April 18, 1939. E. F. OYSTER ET AL 2,155,099

METHOD OF MANUFACTURING SAND MOLDS FOR METAL CASTINGS

Filed Jan. 19, 1938 3 Sheets-Sheet 1

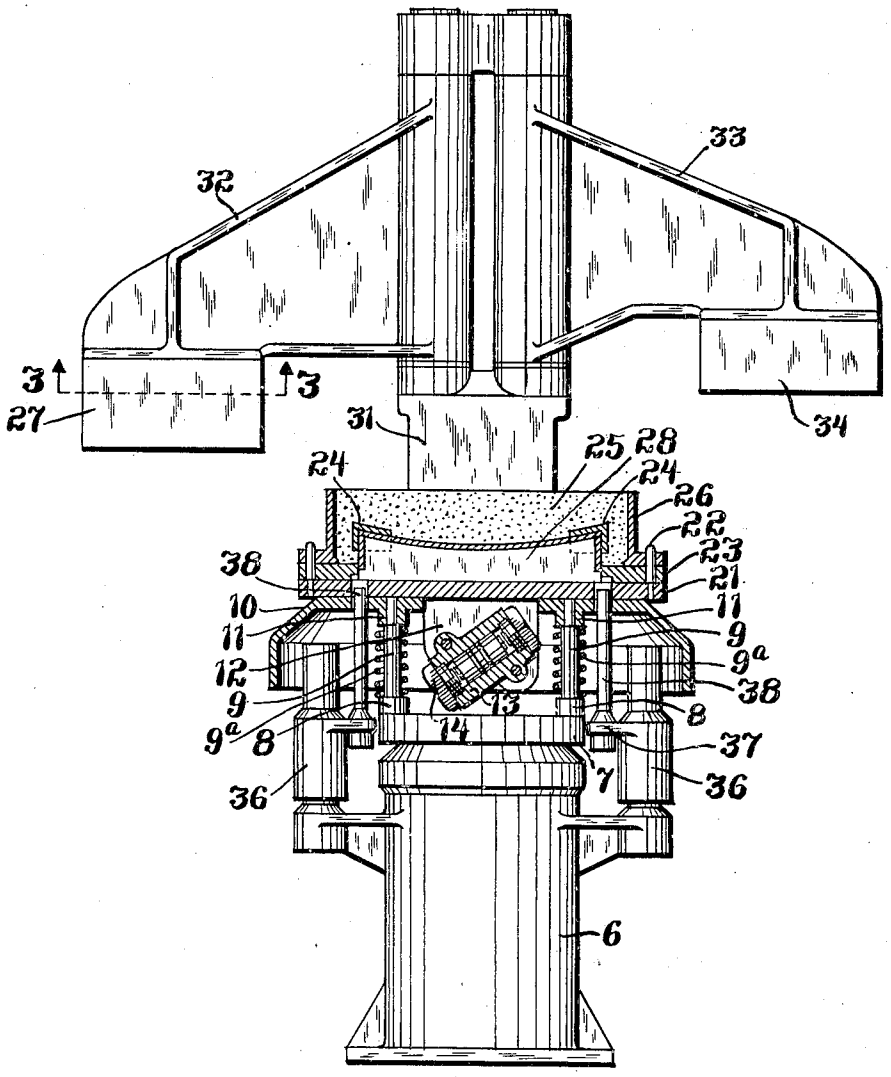


FIG 1

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METHOD OF MANUFACTURING SAND MOLDS FOR METAL CASTINGS

