M. A. DROITCOUR.

PROCESS OF MAKING PRINTING PLATES.

APPLICATION FILED JUNE 27, 1907.

912,092.

Patented Feb. 9, 1909.

3 SHEETS—SHEET 1.

FIG. 1

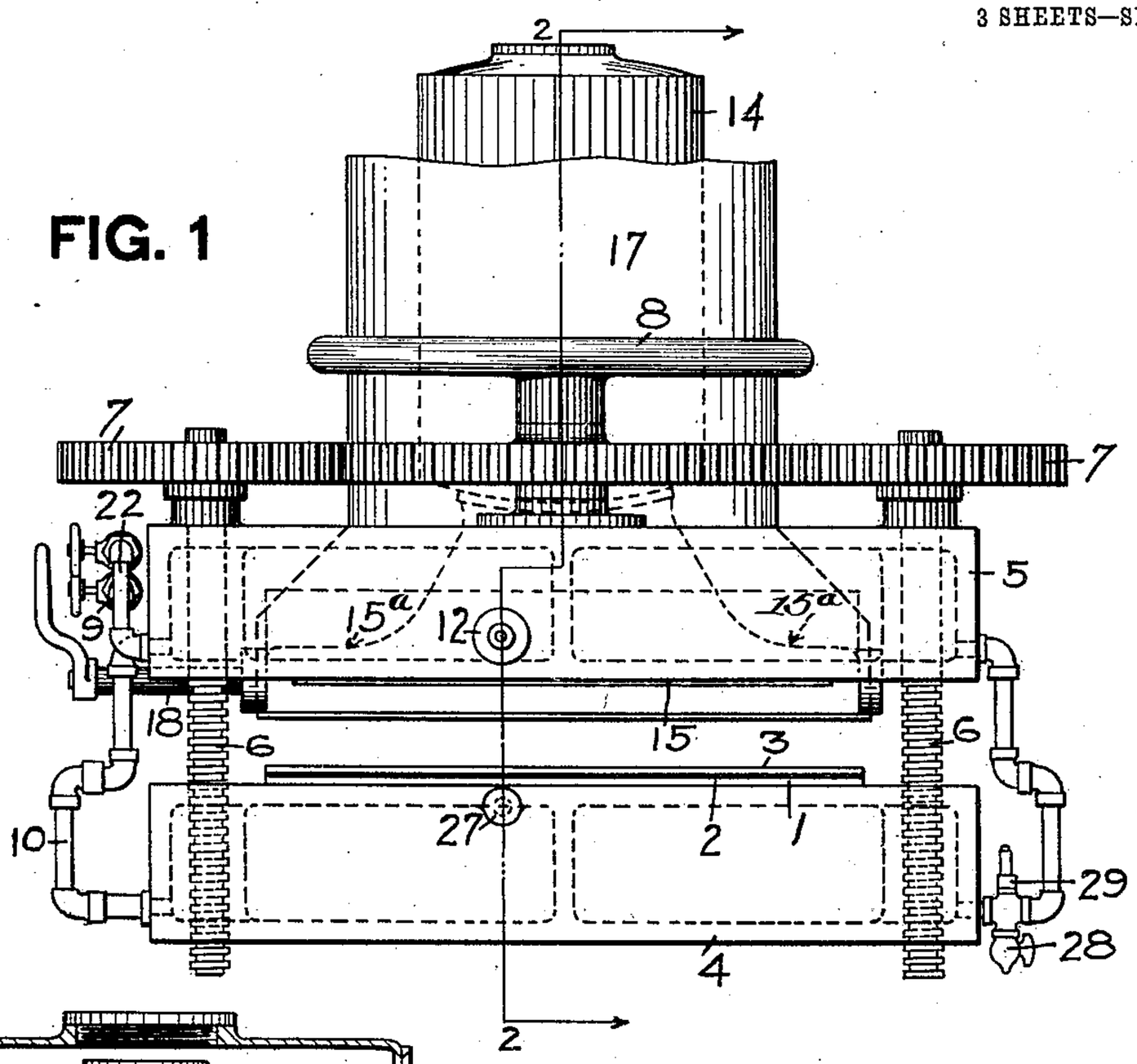
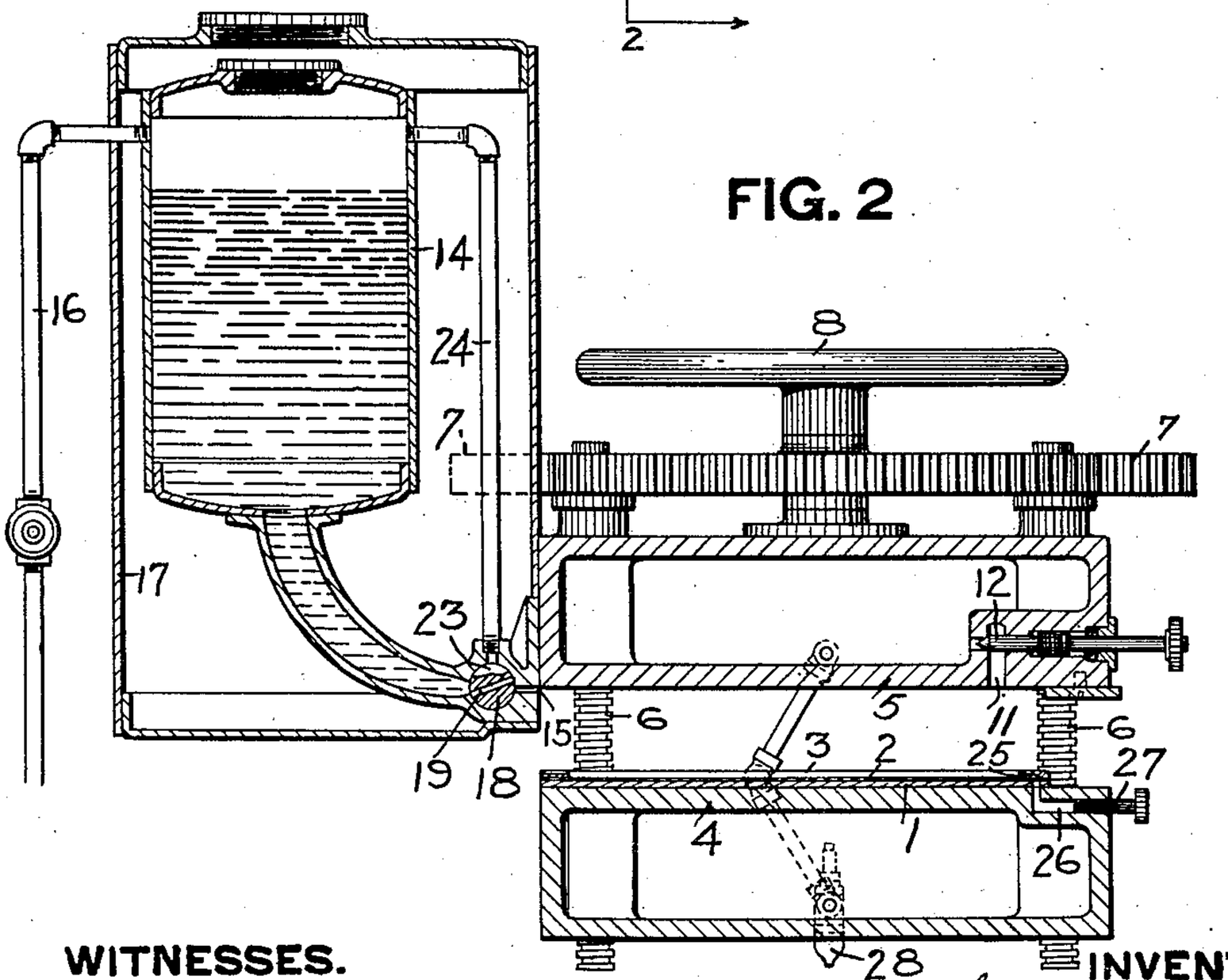


