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2,900,686

METHOD FOR MAKING SAND MOLDS FOR CASTINGS

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2 Sheets-Sheet 1

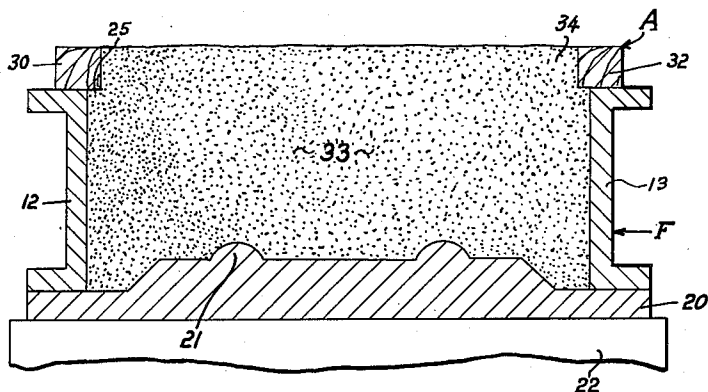


Fig. - 1

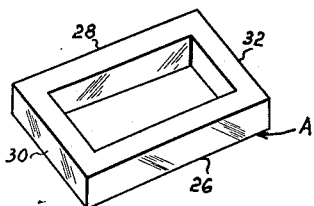


Fig. - 4

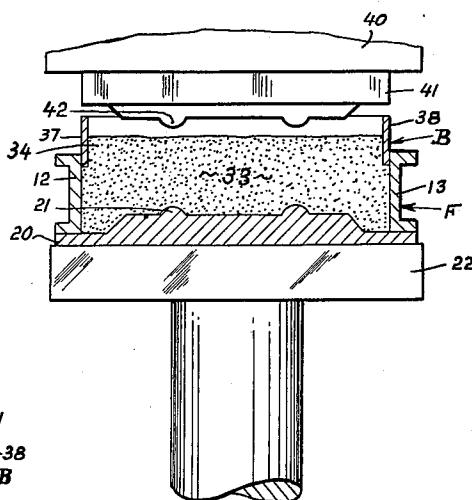


Fig. - 2

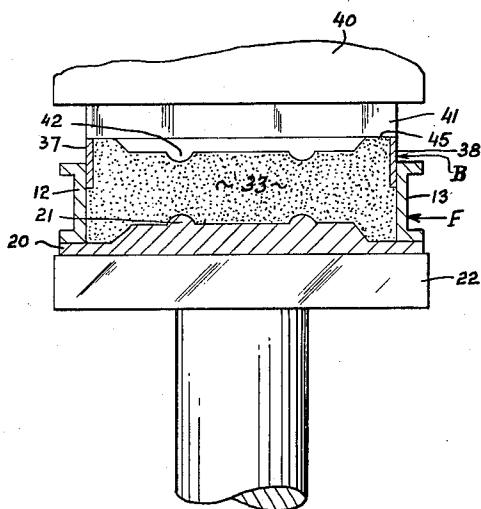


Fig. - 3

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2 Sheets-Sheet 2

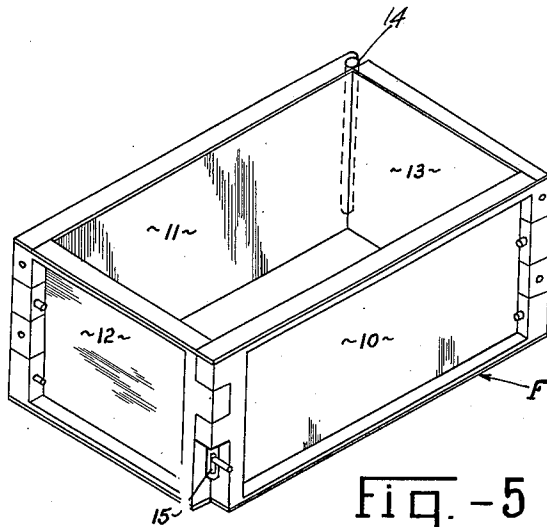


Fig. -5

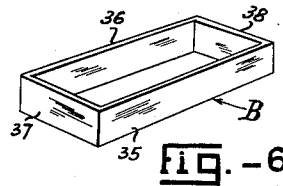


Fig. -6

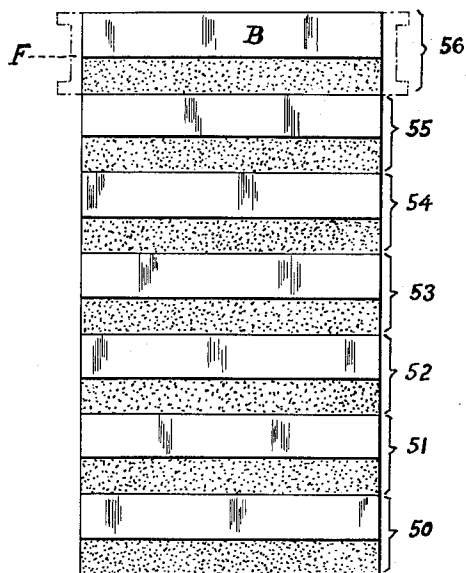


Fig. -7

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METHOD FOR MAKING SAND MOLDS FOR CASTINGS

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3 Claims. (Cl. 22—197)

This invention relates to a method for making sand
molds for casting and more particularly to molds that
are used in foundries for making metallic castings.

In one of the methods used for making metal castings,
a pattern plate is placed on the bed plate of a press, the
pattern plate having the cope forming portion of a pat-
tern thereon. A conventional rectangular molder's flask
is then placed upon the pattern plate in aligned relation-
ship therewith. The flask is then partially filled with
sand. Next, an endless member in the form of a band
is inserted into the flask (in contact with the inside
surfaces thereof) and is supported upon the sand, with a
portion of the band projecting above the top of the flask.
The band is then filled with sand after which the sand
and the band undergo a vertically directed squeezing oper-
ation wherein a press head is forced down onto the band
and the top surface of the sand until the sand is com-
pacted. Thereafter, the filled flask is transported to a
pouring station and the flask is removed from the mold.
The operation of flask filling, band inserting and squeez-
ing is repeated, whereupon a second mold section is
