A. R. BOURGES.

PROCESS OF PREPARING PRINTING PLATES.

APPLICATION FILED SEPT. 8, 1914.

1,237,238. Patented Aug. 14, 1917.

Fig. 1.

Fig. 2.

Fig. 3.

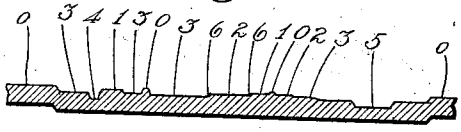
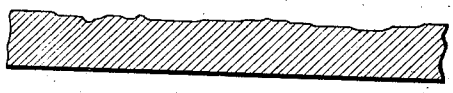
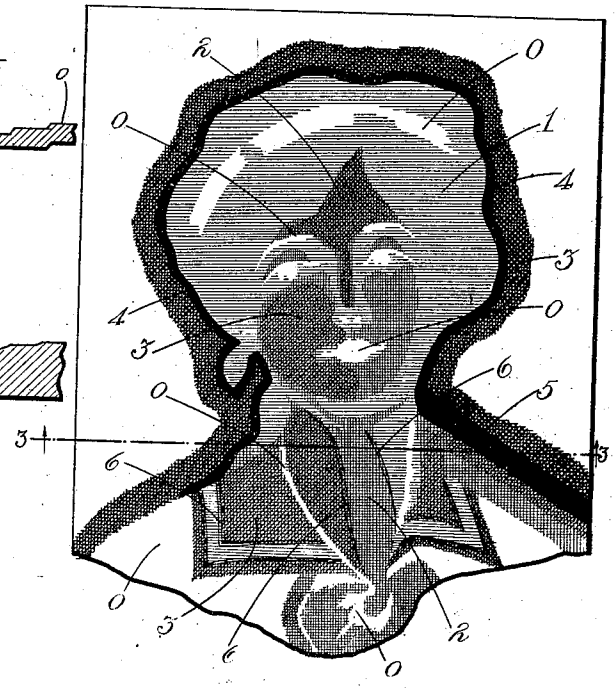


Fig. 4.





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PROCESS OF PREPARING PRINTING-PLATES.

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To all whom it may concern:

Be it known that I, ALBERT R. BOURGES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Preparing Printing-Plates, of which the following is a specification.

This invention relates to improvements in printing plates and processes of preparing the same, and it has for its salient objects to provide an original plate of such character that when used as a master-plate, from which to reproduce electro-types, nickeltypes, lead molds, or other printing plates, the latter will come from the mold with proper make-ready or tone characteristics embodied in them; to provide a process by which an original or master plate, made as usual in other respects, can be re-formed by simple treatment, readily within the range of such skill as is conveniently attainable in the art, so as to embody in itself the desired characteristics requisite to impart to the final printing plates made from this master plate self-contained make-ready characteristics; to provide a process or method of making and preparing printing plates which enables the progress of the make-ready treatment to which the original or master plate is subjected susceptible of test from time to time, to the end that the precise desired result may be secured without guess-work; to provide a process of making printing plates which is extremely economical in that the special make-ready is performed upon the original or master plate only, and any desired number of electrotypes or other reproductions may be made from such original, each having the same make-ready characteristics; to provide a process which greatly minimizes the chances of mistakes in setting up the forms and securing the exact desired results wanted in that it eliminates the possibilities of mistakes due to misplaced make-ready; to provide printing plates and a process of making the same which produces plates suitable for use for most, if not all, of the modern printing presses; to provide printing plates of a character especially valuable and advantageous for use in multi-color printing, and particularly when such multi-color printing is done on multi-form presses which impart the several color impressions to the sheet of paper as it passes through the press a single time; and in general, to produce printing plates embodying numerous novel characteristics having many advantages over those heretofore in use.

In the accompanying drawing—

Figure 1 is a representation of an impression proof of a half-tone plate which has been subjected to my improved treatment;

Fig. 2 is a rear view of the plate from which the impression of Fig. 1 was made, showing the different steps or treatments to which the back of said plate has been subjected;

Fig. 3 is a cross sectional view of the plate on line 3—3 of Fig. 2 after it has been etched and tooled but before re-forming by pressure; depressions and elevations being greatly exaggerated;

Fig. 4 is another view on the same line of section but of an electrotype, nickeltype, or other printing plate made from the master plate; depressions and elevations being greatly exaggerated.

