

J. J. C. SMITH.
 PROCESS FOR MAKING MOLDS FOR STEREOTYPES.
 APPLICATION FILED SEPT. 18, 1909.

965,242.

Patented July 26, 1910.

Fig. 1.

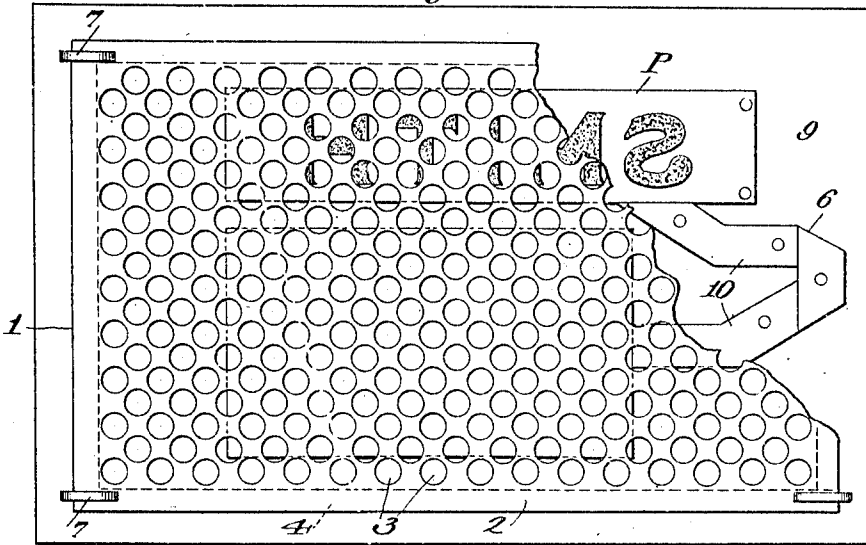


Fig. 2.

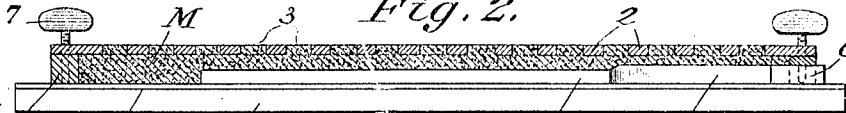


Fig. 3.



Fig. 4.

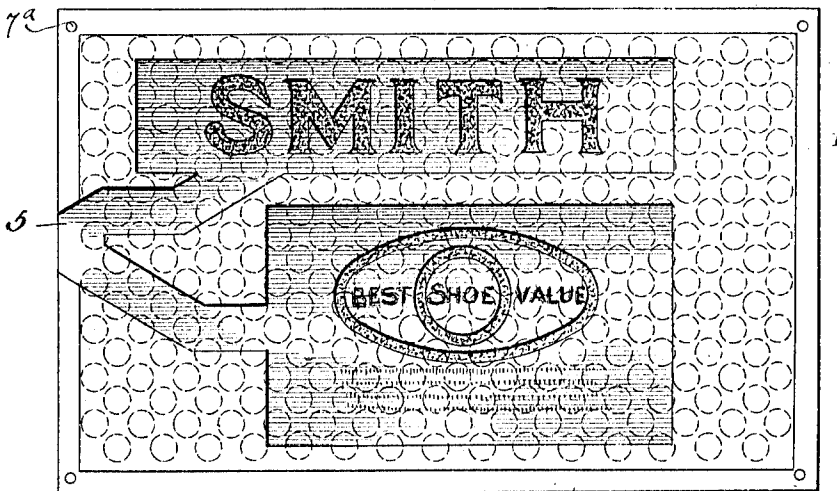


Fig. 5.



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PROCESS FOR MAKING MOLDS FOR STEREOTYPES.

965,242.

Specification of Letters Patent.

Patented July 26, 1910.

Original application filed April 1, 1909, Serial No. 487,169. Divided and this application filed September 18, 1909. Serial No. 518,319.

To all whom it may concern:

Be it known that I, JOHN J. C. SMITH, a citizen of the United States, and residing at Passaic, county of Passaic, State of New Jersey, have invented new and useful improvements in the Process for Making Molds for Stereotypes; and in order that those skilled in the art may understand and practice my invention I give the following specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates generally to the production of cast metal designs, but more particularly to making of new and improved stereotypes for the reproduction by ordinary printing processes of cuts, illustrations, designs, type-matter and the like.

The invention has for its objects the production of cast stereotypes in rapid and economical manner, and of materials heretofore not generally supposed to be suitable for the purpose, and more particularly an improved process or method of making and producing molds for forming such stereotypes or cast designs.

