

Sheet 1, 4 Sheets.

J.B. Fenby.
Valve for Hydraulic Press.
Patented Jul. 27, 1869.

N^o 93,073.

Fig. 1.

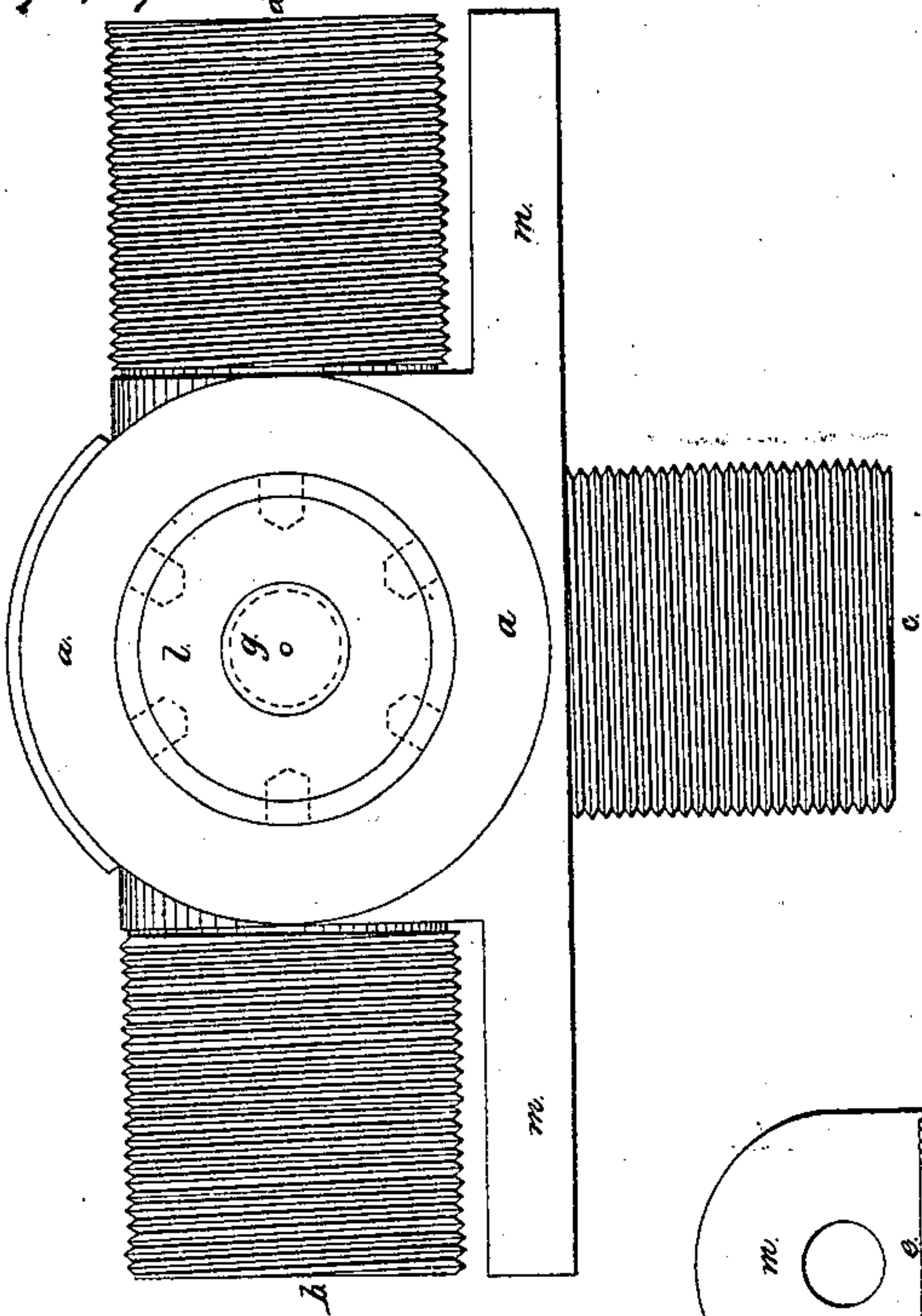
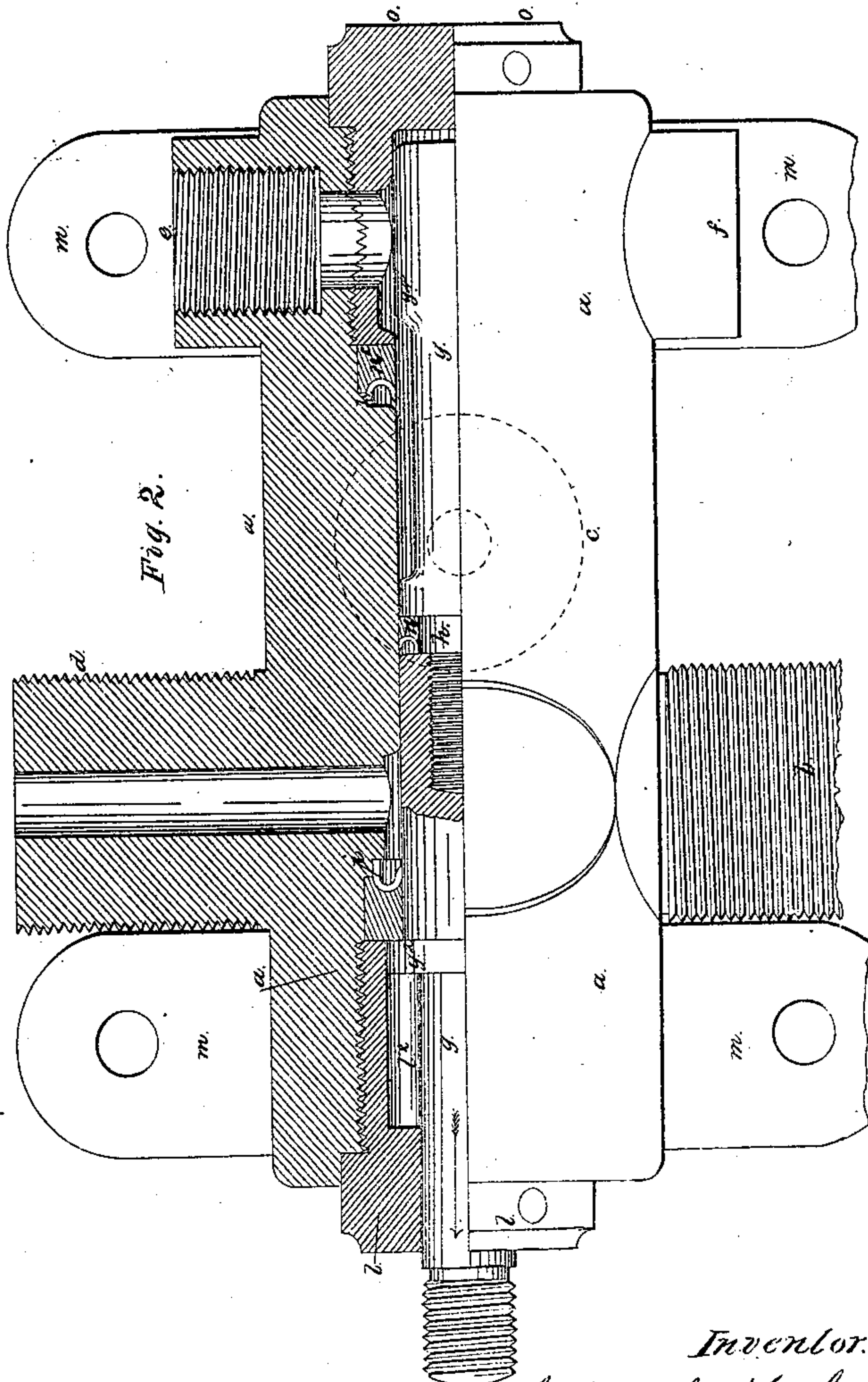


