Nov. 5, 1929. F. E. McCABE 1,734,177

MOLD-MAKING MACHINE

Filed April 29, 1927 2 Sheets-Sheet 1

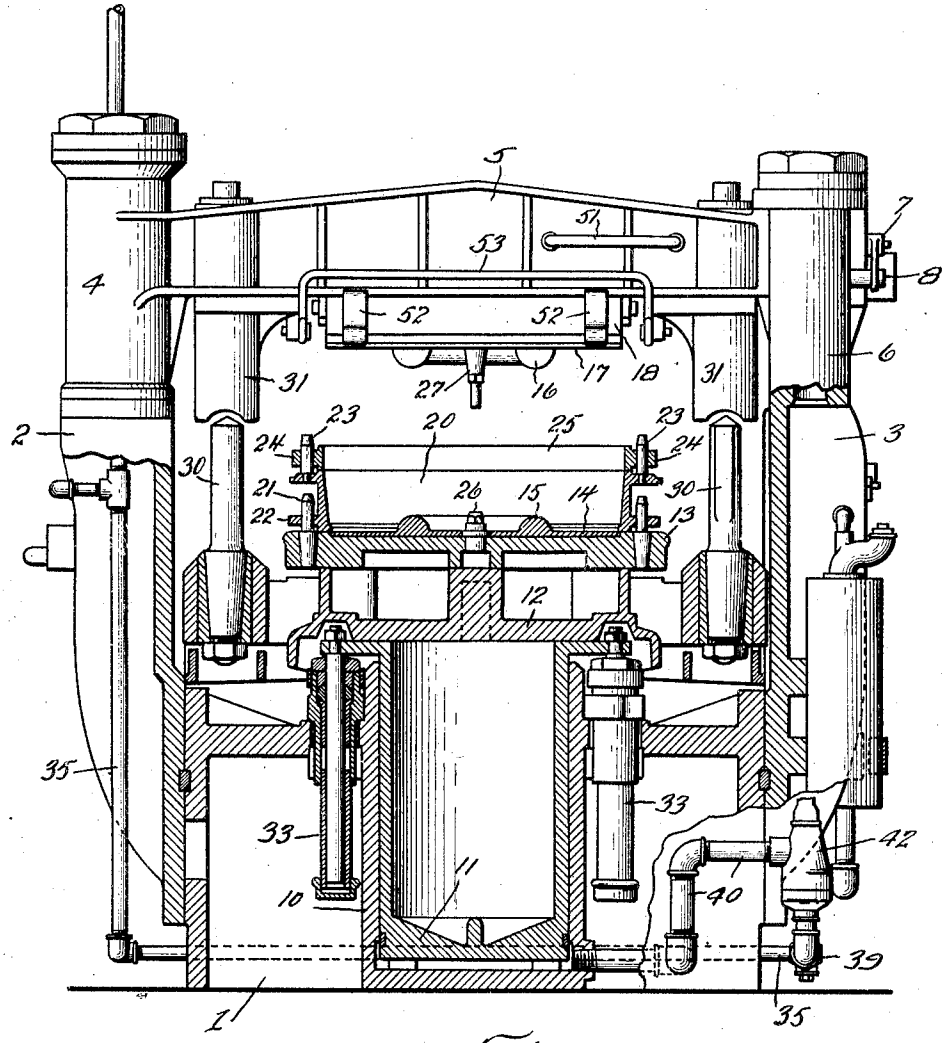


Fig. 1

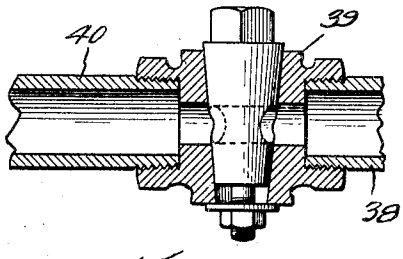


Fig. 2

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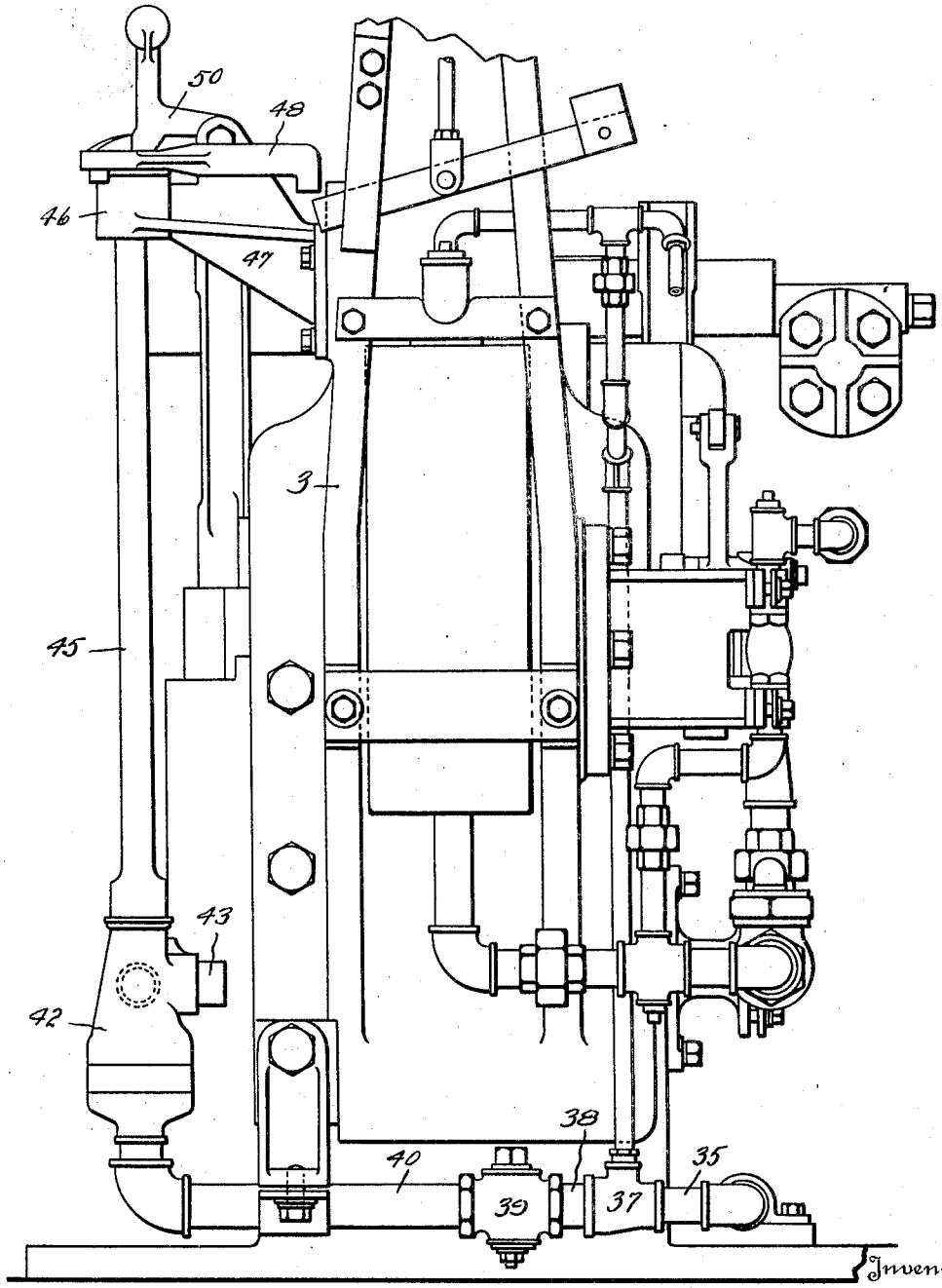


Fig. 3

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UNITED STATES PATENT OFFICE

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MOLD-MAKING MACHINE

Application filed April 29, 1927. Serial No. 187,479.

This invention relates to improvements in the class of molding machines described in my former application Serial No. 733,364, filed August 21, 1924, wherein a ramming head, carrying a pattern and mold flask, is movable vertically toward and from a pressure head, also equipped with a pattern. An arrangement of this kind is employed in the production of so-called "multiple molds", i. e. molds having pattern impressions in their top and bottom faces so that when stacked one upon another the adjacent faces of adjoining molds enclose a mold cavity between them.

It has always been more or less difficult, in the production of molds of this kind by machines of the aforesaid class, to properly distribute and compress the sand about the top pattern. This is not true with respect to the bottom pattern because in the pouring or depositing of the sand in the flask directly onto the bottom pattern the particles of sand find their way readily into the interstices of the pattern and collect about the pattern in uniform density so that in the subsequent compression of the sand an even degree of hardness is effected throughout the entire region of the bottom face of the mold including all parts of the mold cavity.

