Oct. 6, 1936. J. L. YOUNG 2,056,415

METHOD OF MAKING PATTERNS

Filed May 1, 1931

Fig. 1.

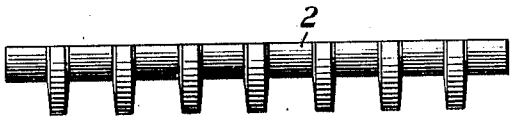


Fig. 2.

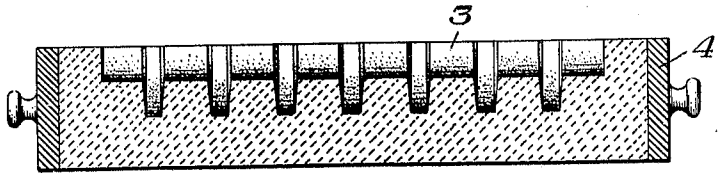
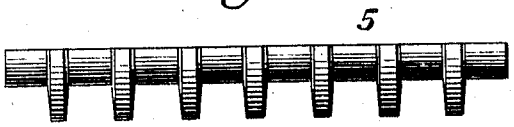


Fig. 3.



INVENTOR

John L. Young

By his attorneys

Young, Stallkin, Kimeke & Hale.

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METHOD OF MAKING PATTERNS

John L. Young, Pittsburgh, Pa., assignor, by mesne assignments, to National Radiator Corporation, a corporation of Maryland

Application May 1, 1931, Serial No. 534,169

1 Claim. (Cl. 22—195)

This invention relates to the art of casting, and more particularly to foundry patterns and core boxes and the method of making the same. The term "pattern" as used herein shall be construed to cover core boxes also.

According to ordinary foundry practice, a master pattern of wood has to be formed. From this master pattern permanent patterns of metal can be cast. The master pattern, however, must be sufficiently oversize to take care of the shrinkage in the foundry patterns which occurs when the cast metal which forms the foundry patterns cools. The foundry patterns must in turn be larger than the article to be cast in order to again take care of this shrinkage of metal in the final product. Frequently, in order to secure the proper dimensions for the master pattern it is necessary to first make an original pattern of the same size as the foundry pattern, and this original pattern is shaped and changed and experimental castings made from it before the final dimensions for the master pattern can be determined.

The foundry patterns as thus made are intended to be used where many thousands of similar castings are to be produced from the foundry patterns, the procedure above outlined of course not being necessary where only a few castings are to be made and one original pattern is therefore sufficient.

In order to simplify the manufacture of foundry patterns it has heretofore been successfully proposed to make an original pattern and from this original pattern produce foundry patterns by an electro-deposition process, thus making metal foundry patterns directly from an original wooden pattern without having to make a master pattern of larger size than the original pattern. This is of course due to the fact that the article formed by the electro-deposition process does not undergo any shrinkage. It has also been proposed to make foundry patterns of cast stone or cementitious compositions, but such patterns have for various reasons not proved highly satisfactory, especially because they are highly frangible.

The present invention contemplates the use of certain resinous materials which can be poured or pressed into a mold, which will not noticeably shrink upon setting, and which will have the strength and wear-resistant qualities necessary for use in a foundry where the pattern is used over and over for the production of many hundreds and thousands of castings. The invention contemplates particularly the use of a thermo-plastic material which, by heating, can be reshaped and restored to original form as wear develops or as the pattern becomes otherwise defective.

Furthermore, the pattern may be made more wear-resistant by the incorporation therewith of an abrasive filler.

The invention may be readily understood by reference to the accompanying drawing, which is purely schematic and is for the purpose of illustrating the invention, and which is not intended to represent any particular article.

Figure 1 represents a side elevation of the original pattern;

Figure 2 represents a longitudinal section through a mold produced from the original pattern; and

Figure 3 is a side elevation of the completed foundry pattern.

