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PATENTED MAR. 6, 1906.

A. M. HOLSTEIN.

METHOD OF MAKING PATTERNS FOR METAL CASTINGS.

APPLICATION FILED APR. 18, 1905.

3 SHEETS—SHEET 1.

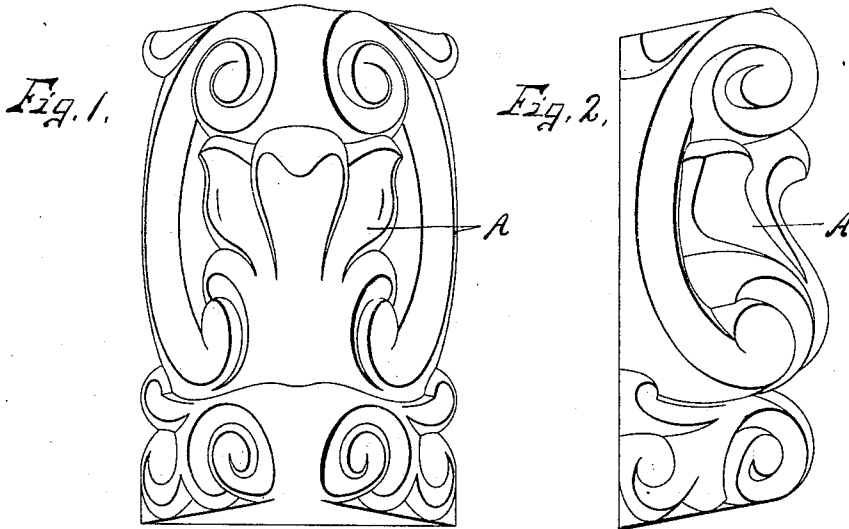
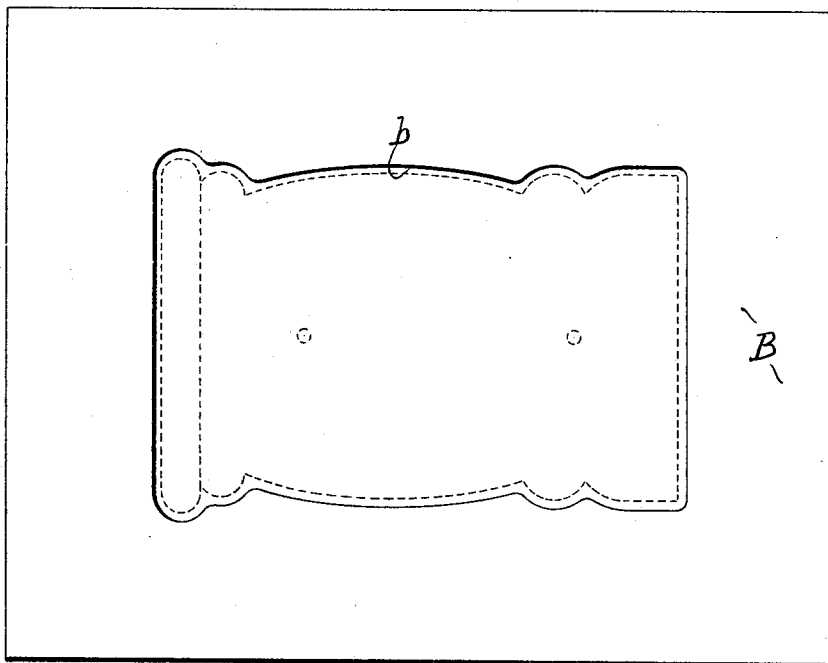


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 4.

