May 21, 1957 S. SMITH 2,792,915

SPEED CONTROL OF ACTUATING ELEMENT IN DIE CASTING AND INJECTION MOULDING MACHINES

Filed Feb. 21, 1955 2 Sheets-Sheet 1

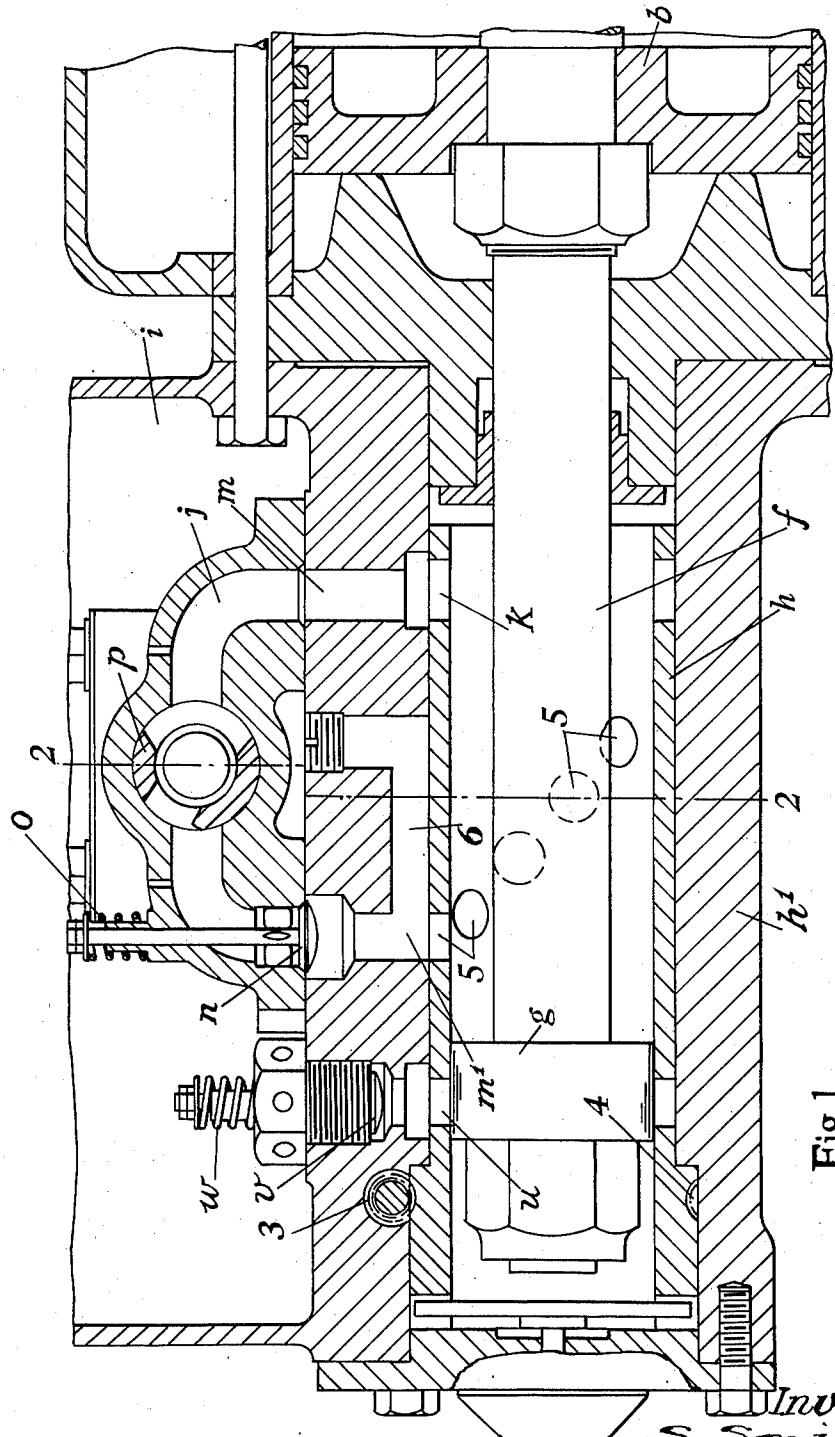


Fig. 1

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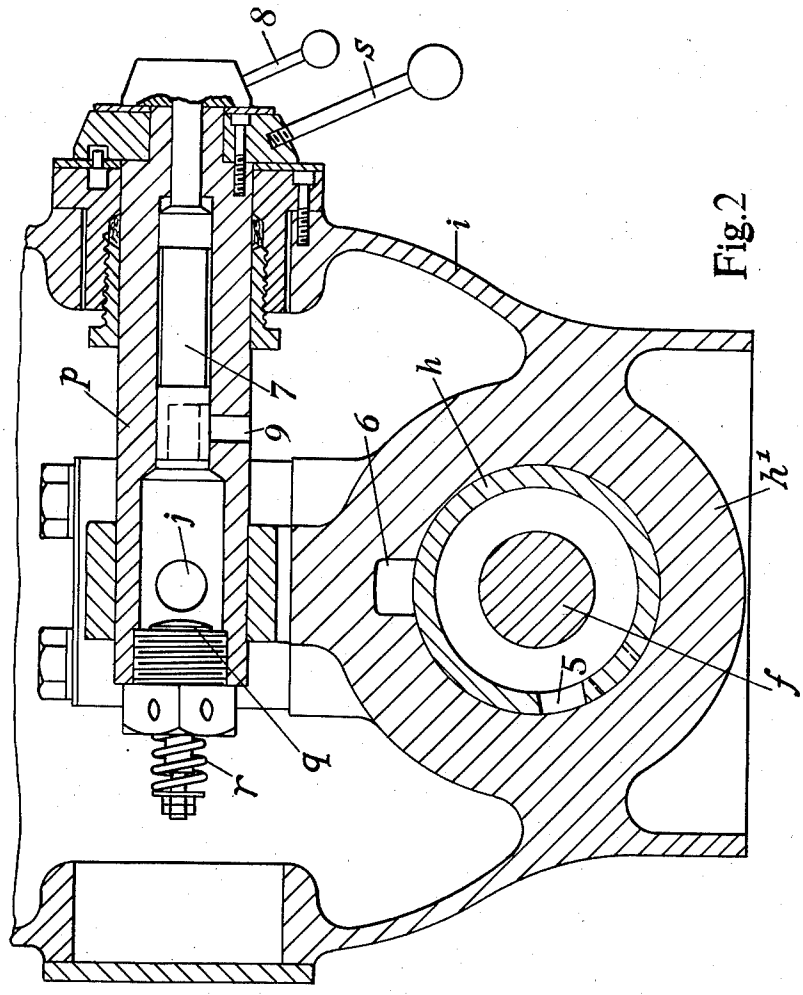


Fig.2

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United States Patent Office 2,792,915 Patented May 21, 1957

2,792,915

SPEED CONTROL OF ACTUATING ELEMENT IN DIE CASTING AND INJECTION MOULDING MACHINES

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Application February 21, 1955, Serial No. 489,705

Claims priority, application Great Britain March 19, 1954

3 Claims. (Cl. 188—97)

This invention relates to die casting and injection moulding machines of the kind in which the molten metal or plastic material is forced into a die under the action of a plunger which is actuated by compressed air, the rate of movement of the plunger during the operative stroke being regulated by a hydraulic control means.

In the specification of United States Patent No. 2,720,946, I have described an invention whereby the hydraulic control means is adapted to effect a slow movement of the injection plunger during the initial part of its stroke, which movement is followed by movement of the plunger at a high rate of speed.

The said invention comprises the combination of a cylinder having a port at each end and an intermediate port, a piston slidable in the cylinder and adapted to control the intermediate port, an oil or other liquid reservoir in communication with the cylinder through one of the end ports, a by-pass arranged between the other two ports, an adjustable valve in the by-pass, a non-return valve between the by-pass and the intermediate port, and a second non-return valve between the by-pass and the reservoir.

The present invention relates to a modification of the invention above specified whereby the position of the piston at which the change from slow to rapid movement can be varied, and whereby the rate of the slow motion can be varied.

The present invention comprises a mechanism as above specified in which the cylinder consists of an angularly adjustable sleeve having therein a plurality of ports situated in different positions along the sleeve, any one of which can be put into communication with the by-pass by angular movement of the sleeve, and an additional valve for controlling the rate of flow through the by-pass.

