

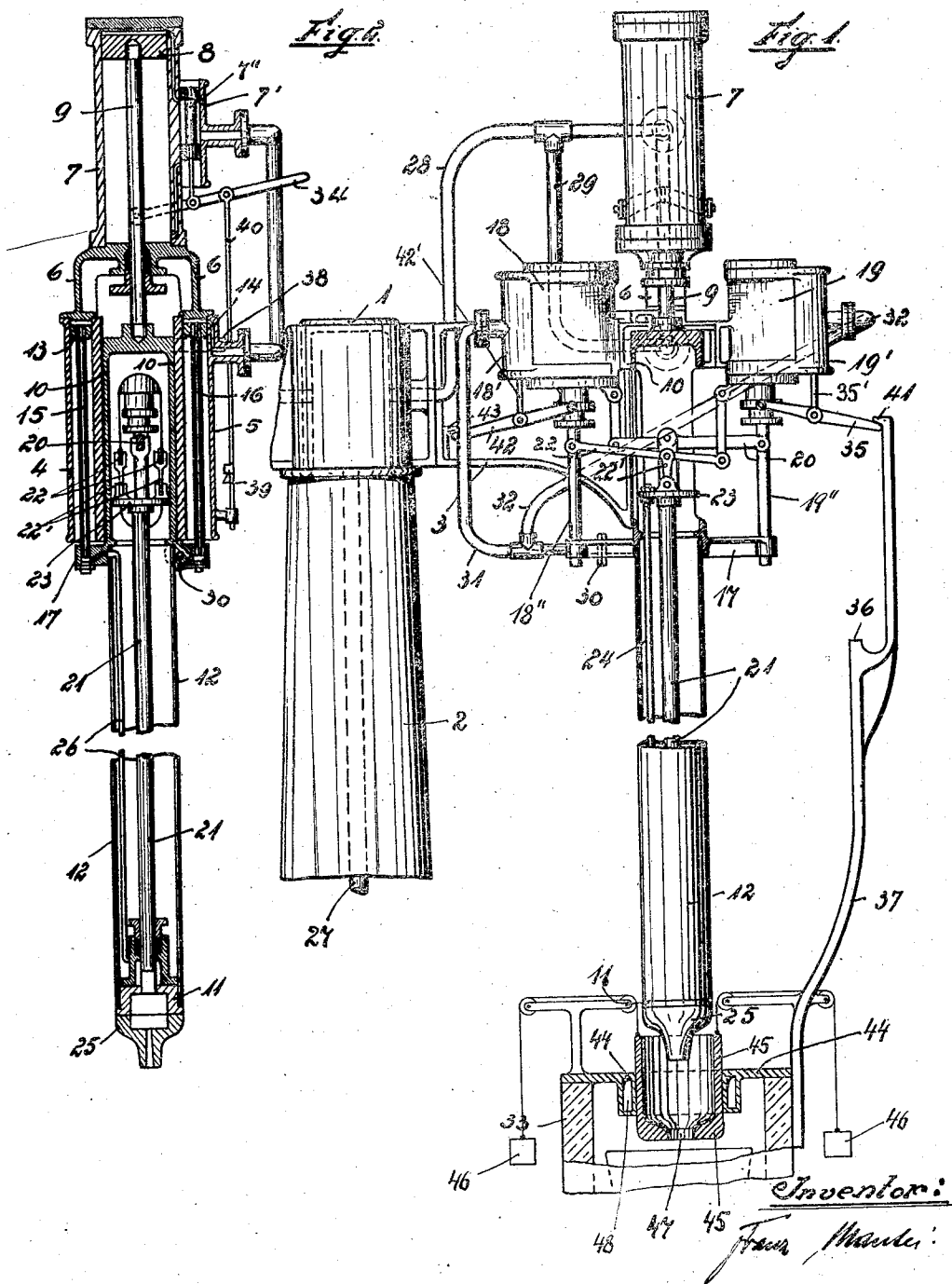
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METAL MOLDING MACHINE

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METAL-MOLDING MACHINE.