FIG. 2



WITNESSES.

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3 SHEETS—SHEET 2.

FIG. 3

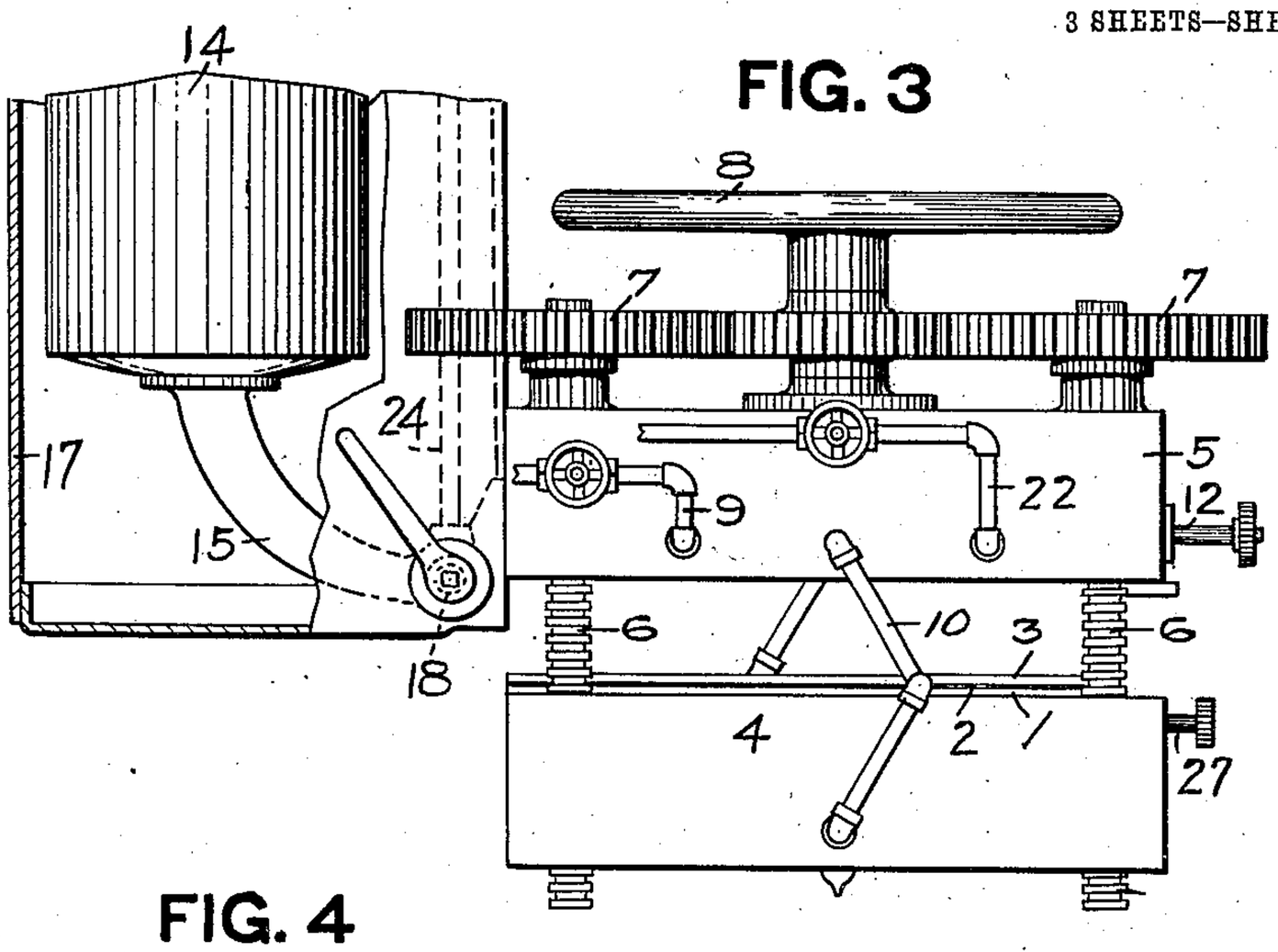


FIG. 4

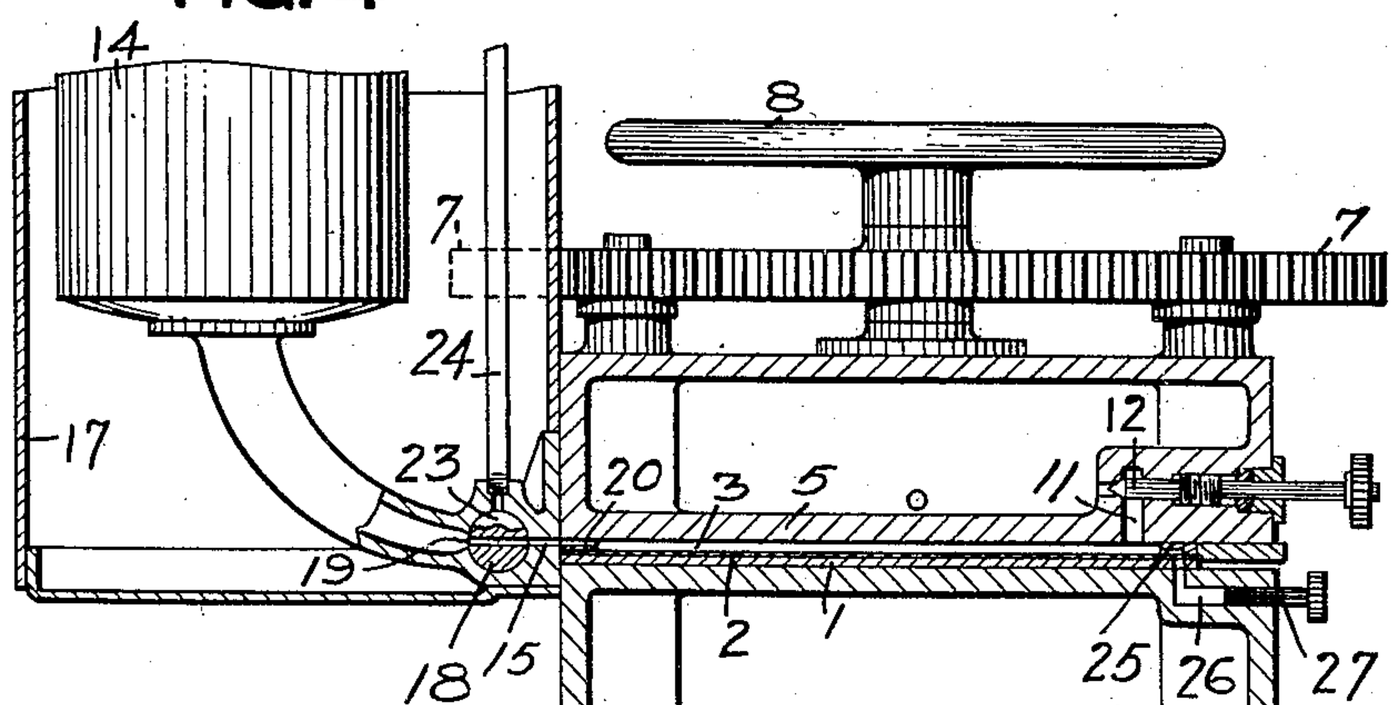


FIG. 6

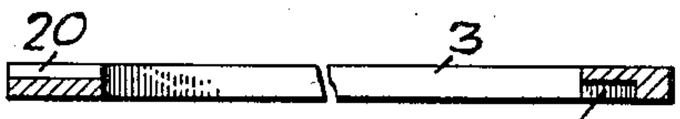
