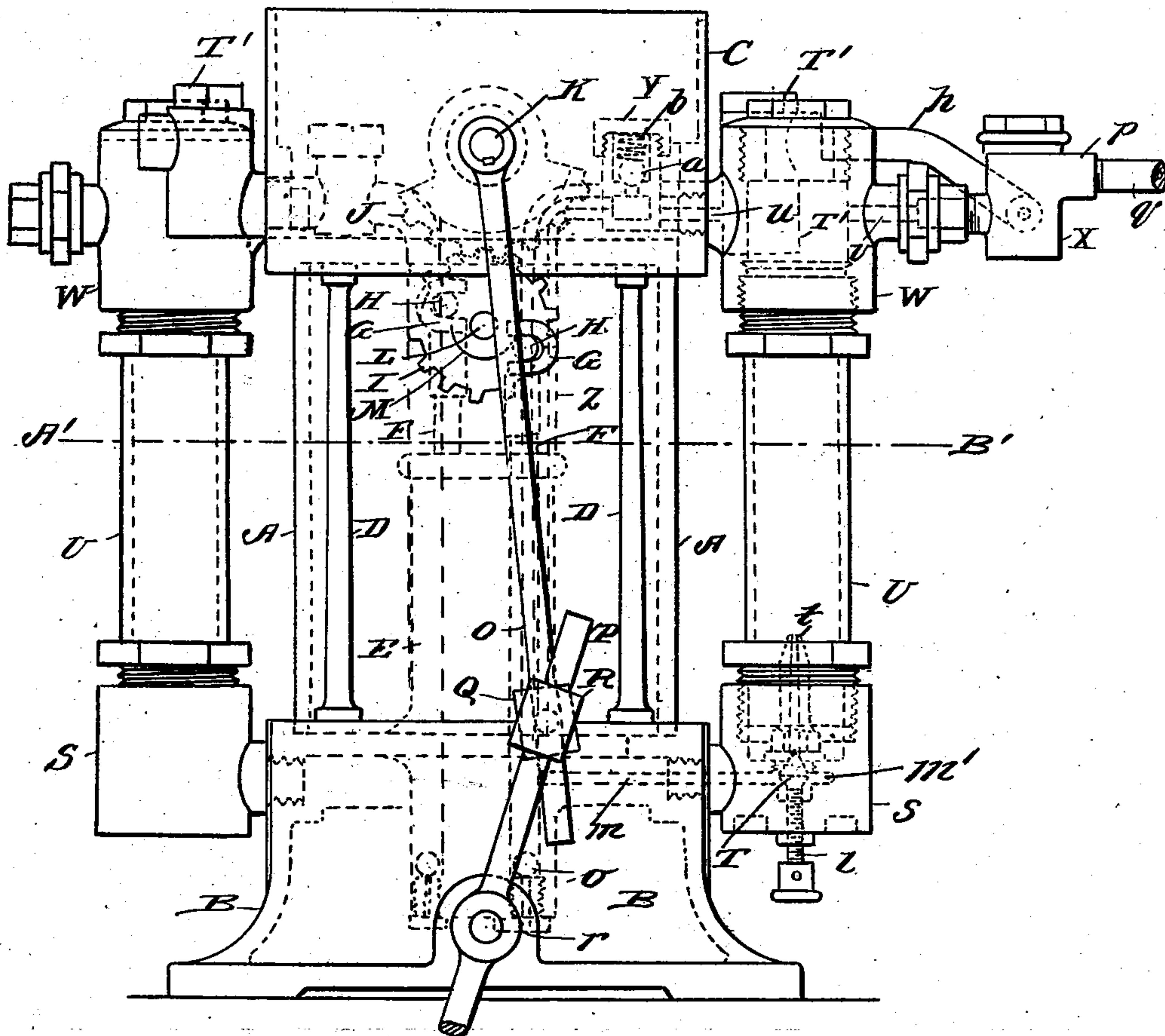


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4 SHEETS—SHEET 1.

*Fig. 1.*



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 APPLICATION FILED MAR. 20, 1907.

923,748.

Patented June 1, 1909.