In the accompanying drawings Figure 1 is a sectional side elevation of a hydraulic control means embodying the invention, and Figure 2 is a cross-section on the line 2—2 of Figure 1.

The machine shown in the drawings comprises an operating cylinder *a* in which the motive fluid employed is compressed air. This cylinder contains a piston *b* adapted to actuate the injection plunger (not shown) of the machine. From one side of the piston *b* extends a rod *f* carrying another piston *g* which is contained in the cylinder *h* of the hydraulic control means.

On a hollow body part h^1 containing the cylinder *h* is arranged a reservoir *i* for oil or other liquid, and in the reservoir is contained a by-pass *j* which is in communication with the reservoir, and which can interconnect an end port *k* and any one of a plurality of intermediate ports 5 in the cylinder through the medium of a pair of ports *m*, m^1 in the body part, the last mentioned ports being adapted to communicate respectively with

opposite ends of the by-pass. Communication between the by-pass *j* and the port m^1 is controlled by a non-return valve *n* loaded by a spring o, and in the by-pass is contained a rotary regulating valve *p* which carries a non-return valve *q* loaded by a spring r (Figure 2), this valve being adapted to allow liquid to pass from the reservoir to the by-pass. The valve *p* is operable by a hand lever *s*. Further there is provided at the end of the cylinder *h* remote from the port *k* a port *u* which may be open to the reservoir, but which is preferably adapted to communicate with the reservoir under the control of a non-return valve *v* loaded by a spring *w*.

The mechanism so far described is essentially similar to that described in the specification of the above mentioned patent, but differs therefrom in the form of the cylinder *h* and the plurality of intermediate ports 5 therein.

The cylinder *h* containing the piston *g* consists of a sleeve which is angularly movable about its axis within the body part of the mechanism, the angular movement of the sleeve being effected by a manually-operable worm 3 engaging a worm wheel 4 formed on the exterior of the sleeve.

The intermediate ports 5 in the cylinder are disposed along an oblique line, that is to say, they are longitudinally and angularly spaced, and in the body part is formed a longitudinal channel 6 adapted to communicate with the by-pass *j* through the port m^1 and non-return valve *n*. By angular movement of the sleeve any one of its ports 5 can be moved into coincidence with the channel 6, thus enabling the position of the piston *g* at which liquid can pass from one end of the cylinder *h* to the other through the by-pass *j* to be varied. By this device the length of travel of the piston during the slow-motion phase of its movement can be varied to suit different working conditions.

Further, the rotary regulating valve *p* in the by-pass *j* which controls the rate of movement of the piston during the fast-motion phase is made hollow, and within it is contained a cylindrical and angularly adjustable valve 7 which is independently adjustable by hand-lever 8 for controlling the rate of flow of liquid from the right hand end of the cylinder *h* through the passageway 9 to the reservoir *i*, during the slow-motion phase of movement of the piston *g*.

By the present invention the mechanism forming the subject of the above mentioned patent can be adapted in a simple and convenient manner to suit a wide variety of different working conditions.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a die casting or injection moulding machine of the kind specified, hydraulic control means comprising in combination a cylinder in the form of an angularly adjustable sleeve having therein a port at each end and a plurality of longitudinally and angularly spaced intermediate ports, means for imparting angular adjusting movements to the sleeve, a piston slidable in the cylinder and adapted to control any one of the intermediate ports depending on the angular position of the sleeve, an oil or other liquid reservoir in communication with the cylinder through one of the end ports, a by-pass arranged between the other end port and the intermediate port under the control of the piston, an adjustable valve in the by-pass, a non-return valve between the by-pass and the intermediate port under the control of the piston, a second non-return valve between the by-pass and the reservoir, and an additional valve for controlling the rate of liquid flow through the by-pass.

2. A hydraulic control means as and for the purpose claimed in claim 1, in which the additional valve is adjustable and arranged to permit a variable liquid flow from the by-pass to the reservoir.

3. A hydraulic control means as and for the purpose claimed in claim 1, in which the adjustable valve is of hollow form and contains the additional valve.

References Cited in the file of this patent

UNITED STATES PATENTS

1,484,030	Kitchen	Feb. 19, 1924
2,676,572	Perry	Apr. 27, 1954
2,720,946	Smith	Oct. 18, 1955