April 28, 1931. C. D. HIGGINSON 1,802,379

IMPRESSIBLE SHEET MATERIAL

Filed April 25, 1927 2 Sheets-Sheet 1

Fig. 1.

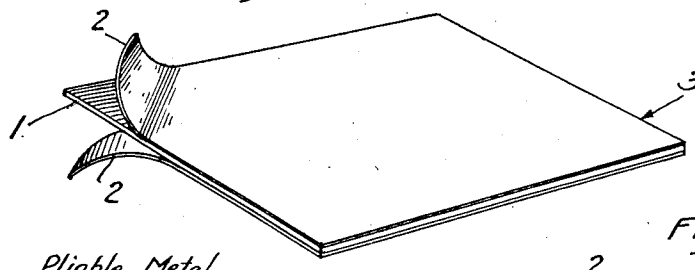


Fig. 2.

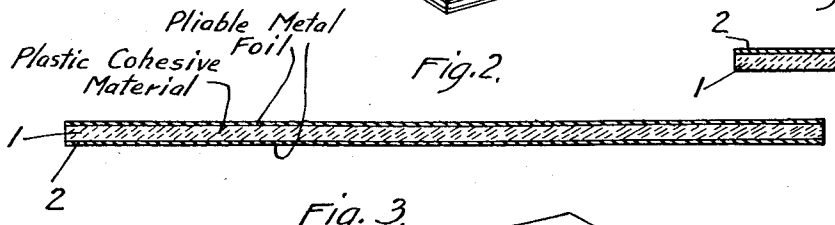


Fig. 2a

Fig. 3.

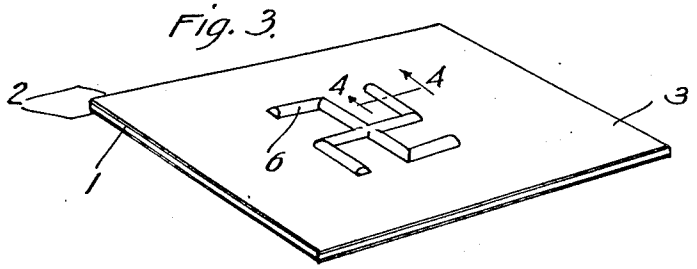


Fig. 4.

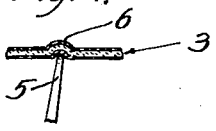


Fig. 5.

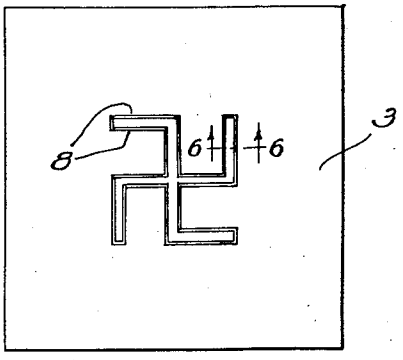
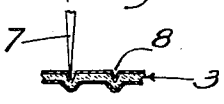


Fig. 6.



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IMPRESSIBLE SHEET MATERIAL

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Fig. 7.

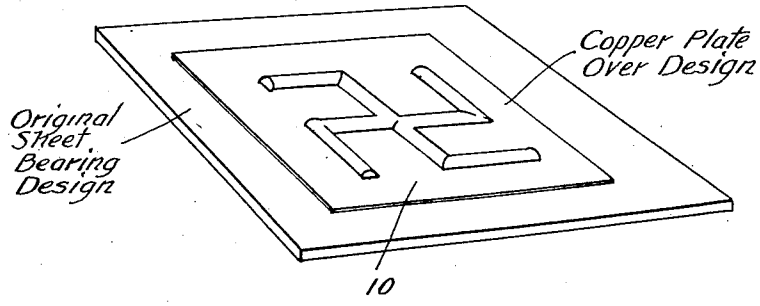


Fig. 8.

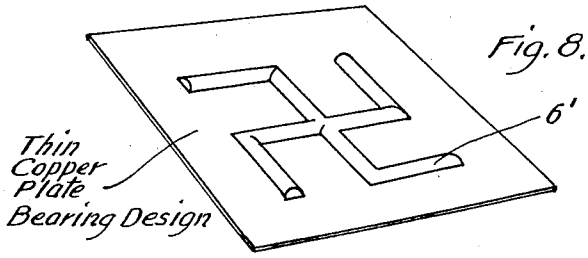


Fig. 9.