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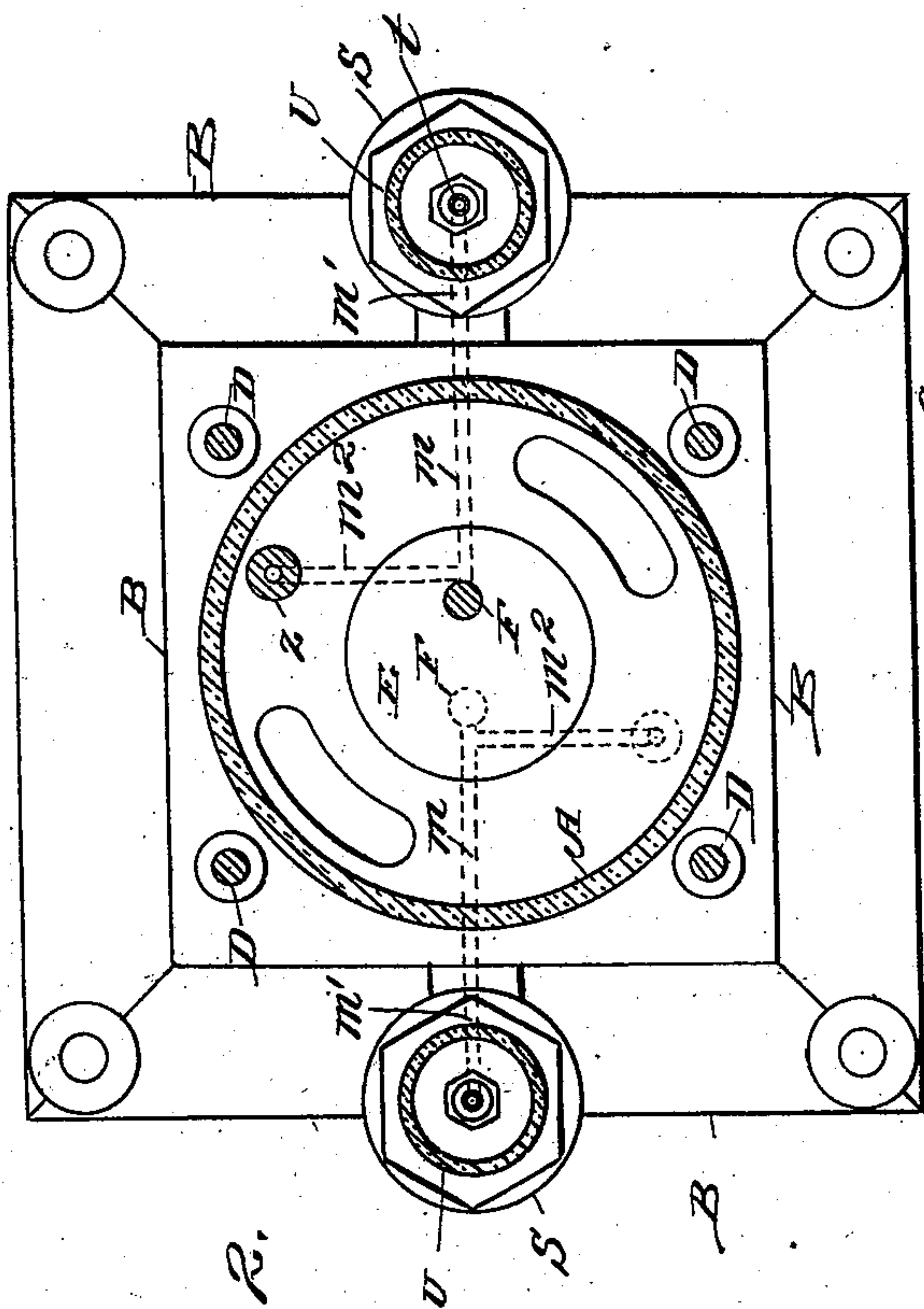


Fig. 2.

