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H. L. BISHOP

3,031,960

METHOD OF MANUFACTURING ELECTROTYPE PLATES

Filed May 23, 1960

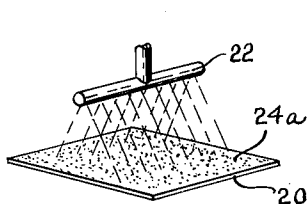


FIG. 1

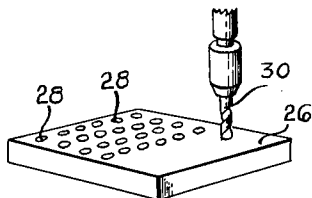


FIG. 2

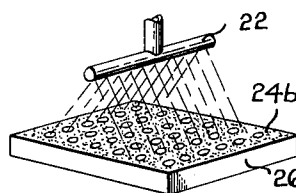


FIG. 3

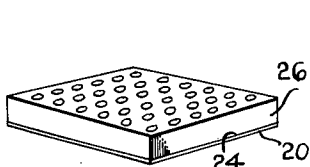


FIG. 4

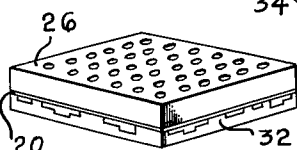


FIG. 5

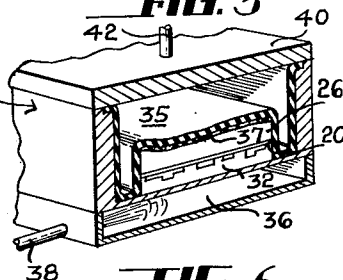


FIG. 6

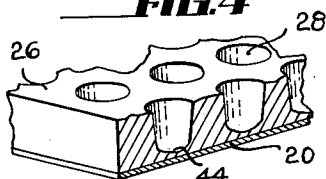


FIG. 7

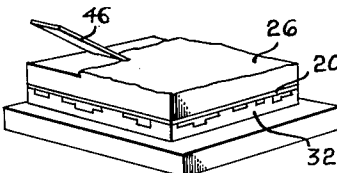


FIG. 8

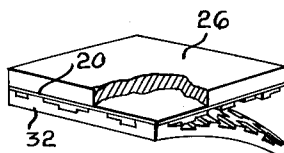


FIG. 9

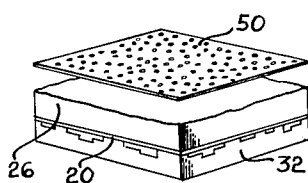


FIG. 10

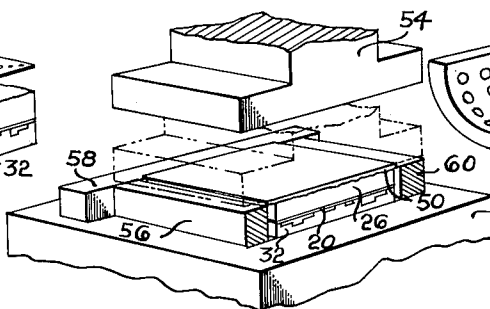


FIG. 11

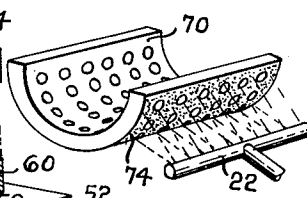


FIG. 12

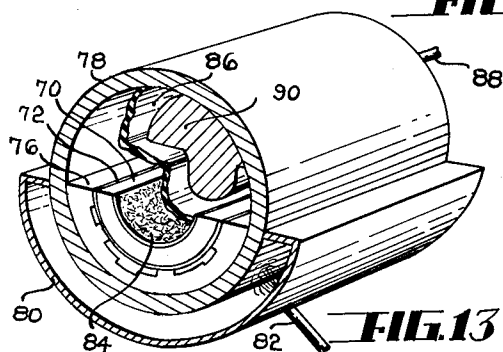


FIG. 13

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METHOD OF MANUFACTURING ELECTROTYPE PLATES

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West Carrollton, Ohio, a corporation of Ohio
Filed May 23, 1960, Ser. No. 30,984
10 Claims. (Cl. 101-401.1)

This invention relates to a method of manufacturing electrotpe plates and more particularly to a method for securing a plastic backing layer to the rear surface of an electrotpe shell. However, the invention is not necessarily so limited.

