

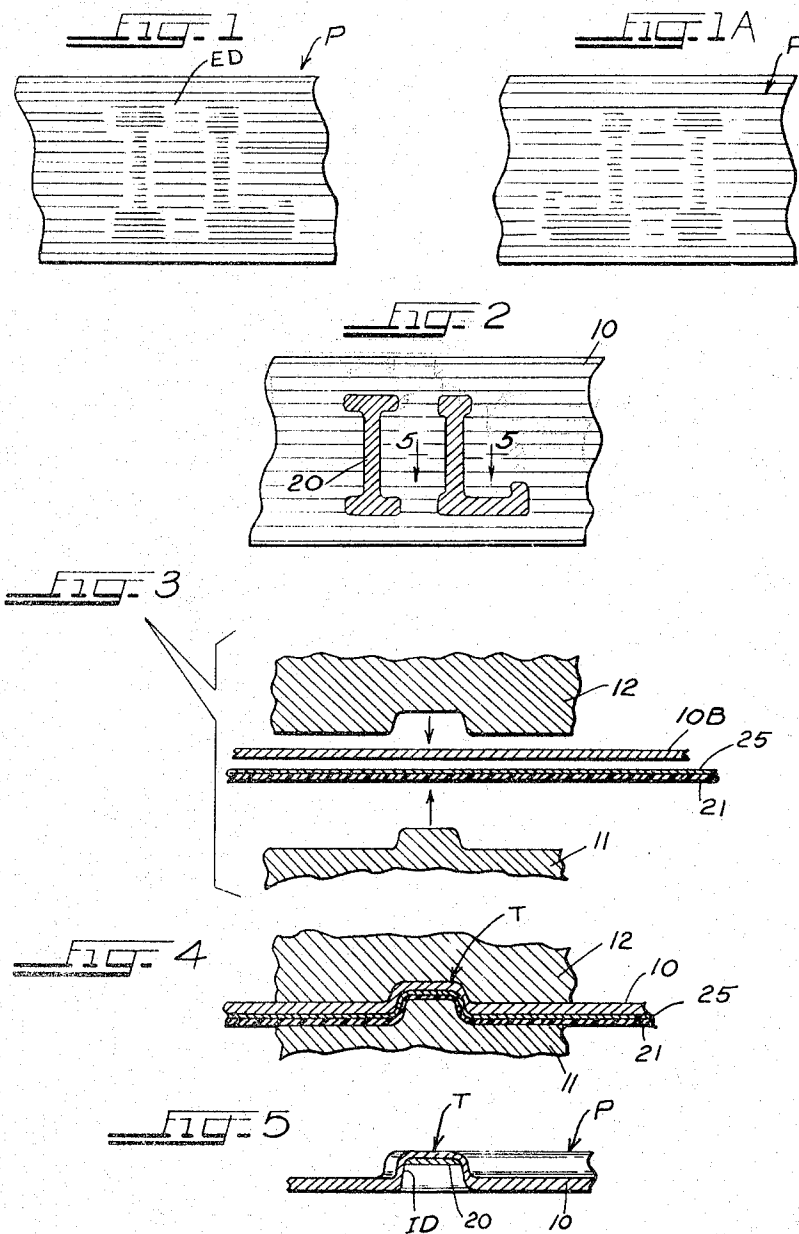
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PRINTING PLATES

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3,301,703

PRINTING PLATES

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2 Claims. (Cl. 117—138.8)

This invention relates to printing plates and the production thereof and especially to printing plates of the kind which bear embossed type characters and which are to be passed sequentially through a printing machine where imprints are made therefrom. This application is a continuation-in-part of application Serial No. 837,613, filed September 2, 1959, and now abandoned. This application is a division of application Serial No. 263,350, filed March 6, 1963, now U.S. 3,245,344.

One well-known form of business machine used for the printing of repetitive data such as periodic mailing lists, premium notices and the like is one in which relatively small printing plates are used, each plate being embossed individually with type characters. Such plates are passed in sequence through the machine to a printing station where each printing plate, selected for printing, is effective through an interposed inked ribbon or the like, to effect an impression from the embossed type characters on such plate. These printing plates are more or less of a permanent nature inasmuch as they are formed from thin sheet metal or tough plastic, and hence can be used over and over again repeatedly for printing records of high quality without apprehension as to accuracy of the printed data or deterioration of the type characters.

