(No Model.)

J. A. TOWLER.

VALVE GEAR FOR PUMPING ENGINES.

No. 588,508. Patented Aug. 17, 1897.

Fig. 1.

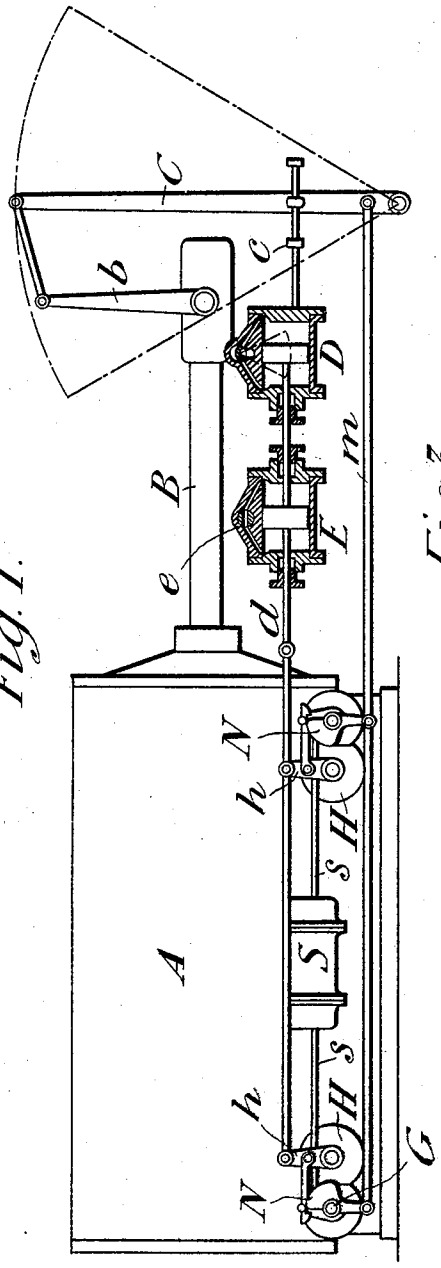


Fig. 4.

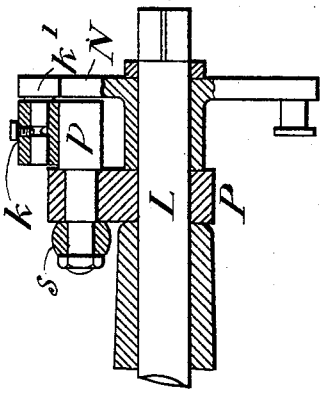


Fig. 3.

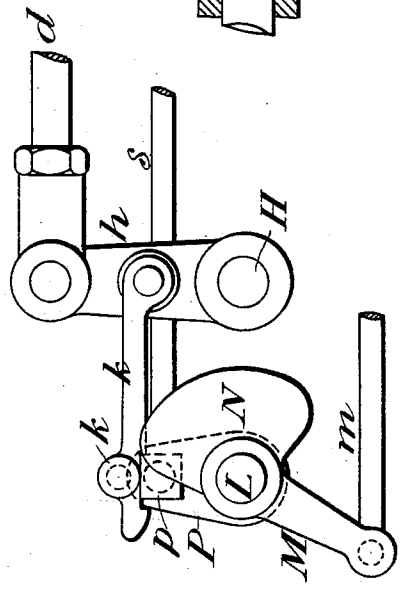
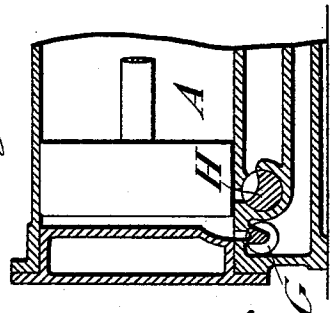


Fig. 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

JAMES ALFRED TOWLER, OF LEEDS, ENGLAND.

VALVE-GEAR FOR PUMPING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 588,508, dated August 17, 1897.

Application filed May 12, 1897. Serial No. 636,250. (No model.)

To all whom it may concern:

Be it known that I, JAMES ALFRED TOWLER, a citizen of England, residing at 1 Cromer Road, Leeds, in the county of York, England, have invented certain new and useful Improvements in Valve-Gear for Pumping-Engines Driven by Steam or Compressed Air, of which the following is a specification.

