Dec. 13, 1955 S. W. DUNCAN 2,726,429

MOULDING MACHINES

Filed Dec. 26, 1951

FIG. 1.

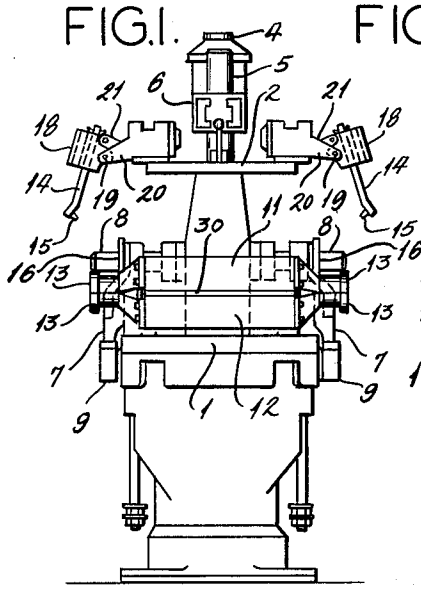


FIG. 2.

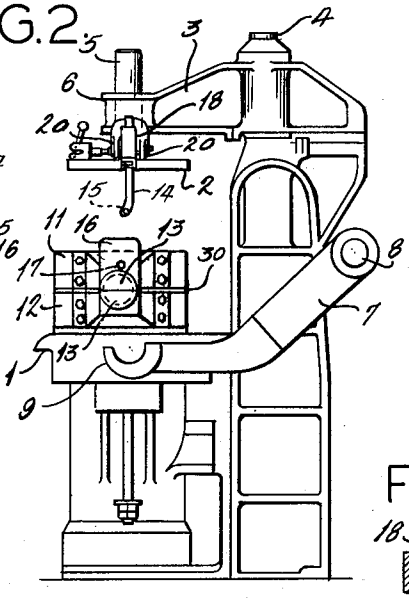


FIG. 7.

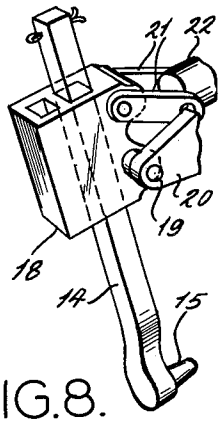


FIG. 8.

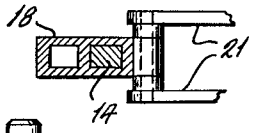


FIG. 3.

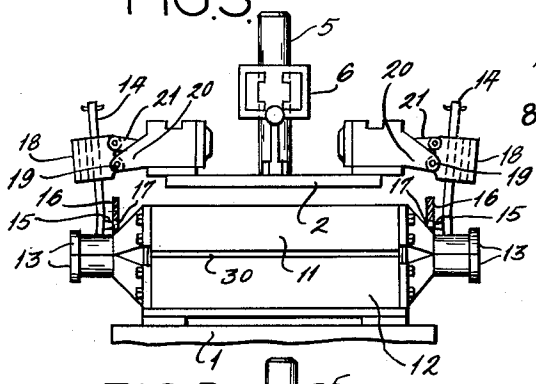


FIG. 4.

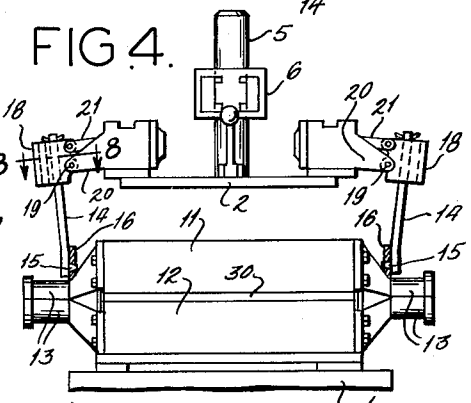


FIG. 5.

