June 4, 1929. F. C. LANGENBERG 1,715,418

MACHINE FOR MAKING CASTINGS

Original Filed Nov. 28, 1925 3 Sheets-Sheet 1

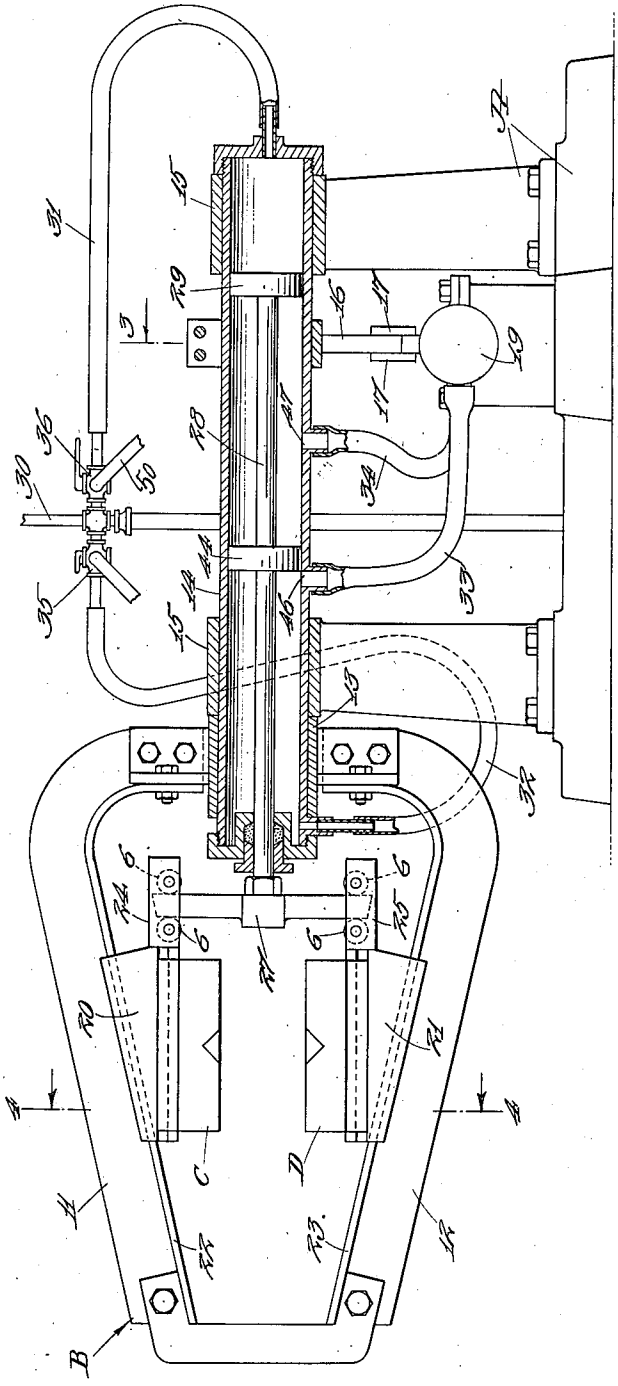


FIG. 1.

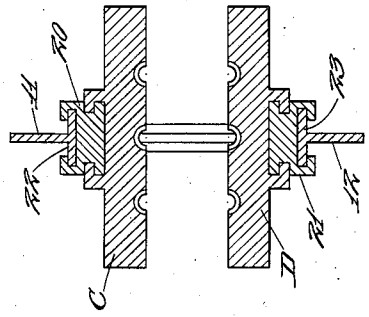


FIG. 4.

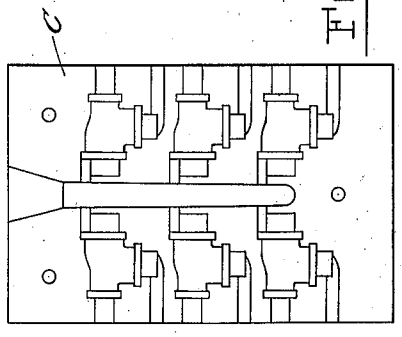


FIG. 5.

