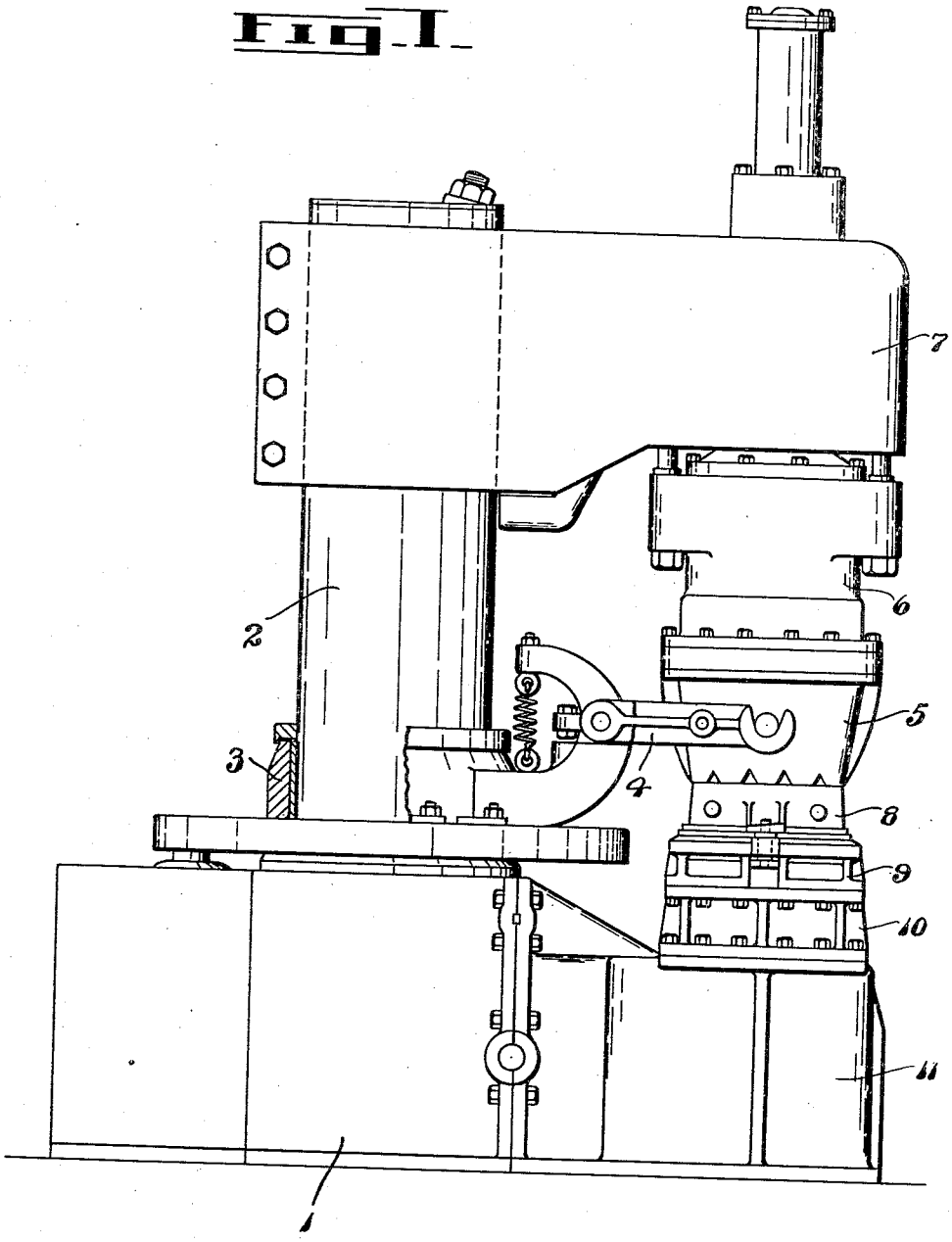
Oct. 17, 1939. D. J. CAMPBELL 2,176,328

SCREEN FOR MOLDING MACHINES

Filed May 2, 1938 3 Sheets-Sheet 1

Fig. 1.



