My invention relates to a process for the production of relief photos from plane photographs and other pictures, such process being also adapted to production of relief surface effects readily resulting from various pressing steps involving gradual application of plastic masses upon paper or other flexible sheets while confined within suitable predetermined limits, and without requiring the long time period hitherto deemed necessary for attaining permanent and stable results.

It is also very desirable and advantageous that my process does not require heat in its pressing steps beyond that of the normal temperature of the materials used, nor does it make essential the provision of materials of more than ordinary expense.

The use of plastic materials for filling cavities in various sheets provided with die openings, to press a thin sheet of paper such as bristol board applied to the sheet having such opening, for the purpose of forcing the board having an outline thereon of the picture to be produced in relief, into the said opening is known, and has been employed with various modifications for some time, but has been attended with serious disadvantages due to the lack of sufficient flexibility in the paper to be pressed into the die, partly to the slow-hardening of the plastic mass that may be used with such pressure, and to many difficulties arising in the "tooling" operation when paper or any textile sheets are used for the backing support of the plastic. A very useful and practicable feature employed in my process therefore includes the temporary support of the plastic upon a metal sheet very flexible in character, and the later use of the metal sheet for filling with a far speedier plastic material in hardening, for the purpose of making the final die for the finished photo, or other picture.

With these and other objects and advantages in view as will appear as the description proceeds, the various and related steps of my novel process will be illustrated in the accompanying drawings in which:

Figure 1 shows a plane photograph or print of which an improved realistic relief picture is to be made by my special process to be herein described and claimed;

Figure 2 shows an edge view in elevation of a print applied temporarily to a thin lead sheet;

Figure 3 is a perspective view of a compo board layer upon which a tissue sheet or other thin sheet is applied with carbon material between, as in a sheet, for manually copying the outlines of the photo before outlined thereon, upon the compo board;

Figure 4 shows an edge view of the lead and print held between cardboard layers having cut-out openings therein, the said layers being here shown as transverse sections on a plane passing through the openings;

Figure 5 shows the superposed layers of cut-out cardboard of Fig. 4 with the lead and print or photo sheets intermediate the cut-out boards, there being a quantity of modeling clay which may be a material used by artists called plasteline, filled-in through the opening of one layer and resting upon the outer surface of the lead sheet, and about to be introduced between the jaws of a press;

Figure 6 shows a transverse section of the layers similar to those of Fig. 5, but showing the position of portions after such pressing operation, the lead and photo layers showing downwardly-bulging effects of the plastic pressure thereon while in the press;

Figure 7 is further transverse section of the lead and photo layers removed from the press, the cut-out boards removed, the pliable plastic mass remaining in the concave cavity in the lead surface, and a smooth board layer applied to the plastic and lead surface to render a support while the tooling operation by a spatula or similar tool is accomplished by pressure upon the print or photo surface, as the pliable plastic mass underneath the lead may yield to the impression of such pressure above the lead and photo.

Figure 8 shows a view similar to that indicated in Fig. 7, but with a cut-out board applied to the edges of the photo surface on the convex side of the latter, and the plastic mass removed from the cavity in the lead sheet to produce a die surface thereon;

Figure 9 is a transverse section of the lead and photo sheets supported as in Fig. 8, the concavity in the lead surface being filled with a hardening plastic such as plaster of Paris, and a smooth wood frame applied over such filling and outlined edges of the pliable layers;

Figure 10 shows a section of the layers in a horizontal plane, the convex surfaces of the lead and photo layers facing upward, the upper cut-board having been supplanted by a rectangular wood frame of slender end and side strips secured together at their ends and providing an opening therein somewhat larger in outline than the area of the openings in the lead and photo.
sheets, and said frame being filled with plaster of Paris even with the frame surface.

Figure 11 is a transverse section of the cast after the upper layer of plaster has hardened, and the frame removed, the view showing such cast reversed;

Figure 12 is a perspective view of a cut-out board layer having a print or photo applied thereto;

Figure 13 shows diagrammatically the plaster cast or mould as the lower layer, and a print or pliable photo sheet attached to the lower surface of a cut-out board as in Fig. 12, as the upper or superposed composite layer, the opening in the cut-out board accurately aligning with the cavity in the plaster cast, the photo sheet having smooth and level surfaces; and opening filled with molding composition such as plastelene, and prepared for the press;

Figure 14 is a transverse section of the photo and board layers after pressing, and

Figure 15 shows the finished relief photograph.