This application is a continuation in part of my copending application, Serial No. 833,850, filed August 14, 1959, for Method of Manufacturing Electrotpe Plates.

Conventional electrotpe plates comprise a copper image bearing electrotpe shell having a lead supporting layer cast to the back side thereof. The electrotpe shell with the lead backing may be flat or it may be curved to match the contour of a printing cylinder. Due to the low strength characteristics of the lead backing layer, it is difficult to secure these electrotpe plates firmly to a printing cylinder. This problem is intensified when the cylinder is set into rotary motion such that the lead electrotpe plate experiences a centrifugal force tending to throw the plate off the printing cylinder. The lead pulls away from its supporting clamps with comparative ease under the influence of this centrifugal force. The susceptibility of lead backed electrotpe plates for pulling away from printing cylinders presents one serious disadvantage to the use of the lead backing layers in these plates.

Another important problem encountered in lead backed electrotpe plates arises from the formation of gas pockets in the lead backing adjacent the printing shell. These gas pockets are attributable to various causes. Perhaps the most important cause resides in the intagliated nature of the electrotpe shell. Thus, the shell contains numerous small depressions corresponding to the image carried by the shell. When molten lead is poured onto the back side of the shell the air in these depressions is trapped and a gas pocket or void which prevents intimate contact between the lead and the metal of the shell is formed.

These gas pockets weaken the electrotpe plate since there is no support for the printing shell wherever there is a gas pocket. When such electrotpe plates are subjected to repeated pressure, as in a printing press, the electrotpe shell eventually weakens and isolated areas of the shell collapse into the gas pockets.

In my United States Patent No. 2,580,783, issued January 1, 1952, for a Preliminary Finishing Machine, an apparatus which minimizes the problems associated with gas pockets is disclosed. With this apparatus, localized pressure is applied to the lead backing of the electrotpe plate so as to press out the gas pockets. Of course, use of apparatus such as this necessarily increases the cost of the electrotpe plates. This means that the disadvantages arising from the presence of gas pockets cannot be entirely overcome even with apparatus of this sort.

Other disadvantages to the use of a lead backing arise from the necessity of melting the lead for application to the printing shell, the formation of voids and blow holes in the lead backing layer, and, in general, the cumbersome introduced by the mere weight of the electrotpe plates.

These disadvantages have induced the printing industry to seek a substitute for the lead backing layer for electrotpe plates. Plastic is an attractive substitute due to its light weight. However, previous efforts to utilize a

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plastic backing layer have met with little success. The chief reason for this lack of success has been that techniques for laminating plastics to metals in such a manner that a firm bond is obtained without the formation of undesirable gas pockets at the interface between the plastic and the metal have been wanting. With plastics the problem of gas pocket formation is particularly acute for the reason that an adhesive may be used between the electrotpe shell and the plastic backing. When heat is applied to the adhesive, volatile matter is released and this merely adds to the accumulation of gaseous matter trapped between the plastic backing and the adhesive layer.

Where gas pockets are found in a plastic backed electrotpe plate, the problems are substantially the same as with a lead backed electrotpe plate. Thus, wherever there is a gas pocket, the printing shell is unsupported and these unsupported portions are susceptible to collapse when the shell is placed in use. Of course, with plastic backed plates the gas pockets are not so easily eliminated as with lead backed electrotpe plates. In other words, lead is a comparatively malleable material and can be pressed into the gas pockets with relative ease. On the other hand, plastic has a considerable resiliency and cannot be easily pressed into the gas pockets.

Successful techniques for overcoming these undesirable effects are disclosed in my copending application, Serial No. 833,850, filed August 14, 1959, for a Method of Manufacturing Electrotpe Plates. This application discloses a method wherein a plastic backing layer is perforated at spaced intervals with holes passing from one side to the other of the plate. When this backing layer is applied to the rear surface of an electrotpe shell with the aid of an adhesive and through the application of heat and pressure, the perforations in the backing layer permit gases released by the adhesive to escape to the atmosphere. The result is that the formation of undesirable gas pockets at the interface between the plastic and the electrotpe shell are eliminated. The present application constitutes a more comprehensive description of this method and includes improvements thereof.