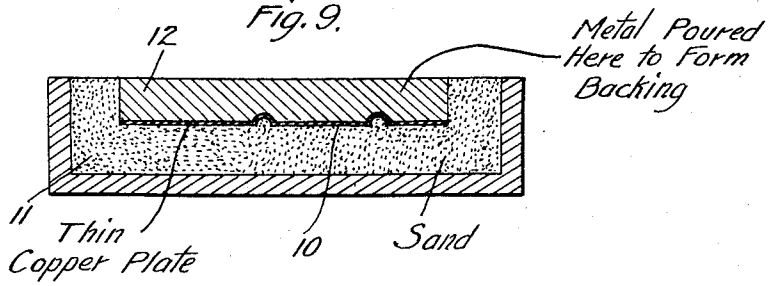
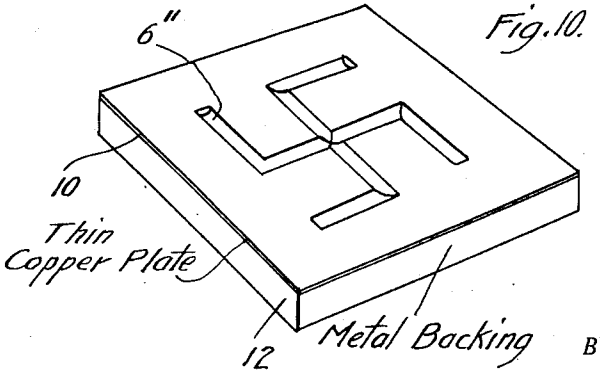


Fig. 10.



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Patented Apr. 28, 1931 1,802,379

UNITED STATES PATENT OFFICE

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IMPRESSIBLE SHEET MATERIAL

Application filed April 25, 1927. Serial No. 186,558.

This invention relates to the art of reproducing designs of artistic or other merit, as by means of embossing, impressing, printing, casting or other processes.

An important object of the invention is to provide an improved form of impressible sheet material for use in such processes as hereinafter described.

The impressible sheet material of my invention comprises essentially a sheet of suitable plastic, cohesive and substantially inelastic material, such as wax or the like, and a thin sheet of pliable and substantially inelastic metal foil, such as lead foil, pressed or otherwise brought into intimate contact with said plastic material. Said sheet material preferably comprises a layer of the wax or other plastic material with a sheet of lead foil or the like on each side thereof but in some cases or for certain purposes it may be necessary to provide a sheet of lead foil or the like at only one side of the wax or other plastic material.

I have found that the sheet of material formed as above described may be easily molded, impressed, or engraved with suitable instruments, and that it holds or retains the shape to which it is so formed and may therefore be used for reproduction purposes as by means of printing or other impression methods or for the purpose of forming dies by the method hereinafter described.

One particular purpose for which the above described material may advantageously be used is in the production of dies. A particularly advantageous method of producing dies therewith comprises first forming the desired design by molding, impressing, or engraving a sheet of such impressible material, then depositing a thin plate of copper or other suitable metal over the design so formed, by means of electro-plating or other suitable process, so as to cause the metal plate so deposited to conform exactly to the shape of said design, and subsequently reenforcing said metal plate by means of a relatively heavy backing of suitable metal, this latter operation being accomplished for example by placing the thin metal plate in a suitable mold and pouring molten metal thereon. The original sheet of impressible material may be removed from the metal plate either before or after the backing is applied, leaving the die bearing the exact reverse of the figure originally formed in the impressible material. Such die may thereafter be used in embossing the design on any suitable medium, or for making castings thereof, or for other purposes for which dies are employed. The finished design will be an exact reproduction of that originally produced in the impressible material. A relief design produced in the impressible material will result in the reproduction of a relief design on the finished article, while an intaglio original will give an intaglio reproduction.

The material may also be used for a variety of other purposes as hereinafter described.

The accompanying drawings illustrate embodiments of my invention and methods of using the same, and referring thereto.

Fig. 1 is a perspective view of a sheet of impressible material according to my invention.

Fig. 2 is a transverse section of a sheet of such material.

Fig. 2a is a partial sectional view of a modified form of sheet material.

Fig. 3 is a perspective view of a sheet of such material with a single design formed thereon in relief.

