No. 695,288. Patented Mar. 11, 1902.

J. J. DELANEY.

PUMPING ENGINE.

(Application filed Apr. 8, 1901.)

(No Model.) 4 Sheets—Sheet 1.

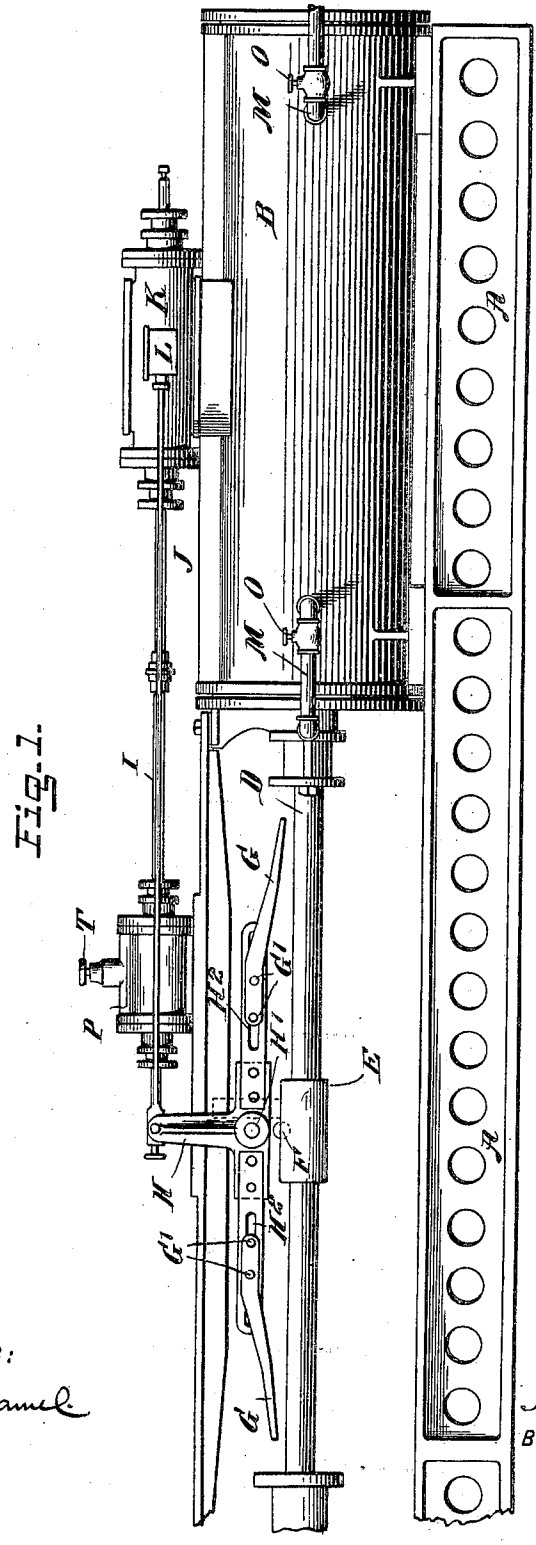

Fig. 1.

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John Lotka

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James J. Delaney

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4 Sheets—Sheet 2.

