Nov. 6, 1934. E. M. STAPLES 1,979,581

MOLDING MACHINE

Original Filed Oct. 20, 1933

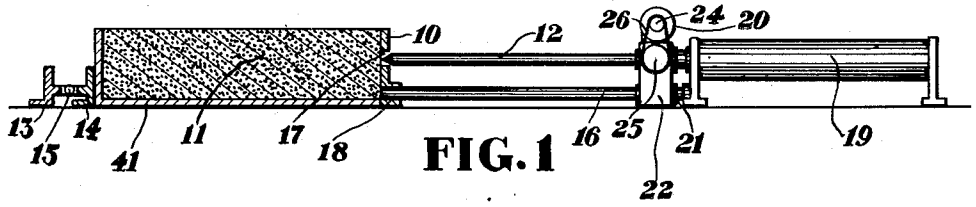

FIG. 1

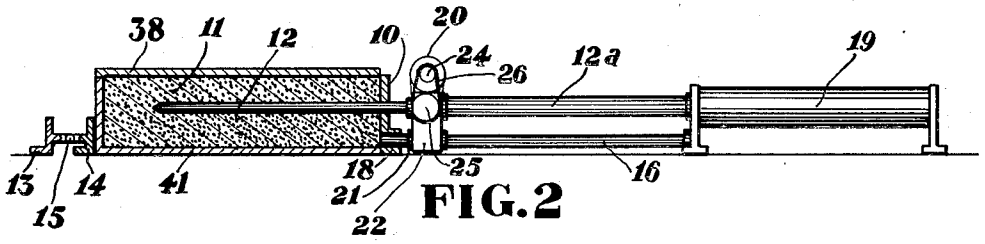

FIG. 2

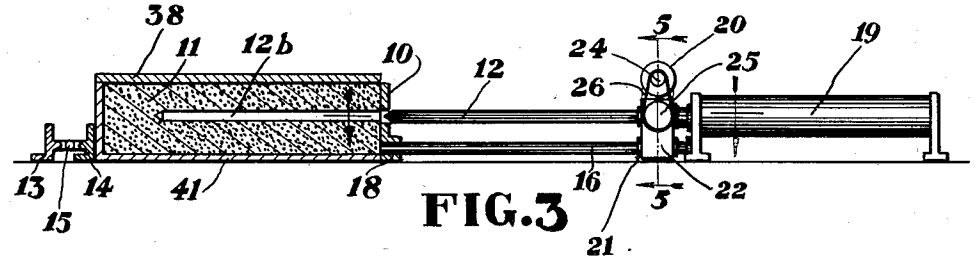

FIG. 3

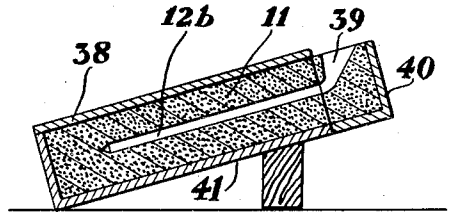

FIG. 4

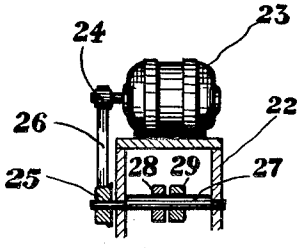

FIG. 5

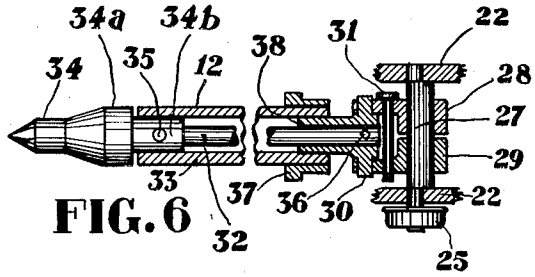

FIG. 6

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1,979,581

MOLDING MACHINE

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Original application October 20, 1933, Serial No. 694,439. Divided and this application March 17, 1934, Serial No. 716,109

7 Claims. (Cl. 22—47)

The present application is a division of my co-pending application, Serial No. 694,439 filed October 20, 1933.

This invention relates to a machine for casting long narrow objects. More specifically, it relates to means for preparing a sand mold for a casting operation by forcing a sand mold for instance made bar shaped, while vibrating same, into the packed molding sand, and then withdrawing the bar or pattern.

Among the objects of the invention is the provision of a machine for casting bars, especially in bronze, and other alloys or metals which cannot be conveniently worked (but permissibly in other metals such as steel.)

