

Oct. 18, 1955

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

2,720,946

4 Sheets-Sheet 1

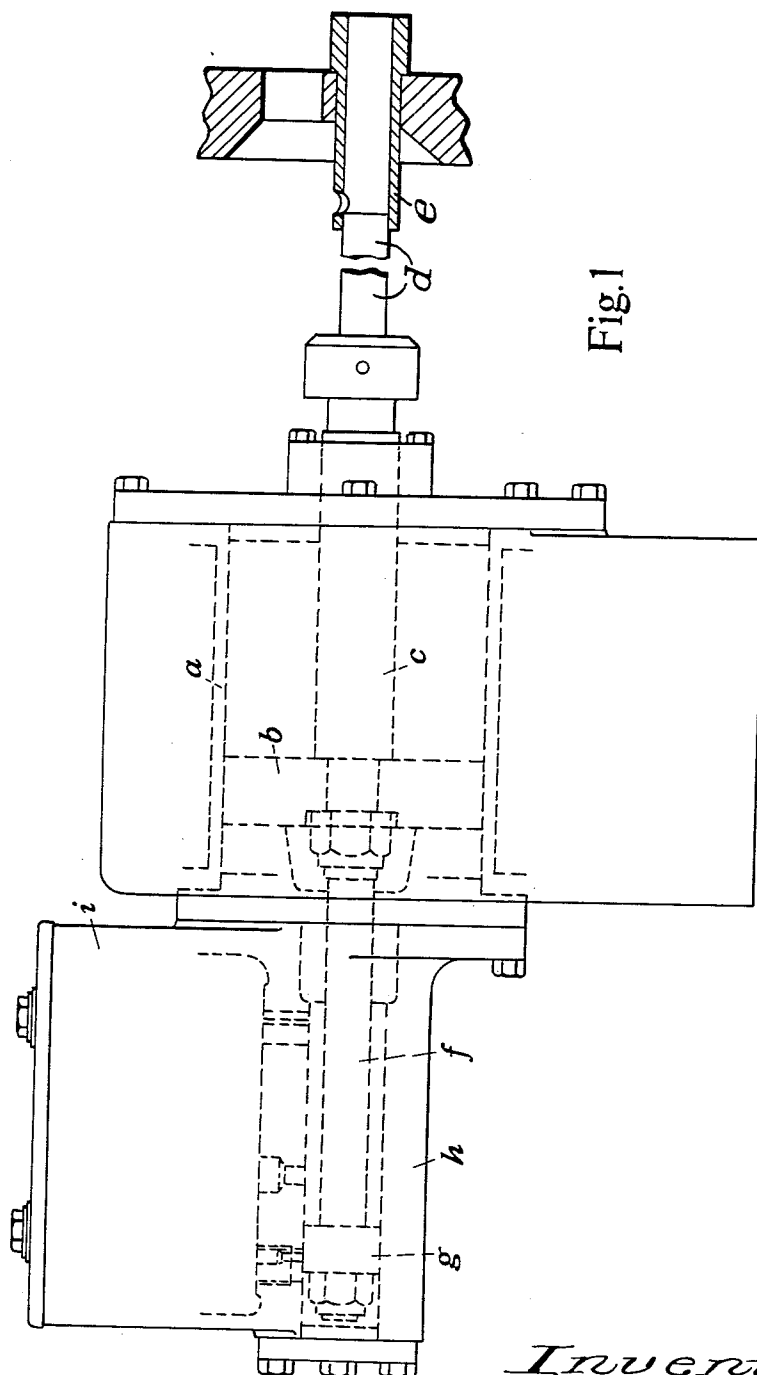


Fig. 1

