Aug. 7, 1951 J. P. DE RANEK 2,563,643

PROCESS FOR MAKING CORES

Filed June 9, 1948

FIG. 1.

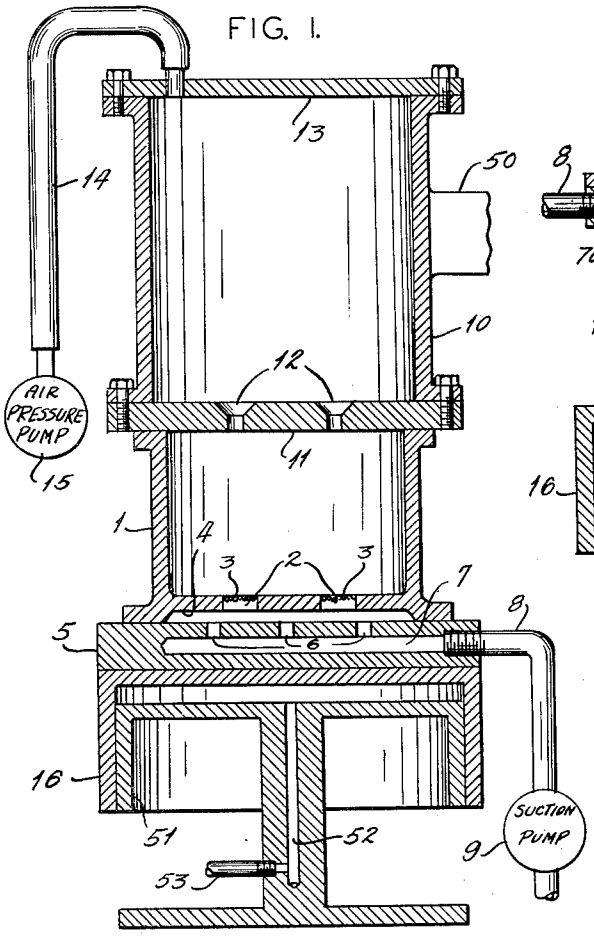


FIG. 2.

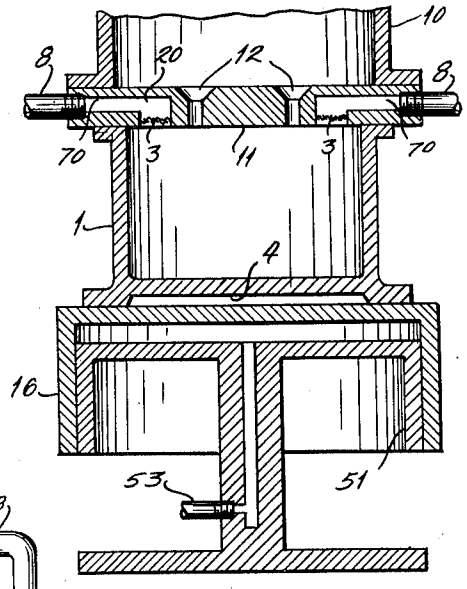
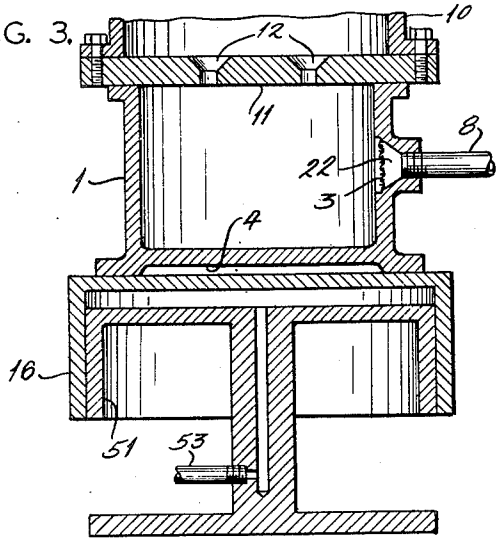


FIG. 3.



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PROCESS FOR MAKING CORES

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2 Claims. (Cl. 22—194)

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This invention pertains to a process for making sand cores, such as are used in molding various metals in the usual foundry practice.

When sand cores are made by the blowing process, the core sand is projected into the core box on a blast of air. As the air thus entering the box must be allowed to escape, various means for venting the box to permit such escape have been used. However, as the pressure in the box is usually above atmospheric pressure, and also possibly on account of uncontrolled currents of air in the box seeking exit, it has been found that often the sand does not pack tight at all points, and the formed cores have parts in which the sand is loose or excessively porous, or even voids or air pockets have formed.

One of the objects of this invention, therefore, is to provide a process for making such cores by which these difficulties may be overcome.

Another object is to provide such a process whereby the excess air may be positively removed from the pores of the packed sand, so that tight packing is promoted during the forming of the core.

Further objects will appear from the following description, taken in connection with the accompanying drawings, in which will be set forth an illustrative embodiment of this invention. It is understood, however, that this invention is susceptible of various embodiments, within the scope of the appended claims, without departing from the principle or spirit of this invention.

In accordance with the process of this invention, generally stated, the air in the core box in which the core is formed, is evacuated by suction means so that a negative pressure (below atmospheric pressure), is produced in the core box. The core sand is then fed into the box, through a suitable opening, on a current of air entering the box by such opening. The positive pressure by which the air and sand are carried into the box may be simply atmospheric pressure, or a higher pressure supplied by suitable air-compression means.

