

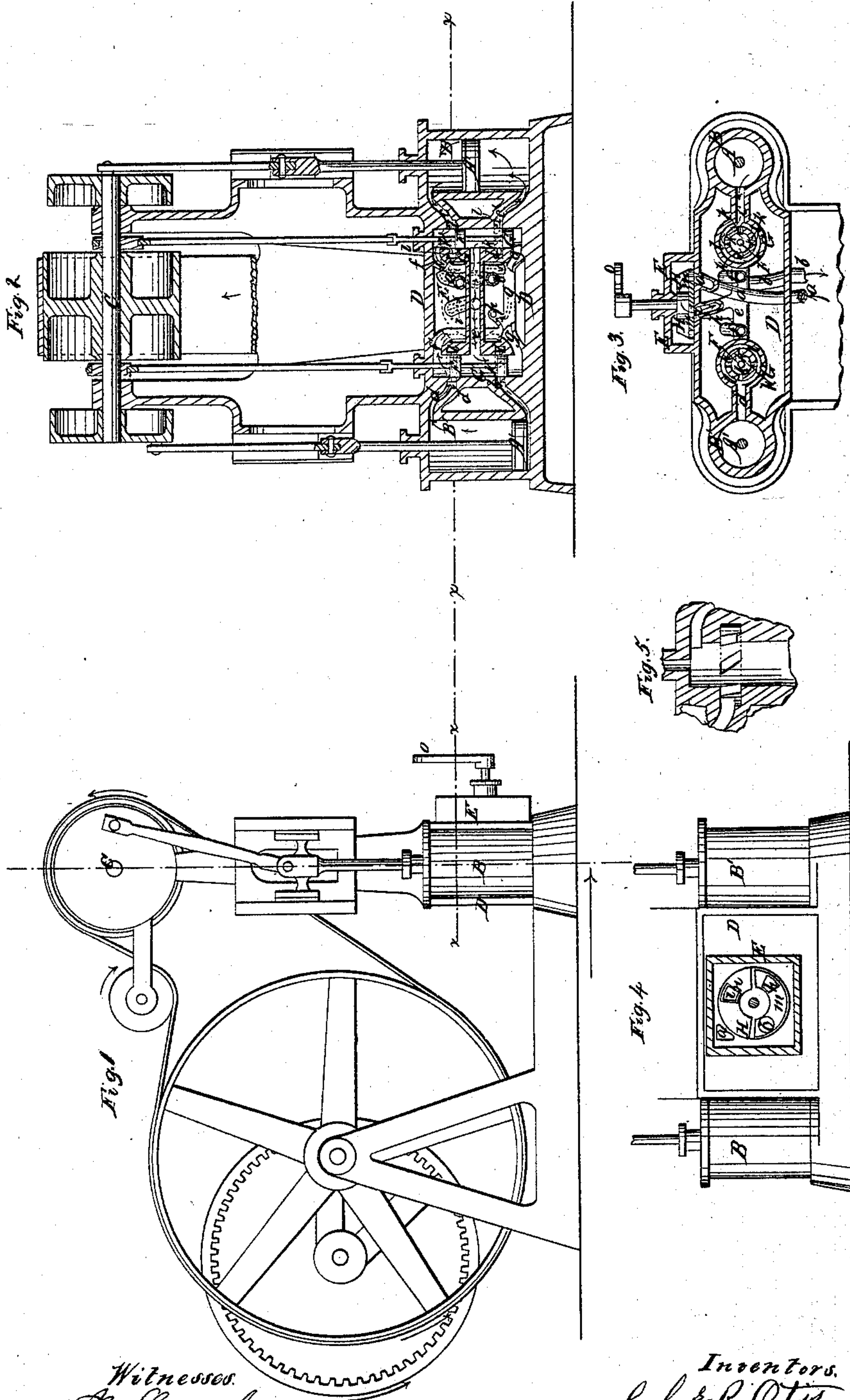
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C. R. & N. P. Otis,

Steam Cut-Off,

No 68,783.

Patented Sep. 10, 1867.



Witnesses.
J. M. Cornaby
G. W. Reed

Inventors.
C. R. & N. P. Otis

United States Patent Office.

CHARLES R. OTIS AND NORTON P. OTIS, OF YONKERS, NEW YORK.

Letters Patent No. 68,783, dated September 10, 1867.

IMPROVEMENT IN VALVES FOR STEAM ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, CHARLES R. OTIS and NORTON P. OTIS, of Yonkers, in the county of Westchester, and State of New York, have invented an improved System of Valves and Passages in Steam and other Engines, in which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a side elevation of a steam engine having our improvement applied to it, and shown as driving a hoisting apparatus.

Figure 2 is a transverse vertical section taken for the most part through the steam-cylinders, main valves, and passages looking from the rear towards the outer side or reversing-valve chest.

Figure 3 represents a horizontal section taken as indicated by the line *xx* in fig. 2.

