July 5, 1932. F. C. GOODLIN 1,866,301

MACHINE AND METHOD FOR FORMING CORES

Filed Aug. 15, 1929 3 Sheets-Sheet 1

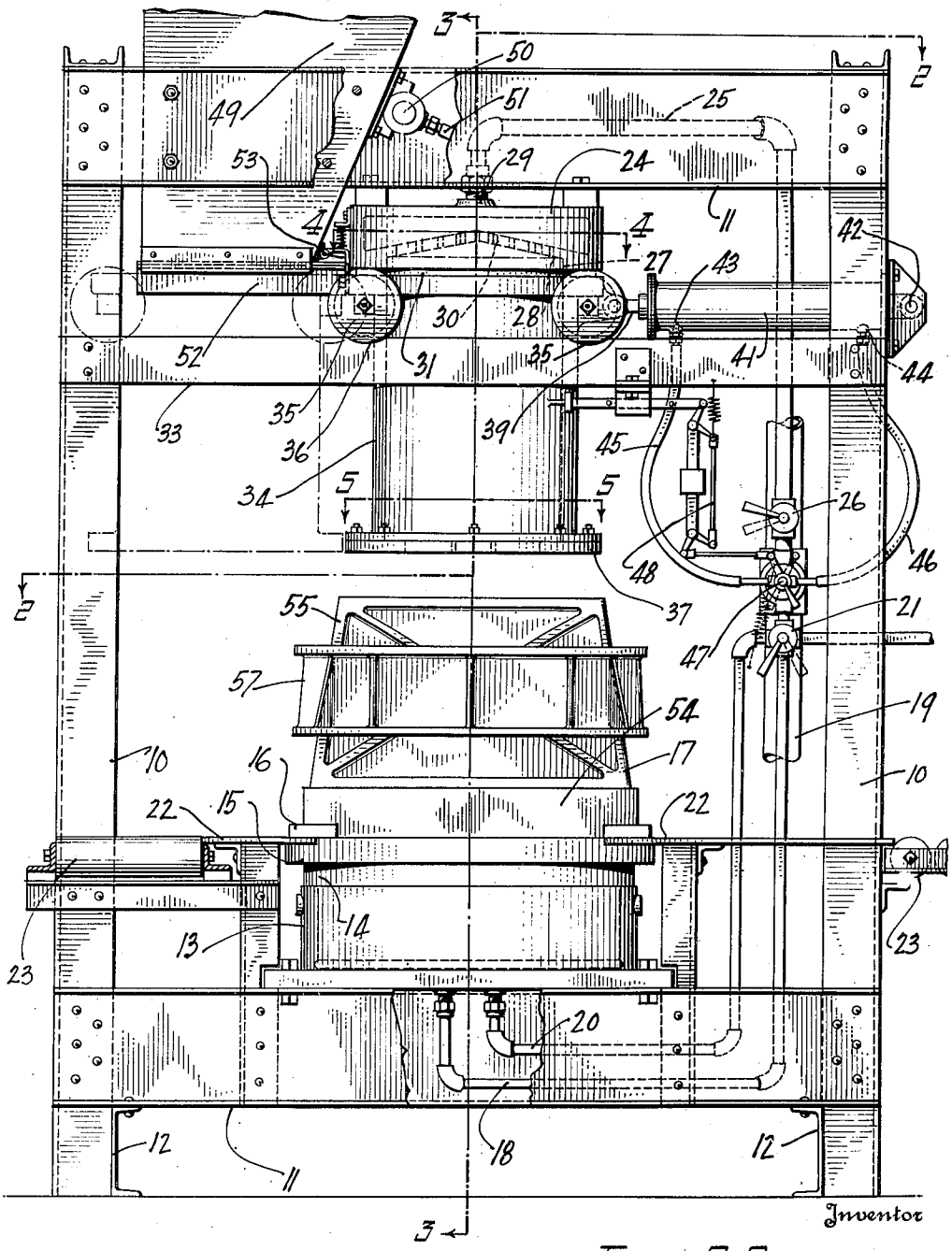


FIG. 1

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MACHINE AND METHOD FOR FORMING CORES

