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R. R. MYERS, JR

2,800,856

METHOD OF MAKING PRINTING PLATES

Filed Nov. 6, 1953

Fig. 1.



Fig. 2.

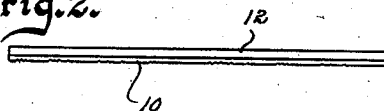


Fig. 3.

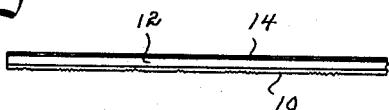


Fig. 4.

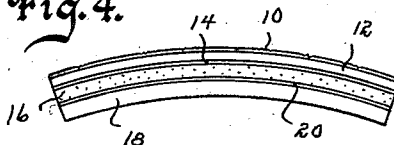


Fig. 5.

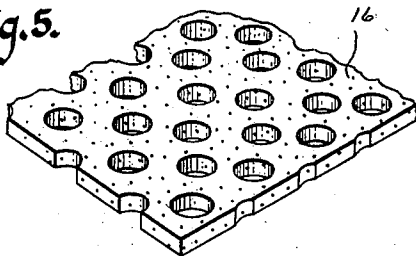


Fig. 6.

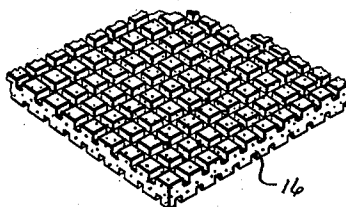


Fig. 7.

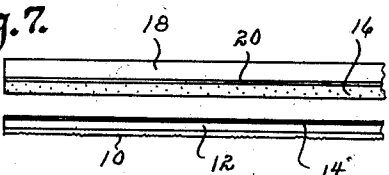


Fig. 8.

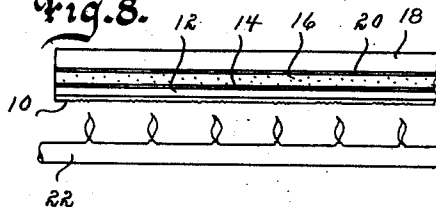


Fig. 9.

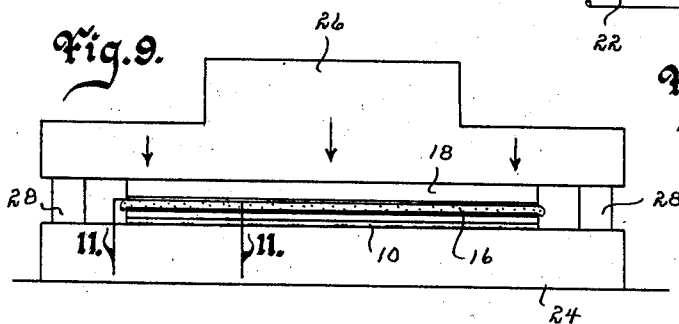


Fig. 11.

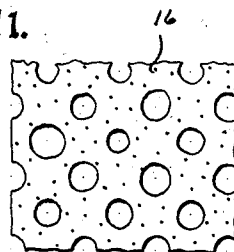


Fig. 10.

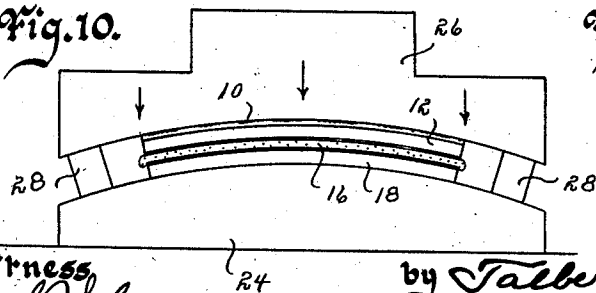
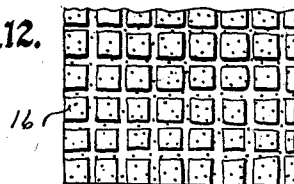


Fig. 12.



Witness
Edward P. Seely

by Talbert Dick & Adler
Attorneys

Inventor
Robert R. Myers Jr.

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METHOD OF MAKING PRINTING PLATES

Robert R. Myers, Jr., Chicago, Ill.

Application November 6, 1953, Serial No. 390,579

3 Claims. (Cl. 101-401.1)

My invention relates to the art of manufacturing printing plates and more particularly to a printing plate that requires no shaving or planing to the correct thickness before being installed on a press. The printing plate and method of making the same is an improvement on the one disclosed in my co-pending application for United States Letters Patent on a Method Of Making Printing plates, filed January 17, 1952, Serial No. 266,939.