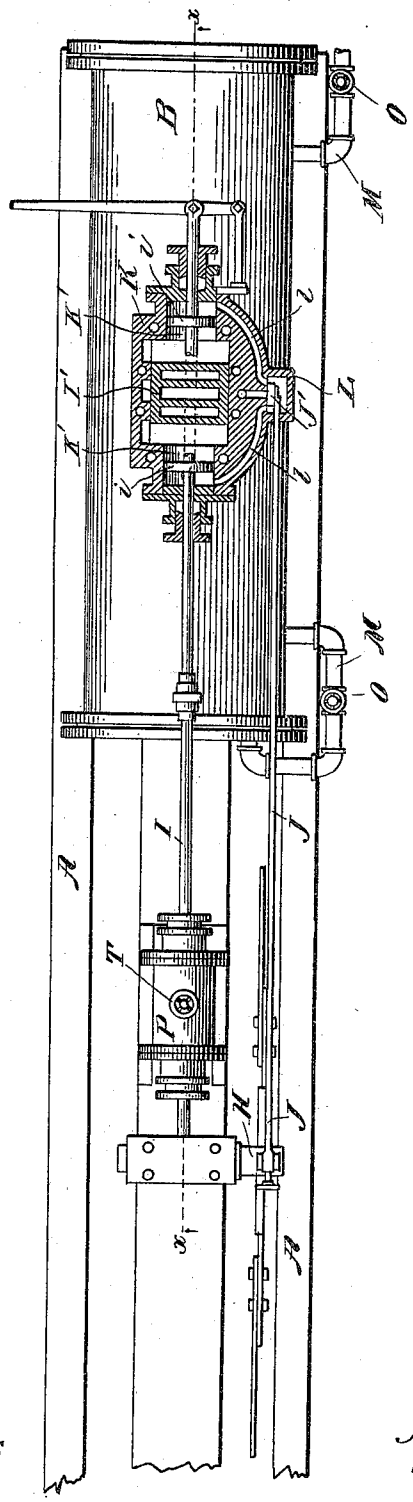

Fig. 2.

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Fig. 3.

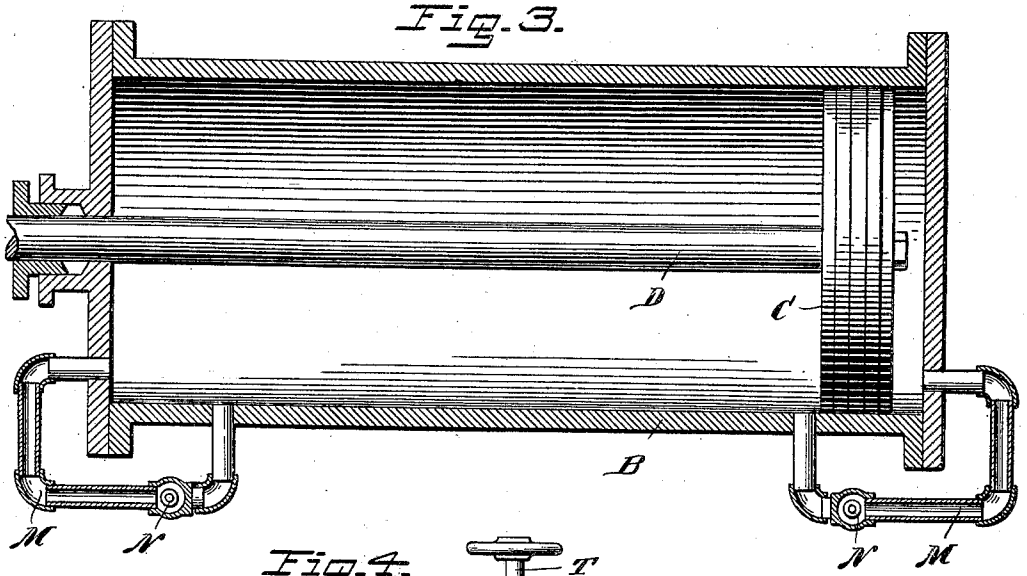


Fig. 4.

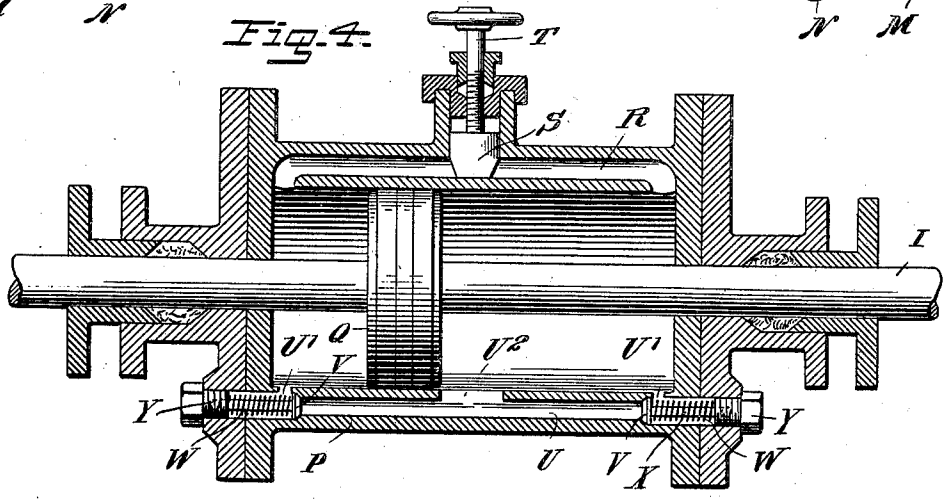
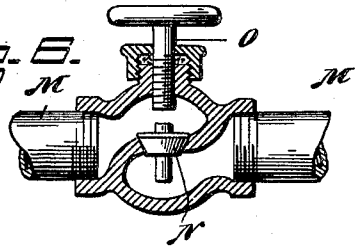


Fig. 5.

