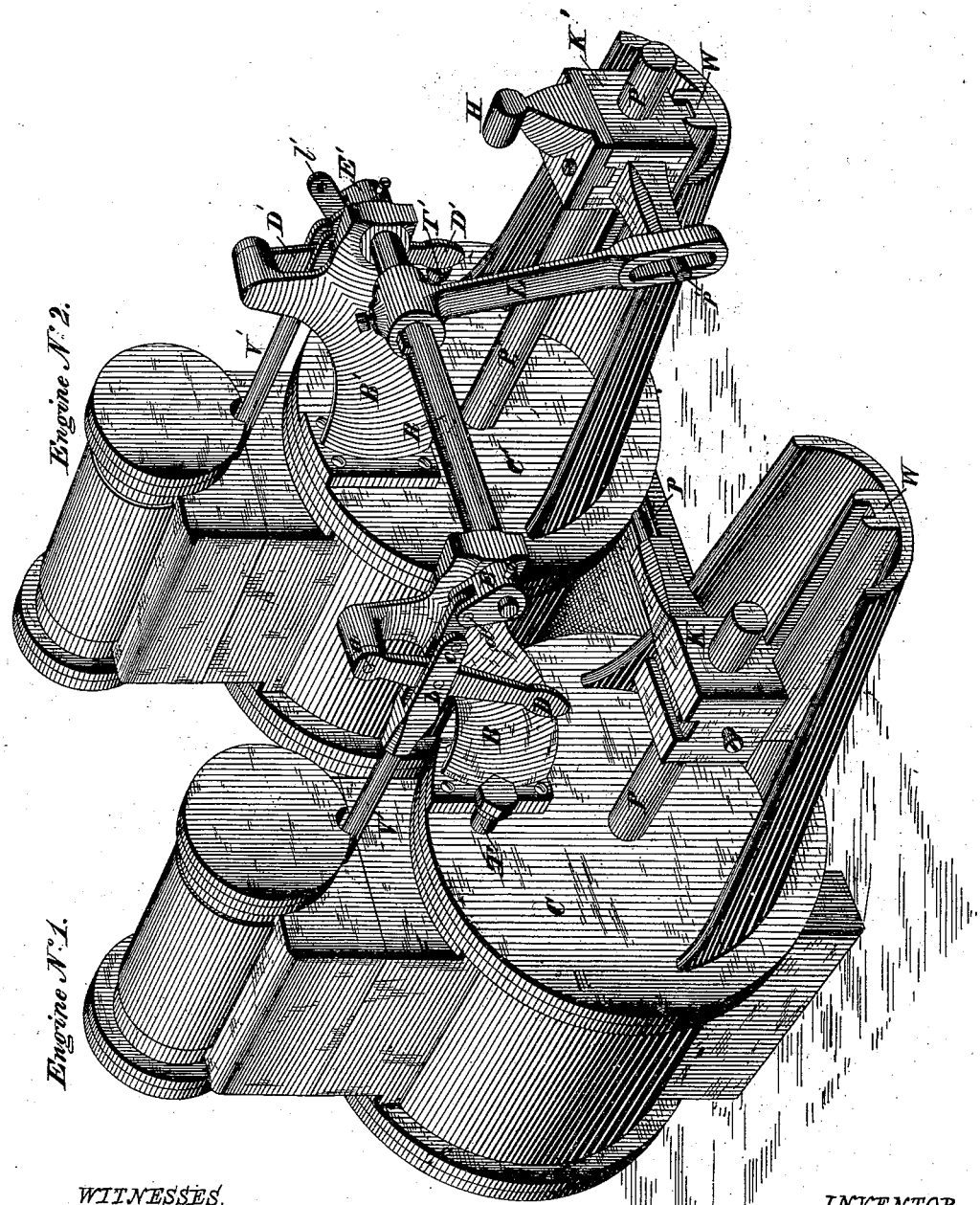
G. F. BLAKE.

DUPLEX PUMPING ENGINE.

No. 186,659. Patented Jan. 30, 1877



WITNESSES.