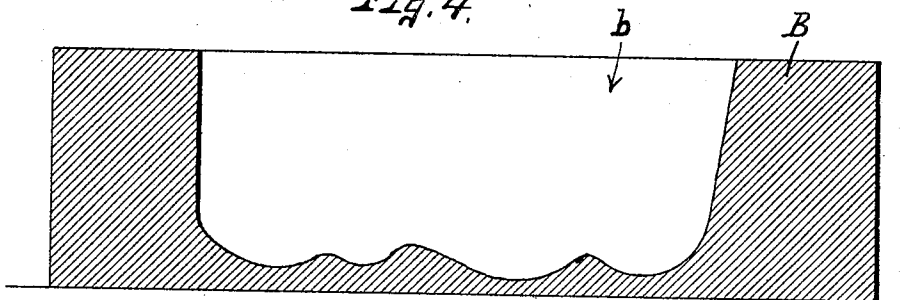


Fig. 5

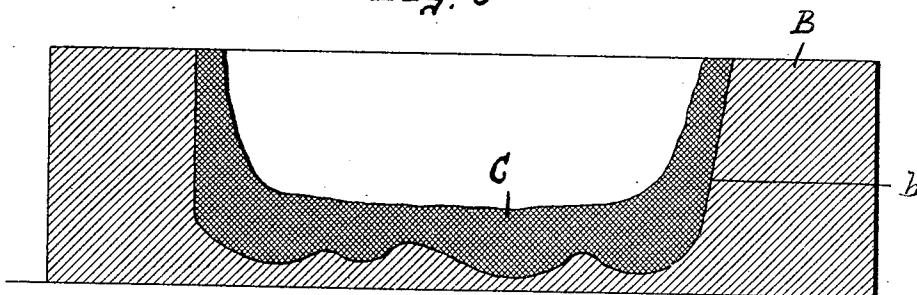
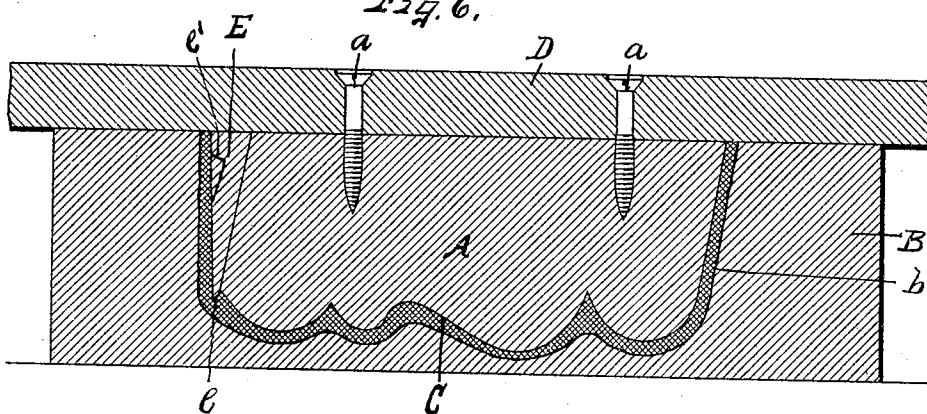


Fig. 6.



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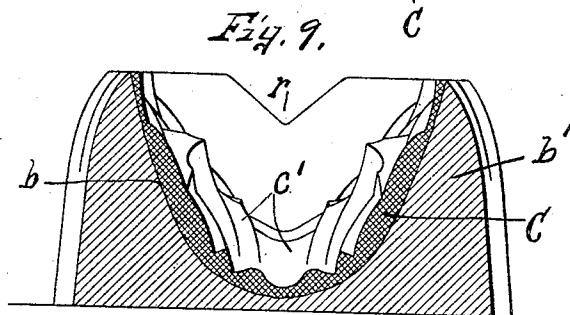
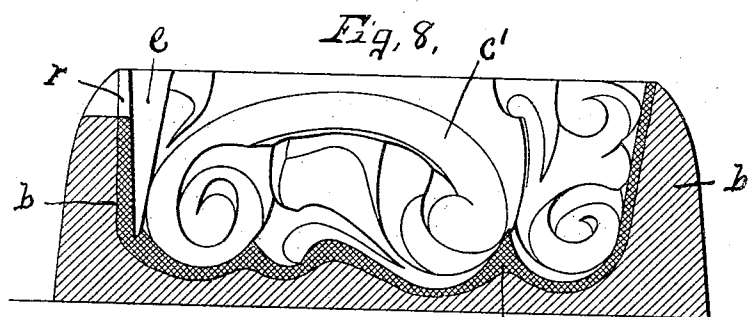
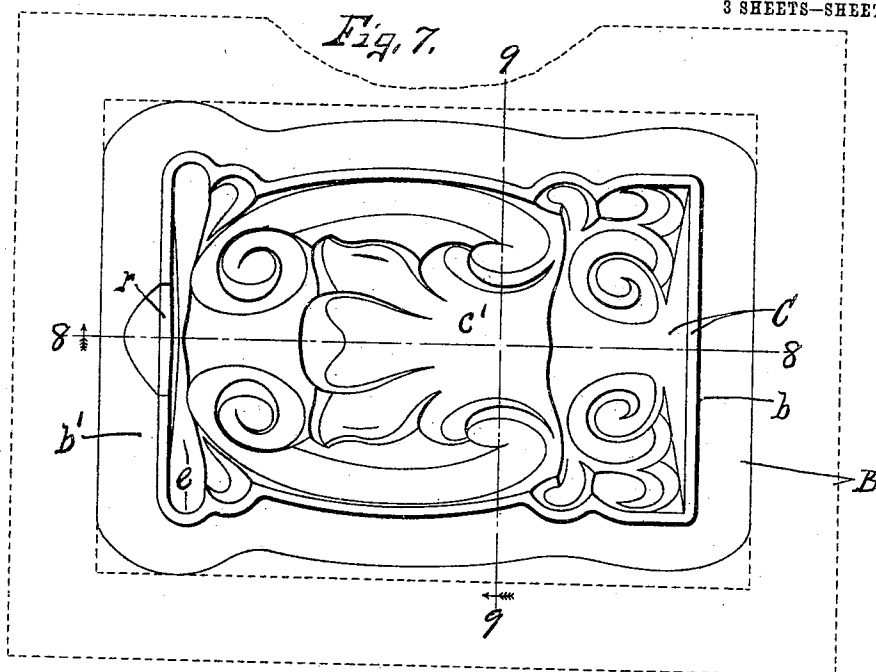
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METHOD OF MAKING PATTERNS FOR METAL CASTINGS.