In some machines, printing plates of the aforesaid kind are passed through the machine one by one, unassociated with any carrier frame, but in other instances each plate is mounted individually on an associated frame, which may have an area allocated to receive punched hole data representations or the like, and for reasons to be explained hereinafter, it is also conventional in such instances to mount an index card on the frame, which index card is imprinted by and from the related printing plate.

Printing plates of the aforesaid character are mounted in trays or drawers which are stored in suitable cabinets when not being employed in imprinting operations. Inasmuch as such printing plates usually bear type characters from which a name and address can be printed, it is often advantageous to refer thereto when the same are stored as aforesaid because of a change of address or for other reasons. In those instances where the printing plates are of such a nature as to be included on a frame which includes an index card bearing an impression from at least selected of the type characters afforded on the related printing plate, reference can be made to such a card to readily ascertain the data that will be printed by the related plate.

Inasmuch as type characters are usually embossed on printing plates of the aforesaid character to appear in reverse reading form in relief on one side and intaglio on the other side, it is customary to refer to the intaglio faces of the type characters, which afford direct reading, incidental to determining just what the type characters will print. In the instance of a printing plate not having an index card associated therewith, this has been the customary way in which to read the type characters embossed on such a plate. Even in the instance where a printing plate is associated with a card on which an impression is made from but a single line of the type characters embossed on the plate, it has been customary to resort to the intaglio faces of the embossed type characters in other lines on the plate in order to facilitate reading of the same. This becomes necessary, for example, when a

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change in address that may be imprinted from the type characters is necessitated.

The embossing operation by which type characters are produced on printing plates of the aforesaid character, either on metallic or plastic plates, results in the production of what may well be called highlights and shadows, especially in the intaglio faces of the type characters. Such highlights and shadows make it somewhat difficult to readily read the intaglio faces of the embossed type characters when it is desired so to do for purposes of verification or for reasons such as those set forth hereinabove.

The entailed problem is one that has been long recognized in the art and there have been numerous proposals in the art for facilitating the reading of the intaglio faces of type characters embossed on printing plates of the aforesaid kind. Thus, it has been proposed to burnish printing plates on which such type characters are to appear so as to thereby eliminate as far as possible the formation of highlights and shadows as aforesaid. It has also been proposed to coat the faces of printing plates, on which embossed type characters are to appear in intaglio, to thereby reduce the production of highlights and shadows and facilitate the reading of the intaglio faces of the type characters. It has also been proposed to fill the intaglio faces with paint or the like to facilitate reading, but heretofore such filling of the type characters has required manual operation which was considered by many users of printing plates of the aforesaid character as being too expensive to be warranted.

In view of the foregoing, it is the primary object of the present invention to enable the intaglio faces of type characters embossed on a printing plate of the aforesaid kind to be easily and inexpensively arranged for expeditious reading and to do this as an incident to the embossing of the type characters.

Specifically, it is an object of the present invention to effectively deposit a pigment coating or filling restricted substantially to the bottom of each embossed intaglio character of the aforesaid kind simultaneously with the embossing thereof, and to do this by interposing between the punch and die of the embossing machine a strip of tough plastic bearing a pigment coating on the side which faces toward the die of the embossing machine. Hence, when the punch and die are brought together to form the embossed type character, the plastic strip will at the same time be stretched, causing the corresponding portion of the pigment coating to be off-set into the resultant intaglio character. Resort is had to a tough plastic strip in accordance with the present invention because so to do avoids breaking or puncturing of the strip by the punch of the embossing punch and die set for a particular type character. Furthermore, and in accordance with the present invention the coating or filling is only applied to the face of the tough plastic strip opposite the face thereof to be engaged by the punch of a particular punch and die set.

It is a further object of this invention to apply the coating or filling material to the face of the strip as aforesaid with sufficient adhesion to prevent inadvertent displacement of the material and yet enable expeditious separation of the material from the strip in the course of an embossing operation. Therefore, the material is effectively deposited in the intaglio character in a facile manner and there is no resultant fouling of the punch and die set in the embossing machine. Another object of the present invention is to assure sufficient adherence of the pigment coating to its carrier strip so that it will not smudge and become easily dissipated prior to use, while at the same time enabling off-set of the pigment coating from the strip with an intaglio depression as aforesaid,

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under embossing pressure, to be realized with resultant assured adherence of the pigment coating to the plate.

Another object of the present invention is to develop and utilize essential, physical characteristics that are necessary to efficacious practices under the present invention.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principle thereof and what is now considered to be the best mode contemplated for applying that principle. Other embodiments of the invention embodying the same or equivalent principle may be used as desired by those skilled in the art without departing from the present invention.