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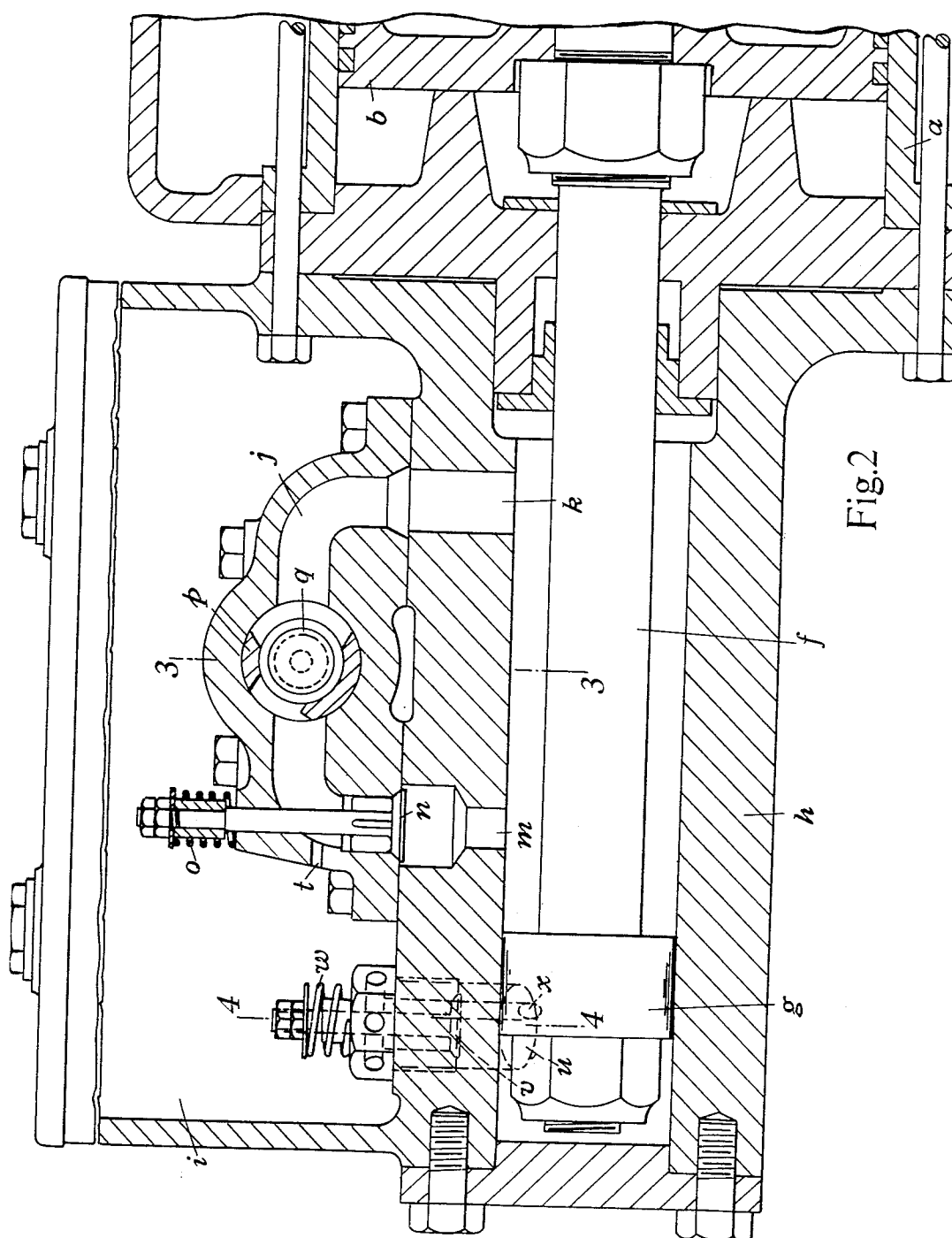


Fig. 2

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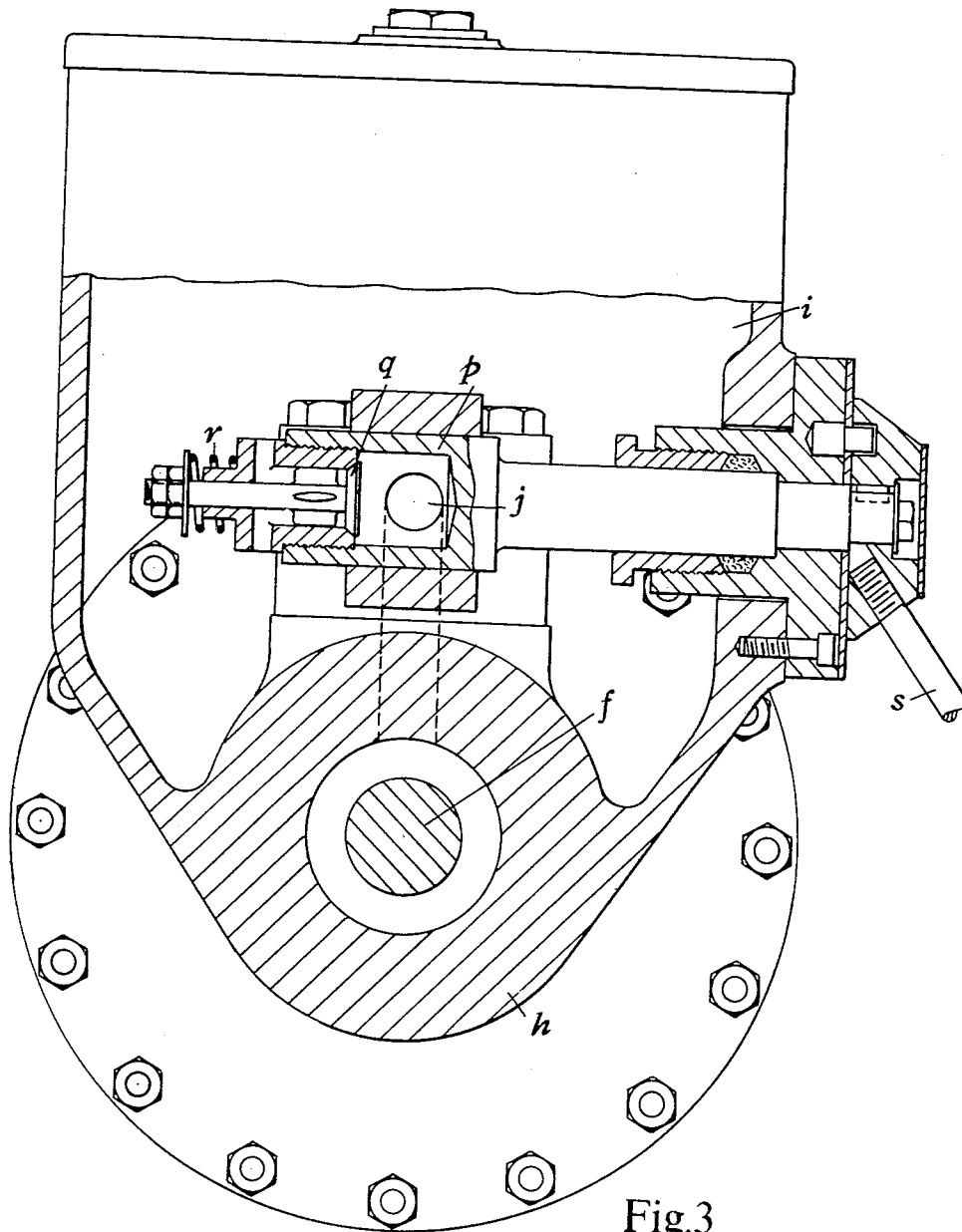


