

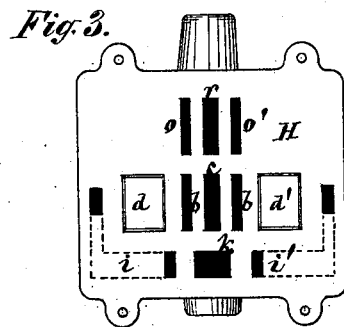
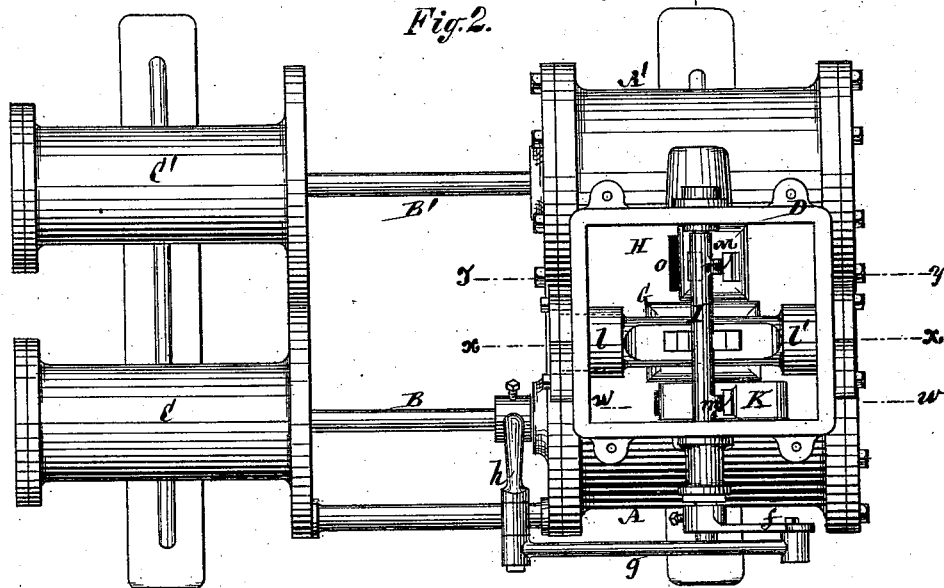
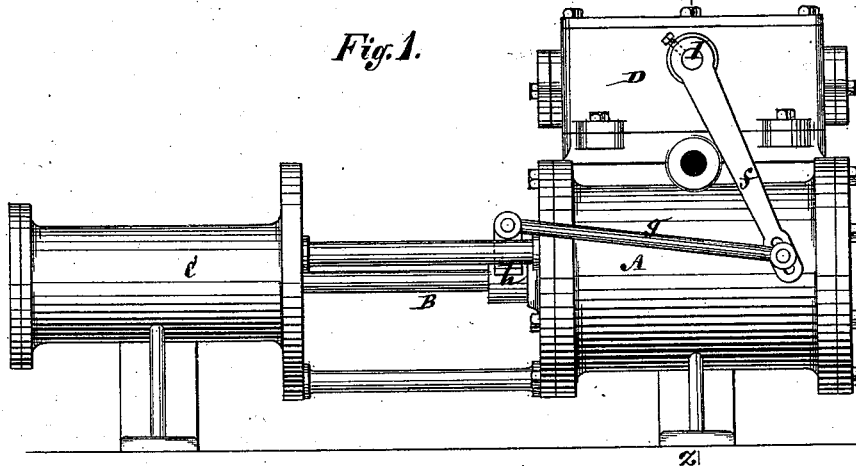
W. H. GUILD, Jr.

2 Sheets—Sheet 1.

Valve Action of Duplex Engines and Pumps.

No. 206,558.

Patented July 30, 1878.



Witnesses:

*Henry Cichling.
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Inventor:

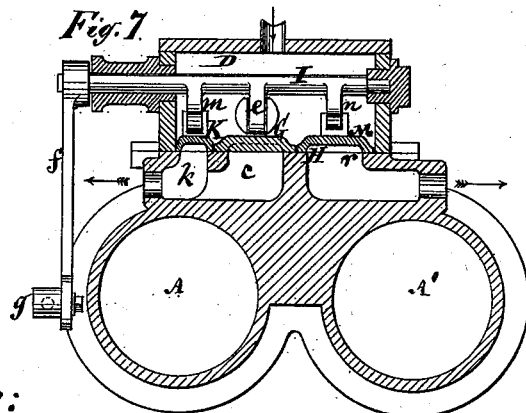
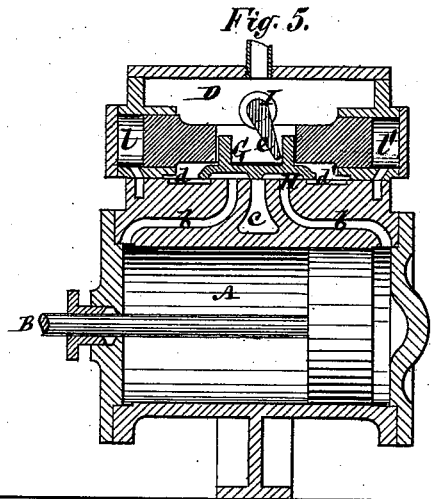
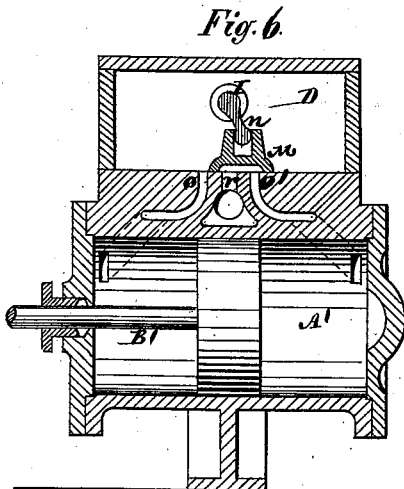
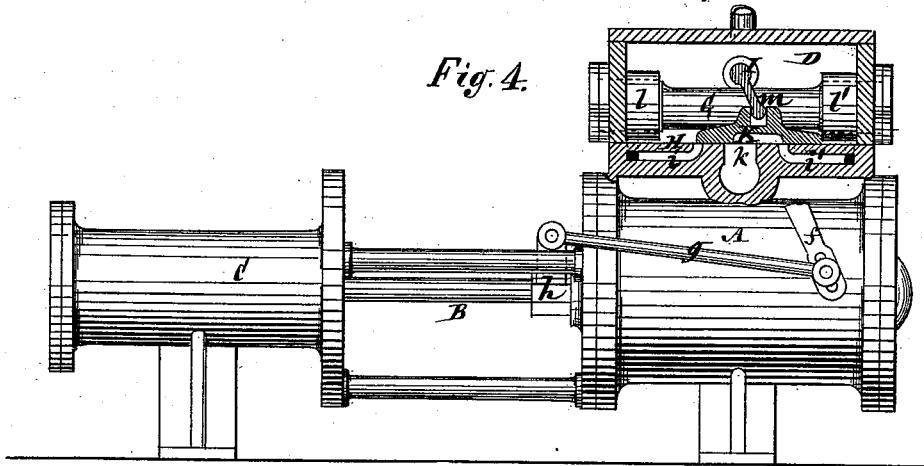
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UNITED STATES PATENT OFFICE.

WILLIAM H. GUILD, JR., OF BROOKLYN, NEW YORK.

IMPROVEMENT IN VALVE-ACTIONS OF DUPLEX ENGINES AND PUMPS.

Specification forming part of Letters Patent No. **206,558**, dated July 30, 1878; application filed January 12, 1878.

To all whom it may concern:

Be it known that I, WILLIAM H. GUILD, Jr., of the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Valve-Actions of Duplex Direct-Acting Engines and Pumps, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to duplex direct-acting engines for pumping and other purposes in which the pistons of said engines operate to keep up a continuous action, and are set to move in relation with each other so that when one of said pistons is at half-stroke or thereabout the other of said pistons has completed its stroke.

The object of the invention is to provide for the automatic action of the valves which respectively control said engines in a simpler or more perfect manner than has been done by causing each engine to actuate the inlet and outlet valves which govern the motive power of the other engine, as in previous arrangements or combinations.

The invention generally consists in a combination of two direct-acting engines for action in concert and in relation with each other, as hereinbefore referred to, and valves connected therewith, organized so that one of said engines actuates the inlet and outlet valves which govern the motive power of both engines, and insures a full or active operation of either engine while the other one is changing its motion.

Although steam will hereinafter be referred to as the motive power employed to drive the engines, any other suitable propelling gas or fluid may be used.

In the accompanying drawings, Figure 1 represents a side elevation of a horizontal duplex direct-acting pumping-engine or steam-pump having my invention applied. Fig. 2 is a plan of the same, with the valve-chest cover removed; and Fig. 3, a top view of the valve-seat within the chest, showing the several ports or passages which the valves of the two engines serve to control. Fig. 4 is a vertical longitudinal section mainly on the line *w w*;

Fig. 5, a similar section, in part, mainly on the line *x x*; Fig. 6, a further similar section, in part, mainly on the line *y y*; and Fig. 7, a transverse vertical section on the line *z z*.

