Oct. 21, 1952 W. M. DUNCAN 2,614,303

MOLDING PROCESS

Filed Sept. 21, 1949

FIG. 1.

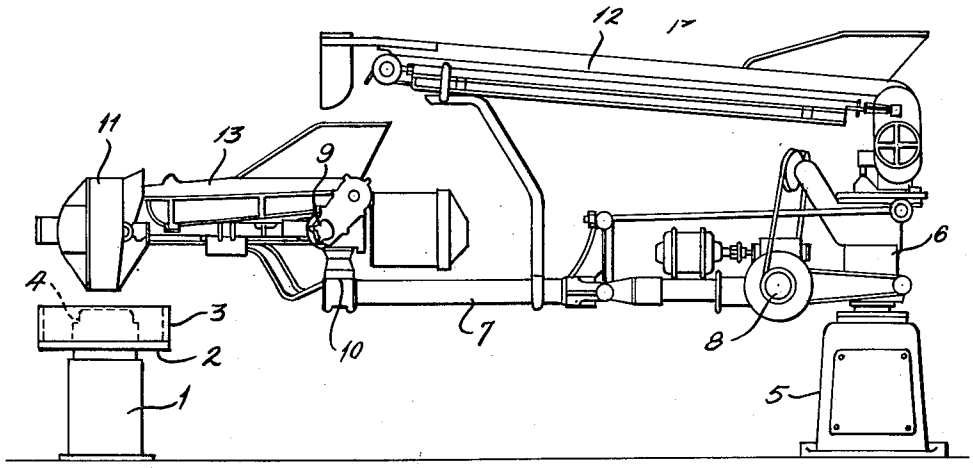


FIG. 2.

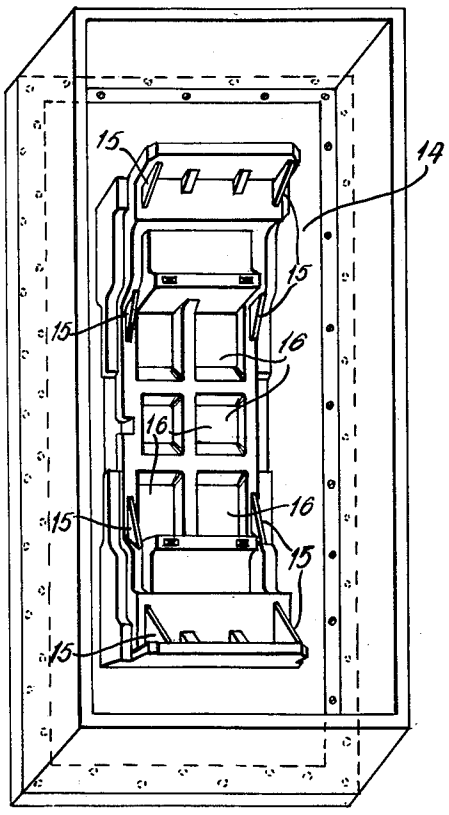
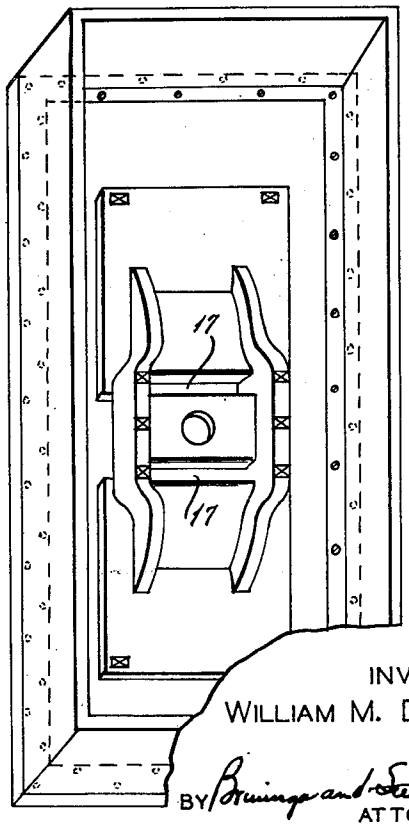


FIG. 3.



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MOLDING PROCESS

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2 Claims. (Cl. 22—197)

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This invention pertains to the manufacture of metal castings, and particularly to the preparation of sand molds for complex castings.

In an effort to minimize the amount of hand ramming required in the preparation of sand molds for founding, mechanical jolting tables, sand slingers, and other devices have been employed individually and with marked success on simple molds. Where the molds have been complicated by the presence of deep cavities and delicate parts, however, hand ramming has continued to be indispensable to the preservation of the delicate parts of the mold.

In United States patent to Clay, No. 2,368,116, it was proposed to partially charge the flask (about a pattern having delicate parts) with loose facing sand, delivered in stream form, and then to fill the flask with the back-up sand delivered by a "sand slinger." While said Clay patent proclaims that the back-up sand, thus delivered, effectively packs the facing sand—in practical operation the ramming thus accomplished is inadequate save where the body of facing sand is quite thin and the cavities proportioned so that their depth is considerably less than their minimum transverse dimension. In the case of patterns to form molds having cavities or projections which require the deposit of facing sand to a depth of more than an inch or so, and in those having cavities whose depth approaches or exceeds the minimum transverse dimension, the packing effected merely by the use of a sand slinger with the back-up sand is wholly inadequate.