My invention relates to valve-gear for pumping-engines driven by steam or compressed air, having the valves of the main cylinder actuated from a subsidiary cylinder which has its distribution valve or valves operated from the piston of the main cylinder.

The chief object of my invention is the application of gear, hereinafter described, to the actuation of valves for the main cylinder of the Corliss kind with provision of trip-gear for rapid closing of the supply-valves and an arrangement of the exhaust-valves, so as to provide adequate cushion in the main cylinder.

I shall describe valve-gear according to my invention, referring to the accompanying drawings.

Figure 1 is a side view of the main cylinder and valve-gear with section of the subsidiary and cataract cylinders. Fig. 2 is a part longitudinal section at one end of the main cylinder. Figs. 3 and 4 show, to an enlarged scale, a front view and section of the trip-gear for the rear supply-valve.

A is the main cylinder; B, its piston-rod, which has an arm *b* linked to a lever C. A rod *c*, having on it tappets when they are acted on by a tappet on the lever C, moves the distribution-valve of the subsidiary cylinder D, the piston of which is rigidly connected to the piston of the cataract-cylinder E, the movement of this piston being controlled in the usual way by adjusting its by-pass valve *e*. The rod *d* of the pistons of D and E is jointed to arms *h*, fixed on the spindles H of the exhaust-valves, and on these arms are pivoted catches *k*, adapted to engage square pins *p*, projecting from arms P, which are fixed on the spindles L of the steam-valves and are linked by rods *s* to springs or pistons subject to pressure in the casing S. On the spindles L are fitted, free to turn, arms M, which are linked by a rod *m* to the lever C near its fulcrum, and the arms M are partly formed as cams N, which move under a roller *k'*, mounted on the catches *k*.

The steam-valves G govern ports which are at the ends of the cylinders, and the exhaust-valves H govern ports at some distance from the ends, so that the piston as it approaches the ends of its stroke passes over and closes these ports, thus cushioning the steam between them and the ends of the cylinder.

The gear described operates as follows: The main piston in making its stroke in one direction moves the lever C, and its tappet, acting on one of the tappets on the rod *c*, moves the valve of the subsidiary cylinder D, so that its piston moves the arms *h*, by which the one exhaust-valve of the main cylinder is opened and the other exhaust-valve is closed; also, one of the catches *k* becoming engaged with the pin *p* of the trip-gear one of the steam-valves is opened, causing the main piston to make its return stroke. The rod *m* then moves back the arm M and brings the cam N round to act upon the roller *k'*, so as to raise the catch *k* and release the lever P, which, urged by the springs or by the pressure in the casing S, immediately closes the steam-valve, the main piston thereupon being caused to continue its stroke by the pressure of the steam expanding in the cylinder.

I have shown a cataract-cylinder E containing liquid to control the movement of the subsidiary piston in D, making that movement the more slow and gradual the more the by-pass by the valve *e* is throttled. This is necessary only when the subsidiary cylinder D is supplied with steam or other elastic fluid under pressure. In cases where it is supplied with water or other liquid under pressure the cataract-cylinder E is dispensed with, the regulation of speed being effected by adjustment of the supply or distribution valve of the cylinder D.

Having thus described the nature of this invention and the best means I know for carrying the same into practical effect, I claim—

1. In valve-gear for a pumping-engine the combination of a lever linked to the main piston and connected through tappets to the distribution-valve of a subsidiary cylinder, the piston-rod of which is connected to arms fixed on the exhaust-valve spindles, these arms hav-

ing trip-catches adapted to engage pins on the arms of the supply-valve spindles and carrying rollers over reciprocating cams connected to the lever linked to the main piston, substantially as described.

2. In the valve-gear of a pumping-engine the combination of an arm fixed on the exhaust-valve spindle connected to the subsidiary piston and carrying a pivoted trip-catch and roller, a cam loose on the supply-valve spindle and connected to the lever which is linked to the main piston, a lever or arm fixed on the supply-valve spindle having a pin adapted to be engaged by the trip-catch, and connected to a spring or piston subject to fluid-pressure adapted to close the valve, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 29th day of April, A. D. 1897.

JAMES ALFRED TOWLER.

Witnesses:
JOHN H. WHITAKER,
ALFRED BROWN.