Two types of make-ready have heretofore been commonly employed, viz: first, building up the make-ready out of superposed sheets of paper and installing the same under the tympan sheets in register with the printing plate, the latter remaining unmodified from its original flat face form, and, secondly, incorporating the make-ready with the printing plate itself either by backing up the printing plate with paper sheet make-ready or by so treating the plate as to vary its thickness and thus vary the printing pressure over different parts of its area.

Somewhat recently a form of the last mentioned method or process has been brought out, known as the McKee process (disclosed in Patent No. 857,531), in which process the original or master plate is made in the usual way, and from this original electrotypes or other printing plates are prepared as usual, and then these electrotypes or other reproductions are specifically treated to incorporate in them the make-ready character in accordance with the following general plan: Each electrotype or other final printing plate is depressed or indented as to its face by means of pressure applied through a make-ready, which is built up the reverse of what is wanted in the final face contour of the plate. That is to say, where the heaviest pressure and shades are wanted

the make-ready is thinnest, and over those areas where the lightest impressions or blanks are wanted, the make-ready is thickest. The relief areas at the back of the plate are planed off so as to give the plate a uniform plane back, while its face retains the modified contour into which it has been pressed.

My invention is somewhat analogous to the said McKee process and plates produced therefrom in that my process also results in printing plates of varying thickness and of self-contained make-ready character. But my invention differs radically from the said McKee process in these respects, among others: First, I perform all the make-ready treatment upon the master plate, and, secondly, the process which I employ in reshaping the original or master plate is very different from that employed in the McKee process; is susceptible of finer gradations as to results, eliminates the necessity of special tools or machines and is capable of securing many advantages.

In practising my invention in a preferred way, I start with an original copper or other metal plate, which has had its printing or impression face produced by any of the usual processes and I prefer that this plate, if of copper, be not thicker than 16 gage thickness; this being a usual thickness. A somewhat thinner gage responds more readily to my treatment. In the making of this original plate care is to be taken in order to insure that its back remains smooth and protected from being pitted by the etching to which it is subjected. This original having been properly cleaned, I first make a few impressions therefrom on any suitable paper and with any ordinary ink, to determine its primal printing condition, and also in order that I may have at least one printed impression sheet for the use hereinafter described.

I next proceed to place on the back side of the plate guide or impression marks whereby I may selectively treat different areas thereof, and I prefer to proceed as now about to be described, though various other ways will occur to those skilled in the art for transferring such working lay-out.

While one of these impression sheets is still in printing contact with the face of the original plate, I suitably mark its margins or trim them off so that I may transfer it to the back of the plate and place it in exact reverse register, *i. e.*, in exact opposition to the corresponding parts on the face of the plate. I carefully inspect this printed impression and determine those areas which are to be tone-modified in the plate. I place next to the back of the plate a sheet of ordinary carbon transfer paper, and then mount the register sheet over the carbon sheet with the impression side out and in correct register as described. I next proceed to outline with a suitable pencil or stylus those areas which are to be printed with the strongest shading or tones and therefore which are to be held highest in the final printing plate, including also, if desired, any burnished places, which are naturally low, and similarly outline those areas which are to be treated to produce medium shades or tints, and likewise outline those areas which are to be of lightest shades and those which are not to print at all. These outline marks are, of course, impressed on the back of the plate through the carbon. I now remove the impression sheet and carbon and proceed to etch the back of the plate properly to bring about the desired relief and intaglio effects which I wish to appear and to be present in the final printing plates. To do this I prefer to proceed as follows: I first carefully cover all area which is to print in the darkest shades or tints, as well also as the margins and face side of the plate, with a suitable acidproof covering or "resist," leaving exposed for etching all of the medium tone areas and lighter tone areas and blank areas. I now etch these exposed areas, preferably by putting the plate in a bath of acid and I permit the etching to continue only until the metal has been bitten away properly to produce the desired medium tones or shades, as will hereinafter appear, and then wash off the acid. I now cover the medium tone areas, leaving the lighter shade areas and the blank areas only exposed, and again etch as before until the plate has been reduced sufficiently for the lighter shades. In this connection it may be noted that the carbon transfer lines have a slight resisting effect which causes those lines which traverse the etched areas to be sufficiently retained to be visible, and thus enable me to carbon outline the several types of areas at the one first operation. However, I have found it feasible and satisfactory to outline only one type of area before etching the first time, then, before etching the second time, replacing the carbon and impression sheet and outlining the second type of areas, and so on. The steps of washing to arrest etching, covering with "resist" so as to leave only the blank areas or still lighter shades, follow, until I finally have the back of the plate provided with the desired contour. I prefer to finish up by tooling or gouging out around the extreme edges of the picture; such tooling being comparatively slight, but sufficient to permit the face of the plate to take a very slight set-back under its subsequent treatment and which effectually precludes undue impact of the inking roller and over-inking along such lines. I also tool out more pronouncedly wherever I wish to produce a vignette effect.