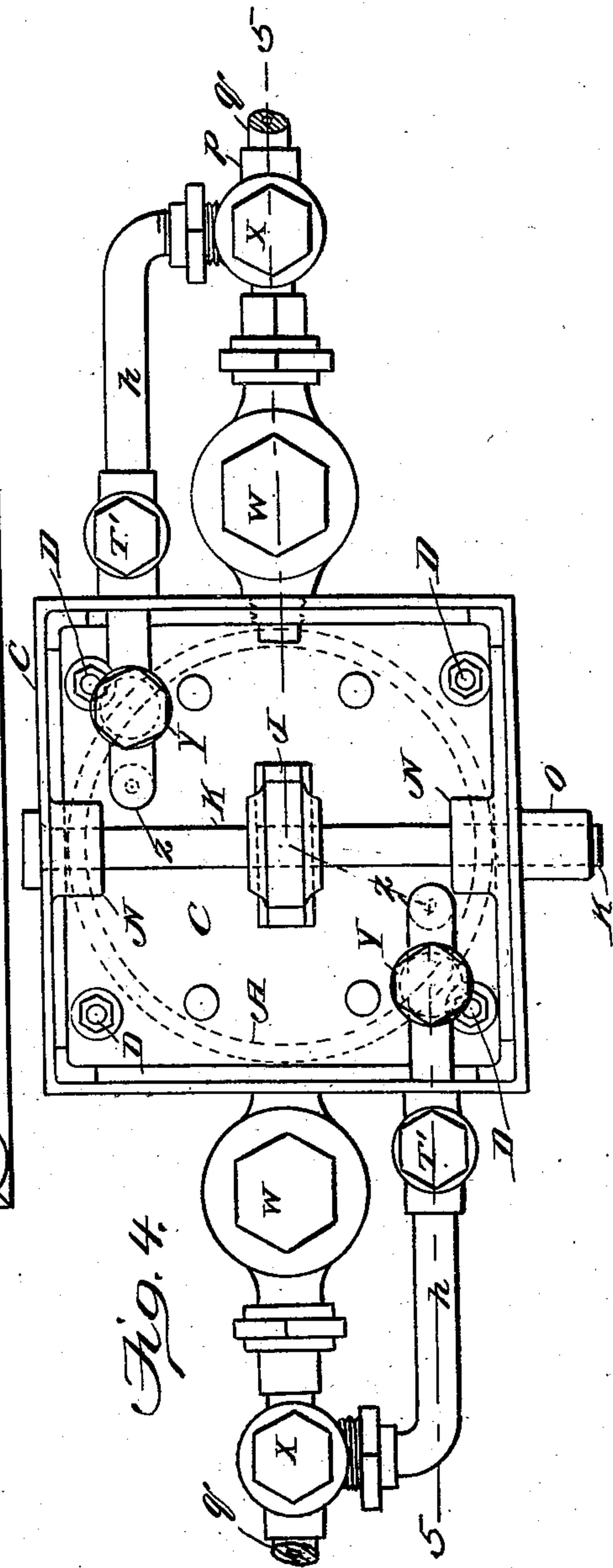


Fig. 4.

