July 3, 1951 C. WITTGREN 2,558,803

TRANSFER SHEET AND METHOD

Filed Oct. 28, 1946

Fig-1

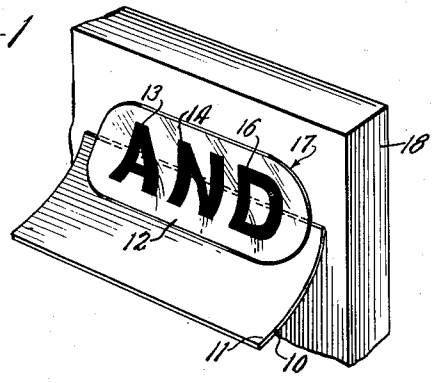


Fig-2

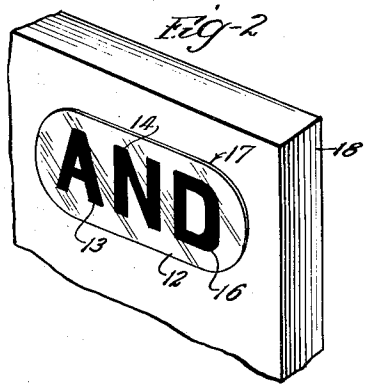


Fig-3

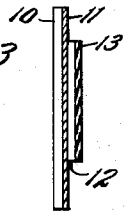


Fig-4

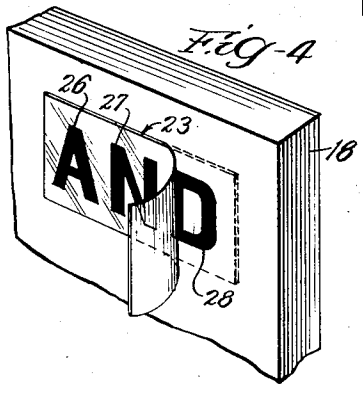


Fig-5

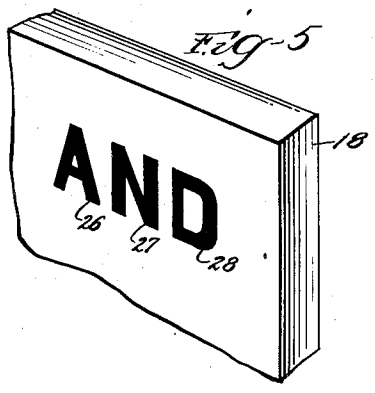
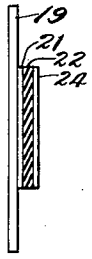


Fig-6



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TRANSFER SHEET AND METHOD

Charles Wittgren, Chicago, Ill., assignor, by mesne assignments, to Robert C. Brown, Jr., Highland Park, Ill., as trustee

Application October 28, 1946, Serial No. 706,201

6 Claims. (Cl. 117—3.4)

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My invention, which relates to transfers and to methods of making and using such transfers, has as an important objective the provision of an improved transfer which overcomes many inherent disadvantages of decalcomania transfers. Other objects include the provision of suitable methods of making and using such transfers to permit application of the transfers to an object, which eliminates the need for a film connecting separate portions of a compound image, and which does not require the application of a liquid to permit the separation of an image from its backing.

In brief, I accomplish these and other subsequently apparent objectives by forming a lacquer image on a thin, transparent, flexible sheet of plastic material such as polyethylene, preferably but not necessarily by the silk screen process, and subsequently applying a coating of suitable adhesive to the exposed surface of the image. This transfer is characterized by a mechanically disruptable bond between the lacquer image and the polyethylene backing whereby it is possible to adhere the image, while supported by the backing, directly to a surface or object and subsequently peel the backing from the image without damage to the image or alteration of its position on the surface.

