2 Sheets—Sheet 1.

J. HOLUB.

Steam-Engine.

No. 199,978. Patented Feb. 5, 1878.

Fig: 1.

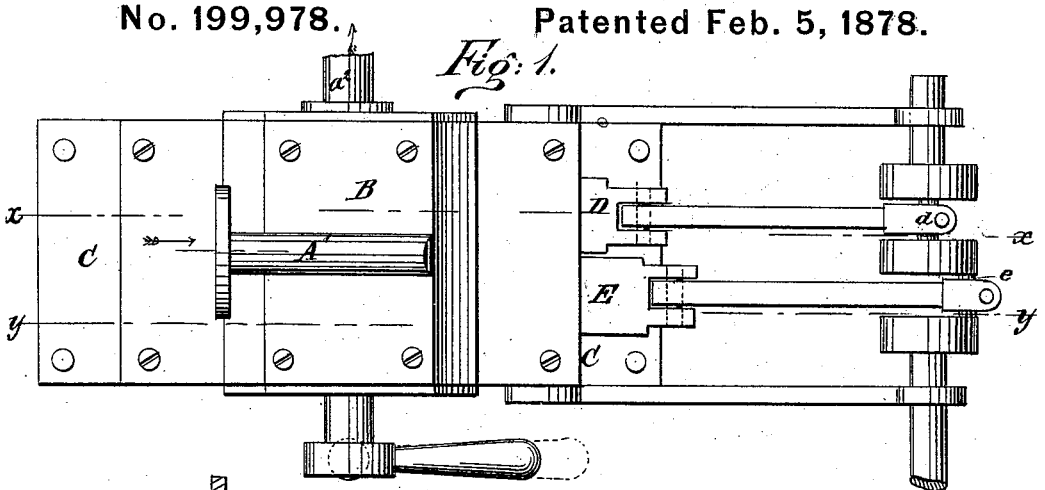


Fig: 2.

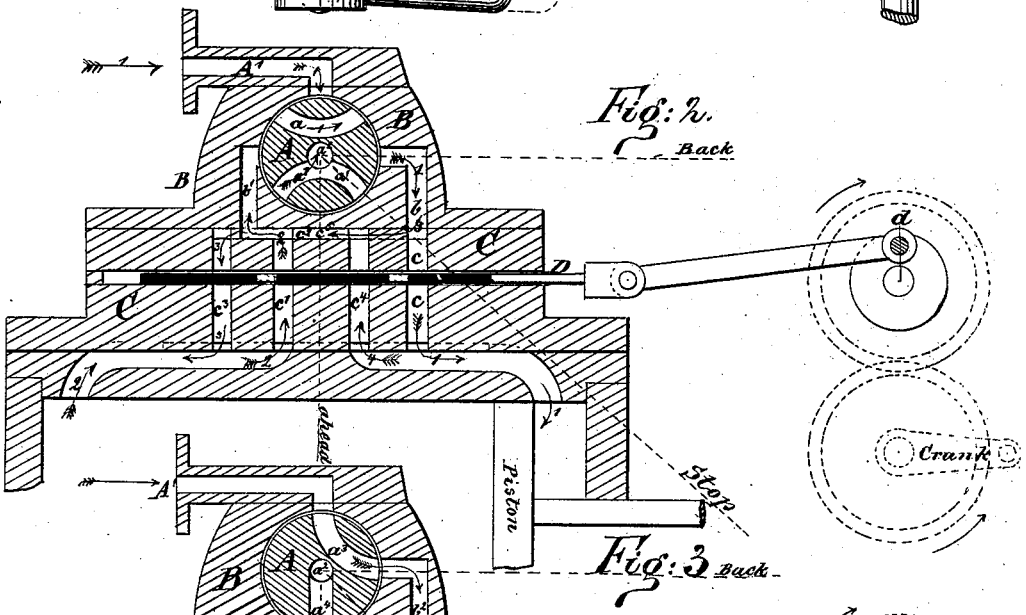
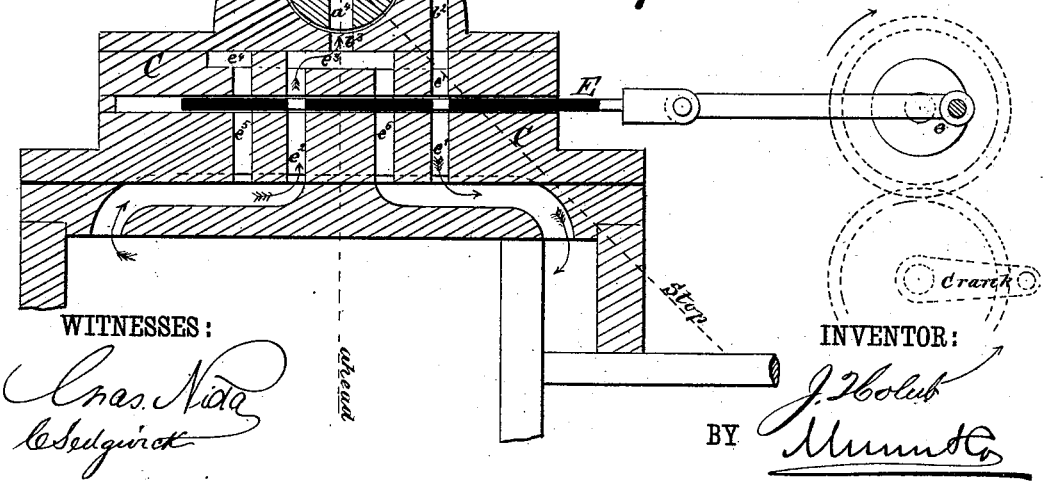


