

No. 897,047.

PATENTED AUG. 25, 1908.

W. ASTFALCK.  
VALVE FOR HYDRAULIC MACHINES.

APPLICATION FILED JULY 23, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

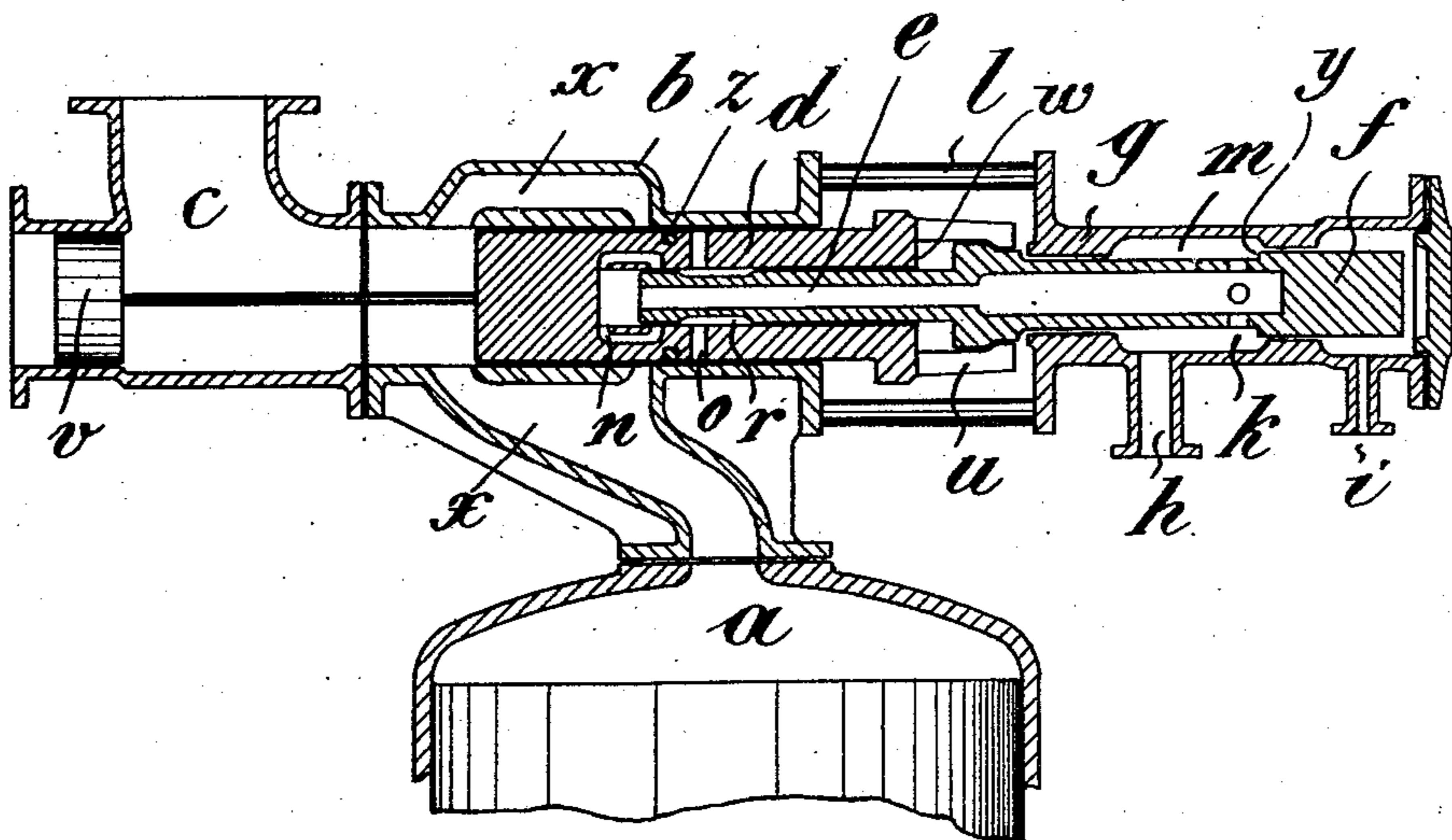
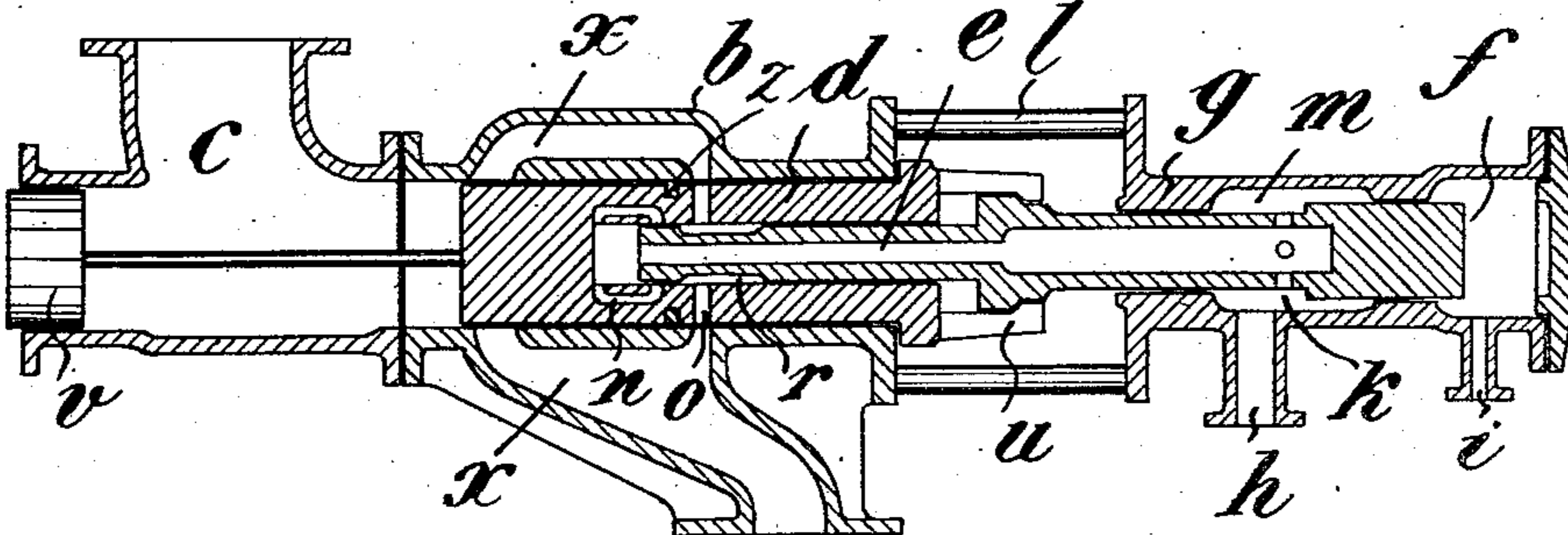