superimposed upon the first, the flask is removed, and, in
the case of stack molding the operation is repeated until
the desired number of molds, suitable for pouring, is
obtained.

In stack molding, the band remains embedded within
the sand of each section after the flask is removed and
provides a reinforcement against bursting of the stack
upon the introduction of the molten metal thereto. One
of the chief difficulties of the above method has been
that of estimating the correct amount of sand to pour
into the flask to assure uniform compacting of the sand
under varying degrees of sand consistency.

It is an object of the present invention to provide a
method for making sand molds wherein the correct amount
of sand to be put into a flask may be simply and quickly
measured during the filling operation thereof so as to
insure uniform compacting of the sand under varying
degrees of sand consistency.

Briefly, the foregoing objects are accomplished by the
provision of a method for making castings carried out by
supporting an empty molder's flask upon a pattern plate
which in turn rests upon a press bed plate. The pattern
plate has a cope forming portion of a pattern thereon.
A rectangular frame, of predetermined dimensions (the
sides of which are preferably hollow) is then placed over
the flask in aligned relationship therewith. Sand is in-
serted loosely into the flask and into the frame until
the sand reaches the top level of the frame. Next, the
operator levels off the top of the sand even with the top
surface of the frame by any suitable means, as for ex-
ample by a straight-edged blade. The frame is dimen-
sioned so that at the completion of the last operation
the flask and frame contain substantially the exact amount
of sand required to assure uniform compacting of the
sand under a predetermined force exerted by a press head.
The rectangular frame is then removed, after which an
endless member or band is inserted into the flask and is

