

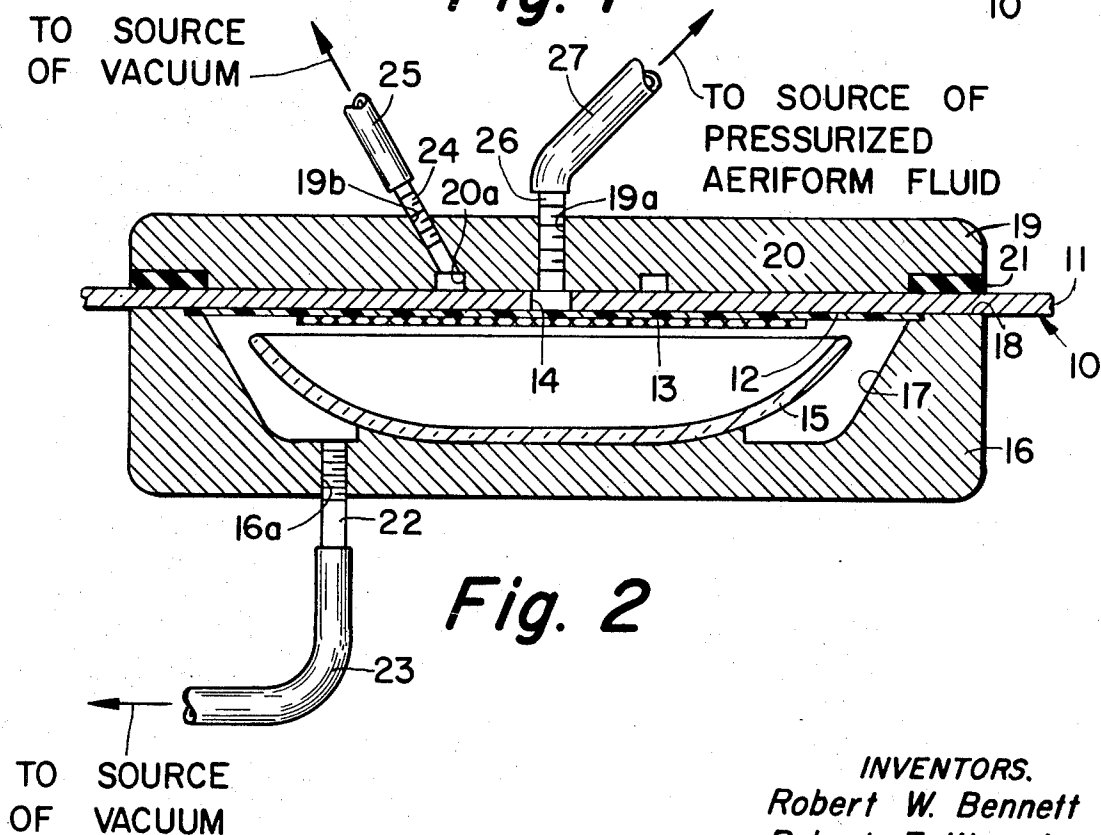
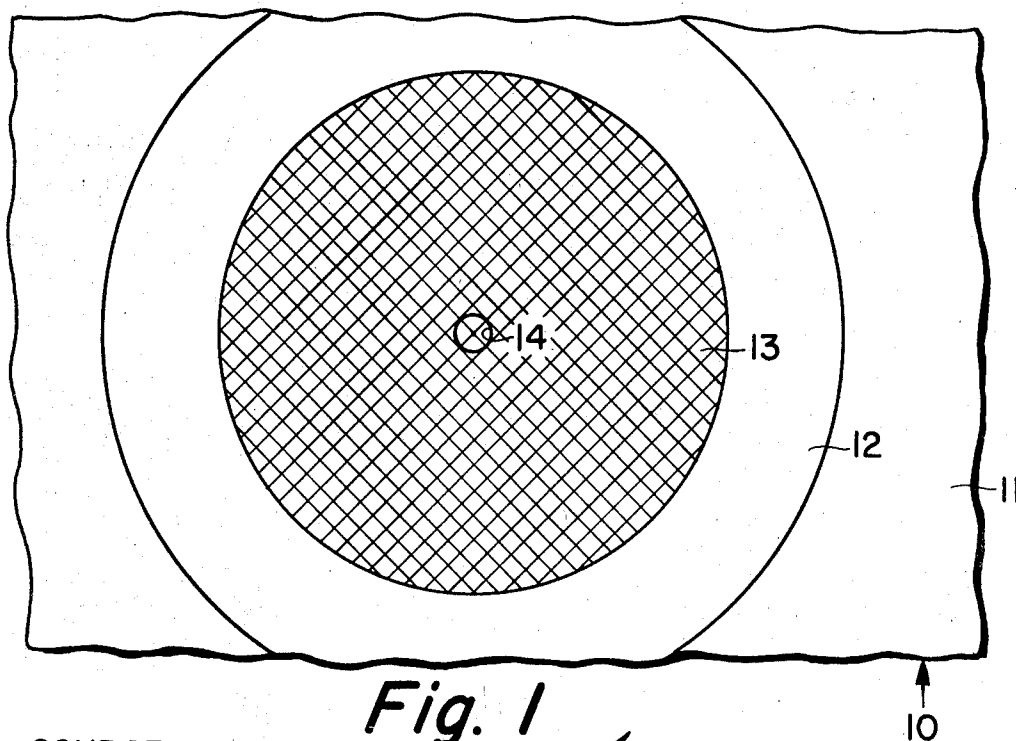
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DECAL APPLYING