Fig. 2.



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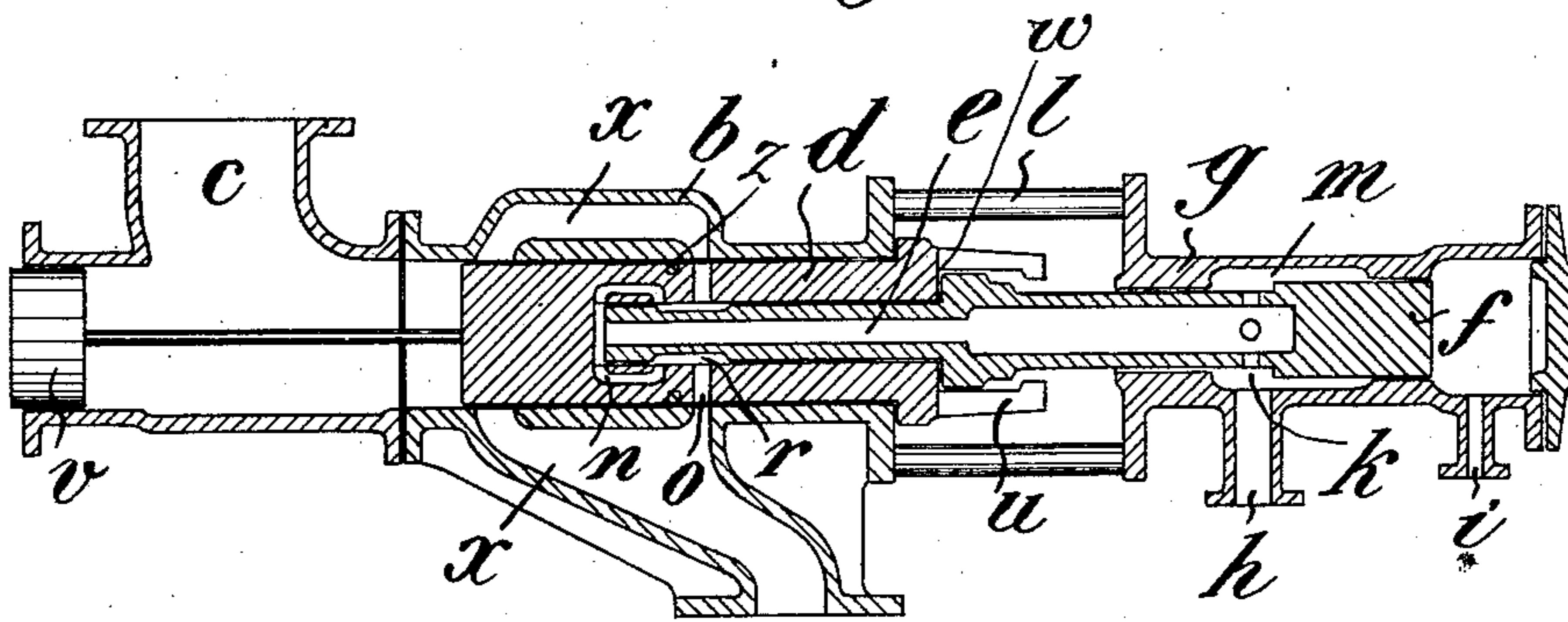
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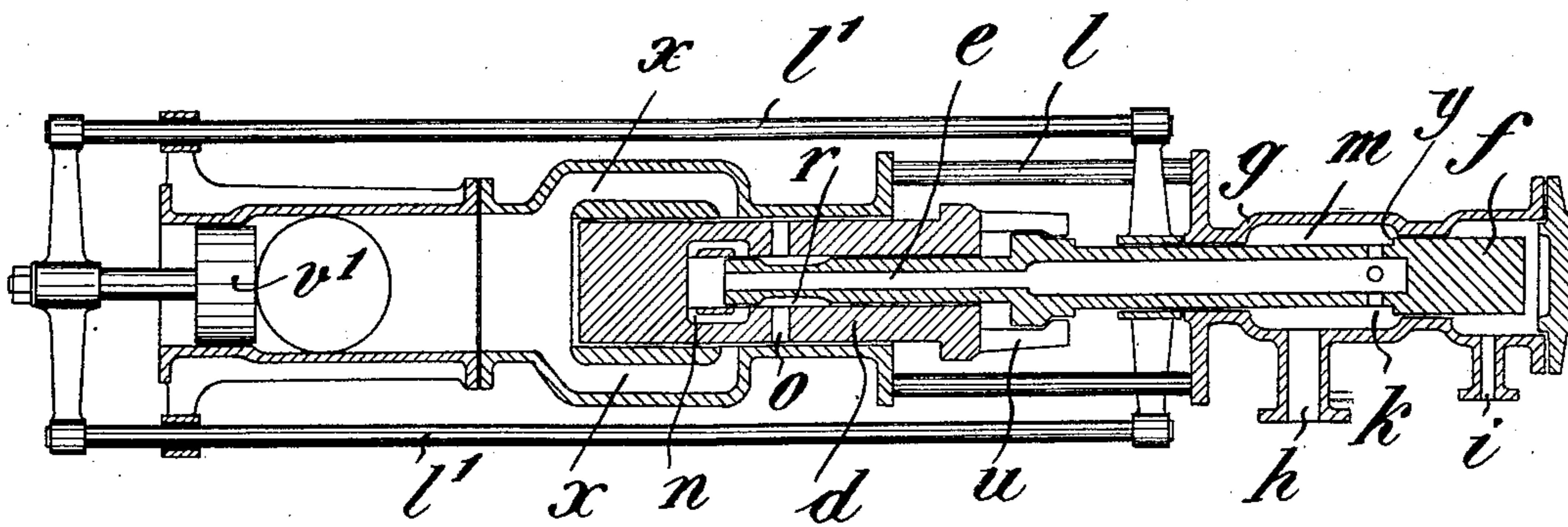
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2 SHEETS—SHEET 2.