Stereotypes at present employed are formed, either by casting type-metal against a matrix of papier mâché, or by electrotyping on a wax or similar impression, the electrotype shell being afterward reinforced or backed by type-metal. A great desideratum in the art of making stereotypes has been to produce a stereotype of harder metal than the type-metal or electrotype plates commonly used, which are heavy in weight and soon become defaced by wear and usage. Further, since it is desired to reproduce cuts, illustrations, type matter and the like in many different publications in different and remote places and at as nearly the same time as possible, the cost of transportation, particularly where sent by mail, as is frequently done, is, owing to the weight of the ordinary type-metal stereotypes, an item of considerable expense which my invention is intended to overcome. The employment of other metals than type-metals has hitherto been prohibited by the fact that harder and lighter metals suitable for printing purposes require considerably higher temperature for melting, making the use of a papier mâché matrix impossible and necessitating the employment of a refractory material for the same. In employing a mold

or matrix of refractory material, however, further difficulty is encountered in that such molds are formed of the molding material in a plastic or semi-fluid state from which it has to dry and harden, and this drying, in order to be sufficiently rapid, requires a heat of about 600° F. Under these conditions fine or even large cracks make their appearance in ordinary molds. It will be obvious that even the finest cracks, or a slight amount of shrinking or warping will destroy the mold, particularly when it is considered that the metal is cast in the molds under pressure, as it is contemplated with the molds of my present invention.

I am aware that plaster molds have been employed for producing metal castings and stereotypes, but such molds as have heretofore been used have the disadvantage not only of not satisfying the above requirement, but of requiring such length of time to dry them by heat that their use for making stereotypes is out of the question, because stereotypes are required to be finished on very short notice, sometimes no more than three or four hours,—a period insufficient even to dry the ordinary plaster mold. Still a further difficulty to be overcome with molds of such material is that the material of the mold must be capable of entering the finest lines of a delicate or intricate design and of taking and retaining impression in a high degree of perfection; and also that it must be capable of withdrawal from the pattern without distortion and must separate from the pattern perfectly and cleanly.

In order that my present invention may be more clearly understood I have illustrated the means employed for carrying it out in the accompanying drawings, in which—

Figure 1 represents a plan view of the apparatus employed, parts being broken away to show underlying parts. Figs. 2 and 3 are similar sectional views, the apparatus being in position in Fig. 2 for the casting operation and showing the mold formed on the patterns; Fig. 3 shows the first step in removing the mold formed from the pattern. Fig. 4 is an underside view of the formed mold. Fig. 5 is a detail sectional view on an enlarged scale of a portion of the mold plate.

Similar characters of reference are ap-

plied to the corresponding parts in the several views.

The apparatus employed for forming the molds comprises a frame or flask 1 formed of a metal plate 2 of any desired or suitable size—say 16" by 20" or larger—easily handled and accommodated in the casting machine. This casting machine will be hereinafter referred to, but forms no part of my present invention. The plate 2 is preferably of steel as affording the requisite strength and stiffness, and also because the mold composition adheres well to steel. Other metals or alloys, brass, for example, may be employed for this plate if desired. This plate 2 is of openwork construction or foraminated or perforated to provide openings or holes 3, the purpose of which will hereinafter appear. These holes may be tapered as illustrated in Fig. 5 if desired, so as to give the mold composition a better grip to the frame. This will be desirable where other metals than steel are employed for the frame 1. Plate 2 is also provided with a rim or flange 4 around its edge on one side thereof and secured thereto in any convenient manner, as by riveting, brazing or the like. On one side the rim is interrupted, as at 5, forming an opening or gate for use during the casting operation. This opening 5 is closed, however, in the process of forming the mold, by means of a removable block 6, (see Fig. 1) or in any other convenient manner. The perforated plate 2 with its rim or flange 4 forms a flask or mold frame 1, relatively shallow so as to take very little molding material, and so form a thin mold, the strength and rigidity of which is derived from the metallic frame. The frames I have employed are not over three-eighths of an inch in thickness, including the plate 2. At each corner the frame is provided with a thumb-screw 7 passing through a threaded opening 7a therein.

For use with the frames 1 I provide a base 8 of somewhat greater dimensions than the frame. This base may be of wood or any suitable material, or may form the top of a table or work bench. On its upper surface this base is provided with a non-adhesive surface to which the molding material will not stick, as, for example, a smooth rubber sheet 9.

