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 MANUFACTURE OF PRINTING PLATES.
 APPLICATION FILED APR. 18, 1910.

1,009,390.

Patented Nov. 21, 1911.

Fig. 1.

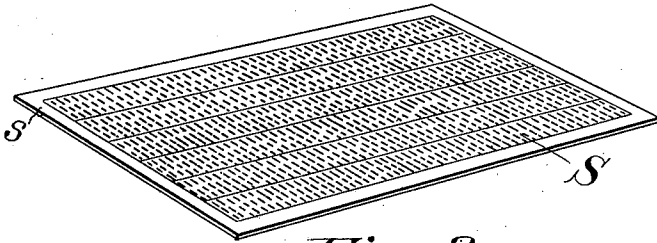


Fig. 3.

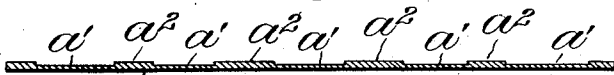


Fig. 4.

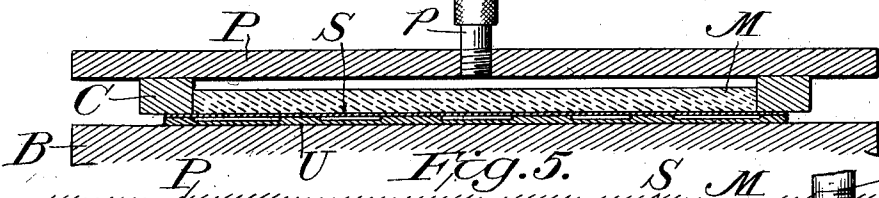


Fig. 5.

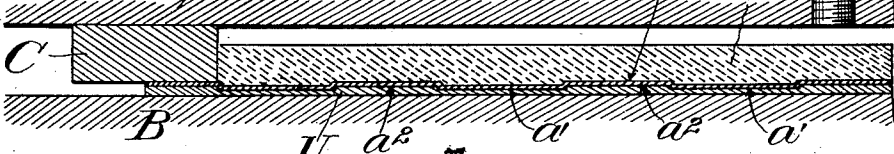


Fig. 6.

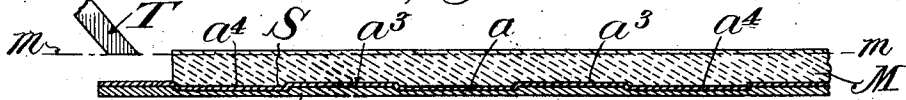


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF PRINTING-PLATES.

1,009,390.

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To all whom it may concern:

Be it known that I, MICHAEL A. DROITCOUR, of Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture of Printing-Plates; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel process or method of producing so-called "made-ready" or "toned" printing plates; and the object of this invention is to produce a perfectly toned printing plate in a very simple but most effective manner, and by means of this process the plate is toned as it is being formed so that when completed it is ready for immediate use and without subsequent distortion of its printing surface will produce impressions having the desired "lights" and "solids" or tones.

In brief my invention consists in making a shell,—such as an electrotype—of copper or other suitable metal from the matrix or printing surface in the ordinary way,—such shell being very thin and flexible; such shell is then placed face downward over a suitable toning member, such as a previously prepared positive underlay placed in register therewith; which underlay is made in any suitable way so as to have projections on its face at the places where it is desired to have depressions or "high lights" in the finished printing surface, and depressions on its face where it is desired to have projections or "solids" in such printing surface. The shell is then subjected to fluid pressure so as to make its face reversely conformed to the opposed "toned" surface of the toning member, and then the shell is backed. Preferably I tone and back the shell by placing the shell and toning member upon a perfectly true plane surface, such as a cast-iron plate; a chase or metal frame is then placed over and rests upon the margins of the shell, so as to hold the same closely in contact with the margins of the positive underlay; then sufficient molten metal, of the usual kind employed to back up the shell, is poured into the chase and upon the shell, to form with the shell a printing plate of the desired thickness; the