Fig.3

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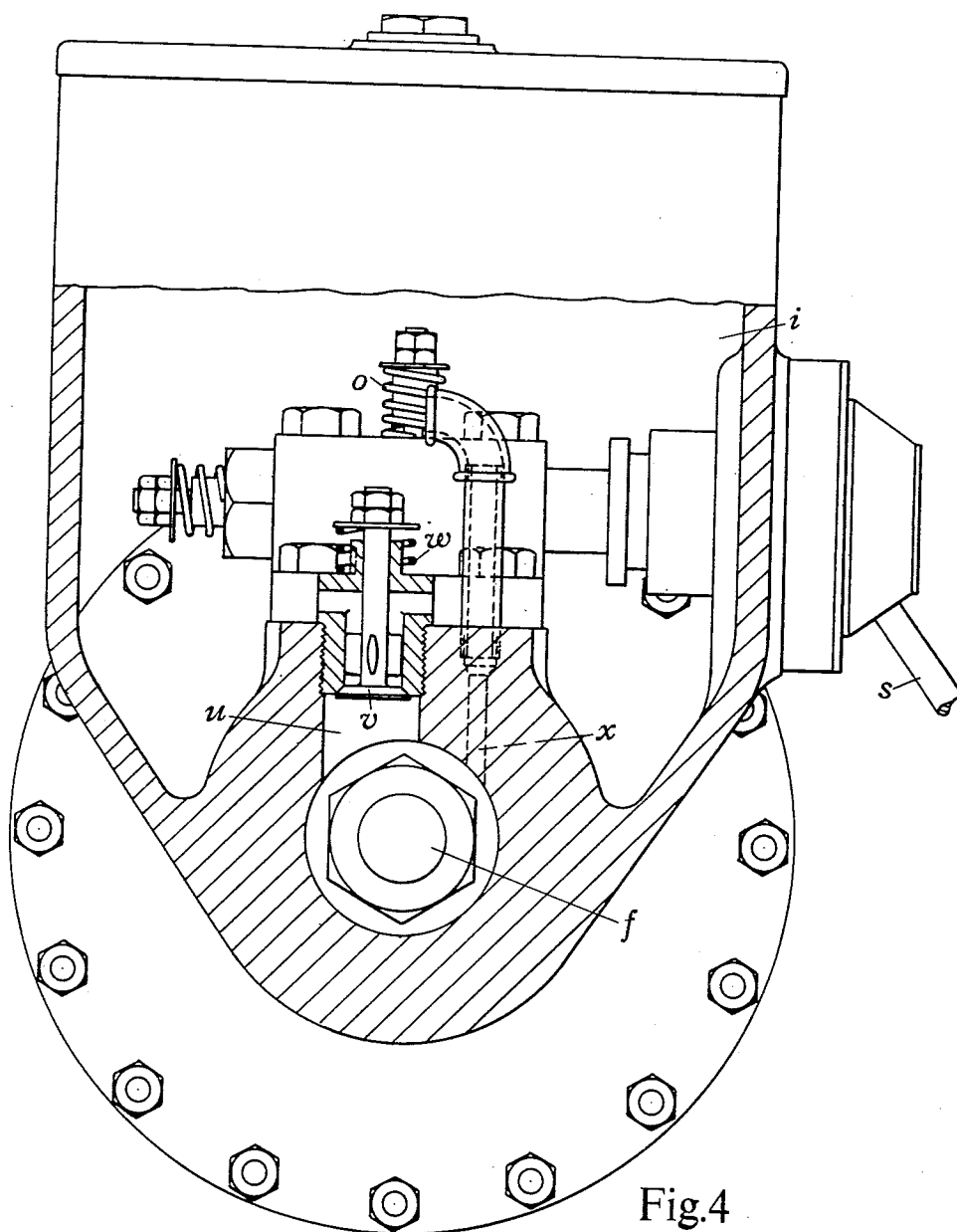


