S. WARRICK & G. S. BRUSH.

STEAM ENGINE.

No. 190,938. Patented May 15, 1877.

Fig. 1.

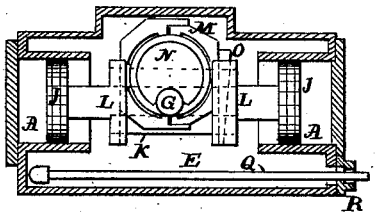


Fig. 3.

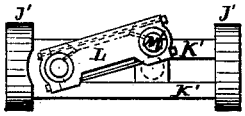


Fig. 2.

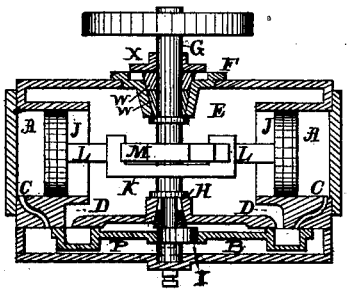


Fig. 4.

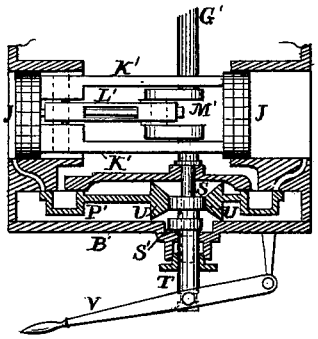


Fig. 5.

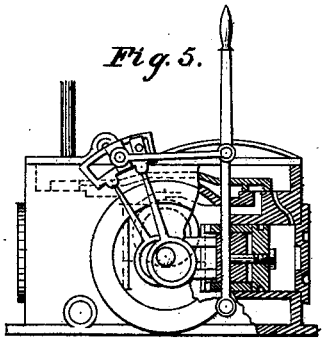
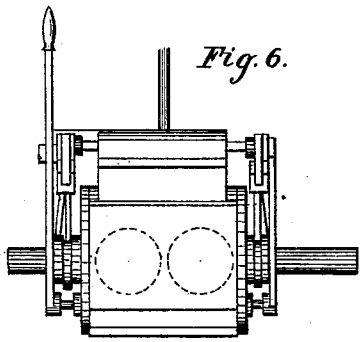


Fig. 6.



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UNITED STATES PATENT OFFICE.

SAMUEL WARRICK AND GEORGE S. BRUSH, OF MONTREAL, QUEBEC, CANADA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **190,938**, dated May 15, 1877; application filed December 22, 1876.

To all whom it may concern:

Be it known that we, SAMUEL WARRICK and GEORGE SEYMOUR BRUSH, both of the city of Montreal, in the District of Montreal, in the Province of Quebec, in the Dominion of Canada, have invented new and useful Improvements in the Construction of Steam-Engines; and that the following is a full, clear, and correct description of the same, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, in which—

Figure 1 is a vertical section of an engine constructed in accordance with our improvements. Fig. 2 is a plan view of the same. Figs. 3 and 4 are views of a modification of the same. Figs. 5 and 6 are views of a double engine provided with the link-reversing gear, the valve-chest being placed between and on top of the cylinders and containing the valves for both engines.

In the drawing like parts of the invention are pointed out by the same letters of reference.

The nature of the present invention relates to improvements, as more fully hereinafter set forth, in the construction of reciprocating engines, the object of the invention being to simplify the construction and add to the efficiency of the same by dispensing with the ordinary frame, cross-head, slide-bars, piston-rod, crank, connecting-rod, and separate water-heater, and by immersing the cylinders and working parts in exhaust steam to prevent condensation of live steam and overheating.

Space is thus economized, friction reduced, weight and number of parts necessary lessened, and economy of cost of construction and diminished consumption of fuel gained.

In Figs. 1 and 2, A A are the two single-acting cylinders, furnished with the valve-chest B, inlet-ports C C, exhaust-ports D D, and an exhaust-receiver, E. The receiver E is provided with a door or cover, F, to allow the shaft G to be inserted in position, the door F forming one bearing for the shaft G, the other bearing being at H. J J is a double piston, united by the bars K K, and provided with the guides L L, left open at the top and bottom, and forming part of the double piston J J. M shows the sliding box, parted in the center, the wear of which may be taken up by an adjustable wedge, O, or other suitable device. P shows a valve provided with an oblong hole or slot, in which the valve eccentric I works. To the valve-chest B a steam-pipe is attached, and an exhaust-pipe to the exhaust-receiver E. The feed-water pipes Q are inserted along the bottom of the exhaust-receiver E, and their ends protrude through the cover R.