For a more detailed description of my transfer, as well as methods of making and using it, reference is made to the following specification and to the drawings in which:

Figure 1 is a partial perspective view of a conventional decalcomania transfer in the process of application;

Figure 2 is a front view of a conventional decalcomania transfer after application;

Figure 3 is a vertical section through a conventional decalcomania transfer;

Figure 4 is a partial perspective view of my transfer, illustrating the method of application;

Figure 5 is a view of my transfer after application; and

Figure 6 is a vertical section through my transfer.

Decalcomania transfers are widely used to transfer images, usually formed of lacquer, from a backing to an object and usually include a backing 10 of opaque, water-absorbent paper to which a coating 11 of water-soluble adhesive has been applied. If the image is compound, that is, includes a plurality of separate portions unconnected by pigmented lacquer, a coating 12 of clear lacquer is applied to the adhesive coating 11 after which various portions 13, 14 and 16 of

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the compound image, generally designated 17, are applied to the film 12. Application of the transfer to an object or a surface 18 is accomplished by dampening the transfer, permitting water to soak through the backing 10 and thus soften the adhesive layer 11, whereafter the film 12 bearing the separate portions 13, 14 and 16 of the compound image 17 may be slid from the backing 10 onto the surface 18. Sufficient adhesive remains on the underside of the film 12 to secure the image 17 to the surface. As may be seen in Figure 2, a compound image decalcomania transfer must include the film 12, which is necessary to maintain the component portions 13, 14 and 16 of the image 17 in the proper relationship relative to each other. This film is particularly objectionable in many instances since its presence is always apparent and becomes more so as age yellows or cracks the lacquer film 12.

There are, of course, other forms of decalcomania such as the duplex decalcomania transfer wherein the lacquer image is applied to a thin paper tissue which is adhered to the water softenable adhesive coating of the paper backing. This type of transfer is attached by applying a varnish or similar coating to the object, and after allowing the adhesive to become tacky, the transfer is applied. When sufficiently dry, the backing is removed by the application of water which is also employed to assist in rubbing the tissue from the image. Subsequently scraping or a varnish solvent may be employed to remove the excess varnish. In each instance, however, it should be noted that the backing of a decalcomania transfer is opaque, which makes the accomplishment of proper registry of the image on the object a difficult operation, requiring a high degee of skill.

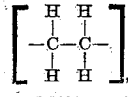
Attempts have been made in the past to overcome this difficulty, either by printing a duplicate of the image on the reverse surface of the backing paper or by attempting to render the backing transparent or translucent, the former being objectionable because the backing masks a substantial portion of the object, and the latter being unsuccessful due, at least in part, to the unavailability of a water-absorbent, transparent, or translucent paper upon which a lacquer image could be successfully applied.

My transfer in its preferred form comprises a backing 19 of flexible, transparent, or translucent polyethylene plastic sheets or films to a surface of which I apply directly, preferably by the silk screen process, a clear lacquer image 21 (as contrasted to a film of lacquer). After drying, one

or more coats 22 of pigmented lacquer are applied over the clear lacquer image followed by a coating 24 of adhesive. Other methods or combinations of methods of forming the image may be employed, as for example by the use of a direct impression or offset printing press to apply colored portions of the image, preferably to a clear lacquer image formed on the surface of the backing.

My transfer can be applied to a surface or object 18 by moistening the adhesive 24 and pressing the assembly or transfer firmly against the surface. Preferably the backing 19 is allowed to remain on the image until the adhesive becomes tacky, producing a bond between the image and the object which is stronger than the bond between the image and the backing. The backing 19 may then be peeled or gently removed from the clear lacquer image 21 without damage to the image or alteration in the position of its component parts herein designated 26, 27 and 28. It is not, however, essential in all instances to wait until the adhesive has become tacky since the image can be peeled from the backing with little effort. Since the backing 19 is transparent or at least translucent, application of the transfer to the surface 18 in perfect registry is obviously accomplished without difficulty and yields an image, as illustrated in Figure 5, wherein the component parts 26, 27 and 28 are unconnected with a lacquer film but are in perfect registry, not only with respect to the object 18 but with respect to each of the parts thereof.