The manner of using the apparatus above described and the process of preparing a mold is as follows: I take the pattern or patterns P, P of which it is desired to make a stereotype or casting and fasten the same temporarily on the base 8 by means of brads, or in any other convenient manner. (See Fig. 1). One or a number of such patterns may be so secured in place, as may be desired, and according to the dimensions of the mold flask employed. In the drawings

I have shown two patterns, by way of example. The patterns will be arranged with sufficient space between them to allow for the necessary gates or sprues, as will be understood by any one skilled in the molding or casting art. These gates or sprues are formed by removably fastening to the base 8 blocks or pieces 10 of suitable shape, and of a thickness slightly greater than the patterns, but of less thickness than the depth of the mold frame 1 (see Fig. 2).

Having arranged the patterns and the blocks or plates forming the gate and sprues as above specified, I coat the faces thereof with a thin film of separating medium to insure a clean separation of the mold from the patterns. For this purpose I preferably employ good sperm oil, applied to the surface of the patterns with a stiff brush so as to reach and coat every cavity and deep line of the pattern. This coating of oil or the like, while necessary to insure clean separation of mold from patterns, has the disadvantage of increasing the tendency of air to become confined in the cavities and lines of the design when the molding composition or material is poured or cast on the patterns, thereby preventing the said molding composition from entering said cavities and lines and thus producing a defective mold. The repellent or antagonistic character of the oiled surface against the water of the fluid plaster composition tends to keep the latter from flowing into and occupying the deeper recesses and lines of the pattern. It will be understood that for stereotypes the design or pattern is fine and intricate, presenting many hundreds of small recesses and cavities on a surface less than fifty square inches, and in order to produce a successful stereotype a faithful reproduction of every line and cavity of the design is required. Agitation of the plaster composition, after it has been cast upon the pattern and while still fluid, has been proposed, but this is only effective in designs which do not present the intricacies of detail possessed by stereotypes and is ineffective for such moldings. Furthermore, if agitation be attempted for the purpose of removing the confined air in the cavities, as, for instance, by applying a brush to drive the same out, the oil film becomes removed in places where reached by the brush, and this results in the mold composition sticking to the pattern and producing defects. To overcome these difficulties I wet or moisten the oiled surface of the pattern with a fluid which will lay uniformly thereon and not be either repellent or antagonistic to the water of the molding composition. For such fluid I have found wood alcohol to give good and satisfactory results. Having therefore coated the patterns with oil, as above stated, I then apply wood alcohol to

the oiled surface. This is preferably done by applying the wood alcohol in a fine spray by means of an atomizer. Care should be taken to apply no more alcohol than is required to wet the oiled surface, as an excess of alcohol would be likely to delay the setting or hardening of the mold. The mold frame or flask is then placed over the prepared patterns and the same is held in position either by arranging weights around its edges or by clamping it to the base, or in any convenient way.

The molding composition having been prepared, is now poured into the mold or frame through the openings 3. This molding composition must possess the requisite characteristics of withstanding the heat of the molten metal to be cast therein when the mold is formed without checking or cracking, since the finest crack would be reproduced on the cast stereotype. This heat will be about 900° F. The molding composition must possess such tenacity that it will, when set, withdraw absolutely clean from the patterns and without distortion. And further it must be of such character that it will enter the finest detail and lines of the design and reproduce a sharp and perfect impression. I have invented a molding composition possessing these characteristics and have filed an application for Letters Patent therefor Ser. No. 487,168, filed April 1st, 1909. As disclosure of this molding composition is not requisite to the understanding and carrying out of the present invention, further reference thereto is not believed to be necessary. Sufficient of the molding composition is poured in to completely fill the interior of the mold frame and to rise through the openings 3 and overflow the same. When the composition has partially set, say in about ten minutes, the surplus composition is removed by striking it off, by means of a stick or bar, level with the top or outer face of plate 2. This leaves the composition filling the holes or openings 3, as shown in Figs. 5 and 6 in which the molding composition is represented at M. After about 10 minutes more, the composition sets sufficiently hard to permit the mold to be removed from the base-board and patterns. This removal of the mold requires great care. To enable the removing of the mold to be accomplished with certainty, and without damage, I have provided at each corner of the mold plate the thumb screws 7. By turning each of these screws slightly in succession and to a similar degree, the mold will be lifted from the base-board without any danger of defacing the molded impression, as is clearly illustrated in Fig. 3. The mold may now be placed at once into the drying oven. This oven may be of any suitable kind, heated by gas or other means of heat,

