

(No Model.)

W. BURNHAM.

GOVERNOR VALVE FOR HYDRAULIC FORGING MACHINES.

No. 452,360.

Patented May 19, 1891.

Fig. 1.

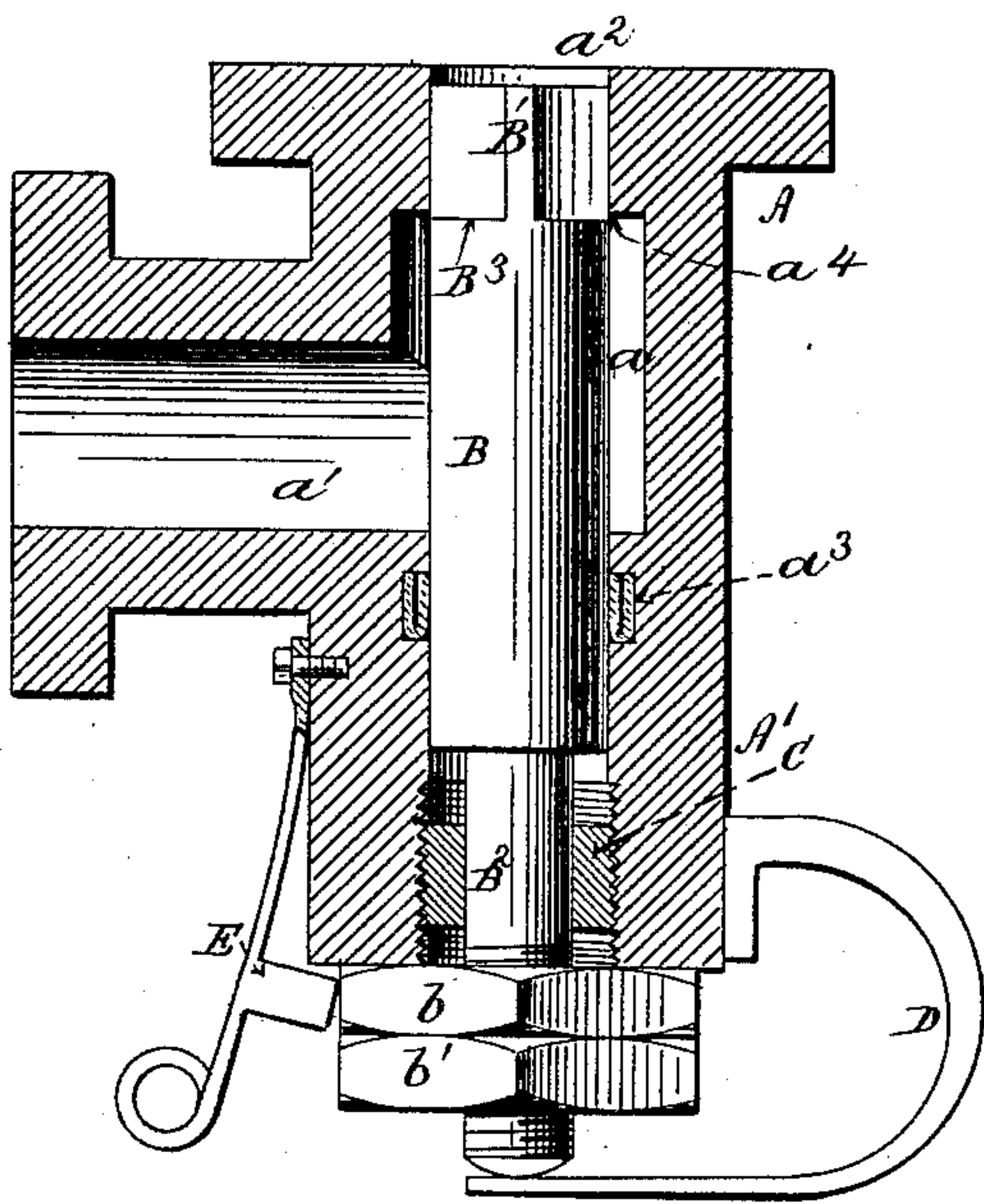
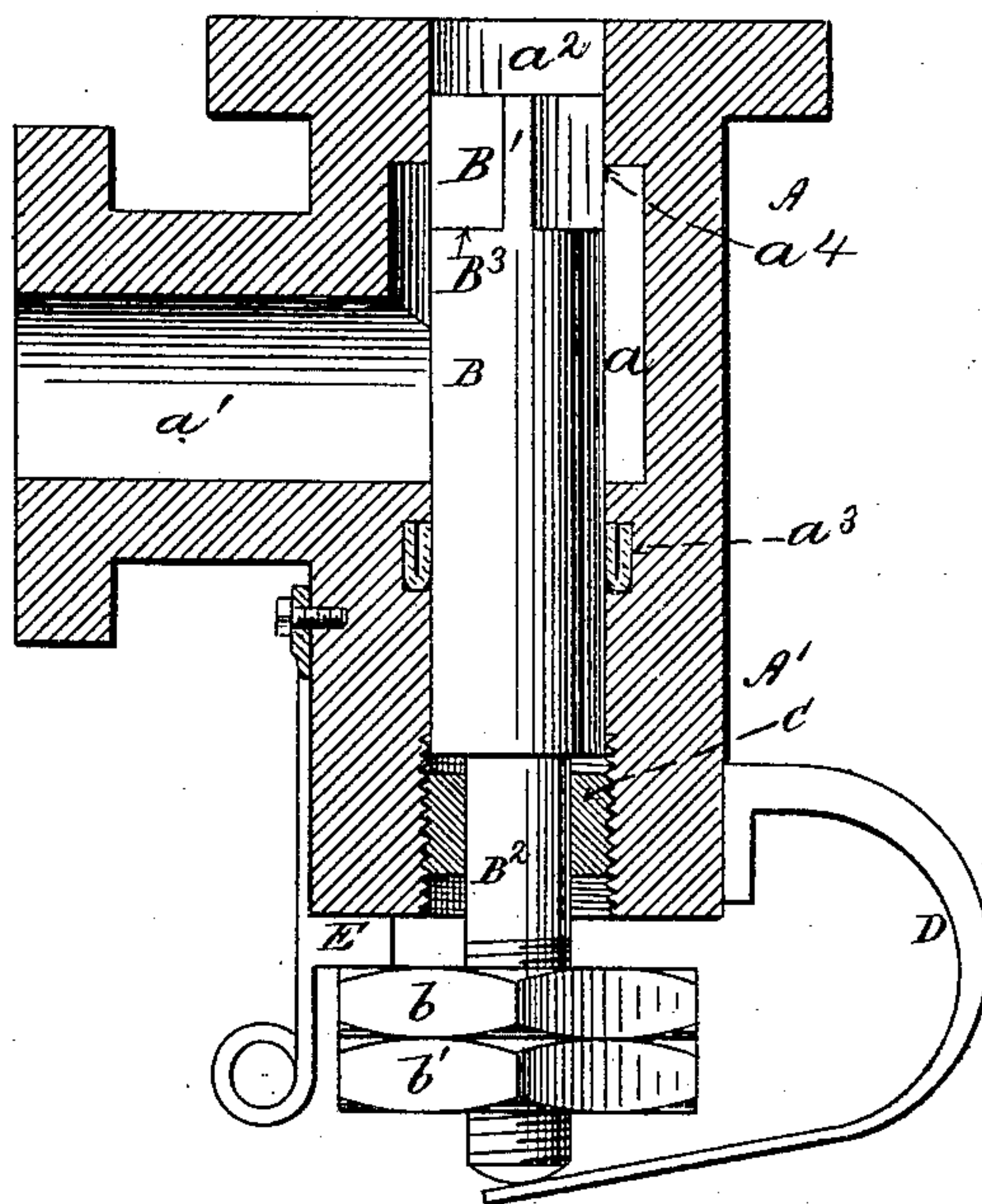