shell is then sealed by closing the chase with a suitable metal plate or cover, constructed to form an air-tight joint with the chase, and while the chase, shell and underlay are held closely together and against the bed on which they are supported, compressed air, or other suitable fluid, is admitted into the chase, above the molten metal, under sufficient pressure to force the shell toward the bed at all points where it is not supported by projections on the face of the toning member or underlay; and thus compels the negative face of the shell to conform to the positive face of the underlay, but of course the reverse thereof,—in that the face of the shell will be recessed or depressed where the face of the underlay projects, and vice versa. After the metal is set the chase is removed, and the complete plate—comprising the metal backing and the shell facing—is shaved or planed in the usual way, and preferably while the shell face is still in contact with the underlay, so as to reduce the plate to the desired thickness and give its back a true plane surface; and finally, the plate is separated from the underlay and its margins trimmed and beveled as usual. Such plate is then ready for use without any manipulation or distortion of its printing surface, which is already "toned" in accordance with the underlay, and ready for printing and will produce the desired "lights" and "solids" in the impressions taken therefrom. In making printing plates such as "tint" blocks which require a plane printing surface and uniform pressure in printing, a like process can be used, except that an underlay is unnecessary;—in such cases the shell being first formed is laid face down upon and in contact with the flat surface of the supporting plate or bed; then the chase is placed thereover, and the molten metal introduced and subjected to air pressure as described, so as to force the face of the shell at all points into direct contact with the plane surface of the bed, so that the resultant printing plate will have a true plane surface.

An important feature of the invention is the subjecting of the shell to air, or fluid, pressure, to produce the desired toning of its face, and backing the toned shell to form a plate, without altering in any way its pre-

viously formed printing surface;—and if the same has been toned, as above described, leaving the tones entirely unchanged. By subjecting the molten metal to fluid pressure while confined in the chase, the metal is kept in close contact at all points with the shell while the latter is forced into contact with the underlay or bed at all points with uniform pressure. These desirable results cannot be as successfully accomplished by subjecting the metal in the chase to the action of a plunger because the molten metal is subject to contraction and chill and the pressure would not be uniformly distributed therethrough, while by reason of the flexible air pressure all the distortional effects of shrinkage in the metal will appear at the back of the plate, but the face of the shell will always be held in forcible contact with the underlay or bed by reason of the constant pressure upon the back of the metal, which pressure is uniform at all points, both where the projections are on the underlay as well as where the recesses appear therein. The tendency of the molten metal is to assume a uniform level and thus form a smooth back on the shell—and at the same time any contraction in the metal due to chilling is readily compensated for by the flow of metal itself under pressure in the softer parts thereof before it becomes set.

In the accompanying drawings I have illustrated one method of making a toned printing plate in accordance with this invention.

In the drawings,—Figure 1 is a perspective view of an electrotype-shell preparatory to toning and backing same. Fig. 2 is a longitudinal section through the shell, Fig. 1. Fig. 3 is a section through the positive underlay. Fig. 4 is a sectional view showing the shell, underlay and backing metal in chase, preparatory to applying the air pressure to the backing of the shell. Fig. 5 is a view similar to Fig. 4 showing the effect of the pressure applied to the metal backing of the shell. Fig. 6 shows the formed plate in position for shaving the back thereof. Fig. 7 is an enlarged sectional view of part of a finished plate.