Filed Jan. 19, 1938 3 Sheets-Sheet 2

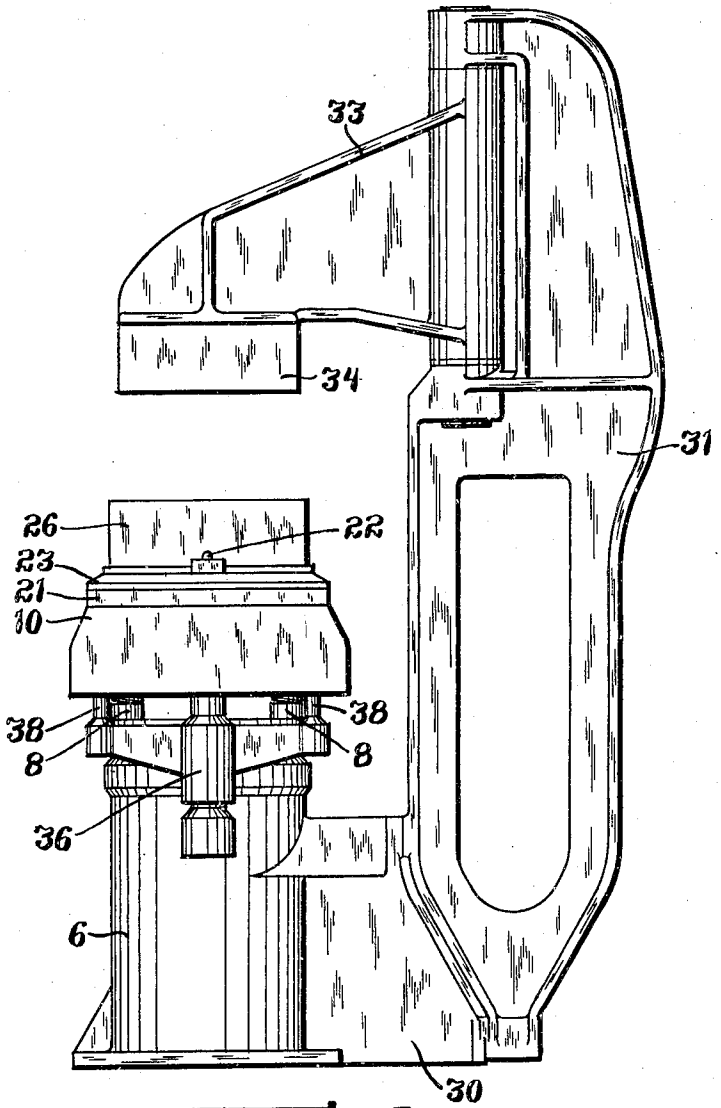


FIG 2

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METHOD OF MANUFACTURING SAND MOLDS FOR METAL CASTINGS

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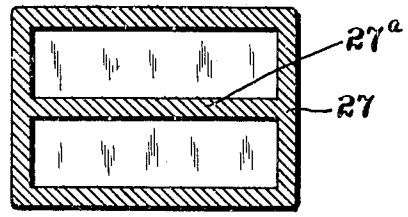


