United States Patent

[11] **3,536,008**

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[21] Appl. No. **625,344**
[22] Filed **March 23, 1967**
[45] Patented **Oct. 27, 1970**
[32] Priority **March 31, 1966**
[33] **Germany**
[31] **R 42,965**

[54] **METHOD OF MAKING METAL PRINTING FORM**
8 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **101/401.1,** 101/463, 101/459
[51] **Int. Cl.** **B41c 1/10,** B41n 1/08
[50] **Field of Search** 101/460, 463, 462, 454, 458, 459, 453, 4011

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ABSTRACT: Producing a composite printing foil by applying to one face of an aluminum foil formed with spaced projections extending outwardly at the other face of the foil, a supporting layer of synthetic resin or paper and the like which layer has a thickness between about one-half and one-and a half times the thickness of the aluminum foil.

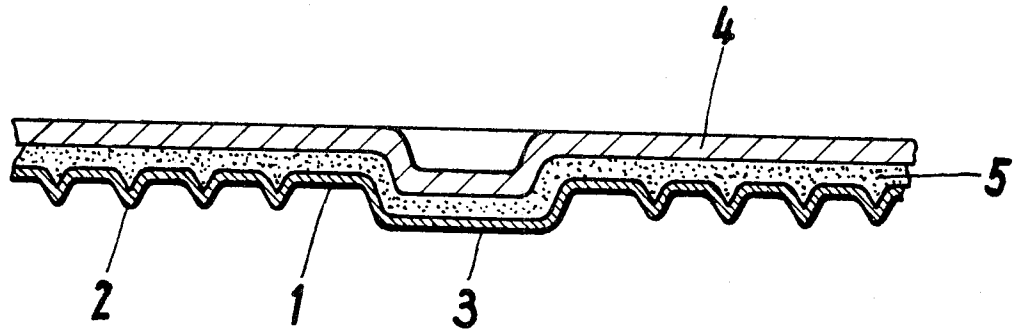


Fig.1

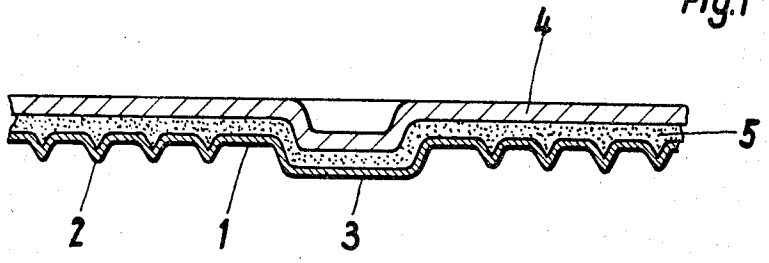


Fig. 2

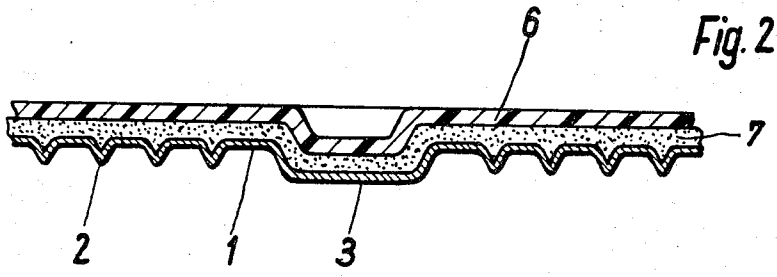
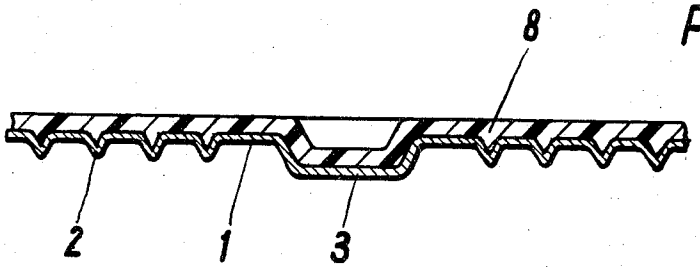


Fig.3



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METHOD OF MAKING METAL PRINTING FORM

BACKGROUND OF THE INVENTION

The invention is concerned with a method of producing a composite printing foil having an aluminum printing face and including an aluminum foil formed with spaced projections or protuberances extending outwardly at the printing face and preferably uniformly distributed thereon, and a supporting layer adhering to the other face of the thus embossed aluminum foil.

Printing foils of aluminum embossed so as to form uniformly distributed projections at one face thereof were proposed, as well as printing foils of said type which were coated with a very thin lacquer layer at their other face.

