Jan. 24, 1933. J. S. MITCHELL ET AL 1,895,419

METHOD OF MAKING DECORATED DRAWN METAL ARTICLES

Filed March 29, 1930

Fig. 1.

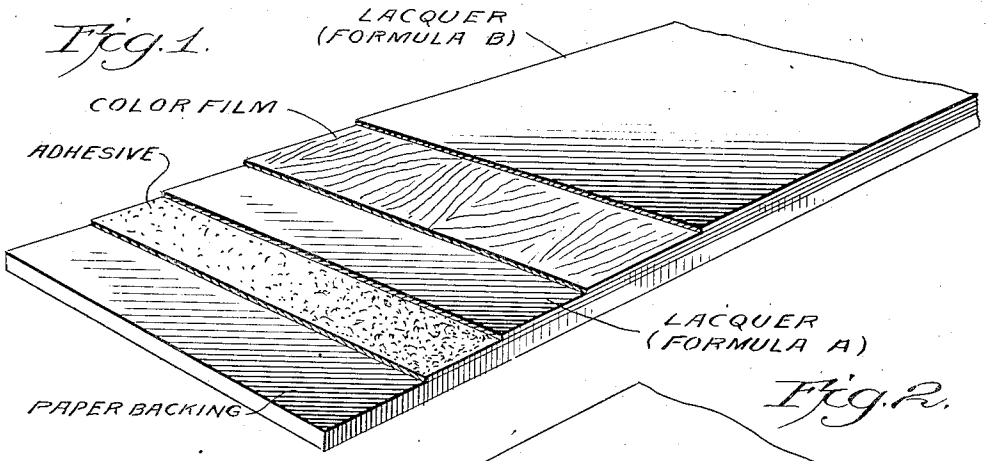


Fig. 2.

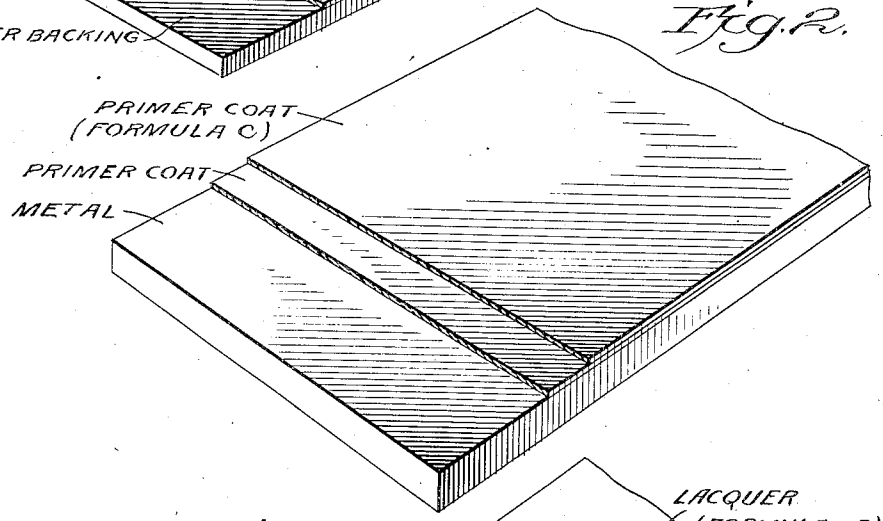


Fig. 3.