In the drawings:

FIG. 1 is a fragmentary view of a portion of the intaglio side of a printing plate bearing conventional embossments;

FIG. 1A is a view similar to FIG. 1 but of the reverse side of the plate;

FIG. 2 is a view similar to FIG. 1 but illustrating the nature of the embossments achieved under the present invention;

FIGS. 3 and 4 are schematic sectional views illustrating stages in the production of an embossed printing plate under the present invention; and

FIG. 5 is a sectional view substantially on the line 5—5 of FIG. 2.

In FIG. 1 of the drawings there is illustrated a fragment of a printing plate P of the kind to be used in printing machines as explained hereinabove. The plate P is illustrated as bearing embossed data ED represented by the type characters "IL". These characters "IL" are to be understood as being of intaglio form as viewed in FIG. 1, that is, are depressed or indented such that the opposite or hidden side of the plate P will have the characters "IL" of raised or relief form as shown in FIG. 1A effective to produce a print on a sheet through an interposed ribbon or the like. Thus when a plate as P, FIG. 1, is turned so that the relief parts of the data ED will be outermost, the data "IL" are not directly readable as will be apparent from FIG. 1A. In other words, the embossed data such as ED on a printing plate as P are directly readable only from the intaglio side, and FIG. 1 can be considered as a typical showing of the difficulty in reading the characters, this being due primarily to the uniformity of glossiness of the plate throughout and the smallness of the characters, bearing in mind that FIGS. 1, 1A and 2 are on a greatly enlarged scale.

In accordance with the present invention, the intaglio characters are to be faced at least in the flat bottom surface thereof with a pigment coating simultaneously with the formation of the embossments, without interference in the formation of the embossments under the desired type font design. The pigment will be selected as one highly contrastive with the color of the material of which the printing plate is made, the following being merely illustrative: black pigment, white or silvery plate; blue pigment, red plate; and so on. Resultantly, this will afford highly accentuated intaglio characters in the plate as 10 illustrated in FIG. 2.

Referring to FIGS. 3 and 4, printing plates of the kind under consideration, of whatever material (metal or plastic) have the embossed data formed thereon by way of individual cooperating punch and die sets such as the punch 11 and the cooperating die 12. The flat plate blank as 10B, FIG. 3, which is to be embossed, is of course interposed between the punch and die arrangement in the related embossing machine, and in order to enable a character to be formed, the cooperating punch and die elements are moved toward one another as indicated by the arrows in FIG. 3 with such force as to deform the plate in the manner illustrated in FIG. 4 resulting in the formation of an embossed type character T, FIGS. 4 and 5.

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Under and in accordance with the present invention, a pigmented coating 20, FIGS. 4 and 5, is deposited in the intaglio part ID of the type character T, and this is accomplished as an incident to embossing and under circumstances where there is no fouling of the punches and dies. In achieving this, a pigmented carrier which includes a strip 21 of tough, very thin, easily deformable plastic is interposed between the punch 11 and the side of the plate blank 10B where the intaglio depression will appear. Advantageously, the plastic can be a polyester film such as that known under the trademark "Mylar" plastic, although other films can be used. The face of the plastic strip 21 opposite the punch 11 is provided with a readily off-settable or pressure-transfer pigmented coating 25 of a nature to be described in detail hereinafter.

Mylar plastic, which is a polyester film chemically identified as polyethylene terephthalate resin, by its very nature, is inherently tough and capable of withstanding severe deforming stresses without breaking or rupturing. Hence, when the embossing force is effected on the punch and die set as 11 and 12, the coated Mylar strip 21 will be squeezed as illustrated in FIG. 4 so that the pigmented coating 25 thereon is pressed tightly into the intaglio character ID, and the resultant pressures will cause the portion of the pigmented coating squeezed into the intaglio character to off-set by virtue of pressure transfer on to the plate 10 as a bottom facing for the intaglio character ID as illustrated in FIG. 5. Thus, while the entailed pressures are effective to displace or squeeze off the pigmented coating from the carrier 21, the carrier strip or film 21 itself remains intact and there is consequently no fouling of the punch 11 likely to interfere with subsequent embossing operations, especially since the pigmented coating is restricted to one side of the carrier, namely, the side facing away from the punch. Moreover, the film is so thin as to be skin-tight, and hence the embossments are formed with precision.

Other plastic films of thermoplastic nature which can be used are: Pliofilm (rubber hydrochloride), polyethylene plastic films and vinyl plastic films.