to a temperature of about 600° F. The molds sustain this degree of heat without any danger of cracking or any other injury. They are left in the oven for a period of from two to three hours, at the end of which time the moisture and water are all expelled therefrom. The numerous perforations or openings 3 in the mold plate permit the ready escape of the moisture and water; and by reason of the fact that the mold material itself consists of only a thin layer of the molding composition, the time required for drying is reduced to a minimum. After having been dried the molds are ready for the casting operation. It will be apparent that the mold is constituted by the thin layer of molding composition which carries the design or impression, together with the openwork mold frame or plate 2. The latter gives great stiffness, rigidity and strength to the mold, not only protecting it from damage but enabling it to resist the pressure to which it is subjected in the casting operation.

I have contemplated employing molds prepared in the manner above described in machines or apparatus for casting metal under pressure. Machines or apparatus of this type have long been known, and have been invented by myself. (See for instance United States Patents No. 70,038 of 1867, and No. 477,231 granted June 21, 1892.) In machines of this character the fluid metal is forced into the molds under what is substantially the equivalent of hydraulic pressure, which forces the metal into the fine details and lines of the designs, enabling, thereby, a perfect casting to be obtained.

It will be noted that by having the molds of the construction described they are not only of sufficient strength to resist the pressure to which they are subjected, but, what is an important consideration, the gases from the molten metal and also the air in the casting spaces find exit through the porous molding composition filling the holes in said molds. It will be understood that the molding composition is of a finely porous character permeable to gases, particularly under the pressure of the metal forced into the mold.

By reason of the above described improvements I am enabled to produce, in a short space of time, perfect castings or stereotypes, of a fineness and perfection of design which is only attained, so far as I am aware, by the electrotype process, and also to produce such castings within as short or shorter a time than now required for making electrotype plates. The molding composition which I employ, of which the mold is made, is such as to permit the same to be exposed at once to the high degree of heat required to dry it in a short time without cracking or injury to the finest detail thereof. The openwork plate

or frame forming part of the mold not only gives the rigidity and strength required, by reason of openings 3, but does not interfere with the rapidity of drying, and at the same time eliminates the difficulty usually encountered of occluded gases and air in the molds when casting. The mold plate forming a part of the mold also enables the mold to be very thin, thereby economizing material, as well as the time required for drying the same.

While I have illustrated and described a particular form of apparatus and mode of operation, it will be understood that this is by way of illustration only, and not of limitation to the precise details and steps disclosed, since it will be obvious that various modifications may be made by those skilled in the art, without departing from the invention.

The apparatus shown and described but not claimed herein is claimed in my application Ser. No. 487,169, filed April 1st, 1909, of which the present application is a division.

What I claim is:

1. The process of forming molds which comprises arranging the patterns on a suitable base, coating said patterns with an oleaginous film, wetting said film with a fluid non-repellent to water, for the purpose described.

2. The process of forming molds which consists in arranging the patterns on a suitable base, coating the face of said patterns with an oleaginous film, moistening said film with wood alcohol, and casting a fluid molding composition upon said patterns.

3. In the process of forming molds of hydrated molding compositions the step of applying wood alcohol to the oiled pattern surfaces for the purpose described.

4. The process of forming molds which consists in arranging the patterns upon a suitable base, placing a flask or molding

frame over said patterns, pouring fluid molding material into said flask and on the patterns, and partially embedding said flask or frame in said molding material, allowing the material to set, removing said frame and molding material and subjecting the same to heat to dry and harden.

5. The process of forming molds which consists in arranging the patterns upon a suitable base, placing a flask or molding frame over said patterns, pouring fluid molding material into said flask and on the patterns, and partially embedding said flask or frame in said molding material, allowing the material to set, removing said frame and molding material and subjecting the same to a temperature of about 600° F. to dry and harden.

6. The process of forming molds which consists in arranging the patterns on a suitable base, coating said patterns with a film of oil, wetting said oil film with wood alcohol, placing a molding frame over said patterns, pouring fluid molding material onto the patterns through said frame, and partially embedding said frame in said molding material, allowing the mold to set, removing the mold from the patterns and subjecting the same to heat to dry and harden.

7. The process of forming molds which consists in arranging the patterns upon a suitable base, placing a flask or frame having an openwork bottom or back plate over said patterns, pouring fluid molding material onto the patterns through said openwork back or bottom plate of the flask so as to embed the same in said molding material, allowing the material to set, removing said frame and molding material from the patterns and subjecting the same to heat to dry and harden.

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