

W. D. FISKE & G. B. N. TOWER.
VALVES FOR COMPOUND ENGINES.

No. 175,830.

Patented April 11, 1876.

Fig. 1.

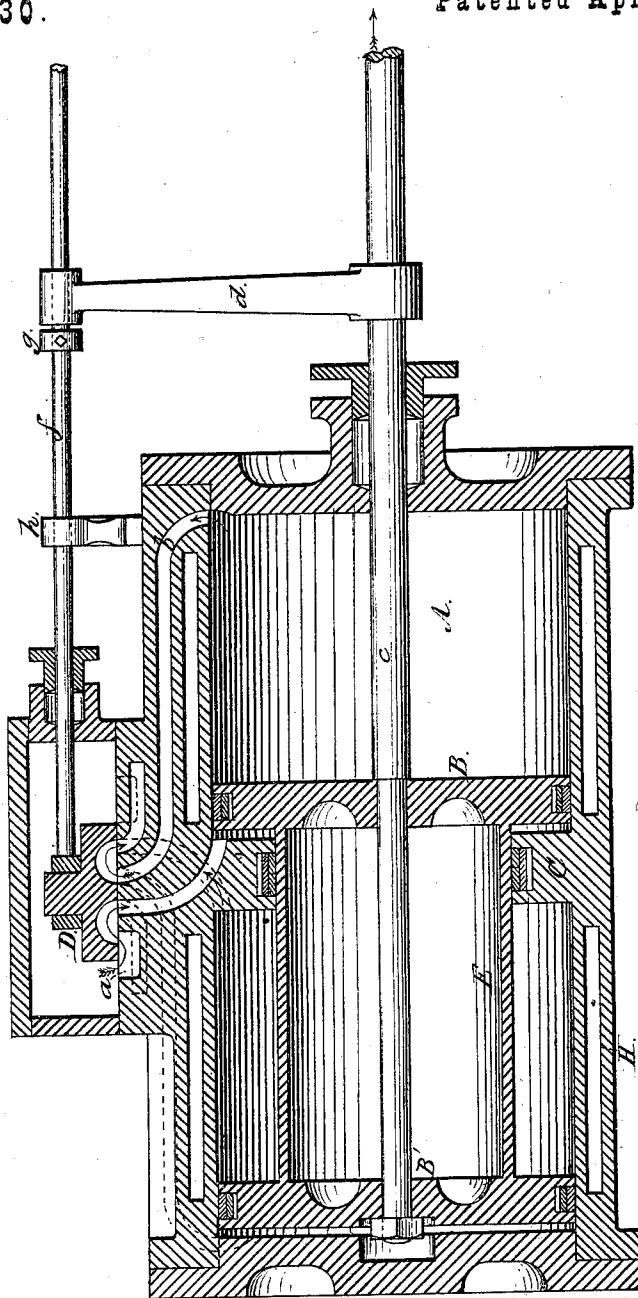
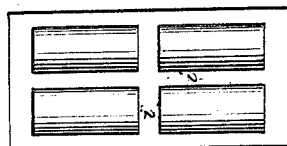


Fig. 2.



Witnesses:

O. T. Earle

John Smith.

Inventors
Wilbur D. Fiske
George B. N. Tower
By *O. T. Earle*
attorney

UNITED STATES PATENT OFFICE.

WILBER D. FISKE AND GEORGE B. N. TOWER, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN VALVES FOR COMPOUND ENGINES.

Specification forming part of Letters Patent No. **175,830**, dated April 11, 1876; application filed March 13, 1876.

To all whom it may concern:

Be it known that we, WILBER D. FISKE and GEORGE B. N. TOWER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Compound Engines; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of engines known as duplex or compound engines, in which the cylinders are elongated to a suitable length for the working of a double set of engine-pistons, allowing sufficient space for the proper expansion of steam at the outer ends of said cylinder; and it consists in a novel arrangement of ports, in which one valve is made to perform the duty heretofore performed by a series of valves, and by which a great saving of power is attained by the diminished amount of friction, and also in first cost by the simplicity of construction and replacement of parts when worn. It also consists in locating the induction and eduction ports in such a manner that a double set of live-steam and exhaust ports is provided for each end of the cylinder, and all the steam required to operate the pistons in said cylinder ends is made to pass through one valve common to both, said single valve answering the fourfold purpose of admitting to, and exhausting from, the double-sided piston in each end of the cylinder the live steam impinging upon one end of the piston in one end of the cylinder, while the exhaust from the live steam of the other end of said cylinder is impinging on the back of the piston in the adjacent or opposite end of the cylinder. Thus it will be seen that, practically speaking, there are really two engines working in one cylinder, and with one valve, the valve, however, being a double one.