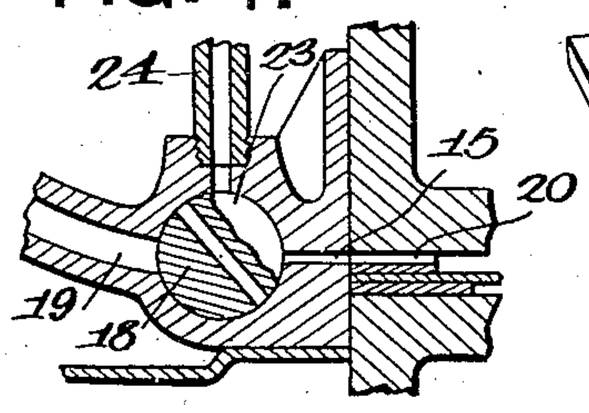


FIG. 4a



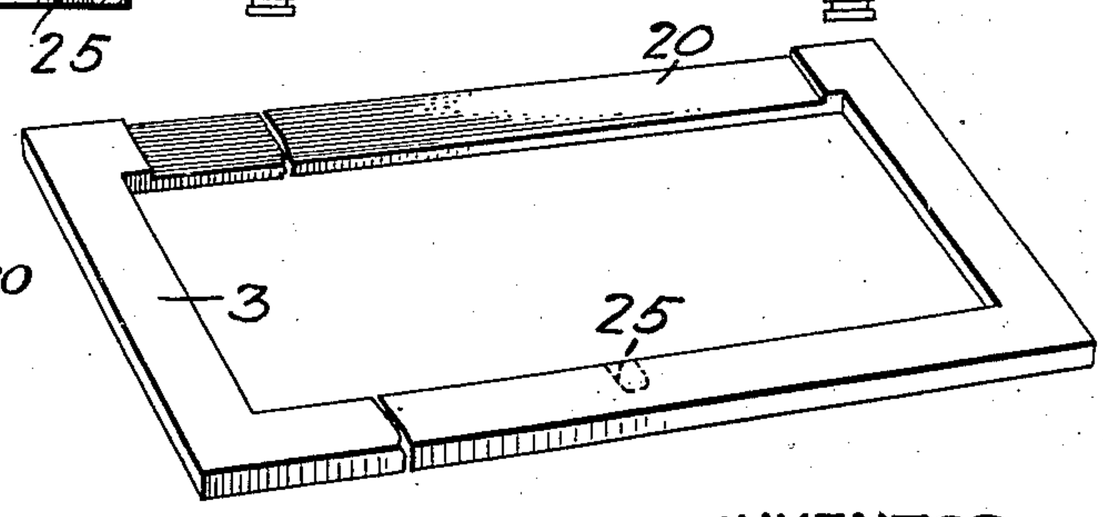


FIG. 5

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APPLICATION FILED JUNE 27, 1907.

912,092. Patented Feb. 9, 1909.

