(No Model.)

M. JOYCE.

MATRIX AND METHOD OF USING MATRICES.

No. 489,011. Patented Jan. 3, 1893.

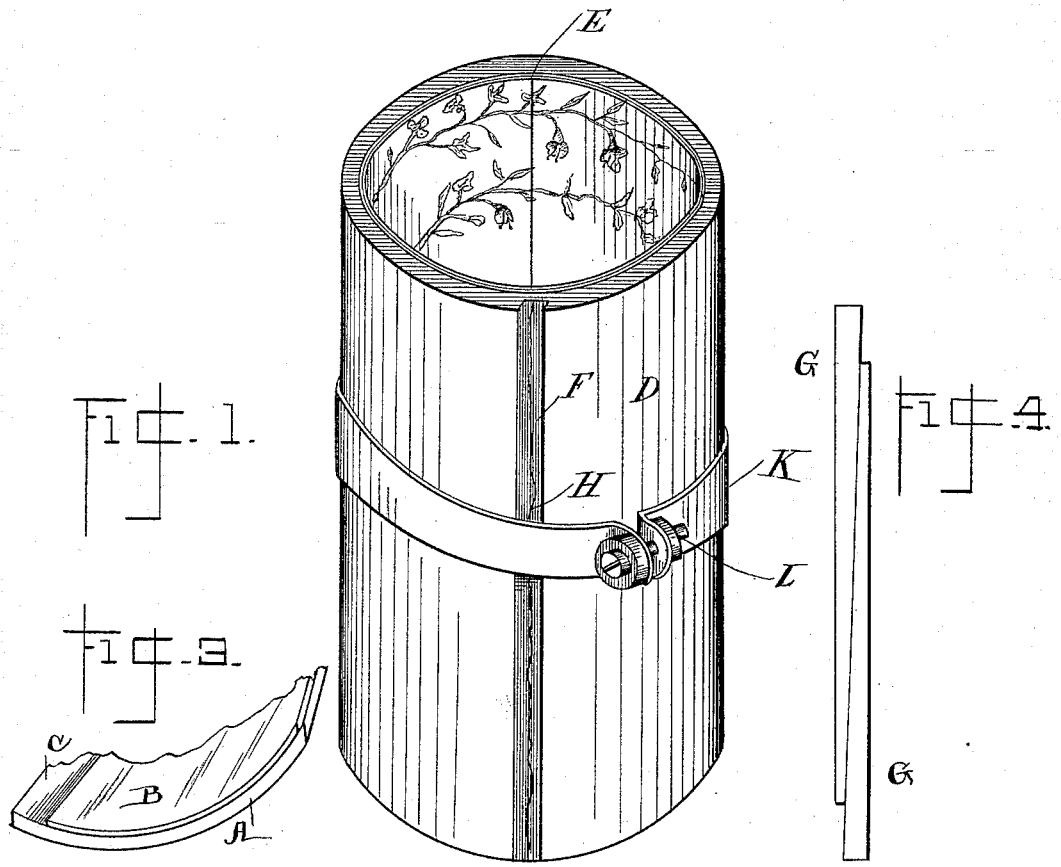
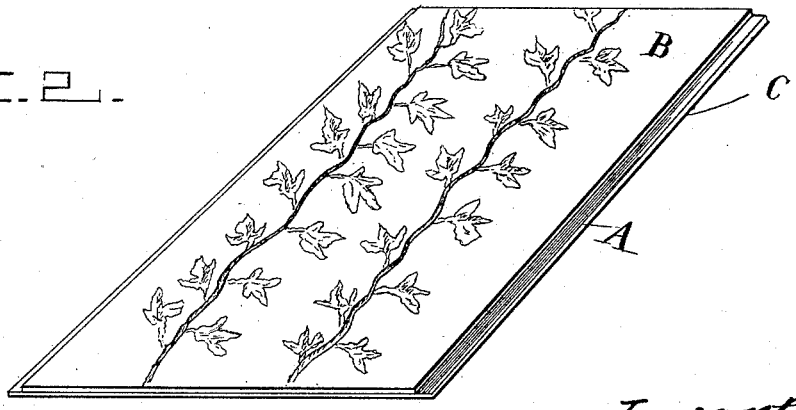


Fig. 1.

Fig. 4.

Fig. 3.

Fig. 2.



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UNITED STATES PATENT OFFICE.

MAURICE JOYCE, OF WASHINGTON, DISTRICT OF COLUMBIA.

MATRIX AND METHOD OF USING MATRICES.

SPECIFICATION forming part of Letters Patent No. 489,011, dated January 3, 1893.