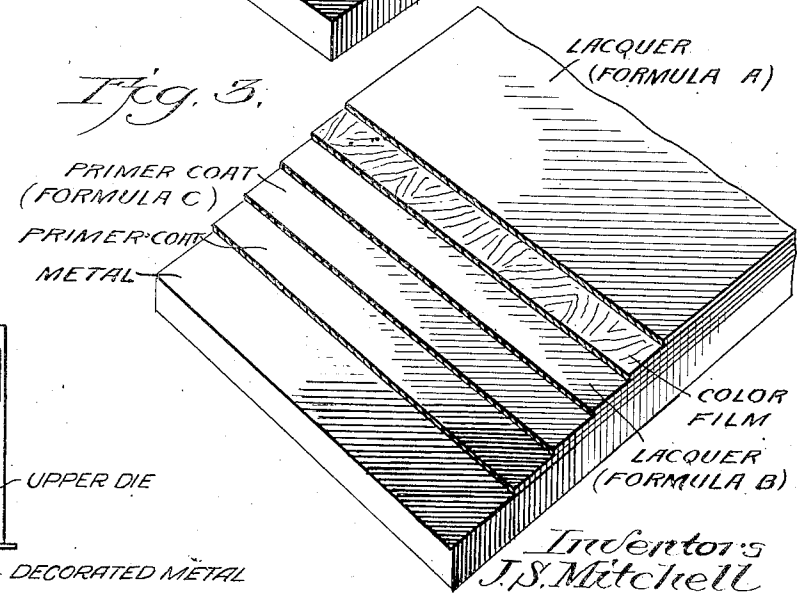
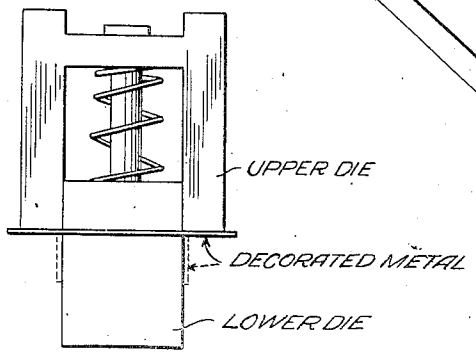


Fig. 4.



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING DECORATED DRAWN METAL ARTICLES

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Many parts made of sheet metal formed and deeply embossed or drawn in dies are decorated so as to give them the appearance of wood, for example. The best and cheapest way of applying graining or other surface decoration of the kind that would be slow and tedious if done by hand, is through the use of decalcomanias or transfers. It is not practicable, ordinarily, to apply decalcomanias or transfers to objects having irregular surfaces or surfaces in which there are sharp bends along curved lines or lines at an angle to each other, and the decoration of such surfaces is now being done at considerable expense by hand.

Over half a century ago it was proposed to apply a decalcomania to the sheet metal blank instead of to the embossed product, and then to emboss the blank without first removing the paper backing from the paint film; the theory being that the paper will protect the paint film from injury by the embossing dies. So far as we know, this process has had little, if any, commercial value although the demand has long been great. The difficulty seems to have been that the development of the process never reached a stage beyond that in which good results would likewise be obtained through the direct application of decalcomanias to the completed articles. The process has not been successful in decorating, for example, articles made from heavy sheet metal drawn to a considerable depth and having sharp or abrupt bends, although that is a field in which the demand is great.

The object of the present invention is to make commercially practicable a decalcomania surface decoration on deeply embossed or drawn sheet metal members or articles.

In the accompanying drawing we have illustrated our invention diagrammatically. In said drawing, Figure 1 is a perspective view of the decalcomania in which portions of all the various layers, except the lower layer, are broken away to expose underlying layers; Fig. 2 is a view similar to Fig. 1, illustrating a metal sheet prepared to receive a decalcomania; Fig. 3 is a view similar to Figs. 1 and 2, illustrating the finished product; and Fig. 4 is a diagrammatic view showing a decorated panel in embossing or drawing dies. In the drawing, the various layers or elements have associated therewith suitable self-explanatory legends.

It is not enough that the paint film of a decalcomania be protected against the rubbing action of the dies in which the metal blank is shaped; but entire coating on the metal, including the decalcomania paint film, must adhere firmly to the metal, must be ductile so as to enable it to follow the changing contour of the blank as the drawing progresses, and must present a hard exposed face that will not easily be marred during use of the decorated article. Furthermore, this coating should be of such a character that it may be polished in the same manner as enamelled or lacquered surfaces, and be refinished with lacquer or the like when occasion demands.