Fig. 2.



Witnesses.

George Shaw
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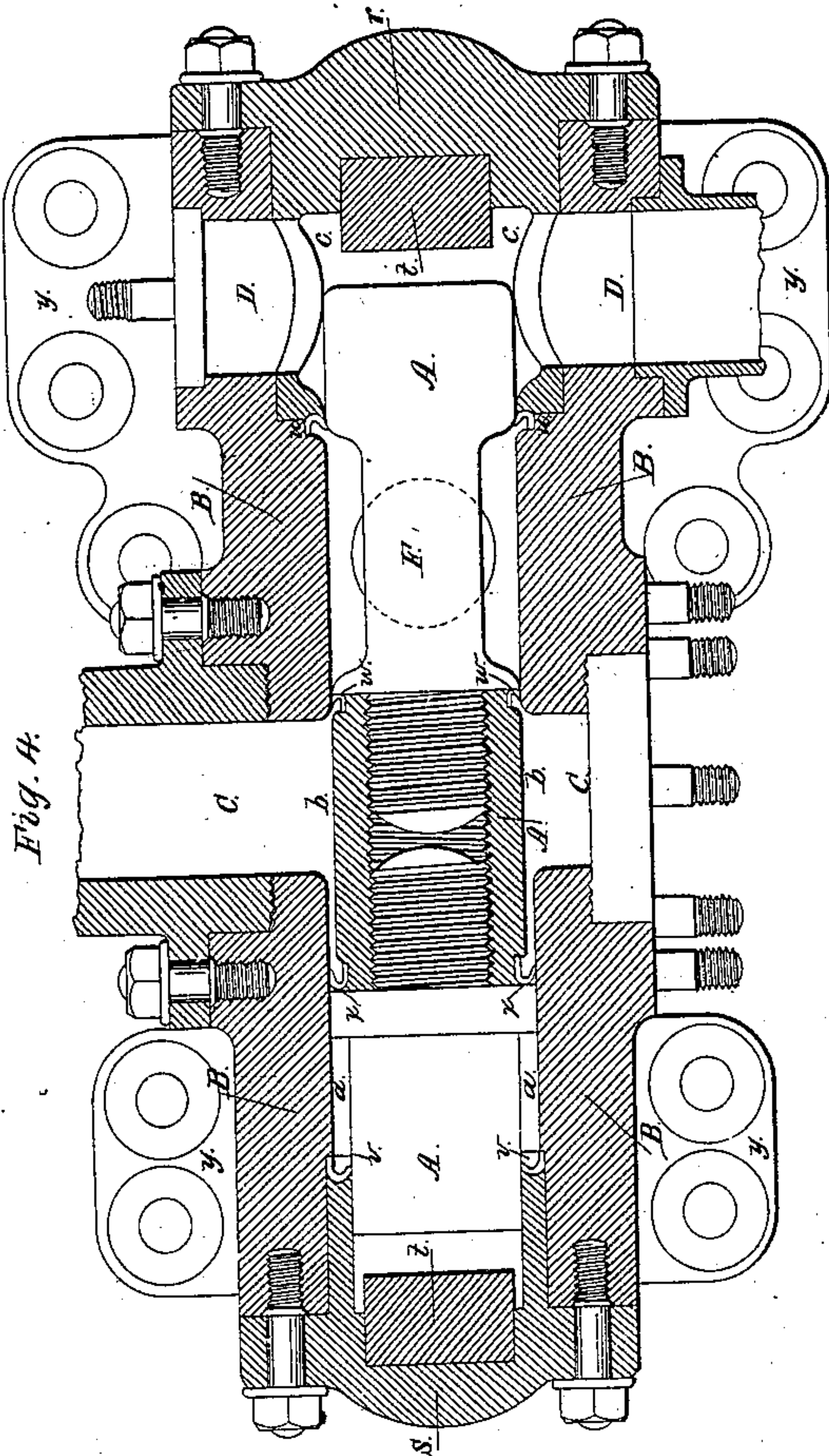
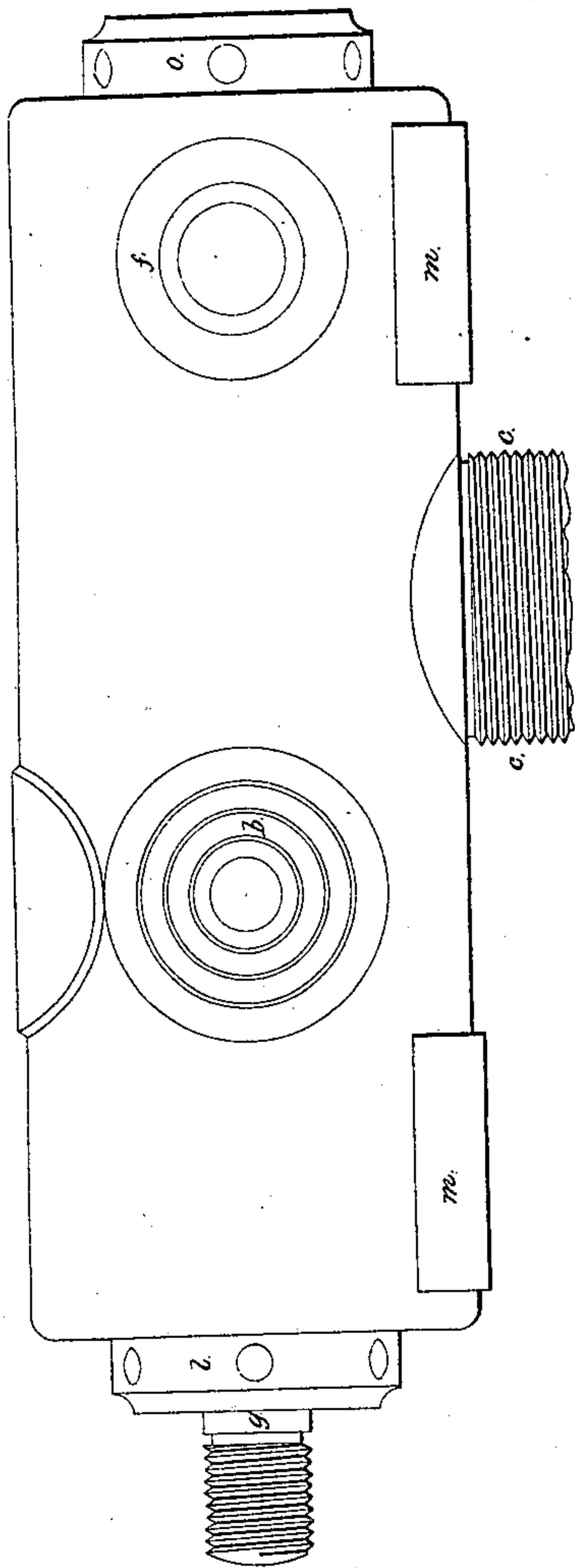
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Fig. 3.



Witnesses.

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Sheet 3, 4 Sheets.