FIG 3

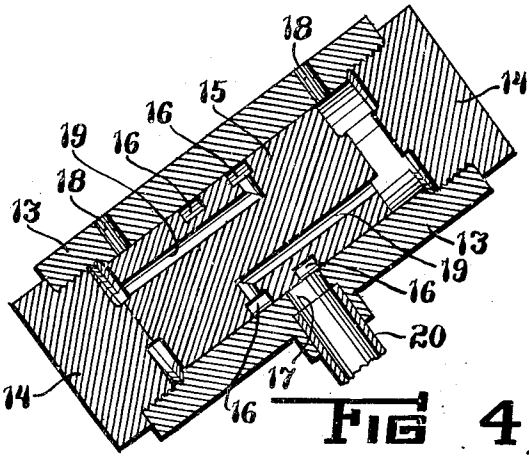


FIG 4

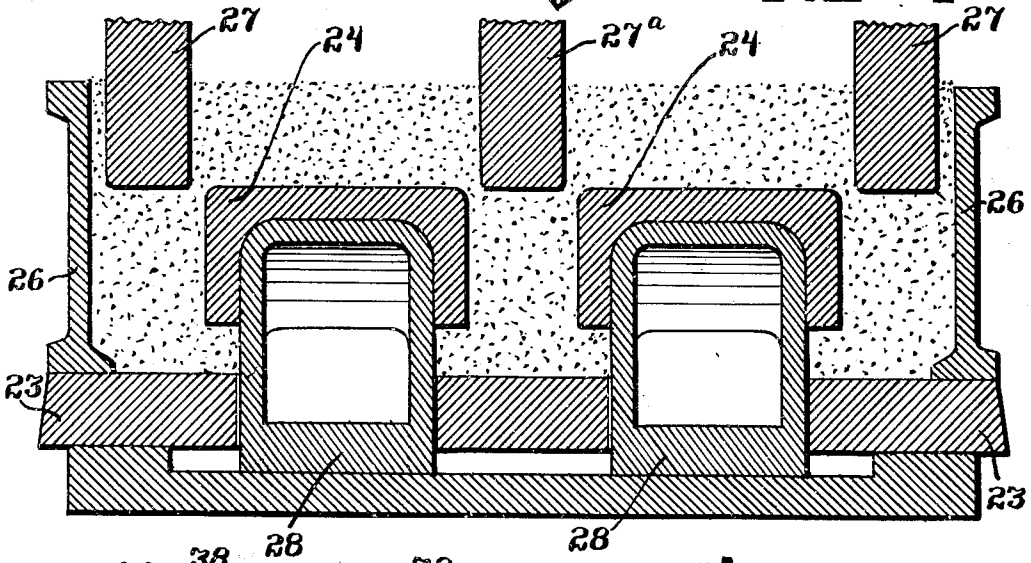


FIG 5

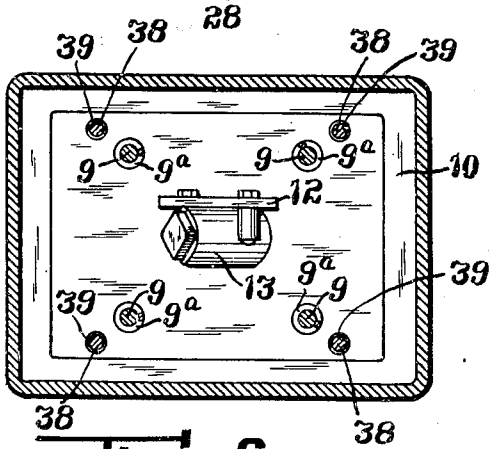


FIG 6

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Patented Apr. 18, 1939 2,155,099

UNITED STATES PATENT OFFICE

2,155,099

METHOD OF MANUFACTURING SAND MOLDS FOR METAL CASTINGS

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Application January 19, 1938, Serial No. 185,702

3 Claims. (Cl. 22—193)

This invention relates to improvements in the art of manufacturing sand molds for metal castings.

While the invention is intended for use generally wherever it may be advantageously employed, it is particularly adapted for use in forming sand molds for casting brake shoes.

In making sand molds for brake shoe castings, it is necessary to use chills which are placed on the pattern and which project beyond the sides thereof thus creating a back draft, or cavity which must be completely packed with sand to produce a usable mold. The ramming or packing of the molding sand in making brake shoe molds must be accomplished without disturbing the position of the chills and the molding sand must be firmly packed under the projecting edges of the chills which are placed on the pattern prior to the act of ramming the mold.

In the manufacture of sand molds, it is necessary to pack the sand solidly about the pattern. This has been done by tamping in which a downward pressure is applied to the surface of the sand; by jolting, in a series of impact blows transmitted to the sand causing the same to settle and pack to the required density; by peaning, in which pressure is applied to a pean which is forced downwardly into the sand in the deep portions of the mold and by squeezing, in which a squeeze head is brought into forced contact with the surface of the sand. While all of these operations have been employed in mechanical molding methods and accomplished on molding machines it has been found impossible to impart sufficient lateral flow to the sand to pack it under the edges of chills and other projecting ledges. In tamping, jolting, peaning or squeezing, the movement of the sand is downwardly with no beneficial lateral packing action as the sand arches under the pressing member, thereby limiting the horizontal movement thereof. Heretofore it has been necessary to resort to tucking to accomplish this result. Tucking a mold of this character has never been successfully accomplished by mechanical methods and it has been necessary to perform this operation by hand labor.

