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M. M. ASSAEL

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DECORATIVE PLASTIC SURFACE

Filed March 21, 1932

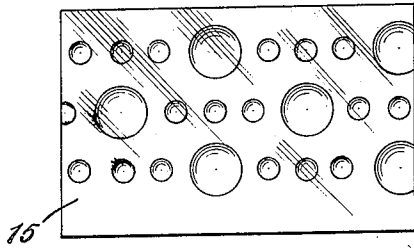


Fig. 1.

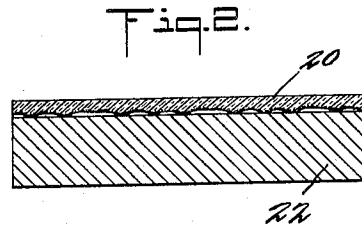


Fig. 2.

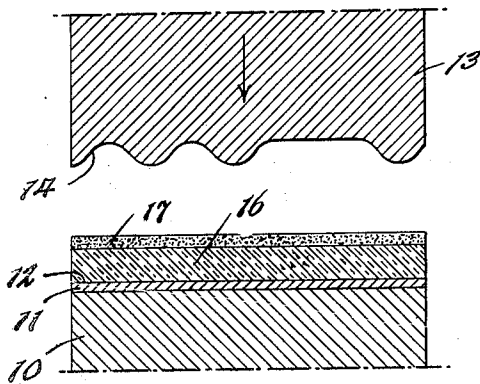


Fig. 3.

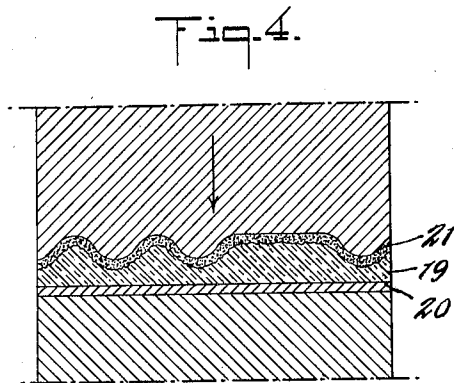


Fig. 4.

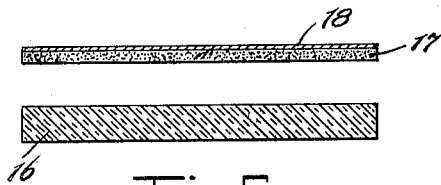


Fig. 5.

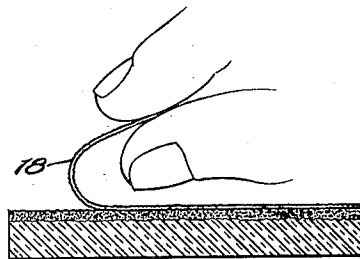


Fig. 6.

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DECORATIVE PLASTIC SURFACE

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The invention relates to a method for producing decorative surfaces simulating polished sheet metal and which may contain some suitable design and the invention relates to a novel decorative product produced by this method.

The primary object of the invention is to provide an economic, practical and inexpensive method for producing decorative sheets or decorative coatings for different articles to simulate embossed sheet metal.

Broadly, the invention is attained by coating one side of a sheet of celluloid with metal particles held in suspension and then subjecting the celluloid sheet so coated to the action of a hot die press which will act to force the metal particles into the celluloid sheet and incidentally impress thereon the design desired.

In one form of the invention, the metallic particles are suspended in cellulose acetate dissolved in acetone which acts as a plasticizer to the celluloid incidentally avoiding any tendency of the metal coated side of the celluloid to crack or check.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawing and in part will be more fully set forth in the following particular description of one form of mechanism embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawing:

Fig. 1 is a plan view of a molded sheet of metal coated celluloid constituting a preferred embodiment of the invention, looking through the transparent side of the celluloid side and viewing a design on the inner or back side thereof, the design being very much magnified;