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MACHINE FOR MAKING CASTINGS

Original Filed Nov. 28, 1925 3 Sheets-Sheet 2

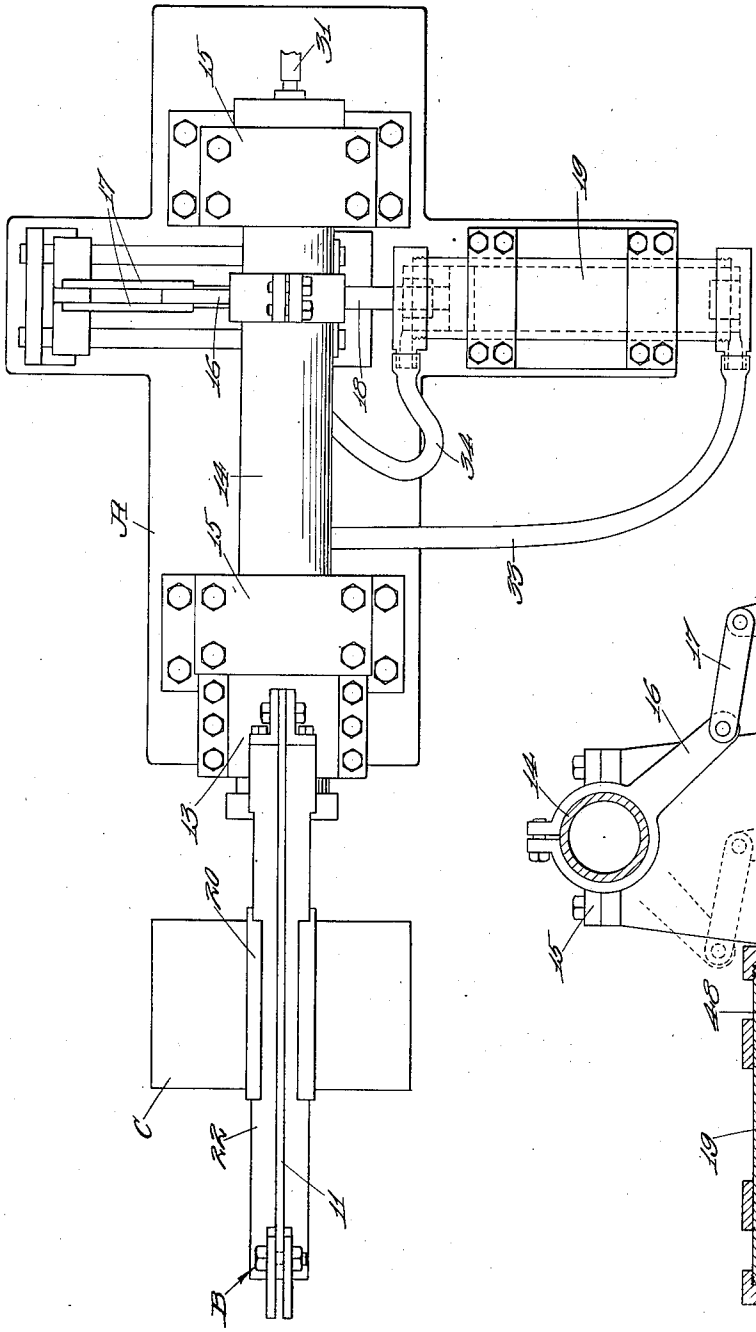


FIG-2-

FIG-3-

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MACHINE FOR MAKING CASTINGS

Original Filed Nov. 28, 1925 3 Sheets-Sheet 3

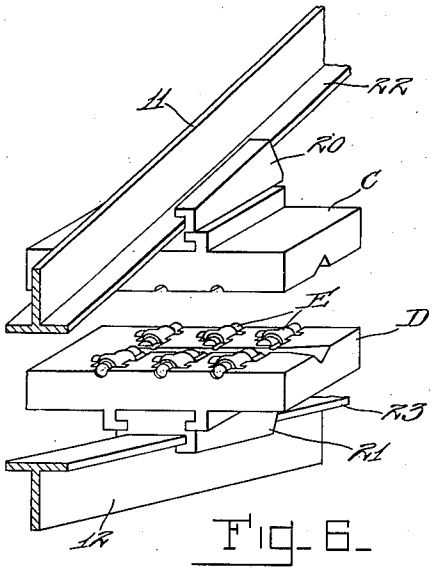


Fig. 6.

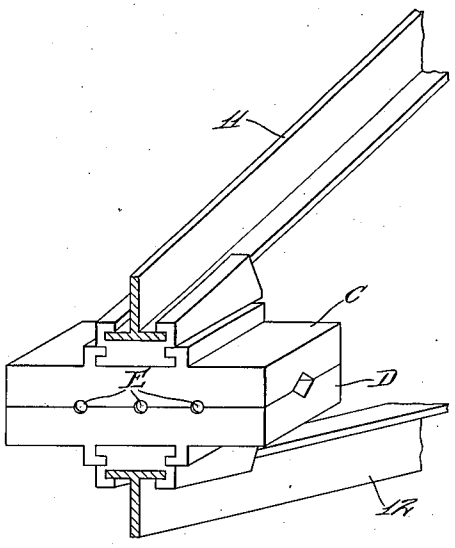


Fig. 7.

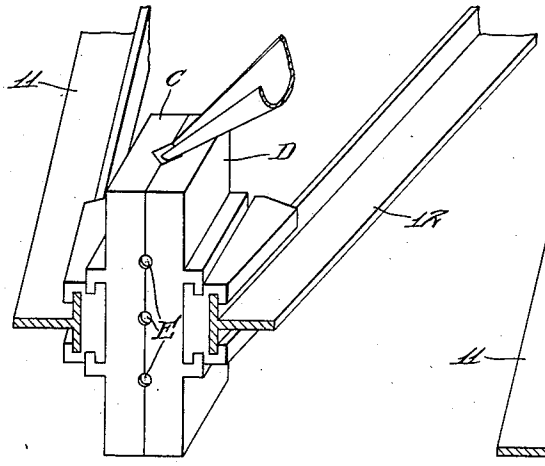


Fig. 8.

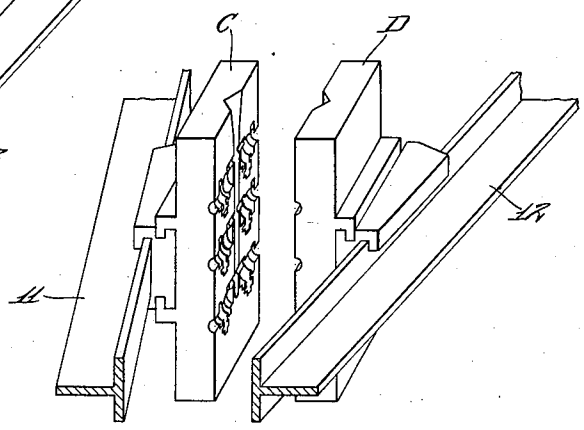


Fig. 9.

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Patented June 4, 1929. 1,715,418

UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING CASTINGS.

Application filed November 28, 1925, Serial No. 71,928. Renewed October 17, 1928.

The present invention relates to a machine for making castings, particularly small identical castings, large number of which are required.

Heretofore, as is well known to those skilled in the art, machines have been devised for this purpose, but as far as I am aware, they have not been altogether satisfactory, since they operate chiefly on the turret principle, there being a large rotating table or carrier by means of which a series of molds are moved successively from one position to another and there submitted to the several necessary operations.

The particular object of the present invention is to provide a small, simple casting machine employing a single mold and can be run at a rapid rate of speed receiving its core, then receiving the molten metal and then discharging the finished casting ready to repeat the operation.