The first problem has to do with the making of the decalcomania. Any ordinary gummed or decalcomania paper, preferably duplex, may be used. On the gummed surface we lay a coating of clear lacquer, and sometimes two such coatings, as this is the stratum that constitutes the exposed wearing face in the final use of the decorated article. Excellent results have been obtained with a lacquer made in accordance with the following formula, to which we shall refer as Formula A: 296 lbs. of soluble one half second viscosity cellulose ester wet with 30% ethyl alcohol; 24 lbs. of twenty-six second viscosity cellulose ester wet with 30% ethyl alcohol; 608 lbs. of 40% solution, phthatic anhydride and glycerin condensation resin in toluol; 188 lbs. of tri cresyl phosphate; 288 lbs. of butyl acetate; 120 lbs. of butyl alcohol; 120 lbs anhydrous ethyl alcohol; 240 lbs of toluol; yielding 250 gallons of lacquer.

The subject is printed on this coating in the usual way. However, the pigments are mixed with a cellulose nitrate solvent whereby, as the printing progresses, the solvents act on the lacquer layer and unite the pigments and the lacquer into an integral mass. A final coat of non-lifting lacquer is then spread on top of the pigments. A lacquer made from the following ingredients may

be used: 2½ gallons of lacquer free from oxidizing gum; 2 gallons of solvent naphtha; and ½ gallon of normal butyl acetate. The butyl acetate is mixed into the naphtha and the resulting mixture is then poured into the lacquer while stirring the latter vigorously.

A thin coating of this lacquer, to which we shall refer as Formula B, is run on the backs of the decalcomanias, preferably within forty-eight hours after the decalcomanias are made. The fresh unoxidized oil pigments will absorb some of the lacquer without spreading or lifting, so that the final lacquer coat becomes thoroughly amalgamated with the paint film.

The decalcomania is now complete and may be applied to its destined use at any time thereafter.

The decalcomania is not applied directly to the metal of the blank but to a lacquer coating thereon. It has been found that the blank may be successfully prepared by coating it with a long oil primer baked on. A second primer coat, preferably of red oxide forming lacquer, is placed over the first coat, and the blank is ready to receive the decalcomania. The following formula, to which we shall refer as Formula C, has been used successfully for the lacquer priming coat: 370 lbs. of regular soluble forty second cellulose ester; 40 lbs, of camphor; 100 lbs, of V. M. P. naphtha; 600 lbs. of toluol; 200 lbs. of xylol; 328 lbs. of ethyl alcohol; 150 lbs. of butyl alcohol; 475 lbs. of ethyl acetate; 120 lbs. of ethyl alcohol, anhydrous; 90 lbs. of ethylene glycol mono ethyl ether; 340 lbs. of ester gum; 80 lbs. of esterized Congo resin; and 160 lbs. of C. P. castor oil.

The decalcomania is applied in the usual way except that a special material is interposed between the same and the prepared blank. The material must be of a kind that will render lacquers tacky. Therefore, when the decalcomania is transferred, the lacquer surface on the blank and the contacting lacquer surface on the decalcomania both become tacky and gradually become welded or amalgamated into one body as the drying progresses. A material suitable for this purpose may be made according to the following formula, to which we shall hereafter refer as Formula D: 2½ gallons of ethyl lactate; 1¼ gallons of ethyleanchlorohydrin; ¼ gallon of ethyl alcohol; and 1 gallon of pure clean water. The last three ingredients are preferably mixed together and the ethyl lactate added last. This cement hardens with age, and will not crack, shrink or peel.

The blank, with the decalcomania thereon, is then placed in the dies which draw the metal and the decalcomania into the desired shape. First, however, the blank and the decalcomania backing are coated with a lubricant. In the case of a duplex backing, machine oil may be used as a lubricant whereas, where the decalcomania has a simplex backing, glycerin will serve satisfactorily as a lubricant.

After the drawing operation the paper backing is removed in the usual way.

The surface that is exposed on the finished product is of course, the first lacquer coat that was spread on the gummed transfer paper. This coating, while ductile enough to yield to the stresses imposed thereon in the drawing dies without tearing or breaking, is at the same time hard and strong. Furthermore, it may be sanded and polished and may be lacquered without being damaged or permitting the subject defined by the pigments to be injured or marred in any way. This latter is of great importance because the application of any of the commercial lacquers to previously known decalcomanias, after transfer, has heretofore always been very destructive thereto. Therefore, not only have we produced a decalcomania and a process whereby it permanently remains in a perfect state almost an integral part of the article, but also one that is unaffected by ordinary lacquers and may therefore safely be coated with lacquer at any time.