Fig. 2 is a transverse sectional view taken through the sheet of Fig. 1 and showing the sheet applied to any supporting surface of which the showing in Fig. 1 is a decorative top face and with the spaces between the embossed design forming side and the adjacent side of the supporting surface much enlarged;

Figs. 3 and 4 are enlarged fragmentary portions of the coating dies of a steam heated and water cooled die press, used in practicing the method and in producing the article herein featured; the parts being greatly exaggerated in thickness to show details; Fig. 3 showing the coated celluloid in position in the mold before the dies are brought into pressing engagement with the same to form the finished product, and Fig. 4 showing the position of the dies at the end of the pressing operation, and before the finished product is removed from the press;

Figs. 5 and 6 show the initial and final stages of a process constituting a slightly modified form of the method feature of the invention, Fig. 5 showing the metal particles positioned on a layer of carrying paper and about to be applied to the celluloid sheet, and Fig. 6 showing the stripping of the paper from the finished article at the end of the die pressing operation.

Referring to the drawing and particularly to the showing of the die parts of a hydraulic press used in practicing the process, it is understood that the press is of the type in which the dies can be heated and chilled by conventional methods. The dies include a bed plate 10 on which is positioned a replaceable plate 11, usually of nickel, the upper surface 12 of which is highly polished in order to provide for the high glossy surface desired on the upper side of the finished article. There is also disclosed a part of a movable die 13, the underside of which is provided with a design producing surface 14. It is understood that this design may be of any desired form, such as the pattern shown at 15, Fig. 1, but may be a cut of a building, a person, flowers, a trade mark, scroll work, or any other form of design which may be desired.

In practicing the method a thin sheet of celluloid 16, preferably clearly transparent, is placed on the plate 11. In one practical operation, this sheet was of the order of fifteen thousandths of an inch thick. Any of the usual tinted, or colored types of celluloid may be used and quite beautiful effects have also been obtained when clear color-

less forms of celluloid were used. On top of the celluloid is spread a layer 17 containing fine metal particles suspended in a suitable vehicle. Metal particles suspended in cellulose acetate dissolved in acetone have been used with entire satisfaction. The metal particles may be of gold, silver, bronze, aluminum, copper, or, in fact, any of the usual powdered metals now in general use for paints, lacquers and the like. Any desired thickness of coating may be had but for economic reasons the coating is made extremely thin, but, of course, not so thin as will cause it to lose its continuity when subjected to the embossing operation of the die press.

Instead of flowing or spraying, brushing or otherwise coating the metal particles directly on to the celluloid sheet, it is herein suggested that the layer 17 be first similarly positioned on a flexible carrier such as a layer of paper indicated at 18 in Fig. 5. The paper layer so coated is then positioned with the coated side downward in engagement with the top side of the celluloid layer 16.

In either case, the hot die 13 with its embossing die surface 14, as shown in Fig. 3, is lowered into pressing engagement, either in direct engagement with the metal coated side as shown in Fig. 3, or into engagement with the paper back side with the paper uppermost when the paper backed method of application is used, as shown in Fig. 5.

In one practical operation, pressure was maintained for about three to five minutes and at a pressure of approximately one hundred and fifty kilograms per square centimeter. During this period, the celluloid under treatment was subjected to heat of about 90° C. At the end of the two or five minute period the press was chilled to room temperature or even lower to insure a solidifying of the celluloid, while the pressure was maintained for an additional period of time, in one instance about fifteen minutes. The die 13 is then elevated out of engagement with the sheet under treatment. In the case where the paper layer has been used the paper is peeled off from the embossed metallic coating as suggested in Fig. 6.

The resulting sheet of metal coated celluloid, as shown at 19 in the press in Fig. 4, has its underside 20 highly polished due to its contact with the polished top of the nickel plate 11. The metal particles 21 are now integrally embedded in the celluloid, so that there is no distinct line of demarkation between the metal layer and the remaining part of the transparent celluloid. When the sheet so formed is removed from the die press and reversed with the transparent side uppermost, the design 15 is visible through the polished side 20 as indicated in Fig. 1. The finished sheet looks like a piece of highly polished sheet metal with a design embossed

therein. Where the layer of celluloid is very thin, there is the appearance as if the embossed design is at the top surface. When the cuts in the embossing die are relatively deep, as suggested in Figs. 3 and 4, the design shows up with deep shadows giving the appearance of depth to the bas-relief showing.