The machine embodying my invention performs the steps of a novel method of casting and is only one of several machines which may be devised to perform this method. Accordingly, I have made the method the subject of a separate application for patent filed November 28, 1925 Serial No. 71,929.

The principal steps of the novel method referred to are:

1. Placing the core in one of a pair of separable cooperating mold members while the said pair are separated from each other and while the core-receiving member is in core-receiving position.

2. Closing the mold while the core-receiving member is still in core-receiving position.

3. Turning the mold into pouring position.

4. Pouring the metal.

5. Opening the mold while in pouring position, thereby permitting the casting to drop out, and

6. Turning the mold to the original core-receiving position.

In the drawings accompanying the specification, I have shown a preferred form of my machine. In this machine the mold sections are held together by yielding pressure which permits the mold sections to separate slightly during the chilling of the casting. This is an important feature of my machine, as otherwise injury might be done to the machine by the change in form of the casting during the cooling and consequent injury to the operating parts of the machine or to the casting itself. This machine is of simple, rugged construction and is operated by compressed air and, therefore, will not be broken or injured as might be the case if it were operated by positive mechanism and if it should happen that metal dripping from the pouring spout or from the mold should cool on the outside of the mold. The simple, rugged construction shown in the drawings is moreover particularly adapted for foundry use where the machine is likely to be subjected to rough treatment under difficult working conditions. Since I believe myself to be the first to produce a casting machine in which a mold composed of two or more separable mold members is put through the series of steps described and produces a casting or castings for each cycle of operation and since other machines having the same essential elements and performing the same cycle of operations can be devised, I consider my invention to be a broad one and desire to claim it in the broadest possible manner consistent with the law.

In the drawings:

Fig. 1 is a front elevation partly in section of a casting machine suitable for performing steps of the herein described method.

Fig. 2 is a plan view.

Fig. 3 is a vertical section taken on line 3—3, Fig. 1.

Fig. 4 is a section taken on line 4—4, Fig. 1.

Fig. 5 is a plan of one part of the mold.

Figs. 6, 7, 8 and 9 are perspective views of a portion of the machine illustrating successive positions of the mold in the cycle of operation.

The machine shown in the drawings includes a frame A, a mold holder B, a mold in at least two parts C and D, and mechanism for rotating the mold sections through an angle of about 90° and for sliding the mold members relatively to the mold holder for the purpose of opening and closing the mold. The mold holder B consists of two converging guides 11 and 12 which are mounted upon a head 13 which in its turn is mounted on a cylinder 14 carried in bearings 15, 15 forming part of the frame of the machine. The cylinder 14 has secured to it an arm 16 which is connected by links 17 to the piston rod 18 of a cross cylinder 19. This cross cylinder

serves to rotate the main cylinder 14 and consequently the mold holder B and mold sections C and D through an arc of substantially 90° at the proper time in the cycle of operation of the machine. The mold sections C and D are preferably detachably connected to supports 20 and 21 which are formed with slides which cooperate with complementary guides 22 and 23 on the converging members 11 and 12 of the mold holder. It will, therefore, be seen that when the mold sections C and D are pushed forward, that is to the left as shown in Fig. 1, the mold will be closed and that it will be opened when the mold members are moved in the opposite direction. The two supports 20 and 21 are provided with rearwardly extending arms 24 and 25 each carrying a pair of rollers 6, 6 between which are the arms of a cross head 27 secured to the end of the piston rod 28. The piston rod 28 is provided with two heads 29 and 44 which are mounted for reciprocation in the main cylinder 14.

The machine is preferably operated by compressed air which is led from a supply main 30 through flexible connections 31 and 32 to opposite ends of the main cylinder 14. Other flexible connections 33 and 34 connect ports in the main cylinder 14 with the opposite ends of the cross cylinder 19. Two three-way valves 35, 36 control the admission of air to the two cylinders.