Fig. 2.



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GOVERNOR-VALVE FOR HYDRAULIC FORGING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 452,360, dated May 19, 1891.

Application filed January 26, 1889. Serial No. 297,699. (No model.)

To all whom it may concern:

Be it known that I, WALTER BURNHAM, of Hyde Park, Illinois, have invented certain Improvements in Governor-Valves for Hydraulic Forging-Machines, of which the following is a specification.

The object of this invention is to render the method of hydraulic forging more widely available in shaping and forging bodies of hot metal by greatly diminishing or practically eliminating the time ordinarily occupied in raising the operating-fluid in the hydraulic cylinder to the required high pressure after the movement of the ram through that part of its working stroke, which occurs before the body of hot metal has acquired contact with both of the forging or shaping dies. For convenience the portion of the working stroke preceding the occurrence of such contact is called the "contact-stroke." The remainder of the working stroke, during which the body of hot metal, hereinafter called the "work," should be made to fill out the space between the dies and take its finished shape therefrom, is designated the "forging stroke."

The broad feature of the invention consists in the combination of the port through which the operating-fluid is introduced into the ram-cylinder with a yielding throttle-valve so loaded or adjusted by means of a weight, spring, or brake that the internal pressure required to move it from its throttling position and enlarge the area of the said port exceeds to a prescribed extent the pressure required to actuate the ram during its contact-stroke; but when the ram encounters the resistance resulting from the contact of the work with both dies the pressure of the operating-fluid in the ram-cylinder rises and the resulting back-pressure upon the end of the throttle-valve instantly forces it back and fully opens the port, and thus freely admits the operating-fluid at high pressure to effect the forging stroke. It follows that by the initial constriction of the said port the operating-fluid in the accumulator or other source of supply is held back and maintained at the required high pressure during the whole of the contact-stroke, and is thus immediately available at the instant when the throttle-valve automatically opens the port wide at

the commencement of the forging stroke. Hence the forging stroke is delivered with ample energy and with such rapidity that the forging operation is completed before the work has time to be too greatly chilled by its contact with the dies.