It has been found in accordance with the present invention that it is important to assure the following essentially physical conditions under room temperature conditions for the plastic carrier strip, the pigment coating thereon, and the plate to be embossed:

- (1) adhesiveness of the pigment coating to the plastic carrier strip without smudging while being handled;
- (2) releasability of the pigment coating from the carrier to the plate under embossing pressure; and
- (3) adhesiveness or anchoring of the released or off-set pigment coating (image-wise) to the intaglio depression in the embossed plate.

The foregoing three critical requirements entail: (a) a thermoplastic carrier about 0.5 to 1.0 mil in thickness and which will resist rupture during embossing; (b) an adhesive material in the pigment coating which is adhesive to the plastic carrier strip but which will release under embossing conditions; (c) an adhesive material in the pigment coating which is adhesive to the material of which the plate to be embossed is composed; and (d) a non-drying component in the pigment coating to prevent the pigment coating from aging, that is, undergoing embrittlement either on the carrier (where it would otherwise crack and peel upon handling the strip after a prolonged period of idleness) or after off-setting into the embossed indentations of the plate (where it would otherwise be likely to flake off or chip during rough handling of the plate).

By using very thin film, there is assurance that the film, when embossed, will not interfere with proper formation of the embossment to duplicate the precise details of the embossing punch and die. Thus, the film becomes a skin-tight lining. Particularly in the instance of metallic plates to be embossed, it appears important to include in the pig-

ment coating an abrasive which will scar and pock the intaglio depression during driving of the pigment coating thereinto when forming the embossment, thereby in effect innoculating the intaglio depression with the off-set pigment, particularly the bottom face of the intaglio depression.

The following is an example meeting the above specified requirements, and range tolerances or variations are parenthetically noted:

EXAMPLE 1.—PIGMENTED COATING

Ingredient	Amount	Function
Vinyl chloride, vinyl acetate copolymer ("VMCH" grade)...	7 grams.....	Continuous, universal thermoplastic matrix vehicle for remaining ingredients.
Toluene ¹	35 ml. (25-50 ml.).....	Agent for dispersing and wetting the resin ingredients vinyl chloride-vinyl acetate copolymer prior to solution in the strong solvent.
2 nitropropane ²	50 ml. (40-60 ml.).....	Solvent.
Sucrose acetate isobutyrate.....	4 grams (3-5 grams).....	A plasticizer and stabilizer which hinders rearrangement and separation of the various liquid and solid components of the transfer film.
Glyceryl phthalate alkyd resin.....	8 grams (6-10 grams).....	Adheres the off-set pigment coating to the embossed plate.
Mogo varnish.....	8 grams (4-12 grams).....	Extender for the oil and pigment.
Mineral or vegetable oil.....	6 grams (5-7 grams).....	Non-drying carrier or vehicle for pigment material.
Carbon black.....	10 grams (10-15 grams).....	Pigment.
Iron oxide.....	10 grams (5-10 grams).....	Abrasive pigment for embossed plate.

¹ Or benzene.

² Acetone, methylethyl ketone, or methylisobutyl ketone can also be used.

The iron oxide in the above example, as noted, is an abrasive which is abrasive to materials of which plates to be embossed in accordance with Example 1 may be composed. This particular abrasive can be replaced by equivalents because it serves, in the example above, as an abrasive which does not detract substantially from the intensity of the carbon black pigment. The solvent in Example 1 evaporates after the pigment coating has been spread on a plastic carrier strip, for example Mylar plastic used subsequently to emboss metal plates in a particularly efficacious manner. The oil prevents subsequent embrittlement of the pigment coating, either on the film or when off-set into an embossment. A film of polypropylene plastic can be satisfactorily substituted for the Mylar plastic film. Thus, it will be seen that the requirements are essentially physical in nature.

In Example 1, the preferred amount of toluene (specific gravity 0.866) in parts by weight is about 30.4 grams, with a preferred range of about 21.6 to 43.3 grams. The preferred amount of 2 nitropropane (specific gravity 0.992) is about 49.6 grams, with a preferred range of about 39.7 to 59.5 grams. It will therefore be seen that in this specific preferred example, the ingredients total about 133 parts by weight, with a range of 101.3 to 168.8 parts by weight.

Example 2 is specifically applicable to the embossing of plastic plates, as distinguished from metal plates, and the variations between Example 1 and Example 2, including the incorporation of dioctyl phthalate in Example 2, are concerned with this difference. The physical requirements of the ingredients in the coating, however, remain the same.

The coating of Example 2 is preferably applied to polypropylene film, although the other kinds of film noted

can be used. Both the coated film of Example 1 and that of Example 2 satisfy the objects of the present invention and can be used successfully in the procedure described in connection with the drawing.

