

Aug. 12, 1924.

S. M. UDALE

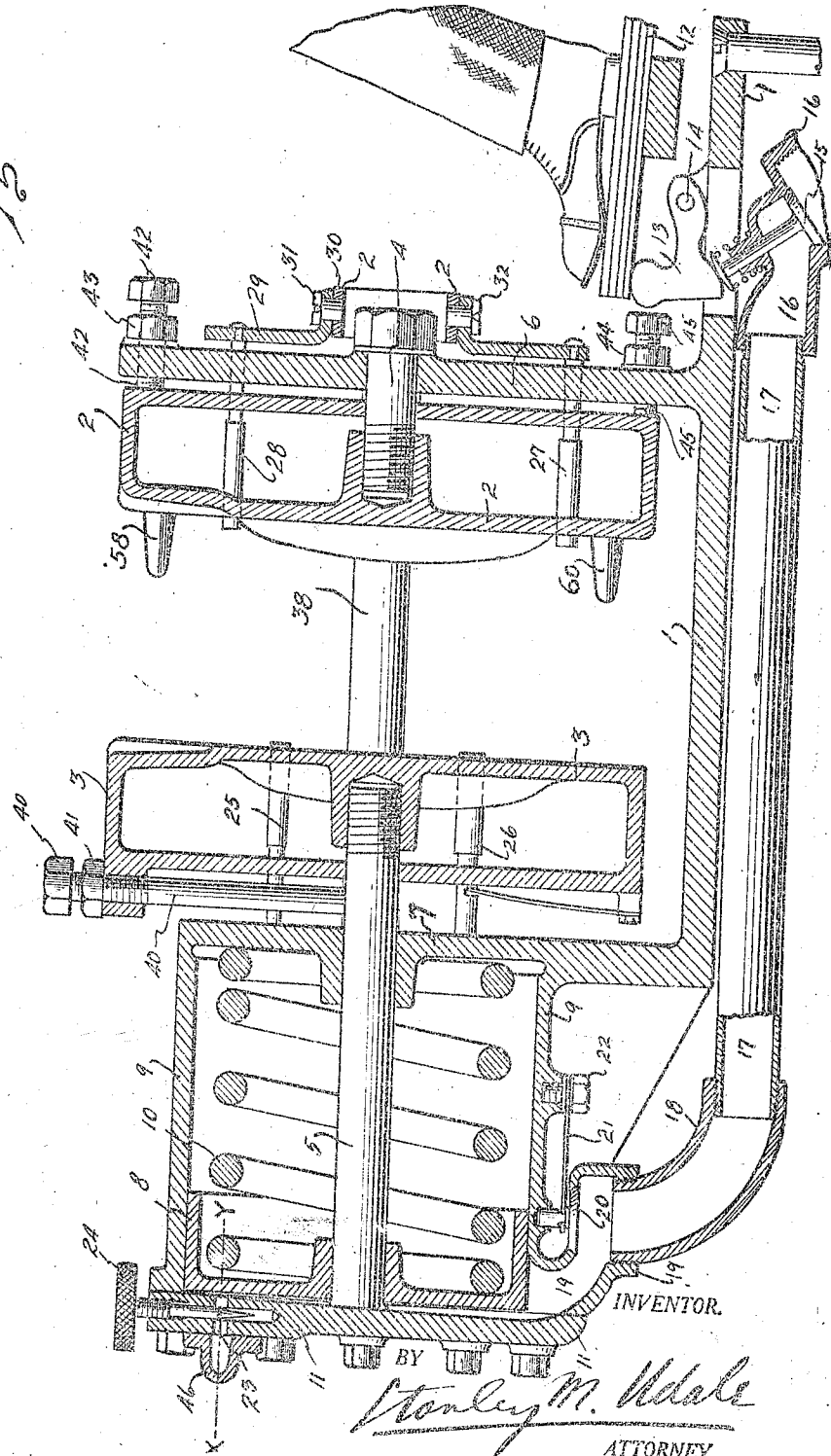
1,504,455

MOLDING MACHINE

Filed May 18, 1923

2 Sheets-Sheet 1

Fig. 1