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supported upon the sand, with a portion of the band pro-
jecting above the top of the flask. The squeezing operation
is then commenced whereby a press head having a pattern
plate on the under surface thereof is forced down onto
the top of the sand and onto the band therein. The
squeezing is continued until the head has completed the
full extent of movement. This occurs while the top
of the band and likewise the top surface of the sand are
above the top surface of the flask. Thereafter, the filled
flask is transported to a pouring station and the flask is
removed from the mold. The operation of flask filling
and band inserting is repeated, whereupon a second mold
section is superimposed upon the first, the flask is re-
moved and, in the case of stack molding, the operation
is repeated until the desired number of molds suitable
for pouring is obtained.

In the drawings:

Fig. 1 is a vertical sectional view through a mold sec-
tion which is made in accordance with the present inven-
tion.

Fig. 2 is a side elevational view of a molder's flask
interposed between the bed plate and the press head of
a foundry press and showing a step in the formation
of a mold section; in this view the flask, bottom pattern
plate and band are shown in vertical section.

Fig. 3 is a view similar to Fig. 2 showing an additional
step in the formation of a mold section.

Fig. 4 is a perspective view of the rectangular frame
which is inserted on the flask in carrying out the method
of the invention. In this view the frame is on a scale
reduced from that shown in Fig. 1.

Fig. 5 is a perspective view of the flask used in carry-
ing out the method of the present invention.

Fig. 6 is a perspective view of the band which is in-
serted into the flask in carrying out the method of the
invention. In this view the band is on a scale reduced
from that shown in Fig. 5.

Fig. 7 is a side view showing a stack of mold sections
made in accordance with the method of the present in-
vention.

The present invention is adapted for making a single
mold cavity by superimposing a cope section over a drag
section. Additionally, the invention is adapted for stack
molding, wherein any desired number of sections may
be superimposed upon each other, and wherein each sec-
tion has a cope cavity on one side and a drag cavity
on the opposite side so that a pair of cavities register
to form a single mold cavity into which the molten metal
is to be poured.

Referring to the drawings there is shown a flask F which
comprises side walls 10 and 11 and end walls 12 and 13.
The walls are hinged together as at 14 (Fig. 5), and are
locked at 15 to form a rectangular frame which is open
at the top and bottom.

In forming a mold section, a pattern plate 20 is fixed
to the bed plate 22 of a foundry press (Fig. 1). The
pattern plate 20 has a cope forming portion 21 of a pat-
tern thereon. The empty flask F is placed upon the
plate 20 in aligned relationship therewith. A hollow
rectangular frame A is then placed on top of the flask
F in aligned relationship therewith. The frame A (Fig.
4) has sidewalls 26 and 28 and end walls 30 and 32.
The inside dimensions of the frame are smaller than the
inside dimensions of the flask, so that the sand above
the flask is offset by an amount sufficient to provide a
shoulder 25 (Fig. 1) for positioning and supporting a
band B. The flask, with the frame A centered thereon, is
then filled with sand 33 to the top surface of the frame A.
At this point, an operator may smooth off the top sur-
face of the sand flush with the top surface of the frame
A (as shown in Fig. 1) with a straight-edged blade. The
flask and frame now contain substantially the correct

volume of sand required to assure uniform compacting of the sand upon exertion of the full force of the press.

Next the frame A is removed from the top of the flask and the band B (Fig. 6) having the side walls 35 and 36 and end walls 37 and 38 may be placed around the projecting portion 34 (Fig. 2) of the sand and supported upon the shoulder 25 which extends around the periphery of the portion 34. At such time a part of the band will project above the top of the sand. The band B is complementary to and has a close fitting, but sliding engagement with the side and end walls respectively of the flask.

