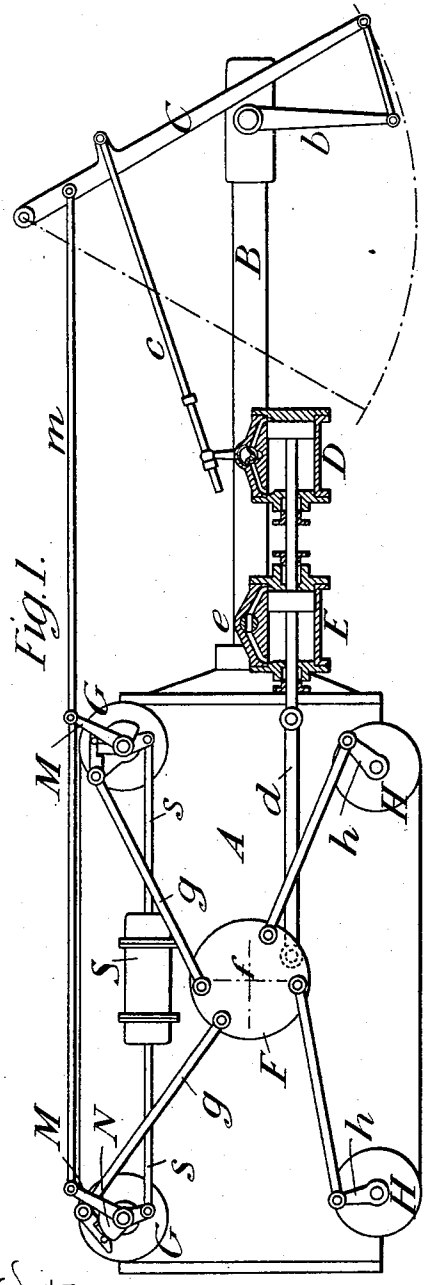
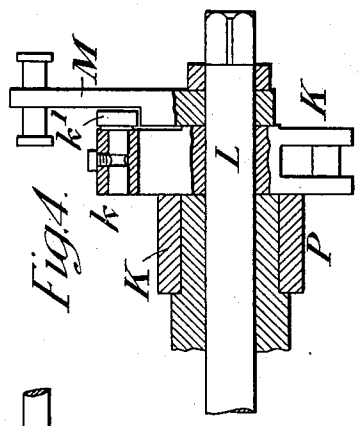
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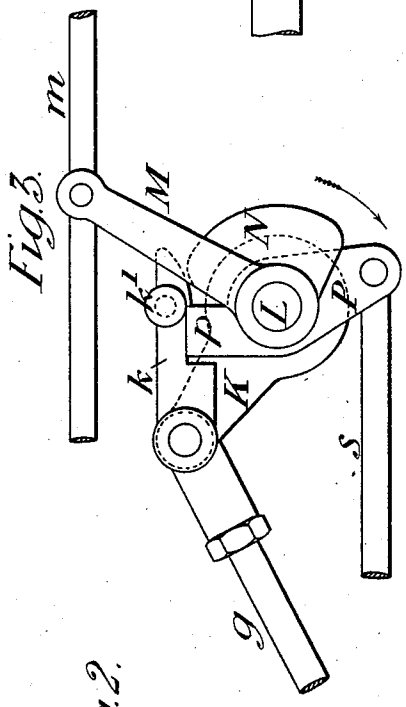
J. A. TOWLER.

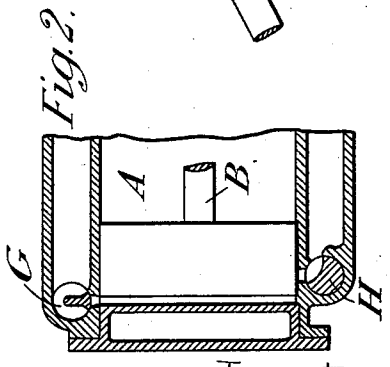
VALVE GEAR FOR PUMPING ENGINES.