In describing the operation of the machine, it will be assumed that the parts are in the position shown in Figs. 1 and 6 with the mold sections C and D separated from each other and the plane of division between the mold sections is substantially horizontal. The core or cores E are then inserted by the operator being laid in the mold cavity in the lower mold section D. They will not fall out because of the relatively horizontal position of the mold section which receives them. The operator then turns the valve handle 36 and admits air from the main 30 through the pipe 31 to the rear end, that is the right-hand end, of the main cylinder 14. This moves the piston 29 to the left as shown in Fig. 1 carrying with it the cross head 27, the mold supports 20 and 21, and the mold sections C and D. Since the guides 22 and 23 converge the mold sections will finally be brought into contact with each other and held firmly in this position. The mold is then in the position seen in Fig. 7. It will, therefore, be seen that the mold has been closed with the cores in it and, therefore, can now be turned into pouring position without danger of the cores dropping out or of their position in the mold being disturbed. When the piston 29 reaches the end of its travel toward the left, it uncovers the port 47 which leads to the flexible connection 34 and thence to the inner end, that is the right-hand end as seen in Fig. 3, of the cross cylinder 19, whereupon the piston 48 in said cross cylinder travels to the left and swings the main cylinder 14 about its longitudinal axis through an arc of substantially 90° bringing the dividing plane between the mold sections into vertical position shown in Fig. 8. This is the pouring position. The metal is then poured into the mold and since the mold is of metal, the molten metal sets almost instantly.

Broadly speaking this completes the essential part of the cycle of operation, it only being necessary to remove the casting from the mold and bring the mold back to the starting position. The workman then restores the valve handle 36 to its original position, permitting the air to exhaust from the rear end of the man cylinder 14 and from the right-hand end of the cross cylinder 19 through the flexible connections 34 and 31 and thence through the three way valve 36 and pipe 50. The valve 35 is then opened allowing compressed air to enter the front or left-hand end of the main cylinder. This moves the piston 44 to the right as shown in Fig. 1, opening the mold to the position shown in Fig. 9 and allowing the casting to drop out. Under ordinary conditions and if the mold is properly constructed, the action of gravity is sufficent to dislodge the casting but this may be done by hand or by a suitable ejector if required. When the piston 44 has reached a predetermined point in its travel, it uncovers the port 46 leading through the connection 33 to the left-hand end of the cross cylinder 19 as viewed in Fig. 3. This pushes the piston 48 back to its original position swinging the main cylinder back through an arc of 90° so that the mold sections are again in horizontal position and separated from each other ready to receive the fresh core or cores. From the foregoing, it will be seen that the preferred cycle of movement includes the steps hereinbefore referred to.

In practice and for the sake of rapidity of operation, I employ all of the steps mentioned in the order given but it will be understood that I do not limit myself to this since it is not essential that the mold be opened while it is in vertical position. However, I prefer to open the mold while in vertical posical position as by so doing, the article is automatically discharged from the mold.

It will also be understood that it is not essential that both mold sections should be in horizontal position when the core is inserted, it being necessary that only the core-receiving section shall be in this position, so that the core or cores when placed therein will not fall out; also that the mold be closed before the core-receiving section has been turned far enough to permit the cores to fall out. Nor is it necessary that the position be exactly horizontal. Likewise it is not necessary that the mold be in exactly vertical position when the pouring takes place. For convenience in description, I have, however, referred to the

core-receiving position as a horizontal position and the pouring position as a vertical position and the arc through which the mold is turned from the core-receiving position to the pouring position as 90° but do not intend to limit myself by the use of these terms since it is evident that the core-receiving section need not be in strictly horizontal position when the cores are inserted nor the mold be in strictly vertical position when the pouring takes place, nor that the angle through which the mold is tilted be exactly 90°, nor that the mold be swung on an axis which passes through it.

It will also be understood that the mold sections may be constructed to cast a plurality of articles at the same time as shown in Fig. 5, and that if desired a group of molds may be operated by one machine.