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GEORGE F. BLAKE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN DUPLEX PUMPING-ENGINES.

Specification forming part of Letters Patent No. **186,659**, dated January 30, 1877; application filed December 28, 1876.

To all whom it may concern:

Be it known that I, GEORGE F. BLAKE, of Boston, in the State of Massachusetts, have invented certain new and useful Improvements in Duplex Pumping-Engines; and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawing, which is a perspective view of a duplex engine having my improvements.

My invention relates to that description of duplex pumping-engines, in which each engine is capable of working its own valves, either separately or together, with the valves of the other engine, so that either engine can be worked independently of the other, or both engines can operate in unison together, as may be required or preferred.

My invention consists in the peculiar construction and arrangement of devices for the purpose of connecting or disconnecting the engines for joint or separate operation, all as hereinafter more fully set forth.

In the drawing are represented two pumping-engines, marked No. 1 and No. 2, identical in construction, and designed to operate pumps of any preferred description.

C C′ are the cylinders, P P′ the piston-rods, and K K′ the cross-heads reciprocating in the ways W W′. Each of the cross-heads K K′ has an inwardly-projecting arm, provided at its end with a pin designed to enter a slot in the lower end of a lever, L, whose upper end is adjustably attached to a rocker-shaft, R, whose journals are supported by brackets B B′ attached, respectively, to the heads of the cylinders C C′. The lever L is connected with the cross-head of whichever engine is intended to operate its own valves together with those of the other engine.

In the drawing it is shown as receiving its oscillating movement from the pin of cross-head K′ of engine No. 2. Lever L communicates a rocking motion to rock-shaft R, which has attached to its ends the arms E E′. V V′ are the valve-rods, each having a fork on its outer end for the reception of a link to connect the rod with one of the arms E E′ of the rocker-shaft.

The arm E is shown as connected to the rod V by means of the link *l* and the pins *c d*. Pendent levers D D′ are hung from short arms projecting outwardly from the upper part of brackets B B′. These levers are pivoted to the valve-rods at *b*, as shown, and their lower ends receive the alternate blows of the tappet-arm H and the tappet-rod T′.

The tappet-arm H is fixed to the cross-head of the engine, which is operating the valves of both engines, (in this case engine No. 2,) and the tappet-rod T′ is inserted in the cylinder-head of the same engine, and receives its outward movement from the blow of the piston.

The hole for the reception of the tappet-rod, in the head of the cylinder of engine No. 1, is stopped by a plug or cap, T, until it is desired to use that engine in operating the valves.

The operation is as follows: When it is desired that engine No. 2 shall operate its own valves and those of No. 1, the lever L is attached to the pin *p′* on the arm of cross-head K′, and the tappet-arm H is affixed to the same cross-head. The link *l′* is disconnected from valve-rod V′, and the link *l* is connected with arm E of shaft R and valve-rod V. The tappet-rod T′ is inserted in the cylinder-head of No. 2, and the tappet-rod hole in No. 1 is closed. The reciprocation of cross-head K′ imparts movement to rock-shaft R and valve-rod V, while lever D′, impelled by the tappet-arm H and tappet-rod T′, gives the required movement to valve-rod V′.

If it is desired to have engine No. 1 operate its own valves, and those of engine No. 2, a converse arrangement is made. Link *l* is disconnected from rod V, and link *l′* is connected with rod V′. Lever L is slid to the other end of shaft R and connected with pin *p* on the arm of cross-head K, and the tappet-rod is inserted in cylinder C, and tappet-arm H is attached to cross-head K. The tappet-rod hole in the cylinder-head of No. 2 is closed.

What I claim, and desire to secure by Letters Patent, is—

In combination with two pumping-engines, arranged as described and shown, the rock-shaft R, carrying the adjustable lever L, arms E E′, and detachable links *l l′*, all constructed, arranged, and operating substantially in the manner and for the purpose described.

The above specification of my said invention signed and witnessed at Boston this 26th day of December, A. D. 1876.

GEORGE F. BLAKE.

Witnesses:
B. E. PERRY,
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