The printing surface of the plate is formed of a metal shell S, which may be produced in any desired manner, as by electrically depositing a thin skin of metal, such as copper, upon a negative matrix corresponding to the printing surface desired. This shell S will of course have minute projections on its face corresponding to the type or printing portions of the surface, and will have corresponding depressions on its under side, but it will nevertheless be approximately plane surfaced on both sides, so that an impression taken therefrom would appear uniform in color and without any

“tones”. This shell however should be formed with a lateral margin *s* around its edges, which may be say one-half inch wide, for a purpose hereinafter explained. In order to produce “tones” or so-called “lights” “high-lights”, “solids”, etc., in the impressions taken from the finished printing plate, it is necessary to vary the height of the printing surface of such plate, making it lower or depressed where “lights” are desired, and making it higher where “solids” are desired. These gradations are practically imperceptible to the eye in the plate itself, but are essential in producing fine work and I produce these tones in the manufacture of the plate as follows: Assuming that it is desired to have portions of the surface of the finished plate raised at the points indicated at *a* in Fig. 2, so as to obtain greater pressure thereon at such points, a positive underlay U is formed in any suitable manner, as by taking a series of impressions from the original type surface upon sheets of paper and building up therefrom a positive underlay in a manner well known to the trade; but such underlay can be formed in any other desired manner, and from other material—it only being essential that the underlay U have depressions *a'* in its face, see Fig. 3, corresponding to the points *a*, *a*, Fig. 2, where the surface of the finished printing plate is to be elevated; and said underlay has projections *a''* on its face where the surface of the finished printing plate is to be depressed. The relative size, depth, height and location of the depressions and projections on the underlay are of course determined by the operator in accordance with the tones which it is desired to have in the impressions taken from the finished plate. The positive face of the underlay U is then placed in register with the negative face of the shell, and both are placed upon a flat surfaced bed B, Fig. 4, with the shell on top of the underlay, the flat type or printing surface of the shell being in contact with the uneven surface of the underlay. A metal chase C of suitable size is then laid upon the margins of the shell so as to press them and the underlying portions of the underlay closely against the surface of the bed B, and form a seal around the shell. The chase is preferably made thicker than the plate to be formed. A sufficient quantity of molten metal M is then poured into the chase to back up the shell and form therewith a printing plate of the desired thickness. Then while the metal is still molten the upper surface of the chase is closed by means of a platen P, which may be the follower of a suitable press, adapted to form an air-tight joint with the top of the chase and also force the latter toward the bed with sufficient pressure to insure an air-tight joint between the bottom of the

chase and the margins of the shell. Then air, or other suitable fluid, is admitted from a suitable reservoir (not shown) by means of a pipe *p* into the air space or chamber 5 formed in the chase under plate *P* and above the metal *M*.—I prefer to use air at a pressure of about 60 pounds. The molten metal naturally assumes its level, Fig. 4, and when the air pressure is applied thereto the shell 10 is uniformly forced toward the bed and against the underlay *U*, and the exterior printing surface of the shell is forced to conform reversely to the uneven surface of the underlay; in other words the negative printing 15 surface of the shell is made to conform with the depressions and projections on the positive surface of the underlay, the surface of the shell of course becoming the reverse of the surface of the underlay, being depressed where the underlay has projections and projecting where the underlay is depressed. The pressure is continued until the metal sets, and then the platen *P* is removed, and the chase withdrawn from the 25 backed shell, and the formed plate—while still applied to the underlay as in Fig. 6—has its rear face smoothed or brought to a plane surface by means of a cutter *T* (Fig. 6), or any other suitable means, by which 30 surplus metal is removed from the back of the plate, as indicated by line *m—m* in Fig. 6, to reduce the plate to the desired thickness, with a uniform plane surfaced back. The underlay *U* is then removed from the 35 face of the plate, but the shell remains a permanent part of the finished plate, which, as shown in Fig. 7, has depressions *a*³ in its face corresponding with the projections *a*² in the underlay. Obviously by properly varying the surface of the underlay any desired tones may be given the printing surface, and while I have described the underlay 40 as if formed of superposed layers of paper it is obvious that the invention does not depend upon the particular structure of the underlay.

It will be seen from the foregoing description that the plate is "toned" as and when 45 made; and all that has to be done after the plate is formed as described is to trim off the unnecessary margins and bevel the edges of the plate, as usual, to enable it to be secured in the press. Care should be taken in such trimming not to injure the 50 toned face of the plate which should not be disturbed after it is formed, and need not be subjected to any subsequent distortion in order to tone it.