Fig: 3 Back



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2 Sheets—Sheet 2.

J. HOLUB.

Steam-Engine.

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Fig: 4.

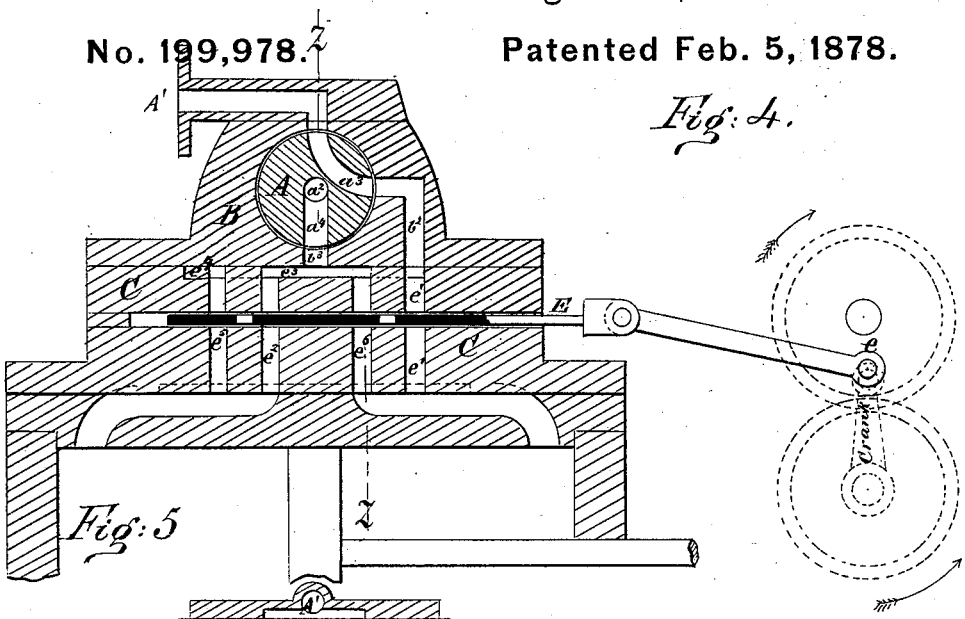


Fig: 5

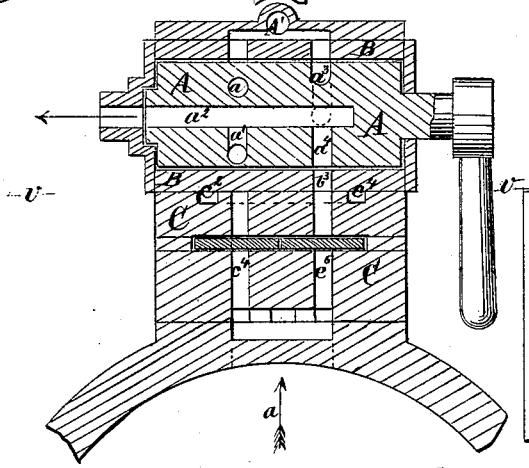


Fig: 6.

