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A. E. WARNBERG

3,783,073

METHOD FOR TRANSFERRING INDICIA TO FABRICS

Filed May 19, 1971

2 Sheets-Sheet 1

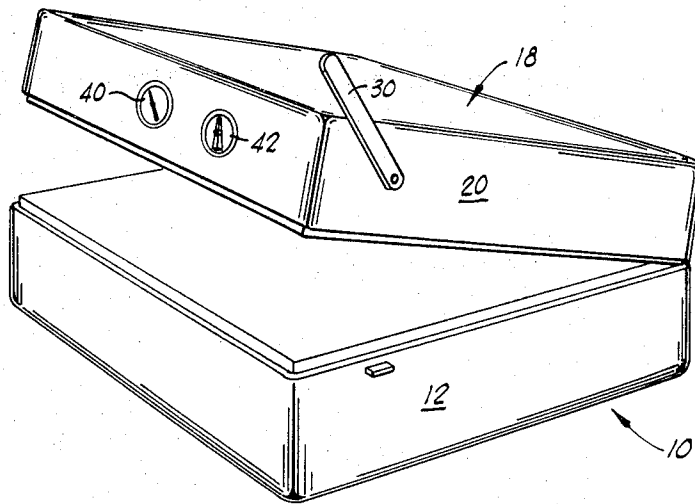


FIG. 1

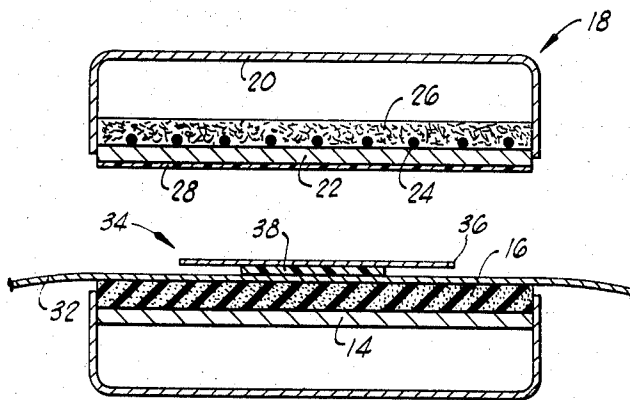


FIG. 2

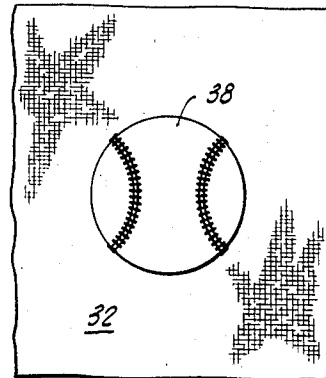


FIG. 3

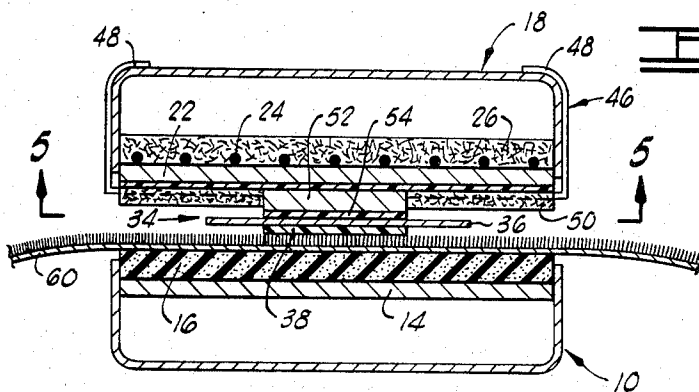


FIG. 4

INVENTOR
ARCHIE E. WARNBERG

BY
Dwight J. Hession & Dougherty
ATTORNEYS

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A. E. WARNBERG

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2 Sheets-Sheet 2

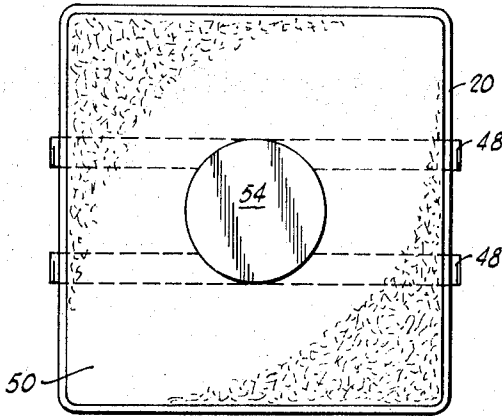


FIG. 5

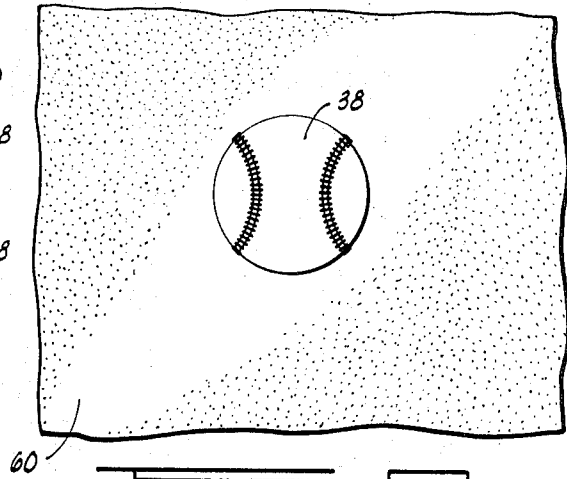


FIG. 6

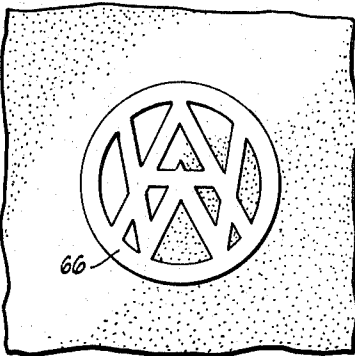


FIG. 9

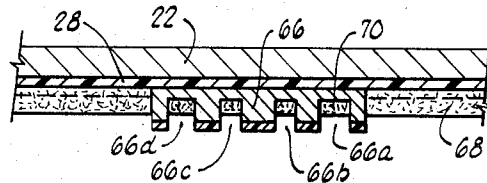


FIG. 7

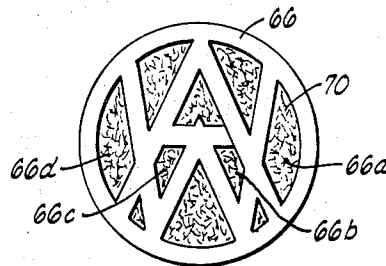
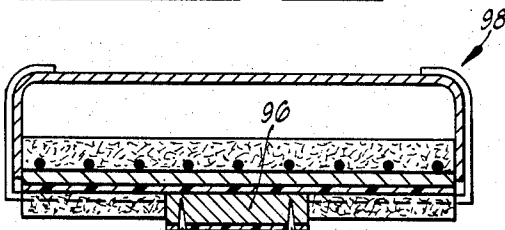


FIG. 10

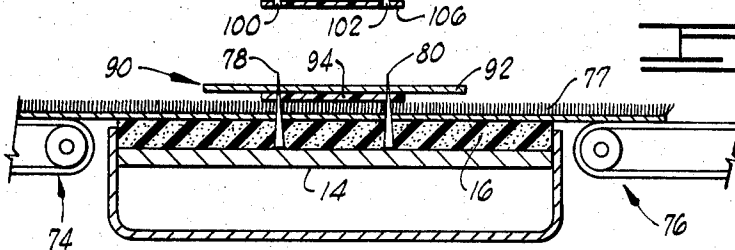


FIG. 11

INVENTOR
ARCHIE E. WARNBERG

BY
Dunlap, Hession & Dougherty
ATTORNEYS

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3,783,073

METHOD FOR TRANSFERRING INDICIA TO FABRICS

Archie E. Warnberg, 3600 NW. 43rd St.,
Oklahoma City, Okla. 73112

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5 Claims

ABSTRACT OF THE DISCLOSURE

A method of decalcomania or indicia transfer to fabrics comprising the steps of placing the fabric to which the indicium is to be transferred upon a supporting surface, placing a transfer sheet carrying the indicium to be transferred on said fabric at the location where the indicium is to be transferred to the fabric, surrounding the edges of the indicium with a coplanar located thermal insulating material and applying heat and pressure to the indicium and to the coplanar thermal insulating material to transfer the indicium to the fabric at the point desired, while protecting the remainder of the fabric from heat degradation.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the transfer of indicia to a fabric, and more particularly, to decalcomania in which a synthetic resin type transfer medium in the form of indicia is caused to adhere tenaciously to a fabric by applying heat and pressure to the synthetic resin.

Brief description of the prior art

It has heretofore been proposed to apply indicia in the form of synthetic resin particles arrayed collectively in various designs to a fabric material for the purpose of labeling the fabric or placing certain information or designs thereon. One of the ways in which this has been accomplished is by a so-called dry transfer or decalcomania technique in which the indicia made up by the plastic particles in the form of a plastisol or an organosol are adhered to a substrate sheet to form what is referred to as a composite transfer sheet. This transfer sheet is then placed upon the fabric to which the indicia is to be transferred, and heat and pressure are applied to the transfer sheet. This causes the particles of synthetic resin making up the transfer indicia to adhere tenaciously to the fibers of the fabric. After cooling, the substrate sheet which previously carried the indicia may be stripped away to leave the indicia firmly bonded to the fabric and in a desired exposed location thereon.