I furthermore tool in a special manner

the somewhat abrupt steps or shoulders produced by the successive etchings, *i. e.*, between different tones, except as to those locations where sharp contrast is desired instead of a soft blending or merging effect. To explain: I employ a flat chisel-edged tool or scraper by means of which I bevel off the shoulders or steps referred to, so that one bevel or depth of etching merges into the next by an incline.

I may effect the successive steps of etching in a way which is in a certain sense the reverse of that just described. That is to say, I may, after having outlined the selected areas, cover all areas except those which are to be etched deepest, then perform the first etching, then remove the "resist" from so much of the protected surface as represents the areas which are to be etched next to the deepest, and again etch over the so enlarged area, and so on until all areas have been etched.

Coming now to the second branch of the process, and assuming I wish to print directly from it, I take the prepared plate, put it in a suitable hydraulic or other high power press and, having placed the back of the plate against a suitable flat back support, apply pressure to the front, preferably through a yielding matrix or sheet lead, and sufficient to force back the etched areas on the back of the plate into contact with the back support. That is to say, I apply such force in such way as to re-shape the plate and impart to its back a substantially flat surface, disregarding, of course, the minor irregularities and minor routed out areas. Heat applied in conjunction with the pressure facilitates the re-shaping of the plate. This re-forming of the plate, of course, leaves the surface with an uneven contour and with depressions wherever the plate has been thinned; the depth of the depression corresponding substantially to the depth of the etching at the back. The plate is now removed from the press and is in readiness for printing. But if I wish to use it as a master plate for the making of electrotypes, stereotypes, lead molds or other reproductions, I can very well dispense with the special step of re-shaping the plate by pressing, as above described, because it will receive an equivalent re-shaping in the act of making the lead mold therefrom, which is afterward used for the electrotypes. That is to say, I place the face of the plate in contact with the lead which is to take the mold impression, and, the back of the plate being in bearing with a flat unyielding surface, the pressure applied for making the impression of its face in the lead serves also to effect the re-shaping of the master plate. In this connection, it will be clear to those skilled in this art that the impression in the lead mold will show the full value of the make-ready treatment, even though the master plate should be somewhat resilient and therefore spring back somewhat toward its original form after the pressure is removed.

Whatever process of reproducing the final printing plates from the original be followed, it will be obvious that the face of the printing plate will have the make-ready contour which has been imparted to the original in the manner hereinbefore described. Accordingly such final printing plates are in condition for printing and embody the desired make-ready characteristics, without further treatment or special mounting in the press.

An important characteristic of my process is that the printing plates produced from the master plate are of uniform metal texture throughout and hence have no tendency to lose value or change form under heavy pressure or long working. This is in contradistinction from those plates which have been molded in one shape and afterward reshaped mechanically by pressure.

The step hereinbefore described of applying the working lay-out to the back of the plate preparatory to etching may be effected in a simple and somewhat different manner as follows:

After having taken an impression or print from the face of the plate on suitable paper, and with a liberal application of ink, I transfer the impression from the paper to a second sheet by simply placing the two face to face and putting them under pressure, so that the impression of the first offsets to the second. I then take the second sheet and apply its impression face directly to the back of the printing plate to be etched and by suitable pressure transfer the impression to the plate. The sheet being now removed, the impression appears clearly on the back of the plate.

I prefer to then proceed as follows: I first cover the area or areas which are to be held and not etched at all with a shellac or other suitable varnish resist which will not be affected by either acid or bezin, which is used later to remove the ink mark. I next proceed to etch over the entire uncovered area, giving the plate only a very slight bite, just sufficient to etch in the metal a clearly visible picture of the impression, with the exception, of course, of the protected areas. I now clean off the ink impression with benzin or other suitable solvent from all unprotected areas, and then proceed to etch by steps substantially as previously described.

This method of transferring by ink impression has pronounced advantages where the subject contains much detail and the areas to be differently treated are many and small.