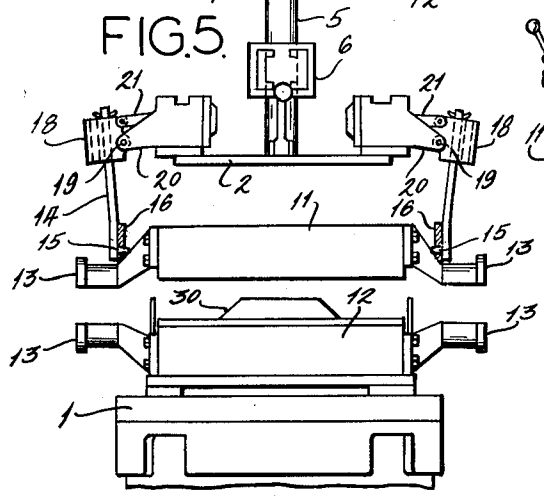
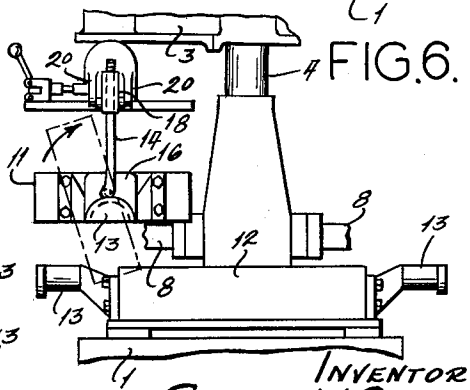


FIG. 6.



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MOULDING MACHINES

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5 Claims. (Cl. 22—48)

This invention relates generally to moulding machines, and particularly to machines for the preparation of sand moulds.

In foundry operations, where sand moulds are produced in a flask from patterns, it is common practice to jolt the flask containing the sand and then to squeeze the sand about a pattern interposed between the cope and the drag of the flask. Unitary machines are available, having upper and lower pressure members, the latter being arranged to operate not only as a jolting table but also to squeeze a mould against the reaction of the upper pressure member. One conventional type of such a machine embodies an arrangement for gripping the cope and drawing it vertically away from the pattern and drag; and the machine is also provided with an arrangement for laterally shifting the position of the elevated cope so as to free the upper surface (i. e., the parting line) of the drag, thus permitting ready removal of pattern, and whatever handwork is required upon the impression made by the pattern in the sand within the drag.

With machines of the character last mentioned, the drawn cope is suspended beside the drag which rests on the lower pressure member. In the suspended position of the cope, the impression made by the pattern in the sand thereof is on the down side. Such disposition of the mould cavity in the cope renders it inconvenient to inspect or do handwork upon that cavity or insert preformed core pieces therein, and consequently foundry hands are inclined to be less accurate in the placement of core pieces, and less careful about their inspection and manual correction of imperfections, in the mould cavity in the suspended cope than they are with the corresponding operations upon the mould cavity of the drag. I have reasoned that the relatively higher ratio of imperfections in the mould cavities of the cope is attributable to the fact that to inspect it the foundry hand must squat down and look up at the cavity in the suspended position of the cope, and does his handwork overhead; whereas, in the case of the drag, the mould cavity is facing upwardly and is conveniently situated for examination and correction. It is, therefore, an object of the present invention to provide a machine of the character aforesaid wherein the mould surface of the suspended flask part may be readily turned so as to face horizontally or upwardly.

Other objects will become apparent to those skilled in the art when the following description is read in connection with the accompanying drawings, wherein:

Figure 1 is a view in front elevation of a moulding machine embodying the present invention and shown with the complete flask at rest upon the lower pressure member of the machine;

Figure 2 is a view in side elevation of the machine shown in Figure 1;

Figure 3 is a detail view in front elevation showing the flask and the parts for engaging the cope to draw it, but in disengaged position;

Figure 4 is a view corresponding to Figure 3, but shows the parts in engaged position;

Figure 5 is another view corresponding to Figures 3 and 4, but showing the cope elevated above the drawing;

Figure 6 is a view in the same elevation as Figures 3, 4, and 5, but showing the elevated cope in laterally shifted position;

Figure 7 is a perspective view of the cope-engaging element of the present invention; and

Figure 8 is a sectional view taken along line 8—8 of Figure 4.

