A. CHRISTIANSON.

SAND MOLD AND APPARATUS FOR MAKING IT.

APPLICATION FILED JAN. 4, 1921.

1,428,359. Patented Sept. 5, 1922.

FIG.1.

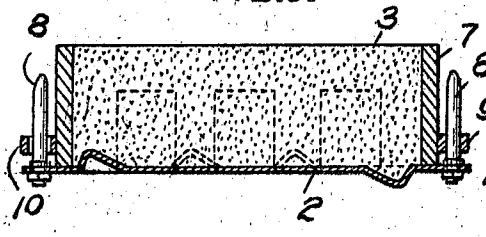


FIG.4.

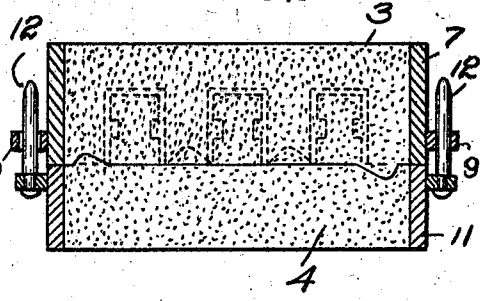


FIG.2.

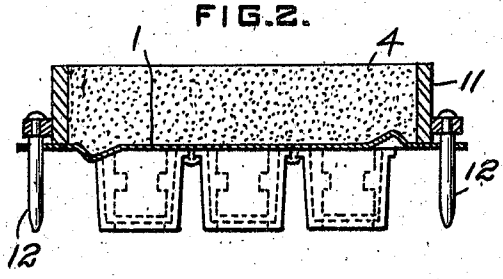


FIG.5.

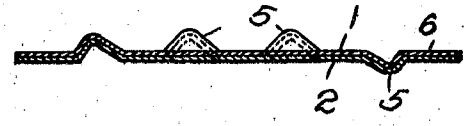


FIG.3.

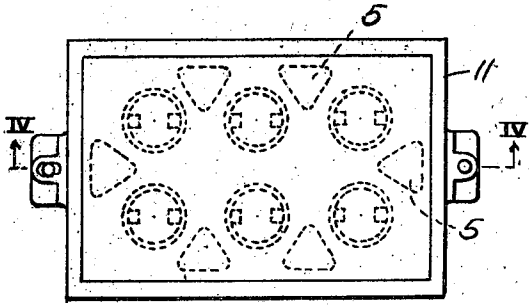
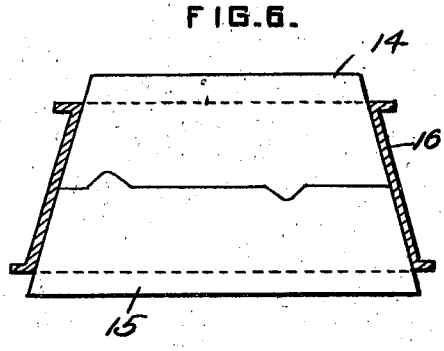


FIG.6.



WITNESSES

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UNITED STATES PATENT OFFICE.

ARNOLD CHRISTIANSON, OF DETROIT, MICHIGAN.

SAND MOLD AND APPARATUS FOR MAKING IT.

Application filed January 4, 1921. Serial No. 434,913.

To all whom it may concern:

Be it known that I, ARNOLD CHRISTIANSON, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Sand Molds and Apparatus for Making Them, of which the following is a specification.

The invention relates to sand molds for casting metal articles, and the object thereof is to construct the sand molds themselves so that their sections will interlock when assembled with each other in their proper relative positions for forming true and accurate castings, and also to provide sand molding apparatus whereby the molds may be formed in a manner and for the purpose just stated.

In practice, sand molds are formed in flasks each comprising a cope and a drag, the cope including the portions of ordinary three or more part flasks usually designated as "cheeks." After the cope and drag sections of the mold have been formed in the cope and drag, they are assembled with each other. In some classes of work the cope and drag are maintained in their position surrounding the mold sections during the casting operation, while in other classes of work, the cope and drag are removed and a special frame placed around the mold sections. When the cope and drag are not removed, they are usually locked to each other by means of pins or dowels which are relied upon to hold the mold sections in proper relative positions. However, it occasionally happens, either due to carelessness on the part of workmen or to worn pins or dowels and their receiving lugs, that the mold sections are not properly aligned. This results in untrue castings being formed. When, in the second class of work, the cope and drag are removed and a special frame placed around the mold sections, the positioning of such frame occasionally causes the mold sections to move and hence become improperly positioned with relation to each other. This, also, results in untrue castings being formed.

In the practice of the present invention, the adjacent parting faces of the mold sections are themselves provided with projections and depressions which register with each other and interlock the mold sections to each other only when such sections are properly assembled.