It is the fundamental purpose of my present invention to provide means for effectively accomplishing this same result with respect to the top portion or face of the mold.

Attempts, with a limited degree of success, have been made heretofore to attain this result. They were, however, reasonably effective only so long as certain predetermined conditions prevailed. Changes in temperature affecting the viscosity of the oil used to lubricate the cylinder and piston employed for actuating the ramming head; a changing from one size flask to another; or a shifting from patterns of one weight to patterns of an appreciably greater or less weight, would so alter the conditions as to render the control means ineffective.

It is a further object of my invention to provide simple and inexpensive yet thoroughly reliable and efficient means for attaining the aforesaid result, and that is readily adjustable to compensate for such varying conditions as above referred to.

Other and more limited objects will appear as I proceed to describe the invention by reference to the drawings accompanying and forming a part hereof, and wherein Fig. 1 represents a sectional front elevation of a molding machine incorporating my improvements; Fig. 2 is a detail of the pressure fluid control valve; and Fig. 3 is a fragmentary end elevation of the machine.

While my present invention is not limited to use in a molding machine constructed in detail like that disclosed in my aforesaid application, I have elected to illustrate it as incorporated in such a machine, and for structural features of the machine itself beyond what is herein shown and described, reference may be had to my former application.

The machine, generally, comprises a base 1 to the opposite ends of which are secured columns 2 and 3, and journaled upon the upper end of the column 2 is a bearing sleeve 4 of a pressure head 5. The end of the head 5 opposite the sleeve 4 is designed to embrace the upper cylindrical end 6 of the column 3, and the same is equipped with latch mechanism 7 that cooperates with a pin 8 on said column to hold the pressure head in operative position.

The base 1 incorporates a cylinder 10 within which a piston 11 reciprocates. Suitably attached to the upper end of the piston is a ramming head 12 that carries a pattern frame or support 13. Applied to this support is the base or plate 14 of a pattern 15. In opposed relation to the pattern 15 is one designated 16 whose base or plate 17 is secured to a pattern frame or support 18 that is carried by the pressure head 5.

20 is a mold flask that is adapted to be placed on the pattern support 13 and to be located in correct relation to the pattern 15 by dowels 21 that rise from the support and are arranged to extend through openings in flanges 22 of the flask. The flask, in turn, is equipped with dowel pins 23 that extend through apertures in lugs 24 of a sand frame

25 thereby to properly align the sand frame with the flask. The pattern frames or supports 13 and 18 are shown as having applied to them, respectively, the cooperating parts 26 and 27 of a sprue cutter that is in the nature of a punch and die.

As will presently appear, the ramming head 12 is moved toward the pressure head 5 by the introduction of pressure fluid into the cylinder 10 beneath the piston 11. As the ramming head approaches the pressure head it is held in proper relation thereto by pilot pins 30 that are carried by the former head and are arranged to enter socket members 31 incorporated in the pressure head. The descent of the ramming head is controlled by dash pots 33.

Preferably, the pressure fluid used to operate the machine is air, and the same is delivered from a suitable source (not shown) to the machine through a pipe 35. For convenience, this pipe is extended downwardly through a bore in the upper end of the column 2 and along the column to a point adjacent the floor on which the machine stands and thence about the rear of the base 1 to the opposite side of the machine where it is extended forwardly, as will be seen by reference to Fig. 3. As shown in the present instance, the pipe 35 joins, through a reducer 37 and a nipple 38, a pressure fluid control valve 39. As will presently appear, this valve constitutes a very important part of my invention. Leading forwardly from the valve 39 is a conduit 40 which is somewhat larger in diameter than the pipe 35. This conduit joins the lower end of a machine operating valve 42, so termed because it governs the introduction of pressure fluid to the cylinder 10 and therefore controls the operation of the machine. This valve has a rearwardly directed outlet 43 (Fig. 3). Leading from the machine operating valve to the lower end of the cylinder 10 is a conduit which, for the present purpose, will be considered a part of the previously mentioned conduit 40 and accordingly it is designated by the same reference character. The valve 42 has an operating stem 45 which rises to about the plane of the ramming head 12 when the latter is in its lower position, and the upper end of said stem is journaled within a boss 46 of a bracket 47, carried by the adjacent column 3. An operating handle 48 is secured to the upper end of the stem 45 and, incidentally, the same is held in the position which it occupies when the valve 42 is closed by means of a latch 50. This is a safety feature which is disclosed in greater detail in my previously mentioned application.