Various techniques have previously been proposed for accomplishing dry transfers of the type described, and a number of patents have issued on various transfer indicia compositions which afford certain advantages when transferred to fabric by the application of heat and pressure. Examples of patents of this type are U.S. Pat. 2,556,078; U.S. Pat. 2,688,579; and U.S. Pat. 3,511,732. In more recent times, it has been a common practice to use as a transfer medium, vinyl plastisols of the type described in the latter patent. Such plastisols are suspensions of finely ground particles of resinous vinyl polymers in a compatible fluid plastisizer. When these plastisols are heated to a proper temperature, they are converted into a homogeneous, rubber-like material which, upon cooling, remains bonded to the fibers of the fabric to which the transfer is made.

In the technique most frequently used for accomplishing the transfer of the plastisol indicia to the fabric upon which the indicia are to be fixed, the fabric is first placed

on a supporting surface which, in common practice, may be a flat rubber pad supported on a relatively stiff surface. The transfer sheet, having the plastisol carried thereon in the form of the design or other indicia which it is desired to transfer, is then placed on top of the fabric at the location where the transfer is to be made. The plastisol faces downwardly, and is in contact with the upwardly facing surface of the fabric. A heated platen is then brought to bear against the transfer sheet, and against the portion of the upper surface of the fabric which is exposed, and the combined influences of heat and pressure effectively transfer the plastisol indicia to the fabric from the substrate sheet upon which it is supported. The heated upper plate frequently is in the form of a heated steel plate which is coated with a layer of a heat resistant synthetic resin, such as a polyhalohydrocarbon.

Although the described procedure for accomplishing plastisol indicia transfers works well with many types of fabrics, a problem has been encountered with certain synthetic fabrics, particularly of the pile type, having relatively low temperature tolerance, and thus being more susceptible to heat degradation or undesirable crimping as a result of the application of the relatively high temperatures thereto necessary to effect transfer of the plastisol indicia to such fabrics. For example, when undertaking to transfer a plastisol design from a composite transfer sheet of the type described to a polyacrylic pile fabric, the heat transferred from the heated platen as it is pressed downwardly on the exposed upper surface of the fabric upon which the transfer sheet is placed tends to crimp the polyacrylic fibers in the pile, and also to develop a crease in the fabric at the boundary of the heated upper platen. An unsightly crimped area which differs from the remainder of the fabric thus is made to surround the transferred plastisol indicia, and an undesirable product results. Other synthetic fibers are susceptible to the same deleterious effect when the relatively high temperatures required to accomplish the transfer are applied thereto. Thus, indicia transfers of the type described have not been employed successfully with these types of fabric.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

The present invention provides a method and apparatus for transferring indicia of the type hereinbefore described to fabrics in such a way that no heat or pressure distortion of any portion of the fabric results, and so that the indicia may be located in the precise location on the fabric desired.

Broadly described, the present invention is a method for bonding a fusible synthetic resin indicium carried by a composite transfer sheet to a fiber-containing fabric comprising the steps of (a) supporting the fabric on a base, with the portion of the fabric to which the indicia is to be transferred exposed to receive the indicium; (b) placing on the exposed portion of the fabric, a composite transfer sheet carrying the indicium on a sheet of substrate material, with the indicium contacting the fabric; (c) applying heat and pressure directly to the synthetic resin indicium to bond the indicium to the fabric at the areas of contact therewith; and (d) concurrently with the application of heat and pressure to the indicium, maintaining areas of the fabric which are not contacted by the indicium at a temperature which is below the temperature to which the indicium is heated during transfer, and below the softening temperature of the fibers of the fabric. This method attains its greatest utility when the transfer is to be made to a pile-type fabric constructed of fibers of synthetic resins, and particularly polyacrylic and monoacrylic fabrics.

In a preferred method of practicing the invention, the maintenance of the temperature of the areas of the fabric not contacted by the indicium at a temperature below the temperature to which the indicium is heated during transfer is accomplished by the use of a thermal insulating material, such as asbestos, which is disposed peripherally around the indicium on all sides thereof so as to shield the fabric from heat transfer. It is also preferable to pressure applied to the fabric in the areas surrounding the develop pressure on the indicium independently of any indicium, thus avoiding crimping or compressing the fibers of the fabric at any exposed location not covered by the indicia when transferred.

An important object of the invention is to provide a method for quickly and easily accomplishing the dry transfer of synthetic resin indicia to heat sensitive fabrics without the degradation or unsightly distortion of the fabric.