*Fig. 3.*



*Fig. 4.*



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WILAND ASTFALCK, OF TEGEL, NEAR BERLIN, GERMANY.

## VALVE FOR HYDRAULIC MACHINES.

No. 897,047.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed July 23, 1907. Serial No. 385,224.

*To all whom it may concern:*

Be it known that I, WILAND ASTFALCK, a citizen of the German Empire, and resident of Tegel, near Berlin, Germany, have invented certain new and useful Improvements in Valves for Hydraulic Machines, of which the following is a specification.

This invention has for its object a distributing regulator for hydraulically worked presses and other engines, in which the regulating-devices for the low pressure or filling-conduit and for the high pressure conduit are connected with each other in a manner that they close, in the first place, the filling or low pressure conduit and only then open the high pressure conduit, and vice versa.

The new feature of the invention consists therein that the two regulating devices are arranged slidably within each other in a joint or common cylinder, and are both driven jointly, while through the constant pressure in the interior of the regulating devices the latter are constantly maintained in such a mutual position that, on the action of the driving-power, and normal resistances, they are pushed forward together or jointly, until the outer organ has finished its stroke, whereupon the inner organ is moved further on by the driving device, whereby there is effected the connection of the driving cylinder with the high pressure conduit. If during the here described working process the outer organ should unexpectedly remain behind the inner organ, in consequence of an extraordinary resistance, so that thereby the communication of the ports between the two organs is effected prematurely—that is to say before the end of the filling, and before the filling-conduit is closed—then the connection between the high pressure conduit and the press-cylinder remains interrupted nevertheless, in consequence of the transition-ports of the outer organ not covering each other and as a result of this the high pressure water, as long as the feed-conduit is open, cannot enter the press-cylinder.

The drawing shows in Figs. 1-4 two sample forms of construction of such a distributing-regulator in a diagrammatic view and in a longitudinal section.

Similar letters refer to similar parts throughout the several views.

*a* is the upper end of the hydraulic press-cylinder, *b* the regulating-cylinder connected with the same, *c* the filling or low pressure conduit, *d* the regulating device for the lat-

ter, and *e* the organ regulating the supply of the high pressure water, which is slidable in *d*.

*f* is the driving piston connected with *e* moving in the cylinder *g*. With the latter are connected the two high pressure conduits *h* and *i*.

The two cylinders *b* and *g* are, for instance, connected with each other by rods *l*. The regulator *e* is hollow and is provided at its left end with a narrowing *r*, and is connected through bores *k* with the interior of the cylinder *m*. The regulator *d*, on the other hand, is provided with axial ports *n* and radial ports *o*, and is coupled with the regulator *e* in any manner, so that both parts can be displaced a little in their relative positions. In the forms of construction shown in the drawing the coupling is effected by clutches *u* provided on *d* adapted to catch a band of the regulator *e*. The regulator *d* may further be provided with a balancing piston *v*, which moves in a lateral sleeve of the feeding-conduit.

This distributing-regulator works as follows: The conduit *h* is constantly standing under high pressure and, in consequence of this, the regulators *d*, *e*, as shown in Fig. 1, are held asunder. In the position shown in Fig. 1 the hydraulic press cylinder *a* receives its filling from *c*, while the high pressure water coming from *h* can only pass into the ports *n*. If the filling is finished, and if through the conduit *i* high pressure water is admitted, so that there is a load on the driving-piston *f*, the two regulators are shifted into the position of Fig. 2, for by the high pressure water admitted from *h* they are constantly kept asunder. If the regulators have got into the position of Fig. 2, the regulator *d* has finished its stroke, but has closed, at the same time, the feeding-conduit *c* towards the press-cylinder. If more high pressure water is admitted through the conduit *i*, the inner regulator *e* is pushed in the outer regulator *d* further to the left, in the sense of Fig. 3, until the two meet at *w*. In this position the interior of the regulator *e* remains still connected with the high pressure conduit *h*. But, at the same time, the admission-ports *x* are put into communication with the interior of the regulator *e* through the ports *o* and *n*, that is to say high pressure water can now pass into the press-cylinder. If the pressing-work is over, and if the conduit *i* is put into communication with the waste-water con-