A A' represent the two steam-cylinders of a duplex direct-acting steam-pump, arranged to occupy a horizontal position; B B', the piston-rods of said two cylinders or engines to which they belong. D is a steam or valve chest common to both engines, and C C' the pumping-cylinders.

The pistons of either engine—that is, of the cylinder A and its pumping-cylinder C, or of the cylinder A' and its pumping-cylinder C'—are set and operated in relation with each other so that when the pistons of one of said engines are at half-stroke the pistons of the other of said engines are at the end of their stroke, as in other duplex direct-acting pumping-engines, and for the same purpose, viz, of keeping up a continuous action and avoiding concussion or shock.

The engine of which A is the working-cylinder, and which will here, for the convenience of description, be designated as the engine A, while the engine of which A' is the working-cylinder will be designated as the engine A', has the motion of its piston controlled by a main valve, G, which may be of a B-construction, and serves to control the terminal passages *b b'* and an intermediate exhaust-passage, *c*, to conduct the steam alternately to and to pass it off alternately from opposite ends of the engine-cylinder, according to the direction in which said valve is moved, and the cavities in it are brought in covered or uncovered relation with receiving and discharging recesses *d d'* in the valve-seat H. This valve G may be operated in part directly by the engine A, which it controls—as, for instance, by a vibrating tappet, *e*, on a rock-shaft, I, operated by a lever, *f*, and connecting-rod *g*, from or by a cross head or arm, *h*, attached to the piston-rod B of the engine, and in part—that is, to complete its throw—by an auxiliary valve, K, which controls opposite terminal passages *i i'* and an intermediate exhaust-passage, *k*, in the valve-seat H, said terminal passages communicating with oppositely-arranged cylindrical chambers *l l'*,

in which the ends of the valve G move as pistons. Said auxiliary valve K is operated continuously by a tappet, *m*, on the rock-shaft I.

These valves G and K are pitched or set to operate in relation with each other and with the engine-piston which they control as follows: When the main valve G, as actuated by the piston-rod B, nearly reaches its central position in one direction, as shown in Fig. 5, and is nearly closed, the auxiliary valve K opens and lets on steam to that one of the cylindrical chambers *l* or *l'* which will be the working one, to complete the throw of the valve G, and so complete the movement of the engine-piston in the direction in which it was traveling, the opposite end of the valve G to that thus receiving a propelling pressure being simultaneously exposed to the exhaust. This action of the valves G and K takes place alternately in reverse directions during the travel of the engine in opposite courses, or accordingly as it is required to admit steam to and exhaust-steam from opposite ends alternately of the cylinder of the engine, the main valve G being almost entirely closed before letting on steam to the auxiliary valve, and the main valve moving to shut off steam at about half the stroke of the engine-piston in either direction, thereby working the steam expansively for the balance of the stroke, as in other combined auxiliary and main valves for direct-acting engines.

In some cases the main valve G need not be operated in part by the piston-rod B of the engine, but may depend for its entire throw upon the auxiliary valve K; but it is preferred to limit the action of the latter to completing the throw of the main valve, and to construct the auxiliary valve with lap on its exhaust and lead on its steam side.

The same piston-rod B that thus operates the auxiliary valve K, and preferably in part also the main valve G, controls likewise the main

valve M of the cylinder or engine A'—as, for instance, through the rock-shaft I and a tappet, *n*—said valve, which may be an ordinary D one, controlling terminal passages *o* *o'* and an intermediate exhaust-passage, *r*, the terminal passages connecting respectively with opposite ends of the cylinder of said engine. Thus the one engine actuates the valves which control the motion of both engines, the pistons of which are simultaneously at different positions in their respective strokes.

The mere arrangement or construction of the valve-gear and valves here shown is not absolutely essential, and may be variously changed; and the valves may be worked from a rock-shaft on the outside of the valve-chest, instead of from the inside thereof.

I claim—

1. The combination, with two direct-acting engines the pistons of which are simultaneously at different positions in their respective strokes, of induction and eduction valves, the movements of all of which are produced or controlled by the reciprocating motion of the piston of one of said engines, and which are organized to control the motion of the pistons of both engines, substantially as specified.

2. The combination, with the two direct-acting engines, of a main valve for controlling the motion of one of said engines, an auxiliary valve for completing the throw of said main valve, and a main valve for the other of said engines, deriving its motion from the engine which is controlled by the auxiliary valve, essentially as described.

3. The combination, with one and the same driving rock-shaft, of the auxiliary valve which controls the motion of one engine and the main valve which controls the motion of the other engine, substantially as specified.

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Witnesses:

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