It will also be understood that the control of the machine by separate valves or by valves operated in sequence by the operator are not necessary; neither is the admission of air from one cylinder to the other or in fact the operation of the machine by compressed air essentials to my invention in its broadest aspects and therefore that I do not limit myself to this or other details except as expressly stated in the claims.

What I claim is:

1. A casting machine which includes separable mold sections and a mounting for said sections which permits closing and tilting movements of said sections, means acting on the mounting for closing the mold sections, means for tilting the closed mold sections through substantially ninety degrees, and means acting to separate the mold sections while in tilted position and hold them in spaced relation.

2. A casting machine which includes separable mold sections and a mounting for said sections which permits closing and tilting movements of said sections, yielding means acting on the mounting for moving each of the mold sections to close the same and means for tilting the closed mold sections through substantially ninety degrees.

3. A casting machine which includes two separable mold sections and a mounting on which one of said sections is slidably movable toward and from the other in an intersecting plane, said mounting being movable to tilt the plane of separation of said sections substantially ninety degrees.

4. In a casting machine and in combination, separable mold sections, a mounting therefor, means on the mounting for moving each of the mold sections to close the same and means for turning the mounting and the parts carried thereby through an angle of substantially ninety degrees.

5. In a casting machine, a mounting including converging side members, separable mold sections slidable on said side members, means for moving said mold sections relatively to said converging side members and means for revolving the mounting.

6. In a casting machine, a mounting including converging side members, separable mold sections slidable on said side members, yielding means for moving said mold sections relatively to said converging side members and means for revolving the mounting.

7. In a casting machine, a mounting including converging side members, separable mold sections slidable on said converging side members, means carried by the mounting for moving the mold sections lengthwise of the side members and thereby toward and from each other, and means for revolving the mounting through an angle of substantially ninety degrees.

8. In a casting machine, a frame having bearings therein, a mounting supported in said bearings and including converging side members, separable mold sections slidable on said side members to cause the sections to approach or recede from each other, slidable means concentric with the axis of said bearings to move said mold sections lengthwise of the side members of the mounting and means to turn the mounting about the axis of the said bearings through an angle of substantially ninety degrees.

9. In a casting machine, a frame having bearings therein, a main cylinder mounted in said bearings and rotatable about its longitudinal axis, a second cylinder, means operated by the second cylinder to revolve the main cylinder in its bearings, a mounting fixed to the main cylinder and including converging side members, separable mold sections slidable lengthwise of said converging side members and a piston in said main cylinder and connected to said mold sections to move the same lengthwise of the converging side sections.

10. In a casting machine, a mounting including converging side members, said mounting being revoluble about its longitudinal axis, separable mold sections slidable on said converging side members and two cylinders one of which rotates the mounting, the other of which slides the mold sections lengthwise of the side members.

11. In a casting machine, a mounting including converging side members, said mounting being revoluble about its longitudinal axis, separable mold sections slidable on said converging side members and two cylinders one of which rotates the mounting, the other of which slides the mold sections lengthwise of the side members, and connections between said cylinders whereby one cylinder is supplied with fluid under pressure from the other cylinder.

12. In a casting machine, a mounting including converging side members, separable mold sections, and carriers for the mold sec-

tions, said carriers being triangular in shape so that the opposing faces of the mold sections are maintained in parallel relation notwithstanding the position thereof lengthwise of the side members.

13. In a casting machine, a mounting, a pair of separable mold sections, supporting means between the mold sections and the mounting permitting movement of the mold sections toward and away from each other, while maintaining their proximate faces thereof in parallel relation, said mounting being itself capable of movement to cause the proximate faces of the mold members to move from one position to another position at substantially ninety degrees thereof.

14. A casting machine which includes separable mold sections, a mounting for said sections which holds one of the sections normally in a core receiving position, a mechanism for moving said sections successively whereby they are closed and then tilted at substantially ninety degrees to a pouring position and opened while in tilted position.

In testimony whereof I affix my signature.

FREDERICK C. LANGENBERG.