Fig. 6.



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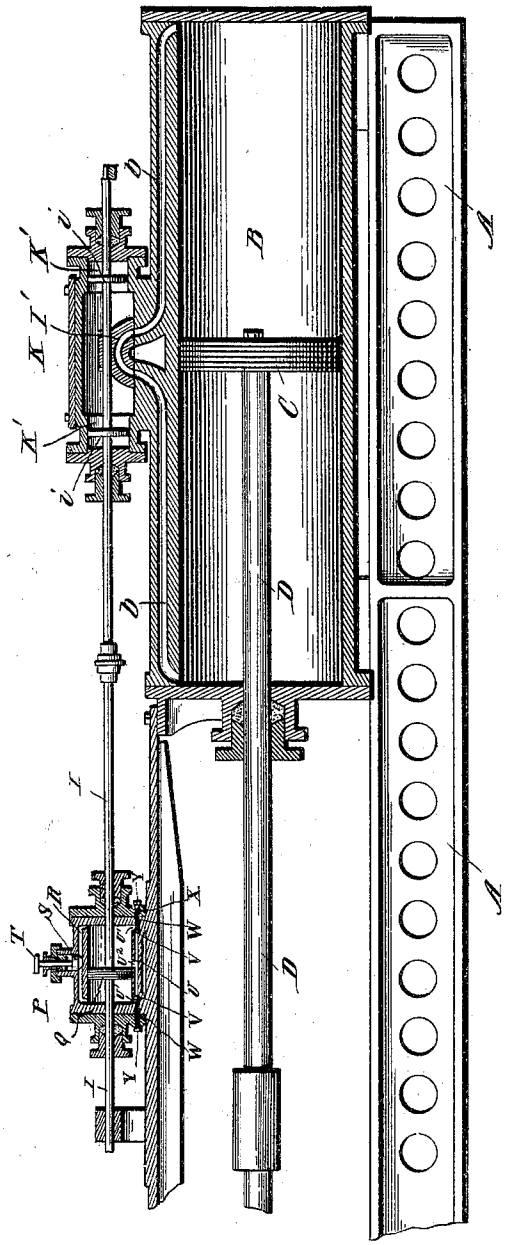
(No Model.) 4 Sheets—Sheet 4.

Fig. 7.



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ATTORNEYS

UNITED STATES PATENT OFFICE.

JAMES J. DELANEY, OF SHAMOKIN, PENNSYLVANIA.

PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 695,288, dated March 11, 1902.

Application filed April 8, 1901. Serial No. 54,846. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. DELANEY, a citizen of the United States, and a resident of Shamokin, in the county of Northumberland and State of Pennsylvania, have invented a new and Improved Pumping-Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a simple and efficient steam pumping-engine which will have but few wearing parts and will be capable of a high piston speed without lost motion.

The invention will be fully described hereinafter and the features of novelty pointed out in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the complete engine. Fig. 2 is a plan of the engine with parts in section. Fig. 3 is a sectional plan of the steam-cylinder. Fig. 4 is a longitudinal elevation of the oil-cylinder or check-cylinder for the valve-rod. Fig. 5 is a detail view of one of the arms attached to the rocker which operates the valve-rod. Fig. 6 is a detail sectional elevation of a check-valve forming part of the engine, and Fig. 7 is a vertical longitudinal section on the line xx of Fig. 2.

The engine comprises a frame or base A, on which is supported the steam-cylinder B, containing the reciprocating piston C. The piston-rod D has a block or cross-head E. The latter carries a steel roller F, adapted to engage alternately arms G, secured adjustably to the rocker H, fulcrumed at H'. The arms G have fastening-screws G', movable in slots H^2 in the rocker, so that the arms can be set at different distances from each other. The rocker H is connected pivotally with the supplementary-valve rod J. The slide-valve, located in the casing K, and the supplementary valve, located in the chamber L and operated by the supplementary-valve rod J, are of any approved construction, and the drawings illustrate the construction employed in the Allison pump. This being well known, I do not deem it necessary to furnish a detailed description of the parts.

As shown, I' represents the main slide-valve, and b b the ports leading from the casing or steam-chest K to the ends of the cylinder B to conduct the live steam back of the piston.

K' K' are auxiliary steam-cylinders connected with the steam-chest K, the main valve-rod I being provided with pistons i i, working in said cylinders. The steam-chamber L communicates with the auxiliary cylinders K' K' through the ports l l, and J' is the supplementary valve in said chamber, connected with the rod J.

