May 14, 1929. R. W. TERLINDEN 1,713,151

METHOD OF PRODUCING TRANSFER WORK

Filed Aug. 3, 1927

Fig. 1.

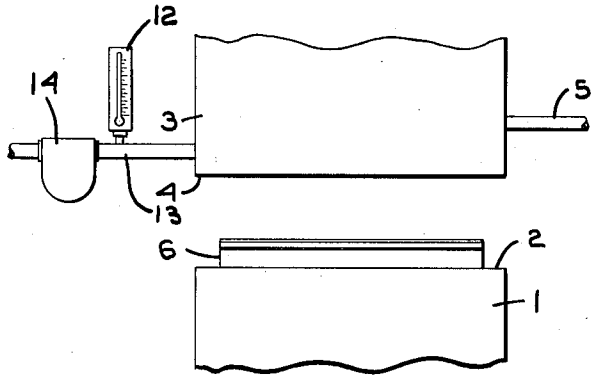


Fig. 2.

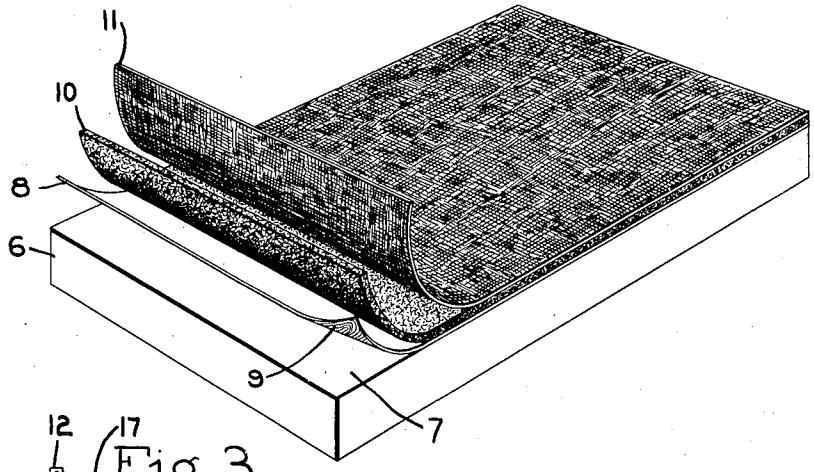
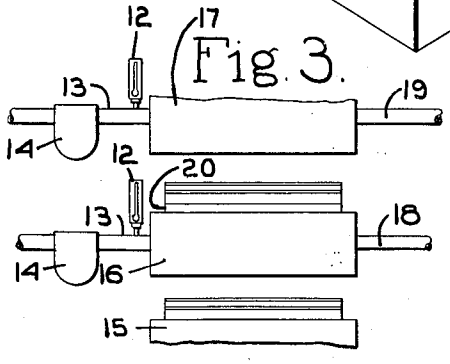


Fig. 3.



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UNITED STATES PATENT OFFICE.

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METHOD OF PRODUCING TRANSFER WORK.

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This invention relates to the method of performing transfer work in which the color is transferred from a transfer sheet directly on to the surface of wood or other suitable material and brought into an intimate union therewith.

While transfer work by the use of transfer sheets has long been performed, its use has been of a limited nature owing to the difficulty of obtaining uniform results and of securing an intimate union between the color layer and the wood or other base material and of covering relatively large surfaces.

The present invention makes use of the ordinary transfer sheet comprising a backing of suitable material, usually a sheet of paper, and a color layer on the face of this backing. The color layer may be applied to the backing by any suitable and usual method and may present any required design, both as to configuration and as to color. Preferably the backing, such as the paper sheet having a coating of starch and dextrin or starch and gum, will then be coated with varnish or similar material before the color is applied thereto to assure a sharp, clear cut printing and to prevent a dissolution of the gum coating on the paper, which would otherwise distort the design, and also to prevent, so far as possible, the color from impregnating the backing or the fibre of the paper and also to enable the color, when the transfer sheet is subjected to the process of this invention, to become loosened from the backing and to pass to the wood or other material.

It is to be understood that the terms "color" or "color layer" mean that portion of the transfer sheet which is to be transferred to the wood or other base material. This layer may therefore be of any one or more colors including black, white or neutral tints and may cover any or all of the area of the transfer sheet as required.