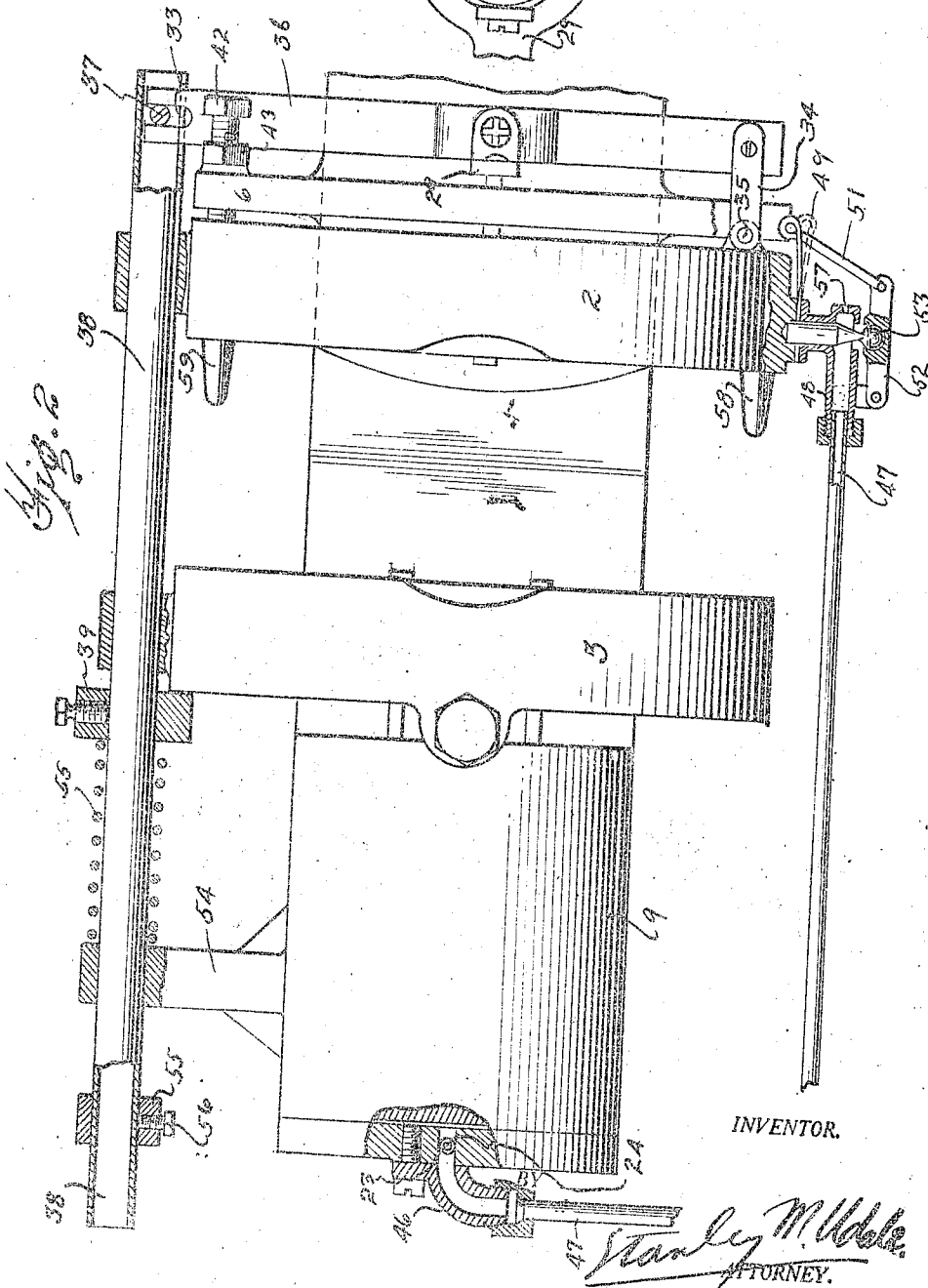
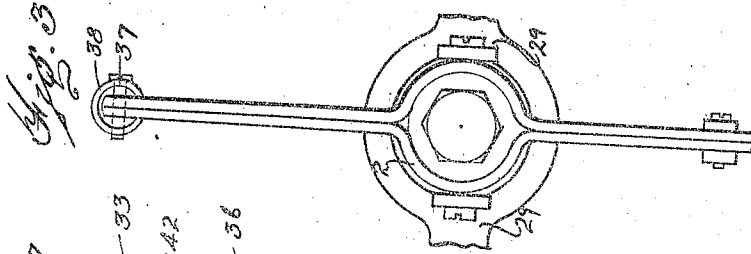
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2 Sheets-Sheet 2



INVENTOR.