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My invention relates to metal molding machines of the kind in which the mold is automatically lowered into a crucible, to fill it with molten metal, and in which a ram enters the mold to compact the metal therein. Heretofore the ram, which has not been actuated itself, has been so arranged that it does not come into contact with the metal till the latter is partly solidified, and is in a ductile or pasty state.

According to my invention the action of the ram is not solely dependent on the movement of the mold, but the ram is given a movement whereby it is caused to act on the metal while the latter is still in a liquid or semi-liquid state, which improves the quality of the casting. The action of the ram on the metal may begin while the mold is still in the bath from which the metal is taken.

I may effect the raising and lowering of the mold by means of a piston in a cylinder, and compressed air or other driving fluid. I may also provide means whereby the mold is automatically opened shortly before the end of the cycle of operations, so that the casting can be taken out, and I may provide a bucket, which has a perforation at the bottom, and into which the mold is lowered before entering the metal bath.

An embodiment of the invention is shown in the accompanying drawing, in which—

Fig. 1 is an elevation of the machine, partly in section and partly broken away, and Fig. 2 a vertical section at straight angles to the plane of Fig. 1.

The mechanism is carried by a bracket 3 rotatable about the upper end 1 of a pillar 2. At the opposite side of the pillar there is a similar bracket supporting similar mechanism, but this is broken away in Fig. 1. To the bracket 3 are fixed two cylinders 4 and 5, which support a yoke 6, on which is mounted the main power cylinder 7 provided with a valve cylinder or box 7¹. The piston 8 in the cylinder 7 is connected by its rod 9 with a cylindrical casing 10, having fixed to its lower end a tube 12. Within the lower end of the latter is the upper part 11 of the mold. The casing 10 is disposed between the cylinders 4, 5, so as to be guided thereby in its movements, and the hollow rods 15, 16 of the perforated pistons 13, 14 located in the said cylinders 4 and 5 are

fixed to a flange 17 on the casing 10. The casing 10 has fixed to it two cylinders 18, 19 with valve cylinders 18¹, 19¹. The rod 19¹ of a piston in the cylinder 19 is connected to a lever 20, which passes through slots in the wall of the casing 10, and to which is connected a ram 21 within the casing 10 and tube 12. The rod 18¹ of a piston in the cylinder 18 is connected by a pair of levers 22 and links 22¹ with a disk 23, which is slidable within the casing 10, and to which the bottom part 25 of the mold is connected by rods 24, only one of which is visible in the drawing. A pipe 26 connects the cavity in the mold with a duct in the flange 17 and with the hollow piston rod 15, so that by downward movement of the mold relatively to the cylinder 4 air is exhausted from the mold. A compressed air pipe 27 passes upwards through the pillar 2, and in one position into which the bracket 3 can be swung this pipe 27 is in communication with a pipe 28 leading to the valve cylinder 7¹. A branch pipe 29 leads from the pipe 28 to the cylinder 5. The hollow piston rod 16 communicates by means of a union 30 with pipes 31, 32 leading to the valve cylinder 18¹ and 19¹ respectively. Upon the crucible 33 there is a cylindrical guide 44 for a vertically movable bucket 45, which is balanced by weights 46 and has in its bottom a hole 47 for the ingate of the mold. The guide 44 is hollow at 48, and cooling liquid may be passed through its cavity.

For making a casting the bracket 3 is rotated so that the tube 12 with the mold is exactly above the bucket 45 on the crucible furnace 33 (Fig. 1). A hand lever 34 connected to the valve 7¹ in the valve cylinder 7¹ is then operated so that compressed air enters the power cylinder 7 above the piston 8 and forces this piston downwards, together with the parts connected with the same and including the mold. The latter is thus lowered into the bucket 45, and is plunged therewith into the crucible, and at the same time air is sucked from the mold by the piston 13. The bucket protects the exterior of the mold, except at the ingate, from contact with the molten metal, so that the outside of the mold does not become coated, and excessive heating of the mold is prevented. While the mold is being