An object of the present invention is to provide a process for laminating a plastic to a metal surface with the application of heat and pressure without the formation of objectionable gas pockets at the metal-plastic interface.

Another object of this invention is to provide a method of adhering a plastic layer to another surface with the use of an intermediate adhesive layer and with the application of heat and pressure wherein means is provided for the escape of gases released in the adhesive layer.

Another object of this invention is the provision of a method for securing a plastic layer to the rear side of an image bearing electrotpe shell using an intermediate adhesive layer, the method involving the application of heat and pressure and including the provision of passages in the plastic layer for the escape of gases formed adjacent the rear surface of the electrotpe shell.

A further object of this invention is the provision of a method for securing a plastic layer to the rear side of an image bearing electrotpe shell with the aid of an adhesive material, the method involving the application of heat to soften the plastic layer, the heating being accompanied by a release of volatile matter from the adhesive layer and/or plastic layer, the provision of passages in the plastic layer which provide an escape for the released volatile matter, and the application of pressure to the plastic layer sufficient to cause the passages in the plastic to fill in and disappear such that the plastic backing layer

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ultimately provides a uniform support for the electrotype shell.

Still another object of this invention is to provide means for producing a plastic backed electrotype plate of precise thickness, the precision being achieved without the usual shaving operation.

Other objects and advantages reside in the construction of parts, combinations thereof, the method of manufacture and the mode of operation as will become more apparent from the following description.

In the drawing, FIGURE 1 is a perspective view illustrating one step of the process.

FIGURE 2 is a perspective view illustrating a second step of the process.

FIGURE 3 is a perspective view illustrating a third step of the process.

FIGURE 4 is a perspective view illustrating a fourth step of the process.

FIGURE 5 is a perspective view illustrating a fifth step of the process.

FIGURE 6 is a perspective view with parts shown in section illustrating apparatus for carrying out a sixth step of the process.

FIGURE 7 is a fragmentary perspective view with parts shown in section illustrating the condition of the electrotype plate at an intermediate stage of the present process.

FIGURE 8 is a perspective view illustrating a seventh step of the present process.

FIGURE 9 is a perspective view with parts shown in section illustrating an electrotype plate having a plastic backing layer adhered thereto.

FIGURE 10 is a perspective view illustrating one step of a process for building the plastic backed electrotype plate to precise dimensions.

FIGURE 11 is a perspective view with parts shown in section illustrating two positions of an apparatus for performing a second step of the process for building an electrotype plate to precise dimensions.

FIGURE 12 is a perspective view illustrating one step of a modification of the present process.

FIGURE 13 is a perspective view with parts shown in section illustrating apparatus for carrying out another step of the modification.

Referring to the drawing in greater detail, FIGURE 1 illustrates an intagliated electrotype shell 20 which has been prepared in the conventional manner by the electrolytic deposition of copper. As is the custom in the manufacture of lead-backed electrotype plates, the shell may have a thickness which is in the range of 10 to 14 thousandths of an inch. Thus, the present invention may be practiced without change in the well established procedures for making electrotype shells. It is found, however, that the present invention may also be practiced with electrotype shells having a thickness smaller than that ordinarily used for lead-backed electrotype plates. That is, the support provided by the plastic backing of the present invention, particularly when all gas pockets have been eliminated as will be described, is sufficient that the thickness of the metallic electrotype shell may be reduced. As a result, the present invention may be practiced with electrotype shells having a thickness as low as 5 thousandths of an inch.

Preferably, the shell has a thin coating of nickel or chrome or the like on the rear surface thereof as disclosed in copending application, Serial No. 30,849, filed of even date herewith by Earl E. Stansell, for an Electrotype Plate and Method for Making Same. This thin coating serves as a protective covering which acts to retard oxidation at the rear surface of the electrotype shell, thus facilitating good adhesion.