UNITED STATES PATENT OFFICE.

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MOLDING MACHINE.

Application filed May 18, 1923. Serial No. 639,744.

To all whom it may concern:

Be it known that I, STANLEY M. UDALE, a citizen of the United States, residing at 893 Lothrop Ave., Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Molding Machines, of which the following is a specification.

This invention relates to molding machines, particularly those operated by pneumatic pressure.

Figure I shows a cross sectional elevation taken on the central plane.

Figure II shows a plan view showing the knock-out linkage and a part section on plane X—Y of Figure I.

Figure III shows an end view of the knock-out linkage.

Description.—The casting machine frame 1 supports two hollow metal molds 2 and 3 by means of bolts 4 and 5 centrally located within the hollow molds 2 and 3 and supported by the arms 6 and 7 of the frame 1.

The mold 2 is stationary, and held in place by its central bolt 4 and cap screws and lock nuts 42 and 43, 44 and 45. The mold 3 is slidably supported on an arm 7 of the frame 1 by means of the bolt 5 which is locked to the piston 8. This piston 8 reciprocates in the cylinder 9 which may be cast integral with the casting 1. The mold 3 is opened by means of the coil spring 10 located within the cylinder 9. The spring 10 presses the piston 8 up against the cylindrical cover 11, which is bolted by means of a flange to the cylinder 9 which is cast integral with the frame 1.

Compressed air is supplied and regulated by the following means. A platform 12 contacts with the bell crank lever 13 pivotally mounted on the frame 1 by means of the pin 14. The bell crank lever 13 engages with the spring closed valve 15 which is arranged in the valve housing 16, to which a supply of compressed air is connected. A pipe 17 is threaded into the outlet of the valve casing 16 and conveys compressed air to the elbow 18, which elbow is threaded into the extension 19 of the cylinder 9. A spring loaded relief valve 20 is provided in the ex-

tension 19 of the cylinder 9. The spring 21 normally keeps the relief valve 20 slightly open and engages with the valve supporting it in place so that the valve is held to a definite minimum opening. This spring 21 is bolted to the cylinder 9 by means of the cap screw 22, and the exact opening of the relief valve 20 is determined by selecting the correct thickness of washer between the spring 21 and casting 9.

An adjustable leak valve or vent 23 is provided in the cylinder cover 11 and the area of this outlet 23 is regulated by the valve 24. A casting 46 is bolted to the cover 11 and a pipe 47 connects the vent or outlet 23 with a casting 48 bolted to the stationary mold 2, see Figure II. This casting clamps a temperature responding metallic element 49 to the mold 3 so that it responds to increases of temperature of the mold. A valve 50 is moved by the metallic element 49 by means of the linkage 51 and 52 and the ball-and-socket joint 53. A minimum valve opening is provided in the small drilled passage 54.

Knock-out pins 25 and 26 in the hollow mold 3 and 27 and 28 in the hollow mold 2 are provided. The knock-out pins 27 and 28 are operated by the knock-out plate 29. The link 30—33 operates the plate 29, being hinged thereto by means of the pins 31 and 32. A link 34 connects the link 36 with the stationary mold 2, a pin 35 being provided therefor. The bar 36 is provided with a slot 33 which engages with a pin 37 in the steel tube 38, which is guided in a projection from the stationary mold 2 and also by a projection from the cylinder 9 and movable mold 3.

The piece 39 is fastened to the tube 38 and serves as a stop so that as the hollow mold 3 moves to the left the rod 38 is carried with it and thus the link 30 is moved, thereby moving the plate 29 and the knock-out pins 27 and 28 (Figure I). A spring 55 tends to return the knock-out pins 27 and 28 to their original position for pouring when mold 3 moves to the right into the pouring position. The ejection means for the stationary mold are the equivalent of those

means shown, described and claimed in the co-pending application of Alex Anderson, serial No. 617,042, filed 5 February 1923.

Operation.—Assuming that a supply of compressed air is available through the opening to 16, when the weight of the operator, that is to say the weight of the man plus the weight of the ladle of iron, comes onto the platform 12 the bell crank lever 13 opens the valve 15, thereby admitting compressed air through the pipe 17, elbow 18, into the chamber 19. This compressed air immediately closes the valve 20 which is held slightly open by a light spring 21. The pressure inside the cylinder 9 above the piston 8 immediately builds up and the mold 3 moves quickly to the right closing the mold so that it is now ready for pouring. The metal is then poured into the mold and the operator steps off the platform 12.