Generally stated, the present invention contemplates that a moulding machine of the character generally described above has its upper pressure member provided with cope-engaging means of a character such as to provide a substantially horizontal axis by which the cope may be turned when suspended. Preferably, such horizontal axis is disposed so as to pass adjacent the center of gravity of the cope with its contained mould. From the practical standpoint, such adjacence to the center of gravity need not, and seldom will, be precise, for the reason that the same cope may be used for confining bodies of sand whose mould cavities differ from time to time. For general purposes, it is sufficient that the axis of horizontal rotation provided by the parts aforesaid be through the body of sand contained within the cope; but it will be understood that, where a given cope is to be used over and over again with the same pattern, it is preferable that such horizontal axis of rotation pass as nearly as possible through the center of gravity of that particular mould half.

In the accompanying drawings, the improvement of the present invention is illustrated in association with a conventional moulding machine of the character having a lower pressure member **1**, which constitutes not only a work table but a jolting table and a means for squeezing the mould against an upper pressure member **2**. The lower pressure member **1** is movable, under a force applied through a fluid pressure system, between the lowermost position shown in Figures 1 and 2 to an elevated position (relatively close to the upper pressure member **2**) shown in Figures 3 and 4.

The upper pressure member **2** is mounted upon an arm **3** for rotation by a vertical spindle **4** for an amplitude of at least 90° from the position shown in Figure 1 to the position shown in Figure 6. If desired, and as shown, the upper pressure member **2** may be interconnected with the arm **3** through a column **5** which is slideably received within a boss **6** and arranged for manual adjustment in the vertical direction.

The machine is also equipped with a pair of lifting arms **7**, one on each side of the lower pressure member **1**. The arms **7** are mounted upon a shaft **8** and provided at their outer extremities with concavities **9** for engagement with trunnions on the flask later to be described. The arms **7** are arranged to rotate with shaft **8** in the clockwise direction from the position shown in Figure 2 through an amplitude sufficient to lift a flask above lower pressure member **1** and permit it to be turned over.

The moulding flask consists of a cope **11** and a drag **12**, each provided at both ends thereof with half trunnions **13** proportioned to interfit with concavities **9**.

The parts of the machine just described are conventional, and per se constitute no part of the present invention.

The present invention contemplates that the upper pressure member **2** be equipped with a pair of cope-engaging elements, each having a spindle **15** proportioned to interfit with hole **17** in a bracket **16**, one at each end of the cope **11**. In the embodiment shown, the members **14** are slideable (within limits) in the vertical direction within a box **18** and the box is pivoted at **19** to a bracket **20** carried by the upper pressure

member 2. A pair of links 21 extends from the boxes 18 to a horizontal reciprocable part 22. The part 22 is actuated in any suitable manner such, for example, as by fluid pressure or electromagnetic means, so as to move the boxes 18 about pivots 19, between the position shown in Figure 1 and the position shown in Figure 4. In the former position, the members 14 extend in a direction so as to clear the brackets 16 and all other parts of the flask. In the latter position, the members 14 are urged in a direction tending to cause the spindles 15 to engage with apertures 17 in brackets 16. When thus engaged, and with the lower pressure member 1 elevated as shown in Figure 4, the lower pressure member 1 may be dropped to the position shown in Figure 1 to draw the cope 11 from drag 12 as shown in Figure 5. Rectilinear relative movement during the drawing operation is assured by the conventional dowels interconnecting the cope and the drag. After the cope has been thus drawn, arm 3 may be rotated to the position shown in Figure 6, carrying the suspended cope 11 with it to a position laterally aside the drag 12. When in this position, the cope 11 may be rotated about the axis defined by spindles 15 within apertures 17 as shown by the arrow in Figure 6 until the surface of the cope, which had previously faced down, is faced toward the workman, and oriented at the angle which best suits him. Usually, the position is about vertical or therebeyond to a position on the other side of vertical from that shown in dotted lines. In this rotated position, the mould cavity in the cope is exposed for easy inspection, and positioned so as to facilitate the placement and nailing of core pieces and manual correction of defects therein. Consequently, better moulds are produced, and more accurate castings result.