In operating the machine, the operator stands in front of it, disengages the latch mechanism 7 from the pin 8 and swings the pressure head 5 rearwardly from above the ramming head. He then places a flask 20 upon the pattern support 13 of the ramming head 12, engaging the apertured flanges 22 over the dowel pins 21, and next positions a sand frame 25 upon the flask. Sand is then poured into the flask and sand frame, heaping them to overflowing, and the surplus is struck off by suitable means flush with the top of the sand frame. The pouring of the loose sand into the flask causes the sand to pack evenly about all parts of the pattern and to enter all interstices thereof. The operator now grasps the handle 51 of the pressure head 5 and swings said head to a position above the ramming head and secures it by the latch mechanism 7 to the pin 8 of the column 3. He next lifts the latch 50 and rotates the handle 48 so as to throw the machine operating valve 42 to wide open position thereby to quickly admit pressure fluid to the cylinder 10. As soon as the valve 42 is so opened the pressure fluid rushes through the conduit 40 into the cylinder 10 and lifts the piston 11 with the parts sustained thereby very rapidly. In fact, due to the elasticity of the fluid, the parts are shot upwardly with such speed that, after the initial impulse, their momentum tends to carry them more or less independently of the lifting influence of the pressure fluid until their weight overcomes their inertia when they are again dependent upon the impelling power of the fluid. The valve 39 is so adjusted that the retardation of the movement of the relatively heavy parts occurs just as the sand reaches the upper pattern and by reason of the velocity which the sand has acquired it is thrown substantially into suspension and by its inertia fills the interstices of the pattern and is evenly distributed throughout the surface thereof. The pressure fluid is admitted to the cylinder rapidly enough to prevent actual recoil of the piston and upon attaining maximum pressure causes the ramming head to be urged toward the pressure head and the sand to be firmly compressed within the sand flask, the sand frame, in the meantime, slipping up over the pattern support 18 where it is held by spring clips 52 until dislodged from said clips by a bail shaped member 53, preparatory to a subsequent operation of the machine, all of which is clearly set forth in my aforesaid application. Thus it will be seen that after the sand is thrown against the upper pattern in a loose condition as above described, causing the particles of the sand to enter all interstices of the pattern and to collect about the face of the pattern in uniform density, a final and powerful squeeze occurs which compresses the sand to the required degree of hardness. Because of this action of the machine, perfect mold cavities are assured in both the top and bottom faces of the mold.

The attainment of the foregoing results depends upon the adjustment of the pressure fluid control valve 39. The valve is set so as

to admit the pressure fluid through the conduit 40 to the cylinder 10 just fast enough to accomplish the effect above described, and if conditions vary from time to time they can be compensated for by a slight readjustment of the valve. For example, when the machine is first started after having stood inactive for a considerable length of time, especially in the mornings when the atmosphere is relatively cool, the oil in the cylinder 10 is congealed and as a result the parts act sluggishly. Under these conditions the valve 39 is opened to a slightly greater degree than under normal conditions and the desired mode of operation is effected; and after the parts warm up and the oil becomes more liquid the valve may be returned to its former adjustment. The valve is also adjusted to compensate for flasks of different sizes and patterns of different weights.

Having thus described my invention, what I claim is:

1. In a molding machine, the combination of a mold flask support, a superposed pattern toward and from which said support is movable, compressed gas means for elevating the support, a conduit and a valve for introducing and regulating the gas delivered directly to said means, a gas supply conduit having an adjustable orifice therein, and a chamber between said orifice and said valve for storing a volume of compressed gas whereby the initial upward velocity of the support will be great and the final upward velocity will be retarded to permit material in said flask to be thrown into the interstices of the upper pattern.

2. In a molding machine, the combination of a mold flask support, a superposed pattern toward and from which said support is movable, compressed gas means for elevating the support, a conduit and a valve for introducing and regulating the gas delivered directly to said means, a gas supply conduit having an orifice therein, and a conduit between said orifice and said valve, the last named conduit being of larger cross-section than the gas supply conduits.

In testimony whereof, I hereunto affix my signature.

FRANK E. McCABE.