The shell 20 is prepared for storage and eventual receipt of a plastic backing layer by application of an adhesive. This adhesive may be a solvent solution of a thermoplastic material, or a thermosetting plastic mate-

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rial, or a combination of the two. The most important prerequisite of the adhesive is that it will adhere to the rear side of the electrotype shell and will also adhere to the plastic backing layer which is to be applied over the adhesive. As one example, the adhesive may be applied in the form of a thin layer 24a by means of a spray device 22 such as illustrated schematically in FIGURE 1. As an alternative, the adhesive layer may be prepared in separate self-supporting sheets of uniform thickness which eventually are sandwiched between a plastic backing layer and the electrotype shell in the practice of this invention.

FIGURE 2 illustrates the preparation of a plastic backing layer for adhesion to the electrotype shell of FIGURE 1. In this operation a thermoplastic plate 26 is drilled with a conventional drill 30 to provide holes 28 therein at spaced intervals. While a drilling operation is illustrated, it is to be understood that punching or other suitable means may be employed to produce the holes 28. For a thermoplastic plate approximately 1/4" thick it is found that holes about 3/32" in diameter drilled in an orderly array at 1/4" centers suffice for the intended purposes, as will be discussed in greater detail in the following.

After the holes 28 have been drilled into the plate 26, a layer 24b of adhesive is applied to one side of the plate by means of the spray device 22, as illustrated schematically in FIGURE 3. Next, the plate 26 is placed in contact with the rear surface of the electrotype shell 20. The resultant assembly is illustrated in FIGURE 4, with the adhesive layers 24a and 24b being illustrated as a single layer 24.

In the next step of the present process, a make-ready mat 32 is placed in contact with the front surface of the electrotype shell. This make-ready mat, which is disclosed in greater detail in my United States Patent No. 2,256,921 issued September 23, 1941, for Make-Ready, is provided with an image in relief corresponding to the image of the electrotype shell. In preparing the make-ready mat 32, the highlight areas of the image are elevated and the dark areas of the image are depressed. The make-ready mat is substantially a mirror image of the electrotype shell and is carefully registered therewith. FIGURE 5 illustrates the assembly which includes the plastic plate 26, the electrotype shell 20, and the make-ready mat 32. It will be obvious to one skilled in the art that the thickness of the make-ready mat and the other components of the electrotype shell assembly has been greatly exaggerated. This is generally true of all illustrations in the drawing.

The assembly of FIGURE 5 is placed in a mold apparatus schematically illustrated in FIGURE 6. The mold apparatus comprises a generally rectangular housing 34 covered with a plate 40. The plate 40 and the side walls of the housing 34 cooperate to compress the margins of a diaphragm or bladder 35 which partitions the interior of the housing 34 into two chambers. An inlet 42 connects through the plate 40 to the upper side of the diaphragm 35. The under side of the diaphragm 35 cooperates with the base of the housing 34 to form a mold cavity for receiving the assembly, which includes the electrotype shell 20, the plastic plate 26 and the make-ready mat 32. A suitable opening, not shown, is provided at one end of the housing 34 for introduction of the electrotype plate assembly into the mold cavity. A jacket 36 enclosing the base of the housing 34 forms a steam chamber under the housing and an inlet conduit 38 admits steam to this chamber for the purpose of heating the mold apparatus.

The molding operation is as follows. The assembly, including the electrotype shell, the plastic plate 26 and the make-ready mat, is located in a central position on the base of the housing 34 and covered with a porous pad 37, which may be of felt composition, as one example. The housing is large enough with respect to the electrotype plate assembly that a gap will exist between the margins of the electrotype plate assembly and the walls

of the housing, as clearly appears in FIGURE 6. With the electrotype plate assembly in position, air or a suitable gas under pressure is introduced through the inlet 42 to force the diaphragm 35 into intimate contact with the electrotype plate assembly. As illustrated in FIGURE 6, the pressure above the diaphragm causes the diaphragm in cooperation with the base of the housing 34 to fully encapsulate the electrotype plate assembly. This action is described in greater detail in my copending application, Serial No. 733,126, filed May 5, 1958, by Homer L. Bishop for Method and Apparatus for Making Electrotypes. Initially, only moderate pressure is applied to the assembly so that any tendency for the intagliated surface of the copper electrotype shell to distort under the application of pressure transmitted through the initially rigid plastic plate is minimized. With the application of pressure to the diaphragm, steam at a temperature sufficient to soften the plastic is introduced through the inlet 38.