Fig. 4

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2,720,946

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

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Application March 23, 1953, Serial No. 343,955

Claims priority, application Great Britain April 7, 1952

2 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 its operative stroke being regulated by a hydraulic control means.

For some purposes it is required that the plunger shall move slowly during the initial part of its operative stroke, and subsequently shall move at a high rate of speed.

The object of the present invention is to provide a hydraulic control means adapted to satisfy the above mentioned requirements.

The 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 reservoir and 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 reservoir.

In the accompanying drawings:

Figure 1 is a side elevation illustrating a part of a die casting or injection moulding machine of the kind to which the invention relates.

Figure 2 is a sectional side elevation of the hydraulic control means embodying the invention.

Figure 3 is a cross section on the line 3—3 Figure 2, and Figure 4 is a cross section on the line 4—4 Figure 2.

Referring to Figure 1, the machine there shown comprises an operating cylinder *a* in which the motive fluid employed is compressed air. This cylinder contains a piston *b* from one side of which extends a rod *c*, the latter having secured thereto a plunger *d* co-operating with the cylinder *e* in the casting or moulding end of the machine. From the other side of the piston *b* extends a rod *f* carrying a piston *g* which is contained in the cylinder *h* of the hydraulic control means.

On the cylinder *h* (Figure 2) is arranged a reservoir *i* for oil or other liquid, and in the reservoir is contained a by-pass *j* which interconnects an end port *k* and an intermediate port *m* in the cylinder, and which is also in communication with the reservoir. The intermediate port *m* 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 3), 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*. Also the by-pass

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is in direct communication with the reservoir through a restricted orifice *t* (Figure 2). Further there is provided at the end of the cylinder remote from the port *k* a port *u* which may be open directly to the reservoir, but preferably has combined with it a non-return valve *v* loaded by a spring *w* (Figure 4). In the latter case there is provided adjacent to the port *u* a vent *x* which is freely open to the reservoir.

Starting with the air and hydraulic pistons in their initial positions in the working stroke as shown in Figure 2, the control means operates in the following manner. On admitting compressed air to one end of the air cylinder *a* (the outlet at the other end being freely open) the rate of movement of the air piston *b* is controlled by the rate at which liquid can flow from the right hand end of the control cylinder *h* through the port *k*, by-pass *j* and restricted orifice *t* to the reservoir. Meanwhile liquid flows freely from the reservoir to the left hand end of the cylinder *h* through the valve *v* and port *u*. After the piston *g* has passed the vent *x* liquid can also enter the cylinder through the vent. When the piston *g* has passed the intermediate port *m*, liquid displaced from the right hand end of the cylinder flows through the by-pass and intermediate port *m* to the left hand end of the cylinder at a rate determined by the setting of the valve *p*. The compressed air in the air cylinder *a* can now move the piston in the air cylinder at the desired higher rate. During the return stroke liquid enters the right hand end of the control cylinder through the valve *q*, the by-pass *j* and the port *k* from the reservoir, and liquid displaced from the left hand end is returned to the reservoir through the vent *x*, until the vent is re-closed by the piston.

By this invention a hydraulic control means adapted to cause a slow initial movement of the air operated piston and allow a subsequent rapid movement of the said piston, is provided in a simple and convenient form.

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 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 reservoir and the other two ports, an adjustable valve in the by-pass, a non-return valve carried by said adjustable valve and allowing liquid to pass from the reservoir to the by-pass, and a non-return valve between the by-pass and the intermediate port.

2. A hydraulic control means as and for the purpose claimed in claim 1, having a non-return valve in association with the end port in direct communication with the reservoir, and a vent between the cylinder and reservoir situated adjacent to the said port.

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