An inherent characteristic of my transfer is the mechanical disruptability of the bond between the image and the backing which is obtained primarily by a proper selection of the backing material. In its preferred form, my backing material consists of a thin, flexible, transparent sheet of polyethylene plastic on the order of 0.0025 inch thick, for example, and which has a general polymeric formula of



This material, in addition to being flexible, is semi-elastic and nonporous in nature, presenting a relatively smooth surface to which the lacquer employed in forming the image cannot form a strong mechanical bond. Ordinary decalcomania lacquers as well as other film-forming materials will dry satisfactorily on the surface of polyethylene and result in an image having a tensile strength greater than the bond between the image and the backing.

Polyethylene plastic is characterized by an unusually great insolubility in ordinary solvents, particularly those of an organic nature such as are customarily employed in compounding lacquers. I may therefore form my images from substantially any type of lacquer, paint, enamel, or the like, which has been compounded to yield a relatively flexible tough film upon drying. Conventional decalcomania lacquers such as those manufactured by the Cudner & O'Connor Mfg. Co. of Chicago, Illinois, may therefore be employed without difficulty and are representative of the preferred type since they include a plasticizer to prevent brittleness and dry sufficiently slowly to permit the satisfactory elimination of bubbles. As an example of a satisfactory drying time, these and other similar lacquers will dry in approximately four hours when maintained at a temperature of approximately 70° F. in an atmosphere of approximately 50% relative humidity.

If desired, the clear lacquer coat 21 may be eliminated and the pigmented lacquer coat 22 applied directly to the backing 19 or, if desired, the position of the clear lacquer coat 21 and the pigmented lacquer coat 22 may be reversed, applying the clear lacquer to the exposed surface of the pigmented lacquer coat 22 after the latter has been applied to the backing 19. The primary purpose of the clear lacquer coat is to build up the body of the image, increasing its tensile strength, and to prevent any removal or pickup of pigmented lacquer by the silk screen. Pickup by the silk screen of clear lacquer is negligible and, when clear lacquer forms the first coat, is unimportant. Since the bond between clear lacquer and pigmented lacquer is stronger than the bond between either lacquer and polyethylene, it is obvious that the tendency of the screen to pick up the pigmented lacquer is reduced.

The precise reason for the failure of the lacquer or other film-forming materials to adhere tenaciously to polyethylene plastic has not as yet been determined with absolute certainty. This characteristic, however, which results in the formation of a mechanically disruptable bond, is believed to be due perhaps in part to the smoothness, elasticity and lack of porosity of plastic materials having the characteristics of polyethylene, the term "smoothness" as used herein denoting not necessarily a flat surface but a surface not having sufficient microscopic roughness to provide a mechanical bond for the lacquer or film-forming material. More probably, however, the inability of the lacquer to bond tenaciously to the polyethylene plastic sheet is due to the inability of the solvents used in compounding the lacquer to even partially dissolve polyethylene.

Since only the surface of the backing need exhibit the desired characteristics, the backing may be of substantially any material, preferably translucent, surfaced with polyethylene as by spraying, rolling, or the like.

Many different types of cements or adhesives may be employed on my transfer and are preferably of the types which become tacky very quickly after moistening. The adhesives customarily employed on decalcomania transfers are satisfactory as, for example, Atlas Decalcomania Glue, manufactured by the Atlas Specialty Mfg. Company of Chicago. However, glue Z—93, manufactured by the Paisley Products Inc. of Chicago, Illinois, is more satisfactory inasmuch as it dries more slowly and exhibits less tendency to pull the image from the backing. Other types of adhesives, such as pressure-sensitive or heat-reactive adhesives, may be employed without difficulty and the selection of adhesive may be made by known methods. If it is desired to apply an image to a porous surface, such as wood or masonry, water-soluble adhesives are not recommended since water can gain access to the adhesive after application thereby destroying the bond. In such instances I prefer to use an adhesive capable of being softened by other solvents such as alcohol or turpentine and resistant to softening by water. Cements of this nature can be employed in my transfer without difficulty since the backing 19 is highly resistant to solution or reaction with such solvents. It has been noted that the rubbing of the backing during application as well as the removal of the backing from the image apparently generates a

static charge in the image which seems to increase its tendency to adhere to the object.

