Dec. 13, 1966 L. F. MILLER 3,290,733

MOLD AND CORE BLOWING MACHINE

Filed Feb. 26, 1962 2 Sheets-Sheet 1

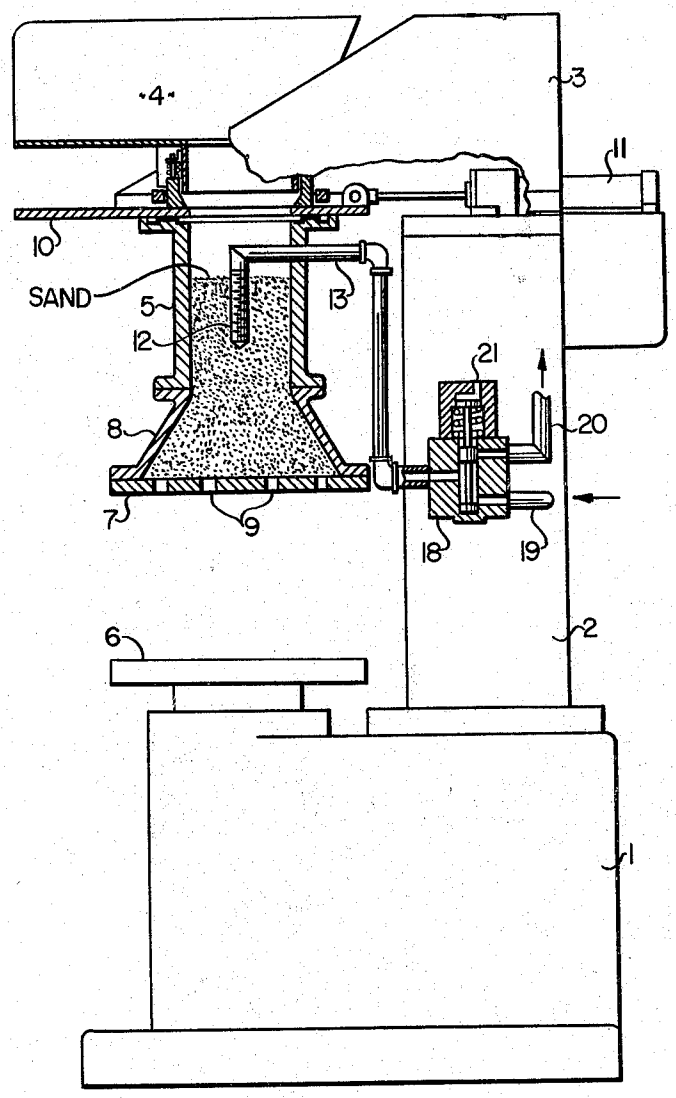



FIG 1

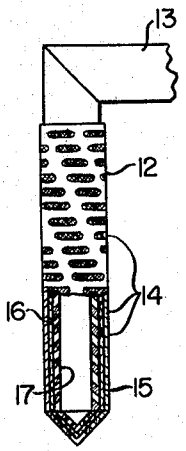



FIG 2

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MOLD AND CORE BLOWING MACHINE

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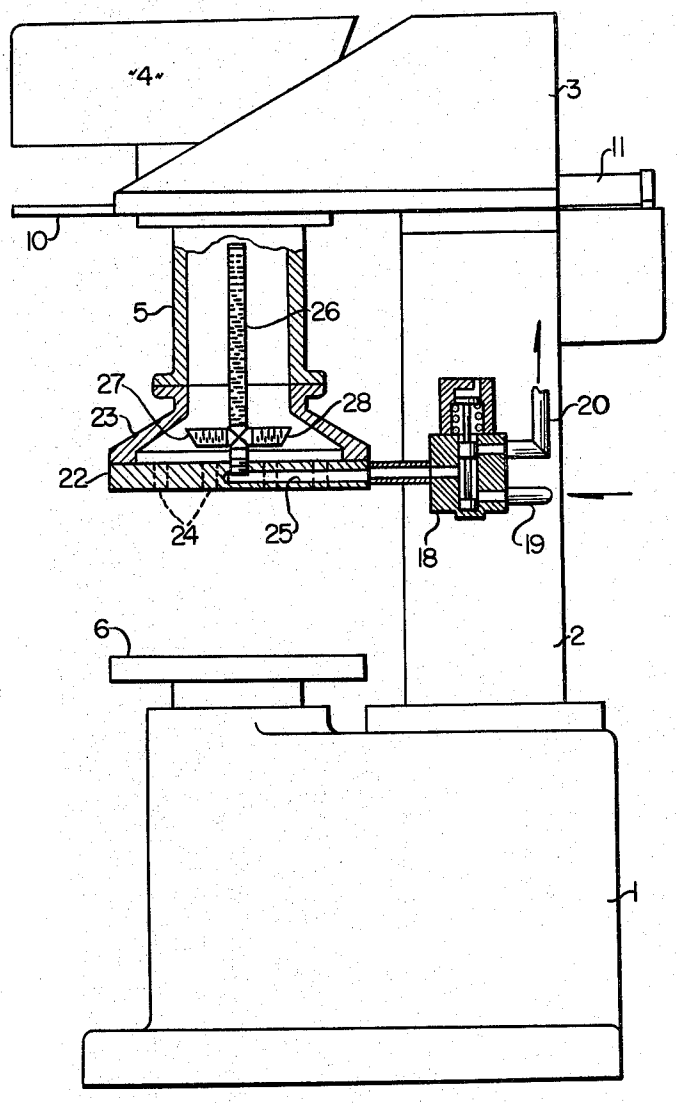