Application filed April 21, 1891. Serial No. 389,807. (No model.)

To all whom it may concern:

Be it known that I, MAURICE JOYCE, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Matrices and Methods of Using Matrices, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a method of and mechanism for producing relief plates for printing.

The object of the invention is to produce a a light and flexible matrix base or plate on which engravings may be made, and to utilize the matrix when completed for casting or otherwise producing cylindrical or flat or curved plates having lines from which impressions may be taken on a printing press.

Figure 1 is a perspective view of a hollow cylinder with curved matrix inside. Fig. 2 is a perspective view of part of a coated plate, suitable for use as a matrix for producing a relief printing plate. Fig. 3 is a similar view of a flexible plate or matrix having a curvature. Fig. 4 is a side elevation of a pair of wedges.

The reference letter A indicates the base plate on which the matrix is formed. This plate may be a thin sheet of metal, preferably steel or iron, with a smooth polished surface, and by preference should have a coating of heat and water repellent varnish, but this is not essential as a rule.

I do not claim herein a particular varnish. I have found the varnished or japanned iron plates commonly known as "ferrotype" plates to answer a good purpose as a metallic base.

In lieu of a metal base I have successfully used a base composed of paper, covered on the upper surface, or on both surfaces, with a thin smooth coating of heat and water repellent material, or varnish. I find it advantageous to incorporate with the coating such a material as powdered slate, silica, pumice, emery &c. as such gives to the surface of the paper a grain of sufficient texture to retain the clay, and prevent it from chipping off. I also find what is known as slate paper answers a good purpose as a base plate. The object of varnishing the metal plate is to prevent oxidation, and to resist chemical action.

I have used a variety of articles in the preparation of the paper besides the varnishes, such as bichromated gelatine, albumen, ammonia, starch, silicate of soda, tungstate of soda, chrome alum, gums, &c. I find that shellac, copal, asphalt and silicate of soda answer my purpose.

I have cast stereotypes from what I call a compound plate. The compound plate is produced by pasting or cementing paper to one or both sides of a metal plate. A plate thus prepared answers the same purpose as a metal or paper base, and will not oxidize or deteriorate if exposed to moisture, nor expand as much as a metal plate during the operation of casting. On the base A I spread a thin coating of plastic heat repellent material B. This coating may be of clay, clay and plaster, silica, baryta, chalk magnesia, or other earthy material capable of withstanding considerable heat. The pulverized material is mixed with water or other liquid and a binding agent, such as gum arabic, or silicate of soda, and is spread on the surface of the thin plate. The surface of the plate may first be moistened by a solution of gum arabic, or other adhesive matter, to cause the plaster coating to adhere to the base. The plastic coating is spread on the flexible base and scraped smooth so that the base is covered, as far as it is necessary, with a coating of the plastic material, from one hundredth to a tenth of an inch in thickness or thereabout. The thickness of the coating will depend on the character of the work. The coating can be made very smooth by scraping with a straight edge, and by placing gages (such as printers' leads or rules) near the margin of the plate, as at C, C, the thickness of the coating left by the scraper can be nicely adjusted. When the plastic coating is neatly spread on the flexible sheet, the plate thus prepared is thoroughly dried, and if desirable may be baked in an oven. The sheet so coated is then ready for use to engrave a matrix thereon. (The matrix base is light and flexible, and capable of uses in addition to those inherent to inflexible base plates as will be explained.) Thus the base prepared as above is inexpensive, and the plate when coated can be cut into pieces of suitable size for a cut or engraving, and can be mailed to

the engraver for use, or stored for any length of time.

The coated plate, prepared as above, can be engraved in manner well known, by cutting through or scraping away the coating B, so that the lines will go down to the base plate A, but will not penetrate the same. A needle or other pointed instrument is an efficient tool for this engraving, and the material scraped, cut or scratched away from the plate can be blown off as dust.

The design to be engraved can be penciled on the coating B, or by laying a thin drawing on the coating and following the lines of the drawing with a stylus, with a light pressure, the design can be slightly impressed into the coating on the base plate. Then by cutting or scratching away the plaster or other coating, the design will appear in dark lines on a light ground, giving about the same appearance as a printed copy from the cut. The flexible matrix having been thus engraved, may be cast flat or bent into suitable curves, from which to cast curved printing plates.

Heretofore, when a metallic plate, especially an iron plate, has been spread with a composition of clay or the like in a plastic state, the surface of the metal plate was liable to rust, and in standing a long time before engraving, the rust on the surface tended to loosen the coating. The rust also ate into the metal, producing an uneven surface to the baseplate which tended to injure the printing plate when hot metal was cast on the engraved matrix. These objections are overcome by using the varnished metallic plate hereinbefore described.