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DECAL APPLYING

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10 Claims

ABSTRACT OF THE DISCLOSURE

A method of applying or transferring the transfer film and an associated design of a decal to the inner surface of a dish or other dish shaped article, including the curved and sloping portions thereof, without wrinkles or blisters in such film following such transfer. A pair of complementary members capable of being hermetically cooperatively disposed to form a hermetic cavity larger than said dish are provided and such dish is disposed in said cavity with the inner surface thereof facing the entrance to the cavity. A decal, having a hole in the backing paper only, is spread over the entrance to said cavity and said members are cooperatively disposed as mentioned. Vacuum is supplied to the unfiled surface of said backing paper to hold it in place and to said transfer film to draw such film off said backing paper while air at atmospheric or higher pressure is supplied through said hole in the backing paper to push said film off such paper and onto said inner surface.

BACKGROUND OF THE INVENTION

The present invention relates to the art of applying or transferring the transfer films of decals to concave surfaces, such as the inner surfaces of dishes or other dish like articles, without blisters or wrinkles in said films following the transfer thereof to said surfaces.

The transferring or application of decals to concavely-curved surfaces such as, for example, the sloping and curving portions of the inner surfaces of dishes or other dish-like articles has, heretofore, been impractical except by hand with the aid of a squeegee to remove blisters and wrinkles from the transfer films of the decals where they contact said sloping and curving portions of said inner surfaces. Such manual transferring or application of decals is, of course, uneconomical and, therefore, the method of the present invention was conceived and developed to provide for more economical decoration of articles of the type mentioned by the use of decals.

BRIEF SUMMARY OF THE INVENTION

In practicing the invention, there is provided a pair of first and second complementary members which may be cooperatively disposed in relationship with one another to provide a hermetic cavity for containing a dish like article during transfer of a decal to the inner surfaces of said article including the curving and sloping portions of such inner surface. A decal is disposed between said members above said inner surface of said article disposed in said cavity and with the transfer film of such decal facing such surface. A hole is provided in the backing paper of said decal at approximately the center of the decal and a fluid passage extends through the one of said members, which contacts the otherwise exposed surface of the backing paper, to permit air or other aeriform fluid at atmospheric or higher pressure to flow through said

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hole in the backing paper and contact the transfer film thereon. Vacuum is supplied to said surface of said backing paper to hold such paper in place, and to said cavity to draw said transfer film off said backing paper while said air or similar fluid flows through said hole to press the transfer film against said inner surface of said article.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 comprises a top plan view of a decal which is to be transferred to the inner surface of a dish or similar article, and

FIG. 2 comprises a cross-sectional elevational view of apparatus used in practicing the invention and illustrates the practice of the inventive method disclosed.

Similar reference characters refer to similar parts in each of the figures of the drawings.

PREFERRED EMBODIMENT OF THE INVENTION

Referring to the drawings in detail, there is shown a decal 10 including the usual backing paper 11, the usual transparent and stretchable transfer film 12 on the top surface of such backing paper, and an open type of a design or decoration 13 on the top surface of such transfer film, it being intended to transfer or apply such film and said design to the inner surface of a dish or dish-like article 15 (FIG. 2) including at least a part of the curved and sloping portions of such inner surface of such dish or article. For purpose of simplification of FIG. 1, only a portion of backing paper 11 and transfer film 12 of decal 10 is shown in such drawing figure. It will also be noted that the thicknesses of backing paper 11, transfer film 12 and decoration 13 are somewhat exaggerated in FIG. 2 for purposes of ease of illustration thereof. A hole 14 of a relatively small diameter is provided through backing paper 11 at approximately the center of transfer film 12 and decoration or design 13 for purposes hereinafter discussed.