Next, a press head 40 having a pattern plate 41 thereon is used for the squeezing operation upon the sand. The plate 41 carries the drag portion 42 of a pattern, which matches the cope portion 21 on the plate 20. During the squeezing operation the band is forced down into the flask until the press head has moved to the fullest extent permissible under the available pressure acting upon the head. Such pressure is sufficient to obtain adequate compacting of the sand without forcing the band entirely into the flask, as shown in Fig. 3. Simultaneously, the drag portion of the mold cavity is formed in the top surface of the sand, while the cope portion is formed in the bottom surface of the sand. During this operation a smooth marginal surface 45 is formed around the periphery of the mold cavity. This serves as a support for the superimposed mold section.

After the squeezing operation, a filled flask is removed from the press and is transported to a pouring station and the flask is removed. This leaves the mold section 50 (Fig. 7) as self supporting, with the band B embedded in the sand.

The empty flask is returned to the press and placed upon the pattern plate 20 and the operation above described is repeated. The second filled flask is then removed from the press, transported to the pouring station, and superimposed upon the mold section 50 and the flask is removed. This leaves a mold section 51 superimposed upon the mold section 50, at which time the cope cavity in the mold section 51 is in registration with the drag cavity in the section 50, thus forming a complete mold cavity.

The single mold cavity may be filled with metal after the mold section 51 is placed on the mold section 50. However, for stack molding, additional mold sections, identical with those designated 50 and 51 are subsequently made and superimposed upon the stack, as at 52, 53, 54, 55 and 56, after which the stack may be poured in the usual way. In Fig. 7 the flask F is shown in broken lines as illustrating the position of the flask before removal after the section 56 is placed upon the section 55.

The terms and expressions which have been employed are used as terms of description and not of limitation and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof.

I claim:

1. A method of making a sand mold comprising, placing an empty flask on an upwardly facing pattern plate in aligned relation therewith, positioning an open top and bottom sand measuring frame of predetermined volume on the flask in aligned relation therewith, the outside horizontal dimensions of said frame being greater than the corresponding inside horizontal dimensions of said flask whereby said frame is supported by said flask and the inside horizontal dimensions of said frame being smaller than the corresponding inside horizontal dimensions of said flask, filling the flask and frame with molding sand up to the upper level of said frame, removing the frame from the flask to form an upwardly extending section of sand projecting above the upper extremity of said flask and an upwardly facing continuous off-set shoulder of sand adjacent to and substantially level with the upper extremity of said flask, placing a band having

the same general plan configuration as the flask on said sand shoulder so as to surround said sand section in generally engaged relation therewith with the exterior horizontal dimensions of said band being just slightly less than the corresponding interior horizontal dimensions of said flask and with the upper extremity of said band extending above the upper extremity of said sand section, applying a predetermined compressive force to the top of the band by compression means including a downwardly facing pattern plate, the pattern portion of which is adapted to be received in said band, and forcing the band downwardly partially into the sand in the flask and engaging the top surface of said sand section by said last mentioned pattern portion whereby a mold cavity is formed in the top surface as well as in the bottom surface of the sand, squeezing the sand between said pattern plates into a predetermined density by said compressive force with the uppermost extremity of said band being located in finalized position level with the uppermost extremity of the sand and above the upper extremity of said flask, removing the compression means and then removing the flask from the sand mold and leaving the band embedded in the sand as a reinforcement for the mold.