The process is particularly useful in the imitation of valuable woods or inlaid work upon less valuable woods or in the transfer of pictures and designs of any character to a wood surface but it is also useful in the ornamentation of celluloid or pyroxylin either alone or in the form of coatings on metal or other material or in the ornamentation of metal or, in fact, any suitable material to which the color of the transfer sheet will adhere or, preferably, into which it may penetrate.

The surface of the color layer of the transfer sheet is ordinarily in its natural condition, although the surface of the color layer may be treated or coated with any material which will assist the transfer of the color to the base under the process of this invention provided moisture is not produced thereby between the color and the base. The surface of this color layer is applied directly to the surface of the wood or other material so as to be in direct contact therewith. In the case of wood, the result of the process is to force the color into the fibre of the wood and, in the case of pyroxylin material, the result is to fuse the color into the material, so as to form an intimate union therewith; while in the case of other materials into which the color cannot actually penetrate, a very intimate union between the color and the material is produced.

Wood or other material upon which this process has been performed may thereafter be varnished or treated with the usual varnishes, lacquers or pyroxylin finishes without disturbing or injuring the color or ornamentation.

In carrying out the process of this invention, the transfer sheet is superimposed or laid upon the wood or other material to be ornamented with the color layer in direct contact with the surface of the material. Pressure, heat and moisture are then simultaneously applied to effect the transfer.

One feature and object of the process consists in supplying the moisture to and through the back only of the transfer sheet. This is important because, if any moisture intrudes between the color layer and the surface of the wood or other material, the required intimate union between the color and the wood or other material is not secured. Moisture at this point produces blisters or eventually results in the loosening of the color from the base material. As a corollary of this feature, the process provides in some cases for the insulation of the back of the wood or other material to which the transfer is applied. If, for example, in the case of wood, heat should pass through the wood layer from the back to the face thereof, any natural moisture in the wood might be forced out at the face and

intrude between the color layer and the surface or face of the wood.

Another feature and object of the process is to secure and apportion the requisite amount of moisture throughout the entire area of the transfer sheet applied to the wood or other base material. This moisture in the present invention is presented to the transfer sheet in the form of steam generated during the process. This steam is probably not actually dry steam but more in the nature of a moist vapor. The amount of such moisture must be exactly right and must be sufficient to loosen the color layer from the backing of the transfer sheet thoroughly and evenly so that it may pass freely to the wood or other base material and, in the case of wood, it is believed to act as a carrier of moist heat in such a manner as to open the pores of the wood and enable the color to be driven into the wood. In order to gauge and apportion the requisite amount of moisture, this invention preferably utilizes a sheet of fabric, such, for example, as cheese cloth, which when impregnated with water will hold in uniform distribution throughout just the requisite amount of water which, when turned into steam during the process, will secure the required results. Ordinary cheese cloth impregnated with water and wrung out is found under ordinary conditions to secure the required results, but it is obvious that the character and thickness of this sheet may be varied as required to hold the amount of water required under any particular set of conditions.

Another object and feature of the process resides in the proper distribution of the moisture to and through the back of the transfer sheet. If the transfer sheet is directly wetted or if it is subjected to heat in a dry condition, undesirable results ensue. Such a sheet contracts under the application of heat and expands under the application of moisture. If such expansion and contraction take place before the color layer adheres to the wood or other surface, it is obvious that the pattern or design may be altered and it would be impossible to secure that accuracy of work which is necessary, especially when designs or patterns are to be matched. Furthermore, the sheet itself may actually break apart under expansion and thus produce imperfect work. Or the expansion and contraction may be unequal at different areas, producing imperfect work. Or moisture, coming at this stage into contact with the transfer sheet at any point, may prematurely destroy the connection between the paper and the color layer. In this invention a layer of homogeneous material pervious to steam and absorbent of moisture, such, for example, as a layer of felt, is interposed between the water impregnated layer of fabric and the back of the transfer sheet. This keeps the transfer sheet dry and in its natural condition until after pressure and heat are applied and the transfer sheet is thus forced into contact with the wood or other base material. Then, as pressure and heat are applied and steam is generated from the the water-impregnated fabric, this steam is distributed evenly and uniformly throughout the felt layer directly to and through the back of the transfer sheet. The layer of felt or similar material serves also to equalize any unevenness in the pressure exerted and insures a uniform application of the pressure as well as a uniform distribution of moisture and heat to the transfer sheet.