Fig. 4 is a partial section on line 4—4 in Fig. 3 showing the manner in which such design may be formed.

Fig. 5 is a plan view of a sheet of impressible material with a simple design engraved or cut therein.

Fig. 6 is a partial section on line 6—6 in Fig. 5, illustrating the manner in which such design may be produced.

Fig. 7 is a perspective showing a thin plate of copper applied to the design.

Fig. 8 is a perspective view of the copper plate removed from the original design.

Fig. 9 is a vertical section through a mold in which the backing metal is applied to form the completed die.

Fig. 10 is a perspective view of the completed die.

The impressible sheet material, as shown

in Figs. 1 and 2, comprises in its preferred form an intermediate layer 1 of wax or other suitable plastic, cohesive, and substantially inelastic material of wax-like consistency, such as certain forms of asphaltic material, with a thin sheet of pliable metal foil 2 at each side thereof and in intimate contact therewith. As a plastic material for the central layer of the sheet I prefer to use bee's wax or wax of similar characteristics, and for certain purposes, particularly where the material is to be electro-plated as hereinafter described, I prefer to mix a suitable proportion of electrically conducting material, such as finely divided carbon, with such wax. Such material may contain for example about one third carbon and two thirds wax, although these proportions may be varied considerably.

The metal foil may advantageously consist of thin lead foil about the thickness of ordinary writing paper, or say about 1¼ thousands of an inch, although the thickness of this foil may be varied between rather wide limits depending upon the purposes for which the material is to be used. Other metals of substantially similar pliability may be used in place of lead, particularly alloys of lead and other metals, such as tin or bismuth.

One method of forming the above described sheet material consists in placing a smooth piece of thin lead foil on wax paper or other suitable material and pouring hot molten bee's wax or the above described composition of bee's wax and carbon dust thereon, then placing another sheet of lead foil on top of the wax and pressing down to the desired thickness of the completed article by means of a suitable heated press or with a hot plate covering all of the surface to be used. The completed sheet of material, indicated at 3, should be of about the thickness of a sheet of three-ply drawing paper although such thickness may be varied between rather wide limits, say between the limits of 1/64 to 3/64 of an inch, without departing from the spirit of the invention. For any total thickness of material within these limits, it may be seen that the thickness of the layer of wax or plastic material is several times as great as that of the metal foil, and is in fact, even for the minimum total thickness, about ten times the above mentioned thickness of the metal foil. This relatively great thickness of the layer of plastic material, as compared to the thickness of metal foil, is essential to satisfactory use of the material in the manner in which I contemplate using the same, and is therefore considered to be an essential feature of the invention. Instead of using molten wax, wax in sheet form may be employed, in which event a sheet of wax is laid over the first sheet of metal foil and the second sheet of metal foil is then placed in position and the composite sheet is then pressed, under the influence of heat if necessary, to the desired thickness as before stated. It will of course be understood that the material may be made in sheets of any desired size, or may be made in large sheets, which may thereafter be cut to form sheets of the desired shape and size.

While I prefer in general to place a sheet of metal foil at each side of the layer of plastic material, I may in some cases provide a sheet of metal foil 2 at only one side of the plastic material 1, as shown in Fig. 2*a*. A sheet material of this formation is not adapted for use in as many ways as that shown in Fig. 2, but for certain purposes it may be used satisfactorily.

In Figs. 3 and 4 I have illustrated one method of forming designs in the above described sheet material. The design in this case is worked in relief, that is to say, so as to project above the surface of the material For making this sort of a design any suitable instrument having a rounded or blunt point 5 may be used as shown in Fig. 4, said instrument being applied with suitable pressure to the reverse side of the material so as to raise the front surface of the material as shown and produce the figure such as indicated at 6 in the desired relief effect.

Another style of design worked in the above described material is shown in Figs. 5 and 6. In this case a relatively sharp pointed instrument 7 may be employed for making fine lines or depressions 8 in the front surface of the sheet of material giving the effect of an engraved design. It will be noted that in either of the above cases the entire thickness of the material is effected, not only the metal foil, but also the central layer of plastic material being deformed. The layer of plastic material permits the sheet to be molded or formed in a wide variety of manners and causes the same to retain any shape or conformation to which it is deformed.