In those cases where it is desired to use this finished thin sheet product as a facing for some article, it is positioned with the embossed, metallic side downward in engagement with the article 22 as suggested in Fig. 2, and with the polished transparent side uppermost. The coating is caused to adhere to the support or article 22, in different ways depending upon the material of which article 22 is formed. In the event that 22 is of glass, for instance, the coating may be cemented in place, or if 22 is of plastic material, it may be pressed into adhering engagement under such heat conditions as are usually employed in pressing together two cementitious bodies.

It is a feature of this disclosure that by practicing the method herein disclosed, it is possible to give the appearance of sheet metal, even polished metal to a plastic pliable body, such as celluloid or cellophane and the different known materials which can be formed as flexible transparent sheets of the pyroxylin or celluloid type. It is possible to apply the metal in the manner herein featured, to other material capable of having the metal particle forced into a surface thereof, as for instance, cardboard, wood, leather and other composition material. Suspending the metal particles in cellulose or ameyl acetate which in turn have been dissolved in acetone has an advantage, when used in connection with celluloid and similar camphor containing substances, in that the acetone apparently unites with the camphor in the celluloid to render the resulting metalized surface pliable and plastic without incidental development of cracks, breaks and checks in the continuity of the metal surface.

The heating step together with the presence of the acetone apparently act to soften the surface of the celluloid sufficient to insure the embedding of the metal particles firmly in the surface of the celluloid and incidentally volatilizes off the celluloid acetate and acetone or other medium used to carry the metal particles. The subsequent chilling operation appears to set the metal faced celluloid surface with the design embossment giving a bas-relief effect as an exact duplication with all of the refinement and minuteness of lines and shades present in the face of the embossing die. The metalized surface formed, as herein indicated, is maintained intact and free of cracks, even when subjected to violent bending action. While the solution of cellulose acetate in acetone is suggested as the preferred vehicle for carrying the metal powders, it is obviously within the

scope of the disclosure to suspend the metal particles in any other suitable vehicle, one such equivalent vehicle being ameyl acetate dissolved in acetone.

5 While the preferred method features the use of a transparent plastic foundation layer 19, especially where it is desired to see the embossment through an outer protecting layer, it is obviously within the scope of the disclosure to use a plastic layer corresponding to sheet 19 which may be opaque or translucent as where the finished product is intended to have its decorative surface 21 exposed as a metalized face.

15 In place of the finely divided metal herein featured, it is suggested that other finely divided materials may be used such as non-metallic powder, for instance, ground glass.

I claim:

20 1. In the art of forming pliable decorative celluloid articles simulating sheet metal with a design thereon, the method which consists in applying to one face of a layer of celluloid a layer of metallic particles suspended
25 in cellulose acetate dissolved in acetone, subjecting the celluloid layer so coated to the action of a die press with the design side of the die engaging the metal coated side of the celluloid, continuing the die pressing at
30 a pressure of about one hundred and fifty kilograms per square centimeter, and at a temperature of about ninety degrees centigrade for a period of about three to five minutes and then reducing the temperature
35 of the die until cold while maintaining the pressure for an additional period of time.

2. In the art of forming decorated articles simulating sheet metal with a design thereon, the method which consists in applying to
40 one side of a sheet of material capable of absorbing metal particles, a layer of metallic particles suspended in cellulose acetate dissolved in acetone and subjecting the sheet so coated to the action of a hot die press,
45 with the die on the coated side provided with the desired design and continuing the embossing action of the press until the metallic particles have set into the sheet.