FIG 3

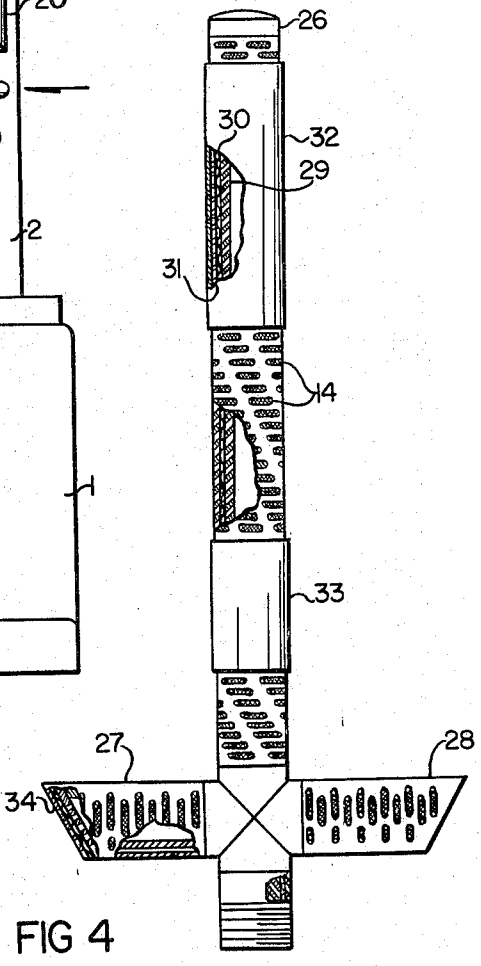



FIG 4

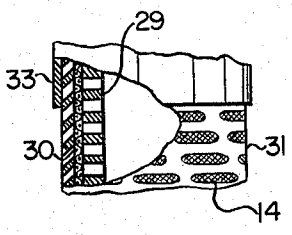



FIG 5

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# MOLD AND CORE BLOWING MACHINE

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5 Claims. (Cl. 22—10)

This invention relates as indicated to a mold and core blowing machine, and more particularly to such machine including novel means for introducing and exhausting the air employed to discharge the sand from the reservoir of the machine into the usual core or mold box.

Reference may be had to Ellms Patent 2,545,944 for a description of a typical core blowing machine widely used in foundries and also to my prior co-pending application Serial No. 805,174, now Patent No. 3,089,207, filed April 9, 1959, for "Blow-Squeeze Molding Machine," such application showing a perforated sleeve within the sand reservoir through which air under pressure is introduced to effect the blow. Still another form of perforated sleeve together with blow and exhaust means is illustrated and described in the co-pending application of Edward D. Abraham, Serial No. 708,446, now Patent No. 3,089,206, filed January 13, 1958, for "Blow and Squeeze Molding Machine and Method of Molding." While in many cases the employment of such perforated sleeves within the sand reservoirs has resulted in improved performance due in part to the more uniform and controlled introduction of air into the body of sand which is to be transported through the blow holes into the core boxes or the like, nevertheless various problems are encountered in practice when such sleeves are employed. One of the more serious problems is the tendency of the rather small perforations, slits or other openings in the sleeve to become clogged after a period of use, necessitating a somewhat difficult and time-consuming cleaning operation. Sand may also gradually accumulate in the annular space between the sleeve and the wall of the reservoir, completely blocking the lower perforations in the sleeve.

It is accordingly a principal object of this invention to provide means for introducing blowing air under pressure into the sand reservoir of the machine in a manner greatly facilitating the blowing operation.