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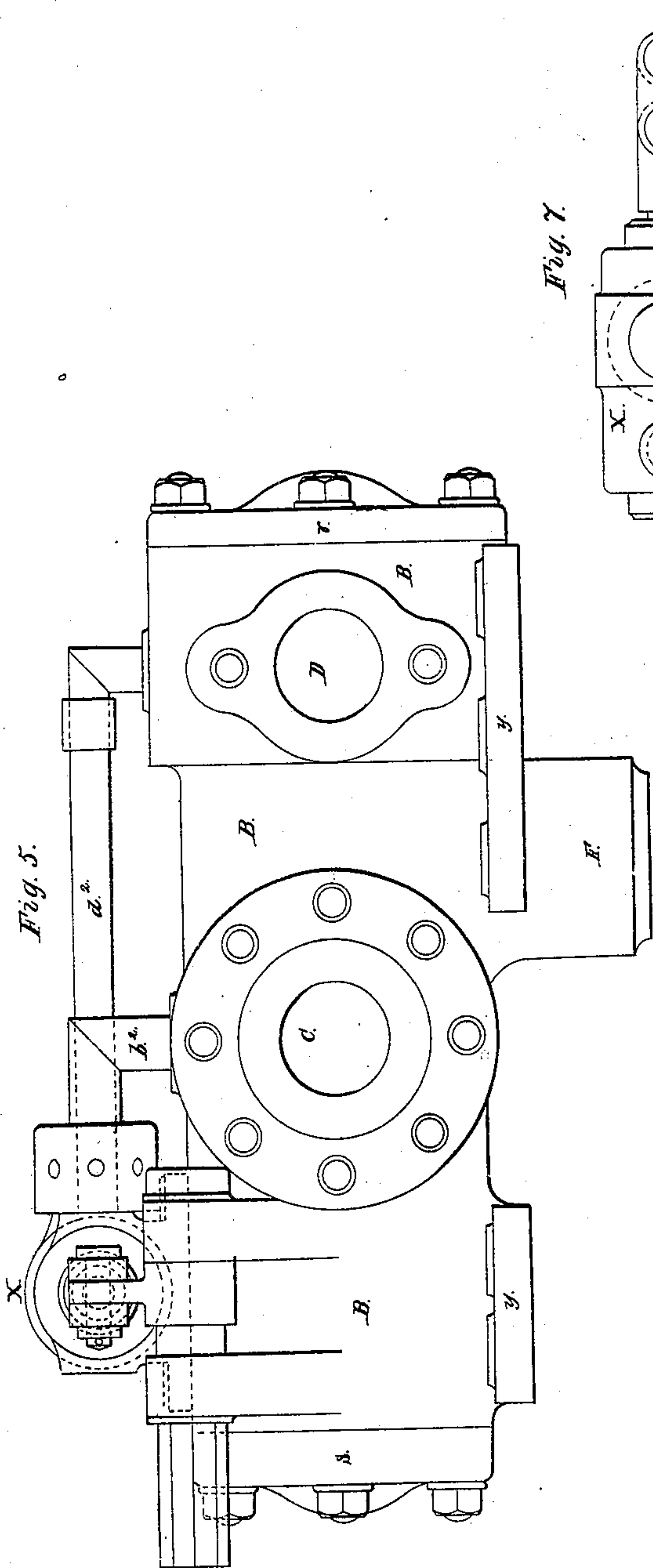


Fig. 5.