The main object is to improve the process of making molds for complex castings so as to reduce the cost of such molds.

Another object is to provide an improved arrangement of apparatus for carrying out such process.

Further objects will appear from the following description, in which will be set forth an illustrative procedure for the practice of this invention. It is understood, however, that such procedure may be varied, within the scope of the appended claims, without departing from the principles or spirit of the invention.

In the preparation of molds from patterns having deep cavities or thin projections, into and about which the sand must be compacted, I have discovered that hand ramming may be, in most cases, dispensed with, and, in all cases, minimized, if the flask, partially charged with facing sand about the pattern, be both jolted and charged with back-up sand deposited by a conventional sand slinger. The jolting may take place in advanve of the sand slinging or concurrently therewith, or both. The jolting contemplated by this invention is of the vigorous type accomplishable by conventional mechanical jolters wherein the flask is maintained level during jolting, as distinguished from the moderate hand jolting wherein the flask is not maintained level. The jolting of the facing sand not only compacts it per se, but appears to condition it to transmit the impact forces delivered by the sand discharged by the sand slinger, whereas, when the facing sand is not so jolted, it cushions the blow imparted by the slung sand. Consequently, markedly greater penetration of the ramming effect of the sand projected by the sand slinger is achieved when the facing sand is jolted. Thus the final compacting of the total sand body of the mold is accomplished under the combined effects of the jolting and the high-velocity projection of the sand slinger, so that the surface of the mold (on which the entering molten metal impinges) is firm enough to prevent erosion, and uniformly dense so as to prevent roughness of the casting due to metal entering a porous portion of the mold.

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In the accompanying drawings:

Figure 1 is a side view showing a sand slinger and a jolting table positioned for use in practicing this invention;

Figure 2 is an enlarged perspective view of the drag portion of a typical pattern with which the process of this invention may be used to advantage; and

Figure 3 is a perspective view of the cope portion for the pattern shown in Figure 2.

Referring to the drawing, 1 designates a conventional pneumatic jolting table of any suitable type having a jolting platform 2, on which the flask 3 is mounted in the usual manner to receive the pattern 4. Mounted adjacent the table 1 is a sand slinger of any suitable type adapted to sling sand downwardly. As shown in the drawing, the sand slinger has a base 5 in which a turret 6 is pivoted on a vertical axis. An arm 7 is pivoted at 8 for up-and-down movement on the turret. A swinging head 9 is pivoted on a vertical axis at 10 on the arm 7 and carries at its outer end a sand-projecting head 11. Sand conveyors 12 and 13 deliver the sand from a source of supply, not shown, to the head 11.

In accordance with this invention, the pattern 4 having been properly mounted in the flask 3 and placed on the platform 2, facing sand is

placed in the flask manually, or otherwise, so as to cover the cavities in the pattern that are to be filled. The jolting table 1 is then started in operation to jolt the facing sand. After a half-dozen or so hard jolts (about a minute will suffice with the usual jolter), the sand slinger may be started in operation. This operates to project wads of backing sand at high velocity downwardly into the flask upon the facing sand therein. The high-velocity wads perform a projection-ramming action on the facing sand in the flask while adding sand thereto. The jolting may be discontinued before the sand slinger operation is begun, but preferably continues until the backing sand (from the sand slinger) has completely covered the facing sand. The sand slinger continues to operate until the flask is completely filled with backing sand.

Figure 2 shows the drag portion of a pattern of a type with which the method of this invention may be used to advantage. The figure shows the pattern mounted on a molding board or match plate 14, associated with the flask 3. The pattern is characterized by a plurality of thin ribs 15 and a plurality of relatively deep pockets 16, which aggravate the mold-forming operation.

The cope portion of the pattern for the same casting is shown in Figure 3. This pattern is characterized by pockets 17, which are deeper than their minimum transverse dimension, so that the mold-forming operation is aggravated thereby.

Neither the pattern shown in Figure 2 nor the pattern shown in Figure 3 could be satisfactorily molded without hand ramming prior to this invention, albeit that the same sand slinger was used thereon.

This invention, therefore, provides a process whereby the mold may be made entirely by power-operated means, and all hand ramming, heretofore considered necessary with patterns having deep cavities, is eliminated. Thus both the time consumed and the cost involved in making the mold may be greatly reduced.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In the art of founding, the process of making sand molds in a flask having its bottom closed by a match plate, said flask having its top open, which comprises, depositing facing sand into the flask through the open top thereof to cover the pattern therein, jolting the flask up and down for about a minute to compact the facing sand therein around the pattern, and thereafter slinging wads of backing sand from above into the flask through the open top thereof and upon the jolted facing sand, to further compact the facing sand and fill the flask.

2. In the art of founding, the process of making sand molds in a flask having its bottom closed by a match plate, said flask having its top open, which comprises, depositing facing sand into the flask through the open top thereof to cover the pattern therein, jolting the flask up and down for about a minute to compact the facing sand therein around the pattern, and thereafter slinging wads of backing sand from above into the flask through the open top thereof and upon the jolted facing sand, while continuing the jolting thereof to further compact the facing sand under combined jolting and the ramming action of the slung wads of backing sand, all while the flask remains open at the top.

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