METHOD OF AND MEANS FOR MAKING CAST PRINTING PLATES HAVING SHADED DESIGNS
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This invention relates to a method of making printing plates and the like and to the means employed.

Original printing plates as used in letterpress printing or surface printing and the like are made by etching a design on one face of a highly polished thin plate which must be "backed up" or "blocked" on a piece of wood or metal to obtain a thickness of approximately .018", the standard clearance of all letterpress printing presses.

The printing surface of an "original" letterpress printing plate is that portion of the highly polished surface that is not eaten away or depressed by the etching acid and is identical with the image that was previously fixed upon the polished face of the plate by chemicals not affected by the etching acid. Therefore, the image remains untouched in its original plane and the rest of the polished face of the plate is eaten away. Thus we have the image in relief on a plane which gives a surface for printing.

One of the objects of the present invention resides in an improved method of producing letterpress and intaglio printing plates by the use of a novel mold which can be used over and over again and which I choose to call a movable mold and through the use of which I am able to cast an image in relief or intaglio in the body or interior of any substance or metal capable of being transformed into a liquid end of solidifying in the mold. In other words, the image will be formed in relief or intaglio by the mold in a plane in the body of the cast block. The mold will be of sufficient size to provide a complete printing plate of a thickness of approximately .018" or whatever other thickness is desired or required.

I attain this object by the use of a mold made up of a multiplicity of relatively adjustable very thin rods of the same lengths and of any desired or preferred cross sectional shape and which in the preferred form are provided with conical ends. Those rods which would traverse the face of the polished printing surface of the finished printing plate are not moved. The rods corresponding to the image and the depressed areas of the finished printing plate are moved far enough to present their larger diameter or body portions in the plane of the printing face of the finished printing plate. The rods corresponding to "shading" areas, for example, are moved to present different portions of their conical ends in the plane of the printing face of the finished printing plate. While I have shown but two rows of rods moved to form shading, it is to be understood that any number of rods in adjacent rows can be moved to provide additional shading, decreasing in the distances moved and becoming less until the tone of the plate becomes darker and finally a total blackness. The rods are held in position for the casting operation. The ends of the rods constitute the mold and during the casting operation the moved rods produce the image in relief in a plane within the block. The face of the block pierced by the moved rods is then cut away until the plane in which the image is cast in relief is exposed which becomes the printing face of the finished printing plate, desired "shading" of which can be obtained by shaving more or less material from this face of the block to expose as much of the indentations made by the "shading" rods as may be desired. The other face of the block may then be shaved off if desired or necessary to produce a printing block of the desired or required thickness.

Another object of the invention resides in the provision of a printing plate for printing highlights and solids as well as various tones. In the usual method of making plates of this character it is necessary first to make a halftone negative, then white-out the highlights by hand and paint in the solids. In the present invention this can be accomplished in one operation through movement of the rods. The highlights being obtained by moving the rods a maximum distance whereby to penetrate the final printing plate, the solids obtained by not moving any rods, and the tones obtained by moving the rods varying distances out of their normal planes, all of which will be understood from the description to follow.

Other objects and uses of this invention and a clearer understanding of its practice will appear from the following description taken in connection with the accompanying drawing which diagrammatically illustrates on a greatly enlarged scale preferred forms of my invention.

In the drawing:

Fig. 1 is a top plan view of the section or base of the mold equipped with a multiplicity of rods, some of which are shown moved to produce the letter V and shading and its code i. e., three dots and a dash in relief in the body of the mold.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1 showing certain of the rods moved and showing the reservoir section or cover of the mold in broken lines;

Fig. 3 shows the base and cover inverted during the casting operation;

Fig. 4 shows the face of the block in which the depressions are cast;

Fig. 5 shows the finished printing block or
plate after the face of the block, provided with the
depressions, has been shaved away to expose
the printing face of the finished printing block or
plate;

Fig. 6 shows several forms of rods; and
Fig. 7 shows effects produced in the plane of
the printing surface by several of the forms shown
in Fig. 6.