Another object of the invention is to provide apparatus which can be quickly and easily attached to presently marketed dry transfer devices to accommodate these devices to use with pile-type synthetic resin fabrics.

Another object of the invention is to provide a method for precisely registering a composite transfer sheet used in a dry transfer process, with a localized, relatively small area heat source preparatory to transferring a synthetic resin indicium from the transfer sheet to a fabric.

Other objects and advantages of the present invention will become apparent as the following detailed description of the invention is read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an apparatus for effecting the dry transfer of synthetic resin transfer indicia as such apparatus has previously been constructed.

FIG. 2 is a vertical sectional view through the apparatus depicted in FIG. 1 and showing, in addition to such apparatus, a fabric disposed in the apparatus preparatory to effecting the transfer thereto of a transfer indicium. There is also shown a composite transfer sheet positioned over the fabric in the position it occupies immediately prior to accomplishing the transfer.

FIG. 3 is a plan view of a woven cotton fabric to which an indicium in the form of a baseball has been transferred.

FIG. 4 is a sectional view similar to FIG. 2 but illustrating apparatus constructed in accordance with the present invention.

FIG. 5 is a sectional view taken along line 5—5 of FIG. 4.

FIG. 6 is a plan view illustrating the appearance of a pile-type fabric after an indicium has been transferred thereto using the apparatus and method of the present invention.

FIG. 7 is a detail, sectional view showing a portion of a heat shield subassembly utilized in a modified embodiment of the present invention.

FIG. 8 is a bottom plan view of the heat transfer block portion of the heat shield subassembly depicted in FIG. 7.

FIG. 9 is a plan view illustrating the appearance of a pile fabric to which a synthetic resin indicium in the form of an internally open monogram has been transferred.

FIG. 10 is a sectional view similar to FIGS. 2 and 4 but illustrating a further modified embodiment of the present invention and illustrating conveyor assemblies used for continuously feeding fabric to the heat transfer apparatus of the invention, and for continuously removing fabric therefrom after the transfers have been completed.

DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Referring initially to FIGS. 1-3 of the drawings, shown therein is an apparatus of the type previously used for

transferring indicia to a fabric. In FIG. 3 there is shown the resultant product which is produced by the transfer.

The type of device which has been employed in accomplishing the dry transfer of indicia of the type such as synthetic resin plastisols is shown in FIG. 1. The apparatus includes the lower base assembly 10 which includes a hollow parallelepiped frame 12 having a rigid supporting plate 14 extending between the side walls thereof and spaced downwardly from the top edges thereof. The rigid supporting plate 14 supports a supporting pad 16 of an elastomeric material, such as foam rubber.

Pivotally connected to an upper side edge of the parallelepiped frame 12 is an upper platen assembly, designated generally by reference numeral 18. The upper platen assembly 18 includes a hollow right parallelepiped frame 20 which is complementary in configuration to the hollow parallelepiped 12 of the base assembly 10. The parallelepiped frame 20 has one of its edges hingedly connected to an edge of the parallelepiped frame 12 so that it may be pivoted about a horizontal axis in the manner depicted in FIG. 1. Carried within the parallelepiped frame 20 near the open side thereof is a heat transfer plate 22 which is typically made of steel. The heat transfer plate 22 is heated by a plurality of heating elements 24 disposed above the plate within the hollow parallelepiped frame 20. The heating elements 24 are surrounded by an insulating material 26. A heat transfer facing 28 of a high density synthetic resin material having high thermal stability is secured to the downwardly facing, exposed surface of the heat transfer plate 22. A suitable material for the construction of the facing 28 is a polytetrafluoroethylene resin manufactured by the E. I. du Pont de Nemours Company of Wilmington, Del., under the trade name Teflon.

A latching mechanism of a suitable type for latching the upper platen assembly 18 to the base assembly 10 in a manner such that the plate 22 and its facing 28 bear with considerable pressure against the pad 16 is provided on the parallelepiped frames 12 and 20. In the illustrated construction of this latching mechanism, a latching handle 30 is provided and functions both to permit the upper platen assembly 18 to be guided downwardly into contact with the base assembly 10 and then, by pivotation, affects the locking of these two elements with concurrent compression of the elastomeric pad 16 by downward movement of the plate 22.

In using the transfer apparatus, a fabric to which it is desired to transfer a synthetic resin indicium is first placed on the upwardly facing surface of the pad 16 so that it is exposed to the facing 28 of the heat transfer plate 22. Thus, a cotton woven fabric 32 is shown extended across the upper surface of the pad 16 in FIG. 2 of the drawings. The fabric 32 is centered on the pad 16 so that that portion of the fabric at which it is desired to locate the indicium to be transferred is centered over the center of the pad.