No. 814,209.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed April 18, 1905. Serial No. 256,179.

To all whom it may concern:

Be it known that I, ADOLPH M. HOLSTEIN, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in the Art and Methods of Making Patterns for Metal Castings, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in the art and method of making patterns for metal castings, and is particularly useful in the manufacture of patterns for casting metal molds for making casket ornaments or moldings from plastic material, as set forth in my Patent No. 683,425, dated October 1, 1901, and also in my Patent No. 779,651, dated January 10, 1905, although it will be apparent from the following description that this improved method of making patterns will be applicable for other purposes. These casket ornaments are usually made in heavy relief from a composite body of plastic material, which while in a plastic state is pressed under a high degree of pressure into a metal female mold having the desired contour, which is reproduced in positive form upon the surface of the plastic material. Heretofore these patterns have been produced under a laborious and costly process by reason of the fact that it has been necessary to carve out of a solid block of comparatively hard metal a negative form of the desired ornamentation, which requires the utmost skill and consumes a considerable period of time, such patterns frequently costing one hundred and fifty dollars or two hundred dollars, while under my improved method I am enabled to produce the same pattern at a cost of ten dollars to twenty-five dollars. In both instances it is necessary to first produce a wood carving of the positive ornament, which is a comparatively inexpensive article; and the object of my invention therefore is to obtain a negative pattern of plastic material in a casing of wood to be used for casting a negative metal mold in which the plastic ornaments may be subsequently formed.

The invention therefore broadly contemplates the mechanical reproduction of a positive ornament into a negative pattern for metal-casting and involves the following operations: first, the production of the positive ornament, as by carving such ornament in wood; second, roughly chambering a block of wood or equivalent material to a sufficient depth and other dimensions to receive the en-

tire positive ornament; third, introducing a body of heated plastic material into the recess or chamber of said block; fourth, rendering the surface of the positive ornament non-adhesive by treating it with a bath of oil or equivalent liquid; fifth, pressing or forcing the positive ornament into the plastic body until its entire ornamented surface is thoroughly impressed into such plastic body, after which the positive ornament is withdrawn, leaving a negative impression of such ornament in the plastic body, and, finally, sawing or blocking out the wood casing which incloses the negative plastic mold, so as to give it the desired external form for casting. It is now clear that by following the operations just described a negative pattern of the positive ornament is produced in a casing of wood and that this pattern is permanent and may be used to make as many reproductions in metal as may be desired, it being understood that the metal reproductions of the negative pattern are used to form plastic ornaments of the class set forth in my patents above referred to and also those referred to in my pending application, Serial No. 215,800, filed July 8, 1904. Many of these heavy ornaments are used on the inclined sides and corners of the casket, and their upper and lower faces are usually disposed in horizontal planes and are therefore arranged at an angle other than a right angle with the back of the ornament. This leaves one of the end faces of the positive ornament with an "underdraft," which would interfere with the withdrawal of the positive ornament from the negative plastic mold of the pattern, and in order to overcome this objectionable feature the underdraft end of the positive ornament is built up with an extra separable piece or section having its end face disposed in a plane at an angle slightly less than a right angle with the back of the positive ornament, so that both the ornament and its separable section may be withdrawn from the plastic negative, thereby leaving a suitable seat in the pattern and also in the casting made therefrom for the reception of a metal section which is used with the casting in the formation of the plastic ornaments.