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Filed May 2, 1938 3 Sheets-Sheet 2

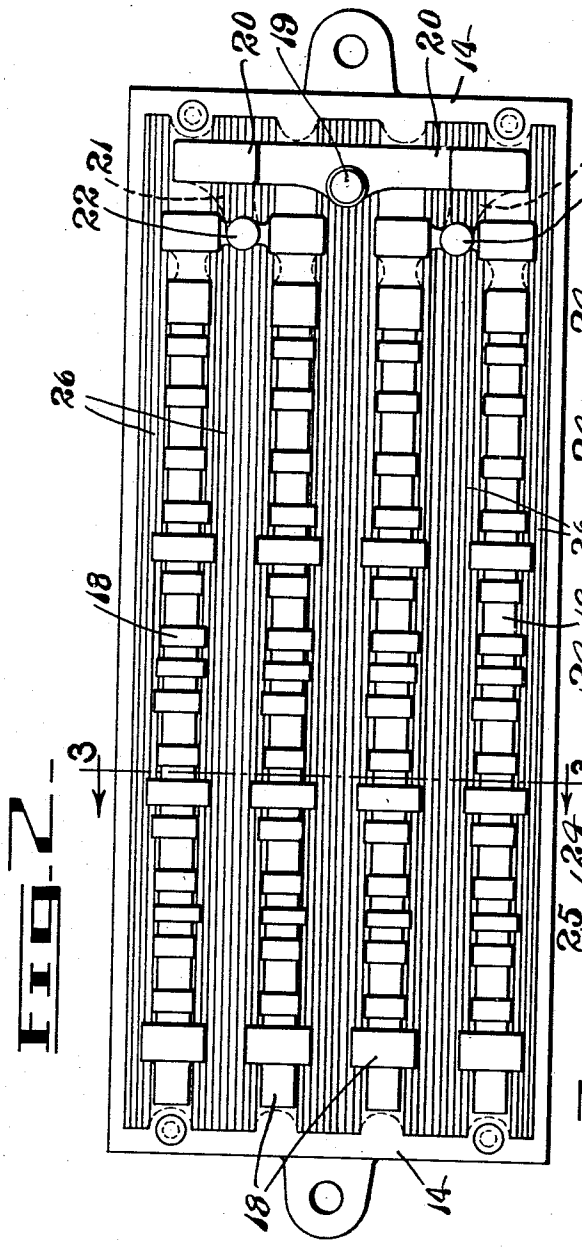


Fig. 2

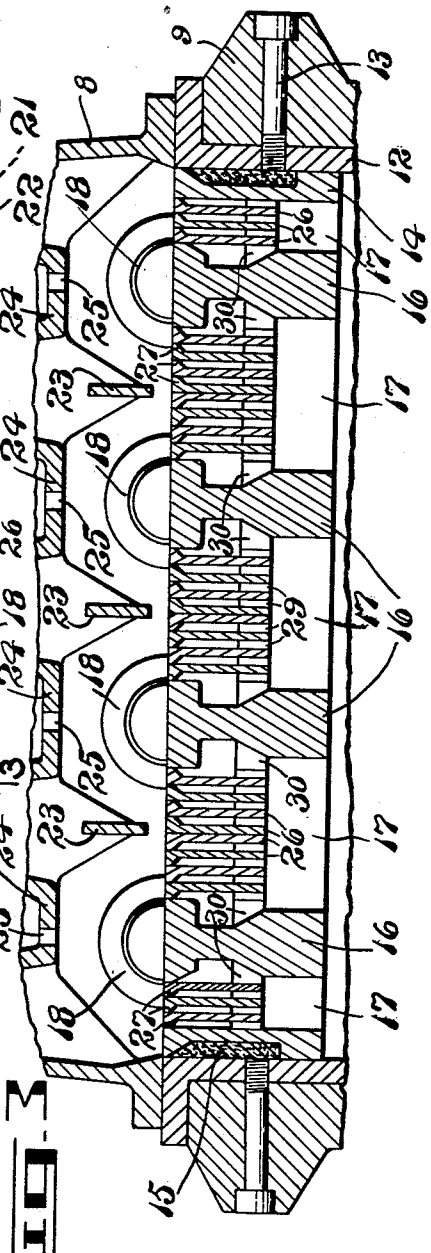


Fig. 3

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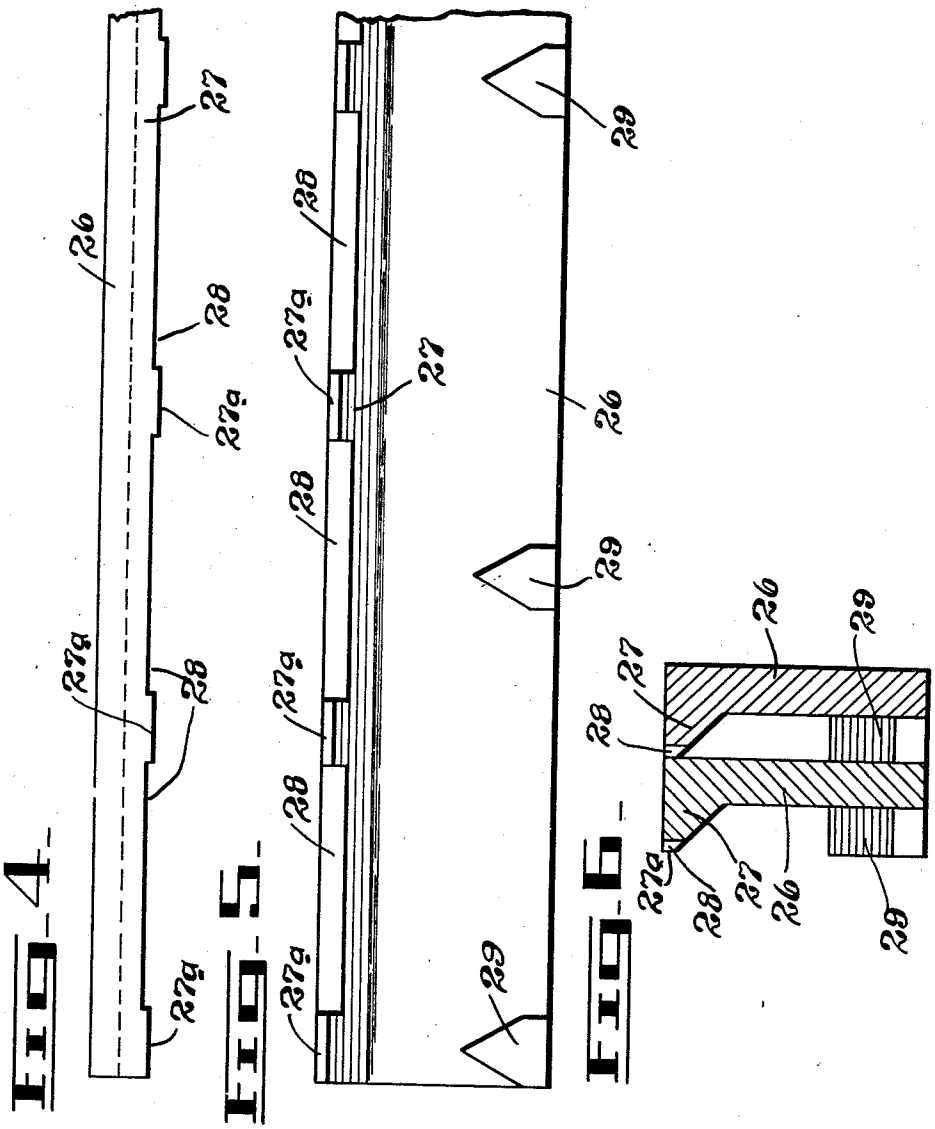


Fig. 4.

Fig. 5.

Fig. 6.

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Patented Oct. 17, 1939

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SCREEN FOR MOLDING MACHINES

Donald J. Campbell, Spring Lake Township, Ottawa County, Mich.

