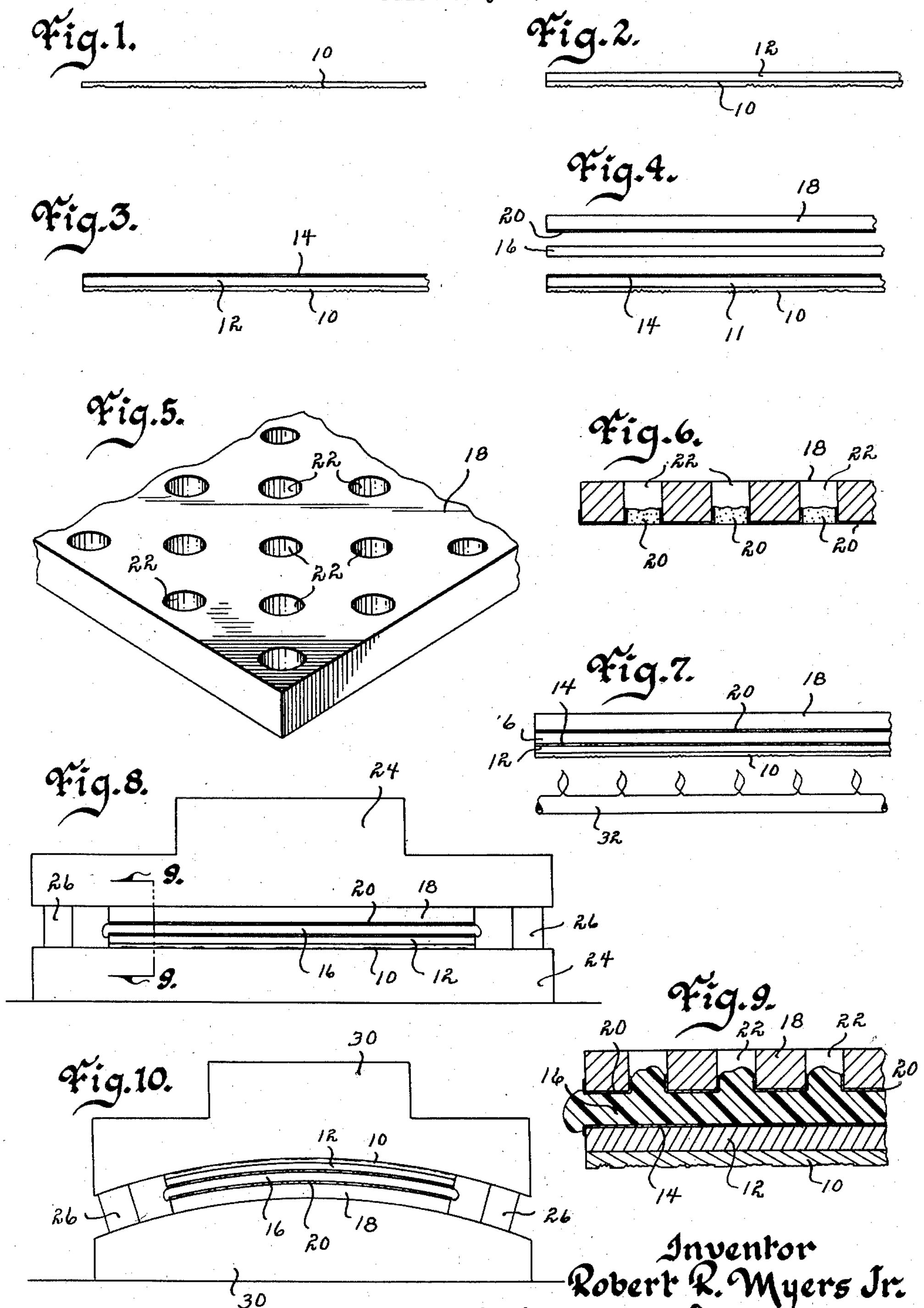
Dec. 3, 1957 R. R. MYERS, JR 2,814,990

METHOD OF PRODUCING PRINTING PLATES

Filed July 12, 1954



Inventor
Robert R. Myers Jr.

by Talbert Dick & Adler
Attorneys

Witness
Edward P. Seeley

United States Patent Office

2,814,990

Patented Dec. 3, 1957

2,814,990

METHOD OF PRODUCING PRINTING PLATES

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

Application July 12, 1954, Serial No. 442,806

2 Claims. (Cl. 101—401.1)

This invention relates to the art of manufacturing printing plates and more particularly to laminated printing plates. 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 November 6, 1953, Serial No. 390,579.

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 still further object of my invention is to provide a laminated printing plate using a perforated metal sheet and a plastic sheet that more successfully secures the plastic sheet to the perforated metal sheet.

A further object of my invention is to provide a method of making printing plates that often 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 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 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 exploded 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 an enlarged view of a portion of my perforated metallic sheet.

Fig. 6 is an enlarged cross-sectional view of a portion of the perforated metallic sheet showing an adhesive on one side thereof and penetrating into the holes thereof.

Fig. 7 is a diagrammatic side view of the step of heating a plate prior to compression.

Fig. 8 is a diagrammatic side view of a flat plate being compressed to the proper thickness.