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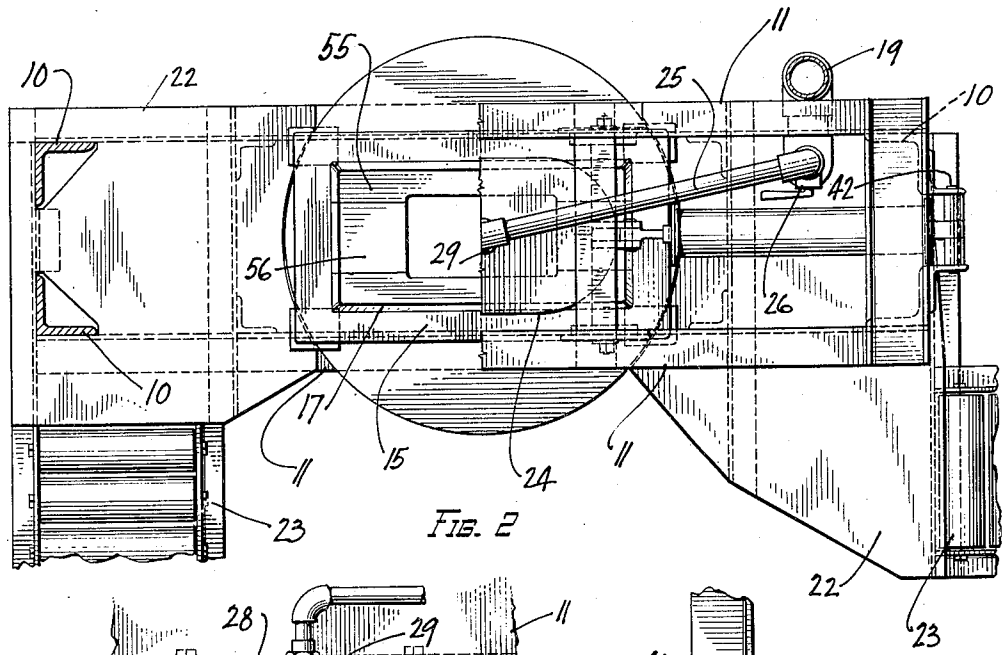


FIG. 2

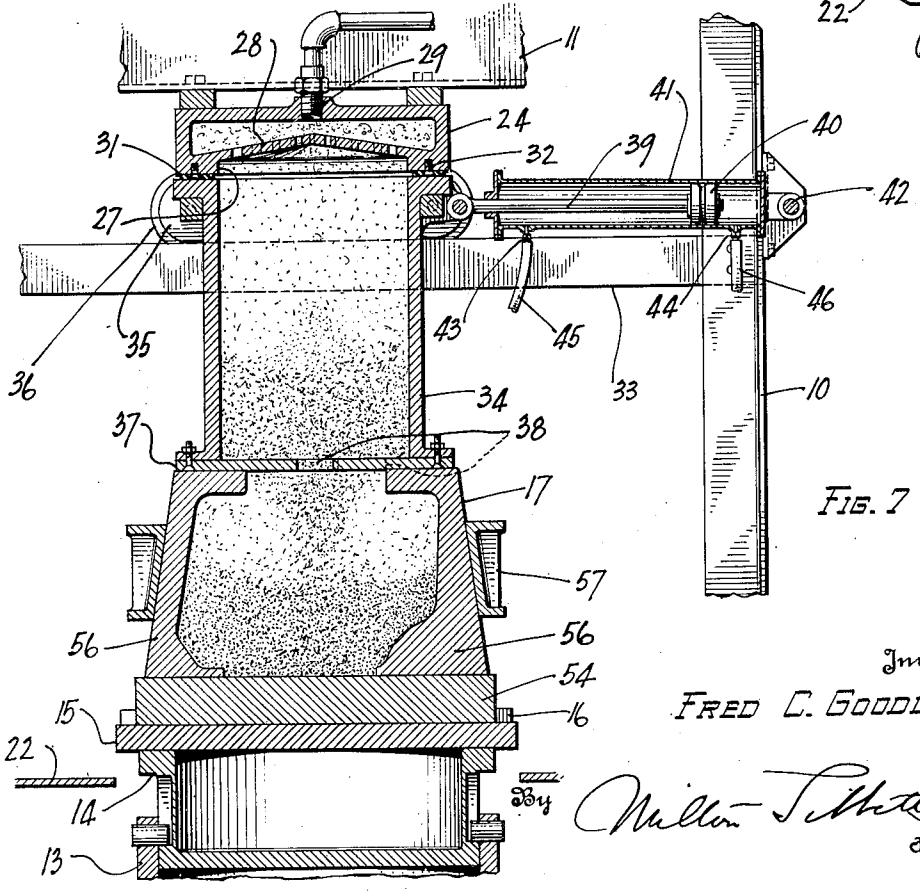


FIG. 7

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MACHINE AND METHOD FOR FORMING CORES