Referring to FIGURE 6, it will be noted that heat from the steam introduced into the jacket 36 will migrate to the plastic plate 26 by passing first through the base of the housing 34, then through the make-ready mat 32, then through the electrotype shell 20 and then into the plastic plate. Under the circumstances, the adhesive layer between the plastic plate and the electrotype shell is the first to come under the influence of the heat. Thus, any volatile matter in the adhesive layer is released before substantial softening of the plastic plate 26 occurs. This volatile matter diffuses freely into the holes 28 in the plastic plate and upwardly into the felt pad 37. Similarly, any gas trapped between the plastic plate and the electrotype shell is expanded upon heating and diffuses into the holes 28 and into the pad 37. It is found that the holes in the plate 26, while serving as passages for the movement of gaseous matter away from the surface of the electrotype shell, also greatly facilitate the migration of heat through the plastic plate.

The lower surface of the plastic plate 26 adjacent the electrotype shell 20 is the first part of the plastic plate which softens. As the plastic at this surface softens to a state of very low viscosity, the plastic flows into and closes off the bottoms of the holes 28 in the plate 26. This condition of closure is illustrated at 44 in FIGURE 7. As a result of this occurrence, the volatile matter released from the adhesive and other gaseous matter initially trapped at the interface between the plastic and the electrotype shell is isolated from the interface and trapped within the holes 28.

After the application of heat has continued for some time such that the plastic plate 26 is softened throughout, the pressure applied to the diaphragm 35 is increased substantially. This causes the softened plastic to press into contact with the intagliated electrotype shell. Since substantially all gaseous matter has been isolated from the interface between the plastic and the electrotype shell, intimate contact between the plastic, the adhesive, and the metal of the electrotype shell is realized over the entire surface of the electrotype shell. Under this application of heat and pressure the holes 28 are substantially eliminated. Thus, the pressure displaces all of the gaseous material in the holes 28 upwardly into the felt pad between the bladder and the plastic plate 26. As a result, the initially perforated plastic plate becomes a substantially solid plastic plate such that the plastic plate provides uniform support along the entire surface area of the electrotype shell.

It is found that this invention may be practiced successfully with vinyl plastic materials as one example. A recommended heating cycle for 0.325" plastic is as follows. Over a period of approximately eight minutes steam is introduced in the jacket 36 to heat the plastic backing layer to a temperature in the range 295°-325° F. During this heating period a pressure of approximately 15 p.s.i. is maintained behind the diaphragm 35. There-

after the pressure is increased to approximately 110 p.s.i. while the temperature of the assembly is maintained at 295°-325° F. Then, a coolant is introduced into the jacket 36 and, when the plastic layer has cooled to a firm, substantially rigid condition, the pressure is released and the electrotype plate removed from the mold apparatus.

FIGURE 8 illustrates an electrotype plate after the plastic backing 26 has been brought into intimate engagement with the rear side of the electrotype shell with the application of heat and pressure. Ordinarily, when the electrotype plate is removed from the mold cavity the rear surface of the backing 26 contains surface irregularities which have been exaggerated in FIGURE 9. These irregularities are due in part to the intagliated image in the electrotype shell and to the make-ready treatment. This surface may be rendered smooth by shaving, as with the knife 46 illustrated schematically in FIGURE 8. In a separate operation the margins of the electrotype plate may be trimmed to precise dimensions.

FIGURE 9 illustrates the completed electrotype plate as the make-ready mat 32 is being peeled from the plate. Up to this point the make-ready mat 32 has served as a protective cover for the printing surface of the electrotype plate. In FIGURE 9 the make-ready treatment impressed on the electrotype plate has been greatly exaggerated.

The sectional detail of FIGURE 9 illustrates that the plastic backing 26 is free of holes in the completed electrotype plate.

FIGURES 10 and 11 illustrate an alternate to the shaving step illustrated in FIGURE 8. In this alternative process a thin layer of perforated plastic material 50 is added to the rear surface of the backing 26 to smoothen this surface and bring the electrotype plate to the desired thickness. Apparatus for accomplishing this purpose is schematically illustrated in FIGURE 11.