Other objects and uses will be brought out in the following description.

In the drawings, Figures 1 and 2 are respectively a front and side elevation of a positive ornament or wood-carving which it is desired to reproduce in plastic material. Fig.

3 is a top plan of a block of wood roughly chambered out to receive the ornaments seen in Figs. 1 and 2, or rather to receive the plastic material into which said ornament is to be impressed. Fig. 4 is a longitudinal sectional view through the chambered block seen in Fig. 3, showing the chamber of somewhat greater dimensions than the ornament. Figs. 5 and 6 are similar sectional views of the chambered block, showing a body of plastic material promiscuously placed into the chamber in Fig. 5, while in Fig. 6 is shown the positive ornament as impressed into the plastic material for forming the negative pattern. Fig. 7 is a top plan of the pattern or negative formed in the plastic body in the chambered wood block, the dotted lines showing the original outline of the chambered block. Figs. 8 and 9 are sectional views taken respectively on lines 8 8 and 9 9, Fig. 7, showing the outline of the completed negative pattern.

In order to clearly demonstrate the practicability and utility of my invention, I have shown a complicated ornament A, which is carved from wood and has its ornamented surface in heavy relief, although its back and ends are usually plain and substantially flat. This ornament is adapted to be placed upon the side or corner of a casket and is therefore disposed in a vertically-inclined position to correspond with the angles of the side of the casket, but the end faces are preferably disposed in horizontal planes, the bottom forming an acute angle and the top forming an obtuse angle with the back of the ornament. This wood-carving or positive ornament constitutes a die for impressing its counterpart or negative into a plastic body, and in order to prevent the plastic material from adhering to the ornamented surface of the positive die such die is usually saturated or coated with oil, which renders the ornamented surface non-adhesive. I next take a block of wood, as B, of ample proportions, which is much larger in its outer dimensions than the ornamental wood die, and chamber the central portion following approximately the outline of the base of the ornament, and of sufficient depth to receive the entire ornamental body or die, leaving ample clearance in the chamber and around the die for the reception of the plastic material into which the die is impressed, the outline of the chamber following the outline of the base of the ornament, but with an eighth of an inch, more or less, clearance all the way around to permit the expulsion of surplus material during the operation of pressing the die into the chamber, as presently described. It is to be understood, however, that no attempt is made in chambering this block of wood to follow the exact ornamental contour of the die, as this chambering is only roughly done and the only care necessary is to see that the cham-

ber is of sufficient depth to receive the entire die and still leave a clear space all around the die when its back face is on a level with the open side of the block B. This chambering of the die is usually accomplished by boring or routing out the material within the margin outlined by the base of the positive die. After this chamber is brought to the desired dimensions roughly it is partially filled with a quantity of the plastic material which contains an adhesive substance and is usually heated while being applied to the walls of the chamber, or, in other words, it is brought to a comparatively soft plastic condition and then applied to the bottom and sides of the chamber in the manner shown in Fig. 5 to a sufficient thickness so that when the die as the positive wood ornament or carving is firmly pressed against such material the latter will be forced under the same pressure against the bottom and sides of the chamber and will bear the impression of the minutest details of the ornament, it being understood that all parts of the positive ornament are carved in such a way as to permit the ornament to be withdrawn from the plastic body or negative without liability of mutilating the negative.