duit, the press-water entering through the conduit *h* acts alone and drives the two regulators *d* and *e* again asunder. At the same time the high pressure water in *m* acts on the annular surface *y* of the piston and shifts the piston, and consequently also *e* and *d*, towards the right, whereupon the ports *x*, and consequently also the interior of the press-cylinder *a*, are put again into communication with the feed-conduit, so that on the return of the piston the water can return into the feed-conduit. The opening of the ports *x* consequently takes place only after the two regulators *d*, *e* have resumed their relative positions shown in Figs. 1 and 2. The conduit admitting the high pressure water was therefore first closed before the low pressure conduit was opened. But if, in consequence of an exceedingly great resistance, it should happen that the outer regulator remains behind when the driving-piston *f* is put under pressure, that is to say, that *e* should become prematurely shifted in *d*, the high pressure water can, in spite of this, not get into the ports *x*, as the regulator *d* is, with regard to the cylinder *b*, in the position shown in Fig. 1, while the ports *o* do not coincide with the ports *x*. For the sake of a reliable tightening there have been arranged in the regulator *d* one or several packing-rings *z*.

The regulator *e* may, as shown in Fig. 4, be connected through rod *l* with a displacer *v*<sup>1</sup>, which projects into a cylindrical prolongation of the feed-conduit. In this way is obtained the advantage that the water moving in the feed-conduit is, after closing the ports *x*, not brought to a standstill suddenly but gradually, so that it can also drive the regulator *e*. The water can, in this way, when the ports *x* are closed towards *c*, gradually fill the space occupied by *v*<sup>1</sup>, as *v*<sup>1</sup> moves with the regulator *e* towards the left. If however the regulator *e* is moved towards the right, in order to connect again the ports *x* with the feed-conduit, the water in *c* is then put in motion through the displacer *v*<sup>1</sup>, so that, when the ports *x* are opened towards *c*, the water coming out of the press-cylinder comes into contact with a volume of water already in motion, that is to say there is prevented in both cases a jar of the water.

What I claim as my invention and desire to secure by United States Letters Patent is:—

1. The combination with the press cylinder, the low pressure conduit and the high pressure conduit, of a controlling member for the low pressure conduit having a passage adapted to provide communication between the high pressure conduit and the cylinder, a second controlling member telescoping in

said first-named controlling member and capable of limited movement therein, means providing communication between said high pressure conduit and the interior of said controlling members to cause said second controlling member to assume a position in which it closes said passage, and means for imparting movement to said controlling members to cause said first-named controlling member to close the low pressure conduit and to cause said second controlling member to open said passage to open communication between the high pressure conduit and the cylinder.

2. The combination with the press cylinder, the low pressure conduit and the high pressure conduit, of a hollow controlling member for the low pressure conduit having a passage adapted to provide communication between the high pressure conduit and the cylinder, a second-hollow controlling member telescoping in said first-named controlling member and having its interior communicating with the interior of said first-named controlling member, means providing communication between the high pressure conduit and the interior of said controlling members to cause said controlling members to assume a relative position in which the second member closes the passage in the first member, means for imparting movement to both of said controlling members simultaneously to cause the first member to close the low pressure conduit, and means for stopping the movement of said first member when it has closed the low pressure conduit while permitting the second member to continue its movement to open said passage.

3. The combination with the press cylinder, the high pressure conduit and the low pressure conduit, of a sliding controlling member for the low pressure conduit, a second controlling member for the high pressure conduit, telescoping in said first-named controlling member and capable of limited movement therein, and a displacer piston in the low pressure conduit connected to the second controlling member to move therein; said piston being adapted to be moved in one direction by the liquid displaced by the first-named controlling member to exert driving action on the second controlling member and being adapted to displace the liquid in the low pressure conduit when moved in the other direction by the second controlling member.

The foregoing specification signed at Berlin, Germany, this ninth day of July, 1907.

WILAND ASTFALCK.

In presence of two witnesses—

HENRY HASPER,

WOLDEMAR HAUPT.