

W. W. CRANE.
Compound Steam-Engines.

No. 139,549.

Patented June 3, 1873.

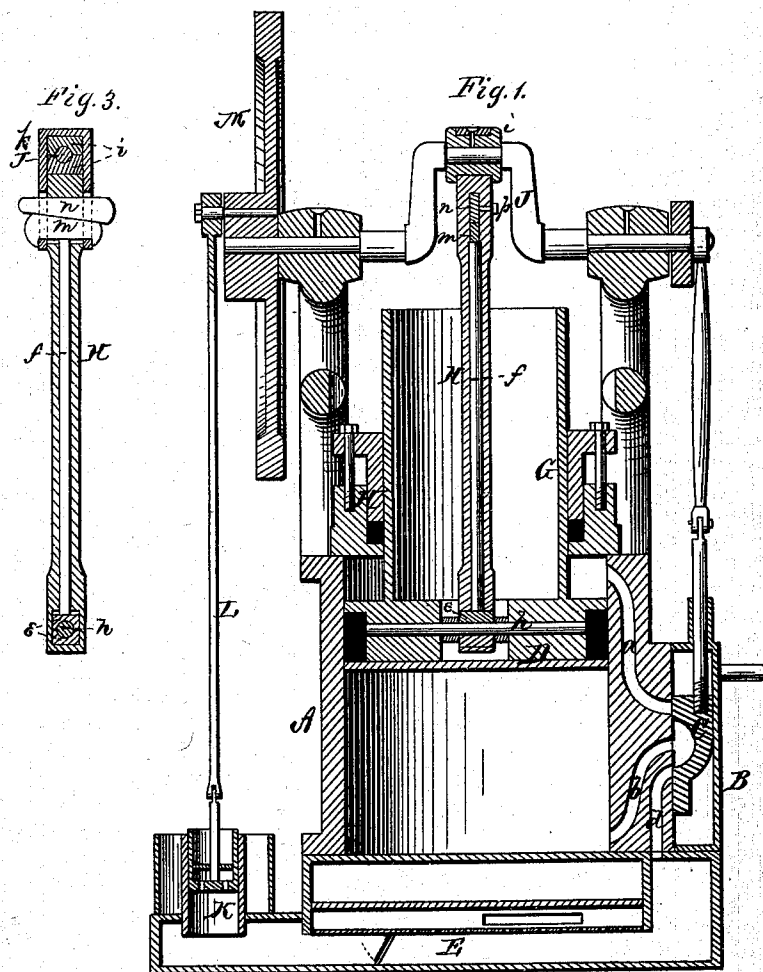
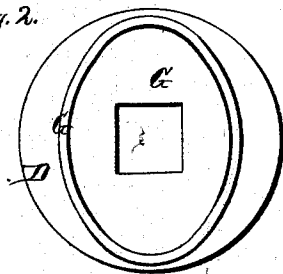


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

WELLSLY W. CRANE, OF AUBURN, NEW YORK.

IMPROVEMENT IN COMPOUND STEAM-ENGINES.

Specification forming part of Letters Patent No. **139,549**, dated June 3, 1873; application filed April 12, 1873.

To all whom it may concern:

Be it known that I, WELLSLY W. CRANE, of Auburn, in the county of Cayuga and in the State of New York, have invented certain new and useful Improvements in Compound Steam-Engine; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon making a part of this specification.

My invention relates to that class of compound steam-engines in which the steam is received from the boiler upon one side of the piston only, and after making one stroke of the piston is conveyed through suitable ports to the other side of the piston, and there expanding is used to make the return stroke, completing the revolution of the engine after which it is exhausted; and it consists in the arrangement of the steam-ports, whereby an ordinary slide-valve can be used; also in making the trunk oval or elongated; and in the construction of the connecting-rod; and also in the combination, with this engine, of a condenser into which the steam is exhausted for condensing the same, all of which will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, in which—

Figure 1 is a longitudinal section of my entire engine, Fig. 2 is an end view of the piston, and Fig. 3 is a longitudinal section of the connecting-rod.

A represents the steam-cylinder with steam-chest B, and C is an ordinary slide-valve working in said steam-chest. *a* and *b* are the two steam-ports admitting steam to the two ends of the cylinder on each side of the piston D within the same. *d* is the exhaust-port, located as shown on one side of the two steam-ports *a b*. The steam enters the steam-chest B from the boiler through the inlet-pipe *e*, and passes when the valve C is in proper position through the port *a* into the cylinder at one end, making one stroke of the piston, and just at or about the time when this stroke is completed the steam is cut off from said port *a* by

the valve, and a communication is opened between the ports *a* and *b*, so that the steam that had entered through the port *a* can return and pass through the port *b* into the other end of the cylinder on the other side of the piston, and there, by expansion, cause or make the return-stroke completing the revolution of the engine. As the communication between the ports *a* and *b* becomes broken by the movement of the valve, and just before the steam again commences to enter the port *a*, communication is opened between the port *b*, and the exhaust port *d* letting the steam, which has thus been used to make both strokes of the piston, pass out into a condenser, E.

By this arrangement of the steam and exhaust ports as described, an ordinary slide-valve may be used in the steam-chest without having any channels or ports of any description through the valve, except the usual concave on the under side. The piston D may be made in any of the known and usual ways, and provided with a trunk, G, which passes through a stuffing-box, H, at one end of the cylinder A. This trunk G is made in oval or elongated form, as shown in Fig. 2, which makes a greater space within the trunk for the movement of the connecting-rod when desired to contract the length of the engine to its shortest limit for the purpose of economizing room, as then the crank-shaft can be brought closer to the trunk than it could if the trunk were round, as is usually the case. I represents the rod connecting the piston D with the crank-shaft J. This rod is hollow for the greatest part of its length, and has a loose rod or screw, *f*, within it. The lower end of the hollow rod H is mortised for the reception of a bisected box, *e*, through which passes a rod, *h*, in the piston D. The rod or stem *f* rests upon this box *e*, and extends up through the hollow connecting-rod H, the upper end of said stem terminating in another mortise made in the rod H for the reception of a key, *m*, and wedge *n*. On the upper end of the connecting-rod H is a bisected box, *i*, placed on the crank of the shaft J, and held by a band, *k*. The key *m* is passed through both ends of this band and through the mortise in the connecting-rod, and when the wedge *n* is driven in, the interior rod or stem *f* will bring the two connections

to their respective positions. A set-screw, *p*, is then used to securely fasten the wedge *n*. The slide-valve *C* is operated by a rod from an eccentric on the crank-shaft *J* in the usual manner. The condenser *E* may be constructed in any of the known and usual ways, and the steam entering the same from the exhaust-port *d* is condensed in the usual way, and relieved by an air-pump, *K*, operated by a pitman, *L*, from a wrist-pin on a fly-wheel, *M*, attached to or on the crank shaft *J*.

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

1. The combination, in a trunk-engine, of the piston, *D*, ports *a b*, exhaust-port *d*, valve

C, and the condenser *E* placed under one head of the cylinder, all constructed substantially as and for the purpose set forth.

2. In combination with the piston and trunk of a trunk-engine, a hollow connecting-rod in combination with an internal tightening-rod, constructed as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 9th day of April, 1873.

WELLSLY W. CRANE.

Witnesses:

A. N. MARR,

C. L. EVERT.