It is a purpose of this invention to provide a method by which mechanical means can be employed to destroy the arching action of the sand and force it downwardly, laterally and upwardly and solidly pack the same under the projecting ledges of a pattern, under chills, ram-up cores and other projecting parts of a pattern whereby perfect molds of the character indicated can be produced on a molding machine.

It is an object of this invention to provide an improved method of manufacturing such molds in which a molding machine may be employed to quickly and accurately produce molds of the character above indicated and in which the sand is firmly and uniformly packed.

Other objects are to provide a method of manufacturing molds which will include, simultaneously subjecting the sand to a peaning squeeze and to oscillatory impacts or vibrations and to subject the sand to a squeeze pressure and to impacts and vibrations to break the resisting arch in the sand and give it a settling movement in both a vertical and a horizontal direction.

The above objects are accomplished and additional ends are attained by the novel method herein described with reference to the accompanying drawings in which there is illustrated practical means for carrying the invention into effect, it being understood that changes and modifications may be made which come within the scope of the claims hereunto appended.

In the drawings:—

Figure 1 is a front, elevational view of the molding machine herein described with parts shown in vertical section to more clearly illustrate the invention,

Figure 2 is a side elevational view of same,

Figure 3 is a horizontal, sectional view taken as indicated by the lines 3—3 of Figure 1,

Figure 4 is a longitudinal, sectional view of the oscillating cylinder employed in reducing the invention to practice,

Figure 5 is a vertical, sectional view of a pattern plate showing the stripping plate and flask with the pattern operatively positioned therein, the same being shown with portions of the peaning plates in an operative position relative thereto.

Figure 6 is a cross sectional view taken as indicated by the lines 6—6 of Figure 1.

In the drawings there is shown a molding machine having a conventional base 6 providing a vertical, hollow cylinder in which there is operatively mounted a piston provided at the upper end thereof with a table 7. The table 7 is provided on the upper face thereof with a plurality of hollow bosses 8 each of which is arranged adjacent a corner thereof and in which is slidably received the lower ends of the pins 9.

The numeral 10 denotes an oscillator table which is provided with a plurality of bosses 11 which project from the downwardly presented side of the table, each in axial alinement with one of the bosses 8. Each of the pins 9 are

secured in one of the bosses 11 and a coil spring 9a is mounted on each pin to normally bear the weight of the oscillator table 10. The oscillator table 10 is also provided on the lower side thereof with a centrally positioned, downwardly projecting web 12 on which is mounted an oscillator cylinder 13. The cylinder 13 is bolted or otherwise securely attached to the web with its axis disposed at approximately a 45° angle to a horizontal plane. Each end of the cylinder 13 is securely closed by means of the heavy plugs 14 and a hammer in the form of a piston 15 is mounted for reciprocatory motion in the cylinder.

The piston 15 is provided with two circumferentially extending channels 16 which are arranged in spaced relation around the middle portion of the piston to alternately communicate with the intake port 17. The cylinder 13 is provided adjacent each end thereof with exhaust ports 18 and a passage 19 in the piston 15 leads from each end of the cylinder to the groove 16 positioned farthest therefrom. A suitable tube 20 may be connected to the cylinder 13 in communication with the intake port 17 through which air or other fluid under pressure will cause a high frequency reciprocation of the piston 15 and will cause the ends thereof to be brought into forced contact with the oppositely positioned plugs 14 in very rapid succession, and cause a high frequency vibration which is communicated to the spring supported oscillator table 10.

The numeral 21 denotes a pattern plate which is positioned on the oscillator table 10 and which is provided with suitable dowels 22. A stripping plate 23 is positioned on the pattern 21 and a flask is positioned in the usual manner on the stripping frame 23.

The dowels 22 project upwardly through suitable bores in the stripping frame and in the base flange of the flask to hold the flask in a proper position.

The numeral 28 denotes a pattern which is positioned on the pattern plate 21 and the numeral 24 denotes chills which are positioned on the pattern as shown in the drawings. The base portion 6 is provided with an extension 30 which projects rearwardly therefrom. A frame 31 projects upwardly from the extension 30 and a peaning arm 32 and squeeze arm 33 are hingedly secured thereto for swinging movement on vertical axes. The peaning arm 32 is provided with a suitable pean 27 which may be swung in position over the flask 26 as shown in the drawings.