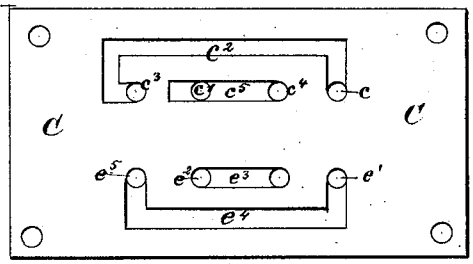
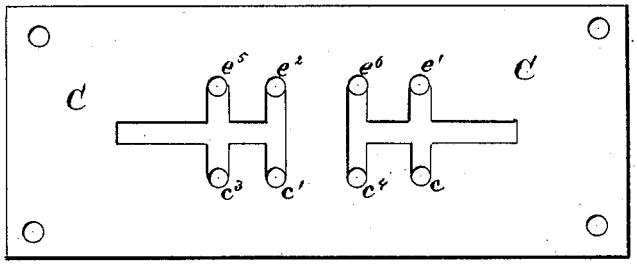


Fig: 7.



WITNESSES:

Chas. Nida.
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INVENTOR:

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UNITED STATES PATENT OFFICE.

JOSEPH HOLUB, OF NEW YORK, N. Y.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **199,978**, dated February 5, 1878; application filed December 7, 1877.

To all whom it may concern:

Be it known that I, JOSEPH HOLUB, of the city, county, and State of New York, have invented a new and useful Improvement in Steam-Engines, of which the following is a specification:

The object of my invention is to furnish an improved valve-mechanism for steam-engines, so constructed that by turning off steam at any point of the stroke the engine will stop always at the center of the stroke of piston, or in the position in which the crank stands at right angles to the piston-rod, and never at the end or dead-point, where the crank is in line with the piston-rod.

The invention consists in the combination, with a main slide-valve and with an auxiliary slide-valve, and with a double set of inlet and outlet ports for each of the said valves, of a steam-valve provided with one set of inlets and outlets for each of the said valves and one common exhaust, the crank of the auxiliary slide-valve turning parallel with the crank of the engine, and the crank of the main valve at right angles thereto, and the sets of inlets and outlets in the steam-valve being so arranged that in shutting off steam from the main sliding valve, when the crank of the engine is in line with the piston-rod at the dead-point, steam will be admitted by the auxiliary slide-valve to bring the crank over the dead-point to the center of the stroke, and stop it there by the auxiliary valve shutting off live steam and exhaust at once, as will be hereinafter described.

In the accompanying drawings, in Sheet 1, Figure 1 represents a top view of my improved valve mechanism. Fig. 2 is a longitudinal vertical section of the same, taken on the line *x x* of Fig. 1 through the main slide or working valve of the engine, the handle of the steam or throttle valve being turned in position of forty-five degrees to the vertical and horizontal, and steam turned off. Fig. 3 is a longitudinal section taken on the line *y y* of Fig. 1 through the auxiliary slide-valve, all parts having the same relative positions as in the foregoing figures. In Sheet 2, Fig. 4 is a similar section on *y y* of Fig. 1, the valve having advanced one-fourth of a stroke and stopped the engine with the crank at right angles to the piston-rod. Fig. 5 is a cross-section on the line *z z* of Fig. 4. Fig. 6 is a detail face view of the steam-chest, looking downward from the line *v v* of Fig. 5, to show the steam-ports. Fig. 7 is an under-side view of the steam-chest, seen in direction of the arrow *a* of Fig. 5, to show the said steam-ports on that side.

Similar letters of reference indicate corresponding parts.