The sheet of material bearing the design of either of the types above described may be used for reproduction by a wide variety of methods. For example the sheet shown in Fig. 5 may be inked in the usual manner of engraving plates and may then be used for producing a reproduction of the design therein by contact with paper or other suitable medium. Reproductions having all of the characteristics of etchings or woodcuts may be produced in this manner.

A particularly advantageous method of utilizing the above described sheet material however, consists in forming dies for embossing or similar purposes in the following manner. As illustrated in Fig. 7, a sheet of material 3 bearing a design, for example as shown in Fig. 3, may have a thin coating of suitable metal such as copper deposited

thereon as shown at 10. This may be accomplished by the usual electro-plating process, the sheet being placed on the usual contact plate employed in such process. The design may be held to the contact plate by means of hot wax applied around the edges of the sheet and overlapping the same sufficiently to hold it firmly in place while leaving the design itself and the desired margin free for electroplating. The design is then preferably treated with carbon dust in the usual manner, this operation being called polishing and being for the joint purpose of insuring even deposition of copper thereon and of permitting the copper plate to be subsequently removed from the design. The contact plate with the design attached thereto, is then placed in the electro-plating solution and an electric current of suitable strength is passed therethrough for the required period of time. A copper plate of from .018 to .028 inches should be applied to the design, and with a fairly high amperage such a coating can be applied in about 3½ to 5½ hours.

The contact plate and design are then removed from the bath and the thin copper shell or plate 10 is preferably next separated from the design. This copper shell bears the exact likeness of the original design but in the reverse, that is to say, an original relief design will produce a copper shell having an intaglio design and vice versa. This thin copper shell is illustrated in Fig. 8 in the position corresponding to its position in Fig. 7 and just after removal from the original design, it being understood that it is the underside of the shell in this figure, that is the side which was in contact with the original design, which is to form the surface of the finished die. The reverse side of the design on this copper shell is indicated at 6′.

This thin copper plate 10 is then placed in a suitable mold, as for example a sand mold 11, Fig. 9, and heated to a suitable temperature, and a backing or reenforcing layer of metal is then applied thereto in molten condition. For example if brass is to be used to form the backing the mold and copper plate should be heated to about 900° F. and the molten brass is then poured in and allowed to cool in the position shown at 12. The completed die may then be removed, bearing an intaglio design as indicated at 6″ in Fig. 10. Such die has the same concave effect as a hand engraved embossing die and may be used in the same manner for embossing designs in relief on leather, artificial leather, or other suitable medium.

For card embossing or other purposes where the pressure used in embossing need not be so great, a softer metal may be used for backing the die. For example the copper plate and mold may be heated to about 100 to 200° F., and molten type metal or other easily fusible casting metal, is poured in and allowed to cool as before.

It will be seen that since the die itself bears the reverse of the original design, the reproduced design will be an exact reproduction of the original design, that is to say that a relief original will give a relief reproduction while an intaglio original will give an intaglio reproduction.

I claim:

1. A sheet of impressible material comprising a single layer of plastic, cohesive material having a wax-like consistency, and a thin sheet of metal foil having substantially the pliability of lead at each side of said first named layer, each of said sheets of metal foil being pressed into intimate contact with said layer of plastic material, and the thickness of the layer of plastic material being several times as great as that of the metal foil.

2. A sheet of impressible material comprising a layer of plastic, cohesive waxy material having a thickness of about 1/64 of an inch or greater, and a thin sheet of lead foil on the order of one thousandth of an inch thick pressed into intimate contact with said plastic material at each side thereof.

3. A sheet of impressible material for use in making dies by electro-plating, comprising a layer of plastic, cohesive material having a wax-like consistency containing finely divided electrically conducting material distributed therein, and a thin sheet of pliable inelastic metal foil in intimate contact with said first named layer at each side thereof, the thickness of the metal foil being on the order of one thousandth of an inch and the thickness of said layer of plastic material being several times as great as that of the metal foil.

4. A sheet of impressible material comprising a single layer of plastic, cohesive material having a wax-like consistency, and a single thin sheet of metal foil at each side of said first named layer, each of said sheets of metal foil having substantially the pliability of lead and being approximately 1¼ thousandths of an inch in thickness, and the composite sheet of impressible material being from 1/64 to 3/64 of an inch in thickness.

In testimony whereof I have hereunto subscribed my name this 16 day of April, 1927.

CONAN D. HIGGINSON.