While the cope is suspended beside the drag, the pattern 30 may be removed from the drag.

The relative sliding movement between members 14 and box 18 is important from the standpoint of minimizing the skill which is required in elevating lower pressure member 1 to a position whereat the parts 15 and 17 may engage. If, in process of such elevation, the flask is moved higher than necessary, and the lower ends of members 14 engage trunnions 13, the members 14 are quite free to move upwardly and consequently no damage is done to the fouling parts. When the member 1 is then lowered, the spindles 15 under the bias of plungers 22 are urged into the apertures 17 so as to effect connection between the upper pressure member 2 and the cope 11.

From the foregoing description, those skilled in the art should readily understand the construction, operation, and advantages of the present invention and realize that it enables the drawn cope to be readily turned into a position whereat its mould surface may be critically examined and operated upon without discomfort or handicap to the personnel. Of special significance is the improved accuracy of placement and ease of securing the core parts. While one complete embodiment of the invention has been disclosed in detail, it is not to be understood that the invention is limited to that embodiment, nor is it limited to the particular moulding machine with which the invention has been shown in association. It is to be distinctly understood that such modifications and variations of the structure disclosed as present themselves to those skilled in the art without departing from the spirit of the invention are, although not specifically described herein, contemplated by and within the scope of the appended claims.

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

1. In a moulding machine of the character having upper and lower pressure members relatively movable to compress a cope and drag between them, and means on the upper pressure member for engaging the cope to draw the same from a pattern, the improvement which comprises, said means and cope including relatively rotatable engageable parts having, when engaged, an horizontal axis of rotation, said axis being located adjacent the center of gravity of the cope.

2. In a moulding machine of the character having upper and lower pressure members relatively movable to compress a cope and drag between them, said upper pressure member being mounted to swing about a vertical axis displaced from the pressure members, and means on the upper pressure member for engaging the cope to draw the same from a pattern, the improvement which comprises, said cope having at each end thereof a member having a socket, said sockets being horizontally aligned and being located near the center of said ends of the cope, and said upper pressure member having at each end thereof a spindle member arranged to removably interfit with said sockets and provide an horizontal axis of rotation for said cope.

3. In a moulding machine of the character having upper and lower pressure members relatively movable to compress a cope and drag between them, and means on the upper pressure member for engaging the cope to draw the same from a pattern, the improvement which comprises, said cope having at each end thereof a member having a socket, said sockets being horizontally aligned and being located near the center of said ends of the cope, and said upper pressure member having at each end thereof a spindle member arranged to removably interfit with said sockets and provide a horizontal axis of rotation for said cope; and means on the upper pressure member to move said spindle members into and out of said sockets.

4. In a moulding machine of the character having upper and lower pressure members relatively movable to compress a cope and drag between them, and means on the upper pressure member for engaging the cope to draw the same from a pattern, the improvement which comprises, said cope having at each end thereof a member having a socket, said sockets being horizontally aligned and being located near the center of said ends of the cope, and said upper pressure member having at each end thereof a spindle member arranged to removably interfit with said sockets and provide an horizontal axis of rotation for said cope, said spindle members depending substantially below said upper pressure member and being movable vertically toward said upper pressure member.

5. In a moulding machine of the character having a vertically movable upper pressure member, and means for supporting a cope and drag therebetween; the improvement which comprises said cope having at each end thereof a member forming a socket, said sockets being horizontally aligned and being located near the center of said ends of the cope, and said upper pressure member carrying at each end thereof a spindle member arranged to removably interfit with said sockets and provide a horizontal axis of rotation for said cope, and a lost-motion connection between said spindle members and said upper pressure member, whereby the spindle members retract upon downward movement of the pressure member to permit compression of the sand and drop upon upward movement of the pressure member to clear the cope for rotation beneath said pressure member about said horizontal axis.

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