It has been found, however, that such embossed printing foils, upon handling, are extremely sensitive to being wrinkled and upon high pressure imprinting at one face and the mechanical stress to which the printing foil is exposed upon making copies thereof will tend to forming folds and creases. The reason for this undesirable behavior of the printing foils could be found in the unilateral deformation of the material.

Furthermore, it was not possible to utilize this type of printing foils for producing copies which could be automatically read by a machine, because the printed indicia produced on a copy sheet upon being imprinted by means of such printing foil were not strong enough to permit optical scanning or reading by machines. Furthermore, the strength of the indicia image was not sufficiently stronger than that of the printed points formed on the copy sheet by slight contact with the spaced projections on the printing foil.

It is an object of the present invention to overcome the above discussed disadvantages connected with conventional aluminum printing foils of the type described and to produce a stable printing foil having an aluminum printing face and being insensitive to wrinkling and capable of imprinting copies which are sufficiently strong so that they may be read optically or by machines.

SUMMARY OF THE INVENTION

The present invention proposes to produce a composite printing foil by applying to one face of a metal foil, preferably an aluminum foil, formed with spaced projections extending outwardly at the other face of the foil, a supporting layer consisting of a synthetic resin which may be applied as a synthetic resin foil or which layer may be formed for instance from an aqueous suspension, or of a coherent fibrous layer such as a paper sheet.

The present invention also encompasses the thus formed composite printing foil.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a cross-sectional view of an embodiment according to the present invention in which a supporting paper sheet is adhesively attached to the metal foil;

FIG. 2 is a cross-sectional view of a second embodiment in which a foil of synthetic material is adhesively attached to the metal foil; and

FIG. 3 is a cross-sectional view of a third embodiment in which the metal foil is coated on one face with a layer of synthetic material.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to the present invention, the aluminum foil, after embossing the same so as to form, preferably uniformly distributed, spaced projections at the printing face thereof, is combined with a foil, sheet or layer of synthetic resin or paper which is applied to the face of the aluminum foil which is opposite the printing face thereof. Such supporting layer may directly adhere to the aluminum foil or may be adhered thereto by interposition of an adhesive material which may be a cold-acting adhesive, or an adhesive which is to be activated or hardened by exposure to elevated temperatures.

Such adhesives per se are well known to those skilled in the art.

The composite printing foil of the present invention may be produced in various ways. In place of applying a supporting foil by means of a hot or cold adhesive, it is also possible to form at the face opposite the projections of the embossed aluminum foil a layer of thermoplastic resin by means of conventional extrusion methods, whereby the thickness of the thus formed supporting layer should be at least equal to about one and one-half times the thickness of the initial unembossed aluminum foil.

It is also possible to apply the layer of thermoplastic resin to the face of the embossed aluminum foil which is opposite the printing face thereof in the form of an aqueous dispersion and to form the supporting layer by evaporation of at least the major portion of the water of the dispersion, a method which per se is known to those skilled in the art.

Thus, the composite printing foil of the present invention has on the face thereof which is to be exposed to pressure by an indicia forming device, for instance a typewriter key, a layer or foil consisting of synthetic resin or paper and firmly adhering to the respective face of the aluminum foil.

Preferably, the thickness of the aluminum foil prior to the embossing thereof will be about 50 microns and the layer or sheet which is adhered thereto will have a thickness of between about 25 and 75 microns.

Thus, according to a preferred embodiment of the present invention, the composite printing foil consists of an aluminum foil having a thickness of about 50 microns and being embossed as described above so as to have uniformly distributed spaced projections at the printing face thereof, and having adhered thereto at the face of the aluminum foil which is opposite the printing face thereof, by means of a cold or hot acting binder material a paper sheet having a thickness of between about 25 and 75 microns.

The embossed aluminum printing foil may be combined, in accordance with the present invention, with a foil of synthetic material adhering to the face of the aluminum foil which is opposite the printing face thereof. Such foils of synthetic material may consist for instance of cellulose acetate, regenerated cellulose, polyethylene, terephthalic acid ester or polyvinyl chloride.

The composite printing foil may also be produced by forming a layer of synthetic material on the aluminum foil, preferably a layer having a thickness of between about 25 and 75 microns and consisting of polyethylene, polyvinyl chloride or polyvinyl acetate.

Referring now to the drawing and particularly to FIG. 1, a schematic cross-sectional view of a composite embossed printing foil is shown, having an embossed aluminum printing face and a supporting paper sheet which is adhesively adhered to the face of the aluminum foil which is opposite the printing face thereof.