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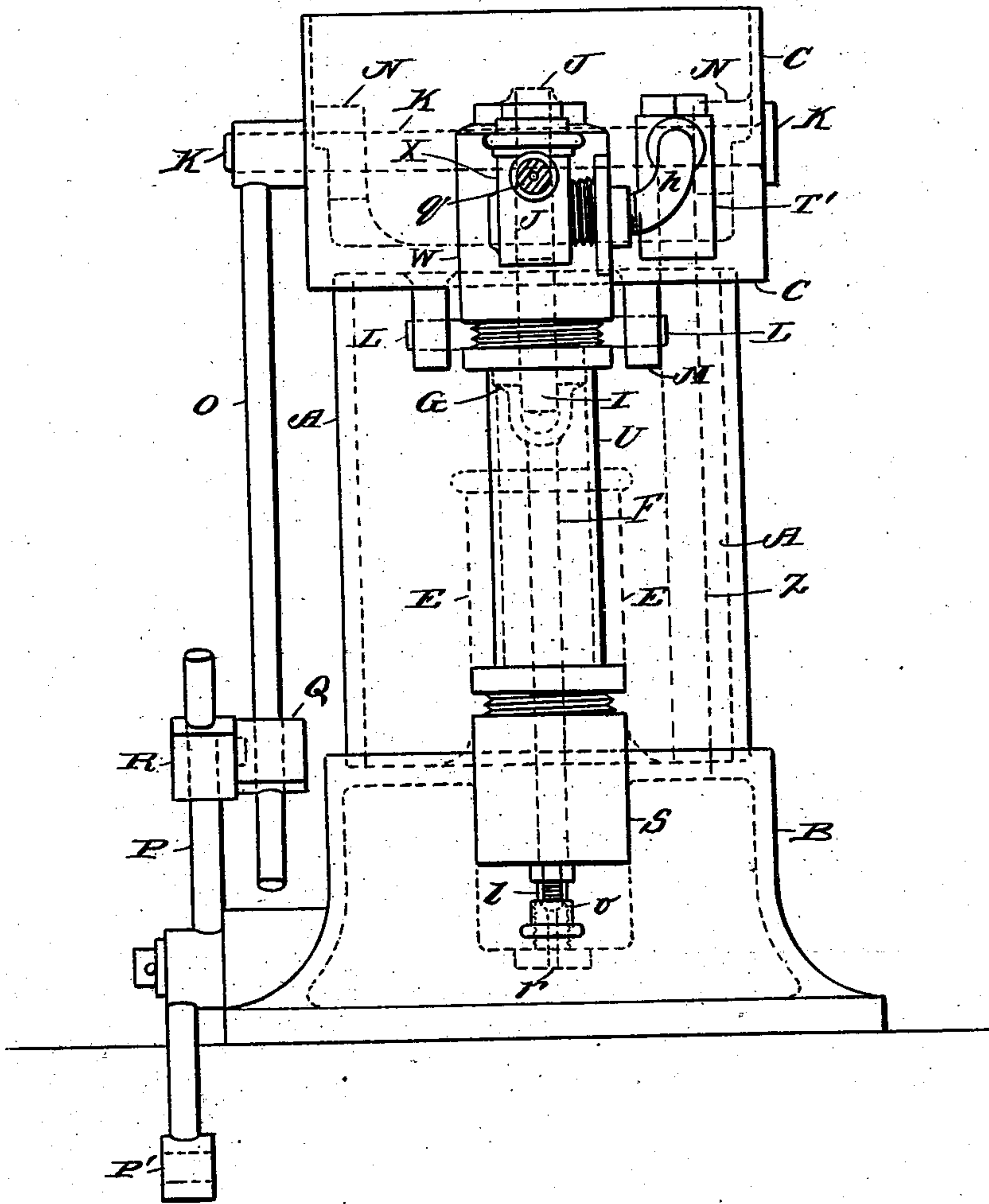
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923,748.

Patented June 1, 1909.  
 4 SHEETS—SHEET 3.

Fig. 3.