The spring loaded valve 15 immediately closes and the compressed air within the cylinder 9 escapes through the vent 23, pipe 47, fixed outlet 57, and also past the temperature controlled valve 53. When the pressure in the cylinder 9 drops to a predetermined pressure the valve 20 opens under the influence of spring 21 and the pressure within the cylinder 9 is released quickly. The spring 10 then drives the piston 8 back so as to release the casting from the mold. The knock-out pins 25 and 26 strike the upright piece 7 and thereby eject the casting from the mold. Meanwhile the mold 3 (Figure II) strikes the piece 39 and so carries the tube 38 to the left through the linkage shown. The knock-out pins 27 and 28 are thus also moved to the left so that if the casting should hang on the mold 2 it will be ejected by means of the knock-out pins 27 and 28 therein.

In order that the molds should face each other properly without any leakage the die straighteners 42—43 44—45 are applied to the mold 2 so that by tightening up on the bolt 4 the tendency of the mold face to become convex can be counteracted. Two or three long threaded bolts similar to 40 and the lock nut 41 are provided on the mold 3 for a similar purpose. Dowels 58, 59 and 60 are also provided to ensure the proper alignment of the two molds with each other.

During the period when the molds are being raised to their working temperature, that is to say during the casting of the first few castings, it is neither necessary nor desirable to retain the castings within the molds as the cold molds are apt to chill the castings.

During the continuous operation of the machine the temperature of the mold increases and therefore a greater period of time is required for the iron to give up its heat to the mold, the flow of heat from the molten iron through the walls of the

casting comprising the mold is slower as the temperature of the mold increases. It follows that molds must be held closed for a longer period of time in order that when the castings are ejected they are completely solid. In order to prolong the period during which the molds are kept closed it is necessary therefore to impede the flow of the compressed air through the adjustable vent 23. The temperature responding element 49, by its connection to the valve 53, does this by gradually closing the valve 53. The small hole 57 constitutes the limiting vent so that the outlet is never entirely shut off, so that when the molds have reached their working temperature the valve 57 is closed and there is no opening other than the small outlet 57.

What I claim is:

1. In a pneumatic molding machine comprising a pair of molds adapted to reciprocate back and forth relative to each other, means for supplying compressed air for the purpose of closing said molds, elastic means for opening said molds, means for cutting off the supply of compressed air, an adjustable leak valve whereby the molds are opened automatically a predetermined period after the supply of compressed air is cut off.

2. In a pneumatic molding machine comprising a pair of molds adapted to reciprocate back and forth relative to each other, means for supplying compressed air for the purpose of closing said molds, elastic means for opening said molds, means for cutting off the supply of compressed air, an adjustable leak valve, an automatic relief valve, whereby the molds are opened rapidly a predetermined period after the supply of compressed air is cut off when the pressure of the air falls to a predetermined figure.

3. In a pneumatic molding machine comprising a pair of matching molds one of which is adapted to slide and is connected to a piston, a cylinder in which said piston slides, means for supplying compressed air to said cylinder for purpose of sliding the said mold into engagement with the other, means for cutting off the supply of compressed air, a leak valve, a temperature responding element in thermal relationship with one of said molds controlling the flow through said leak valve, a relief valve whereby as the mold increases in temperature the time the molten metal is retained in the mold is increased.

4. In a pneumatic molding machine comprising matching molds, means for applying air pressure to close said molds, a relief valve normally open to a limited degree to discharge air from said air pressure means and adapted to be closed by the air pressure, a second valve through which the compressed air is intermittently admitted

past the first valve to the air pressure means, a leak from said air pressure means to the atmosphere whereby the first valve is automatically opened subsequent to the closing of the first valve.

5 5. In a pneumatic molding machine comprising matching molds, means for applying air pressure to close said molds, yielding means adapted to open said molds, a
10 leak from said air pressure means to the

atmosphere, a relief valve adapted to open 15 when the pressure falls to a predetermined figure whereby the molds are quickly opened a predetermined period of time after the supply of compressed air is shut off under the action of the yielding means. 20

In testimony whereof I affix my signature.

STANLEY M. UDALE.