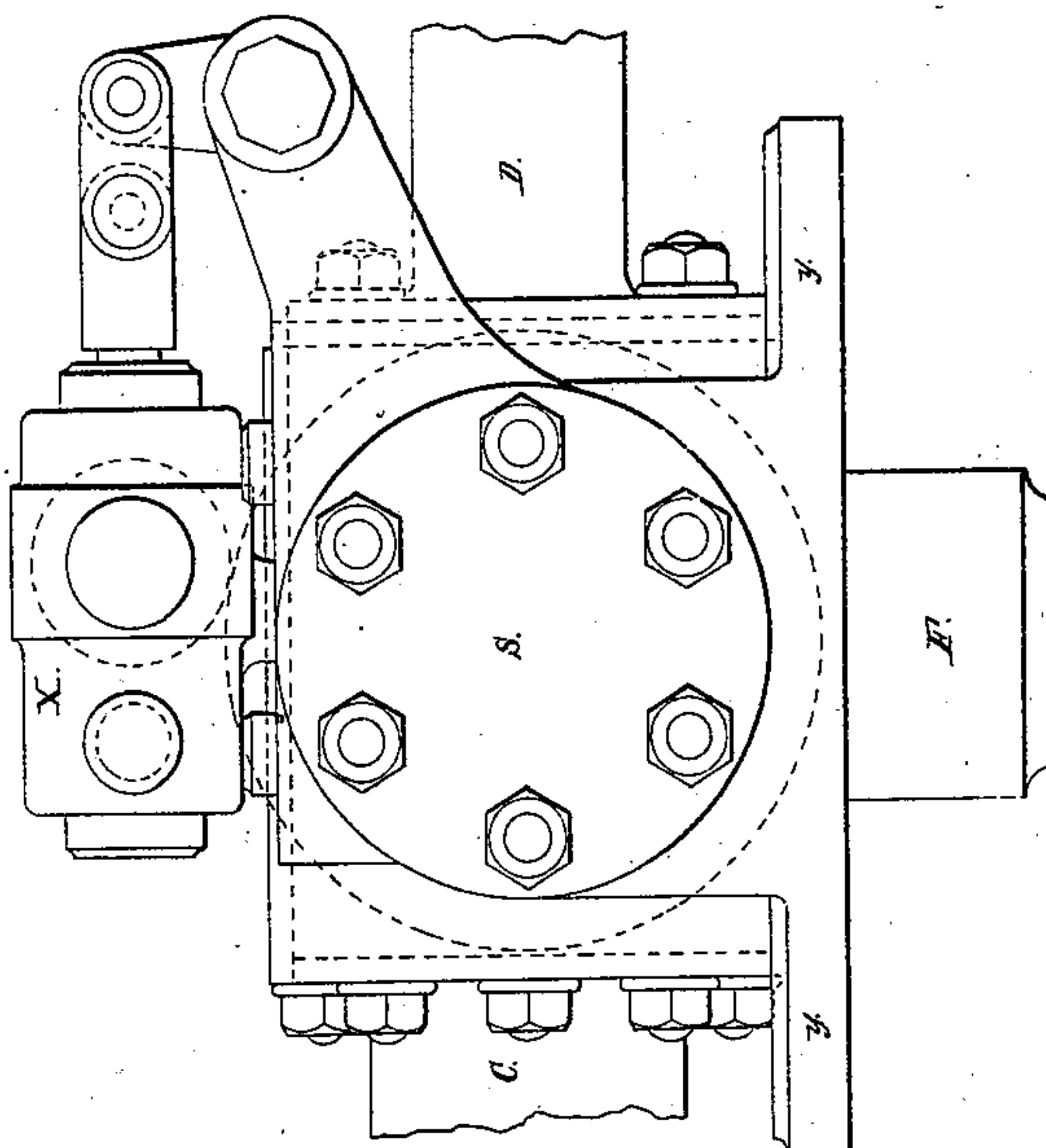


Fig. 7.