I am not aware that paper has been used as a base on which to spread a clay coating as a matrix for engraving, prior to my invention. Should ordinary paper be used without a hardened surface, the moisture of the plastic clay will soak into the paper, and soften the same, and if the moisture be unequal in parts, will cause warping of the paper base. In engraving through the clay coating, the graver or stylus is liable to enter the surface of ordinary paper, thus giving an unequal height to the lines when cast. If not protected, the hot metal will char its way into the paper, especially where there are broad lines. These objections are overcome by preparing the paper base, by covering it with a waterproof and non combustible material, such as is used in slate paper. For making a true and complete printing cylinder, such as is used in printing wall paper and the like, the coated sheet or thin metal plate having the coating of clay or the like adhering to its face is cut of such size as will give the design, or nearly so, and the design engraved thereon. The engraved plate is then inclosed in a tube D of the required internal diameter. The edges of the matrix may not join with accuracy. In that case a small quantity of the plastic material may be spread on the inside of the tube, as indicated at E, and when the same is dry the engraving may be completed across this portion E of the coating, so that the inside of the tube D is a matrix with a complete design on its inner surface, without break or intermission.

It will be understood that it is much more convenient to engrave on a flat surface and then bend the matrix than to engrave on a curved surface, so that the amount of engraving on the surface E will be as small as possible.

The thickness of the matrix plate A B will be allowed for in selecting the tube D, so that the complete cylinder will be of the proper size.

The curved matrix having been prepared, as in Fig. 3, the printing cylinder may be cast solid therein, or may be cast with a core, as is common in making inking rolls. The material employed for the cylinder will preferably be type metal.

To insure the protection of a true cylinder, I take a tube D of strong metal of suitable thickness. In the side of this tube I cut a slot or groove F, extending nearly but not quite through the thickness of the walls of the tube, and preferably having perpendicular sides. Into this slot or groove I drive wedges G, G, which expand the metal and burst the thin remaining film H. On removing the wedges the tube D will close back and make a perfect cylinder, tightly closing the crack made by bursting the film H.

To apply the matrix A, B, the wedges G may be driven into the groove F, and the rim of the tube opened, and after applying the matrix the wedges may be removed and the tube will resume its circular form. If a portion of the wall of the tube is cut away, by cutting entirely through the walls of the tube, even with a very thin cutter, it will be impossible to get an absolutely true cylinder when the kerf or cut is closed up.

In order to produce a perfect cylinder I generally attach one or more metal bands K around the cylinder the bands being tightened by means of screw L. After the cast has cooled I loosen the bands and if necessary insert the wedges in the groove which causes the cylinder to open and the cast and matrix are easily removed.

A great advantage of a flexible plate or base is that a plate can be cast of any desired curve from same, and the thin base or matrix can be cut easily to any size desired. The plates can be prepared for use in large sheets, and when it is desired to produce a small illustration the necessary size can be easily cut with a pair of shears or knife without being compelled to use a large base for a small cut, and avoid the necessity of keeping a lot of different sized plates on hand. The engraver can cut up a plate to suit his requirements in a short space of time. The plates in use at present are generally from one-eighth

to one-half inch in thickness, and only flat stereotypes are cast from them. They are all sizes from two inches square to twenty-two inches, and are expensive compared with thin sheet metal or paper or cardboard.

My invention enables me to produce flat, curved and cylindrical printing surfaces.

What I claim is:—

1. A plate for engraving matrices, consisting essentially of a flexible base, and a hard smooth, dry coating of clay or similar heat resisting material connected to said flexible plate by a binding agent, substantially as described.

2. A matrix plate for relief printing plates, consisting essentially of a flexible base, a layer of non oxidizable material, and a coating of earthy material through which to engrave, connected to the curved plate by a binding agent, substantially as described.

3. A matrix plate consisting essentially of a paper base, and a smooth dry coating of earthy material attached to one face thereof, and forming the outer surface through which coating the graver cuts to produce the matrix.

4. The matrix plate consisting of the paper base permanently coated with a hard non-combustible water proof substance, and having a smooth coating of earthy matter secured thereto by a binding agent.

5. The method of producing a hollow cylindrical matrix which consists in spreading a flexible base piece with a coating of clay or the like and engraving thereon, then inclosing this base in a tube and filling in the joint with clay, and engraving over the joining coating to complete the cylindrical matrix, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

MAURICE JOYCE.

Witnesses:

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