Fig. 9 is an enlarged cross-sectional view of a portion of my plate after being compressed and prior to trimming, and,

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

To clarify the structure of a finished printing plate, I shall first explain the steps necessary to produce the complete plate as shown in Fig. 9, it being understood, however, that this invention is only a part of such finished plate.

While I have indicated and will describe my invention as not needing the thinning and shaving of the backing material from the shell, there well may be times and circumstances when it will be desirable to smooth and reduce the shell backing material by suitable means.

The numeral **10** designates the ordinary printing shell having the printing indicia thereon. If this shell is very thin, it may be backed with a suitable backing material **12**. However, the thickness of this strengthening soft metal **12** is relatively thin, as opposed to the relatively heavy thick backing material heretofore used. An adhesive **14** is then applied to the surface of the backing **12**. Next in the finished laminated printing plate is my printing plate back which consists of a thermoplastic sheeet **16**, a metal sheet **18**, and an adhesive **20** that is used between the plastic and metal sheet as shown in Fig. 4. 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** may be 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 particular thickness as well. For the one-fourth inch (¼″) plate, the sheet metal should be approximately one hundred twenty 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. The plastic face of my unit is then placed adjacent the adhesive **14**. The assembled plate is then suitably heated to render the thermoplastic compressible. After heating, the assembled plate is placed in a mold press of limited travel. This travel of the press indicates the thickness of the printing plate desired. Inasmuch as the heated plastic is compressible, it is squeezed down to allow for the differences and therefore 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.

I have found that if the metal sheet used is of solid sheet material, gases will be objectionably trapped and also 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 effected 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 the sheet **18** with a series of holes **22** throughout its surface as shown in Fig. 5. I recommend that this sheet **18** be approximately twenty to thirty percent open. 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. 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.

In most areas of the metal plate, if not all, the plastic will enter the holes **22** as shown in Fig. 9. The chief problem, of course, of all such laminated printing plates is to weld the plastic sheet to the perforated metal sheet. The accomplishment of this problem is the heart of this invention. In placing the adhesive **20** on the perforated plate or metal sheet **18**, I not only coat the inner side of the metal with a suitable glue or adhesive but cause the adhesive to run into and coat the walls of the holes **22**, as shown in Fig. 6. Thus when the plate is finished the plastic that does penetrate the holes of sheet **20**, will be glued and held therein as shown in Fig. 9. This feature is most important. When a laminated plate is so formed, the plastic and metal sheet will not separate even under severe usage.

In the drawings I have shown the various laminations of considerable thickness, but this is only illustrative and enlarged for purposes of identification. The thermoplastic sheet should be approximately fifteen thousandths to twenty thousands of one inch.

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 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 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 may be 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.

Figure 8 shows a flat mold press **24** having the limiting stops **26**. Fig. 9 is a curved mold press **30** also having limiting stops **26**. Before press molding the unit is subjected to any suitable heat means **32** to make the plastic pliable. Also by penetrating the holes in the plate **18**, the plate **18** is greatly strengthened and is also almost impossible of bending without breaking it. This is most important and particularly in curved printing plates.

Some changes may be made in my method of and means for producing 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 certain depressions of said shell, applying adhesive to the thinly backed shell, placing a sheet of plastic resin material on the adhesive-coated shell back, placing a sheet of perforated light metal on the free side of said plastic 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 plastic material will compensate for irregularities in the areas of the plate by passing into certain of the perforations of the metal plate without affecting the remainder of the sheet of plastic material, the total area of said perforations being effective when the sheet is compressed in said press to receive any surplus of plastic material but insufficient to weaken the structure of the plate, the entrance of said resin material into said perforations forming an additional bonding means for securing the resin material and metal sheets together.

2. The method of making printing plates, comprising, the taking of a metallic printing shell, applying adhesive to the back of the printing shell, placing a sheet of resin plastic material on the adhesive-coated printing shell, placing a sheet of perforated light metal on the free side of said resin material with an adhesive therebetween, heating the assembled plate and compressing the assembled plate in a press, whereby when said assembled and heated plate is compressed, the resin material will compensate for irregularities in the areas of the plate by passing into certain of the perforations of the metal plate without affecting the remainder of the sheet of resin material, the total area of said perforations being effective when the sheet is compressed in said press to receive any surplus of plastic material but insufficient to weaken the structure of the plate, the entrance of said resin material

into said perforations forming an additional bonding means for securing the resin material and metal sheets together.

References Cited in the file of this patent

UNITED STATES PATENTS

286,821	Hoe	Oct. 16, 1883
1,803,548	Drake	May 5, 1931
2,114,288	Davis	Apr. 19, 1938
2,133,981	Frazier	Oct. 25, 1938
2,149,732	Groff	Mar. 7, 1939
2,352,518	Cochran	June 27, 1944
2,355,949	Boutwell	Aug. 15, 1944
2,403,077	Hershberger	July 2, 1946
2,558,269	Reilly	June 26, 1951
2,581,718	Schaffert et al.	Jan. 8, 1952
2,632,722	Libberton	Mar. 24, 1953

FOREIGN PATENTS

17,809	Australia	of 1929