We are aware it is not new to divide one cylinder into sections, and make an engine of each section, nor is it new to divide it by an inner projecting concentric ring or annular projection, the face of which is provided with

packing-rings, and the two ends connected by a trunk common to both cylinder ends, each containing an independent piston-head, none of which we claim, nor the compound operating, intricate, complicated, complex system of valve mechanism, so well known to this class of engines, which require a large portion of the power of the engine to successfully operate them, owing to the great friction, and also a large quantity of lubricants to keep them in a smooth working condition, as well as their costly construction.

To obviate these objections, and simplify the working parts, is what we desire to accomplish by our invention; but what we do claim as new, useful, and important we will now proceed to describe, and refer to the accompanying drawing, which forms part of our description and specification.

Fig. 1 illustrates a longitudinal vertical section; Fig. 2, an inverted plan view of the face of the valve.

By referring to Fig. 1, it will be observed that it is a longitudinal vertical section through the double cylinder, pistons, trunk, valve, valve-chest, and induction and eduction ports, in which is seen, by means of an arrow, the steam entering the live-steam port from the steam-chest, passing down to, and impinging upon, the trunk end of the piston-head, the area of which is near or about one-half the area of the other or expansion side. When this piston is near the end of its stroke, and live steam entering the opposite port on the other side of the valve to the trunk side of the other piston, the exhaust steam from the first or trunk side is transferred to the expansion end of the cylinder through the same port, where it expends its remaining power, and thence is exhausted into the atmosphere or condenser, and so on alternating during the operation of the engine, and repeating the same operation in the opposite end of the cylinder.

The letters on the drawings indicate the following parts: A is the cylinder, provided with the usual heads and the inner annular projection C, which is also provided with the usual metal packing. This cylinder is also constructed with a hollow hot air or steam space, H, around its periphery, forming a jacket, the

object of which is to prevent the radiation of heat, and thereby the prevention of the condensation of steam. B and B' represent the two pistons with their packing, both of ordinary construction. E represents the trunk, which connects the two piston-heads, the said trunk presenting a smooth outer surface, and parallel its entire length, and which works through the inner annular projection, while being packed by the packing-rings in the face of said projection. C is the connecting-rod, the trunk part of which is smaller in diameter than the stuffing-box end, and which, with the trunk, also serves to connect the two pistons, passing entirely through piston-head B and E, and secured in the usual manner to piston-head B'. D represents the main valve, which is a double ported one, with divisions *i i*, and communicating with two sets of ports in the face of the cylinder. Said valve, while in communication with the live-steam port of one piston, is also in communication with the exhaust of the other, transferring the steam to be expanded to its proper destination, and at the same time carrying off the spent steam, which has already been worked twice. This compound duplex valve and its corresponding ports form the gist of my invention, the operation of which has been before explained. F is the valve-stem, which is operated by positive means, viz.: by a tappet-arm, *d*, on the main piston-rod C', and kept in position by a guide-piece, *h*, all operating smoothly, and so simple that any person of ordinary intelligence can manipulate it.

It will be seen that it is made up of but very few pieces, requiring only ordinary mechanical skill in its construction, all of which is of the greatest importance, as is well known none but first-class mechanical skill can build, repair, or manipulate the complicated engines of this character, such skill, in many places where there are no workshops, being very scarce, and when as it often does occur that such skill has to be sent for a long distance, during which time the whole works are stopped, the consequence being ruinous.

Having now described our invention, and its mode of construction and operation, what we claim as new, and desire to secure by Letters Patent, is—

The combination, in compound or duplex engines, and in which differential pistons are used as a medium of motive power, of the four-ported single valve D, and the double live-steam and exhaust ports on each side of a single valve-seat, by which a compound engine is operated in each end of the cylinder, substantially as herein described.

In testimony that we claim the foregoing as our own invention we affix our signatures in presence of two witnesses.

WILBER D. FISKE.
GEORGE B. N. TOWER.

Witnesses:

JOHN D. ELDRIDGE,
HENRY K. TERRY.