In the drawings there is shown two patterns 28 positioned on the pattern plate 21. A cross sectional view of the pean 27 is illustrated in Figure 3 wherein there is shown side and end walls which are adapted to exert a pressure on the portion of the sand positioned between and surrounding the patterns.

In the particular adaptation of the invention shown, the pean has a middle wall 27a arranged to exert a pressure on the portion of the sand positioned between the patterns 28. The other arm 33 is provided with a squeeze head 34 which may likewise be swung into a position above the flask 26. The flask is positioned as herein set forth and filled with sand 25; the arm 32 is swung to bring the pean 27 in an operative position over the flask 26. Air is then admitted to the cylinder 6 to raise the table 14 and bring the sand 25 into forced contact with the pean 27 and compressed air is admitted through the pipe 20 to the cylinder 13 causing an oscillation of the piston 15. The impact of the piston 15 against one or both ends of the cylinder 13 results in a vibration or jarring movement of the spring supported table 10. As the cylinder 13 is positioned with its axis disposed at an angle to a horizontal plane, the oscillation of the piston 15 in the cylinder 13 imparts a like impact or vibration to the sand 25 which settles the same both vertically and horizontally and completely and firmly packs the same in the space between the chills 24 whereby the sand subjected to the peaning squeeze is true to the pattern. The pressure to the cylinder 13 is then discontinued and the table 10 is lowered, the pean is then swung to an inoperative position and the arm 33 is operated to bring the squeeze head 34 over the flask 26. Air or other fluid under pressure is then admitted to the cylinder 6 in the ordinary manner and the sand 25 is brought into forced contact with the squeeze head 34 to complete the packing of the sand 25 in the flask 26.

The draw cylinder 36 may be operated to raise the yokes 37 and push the draw pins 38 upwardly through the openings 39 in the table 10 and through coinciding openings in the pattern plate 21 to raise the flask and stripping plate upwardly and draw the same from the pattern 28.

While we have shown and described an oscillating cylinder 13 having a piston 15 which impacts against either end 14 of the cylinder 13, it is understood that the process includes a vibration or oscillation which may be caused by an impact against either end 14 of the cylinder 13 or any like movement produced by any suitable means. It will also be understood that the term "oscillating impacts" employed in the claims includes vibrations, oscillations or any like movement, and, while we have shown means for creating high frequency oscillations or vibrations, it will be understood that the impacts may be of any frequency which will obtain the desired result.

By forcing the pean heads 27, 27a downwardly into the sand, pressure is applied directly to the deep portions thereof, but this operation alone is not sufficient to pack the sand firmly under the edges of the chills. Subjecting the sand to oscillating impacts also settles and packs the same around the vertical and upwardly presented surfaces of the pattern but will not produce sufficient lateral movement of the sand to pack the same under the edges of the chills or other downwardly presented pattern surfaces. By simultaneously peaning the sand and subjecting it to oscillatory impacts as herein set forth, the arching action of the sand is destroyed causing it to flow downwardly, upwardly and horizontally packing it firmly beneath the projecting edge portions of the chills 24 or other downwardly presented surfaces.

The invention thus provides an improved method which can be followed to mechanically produce sand molds for patterns having chills or other downwardly presented surfaces.

Having thus fully described our improved process, what we claim is:—

1. A method of making a mold comprising placing a pattern in a flask, filling the flask with sand, piercing the sand on a relatively restricted area down to the region adjacent the pattern and simultaneously subjecting the sand to vibrations.

2. A method of making a mold comprising placing a pattern in a flask, filling the flask with sand, piercing the sand on a relatively restricted area to a level beneath the top of the pattern and

simultaneously subjecting the sand to vibrations.

3. A method of making a mold around a pattern having a shoulder beneath which sand must be placed, comprising positioning the pattern within a flask, filling the flask with sand, piercing the sand on a relatively restricted area down to the region of the pattern so as to cause the sand to flow under the shoulder on the pattern and simultaneously subjecting the sand to vibrations.

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