The hereinbefore described method of treatment may be briefly described in conjunction with the drawing as follows:

Assuming the original plate has been made in the usual way, the first step is to carefully protect its front face with a perfect resist so that in the subsequent handling it will be neither marred nor etched. The working lay-out having been properly transferred to the clean back of the plate, as hereinbefore described, I proceed to etch as follows:

Referring to Fig. 2, all areas of the back plate which are not to be etched at all, and which appear in white, are first covered with a suitable acid resist, these areas being designated O. The first etching step is then performed over the unprotected areas, these being all of the shaded parts of said Fig. 2. The plate is then washed (not, however, removing any of the resist) and those areas which are to be printed next to the darkest shade or tone are covered with resist; these areas being shaded with the horizontal lines only and designated 1. The second etching step is then performed to further deepen the exposed areas, the plate washed, and the parts which have received the two etchings and are to receive no more covered with resist; these parts being marked 2 in the drawing, and the third, which in this instance is the final, step of etching formed to produce the extreme high light tones. These latter parts are those which are covered with three lines of shading and are designated 3 in the drawing.

The back of plate is now entirely cleaned off, in readiness for tooling. The outlining of the picture, as hereinbefore described, is indicated at 4, and, as shown in the several views, is comparatively narrow. An example of gouging out to produce a vignetting effect is shown at 5, which tooling, as may be seen by reference to the Fig. 1, causes the tone lines or shading to disappear without any distinct break whatever. The beveling off or reducing of the steps or angles where different tones are to blend into each other softly is accomplished by the use of a flat graver or scraper; examples of this work being indicated at the parts marked 6. As will be seen more clearly in the sectional figures, the use of the tool forms an incline between the two surfaces of different level and avoids a sharp break or demarcation in the impressions from the face of the plate.

The plate having been thus etched in successive steps and tooled as described is in readiness for the re-shaping by pressing, fully described in the specification. It is, of course, understood that the engraver will exercise his skill and judgment in the securing of the several desired effects in treating the plate in accordance with my method.

It will be noted that the etching out of the back of the plate by stages and to varying depths as described is characterized in that each etched surface, no matter how shallow or lightly it be etched, is nevertheless carried back as a depressed surface, as distinguished from an etching through the interstices of a partially screened surface, such for example as is produced in the original etching of the face of the plate through the gelatin "resist." The importance of this distinction is that inasmuch as the etching at the back of the plate is to enable the face of the plate to be set back, the etched out area should not be interspersed with stipples or projections which would defeat or seriously minimize the very purpose of the treatment. It will, of course, be understood that what has been said applies more particularly to the treatment of the middle tones.

As hereinbefore indicated, my invention may be carried out with more or less modification, and I do not, therefore, limit myself to the specific details of procedure herein set forth, except in so far as they are made the subject of specific limitation in the claims.

I claim as my invention:

1. The improvement in the art of imparting make-ready character to plates, which embraces taking an impression from the face side of the plate, determining by inspection those areas which need to be depressed in the face of the plate, utilizing said impression as a working guide and thereby separating the back of the plate into selected areas, in register with those determined by inspection, then converting the back of the plate into differently elevated surfaces by successively exposing unprotected areas to the action of an etching fluid and protecting other areas by suitable resist, and finally, in effect, transferring the lower areas at the back of the plate to the front face of the plate by pressing the varying areas at said back surface into substantially the same plane.

2. The improvement in the art of imparting make-ready character to plates, which embraces taking an impression from the face side of the plate, determining by inspection those areas which need to be depressed in the face of the plate, utilizing said impression as a working guide and thereby separating the back of the plate into selected areas, in register with those determined by inspection, then converting the back of the plate into differently elevated surfaces by successively exposing unprotected areas to the action of an etching fluid and protecting other areas by suitable resist, reducing the steps or angular projections between selected portions of adjoining areas, and finally, in effect, transferring the lower areas at the back of the plate to the front face of the plate by pressing the varying areas at said back surface into substantially the same plane.

3. The improvement in the art of imparting make-ready character to plates, which embraces taking an impression from the face side of the plate, determining by inspection those areas which need to be depressed in the face of the plate, utilizing said impression as a working guide and thereby separating the back of the plate into selected areas, in register with those determined by inspection, then converting the back of the plate into differently elevated surfaces by successively exposing unprotected areas to the action of an etching fluid and protecting other areas by suitable resist, reducing the steps or angular projections between selected portions of adjoining areas, outlining selected portions of boundaries of selected areas by recessing the back of the plate, and finally, in effect, transferring the lower areas at the back of the plate to the front face of the plate by pressing the varying areas at said back surface into substantially the same plane.

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