This apparatus comprises a pair of flat pressure plates 52 and 54 mounted in a suitable press apparatus. Mounted upon the plate 52 are bearers 56, 58 and 60 which establish a precisely determined minimum separation between the pressure plates. The plate 54 is heated to the softening point of the plastic. FIGURE 11 illustrates an electrotype plate comprising a backing layer 26 and electrotype shell 20 still in contact with a make-ready mat 32 after removal from the molding apparatus of FIGURE 6. At this stage the backing layer 26 is comparatively cool such that its shape is fixed. In this particular electrotype plate assembly the backing 26 is made thinner than ultimately desired so that plastic material may be added to the rear surface thereof. The electrotype plate assembly is positioned between the bearers 56, 58 and 60. The perforated plastic layer 50 is deposited on the rear surface of the backing 26 and then compressed between the pressure plates 52 and 54. As pressure is applied, the heat from the plate 54 softens the layer 50 and perforations in the layer 50 fill in partially. Since the plastic layer 50 has the sole function of adjusting the thickness of the electrotype plate for providing a flat rear surface it is not necessary that the perforations fill in entirely. Small holes remaining in the extreme backside of the electrotype plate do not impair the operation thereof. Excess plastic material from the layer extrudes out the sides of the assembly, the bearers ultimately controlling the final thickness of the electrotype plate. Pressure and heat are applied for a sufficient time to soften the upper portion of the backing plate 26 and thereby cause union with the layer 50. After the electrotype plate has been formed to the desired thickness in the apparatus illustrated in FIGURE 11, it is trimmed at the margins in the usual manner.

It is frequently desired to make curved as opposed to flat electrotype plates, the plates being curved to precisely fit a printing roller. The present process is readily amenable to the production of curved electrotype

plates. FIGURE 13 illustrates a curved and perforated backing layer 70 receiving a layer 74 of adhesive which is applied by means of the spray device 22. The curvature of the backing layer 70 is predetermined so that it will fit a printing roller.

The backing layer 70 is adhered to an electrotype shell with the apparatus illustrated in FIGURE 13. This apparatus comprises a cylindrical housing 78 which has an inner radius corresponding approximately to the radius of the curvature which the completed electrotype plate is to have. The sandwich comprising the plastic plate 70, a curved electrotype shell 72 and a make-ready mat 76 is nested within the housing 78. This sandwich is covered with a felt blanket 84. Pressure is supplied to this sandwich by means of a bladder 86 positioned in the interior of the housing 78. Air pressure is introduced into the bladder 86 through an inlet conduit 88. To reduce the amount of air which must be forced into the bladder during the molding operation, the bladder may be partially filled with a displacer such as the insert 90 illustrated.

Heat is supplied to the housing 78 by any suitable means. As one example, a jacket 80 may be provided along a portion of the periphery of the housing and steam introduced into the interior of the jacket through an inlet 82. In this structure heat will migrate to the plastic backing 70 through the wall of the housing 78, through the make-ready mat 76 and then through the electrotype shell 72. The application of heat and pressure produces an electrotype plate in the same manner as described in connection with a flat electrotype plate of the preferred embodiment. Upon removal from the mold apparatus the curved electrotype plate may be trimmed and shaved in the same manner as the flat electrotype plate. It will occur to those skilled in the art, of course, that apparatus similar to that of FIGURE 11 may be constructed for adding plastic to the rear surface of the curved electrotype plate, to thereby build the plate to precise dimensions.

While the present method has been described with reference to an adhesive material, it will be apparent that where an adhesive is not required for satisfactory adhesion the adhesive may be eliminated. Also, where adhesion is not the desired objective, as where mere duplication of the intagliated image of the electrotype shell is the primary objective, the adhesive may be eliminated to enable separation of the shell from the plastic plate which has been molded thereagainst.