The present method of making printing plates is slow and tedious. The prepared printing shells are inverted and subjected to molten backing material. This build up of the shell is relatively thick and after it has cooled and solidified it then must be trimmed and planed to the correct thickness. Obviously equipment for performing this necessary process is expensive, usually eliminating this plate preparation from the smaller shop due to the capital investment necessary. Furthermore, there are many difficulties attendant to the manufacture of the conventional printing plate. One objection is the relatively heavy weight of the finished printing plate. One reason for this is that to obtain strength in the plate it is necessary that the backing material be of maximum thickness. The backing material, is, of course, exceptionally heavy due to its volume. Most backing material is approximately ninety-four percent (94%) lead, three percent (3%) tin, and three percent (3%) antimony. While the backing material is thus of a very heavy nature, it is not strong and obviously has the possible characteristic of bending. Still another problem is that the finished plates have their edges beveled and are held to the press by inversely beveled clamp members. Obviously due to the softness of the backing material, these clamp members may penetrate the plate resulting in the plate becoming loose on the press and buckling and breaking. This combination of objections in the common printing plate places many restrictive limits on the speed on which the press may be operated. In the case of rotary presses, the weight of the plates cause centrifugal force to build up rapidly with the result that the plates tend to bend outwardly and either break or produce undesirable, irregular printing. Still another objection to the common printing plate is the time aspect. Considerable time must be taken in permitting the backing material to cool after it has been placed on the shell. Furthermore, the shaving and planing of the printing plate is not only time consuming but requires the services of skilled operators.

Therefore, the principal object of my invention is to provide a method of making printing plates that produce a relatively light and strong printing plate and one of minimum thickness.

A further object of my invention is to provide a method of making printing plates that eliminates the necessity of shaving the plate to obtain the proper thickness prior to installation on the press.

A still further object of my invention is to provide the method of making a printing plate which embraces the idea of laminated printing plate with one lamination being of irregular plastic sheet so that the plastic will

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be of uniform strength and density throughout the printing plate area.

A still further object of my invention is to provide a light weight strong printing plate that may be produced rapidly thereby saving in both labor, time and materials.

A still further object of my invention is to provide a method of producing printing plates that facilitates the "make ready" of the plates.

A still further object of my invention is to provide a method of making printing plates that requires a minimum of equipment.

These and other objects will be apparent to those skilled in the art.

My invention consists in the method or process, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Fig. 1 is an enlarged edge view of a printing shell,

Fig. 2 is an enlarged edge view of the printing shell and a relatively thin backing material imposed thereon,

Fig. 3 is an enlarged edge view of the unit shown in Fig. 2 with a layer of adhesive thereon,

Fig. 4 is an edge view of my printing plate consisting of a printing shell backing material, a layer of adhesive material, a layer of plastic, a layer of adhesive material, and a plate prior to being compressed into a finished printing plate.

Fig. 5 is a perspective view of the plastic sheet,

Fig. 6 is a perspective view of a modified form of structure of the plastic sheet,

Fig. 7 is an enlarged edge view of the plate and shows one step in the manufacture of a flat printing plate,

Fig. 8 is a diagrammatic side view of the step of heating a plate prior to compression,

Fig. 9 is a diagrammatic side view of a flat plate being compressed to the proper thickness,

Fig. 10 is a diagrammatic side view of an arcular plate being compressed to the proper thickness.

Fig. 11 is a top plan view illustrating the possible distortion of a perforated plastic sheet under pressure, and

Fig. 12 is a top plan view of the possible distortion of a grid type plastic sheet under compression.

Referring to the drawings I have used the numeral 10 to designate an ordinary printing shell having the printing indicia formed on it. In my method of making a printing plate this shell is first tinned by plating or in any other suitable manner to cause ordinary backing metal, designated 12, to adhere to the shell very readily. The shell is then backed in the usual manner but only to a shell and backing total thickness of ninety thousandths of an inch. The backing material is designated by the numeral 12 and the "backed" plate shown in Fig. 2 and made up of the elements 10 and 12 is ninety thousandths of an inch thick. A layer of any suitable adhesive 14 is applied to the backing material 12 to produce the product illustrated in Fig. 3. The adhesive occupies no measurable space in the actual plate. The next step in my method is the placing on the adhesive 14 a sheet of thermoplastic 16. This thermoplastic may be any one of several that have been developed such as vinyl acetate-vinyl chloride material. The named material has excellent dimensional stability characteristics and will not shrink after it is compressed. A sheet 18 of any metal that can be made rather rigid such as steel, alloys of copper, alloys of aluminum, and zinc. I consider aluminum alloy the best material, because it is light in weight yet strong. I realize that some of the alloy steels can be equally strong or stronger for the same weight, but in this case we are also faced with a need to have a sheet of a particular thickness as well. For the usual plate the sheet metal should be seventy-five thousandths of an inch in thickness. This thickness requirement means that