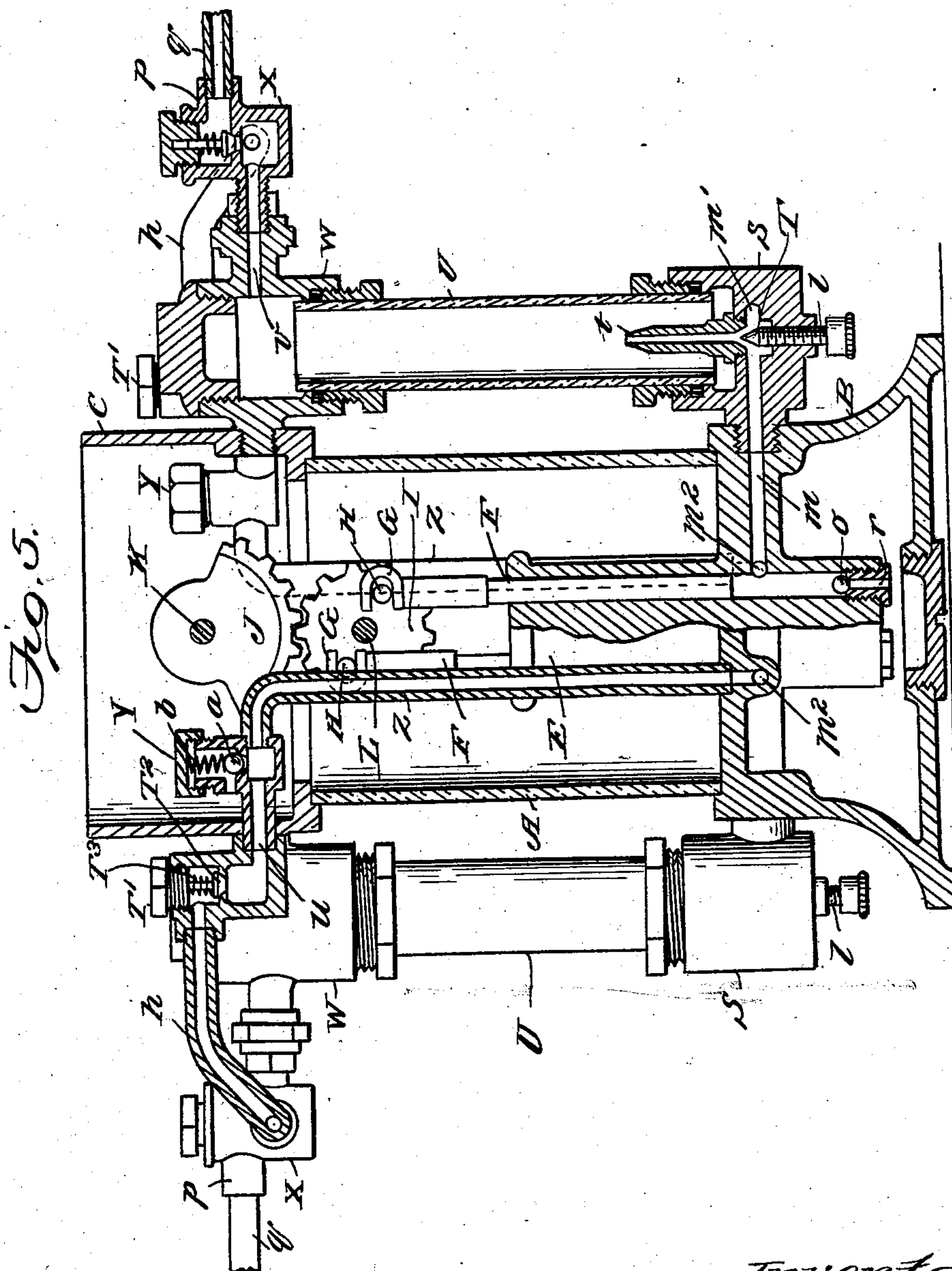
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# UNITED STATES PATENT OFFICE.

ROBERT WOOD, OF BOLTON, ENGLAND.

## RECIPROCATING HYDRAULIC PUMP.

No. 923,748.

Specification of Letters Patent.

Patented June 1, 1909.

Application filed March 20, 1907. Serial No. 363,479.

*To all whom it may concern:*

Be it known that I, ROBERT WOOD, subject of the King of England, residing at 13 Grafton street, Bolton, in the county of Lancaster, England, engineer, have invented certain new and useful Improvements in or Relating to Reciprocating Hydraulic Pumps, of which the following is a specification.

This invention relates to improvements in reciprocating hydraulic pumps, and more especially to the reciprocating type such as those particularly applicable as force feed lubricators, and it has for its object to provide an improved pump of this character which may embody one or more rams or plungers and which is capable of adjustment whereby it may create a flow of a fluid in different quantities and such flow moreover is positive.

A further object of the invention is to provide pumps or lubricators of this character with a relief valve whereby breakage of the sight feed tube or any other part of the mechanism will be avoided should the outlet pipe be stopped or clogged.

To these and other ends, the invention consists in certain improvements, and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing: Figure 1 is a side elevation of a pump constructed in accordance with my present invention, the same being of the double-acting type and especially adapted for use as a force feed lubricator; Fig. 2 represents a transverse section of the pump or lubricator taken on the line A'—B' of Fig. 1; Fig. 3 is an end view of the pump or lubricator as viewed from the right in Fig. 1; Fig. 4 is a top plan view of the lubricator as shown in Fig. 1; and Fig. 5 represents a vertical section of the lubricator taken on the line 5—5 of Fig. 4.

Similar parts are designated by the same reference characters in the several views.