My process is used to produce realistic relief photos from a photograph or other picture which may be a print or other copy such as the level surface portrayed 5 upon the sheet 6 in Fig. 1, and comprises applying the picture sheet to a thin lead sheet 7, and applying a print of the picture 5 upon a layer of compound board 8 with an intermediate carbon sheet 9, to produce an outline of the picture upon the surface of the board. If it is desired to use a thin tissue sheet for such copying, the latter may be applied to the picture 5 and outlined by pencil on the tissue as is well-known.

One or more layers of board 8 may be superposed in a careful cutting operation by a sharp tool following such outline on one layer, may produce a cut-out center opening having an exact outline corresponding to the pencilled outline on one layer. A number of these so-called cut-out boards 10 will ordinarily be used in the process. Two of such boards are shown in Fig. 4 enclosing the print and lead sheets, and these combined layers are shown in horizontal position in Fig. 5, as they are about to be inserted between the jaws 11 of a press, after a pliable composition which may be modeling clay, putty material as known as plastelene and well understood in the art, is applied upon the exposed surface of the lead and confined within the opening 12 of the uppermost board 10.

The plastic composition shown in Fig. 5 is now designated by the numeral 13 and will be a quantity in excess of that required to fill the opening 12, and the pressure exerted thereon by said jaws force the lead and print sheets downward in the area of the outline to produce convex surfaces on the lower side which will remain in these sheets when relieved from the pressure of said jaws 11. While both said sheets are bulged into the empty opening 12 in the lower board, the lead sheet protects the print sheet 6 from fracture.

65 The various layers and sheets being now taken from the press, the boards 10 are removed while the sheets 6, 7 and plastic material 13 are conveniently supported in their pressed position, and a smooth level surface board 15 is temporarily applied to the plastic side of the lead sheet 1, while the “tooling” or so-called modeling operation is performed, by a spatula or other artists tool or sculptors’ tools here designated as 16 whereby pressure is applied to the photo surface of the lead sheet while the pliable lead will yield thereto somewhat, though partly supported by the plastelene 13 on the opposite surface, thus enabling very skilful effects to be produced in the print or photo 6.

At this point in the process, it is advantageous to apply a cut-out board 18 on the outer border edges of the sheet 6 as a support while the smooth board 15 is removed, and the plastic mass 13 is removed by “scraping-out” the latter from the cavity in the lead 7. This now permits filling the latter cavity with a hardening material such as plaster of Paris or similar plastic, and covering this surface over the plaster with the smooth board 15. The assembly is now supported suitably in a horizontal position with the board 15 down, and a plaster cast 16 is made of the convex portion of the photo sheet 6 which is filled-in over the photo surface but within the area of the opening 12 of the board 10 or an enlarged opening (not shown) in a more slender frame 17 which may be of wood and may here take the place of the board 10, as will be understood.

It will now be evident that the illustration of Fig. 10 presents two parallel layers of hardened plaster with the lead and print sheets 6 and 7 between, so that the combined assembly may be separated, leaving the lead and print sheets supported on the board 15, while the plaster cast 18 with its frame or cut board 10 may be lifted off as a mould shown in Fig. 11.

The plaster cast 18 has now the cavity 20 which is an exact die duplicating the picture 5 in relief and after manual treatment without injury to the print sheet used. The lead sheet 7 has borne the strain of molding the surface so effectively, but is not used after the subsequent separation contemplated here-in-after in Fig. 10.

To provide the finished product, the cast 18 is supported horizontally, while a print attached to a cut board 10, as shown in Fig. 12, is applied over the cast as shown in Fig. 13, the opening in the board aligning axially with the die cavity 20 and a plastic material substantially similar to the material 13 used earlier in the process, is filled in upon the print or photo 6 and provided in slight excess, so that pressure in a press, gradually forces the print into the said cavity 20. This forms the print or photo 14 as shown in Fig. 14. The molding material 13 may be readily removed 50 from the print after the pressure step shown in Fig. 13, so that a special plastic composition 25 may be filled into the paper or other print sheet cavity, which plastic hardens readily and quickly, after which the provision of a backing for the photo and such hardened plastic, completes a finished relief product, realistic in its profile and strong by its combined materials to resist frangibility. This is shown in Fig. 15.