In Fig. 6 I have shown the wood-carving A in section as pressed into the plastic material, as C, in the chamber of the block B, with its back face coincident with the top of said block B, so as to form a negative chamber in the plastic body of the full dimensions of the ornamental die A. This plastic body is more or less elastic and resistive, and it therefore requires that the die be forced gradually or intermittently by degrees until its back surface is brought to the level of the top of the block B. In order that the operator may readily determine the degree of depth to which the die has been impressed into the plastic body, the back of the die is preferably secured by screws or other fastening means *a* to a backboard D, which is of sufficient dimensions to cover the open side of the chamber, as *b*, and extends some distance beyond the ends of the block B, so as to afford suitable handles, whereby the operator may easily remove the wood-carving from the negative. It is now clear that by placing the ornamental side of the die into the chamber and against the plastic material (seen in Fig. 5) and applying sufficient pressure against the back of the board D the die will be forced downwardly into the plastic material until the under side of the backboard D engages the top face of the block B at the sides and ends of the chamber *b*, which of course limits the inward movement of the die, and if the backboard remains in engagement with the top face of the block B after the pressure is removed it indicates that the plastic negative is complete.

I have previously stated that one end face

of the die forms an acute angle, while the other end face forms an obtuse angle with the back of the die, as best seen in Figs. 2 and 6 and also in Fig. 8. It is clear that the end face forming the acute angle is of sufficient rake to permit the die to be withdrawn, and in order to render the opposite or obtuse end capable of being withdrawn from the plastic body I provide the latter end with an additional wedge-shape section E, which is secured to the adjacent end face of the die A by suitable screws or pins, thereby building up this end of the die artificially, so that the end face of the section E forms an acute angle with the base of the die A, thus permitting the die with the section E thereon to be readily withdrawn from the plastic negative. The bottom and side edges of this additional section E is made to conform to the general contour of the bottom and sides of the die A, but projects slightly beyond the bottom and sides of the end face of the die to which it is attached for the purpose of forming a transverse groove *e* in the plastic material, as best seen in Figs. 6, 7, and 8. After the negative has been thus formed and the die A removed from the plastic negative the section E may be used as a pattern for casting a similar metal section to be used with the casting which is made from the completed pattern in which the plastic negative is formed.

As previously stated, the block B is made considerably larger than necessary to merely form a chamber *b* in order to afford as much strength as possible to the block during the operation of pressing the die A into the plastic body, by which operation it is obvious that the plastic material is pressed laterally in all directions against the sides and ends of the chamber, thereby producing considerable strain upon the block. As the die is pressed by degrees in the formation of the negative the surplus material is expelled from the top, where it is scraped or cut off and removed by hand from under the backboard D to allow the latter to be finally pressed against or close to the top of the mold as often as may be required, and after the die is removed any rough edges protruding above the upper face of the block are carefully removed, so as to leave a smooth marginal edge around the open side of the negative. After the negative is thus completed any surplus of the margin of the block B surrounding the negative is removed by sawing or otherwise cutting it away on lines nearly parallel with the marginal edge of the negative, leaving a sufficient thickness of wood all around the plastic negative to incase and protect the same.

It is now clear that the pattern produced by the several operations just described comprises a negative ornamental surface *c'* of plastic material inclosed within a wood casing *b'*, which entirely surrounds the bottom, sides, and ends of the plastic ornament or

negative and has at one end the groove *e* for forming a similar groove in the casting, which is made in the mold formed by the pattern, said groove to receive a metal end section *e*, which is used in connection with the metal mold in which the plastic ornaments are formed. This pattern as seen in Figs. 7, 8, and 9 is to be used in the usual manner for making metal castings in sand molds and is of course exactly like the casting in all its details, and therefore the same views, 7, 8, and 9, represent the casting which is formed in the sand mold made from the pattern and may be considered as such in the following description.

In the operation of my invention the ornament A or any other ornament a negative of which is desired is first carved in wood, after which the chambered block B is roughed out to correspond to the general outlines of the ornament, leaving sufficient clearance in the chamber to receive and form the negative of the plastic material when the original carved ornament, as A, is pressed into the plastic body in the chamber *b*. The chamber *b* is then partially filled with a suitable plastic material, as C, care being taken to apply the plastic material in sufficient quantities to the bottom, sides, and ends of the chamber. A suitable backing-board, as D, is then secured to the back of the original positive ornament, and the end section E is also secured to the obtuse end face of said ornament, thereby constituting a die, which is pressed by degrees by a suitable power-press (not shown) into the plastic body within the chamber *b* until the lower face of the backboard D rests upon the upper face of the chambered block B, whereupon a negative form which is exactly the reverse of the positive ornament is impressed in the plastic material, and this material is of such a nature that when dry it maintains the form in which it has been molded by the pressure of the die A. The negative, so far as the ornamentation is concerned, and also the grooves formed by the bottom and sides of the section E, is now complete, after which the positive ornament, with the section E attached thereto, is withdrawn by hand, and the block B is then sawed out or otherwise cut a suitable distance from the marginal edge of the chamber *b* to form an inclosing case for protecting the inclosed negative. After the exterior of the inclosing case, as *b'*, is properly finished the whole pattern is then suitably painted or coated to be used in the sand for forming the mold for the metal sand mold. This casting is made from the pattern in the usual manner, not necessary to herein illustrate or describe, and the section E is also cast in the usual manner to be inserted in the groove *e* of the metal mold in the manner shown in Fig. 8 during the process of forming the plastic ornament. The method of making these plastic orna-