In the manner above described the shells 60 are toned simultaneously with the backing thereof, at one operation, which is a great saving of time and produces much finer results for the reason that the thin shell or surface of the printing plate alone has to be 65 toned, and the metal of the backing being

molten at the time of the toning operation, does not have to be stressed or strained at all and is utilized in effecting the toning of the plate by fluid pressure with absolute accuracy and certainty. 70

While I have described the shell as backed with molten metal, any other backing that might be found suitable for such purpose could be employed.

The invention is also useful, as above 75 stated, in making plates with uniform printing surfaces, the use of air or fluid pressure to force and hold the face of the shell firmly against its support during the operation of backing the shell with metal being novel and 80 of great practical value.

Having described my invention what I claim is:

1. The process of forming printing plates, consisting in first making a thin type shell 85 or surface; 2nd superposing said shell upon a toning member; 3rd supplying metal to the back of said shell to form a plate therewith; and finally, subjecting the shell to sufficient air pressure to cause the surface of 90 the shell to conform to the toning member; removing the plate from the press, and reducing its back to a plane surface while its face is applied to the toning member; and finally removing the toning member and 95 trimming the plate.

2. The process of forming printing plates, consisting in first making a thin type shell or surface; 2nd superposing said shell upon 100 a positive underlay; 3rd supplying sufficient molten metal to the back of said shell to form a plate therewith; 4th subjecting the shell to sufficient pressure to cause the surface of the shell to conform to the underlay; 105 5th reducing its back to a plane surface while its face is applied to the underlay; and finally, removing the underlay and trimming the plate.

3. The process of forming toned printing 110 plates, consisting in first making a thin printing-surfaced shell with margins; 2nd applying a toning member to the printing surface of such shell and laying them upon a plane surfaced support; 3rd placing a 115 chase around and upon the margins of said shell; 4th pouring molten metal into the chase; and 5th subjecting the shell to sufficient pressure to cause the surface of the shell to conform to the toning member. 120

4. The process of forming toned printing plates, consisting in first making a thin printing-surfaced shell with margins; 2nd applying a toning member to the printing surface of such shell and laying them upon 125 a plane surfaced support; 3rd placing a chase around and upon the margins of said shell; 4th pouring molten metal into the chase; 5th subjecting the shell to sufficient pressure to cause the surface of the shell to conform to the toning member, and continuing 130

ing the pressure until the backing metal is properly set; 6th reducing the back of the plate to a plane surface while applied to the toning member; and removing said member.

5 5. The process of forming toned printing plates, consisting in first making a thin printing-surfaced shell with margins; 2nd applying a positive underlay to the printing surface of such shell and laying them upon
10 a plane surfaced support; 3rd placing a chase around and upon the margins of said shell; 4th pouring molten metal into the chase; 5th subjecting the shell to sufficient air pressure to cause the surface of the shell
15 to conform to the underlay, and continuing the pressure until the backing metal is properly set; 6th removing the plate from the press, and reducing its back to a plane surface while its face is applied to the underlay,
20 and finally, removing the underlay and trimming the margins of the plate.

6. The process of making toned printing surfaces, consisting in forming a printing surfaced shell, applying a toning member
25 to the face of such shell, and subjecting the back of the shell to fluid pressure to cause its printing surface to reversely conform to the surface of the toning member and backing the toned shell.

30 7. The process of making toned printing surfaces, consisting in forming a flat surfaced shell, applying a toning member to the printing surface of such shell, subjecting the back of the shell to fluid pressure
35 to cause the printing surface of the shell to reversely conform to the toning surface of said member; and backing the toned shell.

8. The process of making toned printing plates, consisting in forming a flat printing
40 surfaced shell, applying a toning member to the printing surface of the shell, subjecting the back of the shell to fluid pressure to cause the printing surface of the shell to reversely conform to the surface of the
45 toning member, and attaching a suitable backing to the toned shell while under such pressure.

