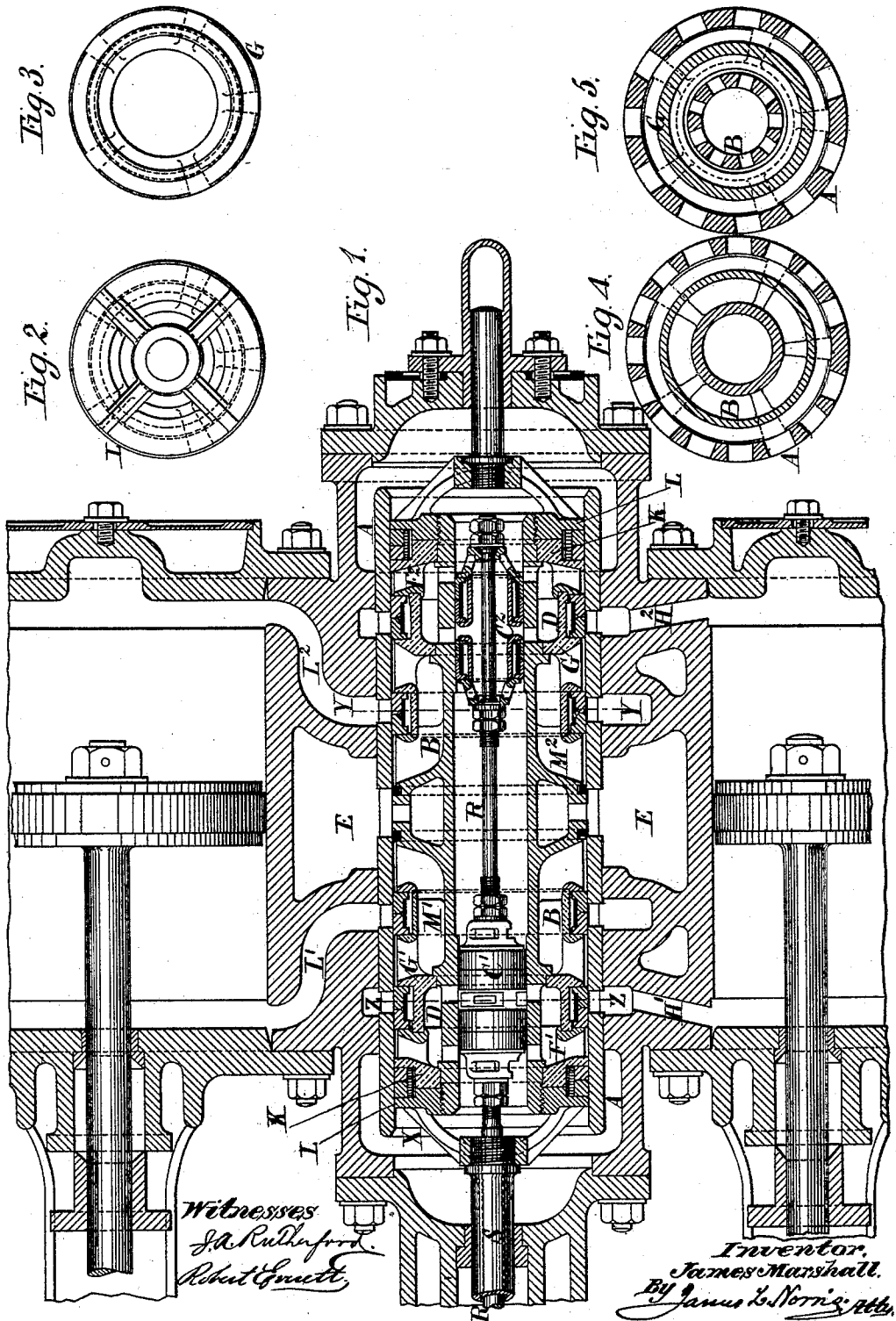


(No Model.)

J. MARSHALL.
PISTON VALVE FOR COMPOUND ENGINES.

No. 462,149.

Patented Oct. 27, 1891.



UNITED STATES PATENT OFFICE.

JAMES MARSHALL, OF LEEDS, ENGLAND.

PISTON-VALVE FOR COMPOUND ENGINES.

SPECIFICATION forming part of Letters Patent No. 462,149, dated October 27, 1891.

Application filed April 29, 1891. Serial No. 390,903. (No model.) Patented in England June 17, 1890, No. 9,300.

To all whom it may concern:

Be it known that I, JAMES MARSHALL, a citizen of England, residing at the Steam Plow Works, Leeds, in the county of York, England, have invented certain new and useful Improvements in Piston-Valves for Compound Engines, (for which I have obtained Letters Patent in Great Britain, dated June 17, 1890, No. 9,300,) of which the following is a specification.