As shown in FIG. 2, there is provided a first member 16 embodying a cavity 17 having a greater depth and diameter than the corresponding dimensions of dish 15. Member 16 has an annular rim 18 which surrounds cavity 17 at the entrance end thereof. A second member 19 which is complementary to said first member is also provided, such second member including a generally flat surface 20 preferably, but not necessarily, having an annular gasket 21 of a resilient and hermetic material which forms a rim portion of surface 20 and is considered a part of such flat surface.

A threaded passage 16a extends through member 16 and opens into cavity 17. A cooperatively threaded end of a conduit 22 is screwed into the threads in passage 16a and the other end of such conduit is connected to the first end of a flexible conduit 23 in any convenient manner. The other end of conduit 23 is connected to a source of vacuum or negative pressure which is not shown in the drawings for purposes of simplification thereof.

A first passage 19a is provided in member 19 at approximately the center of such member and extends through such member and said flat surface 20 thereof. An annular channel 20a is provided in bottom surface 20 of member 19 and surrounds passage 19a in such member at a generally uniform distance from such passage. A second passage 19b extends through member 19 and opens into said channel 20a in bottom surface 20 of member

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19. Passage 19b is threaded and a cooperatively threaded end of a conduit 24 is screwed into such passage. The other end of conduit 24 is connected in any convenient manner to one end of a flexible conduit 25. The other end of such flexible conduit is connected to the previously-mentioned source of negative pressure or vacuum.

The outer end of passage 19a in member 19 is preferably left open to atmosphere but may, if found desirable or necessary, be connected to a source of pressurized aeriform fluid as illustrated in FIG. 2. In the latter event, passage 19a is threaded and one end of a cooperatively threaded conduit 26 is screwed into such passage. The other end of conduit 26 is connected in any convenient manner to a first end of a flexible conduit 27 and the other end of such flexible conduit is connected to said source of pressurized fluid which is also not shown in the drawings for the purpose of simplification thereof.

In practicing the inventive method disclosed, a dish or other dish-like article, such as 15, is disposed in cavity 17 in member 16 as shown in FIG. 2. A decal 10 such as partially shown in FIG. 1 is provided, such decal having a transfer film 12 and a backing paper 11 of sizes larger than the entrance into cavity 17 and such that they may, therefore, be disposed between at least a portion of the areas of the surfaces of annular rim portions 18 and 20 of members 16 and 19, respectively. Decal 10 is spread over said rim portion 18 and cavity 17 in member 16, and above said inner surface of article 15 as shown in FIG. 2. Thus, decal 10 is disposed in said position with the design thereon facing said inner surface of article 15 and with the center of the transfer film 12 of such decal substantially coinciding with the center of such inner surface, as also illustrated in FIG. 2. Member 19 is then disposed as shown in FIG. 2 and passage 19a in member 19 thereby generally coincides with said hole 14 in backing paper 11 of decal 10 as illustrated.

Having positioned said items as described above, vacuum or negative pressure is applied through conduit 25 to passage 19b and thence to said annular channel 20a. Such vacuum draws backing paper 11 of decal 10 up against surface 20 of member 19 to assist in holding such paper firmly against such surface. Vacuum or negative pressure is, at the same time or shortly thereafter, applied through conduit 23 to passage 16a and thence to cavity 17 in member 16. Such vacuum draws downwardly on transfer film 12 and design 13 of decal 10 and, if pressurized fluid at higher than atmospheric pressure is not being employed, air at atmospheric pressure flows through passage 19a and hole 14 in backing paper 11 to press against the back of transfer film 12 at such time.