The apparatus shown in the accompanying drawing represents one specific embodiment of the invention, and it will be understood that the invention is not necessarily limited to the precise construction shown, as certain modifications and changes therein may be made in order that the device may be applied to the best advantage in each particular case.

In the present embodiment of the invention, the apparatus comprises an intermediate tank A which is preferably of glass and in the form of a cylinder, a base tank B which is preferably metallic and serves as a stand or support for the apparatus and an upper tank or cap C which is superposed on the intermediate tank A. These upper, lower and intermediate tanks are so joined as to provide liquid-tight joints between them, and pillars or supports D serve to secure the several tanks together.

Obviously, any suitable number of pistons or rams may be used. In the present instance, a pair of rams F are employed which are fitted to reciprocate in a common cylinder E, the upper ends of the rams being provided with similarly formed forked ends G to cooperate with a pair of oppositely positioned crank pins H which are fixed to an operating gear I. A quadrant gear J cooperates with the gear I and is supported on a shaft K which is suitably journaled in the upper tank C. By the aforesaid construction, the rams and their operating mechanism are inclosed within the tanks A and C, the gear I being mounted on a shaft L which is supported by bearings M which depend into the middle tank A from the under side of the upper tank C, and the shaft K for the quadrant J is supported by bearings N formed within the upper tank C. Obviously, a rocking movement of the quadrant J will cause corresponding rotation of the gear I in reverse directions and in this manner the rams F will be reciprocated simultaneously and in reverse directions. Any suitable means may be connected to the shaft K to produce the necessary rocking movements. I prefer to employ a lever O which is keyed or otherwise fixed to the shaft K exteriorly of the tank C and also a second lever P which is fulcrumed to the exterior of the base tank B, a block Q being slidably mounted on one of these levers, the lever O in the present instance, while a similar block R is slidably mounted on the lever P, these two blocks having a swivel connection. The lower end of the lever P is provided with an eye P' to which a rod or other equivalent part may be connected whereby oscillatory movement may be imparted to this lever. Obviously, the rocking movements of the lever P will be communicated through the blocks Q and R to the lever O which in turn will rock the shaft K, and by



shifting the said blocks longitudinally of the respective levers, the arc through which the shaft K rotates may be varied and in this manner the length of the strokes of the rams  
 5 will also be regulated so that the amount of fluid delivered from the pump may be varied as desired.

The cylinder E carrying the rams depends into the interior of the base tank B and the  
 10 lower end of each ram chamber is provided with an inlet *r* which is controlled by a check or non-return valve *o*. Each ram chamber is also provided with a laterally extending outlet passage *m*. The outlet passage of each  
 15 ram chamber leads to a valve casing S which is mounted at the exterior of the base tank B, this valve casing being provided with an interior chamber *m'* which communicates with an outlet nozzle *t* which leads to a sight  
 20 glass or tube U, the latter connecting the valve casing S with a second valve casing W, the latter having an outlet *v* which leads into a check valve X. This check valve is provided with a discharge *p* which serves to de-  
 25 liver the liquid into a pipe *q* which in turn conducts the liquid to the point where it is to be used. The sight glass or tube U is usually filled with water so that the oil discharging from the nozzle *t* will rise in the form of  
 30 globules, and the amount of the oil or other fluid discharging through the nozzle *t* may be regulated by a valve T which is arranged within the valve casing S and is provided with a threaded stem *l* which may be manip-  
 35 ulated from the exterior of the said valve casing.

The outlet passage *m* leading from each ram chamber is also provided with a lateral or branch passage *m<sup>2</sup>* which communicates  
 40 with an upwardly extending by-passage tube *z*, the latter extending upwardly through the intermediate tank A and into the upper tank C and connecting with a relief valve Y which is located within said upper tank C. This  
 45 relief valve embodies a ball *a* which is normally held seated by means of a compression spring *b*, the by-passage *z* entering below the ball. An outlet *u* also leads from the relief valve casing at a point below the ball and  
 50 into a back pressure valve casing T', the latter having a valve T<sup>2</sup> which is held normally upon its seat by means of a spring T<sup>3</sup>. The passage *u* enters beneath the valve T<sup>2</sup> and an outlet tube *h* leads from this valve casing  
 55 above the valve T<sup>2</sup> and into the lower part of the check valve X at which point such fluid as may flow through the by-passage will enter the pipe *q*. The valve X serves essentially as a check or non-return valve for the  
 60 delivery pipe *q*. The valve T<sup>2</sup> is preferably so set as to remain closed while the delivery pipe *q* is open or unobstructed, but this valve will open to permit a flow of the fluid through the by-passage whenever the back pressure  
 65 in the delivery pipe *q* exceeds a given limit