3. In the art of forming a sheet simulating a sheet of polished metal having a design, the method which consists in subjecting a sheet of celluloid, one side of which is completely coated with a layer of metal particles
55 contained in cellulose acetate dissolved in acetone, to the action of a hot die press, with a die having the desired design bearing on the coated side of the sheet and with a highly polished die on the opposite side of the sheet.

60 4. In the art of forming decorative sheets, the method which consists in coating one side of a sheet of celluloid with a layer containing metallic particles, cellulose acetate and acetone and subjecting the sheet so coated to
65 pressure in the presence of heat in a die

press and incidentally embossing a design on one side of the coated sheet.

5. In the art of forming decorative sheets, the method which consists in coating one side of a sheet of celluloid with a layer containing metallic particles, cellulose acetate and acetone and subjecting the sheet so coated to pressure in the presence of heat in a die press. 70

6. In the art of forming pliable sheets 75 simulating a sheet metal, the method which consists in applying to one side of a sheet of celluloid, a layer of metallic particles suspended in cellulose acetate dissolved in acetone and forcing the metallic particles
80 into the celluloid under pressure until the acetone has had time to act on the celluloid to plasticize the same.

7. The method which consists in applying to one side of a sheet of paper a layer of
85 metallic particles suspended in cellulose dissolved in acetone, positioning the paper, coated side down, upon a sheet of celluloid, subjecting the paper covered sheet of celluloid to the action of a hot die press to force
90 the metal particle into the surface of the sheet, the die engaging the sheet provided with a design and then stripping the paper off the sheet after the design die has been removed. 95

8. The method which consists in applying to one side of a sheet of paper a layer of metallic particles suspended in cellulose dissolved in acetone, positioning the paper coated side down upon a sheet of celluloid, subjecting the paper covered sheet of celluloid to the action of a hot die press to force
100 the metal particle into the surface of the sheet and then stripping the paper off the sheet. 105

9. In the art of forming flexible decorative sheets of celluloid, the method which consists in coating one side of a layer of celluloid with a layer of metallic particles suspended in a volatile carrying medium, subjecting the coated sheet to a pressing action in the presence of heat for a period of time sufficient to volatilize the carrying medium. 110

10. In the art of forming flexible decorative sheets of celluloid, the method which consists in coating one side of a layer of celluloid with a layer of metallic particles suspended in a volatile carrying medium, subjecting the coated sheet to a pressing action in the presence of heat for a period of time sufficient to volatilize the carrying medium and then chilling the sheet while maintaining the pressure for an additional period of time. 120

11. In the art of forming celluloid faced 125 articles, the method which consists in subjecting a sheet of celluloid having one face coated with a layer of metal particles to the pressing action of a die press in the presence of heat while embossing the metal coated 130

side, continuing the hot pressing action for a period of time and then cooling the coated celluloid sheet while maintaining the pressure for an additional period of time.

5 12. In the art of forming celluloid faced articles, the method which consists in subjecting a sheet of celluloid having one face coated with a layer of metal particles to the pressing action of a die press in the presence
10 of heat, continuing the hot pressing action for a period of time and then cooling the coated celluloid sheet while maintaining the pressure for an additional period of time.

13. In the art of forming celluloid faced
15 articles, the method which consists in subjecting a sheet of celluloid having one face coated with a layer of metal particles to the pressing action of a die press in the presence of heat, continuing the hot pressing action
20 for a period of time and then cooling the coated celluloid sheet while maintaining the pressure for an additional period of time and then securing the sheet so formed to a supporting article with the metal coated side
25 in engagement with the article and the other side exposed.

14. In the art of forming decorative sheets, the method which consists in coating a sheet of plastic material with a layer of finely divided particles of material suspended in a flowable, carrying medium and subjecting the sheet so coated to the action of a hot embossing die press to force the particles into the adjacent face of the plastic material, to evaporate the carrying medium and to emboss one side of the sheet.

Signed at New York city, in the county of New York and State of New York this 8th day of March, A. D. 1932.

MAURICE MOISE ASSAEL.

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