It is to be noted that from the pressing step 60 shown in Fig. 5 to the final operation for perfecting the mould cavity 20 as shown in Fig. 10, the print or photo sheet 6 is always protected in the pressure operation from fracture, by the stronger though pliable metal sheet 7; and that 65 when the hardened plaster cast 18 is removed, the plastic and lead sheets are removed together, since the lead sheet after the removal of the cast 18, is then no longer needed.

Having now described my invention and set forth its merits, what I claim, and desire to secure by United States Letters Patent, is:

1. The process of making pictures in relief from plane photographs, comprising the steps of cutting-out the contour of the picture from the
center of a plurality of cardboards, securing one photo print on the surface of one cut board and another print on a thin pliable metal sheet, and superposing cut boards with the metal and print layers therebetween, pressing plastic material such as modeling clay upon the exposed metal surface to force the plastic within the cut-out opening upon the metal and print sheets to cause the latter to bulge out in the opposite opening, applying a smooth support board upon the plastic side and manually tooling the photo surface on the metal to emphasize the relief or sculptured effects, subsequently removing the plastic material from the metal and substituting a hardening plastic and applying a smooth board to the plastic surface of the metal, applying to the opposite surface of the photo print a wood enclosing frame to provide an opening axially aligned with the corresponding metal cavity and filling said opening with a hardening plaster filler to provide a die cast of the picture outline, removing the print and metal sheets from the die, applying the cut board having the photo print secured thereto upon the die cast, forcing pliable plastic material upon the photo print while confined within the opening of the cut board to provide a print die by pressure thereof into the cast die, and filling with a quick-hardening composition the print mould to complete the realistic relief product having a hardened filler.

3. The process of making relief pictures from plane photos or other plane pictures, comprising cutting-out from the center of a plurality of cardboard layers the contour of the picture, securing a photo print upon a thin pliable lead sheet and superposing one of said cut-out boards on each surface border of the print and lead, pressing soft and pliable plastic such as modeling clay upon the exposed lead surface within the outline of the picture to force the plastic and print sheets together into the opening of the opposite cut board, to provide a convex surface in the print through the intermediacy of the lead sheet, delicately pressing the print to accentuate the relief effects of such pressure, removing the pliable plastic from the lead cavity and filling the latter with a plastic which is a hardening plaster, filling the print surface within the cut board outline with a plaster composition to form a plaster cast therein, subsequently removing the lead and its attached print from said plaster cast, forcing a quickly-hardening plastic composition into the said cast or die therein, bearing therein the photo sheet designed to provide the finished relief product, the photo sheet being intermediate the die and plastic, and removing the plaster mould or die, thus leaving the finished product comprising the relief photo sheet filled with said quickly-hardening composition and thereby presenting a realistic relief surface, without fracture.

2. The process of making relief pictures from photos or other plane pictures, comprising cutting-out from the center of a plurality of cardboard boards the contour of the picture, securing one photo print on a thin pliable lead sheet and another print on the surface of one such cut-out board, pressing very pliable plastic material upon the exposed surface of the lead opposite the print to force the lead and print into a supporting cut-out board to bulge the same in the outline of the picture while the lead sheet supports the print against fracture, temporarily applying a smooth backing upon the lead sheet while tooling or sculpturing the print side to emphasize the relief effects, removing the pliable plastic from the lead cavity and substituting therefor a hardening plastic material and applying a smooth board thereto, covering the picture surface with a hardening plastic layer, and removing the cast die here made by the hardening plastic material, applying a cut-out board having the photo print secured thereto upon the die cast product, forcing pliable plastic material upon the photo print while confined within the opening of the cut-out board to provide a print die by pressure thereof into the cast die, and filling the said print die with a quick-hardening plastic composition to complete the realistic relief product having a hardened filler.