3 SHEETS—SHEET 3.

FIG. 7

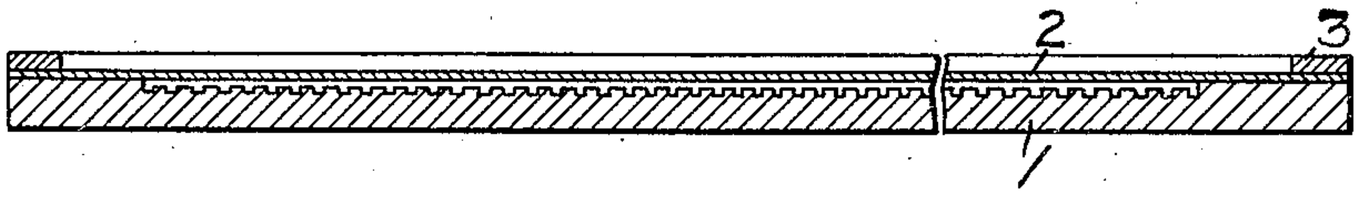


FIG. 8

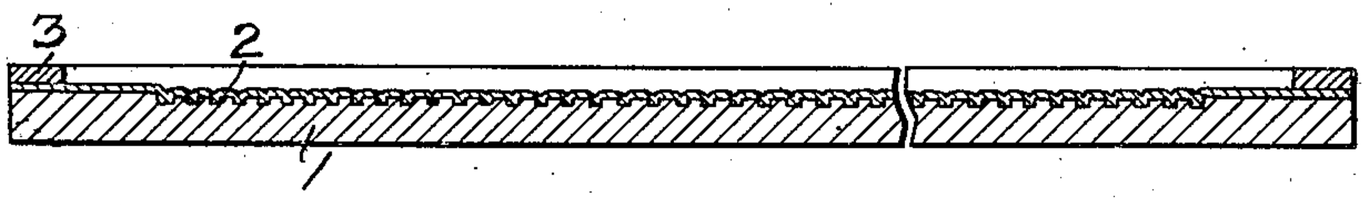


FIG. 9

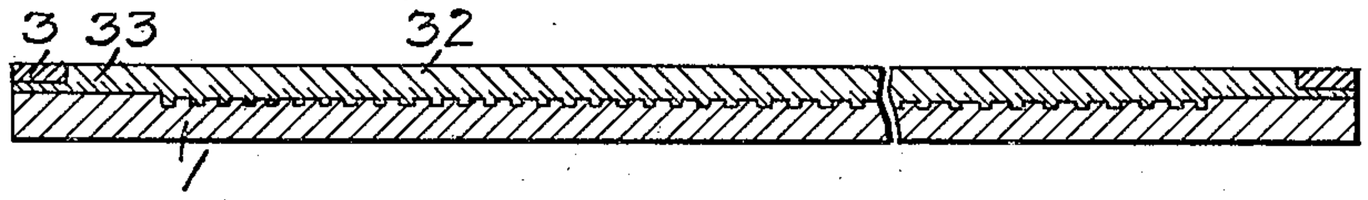


FIG. 10

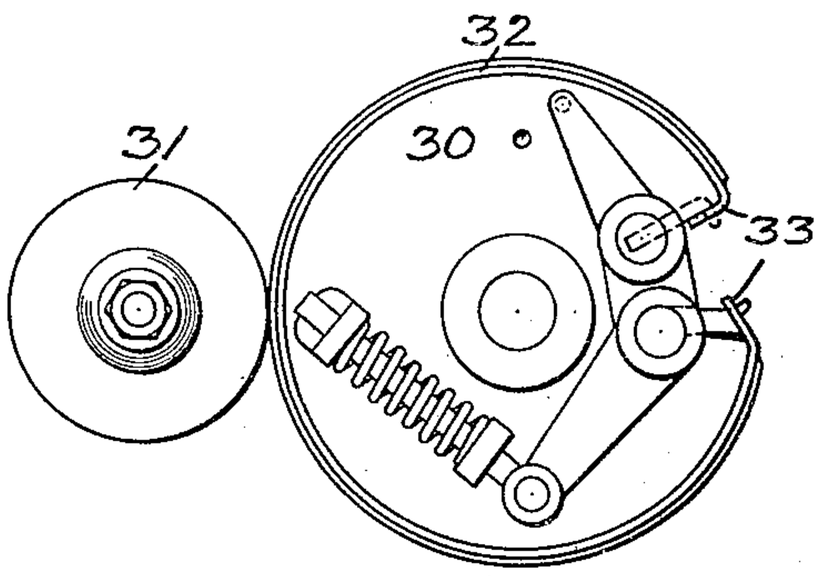
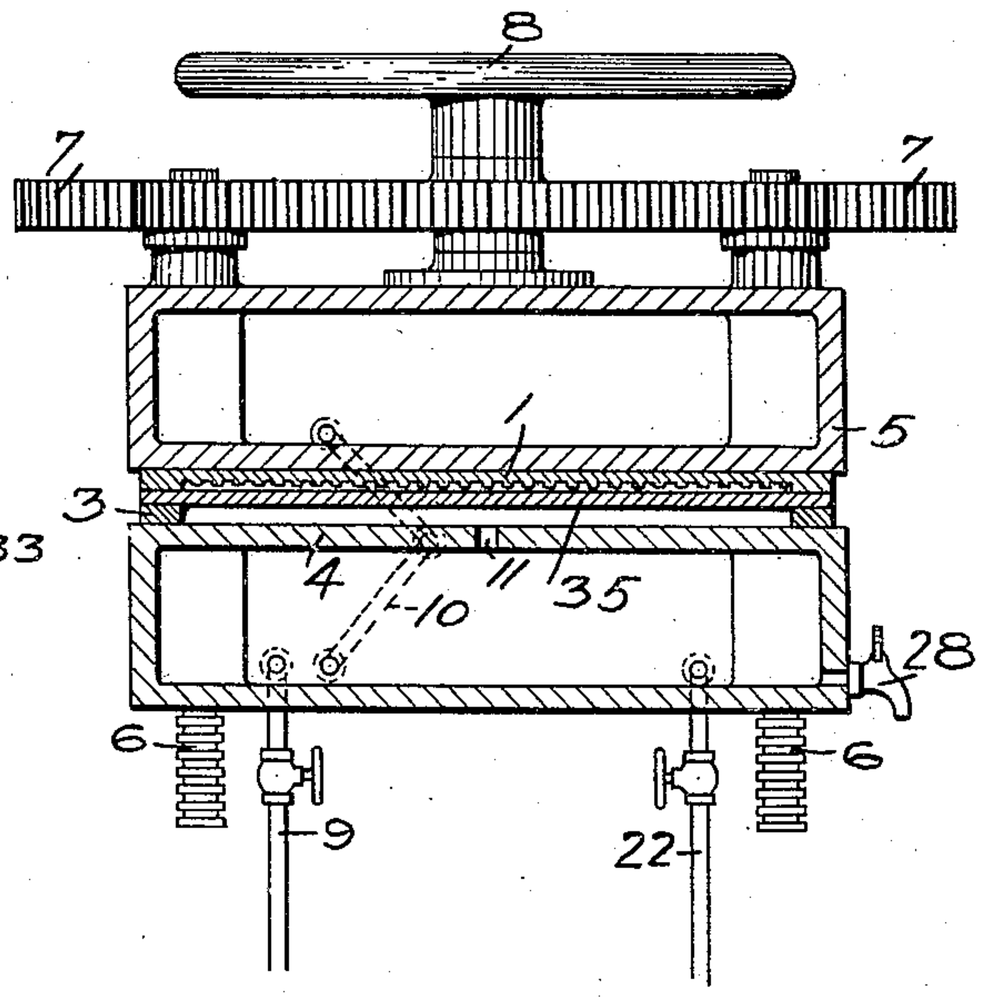