the aluminum alloy retains a weight advantage over sheet steel. The steel, of course, is stronger so that with a balanced press drum, the steel could be nearly as advantageous as aluminum alloy. However, I prefer the lighter weight sheet. The sheet metal is coated with a suitable adhesive 20 and placed adhesive side down on top of the thermoplastic. The whole combination is then heated by any suitable means, as by the gas burner 22, until the thermo-setting plastic is brought to a rather pliable condition. The necessary temperature to produce the desired pliability can be obtained from the supplier of the plastic sheet material. In general these temperatures range from one hundred and fifty degrees Fahrenheit to three hundred degrees Fahrenheit. When the assembled plate has been heated it is placed on a press platen 24 and the press head 26 is brought down on it. The press head may be actuated by any suitable power source. There are stops such as the blocks or beams 28 interposed between the head 26 and the platen 24 and beyond the area occupied by the plate. These stops are of a specific thickness that limit the movement of the press head to the correct thickness for the finished plate. If we are making a printing plate of one hundred and eighty-seven thousandths of an inch, for example, the blocks 28 are machined to this thickness. The slightly "backed" shell is ninety thousandths; the thermoplastic is thirty thousandths; and the metal sheet is seventy-five thousandths, making a total of one hundred and ninety-five thousandths of an inch or about eight thousandths more than the desired thickness for the plate. As the press encounters the heated plate it causes it to assume the thickness desired. The plastic being pliable in its heated state is squeezed down to allow for the difference in thickness between the plate as it is inserted into the press and the thickness determined by the blocks 28. In the process of squeezing the plate down to the proper thickness, the sheet extends into and occupies any of the irregularities of the plate or sheet, and also permits the over all desired thickness in the plate. Therefore it is obvious that it is not important for the shell or the sheet metal to be perfect in surface nor thickness prior to being compressed in the mold. Thus far the process of making the finished printing plate closely follows the teaching of my co-pending application hereinbefore referred to. I have found, however, that if the plastic sheet used is of solid sheet material, any vertical contraction of the sheet in the mold press affects the entire sheet. The reason for this is that when the plastic sheet is compressed, any surplus encountered at a given point must flow to another location or out at the sides of the plate. This means that the plastic must be heated sufficiently to permit relatively long distortions, i. e., if the greatest compression were near the center of the plate, the plastic sheet would obviously have to be affected and moved to the furthest dimensions of the plate. Obviously this would mean that the density of the plastic sheet would not be consistent throughout its area. Not only would this make for an uneven plate and be objectionable but the plastic would have to be heated to such temperature that it would readily flow to the far reaches of its dimensions. Furthermore, a plate will not cool evenly and we might well have a situation where the edges of the plastic would solidify and harden prior to the absorption of surplus plastic material at the center of the plate. I have overcome these objections and problems by providing an irregular surfaced plastic sheet. In Fig. 5 I have accomplished this by having a series of holes extending through the plastic sheet. When such a sheet is compressed in the mold press, any surplus of plastic encountered has an immediate route of escaping by filling the hole areas. This process is illustrated in Fig. 11. Obviously when such a plastic sheet is used, any given point or area that requires a compressing of the plastic to make the plate will be done immediately within that vicinity without affecting the balance of the plastic sheet area. The

same desirable result may be had by gridding either the upper or lower or both sides of the plastic sheet as shown in Fig. 6. The grid projections flatten, when necessary, to take up the surplus plastic and this action is illustrated in Fig. 12. Although I have given preferred thicknesses of the backing material, the plastic sheet, and the metal sheet, it is obvious that the same may vary to meet different circumstances and different thicknesses of printing plates. In the drawings I have shown the various laminations of considerable thickness but this is only illustrative and enlarged for purposes of identification. The finished plate is of excellent quality and requires only beveling and routing to be prepared for use. Also these plates are readily adapted to "make ready" or "treating" which are terms of the trade for forcing some of the printing plates on the press drum out away from the drum farther than other plates to alter the pressure of the plates on the paper as the printing is done. By varying the pressure of the plates a variety of printing effects may be had. My plates may be prepared for "make ready" by pressing the plates to different thicknesses. The plastic material readily adapts itself to different thicknesses which permits "treating" without the use of the usual backing mat on the press itself.