9. The process of making toned printing plates, consisting in making a printing surfaced shell, placing a toning member against
50 the face of the shell, applying fluid pressure to the back of the shell to cause its printing surface to reversely conform to the surface of the toning member, applying molten
55 metal to the back of the shell while it is under such pressure, and continuing the pressure until such metal sets.

10. The process of making toned printing plates, consisting in forming a printing-surfaced shell, applying a toning member to
60 the face thereof, placing a chase thereover and sealing the chase, supplying molten metal in the chase to form a backing for the shell, and then subjecting the shell to fluid
65 pressure until the molten metal sets.

11. The process of forming toned printing plates, consisting in making a printing-surfaced shell, superposing said shell upon a toning member, and finally subjecting the back of the shell to sufficient air pressure
70 to cause the surface of the shell to conform to the toning member, and backing the toned shell while under such pressure.

12. The process of forming printing plates, consisting in first making a thin metallic printing surfaced type shell; 2nd placing
75 the printing face of said shell against a toning member; 3rd applying sufficient molten metal to the back of said shell to form a plate therewith; and finally, subjecting the metal and shell to sufficient air
80 pressure to cause the surface of the shell to conform to the toning member.

13. The process of forming printing plates, consisting in preparing a thin metal
85 printing-surfaced shell, placing same face downward under a chase upon a suitable support, sealing the chase, pouring sufficient molten metal into the sealed chase to back the shell and form a plate, and admitting
90 compressed air into the chase and continuing the pressure until the molten metal sets.

14. The process of forming printing plates, consisting in first making a printing-surfaced shell with margins; laying such
95 shell upon a plane surfaced support; placing a chase around and upon the margins of said shell and sealing the chase; pouring molten metal into the chase to form the backing of the shell; introducing compressed
100 air into the sealed chase; and continuing the pressure until the backing metal is properly set; removing the plate from the press, and reducing its back to a plane surface; and finally, trimming the margins of the
105 plate.

15. The process of making toned printing surfaces consisting in forming a printing surfaced shell, applying a toning member
110 to the face of such shell, and subjecting the face and back of the shell to different fluid pressures to cause its printing surface to reversely conform to the surface of the toning member, and backing the toned shell.

16. The process of making toned printing surfaces consisting in forming a flat surfaced shell, applying a toning member to
115 the printing surface of such shell, subjecting the face and back of the shell to different fluid pressures to cause the printing surface of the shell to reversely conform to the toning surface of said member, and backing the toned shell.

17. The process of making toned printing plates, consisting in forming a flat printing
125 surfaced shell, applying a toning member to the printing surface of the shell, subjecting the face and back of the shell to different fluid pressures to cause the printing surface of the shell to reversely conform to
130

the surface of the toning member, and attaching a suitable backing to the toned shell while under such pressure.

5 18. The process of making toned printing plates, consisting in making a printing surfaced shell, placing a toning member against the face of the shell, applying different fluid pressures to the face and back of the shell to cause its printing surface to re-
10 versely conform to the surface of the toning member, applying molten metal to the back of the shell while it is under such pressure, and continuing the pressure until such metal sets.

15 19. The process of forming toned printing plates, consisting in making a printing surfaced shell, superposing said shell upon a toning member, and finally subjecting the face and back of the shell to different air
20 pressures to cause the surface of the shell to conform to the toning member, and back-

ing the toned shell while under such pressure.

20. The process of forming printing plates, consisting in first making a thin metallic printing surfaced type shell; 2nd, placing the printing face of such shell against a toning member; 3rd, applying sufficient molten metal to the back of said shell to form a plate therewith, and, finally, subjecting the back of the metal and the face of the shell to different air pressures to cause the surface of the shell to conform to the toning member.

35 In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

MICHAEL A. DROITCOUR.

Witnesses:

SYLVIA J. WILLS,

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