A further object is to provide such means in relatively inexpensive form as contrasted to the well-known perforated sleeve or liner.

Another object is to provide such blowing means which will be inexpensive of construction and substantially self-cleaning in use so as to avoid unnecessary down time of the machine.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

FIG. 1 is a side elevation of a mold and core blowing machine in accordance with the present invention, being partly broken away better to disclose certain parts thereof;



FIG. 2 is a fragmentary enlarged view of the blow tube employed in the FIG. 1 machine, likewise partly broken away to show the internal construction thereof;

FIG. 3 is a side elevation similar to FIG. 1 but showing a different construction and arrangement of the blowing means;

FIG. 4 is an enlarged detail view of the blow means of FIG. 3; and

FIG. 5 is a fragmentary detail view of a somewhat modified form of such blow means.

Now referring more particularly to said drawing and especially FIG. 1 thereof, the blowing machine there illustrated comprises a base **1** carrying an upstanding column **2** having a head **3** supporting a sand hopper **4** and a depending cylindrical sand reservoir **5**. A core box or the like (not shown) is adapted to be placed upon clamping table **6** and raised thereby into tightly clamped engagement with blow plate **7** carried by adapter **8** on the lower end of reservoir **5**, such blow plate having one or more blow holes such as **9** therethrough. Sand may be discharged into the sand reservoir from the hopper when slide plate **10** has been reciprocated to the left as shown in FIG. 1 through action of fluid pressure piston-cylinder assembly **11**, such slide plate having an opening therein adapted to register with the opening to the reservoir and such slide plate further being adapted to seal the upper end of the reservoir when reciprocated to the right through the action of piston-cylinder assembly **11**. The construction and operation briefly described above are typical of well-known core blowing machines currently in commercial operation and do not per se constitute a part of the present invention.

A vertically extending blow tube or conduit **12** is centered axially within cylindrical sand reservoir **5**, being supported by lateral extension **13** which projects through the side of the reservoir as shown. The vertical tube **12** may desirably be somewhat pointed at its closed lower end as shown in FIG. 2 and provided with a large number of screened apertures **14** through which air under pressure may be discharged into the center of the body of sand within the reservoir. The screen **15** may be held in place between outer apertured tube **12** and an inner apertured tube **16**, and, as shown in FIG. 2, the inner apertures **17** will register with the outer apertures **14** and all such apertures may be downwardly inclined as shown in order to direct the air under pressure in a generally downward direction into the body of sand. Tube **13** is connected to a three-way valve **18** having a high pressure air inlet **19** and an exhaust outlet **20**, such valve being operated by pilot pressure introduced at **21** from a fluid pressure source manually controlled in well-known manner. Accordingly, a measured quantity of sand may be dropped into reservoir **5** from hopper **4** through the opening in slide plate **10**, and such slide plate then reciprocated to the right through action of piston-cylinder assembly **11** in order to seal the upper end of the reservoir. A core or mold box (not shown) is placed on clamping table **6** and the latter elevated to clamp the box against the underside of blow plate **7** in tight sealing engagement therewith. Air under high pressure is then admitted through three-way valve **18** to centrally disposed blow tube **12**, and the sand is forced thereby through blow

holes 9 into the core box to fill the latter. As soon as the blow has been completed, the spool of valve 18 is shifted to connect tube 12 to exhaust 20 and the blow pressure is relieved from the reservoir through the same screened apertures in tube 12 by which the air entered the reservoir. The core box may now be unclamped and removed, and slide plate 10 may be shifted to the FIG. 1 position to permit another measured charge of sand to be dropped into the reservoir for repetition of the cycle. The alternate blowing and exhausting of the air through the same screened apertures serves to keep such apertures clean and unclogged for maximum continued efficiency of operation.

Referring now to FIG. 3 of the drawing, the core blowing machine there illustrated is generally similar to that above described and is operated in a similar manner. The blow plate 22 carried by adapter 23 is, however, of somewhat greater thickness than blow plate 7, and the blow holes 24 are located to avoid a drilled-out horizontal passage 25 extending to the center of the blow plate and connected to three-way valve 18. Instead of the downwardly depending blow tube 12, there is there provided an upstanding blow tube 26, the upper end of which is closed and the lower end of which is in communication with horizontal passage 25. Two or more short horizontally outwardly extending branch tubes 27 and 28 are connected with upstanding tube 26 within the lower expanded region of the reservoir afforded by adapter 23.