If the handle of the steam-valve be turned from the position of forty-five degrees inclination (or the position of stop) in Fig. 2 to the vertical position marked "ahead," steam will enter from the steam-pipe A′ through the port *a* in the cylindrical valve A, and through the port *b* in the valve-chest B, and through the port *c* in the steam-chest C of the engine into the cylinder, as indicated by arrows 1, the crank of the engine (one-fourth of a turn ahead of the crank or eccentric *d* of the main valve) and the piston being on the dead-point, and the main valve D just beginning to open.

The engine will exhaust, in direction of arrows 2, in reverse order, through the ports c^1, b^1, and a^1, and the common exhaust-port a^2. On the return-stroke, the ports *c* c^1 being then closed by the slide-valve D, the steam, after leaving the port *b*, enters the cylinder by way of the horizontal port c^2 (see also Fig. 6) and the port c^3 in direction of arrow 3, and the exhaust-steam exits in direction of arrow 4, through the port c^4 and the horizontal port c^5, to the port b^1 on its way to the exhaust a^2. The engine is thus worked by the one main valve D.

It is evident that by moving the handle of the valve A from the vertical position marked "ahead" to the horizontal position marked "back," the valve A will be reversed, and with it the motion of the engine and crank, in the usual manner of reversing engines.

We will now assume that the valve A is closed, as in Fig. 2, when the crank is horizontal or on the dead-point. The auxiliary valve E, placed with its crank *e* parallel with the crank of the engine, (see Fig. 3,) is then open to admit steam through the port a^3 in the valve A, and the port b^2 in the valve-chest B, and the port e^1 in the steam-chest C. On the opposite side of the piston steam is exhausting, by way of the ports e^2 and e^3 in the

steam-chest C, and b^3 in the valve-chest B, and a^4 in the cylindrical valve A, to the common exhaust a^2, through the center of the latter. The piston, impelled by the steam so long as the said ports remain open, will thus be moved away from the dead-point until the crank of the engine and the crank e of the valve E shall have assumed the position shown in Fig. 4, vertical to the piston-rod, and the valve E will have advanced far enough to close the ports e^1 e^2, when the piston will be stopped at the center of its stroke by the pressure of the two equal volumes of steam, confined one on each side thereof.

The ports a a^1 in the steam-valve A, leading to the main slide-valve D, being turned off, no steam can enter through the slide D, whatever its position; and the ports e^1 e^2 being closed by the auxiliary valve E, the piston will thus be kept still in the position in which it stopped—that is, with the crank at right angles to the piston-rod.

Should the valve A be turned off when the piston is at the other end of its stroke, the auxiliary valve E will be in position to close the ports e^1 and e^2, and the steam will then enter from the port b^2 by way of the horizontal port e^4 and the vertical port e^5, and the exhaust will take place by way of the vertical port e^6, and the horizontal port e^3, and the ports b^3 a^4 a^2. Consequently the piston will again be moved from the dead-point until it again stops in the position shown in Fig. 4, the cranks, however, in that case being in diametrically opposite positions.

From the foregoing description of the operation, in which the construction has been clearly shown, it is evident that at whatever point of the stroke the steam-valve A is closed (as it is in Figs. 2, 3, 4, 5 of the drawing) the engine will never stop until it has advanced far enough to close the auxiliary valve E, leaving the crank at right angles to the piston-rod, as designed by this invention.

In the drawings the slide-valves are represented as being run from the main shaft or crank-shaft of the engine by means of gear-wheels, as indicated by the dotted circles; but they may be connected by eccentrics or other means, so long as they are arranged in the relative positions shown and described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the main slide-valve D, and with the auxiliary slide-valve E, and with the sets of inlet and outlet ports in the chests B C, shown and described for each of the said valves, of the steam-valve A, provided with the ports a a^1 for the valve D, and the ports a^3 a^4 for the valve E, and the common exhaust a^2, all constructed and arranged to operate substantially as and for the purpose specified.

2. The combination, with the main slide-valve D and with the auxiliary slide-valve E, of the steam-valve A, provided with the set of ports a a^1 a^2 for the main valve D, and with the set of ports a^3 a^4 a^2 for the valve E, said ports and valves being arranged to admit steam through the auxiliary valve E only when steam is shut off from the main valve D to stop the engine, substantially as and for the purpose specified.

JOSEPH HOLUB.

Witnesses:
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