In the practice of my invention, an original pattern is produced from wood or other material commonly employed as a pattern in foundry practice. Such a pattern is shown in Figure 1 and is designated 2. From this pattern a negative or mold is made. The mold may be made of plaster of Paris and such material as bakelite or other thermo-setting material, or metal. The mold is shown in Figure 2 and is designated 3. I have shown the mold supported in a frame 4, but this is merely by way of illustration, and whether or not such a frame is used depends upon the nature of the material from which the mold is formed. If the mold is formed of plaster of Paris it can of course be made merely by casting the plaster of Paris about the pattern 2.

Instead of using plaster of Paris, other cementitious materials can be substituted, such for instance, as magnesium oxychloride or Portland cement. When the master pattern is made of wood or other light material, the negative is formed of cementitious material, but when the master pattern is of cast iron the negative may be formed of white metal or bakelite.

From this mold the foundry pattern is produced. The foundry pattern is formed by filling the mold cavity with a resinous material, which material does not shrink substantially on cooling or setting, which will flow readily under pressure and heat into all of the crevices and recesses of the mold cavity, and which, when cool, is sufficiently strong and rigid to enable it to withstand the usage to which patterns are subjected in foundry practice.

Moreover, it is desirable that this material shall be thermo-plastic as distinguished from those synthetic resins, such as bakelite, which are thermo-setting, and after being once set cannot

be softened by the application of heat, although my invention does not exclude such thermo-setting materials.

One material which I have found highly satisfactory for this purpose is shellac, having a filler therein. Where shellac is used, the mold cavity is filled with shellac and the shellac heated and pressed. Upon cooling, the completed pattern may be removed from the mold. This pattern will have considerable strength and is sufficiently hard that it can be jammed into a sand flask and the sand can be tamped around it without bending or breaking the pattern.

Certain thermo-plastic synthetic resins may be used in place of the natural resin as contained, for instance, in shellac. As examples, polyresins of vinyl compounds may be used. Synthetic resins of this class, like shellac, and resins produced from vinyl compounds, can be filled into the mold cavity and shaped under pressure and heat, and will not shrink appreciably upon setting. Other materials that may be used are cellulose acetate, casein, chlorinated-di-phenyls, phthalic anhydride-resin. Asphalt, if rendered abrasive-resistant, can be employed.

The advantage of using a thermo-plastic material resides in the fact that if a pattern becomes worn or imperfections develop therein during the use thereof, such defective patterns can be put back into the mold, subjected to heat and pressure, and reformed to the slight extent necessary to restore them to good condition. This is of a considerable advantage, particularly where a foundry is using a large number of patterns which represent a considerable capital investment, inasmuch as the shellac or synthetic resin is a relatively expensive material. Synthetic resins which are not thermo-plastic cannot be restored in this way and consequently would have to be discarded when they became worn. Likewise, metal patterns, after they have been used sufficiently to develop wear, have to be discarded.

If the pattern is made with a thermo-plastic material, fillers such as whiting, rotten stone or abrasive may be used, it being possible to use fillers in amounts considerably in excess of 50%. With a thermo-setting material the filler is in the nature of an abrasive, harder than the sand, to resist wear. Silicon carbide and artificial aluminous abrasive grain are typical examples of desirable abrasive fillers.

While I have disclosed certain specific materials satisfactory for the practice of my invention, it will be understood that other materials of the same order are to be considered equivalents and are within the comtemplation of my invention.

I claim:

The method of making a foundry pattern which comprises forming an original pattern, preparing a negative of such original pattern from plastic material which will withstand the required heat and pressure to permit heating and pressing thermo-plastic material therein, permitting the negative to set, filling the negative with a thermo-plastic composition containing an abrasive material, and heating and pressing said composition in the negative to entirely fill the same to produce a foundry pattern, corresponding to the original pattern, permitting the pattern to cool in the negative, and subsequently removing the pattern from the negative.

JOHN L. YOUNG.