Although the preferred embodiments of the process have been described it will be understood that within the purview of this invention various changes may be made in the form, proportion and ingredients and the combination thereof, which, generally stated, consist in a method capable of carrying out the objects set forth as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. The method of applying a plastic backing layer to an intagliated electrotype shell comprising the steps of providing holes in a plastic plate, said holes extending from one side of the plate to the other, placing the plastic plate adjacent the rear surface of the electrotype shell, interposing an adhesive between the electrotype shell and the plastic plate, progressively softening the plastic plate from the side adjacent the shell to the side opposite the shell, said holes providing passages for the escape of gaseous matter from between the plastic plate and the electrotype shell, and pressing the softened plastic plate against the electrotype shell, the pressure displacing the softened plastic into the holes formed therein to substantially eliminate the holes and forcing the plastic into intimate conforming relation to the electrotype shell.

2. The method of forcing a plastic plate into intimate conforming relation to the surface of an intagliated member comprising the steps of providing holes in a plastic plate, said holes extending from one side to the other of

the plate, placing the plastic plate adjacent the surface of the intagliated member, progressively softening the plastic plate from the side adjacent the intagliated member to the opposite side thereof, the holes therein providing passages for the escape of gaseous matter present between the plastic plate and the intagliated member, and pressing the softened plastic plate against the intagliated member, thereby forcing the plastic into intimate conforming relation to the intagliated member and forcing the plastic into the holes formed therein to substantially eliminate the holes.

3. The method of applying a plastic backing layer to an intagliated electrotype shell comprising the steps of providing holes in a plastic plate, the holes extending from one side of the plate to the other, placing the plastic plate above and in contact with the rear surface of the electrotype shell, interposing an adhesive between the electrotype shell and the plastic plate, applying heat to the electrotype shell such that the heat migrates upwardly through the adhesive to the plastic plate to progressively soften same from the side adjacent the electrotype shell to the opposite side thereof, the holes in the plastic plate providing passages for the escape of gaseous matter from between the plastic plate and the electrotype shell, and pressing the softened plastic plate against the electrotype shell to force the plastic into intimate conforming relation to the electrotype shell and to force the plastic into the holes formed therein, thereby substantially eliminating the holes.

4. The method of applying a plastic backing layer to an intagliated electrotype shell comprising the steps of providing holes in a plastic plate, the holes extending from one side to the other of the plate, placing the plastic plate adjacent the rear surface of the electrotype shell, interposing an adhesive between the electrotype shell and the plastic plate, pressing the plastic plate against the electrotype shell with moderate pressure and applying heat to the electrotype shell such that the heat migrates through the adhesive to the plastic plate to progressively soften same from the side adjacent the electrotype shell to the opposite side thereof, the holes in the plastic plate providing passages for the escape of gaseous matter from between the plastic plate and the electrotype shell, the plastic of said plate adjacent the electrotype shell softening as heat migrates thereto and flowing into the holes in said plate to substantially isolate the gaseous matter in said holes from the adhesive layer and the rear surface of the electrotype shell, and increasing the pressure applied to said plastic plate upon softening thereof to force the plastic into intimate conforming relation to the electrotype shell while simultaneously forcing the plastic into the holes therein to substantially eliminate said holes.

5. The method of forcing a plastic plate into intimate conforming relation with an intagliated member comprising the steps of providing holes in the plastic plate, the holes extending from one side to the other of the plate, placing the plastic plate adjacent one surface of the intagliated member, pressing the plate against the intagliated member and supplying heat to the intagliated member such that the heat migrates from the intagliated member into the plastic plate to progressively soften same from the side adjacent the intagliated member to the opposite side thereof, the holes in the plastic plate providing passages for the escape of gaseous matter from between the plastic plate and the intagliated member, the plastic of said plate adjacent the intagliated member softening upon migration of heat thereto and flowing into said holes to substantially isolate gaseous matter trapped therein from the interface between the plastic plate and the intagliated member, and increasing the pressure applied to said plastic plate upon softening thereof to force the plastic into intimate conforming relation with the intagliated member and simultaneously force the plastic into the holes therein to substantially eliminate said holes.

6. The method of making an electrotype plate comprising the steps of providing a plurality of spaced passages

extending from one side to the other in a plastic layer, placing an intagliated electrotype shell adjacent one surface of the plastic layer, interposing an adhesive material therebetween, heating the plastic layer to progressively soften same from the side adjacent the electrotype shell to the opposite side thereof, said passages releasing gaseous matter from between the plastic layer and the electrotype shell, and compressing the softened plastic layer and the electrotype shell to force the plastic layer into intimate conforming relation to the electrotype shell while simultaneously forcing the plastic to flow into and substantially fill said passages.