A composite transfer sheet, designated generally by the reference numeral 34, is then placed on the exposed, upwardly facing surface of the fabric 32 under the center of the upper platen assembly 18. The composite transfer sheet will include a substrate base sheet 36, which may be a thin sheet of silicon-coated paper, and the synthetic resin indicium 38 which is to be transferred to the fabric 32. The thickness of the substrate 36 and the synthetic resin indicium 38 are exaggerated in FIG. 2 for purposes of illustration. Also for purposes of illustration, the particular indicium which is to be transferred to the fabric 32 is a figure of a baseball. Various other indicia could, of course, be used.

When the composite transfer sheet 34 has been positioned upon the fabric 32 in the manner described, the upper platen assembly 18 is then lowered, and the hand lever 30 is brought down to lock the upper platen assembly to the base assembly 10 and apply compression to the composite transfer sheet 34 and to the fabric 32. At this

time, a temperature setting, typically 350° F., is set by means of a control 40 positioned on the front side of the upper platen assembly 18. This will establish the temperature to which the faced heat transfer plate 22 is heated, and this temperature is selected according to the requirements of the particular synthetic resin material of which the transfer indicium 38 is composed. There is also set, by means of a control 42 located on the forward side of the upper platen assembly 18, a time period over which the pressure and heat required to accomplish the transfer will be maintained. The end of this time period may be signaled by a suitable audible signal, or the upper platen assembly 18 may be made to automatically unlatch from the base assembly 10 to permit the upper platen assembly to pivot upwardly to a released and open position. Typically a period of 5 to 15 seconds will be set by the use of the control 42.

As a result of the application of heat and pressure to the composite transfer sheet 34 to press it firmly against the fabric 32 while heated, the synthetic resin material of which the transfer indicium 38 is composed will be fused and will become bonded tenaciously to the fabric 32. After the upper platen assembly 18 has been raised to permit the fabric 32 to be removed from between the base 10 and the upper platen assembly, the fabric is laid flat upon a supporting surface, and the composite transfer sheet 34 is permitted to cool. After a suitable cooling period, the substrate sheet 36 may be stripped away from the transfer indicium 38 to leave the indicium firmly adhered to the fibers of the fabric 32. The appearance of the fabric with the transfer indicium bonded thereto is shown in FIG. 3 of the drawing.

The described method of dry transfer to fabrics constituted by natural (as contrasted with synthetic) fibers, has generally posed no difficulty, and such transfers have been accomplished without malfunction of the equipment or deleterious effect upon the fabric. The synthetic resins of the transfer indicia are bonded to the fibers of the fabric sufficiently strongly that the indicia are not damaged by frequent washing. Problems have been encountered, however, where it is undertaken to transfer synthetic resin indicia of the type described to synthetic fiber fabrics, and particularly to pile-type synthetics. The problems may be generally stated to result in degradation and unsightly deformation of the fabric to which the transfer is made in the area surrounding the transferred indicium. The degradation of the fabric usually results from the inability of many synthetic fibers to withstand the relatively high temperature required to accomplish the transfer, and also results from the tendency of the pile fibers to become crimped or bent as a result of the application of heat and pressure thereto during the accomplishment of the transfer. Synthetic fabric fibers which are particularly susceptible to the described deleterious results are monoacrylic, polyacrylic and polyester fibers. Rayon also does not adequately withstand the heat and pressures required to accomplish the transfer.

The present invention provides a method and apparatus for effectively accomplishing the dry transfer of synthetic resin transfer indicia from composite transfer sheets to fabrics which are susceptible to fiber degradation and undesirable distortion at the temperatures and mechanical pressures ordinarily required to carry out transfers of this type. The apparatus for making dry transfers to fabrics of this type, as constructed in accordance with the present invention, is depicted in FIGS. 4 and 5. An upper platen assembly 18 identical to that depicted in FIG. 1 is used in the apparatus, as is also a base assembly 10 identical to that shown in FIG. 1. To adapt this apparatus to the practice of the method of the present invention, there is secured to the upper platen assembly 18, a heat shield subassembly, designated generally by reference numeral 46. The heat shield subassembly 46 includes a plurality of spring metal retainer bands 48

which are adapted to be snapped over the upper side of the parallelepiped frame 20 in the manner best illustrated in FIG. 4. The spring metal retainer bands 48 pass through, in the manner shown in FIG. 5, a pad 50 of thermal insulating material such as asbestos. The pad of thermal insulating material is dimensioned to mate with the Teflon-faced heating plate 22, and to cover the Teflon facing 28 as shown in FIGS. 4 and 5. At the center of the thermal insulating pad 50, an opening is provided through which projects a metal heat transfer block 52. The metal heat transfer block 52 has one surface substantially coplanar with the upper surface of the thermal insulating pad 50, and positioned in contact with the Teflon facing 28 of the plate 22. At its other surface, which projects a slight distance below the plane in which the lower surface of the thermal insulating pad 50 is located, the heat transfer block 52 carries a facing 54 of Teflon or other synthetic resin heat transfer material. It will be noted that the lower or exposed surface of the facing 54 is spaced a substantial distance below the lower surface of the thermal insulating pad 50. The purpose of this arrangement will become better understood as the description of the invention is further developed.