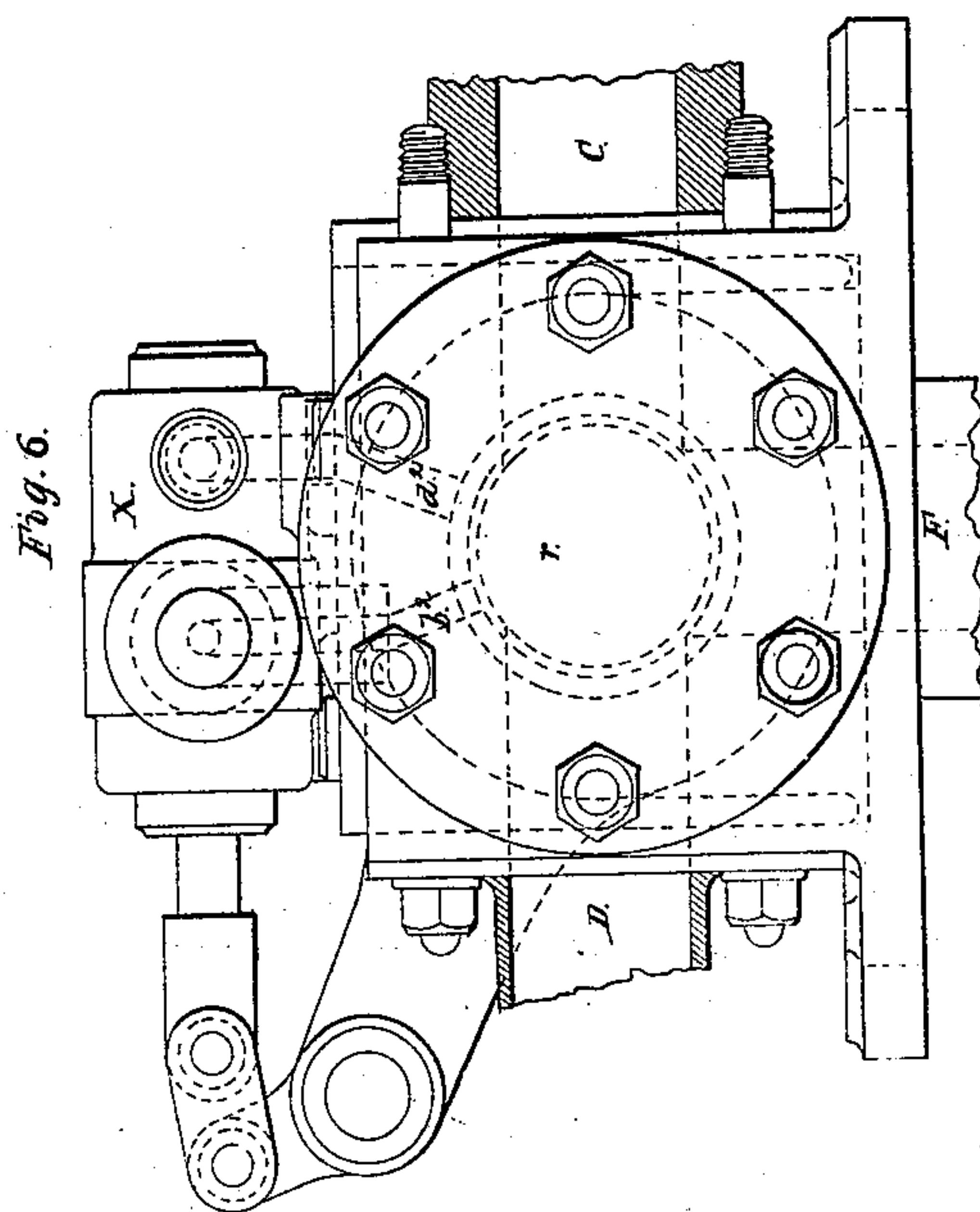


Fig. 6.

Witnesses.

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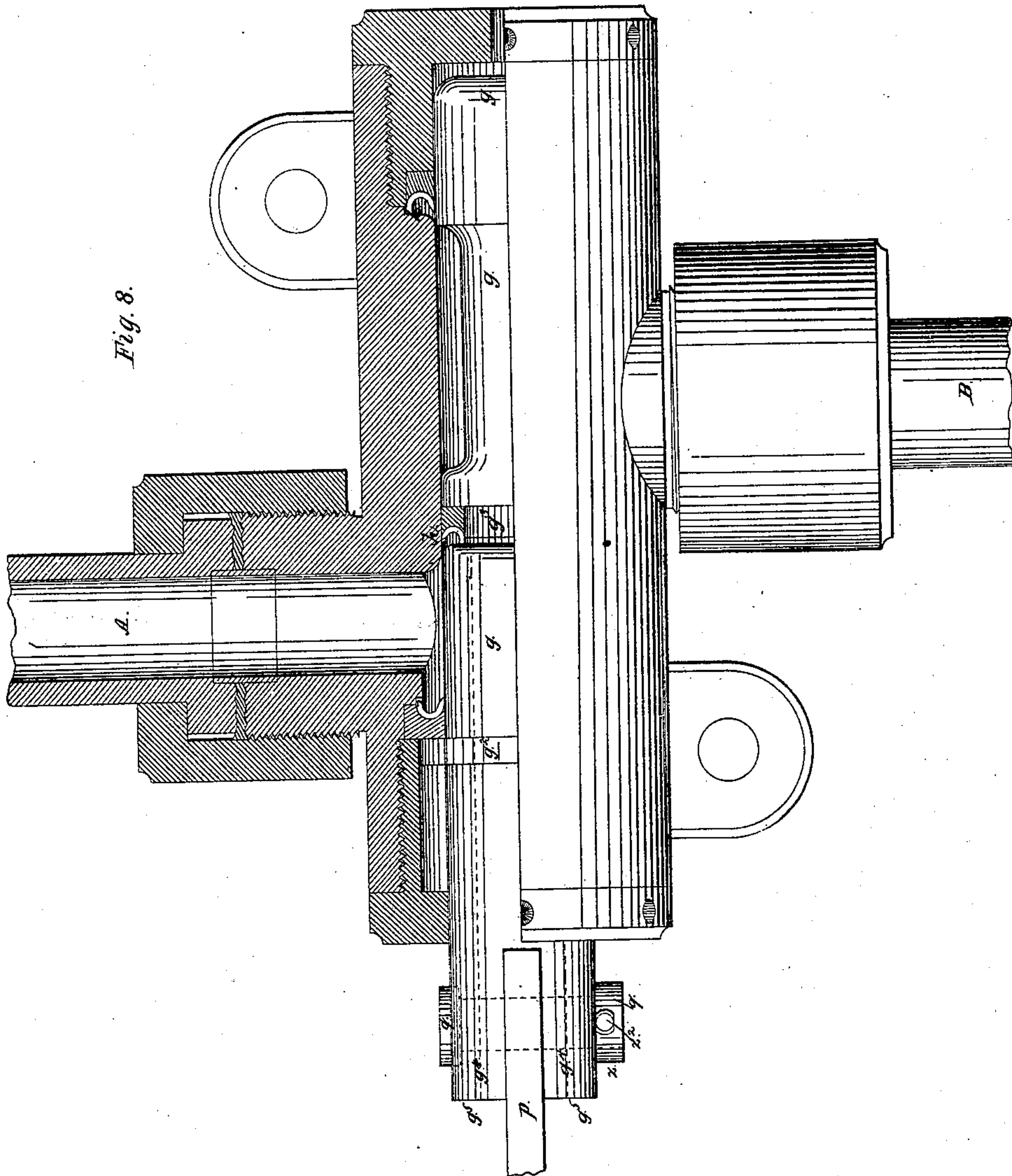
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Sheet 4, 4 Sheets.