In the actual construction the base of the mold
is equipped with a multiplicity of thin rods, for
example, several thousand which it is not feasible
to show. The drawing, therefore, is dia-

grammatic in this respect and the illustration
shows one rod for every fifteen or more used in
practice. The mold proper or the section of the
mold equipped with the multiplicity of rods is
referred to as the base of the mold and the other
section 12 which carries the molten casting ma-
terial is referred to as the cover. It is preferred
to put the supply of molten casting material in
the cover in the inverted position in Fig. 3 and
invert the base and press or sink the moved rods
carried by the base into the molten material as
indicated in Fig. 3.

The base 8 as shown in Fig. 1 may be of box-
lke shape and may be lined with clamping plates
10 and any suitable means, such as screws 11
threaded in the walls of the base and bearing on
the clamping plates, may be provided to hold the
rods in the base of the mold so that it may be in-
verted for the casting operation as shown in
Fig. 3.

The rods shown in Figs. 1 and 2 are all of the
same length, diameter and cross sectional shape,
and are provided with conical ends and are in all
respects of identical construction. Some of these
rods are shown in moved positions to produce in
relief the letter V and shading therefor and the
Morse code for the letter V below the letter.

The rods 15 corresponding to the flat polished
printing face of the finished printing block are
not moved and will, therefore, leave their impres-
sion, if any, only in the face of the block that will
be shaved off. The rods 16 corresponding to the
letter V and the Morse code for the legs of the
letter V are moved far enough to present their conical ends
17 in the clearance above the plane of the rods 15
and above the polished printing face 9 of the fin-
ished printing block. The rods 18 corresponding
the shading to the right of the legs of the letter
V are moved to present different sections of their
conical ends 18 in the plane of the polished print-
ing face 3 of the finished printing block to pro-
duce depressions of different dimensions in the
printing face of the block as shown in Fig. 5.

The rods may be held in elevated or moved posi-
tions by backing members 20 as shown in Fig. 2
and/or clamped in this position by the plates 10
as previously mentioned.

Several of the preferred forms of rods are
shown in Fig. 6, a rod of round cross section with
a conical end being designated 15, one of square
cross section with conical end designated 21, one
of hexagonal cross section with conical end des-
ignated 26 and one of round cross section with a
conical recess in its end designated 27. It will be
understood that instead of the conical recess of
the rod 27 this may be square, hexagon or of any
other desired formation. Viewing the showing
in Fig. 7 in the order of the arrangement of the
rods from left to right in Fig. 6, this figure dis-
closes the shapes and relative sizes of the cross
sectional areas of the depressions produced in the
plane of the printing surface of the finished
printing block by the several forms of rods when
moved to various positions for shading purposes.
The rods in the first three forms produce conical
depressions while the rods 27 produce annular
depressions surrounding a frusto-conical projec-
tion constituting a part of the polished face of the
printing surface of the finished block. The hex-
agonal rod 26 of Fig. 6 is not shown in Fig. 7 in-
asmuch as the square rod 25 is sufficiently illus-
trative.

It will be understood that the mold may be pro-
vided with rods of any of the forms shown in Fig.
6 or if desired several of these forms may be em-
ployed in a single mold.

The movable mold is a device for manufactur-
ing printing plates mechanically. The following
is a description of its operation and the kind of
plates that may be manufactured with it.

The plates may be flat, curved into an arc or even
curved into a cylindrical form. The depressions
in the plates may be made deep or shallow as the
kind of plate would necessitate. The kind of print-
ing may be intaglio or letterpress.

The following method is that of making a let-
terpress plate. The subject or copy of the let-
terpress plate described is where the background
is black and the design i. e., the letter V and the
shading is white. It will be appreciated that this sort
of plate could be used as an intaglio plate to
get the reverse effect of black design with white
background. It will be understood that in mak-
ing an intaglio plate it is merely necessary to move
the rods 15 into a plane beyond the plane
of the rod forming the desired design, and to
move the other rods the same distances as they
are shown moved in Fig. 1 but in the opposite
direction.

As described, the mold is made up of a plurality
of movable rods. These rods may be of any
size, shape or length and the ends of the rods may
be of any shape or contour such as curved, many
sided, tapered, pointed, inverted taper, hollow,
etc., or any other design, shape or contour.