The invention is illustrated in the accompanying drawings of which Fig. 1 is a vertical central sectional view of a cope with the cope section of a mold formed in it; Fig. 2 is a similar view of a drag; Fig. 3 a plan view of the cope assembled with the drag; Fig. 4 a sectional view taken on the line IV—IV, Fig. 3; Fig. 5 a central sectional view of a pair of parting boards illustrating the manner in which they may be manufactured for the practice of the invention; and Fig. 6 a view corresponding to Fig. 4 showing a mold in which the flask sections have been removed and replaced by a special frame.

While the registering and interlocking projections and depressions may be variously formed in the sand at the parting faces of the mold sections, they are preferably formed by providing a parting board with suitable configurations. A single parting board may be used, one side forming the parting face of one mold section and the other the parting face of the other mold section, in which case the parting board should be quite thin. However, it is preferred to provide a separate parting board for the cope and one for the drag. A pair of parting boards 1 and 2 are indicated in Fig. 5, such boards consisting of plates which are simultaneously pressed so as to form corresponding depressions and projections 5. In the present instance, the top face of the bottom board 2 forms the parting face of a cope section 3 of a mold, and the bottom face of the plate 1 forms the parting face of a drag section 4 of the mold. By so forming the parting boards, it will be seen that the projections and depressions formed in the parting faces of the mold sections are such that accurate registry of them may be obtained when the mold sections are assembled with each other.

The molds shown herein are for casting in multiple, pistons for internal combustion engines, although it is manifest that the invention is applicable to the casting of other articles, either separately or in multiple. The invention is particularly applicable to the casting of thin walled articles wherein it is necessary to have the mold sections properly assembled with each other. The projections and indentations 5 are conveniently arranged in positions which do not interfere with the proper attachment of patterns to the parting boards. As indicated

particularly in Fig. 3, such projections and indentations are arranged between the several patterns adjacent to the flask sections, both at their sides and ends, the positions of the projections and indentations being just inside of a continuous flat rim 6 which rests against the edge of the flask sections.

In forming the cope section of a mold such as illustrated in Fig. 1, the parting board 2 may be attached to a flask cope 7 by means of pins 8 attached to the parting board and extending through lugs 9 and 10 attached to the cope. The sand may then be rammed-up around the several patterns in the usual manner. The mold drag 4 may be formed in the same way, the parting board 1 being attached to a drag 11 by means of pins 12 extending through openings formed in the parting board 1. The cope and drag are then assembled as indicated in Fig. 4, the depressions and projections on the faces of the mold sections registering with each other and interlocking the mold sections to each other in their proper relative positions. In this way, the proper positioning of the mold sections is entirely independent of the pins used for connecting the cope and flask to each other.

While the invention has the advantages just explained when used in that class of molding in which the cope and drag remain in position during the casting operation, it is particularly useful where the cope and drag are removed and special frames applied to them. In the latter case, the cope and drag sections 14 and 15 of the mold are formed as sections of a pyramid as is illustrated in Fig. 6. When the mold sections have been assembled in the positions there shown, the cope and drag are removed from them so that they may be used to form other mold sections, and a frame 16 is placed around the mold sections. By forming the parting faces of the cope and drag with registering projections and indentations, the mold sections cannot be moved laterally with respect to each other when the frame is placed over them or when the copes and drags are removed from them. There is thus eliminated the source or cause of untrue castings.

It occasionally happens that the molds for different castings being simultaneously made in a foundry differ from each other but slightly, so that, after the molds are formed, it is difficult to determine which cope should be assembled with which drag. By varying the positions of the depressions and projections of the parting boards for forming the slightly different molds, this difficulty of proper assembling of mold sections may be overcome. Other advantages of the invention may be readily apparent to those skilled in the art.

According to the provisions of the patent statutes, I have described the principle and operation of my invention, together with the mold, and apparatus for manufacturing it, which I now consider to represent the best embodiment thereof. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as explained and illustrated herein.

I claim:

1. A pair of parting boards for the cope and drag of a mold flask, said boards having a continuous flat rim and being provided with projections which register and interlock with each other when the boards are assembled with each other, the faces of the parting boards which are adjacent when so assembled forming the parting faces of a mold cope and drag.

2. In sand molding apparatus the combination with a cope and drag of a pair of parting boards for forming the adjacent faces of mold sections in the cope and drag, said boards being provided with indentations and projections for forming registering and interlocking indentations and projections in the adjacent faces of the mold sections, the boards being adapted to nest with each other when the same are abutted face to face, the faces of the parting boards which are adjacent when so assembled forming the parting faces of the mold cope and drag.

3. In sand molding apparatus the combination with a cope and drag of a pair of parting boards having a continuous flat rim contacting the ends of the respective flasks thereof, said boards adapted to nest causing their adjacent faces when in assembled relation to contact throughout their entire extent and having projections on the one fitting depressions on the other, the faces of the parting boards which are adjacent when so assembled forming the parting faces of the cope and drag whereby the respective projections and depressions formed thereon will interlock to accurately align the cope and drag.

In testimony whereof, I hereunto set my hand.

ARNOLD CHRISTIANSON.

Witnesses:
CHESTER J. MORSE,
RALPH HICOCK.