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Valve for Hydraulic Press.

N^o 93,073.

Patented July 27, 1869.



Witnesses.

George Shaw
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United States Patent Office.

JOSEPH BEVERLEY FENBY, OF BIRMINGHAM, ENGLAND.

Letters Patent No. 93,073, dated July 27, 1869; Patented in England October 30, 1867.

IMPROVEMENT IN VALVES FOR HYDRAULIC PRESSES.

The Schedule referred to in these Letters Patent and making part of the same.

To all to whom it may concern:

Be it known that I, JOSEPH BEVERLEY FENBY, of Birmingham, in the county of Warwick, England, mechanical engineer, have invented or discovered certain new and useful "Improvements in Valves for Hydraulic Presses, and for other purposes;" and I, the said JOSEPH BEVERLEY FENBY, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof; that is to say—

My invention consists in constructing and arranging, in the manner hereinafter explained, the parts and packing of valves for opening and closing at pleasure the communication between the feed or exhaust-pipes of hydraulic presses and the cylinders of the said presses, and thereby establish a communication between the pump and cylinder, when it is wished to raise the ram or plunger of the press, or between the cylinder and the exhaust-pipe, when it is wished to allow the ram or plunger to make its return motion.

Valves, constructed according to my invention, may also be used for the accumulators of hydraulic presses, and for various other purposes.

I will describe my invention with reference to a hydraulic press.

I connect with the cylinder of the press a small or supplementary hollow cylinder closed at one end. A piston or plunger of the kind hereinafter described, works in the said small cylinder. The connection between the said two cylinder is by means of a pipe or opening in the side of the small cylinder, and about midway between its ends. The feed-pipe from the pump opens into the small cylinder at its side near its open end, and the exhaust-pipe opens into the small cylinder near its closed end. The piston or plunger of the said small cylinder is of the same diameter as the interior of the said small cylinder, excepting near its middle, where it is made of smaller diameter, and where, between it and the small cylinder, is an annular space into which the communication with the cylinder of the press opens. The parts of the small cylinder into which the feed and exhaust-pipes respectively open are of somewhat larger internal diameter than the middle part. The range of motion of the piston or plunger of the small cylinder is limited by a collar near its top, working in a recess in the gland at the open end of the small cylinder. When the piston of the small cylinder is in its withdrawn position, that part of it of small diameter is brought into the portion of the small cylinder into which the feed-pipe opens, and a communication is thereby established between the feed-pump and the cylinder of the press, the communication between the cylinder of the press and the exhaust being cut off.

When the piston of the small cylinder is in its advanced position, that part of it of small diameter is in part brought into that portion of the small cylinder into which the exhaust-pipe opens, and the cylinder of the press is thus put in communication with the exhaust-pipe, the communication between the feed-pipe and cylinder of the press being cut off. The piston of the small cylinder may be worked by a screw or lever, or by other means. The small cylinder is provided at top and bottom with cupped-leather packings, and the piston is furnished with a similar packing at the part where the smaller diameter sets in. For convenience in fixing and replacing the leather packing, the piston may be made of two parts screwed together with the packing in question secured between them.

Having explained the nature of my invention, I will proceed to describe with reference to the accompanying drawings, the manner in which the same is to be performed.

Figure 1 represents an end elevation of a small valve for a hydraulic press, constructed according to my invention;

Figure 2 is a longitudinal half section of the same; and

Figure 3 is a side elevation of the same.

The same letters indicate the same parts in figs. 1, 2, and 3.

a is the hollow cylinder of the valve, and *g* is the piston or plunger working in the said cylinder.

The cylinder *a* is provided with screwed lugs or connecting-pieces *b c d*, and tapped holes *e f* for making the necessary joints or connections with the feed and exhaust-pipes of the press-pumps and accumulator.

The piston or plunger *g*, in the cylinder *a*, carries the cupped leather or collar *h*, and in the said cylinder *a* is a cupped-leather packing, *i*, which fits the said piston in all its positions, as hereinafter explained.

The piston or plunger *g*, at the rear of the cupped leather *h*, is reduced in diameter, its extreme end being of the full size, as represented in fig. 2.

In addition to the cupped-leather packing *i*, the cylinder *a* is furnished with the cupped-leather packing *k*.

In the gland *l* is a cylindrical chamber, *P*, in which the collar *g*² on the piston or plunger *g* works, the said collar *g*² acting as a stop to regulate the range of motion of the said piston or plunger. The collar *g*² is made solid with the piston *g*.

The separate metallic rings *n n*², are for convenience of renewal after wear; otherwise the half of the piston *g* and the gland *o* would have to be renewed.