During the continued application of said vacuum to cavity 17, air at atmospheric pressure supplied through hole 14 in backing paper 11 or, if an aeriform fluid at a higher pressure is supplied to passage 19a as previously mentioned, such higher pressure fluid, will cause transfer film 12 to separate from backing paper 11 progressively radially outward from hole 14 and cause such film to stretch or balloon so that design 13 and subsequently transfer film 12 are pressed into firm contact with said inner surface of article 15. During further continued application of vacuum to cavity 17, transfer film 12 will progressively be smoothly spread over the entire inner surface of article 15 by the action of the air or other pressurized fluid flowing downwardly through passage 19a and hole 14 in backing paper 11 further stretching or ballooning transfer film 12 in a direction from the center thereof radially outward from such center toward and over the upper rim or lip of article 15 in a substantially uniform manner. Thus, transfer film 12 and design 13 are transferred or applied to the inner surface of article 15 with no blisters or wrinkles in such film where it contacts the curved and sloping portions of said inner surface. Member 19 is then removed, and the continued application of vacuum through conduit 24 to channel 20a and through conduit 22 and 23 to cavity 17, and such removal

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of member 19 during the continued application of said vacuum, completes the separation of transfer film 12 from backing paper 11. The decorated dish 15 is then removed from cavity 17 and run through alehr or oven where the elevated temperatures oxidize or evaporate the transfer film leaving only the decal design on the inner surface of dish 15.

It is pointed out that the decals such as 10 to be applied to the inner surfaces of dishes or dish-like articles such as 15 can be of the type employing a water soluble glue which holds the transfer film to the backing paper, of the type using a thermal sensitive adhesive such as wax for adhering the transfer film to the backing paper, or other similar and suitable types of decals.

If, for example, a decal employing a thermal sensitive adhesive is employed, such decal is preferably provided with a coating of heat sensitive material, such as wax, which covers the otherwise exposed surface of the decoration or design such as 13 and which serves to hold the decoration or design to the inner surface of the dish or article such as 15 following the application of such design to such surface and until the dish is run through said lehr or oven. Such decals are well known to those skilled in the art. Alternatively, the inner surface of the article such as 15 can be sprayed with a thin coating of a thermally sensitive adhesive such as wax before being disposed in cavity 17 of member 16, and such coating will perform the same function as said coating provided on said otherwise exposed surface of decoration or design 13. If a decal with a thermal sensitive adhesive is employed, the air or other pressurized aeriform fluid supplied through passage 19a in member 19 and thence through a hole, such as 14, in the backing paper of the decal can be heated and/or member 19 can be heated for separation of the backing paper and transfer film. It is also preferable, but not necessary, when using a decal with a thermal sensitive adhesive, to heat the dish or dish-like article such as 15 before disposing it in cavity 17. It found expedient or desirable to do so, following the transfer of such a decal to the inner surface of article 15, pressurized fluid can be supplied through conduits 22 and 23 and the transfer film thus removed from the decoration and adhesive prior to insertion of article 15 into said lehr or oven.

If a decal employing a water soluble glue is employed for decal 10, the surface of the transfer film of the decal upon which decoration or design 13 is provided, and in the areas thereof surrounding such decoration, may be provided with a suitable adhesive to adhere the decoration or design to the inner surface of article 15 following its transfer thereto and until the article is passed through said lehr or oven as previously mentioned. Alternatively, as with the thermal sensitive decal, the inner surface of the article such as 15 can be sprayed with a suitable adhesive material to obtain the desired temporary adhesion. When a decal employing water soluble glue is employed, such decal is, of course, suitably wetted to allow the desired transfer of the transfer film and the decoration from the backing paper to the inner surface of said article such as 15. As is apparent, the wetting of a decal having a water soluble glue is most conveniently performed prior to its disposal between members 16 and 19 for transfer of said article.

The above-described preparations for the transfer of different types of decals are well known to persons skilled in the art and such persons will, therefore, readily recognize the preparatory techniques to be used with each of the types of decals suitable for the practice of the invention.

Although there is herein shown and described in detail only one example of the practice of the method disclosed, it will be understood that such is not to be considered in any way limiting but that the protection sought for the invention disclosed is intended to be limited only by the spirit and scope of the appended claims.

What is claimed is:

1. The method of applying a transfer film of a decal to the inner surface of a dish-like article without wrinkles or blisters in the areas of said transfer film which contact the curved and sloping portions of said inner surface following the application of such film to such surface, such method comprising:

- (a) disposing said article in a first member including an annular rim surrounding a cavity embodied in said member, such cavity having a depth and perimeter larger than the corresponding portions of said article, such member also embodying a passage extending through the member and into said cavity, and said article being disposed in such cavity with said inner surface of the vessel facing the entrance to the cavity;
- (b) disposing the backing paper of a decal against and about said rim of said first member with such transfer film and the associated ornamental design facing said inner surface of said article and generally centered in relationship to such surface, said transfer film being stretchable and having an area larger than the area of the entrance into said cavity and said design being disposed between such film and said inner surface, said backing paper of said decal including a hole of a relatively small diameter extending through such paper at a location approximately in the center of said transfer film;
- (c) disposing against the then exposed side of said backing paper, in a hermetic relationship therewith, a generally flat surface of a second member including a rim portion complementary to said rim of said first member, said second member embodying a first passage extending through such member and including an opening through said flat surface of the member at a location such that said opening will substantially coincide with said hole in said backing paper when the flat surface of said second member is disposed as described, said second member also embodying at least one second passage extending through such member and opening through said flat surface thereof for applying vacuum to the side of said backing paper contacting such flat surface; and
- (d) applying vacuum through said first passage in said first member and said second passage in said second member to draw said transfer film and said design away from said backing paper and press such film and design against said inner surface of said article while maintaining said backing paper against said flat surface of said second member.

2. The method in accordance with claim 1 and in which said decal is of the type employing a thermal sensitive adhesive and, following the transfer of said transfer film and design to said inner surface of said article, supplying pressurized fluid through said passage in said first member to remove the transfer film from the design.

3. The method in accordance with claim 1 and further including supplying pressurized fluid through said first passage in said second member, substantially simultaneously with said application of said vacuum, to assist the transfer of said transfer film and said design to said inner surface of said article.

4. The method in accordance with claim 1 and in which said second passage in said second member includes an annular channel surrounding said opening of said first passage in such member to evenly distribute said vacuum, applied through such second passage, over a portion of the surface of said backing paper which contacts said first surface of said second member.

5. The method in accordance with claim 3 and in which said second passage in said second member includes an annular channel surrounding said opening of said first passage in such member to evenly distribute said vacuum, applied through such second passage, over a portion

of the surface of said backing paper which contacts said flat surface of said second member.

6. The method of transferring the transfer film of a decal to the inner surface of a dish without wrinkles or blisters in the areas of the transfer film which contact the curved and sloping portions of said inner surface following said transferring of said film, such method comprising,

- (a) providing a pair of first and second complementary members having rims which are cooperatively positional in a face-to-face hermetic relationship with one another to form an enclosed hermetic cavity having a depth and perimeter larger than and generally corresponding to the corresponding portions of said dish, the second of said members having a generally flat surface defining the limits of the larger end of said cavity and said first member embodying a passage extending through such member and opening into said cavity, said second member embodying a first passage extending through said member and opening into said cavity at approximately the center of said flat surface of such second member and a second passage extending through the second member and opening into an annular channel in said flat surface of such member and generally uniformly surrounding said first passage in such member;
- (b) disposing said dish in said cavity with the bottom outer surface of such dish facing and generally centered in the smaller end of said cavity;
- (c) disposing said first and second members and the backing paper of a decal so that such paper contacts said flat surface of said second member and said rims of both said members with the transfer film facing said inner surface of said dish and generally centered in relationship to such surface, said transfer film being stretchable and having a diameter larger than the diameter of said larger end of said cavity and the design on said transfer film being disposed between such film and said inner surface;
- (d) providing a hole in said backing paper at a location generally corresponding to the location where said first passage in said second member opens into said cavity and at a location approximately in the center of said transfer film;
- (e) applying vacuum through said passage in said first member and said second passage in said second member to draw said rims of said members into firm contact with said backing paper, and to draw said transfer film away from said backing paper and transfer such film and design to said inner surface of said dish while maintaining said backing paper in contact with said flat surface of said second member; and
- (f) thereafter separating said first and second members to remove said dish from said cavity and said backing paper from the rims of such members in preparation for transferring another decal to the inner surface of another dish.

7. The method in accordance with claim 6 and in which said decal is of the thermal sensitive adhesive type and including the further step of supplying pressurized fluid through said passage in said first member, following the transfer of said transfer film and design to said inner surface of said dish, to remove the transfer film from the design and leave it remaining on said inner surface.

8. The method in accordance with claim 6 and further including supplying, substantially simultaneously with said application of said vacuum through said passage in said first member and said second passage in said second member, pressurized aeriform fluid through said first passage in said second member to thereby assist the transfer of said transfer film and said design to said inner surface of said dish.

9. The method in accordance with claim 6 and in which at least a portion of at least one of said rims of said first and second members is provided with an annular gasket of a resilient hermetic material to attain substan-

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tially optimum hermetic contact with the surfaces of said backing paper.

10. The method in accordance with claim 8 and in which at least a portion of at least one of said rims of said first and second members is provided with an annular gasket of a resilient hermetic material to attain substantially optimum hermetic contact with the surfaces of said backing paper.

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