in such cases for instance as when the sight glass is cut off by a closing of the valve T. The relief valve Y is set to open at a somewhat higher pressure than that required to open the valve T<sup>2</sup> so that should the delivery pipe  
 70 *q* be obstructed or entirely closed, the relief valve will then open and permit the liquid which is positively forced by the rams to discharge into the upper tank C from which it flows back through the intermediate tank A  
 75 and to the base tank B, thereby preventing such a pressure to be developed as might burst the sight glass.

Briefly described, the operation of the apparatus is as follows: On the descent of each  
 80 plunger F, the check valve *o* is closed and oil or other liquid is forced through the passage *m* and the nozzle *t* into the sight glass through which it rises to the casing W and then passes through the passage *v* and the  
 85 check valve X and thence to the delivery pipe *q*. By adjusting the valve T while the oil or other liquid rises in the tube U, the rate of flow may be varied as desired. Should the delivery pipe *q* be partially clogged so as  
 90 to retard the flow of the liquid therethrough, this liquid will then pass from the ram chamber up the by-passage *z*, through the bottom of the relief valve, through the back pressure valve T<sup>2</sup> and the discharge pipe *h* and thence  
 95 to the check valve X. Should the delivery pipe *q* be wholly stopped by reason of the closure of a stop or other valve therein or from other causes, the relief valve Y will then open, permitting the liquid which is posi-  
 100 tively forced by the rams to discharge into the upper tank C and thence return to the base tank B, bursting of the sight tube or glass U being thereby avoided.

It will be evident from what has been  
 105 stated that I provide a reservoir provided with an outlet, and means for filling said reservoir, in combination with a pump for drawing the contents of said reservoir and forcing the same through said outlet, together with  
 110 means for operating said pump comprising a rotatably mounted member such as a toothed gear connected with a piston or ram of said pump, an oscillating member such as a toothed segment continuously en-  
 115 gaging said rotatably mounted member, a rod connected to said oscillating member, and means for oscillating said rod whereby said rotatably mounted member is oscillated. The oscillating means in the present instance  
 120 comprises blocks suitably mounted on rods or levers, and any suitable means may be used for fixing one of the blocks on its rod or lever when it is desired to maintain a se-  
 125 lected adjustment. It will be apparent further that I provide a base reservoir and a main reservoir, the main reservoir being superposed on and communicating with the base reservoir by means of suitable perfora-  
 130 tions so that oil or other liquid can flow from



the main reservoir into the base reservoir. The pump to which I have referred has, as will be obvious, a valve controlled barrel or cylinder extending through the top of the base reservoir.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a lubricator, the combination with a reservoir provided with an outlet and means for filling said reservoir, of a pump for drawing the contents of said reservoir and forcing same through said outlet, and means for operating said pump, comprising a rotatably mounted member connected with the piston of said pump, an oscillating member continuously engaging said rotatably mounted member, a rod connected to said oscillating member, and means for oscillating said rod, whereby said rotatably mounted member is oscillated substantially as described.

2. In a lubricator, the combination with a reservoir provided with an outlet and means for filling said reservoir, of a pump for drawing the contents of said reservoir and forcing same through said outlet, and means for operating said pump, comprising a rotatably mounted member connected with the piston of said pump, an oscillating member in operative engagement with said rotatably mounted member, a rod connected to said oscillating member, a pivoted operating rod, and a pivotal connection between said rods, substantially as described.