At the end of the main cylinder is located a channel M, which might be formed directly in the cylinder-wall or may consist of a pipe, as shown. One end of each channel is in the cylinder-head or immediately adjacent thereto, while the other end is in the side wall of the cylinder at a distance from the head greater than the thickness of the piston. This channel or passage contains a check-valve N, and the extent to which this valve may open is capable of regulation by means of a stop-screw O. The valve opens toward the outer end of the passage M.

The valve-rod I passes through the check-cylinder P, filled with oil or other suitable liquid and containing a piston Q. This cylinder has two passages connecting its ends. One of the passages R has a centrally-located throttle-valve S, capable of adjustment by means of the screw T. The other channel or passage U has two orifices U', communicating with the cylinder at the ends thereof, and a central opening U^2, the length of which is preferably less than the width of the piston Q, so that the latter may cover said opening entirely. The connection of the central portion of the passage with the orifices U' is controlled by check-valves V, pressed inward against their seats by springs W, coiled on the stems X of the valves. These stems have a sliding engagement with screw-plugs Y, against which the outer ends of the springs bear. By screwing the plugs in or out the tension of the springs W can be regulated. By removing the plugs ready access is gained to the valves V and their seats. The passages R U instead of being formed in the side walls of the cylinder P might be constituted by pipes.

The operation of the engine will be readily

understood. In the main cylinder B the piston C moving, for instance, to the right will upon passing beyond the inner end of the channel M at the right-hand end of the cylinder (this being the position shown in Fig. 3) allow steam to pass through the said channel M to the right-hand end of the cylinder, the check-valve N opening as much as the stop-screw O will allow. The flow of steam through the passage may thus be regulated. The steam so admitted to the right-hand end of the cylinder cushions the piston at the end of its stroke and reduces jars. As the action of the check-valve can be regulated, the cushioning effect may be increased or lessened, according to the speed of the pump driven by the piston-rod D. As the pressure in the right-hand chamber of the cylinder increases the check-valve N will close, this being about simultaneous with the opening of the exhaust-port and of the inlet-port, so that the live steam cannot pass through the pipe or channel M into the wrong chamber of the cylinder. As the piston reciprocates the roller F on the cross-head E will alternately engage the arms G and throw the rocker H first one way and then the other. The valve-rods I and J will thus receive an intermittent reciprocating motion. By adjusting the arms G toward or from each other the timing of the valve movement may be varied, and when the pump is operated at a very high rate of speed it is advisable to set the arms G closer together than when a comparatively slow speed is employed. As the piston Q reciprocates in the oil-cylinder or cataract P it first moves quickly, as the oil offers but little resistance, since the oil in the right-hand chamber can pass through the central opening U^2, channel U, the left-hand check-valve V, and the adjacent orifice U′ to the left-hand chamber of the cylinder. As soon, however, as the piston reaches the right-hand edge of the opening U^2 the oil can no longer flow through the passage U from one side of the piston to the other, but is compelled to pass through the channel R, its flow therein being governed by the position of the throttle-valve S. Thus the motion of the piston and of the slide-valve connected therewith will first be rapid, insuring a quick closing of the steam-inlet port, and then slower, allowing time for expansion. As the slide-valve also controls the exhaust-port of the main cylinder B, the action of the cataract-piston Q brings about a closing of the exhaust-port at about the time the right-hand end of the piston C reaches the right-hand edge of the inner orifice of the passage M at the right-hand end of the cylinder B, thus preventing the escape of steam from said end and bringing about the formation of the steam-cushion hereinbefore referred to. The same action of course takes place during the leftward stroke.

I have ascertained by actual trials that the adoption of my improved valve-gear increases the speed of the piston C to such an extent as to augment the capacity of the pump fully fifty per cent. over what the same pump can effect without my improvements.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In an engine, a cylinder, a piston held to reciprocate therein, tubes or channels located at each end of the cylinder and communicating therewith at the ends of the cylinder and at points located at a distance from the cylinder-heads greater than the thickness of the piston, a check-valve in each channel and opening toward the outer end thereof to permit the steam to pass from the working end of the cylinder to the dead end to form a cushion, the check-valve closing on increase of pressure thereby preventing live steam passing through the pipe or channel to the other side of the piston on the opening of the inlet-port, and an adjustable stop for limiting the opening movement of the valve, to regulate the flow of steam from the working end of the cylinder to the dead end to increase or lessen the cushioning effect.