To create a design some or all of the rods will
have to be moved out of the normal plane of the
mold. The normal position may be conceived of as
the plane of the lower surface of a flat plate rest-
ing on the mold ends of all the rods in their nor-
mal position. As mentioned, the ultimate design
desired is a white subject on a black background.

Since my mold works on the principle of creat-
ing greater or lesser areas of white and also of black,
the white of the design necessitates the greatest
movement of the rods out of the normal plane.
As we go to the grey, a diminishing movement,
and finally the black requires no movement of the
rods at all. The extent of the movement must be
determined for each rod and then the rods may be
blocked under to hold them in their moved
position. When the rods have been moved as
just described the screws in the sides of the mold
holder are screwed into contact with the clamping
plates to clamp the rods, and the mold is then
ready for casting.

The variations in the areas of white and black
are created by the displacement of the molding
material by the ends of the moved rods. As
shown in Fig. 3 the mold is upside down when
placed in the casting box. This is to be kept
in mind when the distance "below the normal
plane" is mentioned as differentiated from "above
the normal plane" when setting the rods in posi-
tions.

In Fig. 3 as the mold is lowered the moved rods
displace increasingly more casting material. The
lowest rods i. e., the rods moved the greater dis-
tance, displace the most and the next lowest, a lesser amount and so on until those which have not been moved displace none.

Below the normal plane and the apices of the conical ends of the rods that have been moved the greatest distances is a clearance. Somewhere in this clearance is the plane of the surface of the finished printing plate. The rods that were not moved did not enter the clearance, the rods that were moved to the greatest distance entered the clearance completely and the rods that were moved smaller amounts formed holes of small size in the clearance. Therefore, the clearance not entered by any rods is black, the clearance entered completely is white, and the clearance entered only by the pointed ends of the rods is the grey or shading of the V as shown. Preferably the grey or shading of the image is produced by moving the rods different distances for shading purposes as shown in Fig. 7.

One outstanding feature of this movable mold is the shape of the ends of the rods. This shape makes it possible to create all of the intermediate shades between black and white. The printing surface is not cast on the ends of the rods but in a plane somewhere in the tapered ends of the rods used for shading purposes.

The inverted taper or hollow ended rod 27 described is the reverse of the tapered rod disclosed in the main figure. In using the hollow ended type rod the procedure would be exactly the same as with the tapered ended rod. The result, of course, would be slightly different. The rim of the hollow end would produce a circular depression in the clearance and the interior of the hollow end would produce a projection extending in the reverse direction through the clearance and would become a part of the printing surface of the printing plate.

The movement of the rods may be accomplished in any desired manner, either manually or automatically. The method of moving the rods does not form part of the present invention and, as far as the present invention is concerned it may be assumed that the rods are moved manually.

It is to be understood that this invention has manifold applications, and while the same has been described in connection with the making of printing plates it may be practiced in making many other objects, and in fact practically any molded object, such as articles of jewelry or other decorative articles from any molding material such as metal, plastics or the like.

While I have illustrated and described a preferred form of my invention it is to be understood that I do not wish to be limited to the precise structure, form, design or arrangement of parts illustrated and described as various obvious various changes and modifications may be made therein without departing from the spirit and scope of my invention.

What I claim is:

1. The method of casting a printing block having an image and shadings, which method comprises moving a plurality of pointed rods axially out of their normal plane into a configuration which corresponds to the image to be cast, moving other rods shorter distances out of their normal plane into a configuration which corresponds to shadings of said image, securing the moved rods in their moved positions, casting article forming material about the ends of the moved rods, removing the rods from the casting material, and finally shaving the block thus formed to the desired thickness whereby to produce a design therein corresponding to the design formed by the moved rods.

2. A mold comprising a container having complementary sections fitting on each other, a plurality of relatively axially movable thin rods in one section of the container, each of substantially the same length and having tapered ends, the other section of said container adapted to be partially filled with molten material, certain of said rods being moved axially relatively to the others out of the plane of the other rods to form the design of the mold, the ends of the moved rods being immersed in molten material in said other section a distance less than the length of the tapered ends, whereby to provide therein a design of spaced configurations corresponding to the design of each of the ends of the moved rods, which together make up the complete design of the mold.

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REFERENCES CITED

The following references are of record in the file of this patent:

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