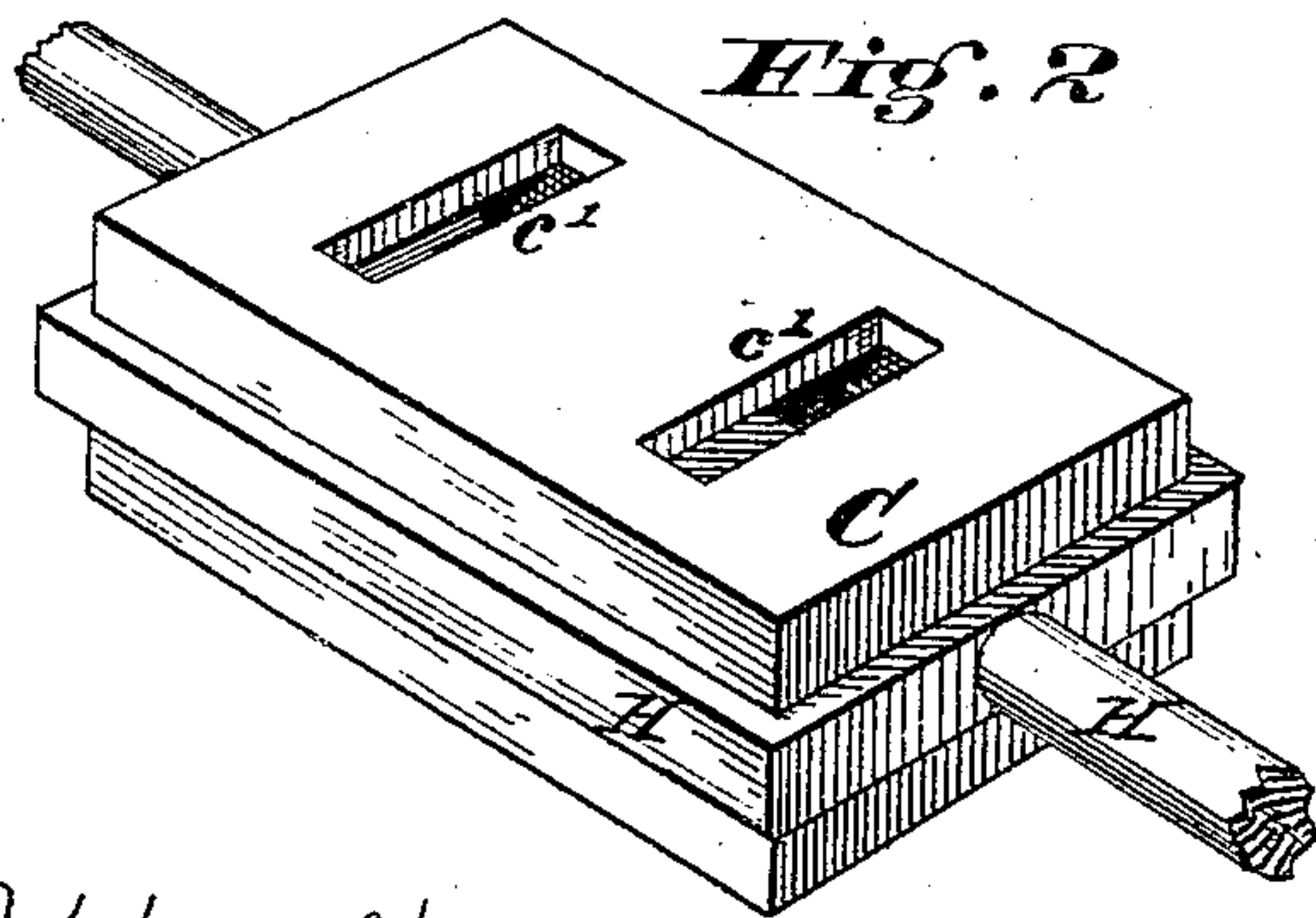
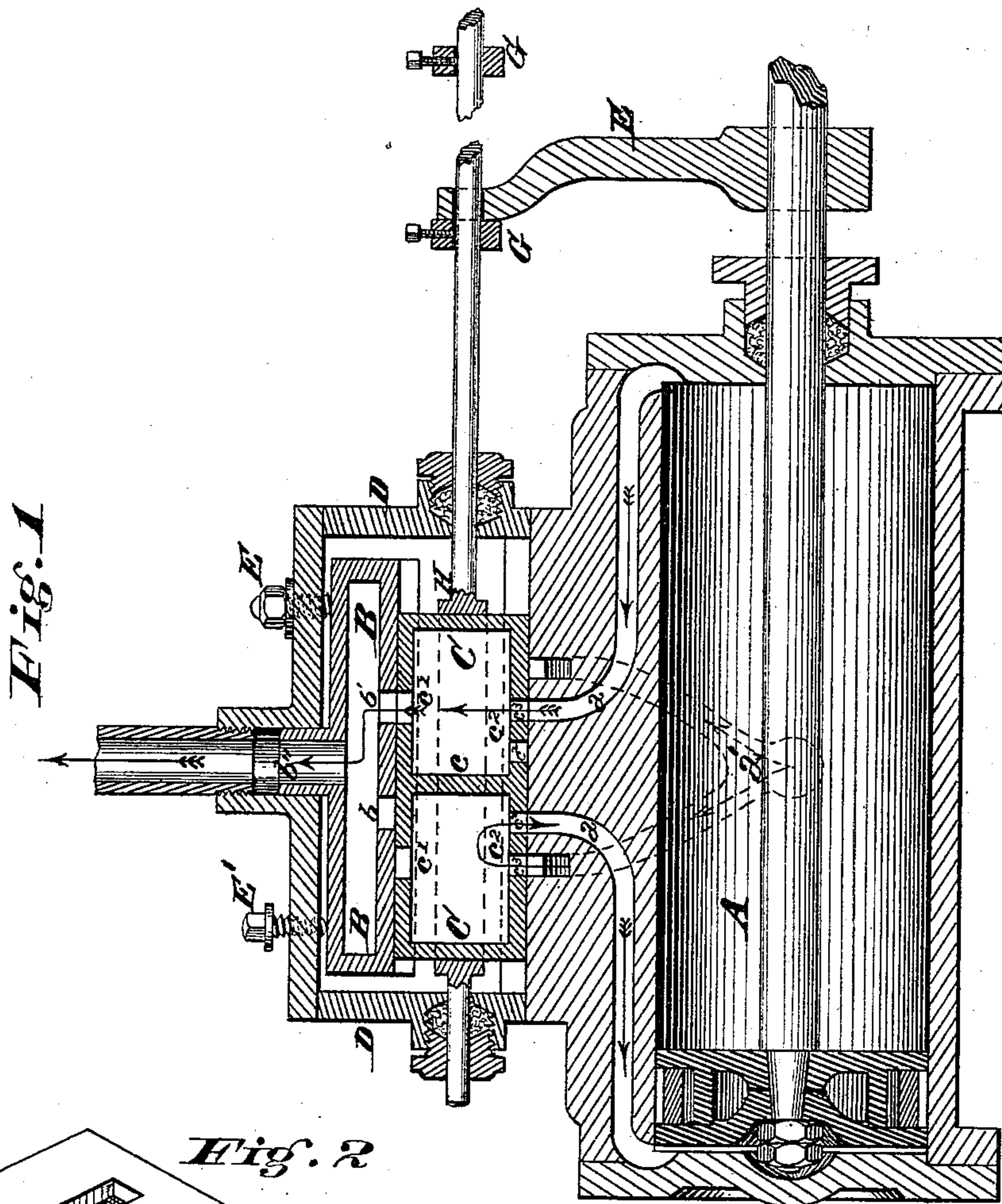