Reference is now had to the accompanying drawing in which:

Fig. 1 is a side elevation of the molding machine and sectionally of the flask containing sand, and before closing the flask.

Fig. 2 is a side elevation of the same with the flask top board clamped in place and the pattern at the furthest extent of the stroke.

Fig. 3 is a side elevation showing the pattern withdrawn and the resultant mold cavity.

Fig. 4 is a longitudinal section of the flask with a pouring cup added, the assembly being in tilted position for pouring the casting.

Fig. 5 is a cross section of the molding machine taken along the line 5—5 of Fig. 3, this view showing the arrangement of the bar vibrating means.

Fig. 6 is a plan view of that portion of the molding machine lying between the vertical arrows on Fig. 3. It shows in detail the vibrator and pattern construction.

In the drawing, 41 is a flask containing molding sand 11, which is indicated by stippling. The structure shown to the right of the flask is for the purpose of forcing the pattern 12, thru the sand while that on the left side is merely for holding the flask against the pressure created by the pattern, 13 and 14 are strong uprights, 13 being anchored to the floor, while 14 is movable laterally. 15 is a toggle, the function of which is to hold the flask in place against a stripping plate 10, in which an opening 17 is presented which is in alignment with the pattern 12. Alignment or slide bar 16 fits in a blind hold 18 in the stripping plate 10, by a driving fit so that the bar and plate are practically integral.

The function of the alignment or slide bar 16 is to guide the pattern and the pattern head oscillating mechanism 20. 22 is the frame of the latter, this frame fitting about slide bar 16 and being slidable thereon.

The motivating force for pushing pattern 12 is derived from a horizontal hydraulic cylinder 19. This is of conventional design, so that its oil connections are not shown. Pattern 12 is connected to the cylinder piston rod 12*a* (Fig. 2) which is shown as of larger diameter. The alignment bar 16 extends outwardly from the base of cylinder 19 parallel to the pattern 12, while 20 is a vibrating mechanism carried by both bar 16 and the cylinder piston rod. Mechanism 20 is slidable on the bar 16 so that the latter serves the double function of aligning the plate 10 and holding the vibrating mechanism upright. The means by which the vibrating mechanism 20 can be slid along bar 16 is a cylindrical bearing 21 carried in the frame 22 of the said mechanism. It will be observed that the frame 22 is carried along by the piston rod, but slidably mounted on alignment bar 16.

The pattern 12 is not solid but comprises an inner solid bar 32 which is surrounded by a tube 22. The latter at its outer extremity has fitted into it a pointed solid oscillating head 34 having a cylindrical rear portion 34*a* which is provided on its inner end with a recess (not shown) to receive the outer end of bar 32. A cross hold 35 is provided in both of these for the reception of a pin (not shown) to hold them together. At the inner end of bar 12 (the right hand and on Fig. 6) the construction is similar, a recess is provided in the end of the T head 30 to receive the end of the bar 32 and a hole 36 is provided through both for the reception of a pin (not shown) to hold them together. The hollow cylindrical rear portion 34*b* is of a diameter adapted to allow it to slide within the tube 33 up to the limit set by the shoulder 34*a*. The outer contour of tube 33 is that of the desired mold cavity, consequently the said outer contour is not limited to a cylindrical shape.

The vibrating mechanism itself comprises the above mentioned frame 22, an electric motor 23 mounted above it, a pulley 24 on the motor, a pulley 25 on the side of the frame, and a belt 26 transmitting power from the motor to the latter pulley.

Referring now to Fig. 5, pulley 25 is keyed to an eccentric shaft 27 which is mounted in the frame 22 crosswise thereof. In the middle of this shaft are carried two connecting rods 28 and 29 which together form a clevis in the arms of which the T head 30 of the oscillating head rod 32 is hung so that its cylindrical ends are

free to oscillate in the extremities of the clevis. A pin 31 is provided to hold parts 28 and 29 together. These details are shown in Fig. 6.

Pattern head 34 is thus connected to the actuating bar 32 within the patterns so as to have a bearing within the latter when oscillated. In this way a bearing surface is provided which is fairly well protected against the entrance of sand particles. Actuating bar 32 is in turn connected to the oscillatable T head by a pin through hole 36 and the head is in turn attached to connecting rods 28 and 29 by pin 31. Pattern tube 33 is clamped to a cylindrical extension 38 of the T head by means of a ring 37 welded to the outside of the tube. This ring also protects the edge of the tube 33 against splitting. Extension 38 is oscillatable within tube 33 which forms a bearing for said extension.