The process thus enables large transfer sheets to be employed and large panels of wood or other material to be treated throughout their entire areas in a simple and expeditious manner.

The drawing illustrates more or less diagrammatically a simple means for carrying out the process.

Fig. 1 is an elevation of a portion of a press with the various materials employed in position ready for the application of the required heat and pressure.

Fig. 2 is a perspective view illustrating the various layers of material employed.

Fig. 3 is a view similar to Fig. 1 where more than one piece of work is performed at the same time.

Any suitable press may be used having its faces adapted to receive and press the layers of material into close contact.

Usually flat pieces of material such as panels of wood are treated and such are here illustrated. In this case the press in Fig. 1 is shown as comprising a base 1 having a flat top surface 2 and a platen 3 movable along a vertical axis toward and from the base and having a flat bottom surface 4. The platen may be heated by any suitable source, a steam inlet pipe 5 for that purpose being indicated. The press should be capable of exerting the required pressure. As an example, five kilograms per square centimetre has been found satisfactory in performing the transfer work upon birch wood, but the exact pressure required will be readily determined by the operator.

A panel or sheet of wood 6 is indicated as the material upon which the transfer is to be effected. This panel is laid upon the base 1 of the press with its upper surface 7 to which the color is to be applied left in its natural state. The transfer sheet 8 is of the usual commercial type and is shown as a sheet of paper having on its face the color layer 9 presenting any suitable arrangement of colors and pattern as, for example, the coloring and design representing the grain and color of some valuable wood. The paper, as already noted, should be treated and varnished before the color layer is applied thereto so that the color layer does not penetrate the paper and so that the color, when the transfer is sub-

jected to heat, pressure and moisture, will be loosened therefrom.

A sheet of suitable homogeneous steam-pervious moisture-absorbent material such as a layer of felt 10 is then superimposed upon the transfer sheet. A layer of ordinary felt from one-eighth to one-quarter of an inch thick has been found satisfactory under ordinary conditions, but the character and thickness of this layer will be varied as required.

A layer of cheese cloth 11 soaked in water and wrung out so as to be impregnated evenly throughout with water is then laid on top of the felt. Ordinary cheese cloth has been found under ordinary conditions to hold the requisite amount of water, but the thickness and character of this sheet of material may also be varied as required by any particular set of conditions. This material serves as an accurate means for gauging and uniformly apportioning the requisite amount of moisture.

The press platen 3, being heated, is then forced down upon the superimposed layers until the required pressure is reached and left for such a time as is necessary to transform the moisture in the cheese cloth layer into steam and pass it through the felt layer. The time required for this will readily be determined by experience. The felt layer should be dry, or nearly so, when the process is complete. A time of about one and one-half minutes has been found satisfactory under ordinary conditions. The required pressure will be readily ascertained. In a press of the type illustrated a thermometer 12 is shown located in the steam outlet pipe 13 from the platen between the platen and a steam trap 14. A temperature of the steam of between 275° and 320° F. measured by a thermometer 12 located at this point has been found to produce the required heat under ordinary conditions.

The result of this simultaneous application of heat and pressure is to transform the moisture uniformly apportioned in the requisite amount into steam and then to force this steam in even distribution through the felt layer to and through the back of the transfer sheet. This acts to loosen the color layer uniformly and evenly from the backing of the transfer sheet, to make the wood receptive to the color and to drive the color evenly and firmly into intimate union with the wood and into the fibre of the wood at the surface. It is impossible for the transfer sheet to become distorted or broken. The pressure is applied evenly and any inequalities equalized by the felt sheet. While in the case of metal bases and bases of other material the color is not actually driven into the fibre, it is brought into such an intimate union therewith as to adhere perfectly thereto.

Several pieces of work may, if desired, be performed simultaneously and such an arrangement is illustrated diagrammatically in Fig. 3. Here the press is shown as having a base 15 and two movable platens 16 and 17 heated by steam supplied through the pipes 18 and 19, respectively. In such a case it will be seen that the upper surface of the platen 16 forms the base for the work pressed between it and the platen 17. In this case it is necessary, when wood or any similar porous material is being treated, to insulate the wood from the platen 16. Otherwise since this platen is heated, the heat passing up through the wood might drive any natural moisture or moisture contained in the wood up to the face thereof and cause it to be intruded between the color layer and the surface of the wood to which the color layer is being transferred with the deleterious results already pointed out. In this case a layer of felt or other suitable insulating material 20 is therefore placed between the bottom of the wood and the top of the platen 16. Except for this feature the performance of the process proceeds in the manner already described.