It should now be pointed out that the cross sectional shape (in a horizontal plane) of the heat transfer block 52 is complementary to, or mates with, the shape of the synthetic resin transfer indicium which is to be transferred to the fabric. In other words, the outline around the outer periphery of the heat transfer block 52 corresponds precisely to the outline around the outer periphery of the indicium which is to be transferred to the fabric. This may perhaps best be perceived by referring to FIG. 5, where the lower surface of the heat transfer block 52 is shown, and comparing this lower surface with the baseball indicium which is the particular indicium which is to be transferred by the use of the heat shield subassembly 46 made up to contain this specific heat transfer block 52.

It will further be apparent that the opening through the thermal insulating pad 50 to accommodate a particular heat transfer block 52 will be custom configured to corrolate to a particular transfer indicium which is to be transferred. Thus, in summary, each of the heat shield subassemblies 46 which is utilized in the practice of the present invention will correspond to a particular indicium which is to be transferred, and the only portion of a composite transfer sheet 34 used to provide the indicium to be transferred which will be contacted by the heat transfer block 52 will be that portion of the composite sheet which actually carries thereon the synthetic resin making up the indicium to be transferred.

With the heat shield subassembly 46 snapped in position on the upper platen assembly 18 in the manner described, and by the use of the spring retainer elements 48, the heat and time controls 40 and 42 on the upper platen assembly are then set to provide the necessary heat and time period to accomplish the transfer. The upper platen assembly is then tilted downwardly and locked in place on the base 10 to commence the transfer process. The heat developed by the heating elements 24 is transferred by conduction to the heat transfer block 52 and through the synthetic resin facing 54. The point at which the heat comes to apply to the composite transfer sheet 34 is solely and directly over the synthetic resin transfer indicium 38.

In FIG. 4 of the drawings, a pile-type fabric 60 is shown in position resting upon the elastomeric pad 16. It has been positioned beneath the transfer sheet 34 at the correct position for location of the indicium 38 on the fabric 60 at the location desired. It is also important to note that the composite transfer sheet 34 has, at this time, been positioned directly under the central portion of the heat shield subassembly 46 in such a way that the transfer indicium 38 is in vertical alignment with the

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heat transfer block 52. A method and apparatus for accomplishing this registration will be later described. In FIG. 4 of the drawings, the complete assembly, with the fabric 60 in position, is illustrated as it appears at a time just before the lever 30 is pulled downwardly to lock the upper platen assembly 18 in position and apply pressure through the heat transfer block 52 to the transfer indicia 38.

By the use of the described structure, and employing the method of the present invention, the heat used in accomplishing the transfer is concentrated and localized in an area which corresponds precisely to the area occupied by the transfer indicium. Heat radiating from the heat transfer plate 22 in locations spaced horizontally outwardly from the heat transfer block 52 is not transmitted to the fabric 60 because the thermal insulating pad 50 prevents radiation of heat at these locations. Moreover, by reason of the projection of the heat transfer block 52 to a lower level than the thermal insulating pad 50, the application of pressure to the peripheral areas around the heat transfer block through the thermal insulating pad 30 is alleviated, and the effect is that the thermal insulating pad 52 only lightly touches the upper ends of the pile fibers of the fabric 60. These fibers thus are effectively shielded and protected, both from the high temperature generated by the heating elements 24 and radiated from the plate 22, and also from the effects of compression. Fibers are thus permitted to remain in their upstanding position, and crimping or compression of the fibers is avoided. Moreover, the previously experienced tendency of the fabric to become compressed over the entire area contacted by the facing 28 of the upper platen assembly 18 when no heat shield subassembly is used is obviated. The finished product of the indicium transfer, accomplished in the manner described, is shown in FIG. 6 of the drawings. It will be noted that there are no perceptible creases or outlines corresponding to the shape of the upper platen assembly 18 present in the fabric to which the indicium has been transferred. It is also true that the pile fibers are not crimped, degraded or damaged in any way by the process as practiced in accordance with the present invention.