While our improved decalcomania is of particular value for the purpose of decorating drawn metal articles, it is is also useful in any field where decalcomanias are employed. Furthermore, although the formulæ heretofore given are those with which we have secured the best results, we do not wish to be limited to the exact proportions or to the exact ingredients heretofore given and where any formula is specifically referred to in the claims we intend to cover equivalents, as well.

We claim:

1. The method of producing a decorated drawn sheet metal article which consists in coating a metal blank with materials presenting a pyroxilin surface, applying to the said surface, with a cellulose ester solvent interposed between them, a decalcomania printed face down on a gummed backing and having a pyroxilin coat on the exposed side to engage the blank, forming the blank and decalcomania in dies, and then removing the backing.

2. The method of producing a decorated drawn sheet metal article which consists in coating a metal blank with materials presenting a pyroxilin surface, applying to the said surface, with a cellulose ester solvent interposed between them, a decalcomania printed face down on a gummed backing and having a pyroxilin coat on the exposed side to engage the blank, covering the blank and decalcomania with a lubricant, forming the blank and decalcomania in dies, and then removing the backing from the paint film.

3. The method of producing a decorated drawn sheet metal article which consists in

coating a metal blank with a baked long oil primer or enamel, then adding a pyroxilin primer coating, applying to the said coated blank, with a cellulose ester solvent interposed between them, a decalcomania printed face down on a gummed backing and having a pyroxilin coat on the side exposed to engage the blank and a pyroxilin lacquer next to the gummed backing, forming the blank and decalcomania in dies, and then removing the backing.

4. The method of producing a decorated drawn sheet metal article, which consists in applying to a sheet metal blank coated with a baked long oil primer and a superposed pyroxilin lacquer a decalcomania comprising a paint film covered on the side next to the backing with a coat made in accordance with the aforesaid Formula A and on the exposed side a coat made in accordance with the aforesaid Formula B, with a material made in accordance with the aforesaid Formula D interposed between the meeting coats on the blank and the decalcomania, forming the blank and decalcomania in dies while the backing remains on the decalcomania, and then removing the backing.

5. The method of producing a decorated drawn sheet metal article, which consists in applying to a sheet metal blank coated with a pyroxilin lacquer a decalcomania having thereon a coat made in accordance with the aforesaid Formula B, with a material made in accordance with the aforesaid Formula D interposed between said coats, forming the blank and decalcomania in dies while the backing remains on the decalcomania, and then removing the backing.

6. The method of making a decalcomania which consists in placing on a gummed transfer sheet a coat made according to the aforesaid Formula A, printing the subject on said coat with pigments mixed with a cellulose nitrate solvent, and then applying a coat made in accordance with the aforesaid Formula B.

7. A decorated metal article consisting of a metal object, a baked long oil primer coat on said object, a pyroxilin primer coat on the aforesaid coat, a pyroxilin lacquer coat upon and amalgamated with the pyroxilin primer coat, pigments overlying and united with said pyroxilin lacquer coat, and a pyroxilin lacquer coat overlying the pigments.

8. A decorated metal article consisting of a metal object, a baked long oil primer coat on said article, a pyroxilin primer coat on the aforesaid coat consisting of the nonvolatile portions of the aforesaid Formula C, a coat composed of the nonvolatile portions of the aforesaid Formula B on said primer coat, pigments overlying and united with the aforesaid Formula B coat, and a coat composed of the nonvolatile portions of the aforesaid Formula A overlying and united with the pigments.

9. The method of decorating a sheet metal article which consists in coating the article with a pyroxilin lacquer, and applying a decalcomania having thereon a coating made in accordance with the aforesaid Formula B, with a material made in accordance with the aforesaid Formula D interposed between the said lacquer and the said coating on the decalcomania.

In testimony whereof, we sign this specification.

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