In operating the machine functions as follows and the casting steps occur in the following order:

Flask 41 is placed in position and toggle 15 is depressed, thereby holding the flask against the stripping plate 10 and holding it rigidly. Flask 41 filled with sand and rammed lightly, after which the mold cover 38 is placed in position and clamped.

Electric motor 23 is now energized and the hydraulic pump (not shown) started. The hydraulic valve (not shown) is then opened to advance pattern 12 and vibrating mechanism 20.

Rotation of eccentric shaft 27 by pulley 25 now imparts a back and forth vibratory motion to pattern head 34, assisting its passage into the sand box 41 by a hammer action. This action is brought about by the rotation of shaft 27 in members 28 and 29 of the clevis, which transmits the motion to the bar 32 and so to the pointed head 34.

After the pattern 12 has reached its extreme position as shown in Fig. 2, the hydraulic valve is reversed and the pattern withdrawn to the position shown in Fig. 3. The vibratory action is preferably stopped during this retraction. Toggle 15 is then lifted upward and the flask taken out and tilted at an angle between 5° and 60°, preferably 20°. A gate 39 contained within a pouring cup 40 is attached to the end of the flask 41 from which stripping plate 10 has been removed. Pouring is now done through gate 39.

Since the sand is highly compressed along the path of pattern 12, it follows that bars of even diameter may be cast.

Not only bars, but other castings which are much longer than they are wide, can be made by this method. To do so, the bar 12 is replaced by a different shaped pattern of the shape that it is desired to reproduce.

It is to be understood that my machine can be made in the so-called "gang" type, i. e. to ram several molds at once by having one hydraulic cylinder actuate several patterns which are attached to a header. Any competent mechanical engineer can, in view of this disclosure successfully design such a gang type machine.

I claim as my invention:

1. In a molding machine, means for forcing a pattern into a flask of lightly packed molding sand, a pattern which is adapted to be so rammed, an oscillatable head on said pattern and means for oscillating said pattern head along the axis of pattern travel.

2. In a molding machine, a hydraulic cylinder, a pattern actuable thereby to travel along the lengthwise axis of said cylinder, an oscillatable head on said pattern and oscillating means carried by said pattern, capable of imparting to said pattern head an oscillating motion along the longer axis thereof.

3. In a molding machine, a hydraulic cylinder, a pattern actuable thereby to travel along the lengthwise axis of said cylinder, an oscillatable head carried by said pattern, and oscillating means carried by said pattern capable of imparting to said head an oscillating motion along the longer axis thereof, said oscillating means including an electric motor and an eccentrically mounted shaft, said pattern head being actuatable by said shaft.

4. In a molding machine, a hydraulic cylinder, a pattern actuable thereby to travel along the lengthwise axis of said cylinder and a pattern head carried thereby, means for maintaining the alignment of said pattern, an oscillating means carried by said pattern, connected to the head thereof said means comprising an electric motor, an eccentric shaft driven by said motor, clevis forming connecting rods on said shaft, an oscillatable T head carried by the open end of said clevis and means jointing the single end of the T head with the inner end of the pattern whereby lengthwise oscillating motion may be transmitted to the said pattern head.

5. In combination a flask, a stripping plate therefor, and a horizontal hydraulic molding machine, the latter comprising an alignment bar adapted to preserve alignment and distance between the stripping plate and the molding machine, said plate having also an opening for the reception of a pattern and a recess for the reception of the aligning bar and a pair of strong uprights, the outer one being anchored to the floor, a toggle controlling the inner upright, the latter abutting the outer end of the flask.

6. In combination a flask, a stripping plate therefor, and a hydraulic molding machine, the latter comprising a pattern adapted to be forced into the flask, an alignment bar adapted to preserve alignment between the stripping plate and the molding machine, the said bar and said pattern jointly carrying means for vibrating the head of the pattern along its axis of advance, said stripping plate having an opening for the reception of the pattern and a recess for the reception of the aligning bar, said bar being fitted into said recess.

7. In a hydraulically actuable molding machine of the type in which the pattern is forced into a flask of molding sand, a pointed pattern head, a tube surrounding said pattern head and forming a bearing therefor, a bar within said tube, said bar being connected to said pattern head, means adapted to impart simultaneous forward motion to the pattern as a whole and means adapted to impart a longitudinal oscillatory motion to said head thru said bar, one member of said latter means being surrounded by said tube and assisting in the support of the rearward end of said tube.

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