Embossed metal foil 1, for instance consisting of aluminum or aluminum alloys known to those skilled in the art, is of the type which may be used for producing copies in a large number and over a prolonged period of time. Foil 1 is formed with evenly distributed small protruding points 2 which extend outwardly at the printing face of the foil. When forming reproducible indicia on the foil, for instance by the impact of a typewriter key in the direction from the nonprinting towards the printing surface of the foil, raised indicia 3 are formed which extend outwardly beyond the level of points 2. Upon application of printing ink or the like to the printing surface of foil 1, only the indicia forming farther outwardly extending

portions 3 will give up ink onto the copy sheet forming a strong copy of the indicia thereon, whereas points 2 will not be copied or will appear on the copy sheet only as insignificantly slightly visible points.

In order to increase the stability and strength of metal foil 1 and to form, for instance by means of a typewriter, a legible image on the nonprinting surface, a paper layer 4 is applied to the nonprinting surface of the metal foil, after embossing and prior to imprinting of the same, by means of an interposed conventional water insoluble adhesive layer 5.

According to the embodiment of the present invention illustrated in FIG. 2, metal foil 1 is adhered by means of a hot sealing adhesive 7 to a commercially available foil 6 of synthetic material, for instance of polyethylene, polyvinyl chloride, cellulose acetate or polyterephthalic acid ester.

The hot sealing of foil 6 to aluminum foil 1 is carried out after embossing but prior to imprinting of aluminum foil 1. By suitably choosing the thickness of synthetic foil 6 or paper sheet 7, the dimensions and strength of the copy formed of image forming portions 3 of the printing face can be controlled.

According to FIG. 3, aluminum foil 1 is coated at its nonprinting face with a layer 8 formed of a dispersion of synthetic material, for instance of an aqueous dispersion, in, per se, conventional manner. Application of the dispersion or the like layer is carried out after embossing and prior to imprinting of the aluminum foil, and it will be noted that in accordance with the last described embodiment the interposition of an adhesive layer between the aluminum foil and the reinforcing layer will not be required.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of printing foils differing from the types described above.

While the invention has been illustrated and described as embodied in a composite printing foil having an aluminum or aluminum alloy printing surface, on which reproducable indicia may be formed for instance by means of a typewriter, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

It is preferred, in accordance with the present invention, to provide a printing form comprising an aluminum foil formed at its printing face with spaced outwardly extending projections and being covered at its other face and a firmly adhering sheet, foil or layer of terephthalic acid, the latter being highly resistant against chemical attack by, for instance, an interposed adhesive —if such adhesive is employed, and by cleaning agents conventionally used for cleaning the printing form. In addition, the layer of terephthalic acid ester does not tend to roll up upon itself, or—if at all—only to a very slight degree.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt if for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptions should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

I claim:

1. A method of producing a composite lithographic printing plate, comprising the steps of embossing a metal foil so as to form on one face thereof spaced depressions and on the other face thereof corresponding spaced projections extending outwardly from said other face of said metal foil; applying to said one face of said thus embossed metal foil a supporting layer of a material selected from the group consisting of synthetic resins and coherent fibrous layers so as to fill also said depressions; and subsequently forming in said embossed metal foil and supporting layer raised indicia-forming portions protruding from said other face of said embossed metal foil and extending beyond said spaced projections thereon, said raised indicia-forming portions being formed by applying pressure onto said supporting layer on said one face of said metal foil in the region of said raised indicia-forming portions.

2. A method as defined in claim 1, wherein said metal consists essentially of aluminum.

3. A method as defined in claim 2, wherein said coherent fibrous layer is a paper sheet.

4. A method as defined in claim 2, wherein said supporting layer is adhesively adhered to said one face of said aluminum foil.

5. A method as defined in claim 2, wherein said supporting layer has a thickness equal to between about one-half and one and one-half times the thickness of said aluminum foil

6. A method as defined in claim 5, wherein said supporting layer consists of a thermoplastic synthetic resin and is applied to said aluminum foil by extrusion.

7. A method as defined in claim 2, wherein said supporting layer is formed by applying to said one face of said aluminum foil an aqueous dispersion of a thermoplastic resin and removal of at least the major portion of the water thereof.

8. A method as defined in claim 2, wherein said supporting layer consists of a foil of a substance selected from the group consisting of cellulose acetate, polyethylene, terephthalic acid ester, polyvinyl acetate and polyvinyl chloride.