The felt layers interposed between the water impregnated cheese cloth layer and the transfer sheet must be dry when the process is started so that no moisture comes against the transfer sheet until after the application of heat and pressure.

When the process is used in connection with a pyroxylin base material, it is necessary that the cooperating members of the press be thoroughly cool before the pressure is released in order to obviate the possibility of blistering the pyroxylin or a possible ignition or explosion of the pyroxylin material.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. The method of performing transfer work on the surface of a material wherein the color is transferred directly from the transfer sheet on to the said surface, which comprises applying heat, pressure and moisture simultaneously throughout and uniformly throughout the transfer sheet with the heat and moisture applied to the transfer sheet at the back only.

2. The method of performing transfer work on the surface of a material wherein the color is transferred directly from the transfer sheet on to the said surface which comprises applying heat, pressure and moisture simultaneously throughout and uniformly throughout the transfer sheet and in distributing the moisture uniformly throughout and to the back only of the transfer sheet and only after the application of the pressure has begun.

3. The method of performing transfer work on the surface of a material wherein the color is transferred directly from the transfer sheet on to the said surface which

comprises simultaneously applying heat, pressure and moisture, in gauging and apportioning the requisite amount of moisture by impregnating with water a layer of fabric which will retain the said amount and in distributing the moisture from the said layer of fabric to the back only of the transfer sheet through a layer of interposed homogeneous material.

4. The method of performing transfer work on the surface of a material wherein the color is transferred directly from the transfer sheet on to the said surface which comprises simultaneously applying heat, pressure and moisture, in gauging and apportioning the requisite amount of moisture by using a layer of fabric impregnated with water and in uniformly distributing steam formed from said water through a layer of felt interposed between the layer of fabric and the back of the transfer sheet, thereby to free the color from the transfer sheet and to force it into intimate union with the base material without the presence of moisture between the color and the base material.

5. The method of performing transfer work on the surface of a material wherein the color is transferred directly from the transfer sheet on to the said surface which comprises simultaneously applying heat, pressure and moisture, in gauging and apportioning the requisite amount of moisture and in uniformly distributing steam formed from said water through a layer of felt interposed between the layer of fabric and the back of the transfer sheet, thereby to free the color from the transfer sheet and to force it into intimate union with the base material without the presence of moisture between the color and the base material.

6. The method of performing transfer work which involves superimposing upon the surface of a layer of wood a transfer sheet with its color surface in direct contact with the surface of the wood and in applying heat, pressure and moisture at the back of the transfer sheet which consists in determining and apportioning the amount of moisture required by means of a water impregnated layer of fabric, in uniformly distributing said moisture by means of a layer of felt and in interposing the said layers in superimposed relation between the pressure applying means and the back of the transfer sheet with the layer of felt in contact with said back.

7. The method of performing transfer work which consists in superimposing upon the surface of a base material a transfer sheet with the color surface in direct contact with the surface of the base material, in superimposing upon the transfer sheet a layer of felt or similar homogeneous material pervious to steam and absorbent of moisture in superimposing upon said layer of felt a layer of fabric containing uniformly apportioned throughout a predetermined amount of water, in subjecting the aforesaid four superimposed materials simultaneously to heat and pressure and in correlating the amount of moisture of the fabric layer, the thickness and character of the homogeneous material, and the amounts of heat and pressure to cause the moisture in the fabric layer to be converted into steam and distributed through the felt layer to loosen the color from the transfer sheet and force it into intimate union with the base material.

8. The method of performing transfer work involving the transfer by the use of heat and pressure of the color layer of a transfer sheet to the surface of a layer of wood which consists in supplying a predetermined amount of steam directly simultaneously and uniformly to and throughout the back only of the transfer sheet during the simultaneous application of the heat and pressure uniformly throughout, thereby to increase the receptivity of the wood to the color, to prevent deleterious shrinking of the transfer sheet, to loosen the color from the back of the transfer sheet and to cause the color to be driven into intimate union with the fibre of the wood at the surface thereof.

In testimony whereof, I have signed my name to this specification.

RICHARD W. TERLINDEN.