Apparatus suitable for carrying out the process of this invention is illustrated in the accompanying drawings, in which:

Figure 1 is a vertical sectional view of a core forming apparatus, embodying this invention, and adapted for carrying out the method thereof, and

Figures 2 and 3 are similar views, showing other embodiments of this invention.

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Referring to the drawing, 1 designates a core box of any suitable type whose interior is, of course, shaped to the shape of the core to be formed. The box 1 is provided with one or more air outlet passages 2, each having mounted therein a screen 3 adapted to prevent the passage of sand through the opening, while permitting the passage of air. The under-face of the bottom wall of the box 1 may be recessed as indicated at 4 to provide an air-circulating passage. The box 1 rests on a supporting plate 5, provided with one or more air openings 6, communicating with a suction duct 7 leading to the edge of the plate where it may be connected as by a pipe 8 to a suitable suction means represented by the suction pump 9.

Mounted on a suitable support, as at 50, is a sand supply container 10, closed at the bottom by a blowplate 11, provided with one or more blowholes 12. The container 10 may be open at the top to atmospheric pressure. Under some conditions, however, it may be desirable to provide a positive pressure higher than atmospheric pressure. In such cases the top of the container may be closed, as by a plate 13, and its interior connected as by a conduit 14 with a source of pressure, represented by the pump 15. The box 1 and the plate 5 may be supported by the usual lifting table 16, which may be raised by pneumatic pressure to hold the box 1 against the blowplate 11 during the core-forming operation. In the embodiment shown, the table 16 slides on a support 51, provided with a duct 52 communicating thereabove and connected to a fluid pressure pipe 53.

In operation, the suction means 9 is operated to reduce the pressure in the core box 1 to below atmospheric pressure. The core sand from the container 10 feeds through the blowholes 12, being carried on a current of air forced through said holes by the positive pressure in the container 10, which may be at or above atmospheric pressure. The negative pressure produced in the box 1 by the means 9 is however maintained during the operation. The sand thus carried into the core box is deposited on the bottom and along the sides thereof, and builds up progressively until the core box is full. The sand enters the box 1 with a velocity depending on the pressure set up, so that its impact on the sand already placed tends to pack it tightly. When the air-outlet openings have been covered by sand, the air, passing out at said openings, is drawn from the pores of the deposited sand. This removes all air which may tend to form

voids, and the movement of air through the sand under negative pressure tends to draw the sand particles closer together, and thus pack it tighter.

In the embodiment of Figure 2, the air-outlet openings **20** provided with screens **3** are in the blowplate **11**, and communicate with one or more exhaust ducts **70**, to which the suction pipes **8** are connected. In Figure 3, the air-outlet opening **22** is in the side wall of the box **1**. It will be understood that the air outlets may be in the bottom, sides and top of the core box.

While the operation of the various embodiments is generally along the same principle, the following distinctions will be noted:

In Figure 1, the air is evacuated from the core box at the bottom, so that while the sand is fed into the core box its body builds up under atmospheric pressure or super-atmospheric pressure, while the air is being evacuated from the sand body as it builds up in the bottom of the core box. In the embodiment shown in Figure 2, the air is again evacuated from the core box, and flows upwardly therein through the openings **20**, while the sand again builds up in the core box. In this case again the air is not only evacuated from the core box itself, but from between the sand particles as they build up. In the embodiment shown in Figure 3, the air is evacuated at the side of the core box, flowing from the interior to the outlet; again, however, as the sand builds up in the core box, the air is evacuated from the sand body. In all embodiments, therefore, the core box is not only evacuated so that pockets are avoided at corners and recesses in the core box, but the sand body itself is evacuated of air, so that it can build up into a solid mass.

It will be seen, therefore, that this invention provides a process and apparatus whereby sand cores may be made with assurance that they will be free from voids, of uniform texture, and tightly packed throughout. It will accordingly be seen that by the method and apparatus herein described and claimed, not only are pockets avoided, but the sand body itself is thoroughly evacuated of air, so that these particles will fit together without interference of porous spaces. By this method, therefore, the amount of binder which is required will be reduced to a minimum. However, the core is still sufficiently vented where such requirement is necessary in the making of castings from the cores.

In the accompanying drawings, only so much of the apparatus has been illustrated to facilitate

disclosure of the fundamentals and principles of the process and apparatus embodying this invention. The usual supports may be provided; thus, as usual, the core box may be supported on a table **16** with a support **51**. As usual, moreover, the sand container or supply **10** is mounted on a support **50**, so as to be positioned above the table. The core box can therefore, as usual, be placed on the table and brought up against the bottom of the container. The bottom and top of the core box may of course be suitably machined to rest firmly upon the table, in Figure 1 to make air-tight connections with the bottom of the sand container and with the plate **5**; in Figure 2 to make air-tight connections between the blowplate **11** and the core box and the sand container; and in Figure 3 to make an air-tight connection with the bottom of the sand container.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In the art of making cores of sand, the process comprising, feeding core sand with attendant air under at least atmospheric pressure into a core box provided with vents in order to deposit the sand in the box and simultaneously withdrawing air from the box through the vents by applying thereto a pressure below atmospheric pressure.

2. In the art of making cores of sand, the process comprising, blowing core sand with air under at least atmospheric pressure into a core box provided with vents in order to deposit the sand in the box and simultaneously withdrawing air from the box through the vents by applying thereto a pressure below atmospheric pressure.

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