Such being the construction, the operation is as follows: Steam being admitted at C impels the double piston J J, producing a rotary movement of the eccentric N and shaft G, the sliding box M working in the open guides L L. The exhaust steam escapes through the exhaust ports D D into the exhaust-receiver E, and surrounds the cylinders A A, preventing condensation of live steam within them, and effectually retaining the working parts at an even temperature, obviating liability to accident or breakage through overheating.

Another modification of the engine is shown by the elevation, Fig. 3, and the plan view, Fig. 4, the object of which is to dispense with the eccentric N, when its diameter becomes too large, and with its consequent friction, would be an objection to its use, and when a crank would not take up too much breadth to allow the double piston J J to be united. J′ J′ is a double piston, united by bars K′ K′. L is a connecting-rod, one end of which is connected to double piston J′, and the other end to crank M. Steam being admitted to double piston J′, a rotary motion is imparted to crank M′ by the connecting-rod L′.

When a reversing-engine is required, and except when the ordinary link-reversing gear is preferred, we use the reversing motion shown by Fig. 5, the object of which is to secure a simple and easy manner of changing the direction of motion. S S′ are a pair of eccentrics, cast or secured in position upon the bush T, which extends through valve-chest cover B′, and is capable of being moved along the engine-shaft G′ in the direction of the axis. The valve P′ is provided with tapered guides U U. On moving reversing-lever

V the eccentrics S S′ are moved along G′. One of them, S, leaves valve P; the other one, S′, then comes in contact with tapered guides U U, and, moving valve P′ over, works in the same place that S has left. The motion of engine-shaft G′ is then reversed.

To keep the engine-shaft bearings F and H steam-tight, and to permit their adjustment, we use two or more rings, W W, which fit steam-tight upon the engine-shaft G, and are turned conical to suit the bearing, which is bored conical to receive them. The rings W W are split on one side, and so placed that each shall break joint with the other. By pressing up the adjusting plate X the wear is taken up, and leakage prevented.

When engine-shaft G extends right through, or when an ordinary link or hook reversing motion is required, we may place valve-chest B on top of cylinders A A, and put through it a rock-shaft, with one arm inside to operate the valve, and one arm outside connected by an eccentric rod to an eccentric upon, G, outside the engine.

When water is used as a motor, we place valve-chest B below G to afford greater facility for the discharge-water to escape.

We may place two or more engines side by side within one exhaust-receiver, the engine-shaft having two or more eccentrics or cranks upon it, which are placed at right angles or other suitable angle with each other. Such an arrangement is shown by Figs. 5 and 6, Fig. 5 being an elevation, and Fig. 6 an end view of a double engine, with link-reversing gear, the valve-chest being placed between and on the top of the cylinders, and containing the valves for both engines.

It is evident that we may use any kind of valves and cut-off valves in ordinary use, by operating them inside or outside the engine, as the case may require, not being restricted to the common slide-valve only.

We operate the feed-pump in any convenient manner.

When the engine is to be applied to pumping purposes, the pump-rod may be secured to one end of double piston J, or a double pump-piston may be attached to an eccentric or a crank on the shaft G, in the same manner as double piston J. We may use the latter method to operate air and circulating pumps on condensing or compound engines.

We may use compressed air, water-pressure, or other motor, instead of steam.

We may place the engine in a vertical or other position, or two engines in the form of an X operating one eccentric, and one valve-eccentric operating the two valves.

We may use a crank and sliding box, instead of a connecting-rod, with double piston, similar to J J, when a much shorter engine is required than is attainable by the use of a connecting-rod.

We claim as our invention—

The combination of the two single-acting cylinders A A, surrounded by the exhaust-receiver E, the double piston J J, open guides L L, eccentric N, and sliding box M, substantially as described.

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