2. A method of making sand molds comprising, placing an empty flask on an upwardly facing pattern plate in aligned relation therewith, positioning an open top and bottom sand measuring frame of predetermined volume on the flask in aligned relation therewith, the outside horizontal dimensions of said frame being greater than the corresponding inside horizontal dimensions of said flask whereby said frame is supported by said flask and the inside horizontal dimensions of said frame being smaller than the corresponding inside horizontal dimensions of said flask, filling the flask and frame with molding sand up to the upper level of said frame, removing the frame from the flask to form an upwardly extending section of sand projecting above the upper extremity of said flask and upwardly facing continuous offset shoulder of sand adjacent to and substantially level with the upper extremity of said flask, placing a band having the same generally plan configuration as the flask on said sand shoulder so as to surround said sand section in generally engaged relation therewith with the exterior horizontal dimensions of said band being just slightly less than the corresponding interior horizontal dimensions of said flask and with the upper extremity of said band extending above the upper extremity of said sand section, applying a predetermined compressive force to the top of said band by compression means including a downwardly facing pattern plate, the pattern portion of which is adapted to be received in said band, and forcing said band downwardly partially into the sand in said flask and engaging the top surface of said sand section by the last mentioned pattern portion whereby a drag portion of a mold cavity is forced in the top surface of the sand and a complementary cope portion of a mold cavity is formed in the bottom surface of the sand, squeezing the sand between said pattern plates into a predetermined density with said compressive force and forming smooth parallel marginal portions around the respective cope and drag cavity portions with the uppermost extremity of said band in its finalized position being level with the uppermost extremity of the sand and above the upper extremity of said flask, removing the compression means and transporting the filled flask and associated band to a pouring station, removing the flask from the sand mold and leaving the band embedded in the sand as a reinforcement for the mold, repeating the above flask and frame filling and squeezing operations of a flask with another band and superimposing the filled second mentioned flask and associated band on the first mold whereby the cope cavity portion in the bottom surface of the second mold cooperates with the drag cavity portion in the top surface of the first mold to form a complete mold cavity, removing the flask from the second mold and

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leaving the second band embedded in the second mold.

3. A method of stack molding comprising, placing an empty rectangular flask in aligned relation on an upwardly facing pattern plate having a cope forming portion of a pattern thereon, positioning an open top and bottom rectangular sand measuring frame of predetermined volume on the flask in aligned relation therewith, the outside horizontal dimensions of said frame being greater than the corresponding inside horizontal dimensions of said flask whereby said frame is supported by said flask and the inside horizontal dimensions of said frame being smaller than the corresponding inside horizontal dimensions of said flask, filling the flask and frame with molding sand, smoothing off the top surface of the sand flush with the top surface of said frame, removing the frame from said flask to form an upwardly extending section of sand projecting above the upper extremity of said flask and an upwardly facing continuous shoulder of sand adjacent to and substantially level with the upper extremity of said flask, placing a band having the same general plan configuration as said flask on said sand shoulder so as to surround said sand section in generally engaged relation therewith with the exterior horizontal dimensions of said band being just slightly less than the corresponding interior horizontal dimensions of said flask and with the upper extremity of said band extending above the upper extremity of said sand section, applying a predetermined compressive force to the top of said band by compression means including a downwardly facing pattern plate, the pattern portion of which is adapted to be received in said band, and forcing said band downwardly partially into the sand in said flask and substantially simultaneously engaging the top surface of said sand section by the last mentioned pattern portion whereby a drag portion of a mold cavity is formed in the top surface of the sand and a complementary cope portion of a mold cavity is formed in the bottom surface of the sand, squeezing the sand between said pattern plates in

a predetermined density with said compressive force and forming smooth parallel marginal portions around the respective cope and drag cavity portions with the uppermost extremity of said band in its finalized position being level with the uppermost extremity of the sand and above the upper extremity of said flask, removing the compression means and transporting the filled flask and associated band to a pouring station, removing the flask from the sand mold and leaving the band embedded in the sand for a reinforcement for the upper portion of the mold in the vicinity of and surrounding said drag portion of the mold cavity, repeating the above operations of flask and frame filling, band inserting, and squeezing of the sand with another band and superimposing the filled second flask and associated band on the first mold whereby the cope cavity portion in the second mold cooperates with the drag cavity portion in the first mold to form a complete mold cavity, removing the flask from the second mold and leaving the second band embedded in said second mold, and then repeating the above operations of filling, band inserting, squeezing, transporting, and removing the flask until a desired number of molds are disposed in stacked relationship, and then filling the mold cavities with metal.

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