2. In an engine, a cylinder, a piston held to reciprocate therein, tubes or channels located at each end of the cylinder and communicating therewith at points situated at different distances from the cylinder end, to admit steam in the end of the cylinder to cushion the piston at the end of the stroke, a steam-chest, a slide-valve controlling the exhaust and inlet ports of the cylinder, and a cataract-cylinder for regulating the movement of of the slide-valve to close the exhaust-port at the proper time to form the steam-cushion at the end of the cylinder.

3. In an engine, a cylinder, a piston therein, a piston-rod provided with a block or cross-head, a roller carried by said block, a steam-chest, a main valve therein, a rocker, valve-operating means controlled by the movement of the rocker, and arms adjustable on the rocker toward and from each other and adapted to be engaged alternately by the roller on said block, the said arms having inclined working faces and end extensions at an angle to the working faces.

4. In an engine, a cylinder, a piston reciprocating therein, a piston-rod carrying a projection, a rocker having slots extending lengthwise of the piston-rod, arms adjustable in said slots toward and from each other to regulate the stroke, the said arms being adapted to be moved alternately by the projection on the piston-rod, fastening-screws extending through the slots in the rocker for securing the arms in the adjusted position, a steam-chest, a valve therein, and valve-operating means controlled by the movement of the rocker.

5. In an engine, the combination with the main cylinder, piston, and piston-rod, the steam-chest, the valve therein, and the valve-rod, of a cataract-cylinder through which passes said valve-rod, a piston secured to the

valve-rod within said cylinder, two channels or passages each connecting one end of the cataract-cylinder with the other, one of said channels having two end orifices and a central opening in the path of the piston, and outwardly-opening check-valves located in said channel between the central opening and the end orifices.

6. In an engine, the combination with the main cylinder, piston and piston-rod, the steam-chest, the valve therein, and the valve-rod, of a cataract-cylinder through which passes said valve-rod, a piston secured to the valve-rod within said cylinder, two channels or passages each connecting one end of the cataract-cylinder with the other, one of said channels having two end orifices and a central opening in the path of the piston, outwardly-opening check-valves located in said channel between the central opening and the end orifices, and an adjustable throttle-valve in the other channel.

7. In an engine, the combination with the main cylinder, piston and piston-rod, the steam-chest, the main valve, the cylinders connected with the steam-chest, the pistons on the valve-rod and working in said cylinders, and means for controlling the passage of steam to the said cylinders, of a cataract-cylinder through which passes said valve-rod, and a piston secured to the valve-rod, within said cylinder, the cataract-cylinder being provided with two channels or passages each connecting one end of the cylinder with the other, one of said channels having two end orifices and a central opening in the path of the piston.

8. In an engine, the combination with the main cylinder, piston and piston-rod, the steam-chest, the main slide-valve, the cylinders connected with the ends of the steam-chest, the valve-rod provided with pistons working in the said cylinders, the steam-chamber connected with the steam-chest, and with the said cylinders, the supplementary valve in said chamber, and means for imparting motion to the supplementary valve, of a cataract-cylinder through which passes the main-valve rod, a piston secured to the valve-rod within the cataract-cylinder, the said cataract-cylinder being provided with two channels or passages each connecting one end of the cylinder with the other, one of said channels having two end orifices and a central opening in the path of the piston, and outwardly-opening spring-controlled check-valves in said channel between the central opening and the end orifices.

9. In an engine, the combination with the main cylinder, piston and piston-rod, the steam-chest, the main slide-valve, the valve-rod, and means for reciprocating the same, of a cataract-cylinder through which passes the valve-rod, a piston secured to the valve-rod within said cataract-cylinder, the said cataract-cylinder being provided with two channels or passages each connecting one end of the cylinder with the other, one of said channels having two end orifices and a central opening in the path of the piston, the length of said central opening being less than the width of the piston, outwardly-opening spring-controlled check-valves located in said channel between the central opening and the end orifices, and an adjustable throttle-valve located centrally in the other channel.

10. In an engine, the combination with the cylinder, piston, and piston-rod, the steam-chest, the main valve and valve-rod, the supplementary valve and valve-rod, the rocker connected with the supplementary-valve rod, means for moving the rocker from the piston-rod, and means controlled by the supplementary valve for operating the main valve, of a cataract-cylinder through which the main-valve rod passes, and a piston secured to said valve-rod within the cataract-cylinder, the cataract-cylinder being provided with two channels or passages each connecting one end of the cylinder with the other, one of said channels having two end orifices and a central opening in the path of the piston.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES J. DELANEY.

Witnesses:

JOHN REAGAN,

JOHN M. COATES.