The mode of fixing is as follows:

One of the lugs or connecting-pieces *b d* being coupled to the pressure-pipe leading to the tank of the

pumps, the other lug *b* or *d* is stopped off or coupled to the corresponding parts of the next valve where several form one series. The lug or connecting-piece *c* is coupled to the cylinder of the press, where the ram moves, and to the ram if the cylinder moves.

One of the tapped lugs *e* or *f* is coupled to the exhaust-pipe, and the other is stopped off or coupled to the next valve.

The cylinder *a* is provided with four flat lugs or connecting-pieces *m* for bolting the valve to a base-plate or to the press.

In fig. 2 the valve is shown with the exhaust open. The cupped-leather packing *h* fitting the reduced part of the cylinder *a*, cuts off the pressure from the press, while the reduced part or the ram *g* allows the escape of any water in the press past the cupped-leather packing *k*, and through the exhaust-pipe.

By moving the piston *g*, in the direction of the arrow in fig. 2, the enlarged part *g'* of the piston *g* being brought into the leather packing *k*, the valve will be in a neutral position, that is, the piston *g*, just closes the leather packing *k*, and the leather packing *h* is still in the reduced part of the bore of the cylinder *a*. The press will then remain stationary at any part of its stroke, as the pressure from the accumulator cannot pass the leather packing *h*, nor can the water in the press pass the leather packing *k* to the exhaust. By moving the piston *g* still further in the direction of the arrow, the leather packing *h* will be brought into the enlarged part of the bore of the cylinder *a*, and access allowed to the water from the accumulator through *c* to the press, while the enlarged part of the piston *g* still closes the leather packing *k*.

Figure 4 represents in horizontal section a large valve constructed according to my invention, arranged for working with a secondary valve of smaller bore.

Figure 5 is a side elevation of the same, and

Figures 6 and 7 are end elevations of the same.

The same letters indicate the same parts in figs. 4, 5, 6, and 7.

B is the hollow cylinder provided with the required lugs or connecting-pieces *y* for bolting down, and with passages *C*, *D*, and *F*. for feeding, exhausting, and coupling to the press.

The plunger *A* is made in three parts for the purpose of fitting on leather collars *x w*.

At either end of the valve-cylinder are leather collars or packing *v* and *u*.

Pieces *t* of wood, India rubber, or other material, are inserted into the recesses in the glands *r* and *s* for the ends of the plunger *A* to strike against.

The smaller valve *X* is fixed on the large valve, in the manner represented in figs. 5, 6, and 7, and the said smaller valve *X* has communication with the chambers *a*, *b*, and *c*, in the cylinder of the large valve, the lugs or connecting-pieces of the said small valve being connected for this purpose with the said chambers *a b c*.

The valve as shown in fig. 4 is in a neutral position.

The feed-water being supplied through the passage *C*, passes into the smaller valve *X* through the pipe *b'*, and is exhausted from thence through the pipe *d'*.

The plunger of the smaller valve *X* being worked with a lever, the water is alternately supplied to and exhausted from the chamber *a*, and thus gives the plunger *A* the necessary reciprocating motion for admitting the water to the ram of the press from the feed-lug or connection *C* through the lug or connection *F*, and withdrawing and discharging the said water through the exhaust-passage *D*.

Figure 8 shows in half section a hydraulic stop valve, constructed according to my invention.

The arrangement of the cylinder, lugs, glands, piston, rings, and leather packings, is mainly similar to that of the said parts already described and represented.

The piston *g* passes through the leather packing *i*, fitting it at all times. The said piston also always fits the leather packing *k*, and the pressure upon it is in perfect equilibrium.

The leather packing *h* opens and closes the communication between the pipes *A* and *B*. The pipe *A* is coupled to the accumulator, and the pipe *B* to the press, water-engine, crane, or other machine to be worked by the water-power. The pipe *B* may lead to one of the side valves already described, and from thence to the machine.

In connection with this valve, is shown an improved way of constructing the piston *g*, whereby greater facility is obtained for putting in new cupped leathers or packings *h*.

The inner part of the piston is reduced, as shown at *g'*, and is still further reduced at one end to the size indicated by the dotted lines marked *g''*, the reduced diameter *g''* reaching to the outer end. The part *g'''* is bored to slide on to the part *g'*, the said part *g'''* having the collar *g''* formed on it. A small portion of the part *g'''* is reduced to the size of the part *g'* to bring the joint under the leather packing *h*.

This construction of piston is applicable to any of the valves hereinbefore described, made according to my invention.

The pin *q* fitted with the collar *z* and split pin, *z'*, serves to connect the two parts *g'* *g'''* of the piston, and to couple the motion-link *p* to the piston.

Having now described the nature of my invention, and the manner in which the same is to be performed,

I claim as my invention the improvements in valves for hydraulic presses, and for other purposes hereinbefore described, and illustrated in the accompanying drawings, that is to say, the said valves constructed of a hollow cylinder and a piston or plunger working therein, the said hollow cylinder and piston or plunger being packed, and the parts connected therewith being constructed and arranged substantially as described and illustrated, whether the valve be worked by the direct motion of the piston or plunger, or by a small supplementary valve of similar construction.

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