My invention relates to a construction and arrangement of slide-valve and cylinder-ports governed by it in such a manner as to effect in a simple and compact manner the control of the supply and discharge to and from a pair of parallel cylinders placed side by side and working either as compound or twin cylinders. For this purpose between the two parallel cylinders I provide a cylindrical slide-casing with internal grooves or recesses at different parts of its length, each such groove or recess communicating with a port of the cylinder on the one side or on the other. I fit to work in this cylindrical slide-casing a cylindrical slide-valve consisting of a tube with a number of piston parts projecting from it at different parts of its length, each such piston part being in a suitable position for covering and uncovering by its movement one of the port grooves or recesses above mentioned. I prefer to pack each of these piston parts with spring-rings.

For governing and varying the cut-off, I fit within the tubular slide-valve a second tubular slide-valve with projecting piston parts governing passages through the main slide-valve to the parts of the slide-casing whence the cylinder-ports receive supply. By moving this internal slide-valve relatively to the main slide-valve the supply of steam to the cylinders can be cut off at various parts of the stroke.

Figure 1 of the accompanying drawings is a longitudinal section of a slide and expansion valve and steam-chest according to my invention for the pair of parallel cylinders of a compound engine. Fig. 2 is an end view of the slide-valve at X. Fig. 3 is an end view of each of the rings G. Fig. 4 is a transverse section at Y Y, and Fig. 5 is a transverse section at Z Z.

The metal between the two cylinders is

bored out to receive a liner A and has formed in it recesses communicating with the ports leading to the ends of the two cylinders—namely, $H' H^2$ the ports of the high-pressure and $L' L^2$ the ports of the low-pressure cylinder. There is also a large middle recess E for exhaust. Facing each of these recesses the liner A has a number of round holes drilled through it. Within the liner A is fitted the main slide-valve B, which is tubular and is so shaped as to constitute a series of pistons each provided with spring packing-rings, which, except those next the ends, slide over the round holes of the liner A, thus closing and opening the passages to the several ports $H' H^2 L' L^2$.

Within the main slide-valve B is fitted to slide the tubular expansion-valve, each of its ends $C' C^2$ formed as a double piston with spring-ring packings, and between them in each case a passage from the interior. These double pistons slide over a set of round holes drilled at D through the internal body of the main slide-valve B, thus opening and closing passages to the supply-ports $F' F^2$ of the main slide-valve.

In constructing the main slide-valve I fit on the tubular internal body B a set of rings G K L, at each end recessed to receive the spring-ring packings and all secured in position by screwing the end rings L onto the internal body. The expansion-slide C is also made up at each end of a middle body C' or C^2 , recessed for spring-rings, with a pair of rings secured to the middle body by nuts and lock-nuts on the slide-valve B. The main slide-rod S is tubular and the rod R of the expansion slide-valve passes through it, these two rods being worked externally by eccentrics or cams or in any other known manner. The steam-pipe being connected to either end of the steam-chest so as to charge with steam the two end parts of the chest and the middle of the slide-valve, while the exhaust-pipe is connected to any part of the recess E, the steam passes alternately by the ports $F' F^2$, which are governed, respectively, by the cut-off slides $C' C^2$, to the ports $H' H^2$ of the high-pressure cylinder, the exhaust-steam from the high-pressure cylinder passes alternately by the ports $H' H^2$ and by passages $M' M^2$, formed

in the main slide-valve, to the ports $L' L^2$ of the low-pressure cylinder, and the exhaust from the low-pressure cylinder passes alternately by the ports $L' L^2$ and passages $M' M^2$ to the suction-cavity E. Obviously when an expansion-valve is not required the internal slide-valve C may be dispensed with.

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

1. The combination, with the pair of parallel cylinders of a compound or twin engine and their ports, of a cylindrical tubular slide-valve interposed between the two cylinders and provided with packed piston parts governing passages to these ports, substantially as herein described with reference to the accompanying drawings.

2. The combination, with the pair of parallel cylinders of a compound or twin engine and their ports, of a lining A, interposed between the two cylinders and having recesses to communicate with the ports leading to the ends of the two cylinders, a cylindrical tubular slide-valve B, arranged within the interposed lining and provided with packed pistons governing the recesses of the lining, and a cylindrical tubular expansion-valve arranged within the main slide-valve and com-

posed of connected pistons $C' C^2$, substantially as described.

3. The combination, with the pair of parallel cylinders of a compound or twin engine and their ports, of a cylindrical lining A, interposed between the two cylinders and having recesses to communicate with the ports leading to the ends of the two cylinders, a cylindrical tubular slide-valve B, arranged within the interposed lining and provided with packed pistons governing the recesses in such lining, the tubular rod S, connected with the slide-valve, a cylindrical tubular expansion-valve arranged within the slide-valve and composed of connected pistons $C' C^2$, governing the ports through the slide-valve, and a rod S extending through the tubular rod and connected with the expansion-valve, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of April, A. D. 1891.

JAMES MARSHALL.

Witnesses:

OCTAVIUS EDDISON,
HERBERT WARD,
Solicitors, Leeds.