dipped into the crucible a lever 35 connected by a rod 35¹ to the valve in the valve cylinder 19¹ strikes an abutment 36 on a holder 37, and the valve is moved to admit compressed air to the cylinder 19, causing the lever 20 to push down the ram 21, which is thrust upon the liquid metal in the mold and expels whatever excess of metal may have entered the mold. While this pressure is still being maintained an abutment 38 fixed to the casing 10 (Fig. 2) strikes an abutment 39 on a rod 40 connected to the lever 34, and the lever 34 is thus rocked to admit compressed air below the piston 8, which lifts the lowered mechanism. While the mechanism is ascending the liquid metal in the mold solidifies, and the lever 35 strikes an abutment 41 on holder 37, causing the valve in the valve cylinder 19¹ to be moved so that the piston in the cylinder 19 lifts the ram 21. At the same time a lever 42 connected by a rod 42¹ to the valve in the valve cylinder 18¹ strikes an abutment 43, causing the piston in the cylinder 18 to actuate the levers 22 and depress the disk 23 and rods 24, so that the lower part 25 of the mold is removed from the part 11, and the casting can be taken out. The machine can then be rotated through 180° to place the other bracket, with its molding mechanism, over the crucible.

It will be understood that I may use motive fluid other than compressed air for actuating the mechanism.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In a metal molding machine the combination of a mold carrier, mechanism for raising and lowering said mold carrier whereby the mold held thereby can be dipped into a metal bath, a vertically movable ram for compacting the metal in the mold, and mechanism for raising and lowering said ram.

2. In a metal molding machine the combination of a mold carrier, a ram for compacting metal in the mold held in said mold carrier, fluid operated mechanism for raising and lowering said mold carrier, whereby the mold can be dipped in a metal bath, and fluid operated mechanism for raising and lowering said ram.

3. The combination claimed in claim 2, the mechanism for raising and lowering the mold carrier including a cylinder, a piston therein, a piston rod, a movable casing, and a guide for said casing, said casing enclosing part of the mechanism for moving the ram.

4. The combination claimed in claim 2, the mechanism for moving the ram including a cylinder raised and lowered by the actuating mechanism of the mold carrier, a piston therein, valve mechanism controlling the supply of fluid to said cylinder, and

stationary abutments for actuating said valve mechanism.

5. The combination claimed in claim 1, together with mold opening mechanism comprising a cylinder raised and lowered by the actuating mechanism of the mold carrier, a piston therein, valve mechanism controlling the supply of fluid to said cylinder, and stationary abutments for actuating said valve mechanism.

6. In a metal molding machine the combination of a mold carrier, mechanism for raising and lowering said mold carrier whereby the mold held thereby can be dipped in a metal bath, mechanism for raising and lowering said mold carrier, a vertically movable ram for compacting metal in the mold, mechanism for raising and lowering said ram, an air conduit fixed to said mold carrier for exhausting air from the mold, a cylinder, and a perforated piston in said cylinder having a hollow piston rod connected to said air conduit.

7. In a metal molding machine the combination of a mold carrier, mechanism for raising and lowering said mold carrier, whereby the mold held thereby can be dipped into a metal bath, a ram for compacting metal in the mold, a movable cylinder raised and lowered by the actuating mechanism of the mold carrier, a piston in said cylinder, means connecting said piston to said ram, a pipe for supplying motive fluid to said cylinder, a stationary cylinder, a perforated piston in said stationary cylinder having a hollow piston rod connected to said pipe, and means for supplying fluid under pressure to said stationary cylinder.

8. In a metal molding machine the combination of a mold carrier, mechanism for raising and lowering said mold carrier whereby the mold held thereby can be dipped in a metal bath, and mechanism for opening the mold, said mold opening mechanism including a movable cylinder raised and lowered by the actuating mechanism of the mold carrier, a stationary cylinder, a perforated piston in said stationary cylinder having a hollow piston rod, a pipe connecting said piston rod to said movable cylinder, and means for supplying fluid under pressure to said stationary cylinder.

9. In a metal holding machine the combination of a crucible, a mold carrier, mechanism for raising and lowering said mold carrier whereby the mold held thereby can be dipped into said crucible, and a vertically movable bucket in the path of said mold carrier having a hole in its bottom.

10. The combination claimed in claim 9, together with a guide for the bucket having a cavity for admission of a cooling medium.

In witness whereof I have signed this specification.

FRANZ MANTEL.