FIG. 11



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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING PRINTING-PLATES.

No. 912,092. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed June 27, 1907. Serial No. 381,067.

To all whom it may concern:

Be it known that I, MICHAEL A. DROITCOUR, resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Processes of Making Printing-Plates; and I do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to a method of making printing plates of plastic material, and more especially to a method of making such plates from celluloid or other material which can be softened by heat.

The object of the invention is to provide a method of making such plates whereby the cost of producing printing plates is greatly reduced over processes now in vogue and also whereby the expensive process of building up the plate, as is done for fine book and magazine work, is dispensed with.

In the printing art there are two processes in use, among others, of making printing plates, one the electro-plate process and the other the stereotype process. In both of these processes the plates are made from metal and the processes are slow and expensive and especially so for fine work where it is found necessary to build up the plates due to the impossibility of getting uniform thickness of plate in order to secure a uniform impression over the entire page.

My process is intended to take the place of the ordinary electro-plate or stereotype processes and its object is to greatly simplify, expedite and cheapen the process of making the printing plates, and especially to dispense with the slow and expensive work of building up the plates for fine work.

Generally stated, the process consists in forming such printing plates from celluloid or other plastic material which is capable of being softened for molding to the matrix and will then harden to maintain this form.

In the preferred practice the process consists in the application of steam directly to a face of the plastic sheet laid against the matrix in order to both soften the sheet and also press it into the depressions in the matrix.

The invention also comprises other process steps, such as the cooling of the plastic sheet, the grinding of the back thereof to get uniform thickness, and for some purposes, the flowing of some suitable plastic material onto the back of the sheet to thicken and strengthen the same.

In the accompanying drawings Figure 1 is a front view of a suitable press adapted for forming the plastic printing plate; Fig. 2 is a vertical section through the same showing the parts preparatory to pressing; Fig. 3 is an end view of the press; Fig. 4 is a vertical section showing the application of the celluloid backing; Fig. 4^a is a sectional detail showing a different position of the valve; Fig. 5 is a perspective view of the frame used; Fig. 6 is a sectional view of the same; Fig. 7 is a section on an enlarged scale through the matrix, the plastic sheet and frame laid on the same showing the same before the application of the steam; Fig. 8 is a similar view showing these parts after the application of the steam; Fig. 9 is a similar view after the application of the plastic backing material; Fig. 10 is a diagrammatic view illustrating the grinding of the back of the plate; and Fig. 11 is a vertical sectional view through a press showing a modified method.

In carrying out my process any suitable plastic material capable of being softened for molding and afterwards set may be used, but I prefer to use celluloid or similar pyroxylin composition, although if desired hard rubber can take its place. Also I prefer to use steam as the medium for heating the plastic sheet and pressing it down into the matrix but any other suitable fluid medium capable of softening the composition and of exerting pressure against the same will answer the purpose.

For brevity in the detailed description herein I shall refer to celluloid as composing the plastic material and to steam as the medium for softening the same and pressing it into the matrix but I wish it distinctly understood that no limitations are to be imposed upon the terms of the claims hereinafter made by these specific descriptive terms, but that it is intended to include within the scope of these claims any plastic sheet capable of being softened for molding and afterwards setting and to employ any medium capable of softening the sheet and pressing it down into the matrix.