Application May 2, 1938, Serial No. 205,573

8 Claims. (Cl. 22—157)

This invention relates to molding machines, and particularly to a screen construction for use in molding machines in which the sand is driven and forced from a sand holding hopper into a flask and against a pattern by means of air pressure acting upon the sand in the hopper to project it into the flask and against and around said pattern or patterns.

It is common in the prior art pertaining to so-called compressed air or pneumatic molding machines to provide vents for the escape of air which passes through the sand from the flask. The usual ways are to provide a large number of holes through the pattern support and secure a screen, for example as of woven wire over the holes, which screen will block the sand presumably and permit the passage of air. Another way is to solder or otherwise fasten perforated thimbles in the holes. Such methods of venting the air are subject to either one of two disadvantages. If enough air venting holes are made, the pattern support is weakened and is not capable of withstanding the very heavy pressure, which it must undergo in service without deformation under the pressure, which deformation may be either permanent or which upon release of the pressure will have an effect of disturbing the mold. If enough air vent holes are not made and the strength of the pattern is not thus greatly reduced, there will not be sufficiently rapid air escape and the velocity of the sand being blown into the flask and against the pattern will be retarded. The sand of the mold will not be packed uniformly about the pattern nor will it have sufficient hardness to prevent swelling of the casting made in the mold. Such swelling actually is due to an enlargement or expansion of the mold cavity through the force exerted against its sides by the pressure of the molten metal when the sand is not sufficiently packed. With my invention there is produced, and it is an object of the invention to produce, a screen that will permit air to escape more rapidly and evenly from the flask and not retard the velocity of the sand as it is blown into the flask as occurs with the methods and screens previously used, which cause loss of strength in the apparatus. The velocity of molding sand blown into the flask and around the pattern will not be obstructed and retarded in its entrance and movement, and therefore, the sand is permitted to enter the mold with a higher velocity, resulting in a harder packing of the sand and more uniformly about the pattern against which it is blown.

In my prior application, Serial No. 755,688, initially filed December 3rd, 1934, there is shown a molding machine of a character and type in which my novel invention of a screen is applicable for use; and in said application there is shown and described the previously referred to foraminous wire screen at the under side of the pattern support. The screen of the present invention may be used in machines of this type and character, but is not limited to the specific machine therein disclosed, as it is capable of being employed on most molding machines of the sand blow or compressed air operated type.

An understanding of the invention may be had from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is an elevation of a molding machine somewhat similar to that shown in the previously identified application in which my invention of screen is adapted to be used.

Fig. 2 is a plan view of the flask and pattern support and the associated screen structure, the patterns also being shown in plan.

Fig. 3 is a transverse section taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary plan view of one of the screen bars, a large number of which are used.

Fig. 5 is a similar side elevation thereof, and Fig. 6 is an enlarged transverse sectional view showing two of the screen bars located side by side as in use.

Like reference characters refer to like parts throughout the several views.

The molding machine shown in Fig. 1 includes a heavy base support 1 for a vertical column 2, rotatably mounted on which is a collar 3 which carries a plurality (usually three) of yokes 4 between and on the arms of each of which a sand hopper 5 is carried. The sand hopper when loaded with sand is adapted to be placed underneath the lower end of an air chamber structure 6 which, together with the mechanism for operating it, is carried on an overhead support 7 mounted upon the upper portion of the column 2. The flask 8 into which the sand is to be projected is located below in the said hopper and in a position such that the hopper when in service position, at its lower end will come directly thereover. Said flask is supported by the several supports 9, 10, and 11, the latter of which is a base housing connected with the first described supporting housing 1. The detail of this machine is not herein entered into at all as the invention is not directed thereto. A companion application hereto filed May 2, 1938 and bearing Serial No. 205,572 for patent upon the structural de-

tail of the machine will fully disclose its structure and operation, said companion application being directed to improvements in the machine shown in the above noted application Serial No. 755,688.