3. In a lubricator, the combination with a reservoir provided with an outlet and means for filling said reservoir, of a pump for drawing the contents of said reservoir and forcing same through said outlet, and means for operating said pump, comprising a rotatably mounted member connected with the piston of said pump, an oscillating member in operative engagement with said rotatably mounted member, a rod connected to said oscillating member, a pivoted operating rod, and a pivotal connection between said rods, comprising blocks slidably mounted on said rods, one of said blocks being provided with a pivot pin and the other with a socket in operative engagement therewith, substantially as described.

4. In a lubricator, the combination with a reservoir provided with an outlet and means for filling said reservoir, of a pump for drawing the contents of said reservoir and forcing same through said outlet, and means for operating said pump, comprising a rotatably mounted member connected with the piston of said pump, an oscillating member in operative engagement with said rotatably mounted member, a rod connected to said oscillating member, a pivoted operating rod, and a pivotal connection between said rods, comprising blocks slidably mounted on said

rods, one of said blocks being provided with a pivot pin and the other with a socket in operative engagement, substantially as described.

5. In a lubricator, the combination with a reservoir provided with a plurality of outlets and means for filling said reservoir, of a plurality of pumps coöperating to draw the contents from said reservoir and force same through said outlets, and means for operating said pumps, comprising a rotatably mounted member, a pin and slot connection between said rotatably mounted member and each of said pistons, and an automatically oscillated plate in operative engagement with said rotatably mounted member, whereby said rotatably mounted member is oscillated substantially as described.

6. In a lubricator, the combination with a base reservoir, and a main reservoir superposed on and communicating with same, said base reservoir being provided with a top forming the bottom of said main reservoir and said top having a conduit therein forming an outlet for said base reservoir, of a pump having a valve controlled barrel projecting through said top into said base reservoir and forming a communication between said base reservoir and conduit, and an automatically operated plunger for said pump, substantially as described.

7. In a lubricator, the combination with the base reservoir and a main reservoir superposed thereon, said base reservoir being provided with a top forming the bottom of said main reservoir and said top having apertures therethrough forming a communication between said reservoirs, and also being provided with a plurality of conduits formed therein, comprising outlets for said base reservoir, of a plurality of pumps, having valve controlled barrels projecting through said top into said base reservoir and forming communicating passages between said base reservoir and said conduits, plungers for said pumps, and means for automatically operating said plungers, substantially as described.

8. In a lubricator, the combination with a base reservoir provided with a top having outlet conduits bored therein and openings through said top, of a cylinder seated liquid tight on said top, a hollow cover seated liquid tight on the top of said cylinder and provided with apertures through its bottom, an upright solid member disposed in said reservoir and said cylinder and provided with valve controlled bores therethrough forming pump barrels communicating with said conduits, plungers contained within said cylinder operating in said barrels for drawing the liquid from said base reservoirs and forcing same through said outlet conduits, and means for automatically operating said pumps, substantially as described.

9. The combination of a tank, a pump



connected with the tank, means for operating the pump to cause the same to draw liquid from the tank, main and by passages both leading from the pump and meeting in a common delivery pipe, each for conducting liquid from the pump, and a relief valve in coöperative relation with one of the passages, said tank being arranged to receive liquid from the relief valve when the latter is opened.

10. A force feed lubricator comprising a supply tank, a pump connected thereto, a delivery pipe for conducting the lubricant to a suitable point for use, a main passage connecting the discharge of the pump and said delivery pipe, and a by-passage also connecting the discharge of the pump and said delivery pipe, and a relief valve connected in the by-passage.

20 11. A force feed lubricator comprising a supply tank, a pump connected thereto, a sight feed tube connected to the discharge of said pump and to the delivery pipe, a by-passage pipe also connecting the discharge of

said pump and the said delivery pipe, and a relief valve connected in the by-passage pipe.

12. A force feed lubricator comprising a base tank and a supplemental tank superposed thereon, a pump having an inlet communicating with the base tank, a sight feed tube arranged at the side of the base and supplemental tanks and connected to receive fluid from said pump, a by-passage pipe also leading from the discharge of said pump and into the superposed tank, a relief valve connected in the by-passage pipe and adapted when opened to deliver the lubricant into the superposed tank, and a delivery pipe connected to the outlets of both the sight feed tube and the by-passage pipe.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT WOOD.

Witnesses:

EDMUND CHADWICK,  
JAS. STEWART BROADFOOT.