The final feature of my method that speeds the production of the finished plate is the use of chilled press head and base. The cold press members speed the hardening of the plastic and cause the plate to set up faster than it otherwise would. On the other hand, since the cold press head and platen contact the outer surfaces of the plate, they will not cause unfavorably rapid cooling of the plastic. From the time the press contacts the plate face and back until the plate is compressed to the correct thickness is a very short time interval. There is plenty of time for the press to squeeze the plate to the predetermined thickness before the plastic hardens. At the same time heat is drawn away from the whole plate at a considerable rate which causes the plate to set very rapidly.

I have also found that by making the printing shell heavier, approximately twenty thousandths of an inch, it is possible to eliminate the backing metal altogether. This is particularly desirable in small shops for curved plates to fit rotary presses. If the shell has to be backed, either the old hand curving methods are used or some machinery such as centrifugal casting machinery is required. The latter requires more capital investment for the complex machinery while the former is expensive because it involves so much labor. Consequently it may be more economical for small shops to incur the expense of making a twenty thousandths thick shell and eliminate the addition of backing material altogether. The plastic will then be forced directly into the print recesses on the back of the shell. Of course, the shell is coated on its back with a suitable adhesive before the plastic is pressed into position. When the "thick" shell is used, more plastic or a thicker sheet metal back, or both, may have to be employed to make the total plate the proper thickness.

The plate that is made by my method is very clearly much lighter than a conventional plate. The plastic and sheet metal comprise more than one-half of the total thickness of the plate. The plastic and the sheet metal each have a specific gravity much less than that of the backing metal that is more than nine-tenths lead. Furthermore, the sheet metal has more rigidity than a lead plate of the same thickness. The lead alloy that comprises the usual backing is also far surpassed in rigidity by the aluminum alloy or steel sheet used in my method. As a result, I have both a stronger plate and a lighter one. These two facts mean a potentially substantial increase in safe press speed. By reducing the weight of the plate, I have lessened the total centrifugal force created at a given speed, and the strong plate resists better the tendency of the centrifugal force to tear the plate from

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the press drum than does the usual lead-antimony-tin alloy backing used in conventional plates. Not only are plates made faster by my method, therefore, but they are superior in performance as well. The costly shaving operation is also eliminated thereby avoiding the necessity for one of the expensive shaving machines. It is also clear that my light, strong plates can be shipped cheaper and with less damage in handling.

Some changes may be made in my method of making printing plates without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. A method of making printing plates comprising the taking of a printing shell, applying a thin backing of backing metal to said shell to fill all depressions in said shell, applying adhesive to the thinly backed shell, placing a sheet of irregular surfaced thermoplastic material on the adhesive coated shell back, applying adhesive to a sheet of light metal, placing the adhesive coated metal sheet on the free side of said thermoplastic material, heating the assembled plate, and lastly compressing said plate in a press of limited travel, whereby when said assembled heated plate is compressed, the irregular surface of the moldable thermoplastic material will compensate for irregularities in areas of the plate without affecting the remainder of the sheet of thermoplastic material.

2. A method of making printing plates comprising the taking of a printing shell, applying a thin backing of backing metal to said shell to fill all depressions in said shell, applying adhesive to the thinly backed shell, placing a sheet of perforated surfaced thermoplastic material on the adhesive coated shell back, applying adhesive to a sheet of light metal, placing the adhesive coated metal sheet on the free side of said thermoplastic material, heating the assembled plate, and lastly compressing said

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plate in a press of limited travel, whereby when said assembled heated plate is compressed the perforations of the moldable thermoplastic material will compensate for localized irregularities in the finished plate by the surplus thermoplastic material filling its own perforations in that area and thus not affecting the remaining areas of the sheet of thermoplastic material.

3. The method of making printing plates comprising, the taking of a metallic printing shell, applying adhesive to the back of the printing shell, applying a sheet of perforated thermoplastic material on the adhesive-coated printing shell, placing a sheet of light metal on the free side of said thermoplastic material with an adhesive therebetween, heating the assembled plate and compressing the assembled plate in a press of limited travel, whereby when said assembled and heated plate is compressed the perforations of the moldable thermoplastic material will compensate for localized irregularities in the finished plate by the surplus thermoplastic material filling its own perforations in that area and thus not affecting the remaining areas of the sheet of thermoplastic material.

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