ments is clearly set forth in the patents previously referred to, but, briefly stated, consists in filling the metal negative mold with the plastic material and then pressing the same firmly against the ornamented negative surface or, as described in claim 1 of the Patent No. 683,425, a piece of fabric of the desired shade or material is placed against the negative surface of the metal mold, and the plastic material is then placed upon the fabric and, together with said fabric, is subjected to pressure sufficient to cause the ornamented negative surface of the mold to be impressed into the fabric and plastic body, so that the plastic ornament, or rather the cloth-covered surface of the plastic ornament, assumes the same configuration, except reversed, as the negative surface of the metal mold. During this operation of forming the plastic ornament sufficient plastic material is used to bring the back of the ornament into a plane coincident with the open side of the mold; but instead of using plastic material for the entire body of the ornament I preferably introduce a filling of wood at the back, as shown and described in my pending application, Serial No. 215,800, previously referred to, which materially lightens the weight of the ornament and at the same time affords a solid body into which screws may be inserted to fasten the ornament to the casket. In the operation of withdrawing the plastic ornament thus formed the end section *e* is first removed, and for this purpose is provided with a shoulder *e'*, while the end of the mold is formed with a recess *r* to permit the insertion of the finger into engagement with the shoulder *e'* for removing the section *e*. After this section *e* is removed the ornament may also be readily removed by lifting it carefully from the negative surface of the metal mold.

It must be borne in mind that the negative mold in which these plastic ornaments are formed must be of great strength in order to withstand the pressure to which the plastic material is subjected under the die or positive element. It is therefore clearly evident that a mold for this purpose cannot be made of wood of sufficient strength to withstand the pressure and that even if it could be produced in wood it would be almost impossible to carve a single negative which would be symmetrical and conform in every detail to the desired positive ornament. Furthermore, in case of destruction of this wood neg-

ative it is obvious that it would be next to impossible to reproduce another negative having the same details of ornamentation as the original negative, and even if it were possible to carve a duplicate wood negative in which the plastic ornaments might be molded it would necessarily be a very laborious and costly operation. On account of the impracticability of the employment of negative molds of wood in the manufacture of my plastic ornaments, it has been customary to have these negatives made by die-sinkers in metal. The manufacture of a metal mold under the old process of die-sinking to form a plastic ornament, as shown in Figs. 1 and 2 of the drawings, would require several months of continuous labor by the most skilled and therefore high-priced mechanics, and it can be readily seen that such a proceeding is extremely expensive, to say nothing of the delay to which the manufacturer of the ornaments is subjected in procuring these dies. Under my improved method of forming these negative molds the pattern may be manufactured from the rough by unskilled labor in about five hours ready for the foundryman to make the metal casting therefrom. These figures are given to show the vast saving in labor, time, and expense in the production of a negative pattern and metal mold.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

The herein-described method of manufacturing cast-metal negative dies for casket ornaments consisting, first, in making a positive wood ornament of the desired form; second, chambering a wood block so that the chamber is of greater dimensions than the positive wood ornament; third, applying a composite plastic material to the bottom and sides of the chamber; fourth, pressing the wood ornament into the plastic material in said chamber, leaving a negative impression of said positive ornament in the plastic material; fifth, shaping the wood block to form a comparatively smooth exterior, thereby producing a pattern, then making a sand mold from the pattern, and finally casting a metal die in the sand mold.

In witness whereof I have hereunto set my hand this 29th day of March, 1905.

ADOLPH M. HOLSTEIN.

Witnesses:

H. E. CHASE,
MILDRED M. NOTT.