Filed Aug. 15, 1929 3 Sheets-Sheet 3

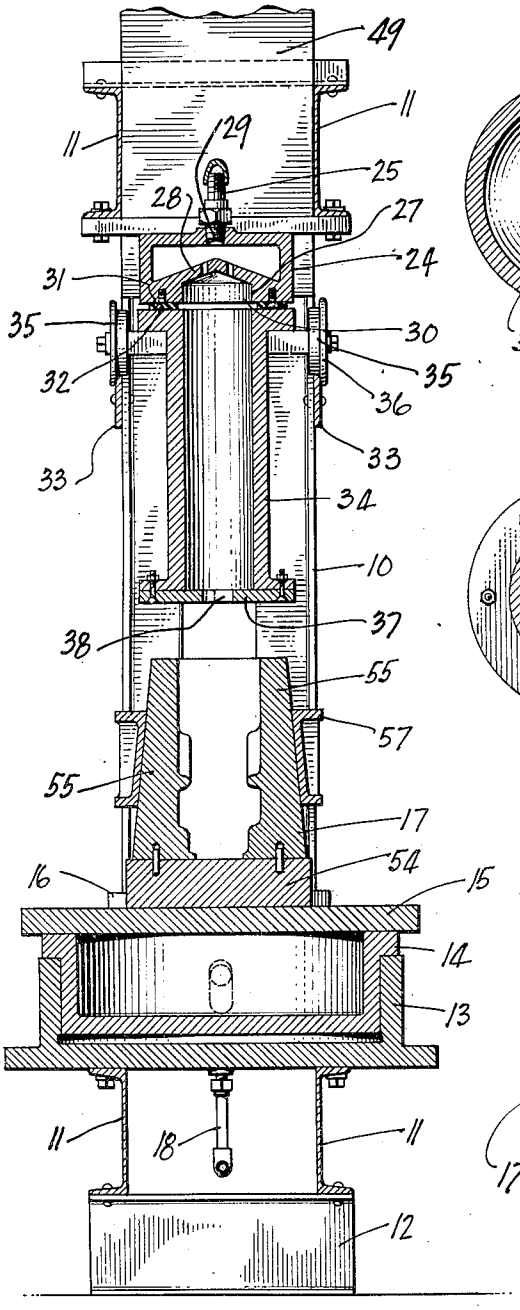


FIG. 3

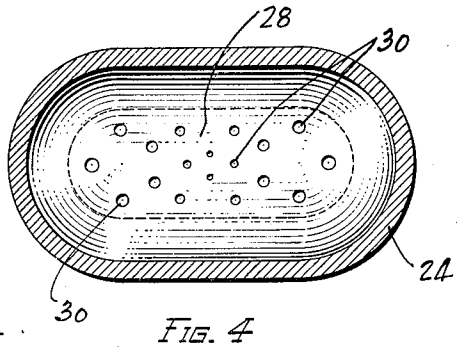


FIG. 4

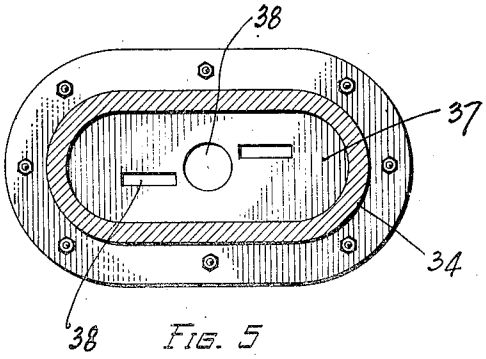


FIG. 5

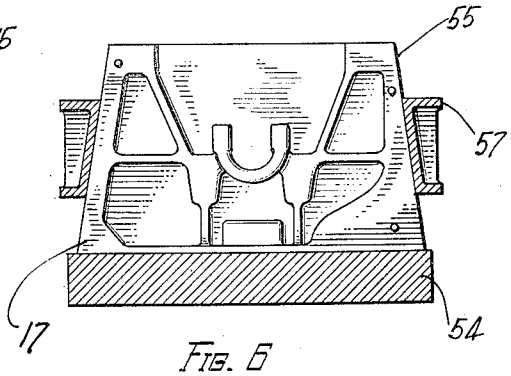


FIG. 6

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UNITED STATES PATENT OFFICE

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MACHINE AND METHOD FOR FORMING CORES

Application filed August 15, 1929. Serial No. 386,218.