It will be seen that the valve may be so adjusted as to more or less constrict the port through which the operating-fluid is supplied to the ram-cylinder and that it may have applied to it a weight, spring, or brake which will oppose more or less resistance to its opening movement, and that whatever may be the conditions of its adjustment its operation during the working stroke of the ram is automatic. It is therefore designated a "governor-valve for hydraulic forging-machines."

In the accompanying drawings, illustrating the invention, the governor-valve is in the form of a piston and has applied to it a spring for, if need be, assisting in holding it in its throttling position.

The drawings are as follows: Figure 1 is a sectional longitudinal section of the valve-shell, showing the piston in elevation and in the throttling position which it may occupy during the contact-stroke. Fig. 2 is a similar section showing the piston in the position which it is forced to acquire during the working stroke.

The valve-shell A has formed in it the chamber *a*, the side of which is provided with the hollow arm *a'* for connection with the main pipe, which supplies high-pressure fluid from an accumulator or other source. The port *a²* is for conducting the high-pressure fluid from the valve-chamber *a* to the ram-cylinder. The throttle-valve consists of the end-wise-sliding piston B, which has a suitably packed bearing *a³* in the hollow end A' of the valve-shell, and upon its inner end is provided with a projecting spider B', which by fitting within the port *a²* aids in centralizing the piston.

A nut C, provided upon its periphery with a male screw-thread, is adapted to engage and fit tightly a female screw-thread formed upon the interior surface of the outer portion of the hollow end A' of the valve-shell. The nut C is centrally perforated to allow of the extension through it of the valve-stem B², which

near its outer end is screw-threaded and provided with two jam-nuts b b' . A spring D, exerting an inward thrust upon the valve-stem, tends to drive the piston toward the mouth a^4 of the port a^2 . The nut b is a stop, which by collision with the end of the valve-shell arrests the inward movement of the piston. By adjusting the positions of the jam-nuts the piston may be thus arrested with its end B^3 at such distance from the mouth a^4 of the port a^2 as will leave the required relatively small opening for the supply of fluid to the ram-cylinder during the contact-stroke. The nut C serves as an abutment which fixes the limit of backward motion of the piston induced by the increased back-pressure upon its end B^3 during the forging stroke.

A chock E, which during the contact-stroke bears upon the periphery of the jam-nut b , as shown in Fig. 1, during the forging stroke springs into the space between the jam-nut b and the end of the valve-shell, as shown in Fig. 2, and thus prevents the piston from being thrust inward by its spring D when the supply of high-pressure fluid is shut off at the conclusion of the forging stroke and during the withdrawal of the fluid from the ram-cylinder while the ram is making its return-stroke, after which the chock is withdrawn and the spring D forces the piston back to its throttling position preparatory to a repetition of the working stroke.

The friction upon the valve-piston of its packed seat will usually suffice to maintain the valve in its constricting position during the first portion of the working stroke of the ram, which is herein designated the "contact-stroke." Thus the tight packing, acting as an efficient brake, may serve as an equivalent for the spring D, and the spring D may be dispensed with, in which case after the conclusion of the working stroke and the empty-

ing of the ram-cylinder the valve-piston may be pushed into its constricting position by power exerted manually.

What is claimed as the invention is—

1. A governor-valve for a hydraulic forging-machine for automatically enlarging the area of the port which supplies high-pressure fluid to the ram-cylinder during the latter portion of or what is herein called the "forging" stroke of the ram, the same consisting of a valve-chamber adapted for connection with the high-pressure-fluid-supply pipe, a port for conducting the high-pressure fluid from said valve-chamber to the ram-cylinder, a valve yielding to internal pressure and adapted for throttling said port during the first portion of or what is herein called the "contact" stroke of the ram, and means for opposing a prescribed degree of resistance to the yielding movement of said valve, by which movement the area of said port is enlarged.

2. The combination, as herein set forth, of the inlet-port of a hydraulic-ram cylinder with a valve for throttling said port adapted to yield and enlarge the area of said port when subjected to prescribed internal pressure, an adjustable stop for limiting the extent to which said valve can constrict the said port, and means, such as a spring, for holding said valve against said stop with a prescribed degree of force.

3. The combination, as herein set forth, of the valve-chamber a , the hollow arm a' , the port a^2 , the spring D, and the throttle-valve B with a chock E for automatically chocking the valve B when it is driven back by the preponderance over the force of its spring of the internal pressure exerted upon its end B^3 .

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