F. M. HAIN & C. WAIS.

Balanced-Valves for Steam-Engines.

No. 148,692.

Patented March 17, 1874.



Inventor

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UNITED STATES PATENT OFFICE.

FRANK M. HAIN AND CHRISTIAN WAIS, OF CINCINNATI, OHIO.

IMPROVEMENT IN BALANCED VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **148,692**, dated March 17, 1874; application filed November 20, 1873.

To all whom it may concern:

Be it known that we, FRANK M. HAIN and CHRISTIAN WAIS, both of Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Balanced Valves for Steam-Engines, of which the following is a specification:

Our invention consists in the first part of a hollow-partitioned valve of peculiar construction, in combination with a steam-cylinder and ports to match, and a box or port-plate closely fitting against the upper surface of the valve, and provided with exhaust-ports, the object of this invention being the balancing of the valve by simple means well adapted for durable and efficient use. Our invention further consists of the provision of adjusting-screws for the exhaust-plate, by which it can be raised and lowered to preserve the proper contact with the upper face of the valve.

Figure 1 is an axial section of a steam-cylinder and valve-mechanism embodying my invention. Fig. 2 is a perspective view of the valve and driving-yoke.

A is the steam-cylinder, whose end ports *a a* are fed through the central port *a'*, shown in dotted lines. B is an exhaust box or plate, which has the exhaust-ports *b b'* communicating with the exhaust-pipe B', into which the circular projection *b''* of the plate B fits snugly in the manner shown. We prefer to form within the plate B a large chamber for the purpose of equalizing the egress of the steam and affording large capacity for the reception of the exhaust at the termination of each stroke. C is the valve, which is box-like in form, with a partition, C, in the middle of it to separate the exhaust side of the engine from the live-steam side. To form the exhaust connections at

proper times, we provide in the valve the exhaust-ports *c¹ c¹*; and to convey steam to the respective ends of the cylinder, we provide the steam-ports *c² or c²* and *c³*, it being operative to have the two ports *c² c³* cut into one, making then but a single port on each side of the partition, which we denominate *c²*. It will be seen that the valve is practically balanced, there being no exterior pressure upon it, except the trifling amount on the lower side equal to one of the steam-ports. The plate B is kept in the proper location to preserve the necessary joint with the valve C by means of the nuts and studs E, which are placed diagonally across the plate, and the set-screws E' also set diagonally to force it in the opposite direction, the nuts and studs E serving only to raise up the valve. The valve C is operated in the usual way by tappet-arm F, tappets G, and yoke-rod H, or in any other preferred way.

We claim—

1. The combination of steam-cylinder A *a a'*, exhaust-port plate or box B, and valve C, having partition *c* and ports *c¹ c²*, the parts being connected and operating substantially in the manner and for the purpose specified.

2. The combination of cylinder A *a a'*, exhaust-port plate or box B, valve C *c c¹ c² c³*, chest or frame D, and adjusting-screws E E', connected and operating substantially in the manner and for the purpose specified.

In testimony of which invention we hereunto set our hands.

FRANK M. HAIN.
CHRISTIAN WAIS.

Witnesses:

F. MILLWARD,
J. L. WARTMANN.