In carrying out my invention I can make use of any suitable apparatus and in Figs. 1 to 4 have shown one form of press suitable for the purpose. I start with a matrix 1 which may be formed in any desired way, such as from paper pulp, sheets of moistened paper, or in fact I may use any of the known methods for forming such matrices from the type form or other matter to be reproduced.

Upon the type face of such matrix I place a sheet 2 of celluloid, or other composition, and then place a frame 3 upon this sheet, said frame resting upon the edges thereof, as shown in Fig. 7. These assembled parts are then placed in the press which, as shown, comprises a bottom platen 4 and a top platen 5 which can be brought tightly together and again separated by suitable means, such as screws 6 provided with gears 7 meshing with a central gear provided with a handle 8 whereby said screws can be rotated in unison. The matrix, celluloid sheet and frame 3 are tightly clamped between the platens of the press, the platens of the press being preferably heated, such as by being made hollow and providing one thereof with a steam inlet 9 and connecting the chambers of the two platens by means of a tube or flexible pipe 10. Steam is then admitted between the top platen 5 and the top or back face of the celluloid sheet 2, such as by admitting it from the chamber in the top platen through an opening 11 which is controlled by a suitable valve 12. The steam introduced between the top platen and the celluloid sheet is confined by the frame 3 on the edges of said sheet. The steam acts in a two-fold capacity, first, by its heat to soften the celluloid, and second, by its pressure to press the softened celluloid down into the depressions in the matrix. The consequence is that the lower face of the celluloid sheet is given a form which is an exact reverse of the matrix. Fig. 8 shows the celluloid sheet pressed into the matrix. Obviously any fluid medium which would act to soften the sheet 3 and to act by pressure to press it down into the matrix would serve equally as well as steam, for instance, a heated gas under pressure.

Where time is not an essential element, and especially for fine screen work, half tone engravings, etc., the celluloid sheet 3 will be very thin, say one one-hundredth or two one-hundredths of an inch in thickness, so as to require only a few seconds for softening and pressing down into the matrix, and will press down into very fine lines in the matrix. When such a thin sheet is used it must be backed to give it sufficient body to resist the pressure of the printing press. I back the same by flowing onto the same while still in the press some plastic material which will form a close adhesion with the sheet. Many forms of plastic material can be used for this purpose, one of them being celluloid which will weld to the thin sheet in the matrix and form practically an integral portion thereof. The celluloid in a softened or semi-liquid condition is contained in a suitable reservoir 14 from which leads a pipe which spreads out, as indicated by the dotted lines 15ª, Fig. 1, into a wide nozzle 15 communicating with the space below the platen 5 and within the frame 3. The celluloid is forced into this space by any suitable means, such as steam pressure applied on top of the celluloid in reservoir 14, as through pipe 16, or by a mechanical plunger acting in said reservoir to force the celluloid into the press. The reservoir 14, nozzle 15 and other parts are inclosed in a steam jacket 17 to keep the celluloid in condition to flow. The nozzle 15 is provided with valve 18 having a passage 19 through which the celluloid flows. The frame 3 has one side reduced, as at 20, to the width of the nozzle 15, to permit the celluloid to enter the space above the sheet 2, in a thin wide stream. When this is accomplished the source of the celluloid is cut off and the plate so formed is cooled, such as, for instance, turning off the steam from the platens 4 and 5 and admitting water into said platens which may be done through a pipe 22. This cools the plate rapidly, causing the celluloid to set. To overcome the effect of shrinkage in cooling and to give a perfect type reproduction, the celluloid is held under pressure while cooling. This is accomplished by providing the valve 18 with a groove 23, so positioned that when the molten celluloid is cut off, as shown in Fig. 4ª, said groove connects a steam pipe 24 with the space back of the celluloid in the press, and this holds the celluloid under pressure while cooling and prevents shrinkage. On the front of the frame 3 is a groove 25 communicating with a vent 26 in the lower platen, said vent being controlled by a valve 27 by means of which it can be determined when the space in the press is entirely filled with celluloid. When the celluloid is cooled the press is opened and the celluloid sheet can be readily removed from the matrix, after which the matrix can, if necessary, be used in making other similar plates. The water and steam in the platens are drained out through the cock 28. A pressure valve 29 is also provided to retain the necessary steam pressure. The plate so produced is liable not to be uniform in thickness at all points and in printing would give different degrees of impression on different parts of the plate. To overcome this and produce uniformity of impression I remove from the back of such plate all of the high parts. This can be done by any suitable apparatus, such as by grinding the same, as shown in Fig. 10. The plate is applied type face against an accurately formed surface, such as a cylinder 30 and the back thereof is subjected to the action of any suitable instrument, such as a grinding wheel 31. The plate, when curved onto the cylinder contacts with the cylinder on all of its type points and consequently when ground down is of uniform thickness between its back and all of its type points, thus insuring uniformity of impression while printing.