A modified embodiment of the apparatus of the invention is partially illustrated in FIG. 7 of the drawings. In it, a portion of a differently constructed heat shield subassembly is illustrated. The heating plate 22 of the conventional upper platen assembly 18 is shown, as is the synthetic resin facing 28 provided on the lower surface of this plate. A portion of a heat shield subassembly is illustrated, and includes a heat transfer block 66 and an asbestos thermal insulating pad 68 which surrounds the outer periphery of the heat transfer block 66 in the manner hereinbefore described. It will be perceived in referring to FIG. 7, that the heat transfer block here employed is recessed with a plurality of recesses 66a, 66b, 66c and 66d. The recesses are relatively deep and contain thin pieces of asbestos thermal insulating material 70.

The heat shield subassembly, which includes the heat transfer block 66, is made up for the purpose of transferring a foraminous or perforate transfer indicium of the type depicted in FIG. 9. In this instance, the transfer indicium provides a monogram which includes the initials A and W surrounded by a circle. Certain internal portions of the monogram are open, and these open spaces are correlated with the recesses 66a-66d provided in the heat transfer block 66. In other words, when the transfer indicia is properly aligned with the heat transfer block 66, the open areas in the monogram will be aligned with the recesses provided in the heat transfer block. These recesses each contain a piece of asbestos thermal insulating material 70. The configuration and construction of the heat transfer block 66 with the pieces of asbestos thermal insulating material 70 contained in the recesses therein thus provides protection to the pile fibers of the

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fabric located in the open internal portions of the monogram, and prevents these fibers from becoming crimped by heat or distorted and flattened by compression. When the monogram has been transferred to the pile fabric, it then appears as shown in FIG. 8, with the pile fibers which are located in the open spaces on the interior of the monogram standing up and appearing aesthetically natural in their attitude.

It should be here pointed out that in some instances, a desirable effect may be produced by merely providing relatively deep recesses extending upwardly from the face of the heat transfer block forming a portion of the heat shield subassembly into the interior of this block. These recesses differ from those shown in the FIG. 7 structure in that they are slightly deeper, and are not lined with the asbestos thermal insulating material 70. Where this type of heat shield subassembly is employed, a three-dimensional effect tends to be obtained in the appearance of the indicium after it has been transferred to the fabric, in that some portions of the indicium are higher than other portions—that is, some portions, which correspond to the locations of the recesses formed in the heat transfer block 66, will project above the primary plane of the fabric as a result of the lesser compression and less intense heat transfer imparted to the pile of the fabric at these locations. This three-dimensional effect will be perceptible, whether the indicium being transferred has interior openings of the type shown in FIG. 8, or is a solid uninterrupted indicium, such as the baseball indicium shown in FIGS. 3 and 6.

It will be apparent from the foregoing discussion of the invention that it is important to the successful practice of the method of the invention that the transfer indicium be precisely aligned in vertical registry with the heat transfer block forming a portion of the heat shield subassembly, which heat shield subassembly is snapped-on the upper platen assembly 18. While it is possible to accomplish such registration visually and by manual means, it is nevertheless desirable, for accurate high speed operation, to provide a means which will facilitate registration of the transfer indicia with the heat transfer block, and will reduce the possibilities of slight misalignments which will, when they occur, result in crimping of some of the pile fibers located on one side or the other of the transfer indicia with resultant disfiguration of the finished articles.

Apparatus which may be utilized for assuring proper registration of the transfer indicia with the transfer block is illustrated in FIG. 10 of the drawings. There are here shown disposed on opposite sides of a transfer apparatus of the general type depicted in FIG. 4, an incoming or feed conveyor assembly 74 and a discharge conveyor assembly 76. Pile fabrics 77, to each of which a particular indicium is to be transferred, are fed to the transfer apparatus on the conveyor assembly 74 which is preferably operated in an intermittent or stepped fashion so as to advance a fabric until it has been positioned in the transfer apparatus, and then stop until the transfer operation has been completed, and then advance another fabric to the transfer apparatus. Operating in synchronism with the feed conveyor assembly 74, the discharge conveyor 76 also operates intermittently to remove fabrics after the transfer of indicium to each one has been completed.

Each of the fabrics to which a transfer is to be made, is preferably, though not necessarily, marked very lightly with two small points (not shown) at a location where the fabric is to be pierced by a pair of upwardly projecting tines 78 and 80 which are secured to the plate 14 and project upwardly through the pad 16 for a substantial distance above the upper surface of the pad. These registration marks, when provided on the fabric 77, serve to indicate the location on the fabric at which the transfer indicium is to be located after transfer.