Figure 4, a front or face elevation of the steam-cylinders and connecting-valve chest with the cover of the reversing-valve chest or chamber removed, the reversing-valve being shown in red outline; and

Figure 5 a view in elevation of one of the main valve-cylinders detached, and showing the shape and position of the passages which establish communication between said cylinder and its respective steam or engine-cylinder.

Similar letters of reference indicate corresponding parts in each of the several figures.

Our improvement is applicable to engines working in combination or having cylinders in duplicate, with their respective pistons differently set in point of stroke, if requisite, relatively to each other, said cylinders not being of an oscillating or movable character. Said improvement, though applicable to other purposes, is here shown as connected with such double-cylinder engine employed in the driving of an ordinary hoisting apparatus, which not being part of our present improvement, we shall not minutely describe. It may be well, however, to remark in connection with engines so employed that much of their efficiency depends upon the control which is or may be had over the reversal of their actions for hoisting or lowering goods, as desired, and in the general action and arrangement of the valves with their chambers or chests and passages connecting the duplicate engine-cylinders and several valves; and our improvement partly or mainly consists in a novel construction, employment, and arrangement of certain of these parts, whereby not only stability and durability are secured, but an easy control and efficiency generally are effected in a comparatively simple manner.

To enable others skilled in mechanism of the class to which our improvement refers, to make and use the same, we will now proceed to describe it as illustrated in the accompanying drawing.

A and A' represent the two engine-pistons working in their respective cylinders B B', and giving motion by their rods and pitmen to the driving-shaft C of a hoisting apparatus. The two engine-cylinders B B' are rigidly connected by means of a main valve and steam-passage chamber or chest, D. These passages may for the most part or wholly be formed by coring the casting which forms the chest, and which may be of one piece with the bed or foundation plate so as to give increased stability and lessen the liability to leakage. Of these passages *a* is the main steam pipe or inlet which conveys the steam from the boiler through the main valve-chamber D to the reversing-valve and steam-chest E; and *b* is the main outlet or escape pipe similarly arranged relatively to said valve-chests. The main valves F F' are of double piston form working in cylinders G G', and controlling steam-passages *c c'* and *d d'* at either end of the engine-cylinders B B'. The spaces between the heads of either double-piston valve F F' are made to communicate by a connecting passage, *e*, while the spaces outside the heads of said pistons at either end of their cylinders are connected with each other, and the two valve-cylinders united by means of branches and passages *f f'*, and *g*, the latter having a branch, *h*, opening into the reversing-valve chest E, and the valve-connecting branch *e* likewise being provided with an extension, *i*, in similar communication with the said chest. The passages *c c' d d'* at either end of the engine-cylinders have their connection with the valve-cylinders G G' established by means of a series of oblique apertures, *k k*, arranged round said cylinders and opening into annular passages *l l*, which form extensions of the passages *c c'* and *d d'* at either end of the engine-cylinders. By this oblique construction of the connecting apertures *k k*, the piston-valves F F' are restrained from catching or cutting, and their traverse rendered smoother and easier when passing or crossing the said apertures than if the same openings or breaks in the continuity of the cylinders were at right angles to the line of travel of the piston-valves, contact with the edges of said apertures being in the latter case sudden

and abrupt, while in the oblique construction here shown of them it is gradual and easy. The reversing-valve H is of a disk form, and is made to control the passages *b h i* which communicate with the outside valve-chamber E. It is provided with an exhaust cavity, *m*, and induction aperture, *n*, and takes in steam from the rear, steam being received into the valve-chest E by the induction pipe *a*.

From this minute description of the construction and arrangement of the several parts, a brief explanation will suffice to make clear the operation of the same. Thus, by turning the reversing-valve H to pass steam through its aperture *n* into the passage *i*, which communicates by the connecting pipe *e* with the spaces between the heads of the piston-valves F F', the exhaust cavity *m* is brought over the eduction pipe *b* and branch *h*, which connects the outside or end spaces of the piston-valves together, and the engines are made to run, say, in a forward direction; but by reversing the position of the outside valve H, so as to make its steam aperture *n* cover the branch *h*, and its exhaust cavity control the eduction passage *b* and branch *i*, the motion of the engine will, it is obvious, be reversed, while by turning the lever or handle *c* of said valve into, say, a horizontal position, so as to shut off communication with both branches *h* and *i*, the engines will be stopped.

This our improved system of valves and passages not only insures stability and durability, with comparative freedom from leakage and derangement, but is easily controlled and managed, practical experiments proving the same to be an improvement upon previous systems.

What we claim as new, and desire to secure by Letters Patent, is—

The valves and passages, essentially as herein shown and described, consisting of the main piston-valves F F' with their passages *f f' e h i*, and induction and eduction passages *a* and *b* within the valve-chest D, in combination with an outside reversing-valve, H, arranged for operation together, substantially as specified.

CHAS. R. OTIS,
NORTON P. OTIS.

Witnesses:

RAFFAELLE COBB,
LYMAN COBB, Jr.