the same sheet there is provided a horizontal guide line 30 below each row of characters and a series of spaced vertical guide lines 32 in association with and intersecting each horizontal guide line. Each character is bracketed by a pair of the aforesaid vertical guide lines which between them define a space 34 wherein such character is disposed. The guide lines 30, 32 are printed in a conventional manner and are not transferable. These lines are employed to assist in the spacing and arrangement of the transferred characters on another surface. For example, when using the sheet 10', the operator will lightly draw a line on a surface to which the characters are to be transferred. Then he will register the horizontal line 30 with such lightly drawn line, using the horizontal line 30 below a character which he is to transfer. When another character is transferred, the horizontal line 30 in association with it is registered with the lightly drawn line, and the vertical guide line on the left hand side of the second character being transferred will be placed close to the right hand side of the character previously transferred. In this manner the characters transferred are

properly horizontally registered and are nicely spaced from one another.

By reason of the present invention, printers, advertisers, artists, and the like can readily place printed matter on copy they desire to employ, with particular reference to correct horizontal or vertical spacing of the separate characters.

While we have illustrated and described the preferred embodiments of our invention, it is to be understood that we do not limit ourselves to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

This invention is a continuation-in-part of our copending application Serial No. 852,763, filed November 13, 1959, for Transfer Friction Sheets for Alphabets, Designs and the Like, now abandoned.

Having thus described our invention we claim as new and desire to secure by Letters Patent:

1. As a new article of manufacture, a dry transfer sheet for applying in any desired sequence to another sheet or object at selected sites on such sheet or object under the control of a user, only selected different characters carried by said transfer sheet: said dry transfer sheet comprising,

- (a) a pellucid base sheet the rear surface of which has high release properties,
- (b) a plurality of coherent solid opaque dry individual discrete films on the rear surface of said base sheet, said discrete films being in the shapes of a multiplicity of different characters spaced apart from one another on said sheet, and
- (c) a dry pellucid adhesive coating extending over the rear surfaces of the discrete character films and the exposed rear surface of the base sheet between said films,
- (d) said coating being adherable, at selected portions only, to selected sites of another sheet or object at ambient conditions only upon rubbing the front surface of the base sheet at such selected portions,
- (e) the bond between said discrete character films and the adhesive coating being stronger than the bond

between said discrete character films and the rear surface of the base sheet, and

- (f) said adhesive coating having a greater affinity for another sheet or object when rubbed through the base sheet than the affinity between the discrete character films and the rear of the base sheet,
- (g) so that the dry transfer sheet can be placed on another sheet or object, positioned to accurately locate any selected character in any selected site on the other sheet or object without adhesion of the adhesive coating to the other sheet or object and thereafter the selected character can be transferred dry to the exclusion of other characters while in its desired position by rubbing the front surface of the transfer sheet over the selected character.

2. An article as set forth in claim 1 wherein the high release properties of the rear surface of the pellucid base sheet are provided by a release coating on said rear surface and wherein the adhesive is wax.

3. An article as set forth in claim 2 wherein the release coating is silicone and the wax is microcrystalline wax.

4. An article as set forth in claim 2 wherein the release coating is a stearato-chromic chloride and the wax is microcrystalline wax.

5. A method of applying ink characters to a sheet or objects, said method comprising placing on said sheet or object the rear surface of a dry transfer sheet as set forth in claim 1, positioning the transfer sheet with respect to the sheet or object so that a selected character thereon is located directly over a selected site on the sheet or object, and then rubbing the front surface of the transfer sheet over said selected character, so that only the selected character is transferred dry to the sheet or object.

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