No. 588,842. Patented Aug. 24, 1897.









Witnesses
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES ALFRED TOWLER, OF LEEDS, ENGLAND.

VALVE-GEAR FOR PUMPING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 588,842, dated August 24, 1897.

Application filed February 6, 1897. Serial No. 622,354. (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 front supply-valves.

In all the figures like parts are denoted by similar reference-letters.

Referring first to Figs. 1 to 4, inclusive, A is the main cylinder; B, its piston-rod, which has an arm *b* linked to a lever C. To this lever is jointed a rod *c*, having on it tappets which move 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 of the pistons of D and E is linked by a connecting-rod *d* to a crank-pin on a wrist-plate F, which is pivoted at *f* to the main cylinder A or to the engine-frame at the side of the cylinder.

On the wrist-plate F are four crank-pins, linked, respectively, to the arms which work the supply and exhanst valves. These are of Corliss form, the two supply-valves G on the one side of the cylinder governing ports close to the ends of the cylinder, and the two exhaust-valves H on the other side governing ports which are at some distance from the ends of the cylinder, so that the piston passes over them and so determines cushions as it approaches the ends of its stroke. The exhaust-valves H are worked by simple crank-arms *h*, but the supply-valves G are worked by trip action, which is of the following description: Each of the links *g* from the two upper crank-pins of the wrist-plate is jointed to an arm K, which is loose on the valve-spindle L and has jointed on it a catch *k*, having a roller *k'* mounted on its side.

To the lever C is jointed a rod *m*, which is jointed to an arm M, also loose on the valve-spindle L and having a cam N adjustably fixed on its side.

On the valve-spindle is fixed a lever P, which presents a square shoulder *p* to be engaged by the hook of the catch *k*, and which is connected by a rod *s* to a spring or a piston under pressure in a casing S, this spring or piston always tending to move the arm P in the direction of the arrow.

This gear operates in the following manner: The main piston in making its forward stroke, by means of one of the tappets on the rod *c*, moves the valve *d* of the subsidiary cylinder D, so that its piston moves the wrist-plate F to the position shown in Fig. 1, by which motion the back exhaust-valve of the main cylinder is opened, the front exhaust-valve is closed, and the catch *k* being engaged with the shoulder *p* of the front trip-gear the front steam-valve is opened, causing the main piston to make its back 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 spring or pressure in S, immediately closes the front steam-valve, the main piston thereupon being propelled backward by the pressure of the steam expanding in front of it. During the return stroke of the main piston the valve of the cylinder D is moved, so that the motion of the wrist-plate is reversed, and the main cylinder-valves are operated so as to exhaust from the front and supply steam behind.

I have shown a cataract cylinder E con-

taining 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 is dispensed with, the regulation of speed being effected by adjustment of the distribution-valve of the cylinder D.

I claim—

1. In valve-gear for a pumping-engine the combination of a lever moved by the main piston and working by tappets the distribution-valve of a subsidiary cylinder, the piston-rod of which moves a wrist-plate having crank-pins linked to the arms of the exhaust-valve spindles both at the one side of the cylinder and to trip-arms which engage the arms of the supply-valve spindles both at the other side of the cylinder and are disengaged by the movement of the lever above mentioned, substantially as described.

2. In a trip valve-gear, the combination of a main cylinder and piston, a valve-spindle, an arm loose on the valve-spindle, and provided with a pivoted catch and roller, a cam also loose on the valve-spindle, a subsidiary piston, by which the loose arm is moved, a main lever worked by the main piston, and connected with said cam, and a lever or arm fixed on the valve-spindle, and having a shoulder engaged by the pivoted catch, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 19th day of January, A. D. 1897.

JAMES ALFRED TOWLER.

Witnesses:

WM. A. BAINES,

WM. G. CHAMBERS.