In Example 2, the preferred amount of toluene is about 822 grams, with a preferred range of about 693 to 953 grams; and the preferred amount of 2 nitropropane is about 1390 grams, with a preferred range of about 1090 to 1690 grams. It will therefore be seen that in the preferred situation, the total parts by weight in Example 2 is about 3312 grams, with a preferred range or variation of 2658 to 3915 grams.

In both Examples 1 and 2, the more significant ingredients are therefore present in the following preferred parts by weight where the basis is 133 total parts by weight in Example 1 and 3312 parts by weight in Example 2 unless otherwise indicated:

	Example 1	Example 2
Matrix.....	5.25	6.05
Pigment.....	7.5	7.25
Abrasive Particles (Preferred upper limit).....	7.5	3.02
Non-drying oil.....	5.25 (7/133)	1.28 (42/3312)
Adhesive, Coating to plate.....	6	4.85
Plasticizer.....	3	9.8

EXAMPLE 2.—PIGMENTED COATING

Ingredient	Amount	Function
Vinyl chloride, Vinyl acetate copolymer (preferably a mixture of 90% "VMCH" grade and 10% "VYNW" grade).	200 grams.....	Continuous, universal, thermoplastic matrix vehicle for remaining ingredients.
Toluene ¹	950 ml. (800-1100 ml.).....	Agent for dispersing and wetting the resin ingredients vinyl chloride-vinyl acetate copolymer prior to solution in the strong solvent.
2 nitropropane ²	1,400 ml. (1,100-1,700 ml.).....	Solvent.
Sucrose acetate isobutyrate.....	120 grams (60-140 grams).....	Plasticizer and stabilizer agents which adhere the pigment coating to the plastic film, which plasticizes coating to promote its release or off-set to the embossed plate, and which hinders rearrangement and separation of the various liquid and solid components of the transfer film.
Dioctyl phthalate ³	200 grams (150-250 grams).....	Adheres the off-set pigment coating to the embossed plate.
Glyceryl phthalate alkyd resin.....	160 grams (140-180 grams).....	Extender for the oil and pigment.
Mogo varnish.....	80 grams (60-100 grams).....	Non-drying carrier or vehicle for pigment material.
Mineral or vegetable oil.....	40 grams (35-42 grams).....	Pigment.
Carbon black.....	240 grams (220-260 grams).....	Abrasive pigment for metal plate.
Iron oxide.....	60 grams (10-100 grams).....	

¹ See Example 1 above.

² See Example 1 above.

³ Can be replaced by tricresyl phosphate or equivalent primary plasticizers such as dibutyl or dicapryl phthalate.

From the foregoing it will be seen that the present invention affords a practical way of embossing a thin, rectangular plate to become a printing plate for credit or like transactions, while enabling the type characters thereof to be easily read by way of a pigment coating in the intaglio depressions that contrasts with the background color of the plate. This is made possible by so formulating the film and pigment coating thereon as to assure retention of the coating on the film while permitting it to offset therefrom under the embossing pressure, to assure virtually skin-tight fitting of the coated film about the die element of the embossing elements which produce the intaglio depression. Specific examples have been set forth, including ingredients, but it will be appreciated that variations as to the named ingredients are quite possible once the physical relationships are taught under and in accordance with the present invention and can be adopted as a routine manner; and hence while I have illustrated and described preferred practices of the invention, it is to be understood that these are capable of variation and modification.

I claim:

1. A film bearing on one side only a pigment coating for facing the intaglio depressions of an embossed printing plate undergoing embossing and comprising a film of thermoplastic material, about 0.5 to 1 mil in thickness, having such a pigment coating thereon composed of the following:

Material:

Vinyl-chloride vinyl-acetate copolymer as a continuous universal thermoplastic matrix for all the coating ingredients	Parts by weight
Pigment particles	about 5 to 6.
Abrasive particles	about 7.
	not more than about 7.5.

Material—continued

Parts by weight

A non-drying pigment vehicle selected from the group consisting of mineral and vegetable oil ----- not more than about 5.25.

Adhesive material to adhere the coating to the plate when the coating is driven by pressure onto the plate ----- about 5 to 6.

A plasticizer and stabilizer agent selected from the group consisting of sucrose acetate isobutyrate and dioctyl phthalate --- about 3 to 10.

2. A film according to claim 1 in which the pigment particles are carbon black, the abrasive particles are iron oxide, and the adhesive material is glyceryl phthalate alkyd resin.

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