The flask 8 is located directly upon an open frame 12 within the support 9. Said frame is connected to said support by the screws 13 shown in Fig. 3. Within the frame 12 is an open frame 14 having a continuous recess around its outer portions for a part of its height in which a suitable fibrous packing 15 is positioned. Pattern supporting bars 16 of relatively heavy cross section extend in the present disclosure lengthwise of the frame 14 between its ends; and transversely of the frame between its sides and betwen the bars 16 are screen supporting bars 17, these extending between the lower portions of the bars 16 and permanently or integrally connected therewith. The bars 17 are spaced apart from each other, lie transversely of the bars 16 and form a rigid support for the screen bars and hold them from bending or springing downwardly as the sand which forms the mold is forced into the flask, and also later when the upward squeeze against the sand in the mold is performed, as described in the above noted companion application.

The pattern at 18, which in this case illustrates a pattern for one-half of a cam shaft, lie lengthwise of, directly over and upon the bars 16 and are secured thereto. Such patterns are provided with portions 19, 20, 21 and 22, (those at 21 being shown in dotted lines) for the lateral runners, connecting gates and risers which are necessary in the cope portion of a mold for the introduction of the molten metal thereto.

The flask is preferably formed with spaced apart flask bars 23 within and extending lengthwise and parallel with and between and above the patterns at 18 (Fig. 3), and also with relatively wide bars 24, recessed at their upper sides and with openings at 25, sand being forced into the mold between the relatively wide bars 24 and also through the openings 25 therein. The bars 23 serve to support the sand in the mold after it has been formed, the openings 25 are openings through which sand is directly blown on top of the patterns by compressed air, though the greater proportion of the sand entering the mold comes through the openings above the bars 23 and between the recessed wider bars 24.

Between the pattern supporting bars 16, and also between the outermost side of such bars and the frame 14, a plurality of screen bars 26 are mounted completely filling the space between the upper portions of said bars 16 and the inner sides of the frame and resting at their lower edges upon the supporting bars 17. The screen bars are in the form of relatively thin flat or rectangular plates with one side in a vertical plane and thickened at their upper parts to make laterally extending flanges 27 which preferably are of tapered form and narrowing in width away from the bodies of the bars 26, as best shown enlarged in Fig. 6.

In the edges of these flanges 27 elongated depressions are machined which form between the spacer bosses 27a when the screen bars are assembled within the frame 14 narrow screening slots or recesses 28, the depth of which varies. Where the molding sand for a particular mold is of a coarse texture, such depth may be as much as six or seven thousandths of an inch. Where the sand is to be finer grain, the depth of the elongated slot or recess may be as little as two thousandths of an inch, and in some cases less than that. Between adjacent ends of the slotted or recessed portions at 28 there remain the lugs 27a which come against the straight vertical sides of the next adjacent screen bars 26, as shown in Fig. 6. At the same side of each screen bar as the flange 27 but below and spaced from said flange, are a series of spaced apart blocks 29 having a thickness such that their vertical faces are in the same vertical plane with the edges of the lugs 27a between the slots or recesses at 28, thereby properly positioning and holding the screen bars in true spaced apart vertical relation to each other. Between two adjacent pattern supporting bars 16, as shown in Fig. 3, two of the screen bars are placed back to back midway between the bars 16, and then the other bars are placed with their flange portions 27 extending toward the adjacent pattern carrying bars 16. The lugs at 30 (Fig. 3), one at each side of a pattern carrying bar 16, have their ends in the same vertical plane with the vertical sides of the bar 16, whereby all of the screen bars are positioned and held in vertical relation to each other and to the other parts of the structure. The lugs 29 at their upper portions are of an inverted V-shape, and are so spaced that they are directly above the bars 16, thereby affording no surface for the building up of any sand or dust on the bar 16 and which is of such fineness that the grains thereof may pass through the slots at 28 between adjacent screen bars.