As shown in FIG. 4, blow tube 26 may comprise an inner apertured tube 29 separated by screen 30 from an outer apertured tube 31, and one or more outer imperforate tubular sleeves such as 32 and 33 may be slipped over such outer apertured tube 31 for vertical adjustment therealong to regulate and control both the size and location of the regions where air under pressure will be discharged into the body of sand within the reservoir to effect the blow. The ends of branch tubes 27 and 28 may be downwardly bevelled as shown at 34 and the apertures in such ends likewise inclined downwardly so that the general direction of the air discharged from both the vertical central blow tube and the side branches thereof will be in a generally downward direction.

As further shown in FIG. 5, a similar but somewhat less expensive construction may be utilized wherein the apertures in inner tube 29 are horizontal (radial of the tube) and communicate with the inner ends of the downwardly inclined apertures in the outer tube 31. Such apertures will ordinarily preferably be in the form of narrow slots directed downwardly at approximately a 45° angle and distributed circumferentially of the vertical axial blow tube. It will, of course, be understood that a wide variety of modifications may be employed and that other forms of sand reservoirs may be utilized including those in which the adapter or bottom portion is generally of funnel shape. Likewise, while my central blow tube will ordinarily be utilized as the sole means for delivering air under pressure into the body of sand within the reservoir to effect the blowing operation, nevertheless such blowing means may be utilized in conjunction with the well-known overhead blow means such as that shown in Ellms Patent 2,545,944 or in conjunction with the delivery of air under pressure through a perforated cylindrical sleeve within the reservoir as shown and described in my aforesaid co-pending application.

The reservoir will ordinarily desirably be filled about three-fourths full of sand prior to the blow and the larger portion of such sand then blown into the core or mold box. The perforated portion of the blow tube may be entirely surrounded by sand prior to the blow or may extend somewhat above the sand level. Adjustment of sleeves such as 33 may be employed to regulate the regions of principal air emission and thereby prevent unduly localized action such as may sometimes tend to occur in the lower part of the reservoir, for example.



A mold and core blowing machine constructed in accordance with this invention is relatively inexpensive of construction, easy to operate and easy to maintain. Moreover, it provides for delivery of high pressure air to the middle of the body of sand contained within the reservoir and preferably for a downward direction of the air thus discharged, obtaining maximum fluidity of the air-sand mixture to facilitate its passage through the blow holes.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any one of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a mold and core blowing machine having a sand reservoir with a blow opening and a sand charging opening, means for closing such charging opening prior to the blow, and means for exhausting said reservoir following the blow; blow means for delivering air under pressure to said reservoir internally of the body of sand contained therein comprising an air conduit leading to and communicating with a pair of tubes sleeved one inside the other with a layer of fine mesh screen interposed therebetween, said tubes extending within said reservoir and having apertures in the walls aligned with one another.

2. The machine of claim 1, wherein such apertures in at least the outer said tube are downwardly inclined.

3. In a mold and core blowing machine having a sand reservoir with a blow opening and a sand charging opening, means for closing such charging opening prior to the blow, and means for exhausting said reservoir following the blow; blow means for delivering air under pressure to said reservoir internally of the body of sand contained therein comprising an air conduit leading to and communicating with a tube having small apertures in its side wall and located generally centrally within said reservoir, and a sleeve fitted on said tube and slidable therealong to mask selected apertures and thereby adjustably determine the region of said reservoir into which such air under pressure is introduced.

4. In a mold and core blowing machine having a sand reservoir with a blow opening in the bottom thereof, means for clamping a core box and the like in position to receive sand discharged under pressure from such opening, and means for sealing said reservoir after it has been charged with a body of sand; blow means for delivering air under pressure to said reservoir comprising a laterally perforated conduit extending generally centrally within said reservoir substantially below the normal sand level prior to the blowing operation, and exhaust means for exhausting high pressure air from said reservoir following completion of the blow, such perforations in said conduit being of large total area but individually small to prevent entry of sand and to diffuse the blow into such body of sand, said reservoir being laterally enlarged in its lower region and said conduit having at least one lateral extension in such region.

5. In a mold and core blowing machine having a sand reservoir, a blow plate at the bottom of said reservoir having a blow opening therethrough, means for clamping a core box and the like against said blow plate in position to receive a body of sand discharged from such opening, and means for sealing said reservoir after it has been charged with sand; blow means for delivering air under pressure to said reservoir comprising a passage extending from one side of said blow plate horizontally therethrough to the center thereof, and an upstanding conduit mounted centrally on said blow plate in communication with said passage and also in communication with the interior of said reservoir, said conduit being apertured to provide an opening of large total area for admission of air to said reservoir below the normal level of sand therein, but said apertures being individually sufficiently small to prevent

entry of sand and to diffuse the blow into such body of sand.


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