7. The method of making an electrotype plate comprising the steps of placing a plastic backing layer adjacent the rear surface of an intagliated electrotype shell, interposing an adhesive material between the backing layer and the electrotype shell, placing a porous blanket on the rear side of the backing layer, providing passages in the backing layer communicating between the porous blanket and the adhesive material, compressing the porous blanket, the backing layer and the electrotype shell together to press the backing layer into intimate contact with the electrotype shell, and applying heat to the backing layer to progressively soften same from the side adjacent the electrotype shell to the opposite side thereof, the plastic layer upon softening flowing into intimate conforming relation to the electrotype shell, said passages permitting gaseous matter located between the plastic backing layer and the electrotype shell to escape into the porous blanket, the pressure applied being sufficient to force the plastic to flow into the holes therein, thereby substantially eliminating the holes.

8. The method of forcing a plastic plate into intimate conforming relation with an intagliated member comprising the steps of providing holes in the plastic plate, the holes extending from one side to the other of the plate, placing the plastic plate adjacent one surface of the intagliated member, pressing the plate against the intagliated member and supplying heat to the intagliated member such that the heat migrates from the intagliated member into the plastic plate to progressively soften same, the holes in the plastic plate providing passages for the escape of gaseous matter from between the plastic plate and the intagliated member, the plastic of said plate adjacent the intagliated member softening upon migration of heat thereto and flowing into said holes to substantially isolate gaseous matter trapped therein from the interface between the plastic plate and the intagliated member, and increasing the pressure applied to said plastic plate upon softening thereof to force the plastic into intimate conforming relation with the intagliated member said increased pressure progressively closing the holes in said plastic plate from the side adjacent said intagliated member to the opposite side thereof.

9. The method of forcing a plastic plate into intimate conforming relation with an intagliated member comprising the steps of providing holes in the plastic plate, the holes extending from one side to the other of the plate, placing the plastic plate adjacent one surface of the in-

tagliated member, covering the rear surface of the plate with a porous pad, inflating a bladder behind the porous pad to press the porous pad and the plastic plate against the intagliated member, supplying heat to the intagliated member such that the heat migrates therefrom into the plastic plate to progressively soften same, the holes in the plastic plate providing passages for the escape of gaseous matter into the porous pad from between the plastic plate and the intagliated member, the plastic of said plate adjacent the intagliated member softening upon migration of heat thereto and flowing into the holes to substantially isolate the gaseous matter therein from the interface between the plastic plate and the intagliated member, and increasing the pressure applied to the plastic plate upon softening thereof to force the plastic into intimate conforming relation with the intagliated member said increased pressure progressively closing the holes in said plastic plate from the side adjacent said intagliated member to the opposite side thereof.

10. The method of applying a plastic backing layer to an intagliated metallic electrotype shell utilizing a fluid pressure biased membrane to press the plastic against the shell comprising the steps of providing holes in a plastic plate, the holes extending from one side of the plate to the other, positioning one side of the plastic plate adjacent the rear surface of said shell with an adhesive therebetween, placing a porous pad adjacent the other side of the plastic plate, positioning the assembly including the porous pad, the plastic plate, and metallic shell between said membrane and a supporting surface, supplying fluid under pressure to said membrane to press the assembly against the supporting surface, said membrane cooperating with said supporting surface to confine said assembly, progressively softening the plastic plate by applying heat thereto through said metallic shell, the heat migrating through the adhesive and the holes in said plastic plate providing an escape path to said porous pad for gases disposed in the region between said plastic plate and said metallic shell and for volatile matter released from said adhesive on heating, and removing the holes from the plastic plate on progressive softening thereof by increasing the pressure supplied to said membrane, said membrane forcing the softened plastic into intimate conforming relation with said metallic shell.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,031,960

May 1, 1962

Homer L. Bishop

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 14, for "ijn" read -- in --; line 52,
for "Patent No. 2,580,783" read -- Patent No. 2,580,723 --;
column 3, line 14, for "proceess" read -- process --.

Signed and sealed this 4th day of December 1962.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

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Commissioner of Patents