From the foregoing it may be seen that my transfer exhibits a marked superiority over conventional decalcomania transfers. For example, the necessity of soaking the transfer in water, or the like, for an indeterminate period of time is eliminated since no water-softenable adhesive coat exists between the image and the backing. This eliminates the possibility of premature removal of the image from the backing prior to application or dissolving sufficient quantities of adhesive to prevent the proper application of the transfer. Although fully applicable to simple images wherein all portions thereof are connected by pigmented lacquer, my transfer exhibits more marked superiority in cases where compound images are required, inasmuch as no necessity exists for providing an interconnecting film of clear lacquer between portions of the compound image. Because of the transparent nature of my backing, perfect registry can be obtained by an inexperienced workman since the relative positions of the image and the object, as well as the relative positions between various portions of the image, are at all times visible.

In the foregoing specification and in the appended claims the term "mechanically disruptable bond" is to be understood as defining a bond between lacquer and the backing material which may be ruptured or destroyed without the use of liquids and without damage to the lacquer image. Liquid may be used to soften an adhesive on the exposed face of the image, but its effect on the bond between the image and the backing is negligible since both the image and the backing are substantially nonporous. The term "translucent" shall be understood as including "transparent," and defining a light transmitting power of the backing sufficiently great to permit definition of the image and the object.

In compliance with R. S. 4888, I have described in detail in the foregoing specification the preferred method of making and using my improved transfer. However, it should not be understood that I limit myself to the specific details herein disclosed except in so far as defined in the appended claims.

I claim:

1. A transfer comprising a flexible, relatively smooth backing of polyethylene, an image of dried film-forming material on a surface of the backing, and a coating of adhesive on the exposed surface of the image, the backing being substantially insoluble in the film-forming material, said transfer being characterized by a mechanically disruptable bond between the backing and the image.

2. A transfer comprising a sheet of polyethylene, a dried lacquer image on a surface of the sheet, said image comprising a film of unpigmented lacquer in contact with a film of pigmented lacquer, and a coating of adhesive on the exposed surface of the image.

3. A transfer including a flexible transparent backing of polyethylene, a plurality of unconnected dried lacquer images on a surface of the backing, and a coating of adhesive on the exposed surface of the images, said transfer being characterized by a mechanically disruptable bond between the images and the backing.

4. A transfer including a flexible transparent backing of polyethylene, a plurality of unconnected clear lacquer images on the backing, a coating of pigmented lacquer on the clear lacquer image, and a coating of adhesive on the exposed surface of the pigmented lacquer, said transfer being characterized by a mechanically disruptable bond between the images and the backing.

5. The method of transferring an image of dried film-forming material from a base to a transfer surface which comprises applying the film-forming material to a flexible, relatively smooth backing of polyethylene and permitting it to dry thereon, the backing being substantially insoluble in the film-forming material, whereby a mechanically disruptable bond is formed between said backing and said dried material, and then applying the image to said transfer surface by placing it face down against said surface while interposing between the image and the transfer surface an adhesive having greater adhesion than the mechanically disruptable bond between the image and the backing, whereby the image may be stripped from the backing without the use of solvents.

6. The method of transferring an image of dried film-forming material from a base to a transfer surface which comprises applying the film-forming material to a flexible, relatively smooth backing of polyethylene and permitting it to dry thereon, the backing being substantially insoluble in the film-forming material, whereby a mechanically disruptable bond is formed between said backing and said dried material, placing an adhesive on the transfer surface having greater adhesive properties than said disruptable bond, and then placing the image with its backing face down upon said adhesive coated surface whereby the image may be stripped from the backing without the use of solvents.

CHARLES WITTGREN.

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