The composite transfer sheet 90 utilized when the invention is practiced to facilitate registration in the man-

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ner described is provided on the upwardly facing side of the substrate sheet 92 with a pair of registration dots (not shown). These dots serve to indicate to an operator, the location at which the composite transfer sheet 90 is to be pierced by the tines 78 and 80. Preferably, the registration dots, located on the upper surface of the substrate sheet 92, are disposed over the underlying transfer indicium 94 so that the tines 78 and 80, when the composite transfer sheet 90 is located in the proper manner, pass through both the transfer indicium 94 and the substrate sheet 92. FIG. 10 illustrates the appearance of the assembly when the composite transfer sheet 90 has been properly disposed over the tines 78 and 80.

It will be noted in referring to FIG. 10, that when the registration assembly is constructed in the manner described, a heat transfer block 96, forming a portion of the heat shield subassembly 98 in use, carries a pair of very small recesses 100 and 102 which are complementary in configuration to the pointed upper ends of the tines 78 and 80. Thus, when the upper platen assembly 18 is lowered and locked in position on the base 10, the upper ends of the tines 78 and 80 will register with the recesses 100 and 102 in the heat transfer block 96, and will not prevent the heat transfer block from pressing downwardly against the composite transfer sheet 90. With the described arrangement, perfect registration of the transfer indicium 94 with the exposed lower surface of the heat transfer block and its facing 106 is obtained, and the indicium is transferred to the precise spot desired on the fabric.

As soon as the upper platen assembly 18 has been released and elevated, the operator lifts the fabric 77 with the transferred indicium 94 bonded thereto from the elastomeric pad 16 and places it upon the discharge conveyor 76 to permit the fabric to proceed to a point downstream in the process. A suitable period for cooling will have by this time elapsed, and another operator then strips the substrate sheet 92 away from the transferred indicium 94 and completes the preparation of the fabric for packaging, shipment etc.

Although certain preferred embodiments of the invention have been herein described in order to provide an understanding of the basic principles underlying the invention, and certain modes of practice of the invention, it is to be understood that various changes can be effected in the depicted and described apparatus without departure from the basic principles which underlie the invention—particularly in the broadly described steps of the process which are carried out in achieving the results sought. Other thermal insulating materials than asbestos can be employed, and other arrangements can be made for protecting fabric from heat and pressure. Moreover, other types of devices for obtaining the desired registration of the transfer indicium with the heat transfer block forming a portion of the heat shield subassembly of the invention can be devised and used successfully. Changes and innovations of this type which do not depart from the basic principles of the invention are thus deemed to be circumscribed by the spirit and scope of the invention except as the same may be necessarily limited by the appended claims or reasonable equivalents thereof.

What is claimed is:

1. A method for bonding fusible synthetic resin indicia to a pile-type synthetic resin fabric comprising: placing an indicium on the fabric in contact with a portion of the pile thereof at the location where it is desired to affix the indicium to the fabric;

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pressing the indicium against the fabric and concurrently applying heat to the indicium to bond the indicium to the fabric; and shielding that portion of the pile of the fabric not contacted by the indicium from heat during the application of heat to the indicium.

2. The method defined in claim 1 wherein pressing of indicium against the fabric is carried out with the pile of the remainder of the fabric which is not contacted by the indicium maintained free of pressure.

3. The method defined in claim 1 wherein pressing the indicium against the fabric and concurrently applying heat thereto is accomplished by forcing a heated rigid block against the indicium over its entire area.

4. A method for transferring a synthetic resin indicium from a composite transfer sheet to a fiber-containing fabric comprising:

supporting the fabric on a base with a portion of the fabric to which the indicia is to be transferred exposed;

placing on said exposed portion of the fabric, a composite transfer sheet carrying the indicium to be transferred, with the indicium contacting the fabric; applying heat and pressure directly to the indicium to bond the indicium to the fabric over the area of contact therewith; and

concurrently with the application of heat and pressure to the indicium, placing a thermal insulating material between areas of the fabric not contacted by the indicium and the heat source from which heat is applied directly to the indicium to maintain such areas below the temperature to which the indicium is heated during transfer, and below the softening temperature of the fibers of the fabric.

5. A method for transferring a synthetic resin indicium from a composite transfer sheet to a fiber-containing fabric comprising:

supporting the fabric on a base with a portion of the fabric to which the indicia is to be transferred exposed;

placing on said exposed portion of the fabric, a composite transfer sheet carrying the indicium to be transferred, with the indicium contacting the fabric; applying heat and pressure directly to the indicium to bond the indicium to the fabric over the area of contact therewith, less heat and less pressure being applied to some parts of the indicium than to other parts thereof whereby a three-dimensional effect is obtained in the transferred indicia;

concurrently with the application of heat and pressure to the indicium, maintaining areas of the fabric not contacted by the indicium at a temperature below the temperature to which the indicium is heated during transfer, and below the softening temperature of the fibers of the fabric.

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WILLIAM D. MARTIN, Primary Examiner

J. A. BELL, Assistant Examiner

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