This invention relates to machines and methods for making cores and molds, and more particularly to the employment of pneumatic means therefor.

In this art it has been a comparatively easy matter to blow cores with synthetic core sand but up to the time of this invention natural bond sand has resisted all efforts to blow it into the core box to make a complete and practical core. Such cores, therefore, have had to be made by pounding the sand into the core box which is a laborious, expensive and time-consuming process.

Previous attempts to force the sand, natural bond sand, into the core box has resulted in simply blowing the sand around in the feed receptacle and the sand that is actually blown into the core is unevenly distributed and not firmly packed.

The present invention contemplates the use of a large quantity of air to feed the sand and pack it well, and the mechanism employed provides for a proper distribution of the air so that the pressure is evenly applied to the sand and the sand is forced into the core box so that all parts of the latter are filled and the sand well packed therein. Cores so made are found to be equal to and in most respects better than the hand packed cores because of the more equal distribution of packing pressure.

An object of the invention therefore is to form cores of natural bond sand by blowing the sand into a core box.

Another object of the invention is to form a core by forcing sand into a core box by a volume of air sufficient to pack the sand firmly and with a uniform distribution of air so that the purpose may be accomplished.

Another object of the invention is to provide a core blowing machine with means for uniformly distributing the air pressure to the sand.

Another object of the invention is to provide a core blowing machine with a movable sand receptacle adapted to be brought into register with the core box and air chamber, to thereby facilitate the operation of the machine.

Another object of the invention is to provide a movable sand receptacle and an associated reciprocal table for the core box, with co-operating means for efficiently and rapidly blowing cores.

A still further object of the invention is to provide a machine for blowing cores which is positive in action, highly efficient in operation, and yet of marked simplicity as a whole and in respect to each of its component parts, so that its manufacture may be economically facilitated, both as regards its parts and their assembly.

Other objects of the invention will appear from the following description taken in connection with the drawings which form a part of this specification, and of which:

Fig. 1 is a front elevation of a machine embodying the invention;

Fig. 2 is a cross sectional view substantially on line 2—2, Fig. 1;

Fig. 3 is a vertical sectional view substantially on line 3—3, Fig. 1;

Fig. 4 is a cross sectional view of the head, substantially on line 4—4, Fig. 1;

Fig. 5 is a cross sectional view of the sand chamber, substantially on line 5—5, Fig. 1;

Fig. 6 is a view of one of the side walls of the mold, and

Fig. 7 is an enlarged fragmentary view, illustrating the parts as assembled during the process of blowing the core.

Referring to the drawings for more specific details of the invention, 10 represents four corresponding uprights or columns connected by side rails 11 and end rails 12, to provide a suitable frame or support for the co-operative parts of the machine, it, of course, being understood that any desirable support may be employed with equally good results and that the design or type of the support is entirely within the discretion of the manufacturer.

Bolted, or otherwise secured, on the lower side rails 12 is a cylinder 13, having positioned therein for reciprocation a piston 14. As shown, the piston has formed thereon a table 15 provided with location members 16 adapable to position a form or core box 17, to be hereinafter described.

The piston 14 is adapted to be moved ver-

tically by air pressure admitted to the cylinder 13 through a suitable inlet connected as by a pipe line 18 to a main supply line 19 leading to a suitable source of supply, not shown. The cylinder is also provided with an outlet connected as by a pipe line 20 to a suitable valve 21 adapted to control both the inlet and the outlet.

The table 15 is normally supported by the piston 14 in a horizontal plane with a table 22 having arranged at each end thereof suitable conveyers 23, so that the form 17 may be readily conveyed to and from the table 15 in order to expedite the handling thereof. As shown, the conveyers 23 are of the conventional roller type. However, it is to be understood that other forms of conveyers may be used with equally good results.