The screen structure thus made is amply strong, rigid and so supported that there is no deformation because of heavy pressure against their upper edge portions when the sand is forced and compressed in the flask. At the same time the vents provided by the elongated, yet narrow slots at 28 permit the rapid escape of the air when the sand is blown into the flask as fast as is required to obtain the best results. The velocity of the sand will not be retarded, it will be projected into the flask, against and around the patterns with uniform distribution and density. The screen bars are preferably narrow in thickness and relatively deep in their vertical dimensions and are supported at relatively close intervals by the supports 17 underneath. A very rigid and unyielding structure is produced, yet one having an ample capacity for the escape of air from the flask without retarding the rapid admission of the molding sand.

The invention is very practical and useful and has so proven in practice. The claims appended hereto define the invention, which is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. In a construction of the class described, an open frame, a plurality of pattern supports associated with said frame, and a plurality of elongated screen bars located side by side between said pattern supports and between said pattern supports and sides of the frame, said screen bars having openings between them of narrow width for a portion of their length whereby sand blown by compressed air into the flasks around said patterns and against said screen bars is held against passage through said openings and the air within the flask can escape from the flask through said openings.

2. In a construction of the class described, an open, substantially rectangular frame, a pattern supporting bar extending across the said frame

and adapted to have a pattern secured thereto, and a plurality of screen bars disposed lengthwise of the pattern supporting bar and filling the space in the frame not occupied by the said pattern supporting bar, said screen bars being of less thickness than their depth and having between adjacent bars narrow elongated air passing openings, as and for the purposes specified.

3. A construction containing the elements in combination defined in claim 2, combined with spaced cross supporting bars underneath said screen bars and upon which the lower edges of said screen bars rest, said cross bars being permanently secured at their ends to the frame and to said pattern carrying bar.

4. A pattern support and screen structure for compressed air molding machines comprising, an open frame, pattern supporting members carried by said frame, said members being spaced apart from each other and from the sides of the frame, flat topped screen bars having their upper sides flush with each other, with the upper sides of the pattern supporting members, and with the upper edges of the frame within said frame and filling the spaces therein at the sides of said pattern supporting bars, said screen bars at their upper sides each having a laterally extending flange, and adjacent their lower portions a series of spaced apart laterally extending spacing members having a thickness substantially equal to the width of said flanges, and said flanges at their free edges having at spaced apart intervals in the length thereof narrow elongated recesses formed therein, thereby providing narrow elongated passages between said flanges and the next adjacent screen bar, as and for the purposes described.

5. A construction containing the elements in combination defined in claim 4, said spacing blocks at their upper portion being of inverted V-shaped form, and transverse supporting bars connected to the pattern supports and the frame underneath said screen bars for supporting the said screen bars, as specified.

6. In a molding machine, a frame, a plurality of screen bars arranged in side-to-side adjacent relation in the said frame, the said screen bars each comprising a substantially rectangular body portion having a flange extending from the upper side thereof and separated from the body portion of the adjacent screen bar for a portion of its length, portions of the flange being in contact with the adjacent screen bar and spacer members for maintaining the body portion of the screen bars in separated side to side relation.

7. In a molding machine, a plurality of screen bars each comprising a substantially rectangular body portion having extending along the upper side thereof a flange engaging the adjacent screen bar for a portion of its length and additional means for maintaining the body portion of said screen bars in separated relation to each other for a portion of their lengths.

8. In a construction of the class described, a rectangular open frame, a pattern supporting bar located lengthwise of the frame, and secured at its ends to the said frame and adapted to carry a pattern at its upper side, spaced apart cross bars connected and their ends to the sides of the frame and to said pattern carrying bar, a plurality of screen bars disposed in parallelism to and against each other between said pattern carrying bar and the sides of the frame and having their upper edges flush with each other and with the upper side of the pattern carrying bar and resting upon said cross bars, said screen bars at adjacent sides having narrow elongated air passing openings for air to pass in a downward direction, said openings being of a width which will preclude molding sand from passing therethrough, said screen bars also each at its upper edge portion and at one side, have a laterally extending flange with plurality of spaced apart bosses which bear against the vertical side of the next adjacent bar, said flange being cut away longitudinally at spaced apart intervals to form said bosses and to make elongated narrow recesses to thereby provide said air passage openings.

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