In the process of molding, the matrix

forms a thin margin on the sheet, as shown at 33, which serves as a means of attachment to the press cylinder or press platen and prevents printing on the margins. The plate is then trimmed in any suitable way and the edge portions 33 may be punched with holes for attachment to the cylinder of a press. For work not requiring such fine lines, such as for ordinary newspaper work and in which speed in making the plate is especially desirable, the celluloid sheet may be somewhat thicker, such as say from three-thirty-seconds to one-sixteenth of an inch. This requires slightly more time to soften the same but does not require a backing. In this case I prefer to proceed as shown in Fig. 11, the parts being put in the press upside down with the matrix against the top platen and the celluloid sheet 35 below the same. Steam in this case is admitted from the bottom and serves to soften and press the celluloid into the matrix as heretofore described. To hasten the process the sheet may be heated prior to placing it in the press, which may be done in a suitable oven or steam chamber. After pressing, the celluloid plate may be cooled in the manner above described but preferably by admitting water directly in contact with the lower face of the celluloid plate. This is why I place the parts in the press upside down so that the water cannot come in contact with the matrix, as it would cause the latter to swell. After cooling the high spots on the back of the plate are removed in the manner described in connection with Fig. 10.

My method of making plates is very expeditious, as it has been found that an application of steam for a period of five seconds suffices to soften the celluloid and press it fully into the matrix. The backing of the sheet when necessary and the cooling are very quickly performed and the subsequent grinding or equivalent operation is also a rapid operation so that it is possible to turn out printing plates for ordinary newspaper work in considerably less time and with much less expense than under the stereotype or electro-type processes. The removal of the high spots on the back of the plate insures absolute uniform thickness and gives equally as good results in fine magazine and book work as with stereotype or electro type plates in which several days' time of an expert has been consumed in building up to proper thickness. The celluloid presses down into the matrix with such exactness that it has been found possible to reproduce half tone work in fine screens.

What I claim is:

1. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, then applying to the back of said sheet hot fluid under pressure to soften the sheet and simultaneously press the same into the matrix, and then cooling said sheet.

2. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, then applying steam to the back of the sheet to soften the same and simultaneously press it into the matrix, and then cooling said sheet.

3. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of pyroxylin composition, and then applying to the back of said sheet a hot fluid under pressure to soften the sheet and simultaneously press it into the matrix.

4. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of pyroxylin composition, and then applying steam to the back of said sheet to soften the same and simultaneously press the same into the matrix.

5. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, then applying to the back of said sheet a hot fluid under pressure to soften the sheet and simultaneously press the same into the matrix, and thereafter applying a cooling medium to harden the sheet.

6. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, applying to the back of said sheet a hot fluid under pressure to soften the sheet and press the same into the matrix, and holding the same under pressure while cooling.

7. The method of making printing plates, consisting in forming a matrix, pressing into the matrix a sheet of plastic composition by applying fluid pressure directly to the back of said sheet, and applying fluid pressure directly to the back of the printing plate so formed to set the same.

8. The method of making printing plates, consisting in forming a matrix, pressing into the matrix a layer of plastic composition, then flowing onto the back of said layer a plastic backing material, and holding the same under pressure while setting.

9. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, then applying to the back of said sheet a hot fluid under pressure to soften the same and simultaneously press the same into the matrix, and then flowing onto the back of said sheet a plastic backing material.

10. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of pyroxylin composition, then applying to the back of said sheet a hot fluid under pressure to soften the sheet and simultaneously press the same into the matrix, and then flowing onto the back of said sheet a plastic backing material.

11. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of pyroxylin composition, applying to the back of said sheet fluid under pressure to soften the same and simultaneously press the same into the matrix, and then flowing onto the back of said sheet a plastic pyroxylin backing composition.

12. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, applying to the baek of said sheet a hot fluid under pressure to soften the sheet and press it into the matrix, and then removing the surplus material from the back of said sheet.

13. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, applying to the back of said sheet a hot fluid under pressure, and when said sheet has set removing the same from the matrix and placing the same type-face against an accurately formed surface, and then removing the surplus material from the back of said plate.

14. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, applying to the back of said sheet a hot fluid under pressure, applying to the back of said sheet a layer of plastic material, placing said sheet type-face against an accurately formed cylinder, and then removing the surplus material from the back of said plate.

15. The method of making printing plates, consisting in forming a matrix, pressing into the same a sheet of plastic composition, applying to the back of said sheet a layer of plastic backing material, placing said sheet type-face against the surface of an accurately formed cylinder, and then subjecting the back of said sheet while so held to the action of a tool constructed to remove material from said sheet.

16. The method of making printing plates, consisting in forming a matrix, laying on the same a sheet of plastic composition, applying to the back of said sheet a hot fluid under pressure, and when said sheet has set removing the same from the matrix and placing the same type-face against the surface of an accurately formed cylinder, and subjecting the back of said sheet to the action of a tool constructed to remove material from said sheet.

In testimony whereof, I the said MICHAEL A. DROITCOUR have hereunto set my hand.

M. A. DROITCOUR.

Witnesses:

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ROBERT C. TOTTEN.