Suitably positioned on the upper side members 11 of the frame is a head member 24 connected by a large pipe line 25 to the source of air supply through a valve 26 readily accessible to the operator of the machine. As shown, the head 24 comprises a chamber substantially oval in cross section, and open at one end, as at 27, and formed in the chamber, immediately over the opening is a baffle plate or diaphragm 28. The diaphragm is substantially in the form of a cone, the apex of which is immediately beneath an inlet port 29 positioned centrally in the top of the head and communicating with the pipe line 25. The diaphragm is formed with a plurality of apertures 30 arranged in spaced relation with respect to each other and graduated in size from the apex outwardly so that air admitted through the pipe line 25 and port 29 may be discharged with substantially uniform volume through the opening 27, the object of which will hereinafter appear. The head has secured thereto a rubber gasket 31 as by screws 32.

Positioned on a suitable track comprising parallel rails 33, bolted or otherwise secured to the uprights or columns 10 of the frame, is a chamber 34. This chamber is supported on the rails 33 by suitable rollers 35 having suitable flanges 36, so that the chamber 34 may be moved vertically within certain limits without disengaging the rollers from the track. The chamber 34 is open at the top to register with the opening 27 in the header 24, and bolted or otherwise secured on the lower end of the chamber 34 is a plate 37 having therein a plurality of openings 38. As shown, the openings 38 are arranged for blowing a special form of core, it being understood that various forms will require plates having different forms of apertures.

Formed upon the chamber 34 is a boss having pivotally secured thereto a rod 39 connected to a piston 40 positioned for reciprocation in a cylinder 41. The cylinder 41 is pivotally secured to the frame as indicated at 42 and is provided at its respective ends with ports 43 and 44 connected respectively by pipe lines 45 and 46 to a suitable valve 47 in the air supply pipe 19, so that by turning the valve 47 air can be admitted first to one end of the cylinder 41 and then the other to actuate the piston to reciprocate the chamber 34 on the track 33. The valve 47 is connected to a suitable trip mechanism 48 adapted to automatically close the valve 47 when the cylinder 34 is moved into position beneath the head 24.

Positioned on the frame, adjacent to the head 24 is a sand hopper 49 to which is attached a vibrator 50 suitably connected as by a pipe line 51 to the air supply pipe, and provided with a suitable control valve, not shown. The discharge end of the sand hopper is in the same horizontal plane as the discharge end of the head 24 and is normally closed by a slide 52 mounted in suitable guide-ways. The slide 52 is connected to the chamber 34 and is adapted to be moved thereby to open and close the large opening in the hopper. The hopper also has connected thereto a suitable scraper 53.

As the chamber 34 is moved beneath the hopper, the slide 52 is moved to open the discharge end of the hopper, whereupon the chamber is filled with sand and as the chamber 34 is moved back beneath the head 24, the slide is moved concomitantly to close the discharge end of the hopper, and during the movement of the cylinder 34 from beneath the hopper to its position beneath the head, the scraper 53 levels off the sand deposited in the chamber.

The form or core box 17 shown in Figs. 1, 3, 6 and 7 was particularly designed for producing cores for molding sections of a crankcase of an internal combustion engine. As shown, it comprises a base plate 54, side plates 55, and end plates 56, assembled substantially in rectangular form and secured together by a suitable clamping ring 57. It is, however, to be understood that while this particular form is shown by way of illustration, any other type or character of form may be employed, such as a cope and drag, with equally good results.

In operation, the form 17 is assembled and moved to the table 15 where it is positioned by the locating members 16. The valve 47 is then turned to admit air to the cylinder 41 for action on the piston therein to move the cylinder 34 into position beneath the hopper 49. As the cylinder 34 moves into position beneath the hopper 49, which has been previously filled with sand, it moves the slide 52 to open the discharge end of the hopper. With the cylinder 34 in this position, the vibrator 50 on the hopper is actuated to cause the sand to flow from the hopper into the cylinder 34. The natural bond sand used will not readily pass through the openings in the bottom of the cylinder so that the lat-

ter may thus be filled. When the cylinder is filled, the valve 47 is again manipulated to admit air through the port 43 to the cylinder 41 to actuate the piston to move the cylinder 34 from beneath the hopper 49 to a position immediately beneath the head 24. In moving to this position, the scraper 53 on the hopper levels off the sand in the cylinder 34 and the slide 52 is moved to close the hopper, and as the cylinder 34 assumes its position under the head 24, the trip mechanism 48 is actuated to close the valve 47 and shut off the air supply.

After this operation, the valve 21 is manipulated to admit air through the pipe line 18 to the cylinder 13 to raise the piston 14 and the form 17, so that the upper end thereof engages the plate 37 bolted to the cylinder 34. Suitable air pressure is applied to firmly clamp the cylinder 34 between the head 24 and the form 17, and to prevent leakage between these parts suitable gaskets or rubber bushings are employed, such as the rubber ring 31 shown in Figs. 3 and 7.

With the machine and form in this position, air under high pressure is admitted to the head 24 through the pipe line 25 by operating the valve 26, and as air enters the head 24, it is deflected by the baffle plate 28 and distributed through the apertures 30 therein to impose a large volume of air of uniform density on the sand in the cylinder 34, causing the sand therein to be ejected with force through the openings 38 in the plate 37 into the form or core box 17. The core box is provided with suitable air vents, not shown, to permit the air to escape as the sand enters.

By reason of the baffle plate 28, its substantially conical shape, and the particular arrangement of the apertures therein, the air is distributed throughout the chamber 34 with equal pressure, and a large volume of air may thus be discharged through the head. Accordingly, the sand in the chamber is rapidly and firmly forced into the form of core box in such quantities and with such force as to cause the sand grains to adhere to each other and to build up the core in a tightly compact mass which will not readily break or crumble and which may be used without baking.

After the form 17 has been filled with sand from the cylinder 34, the valve 26 is again manipulated to shut off the air supply. The valve 21 is now moved to close the supply line 18 and to simultaneously open the pipe line 20 leading to the exhaust, so that the piston 14 under its own weight and the weight of the mold may descend to a position where the table 15 is in a plane with the table 22. The core box is then shoved to one side on the conveyers 23 and the machine is again ready for the next operation.

Although this invention has been described in connection with certain specific embodiments, the principles involved are susceptible of numerous other applications that will readily occur to persons skilled in the art. The invention is, therefore, to be limited only as indicated by the scope of the appended claims.

Having thus described the various features of my invention, what I claim as new and desire to secure by Letters Patent is:

1. An air distributing chamber for a core forming machine, having positioned therein a baffle plate provided with a plurality of apertures of graduated sizes arranged in rows and in spaced relation with respect to each other.

2. An air distributing chamber for a core forming machine, having positioned therein a conical shaped baffle plate provided with a plurality of apertures arranged in spaced relation.

3. In an air distributing head for a core forming machine, a conical shaped baffle plate positioned in the head and provided with a plurality of apertures arranged therein in spaced relation with respect to each other and increasing in sizes from the apex of the cone to the base thereof.

4. The method of forming a natural bond sand core comprising forcing such sand into the core box by air distributed in a rectilinear stream at uniform pressure over the sand.

5. The method of forming a core comprising forcing sand through a receptacle into a core box by air distributed evenly over the sand in the receptacle.

6. The method of forming a core comprising forcing natural bond sand into a core box by a rapid feed of air evenly distributed over the sand being fed to the box.

7. In a moulding machine including a sand container and an air distributing head for the sand container provided with inlet and outlet openings for introducing air under pressure into the container, means for modifying the velocity and pressure of the air as it passes into the container comprising a baffle having constricted openings leading from the head to the container adjacent the inlet opening and less constricted openings at a distance from the inlet.

8. In a moulding machine including a sand container and an air distributing head for the sand container provided with inlet and outlet openings for introducing air under pressure into the container, means for modifying the velocity and pressure of the air as it passes into the container comprising a baffle having relatively small openings therethrough at portions which are directly in line with the inlet and increasingly larger openings as the distance from the inlet increases.

9. In the art of making cores by the use of a moulding machine having a sand container and an air distributing head on the

container, the method of ejecting sand from the container into a mould comprising introducing a blast of air into the head and restricting the flow of portions of the blast until the velocity and pressure of the air within the container are uniform.

In testimony whereof I affix my signature.

FRED C. GOODLIN.