(No Model.)

I. N. MOORE.

STEAM ENGINE.

No. 598,949. Patented Feb. 15, 1898.

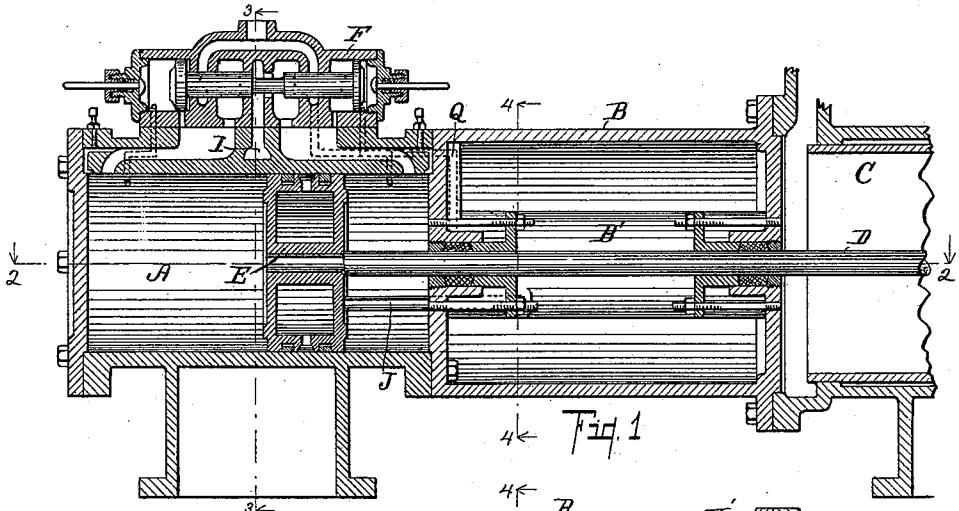

Fig. 1

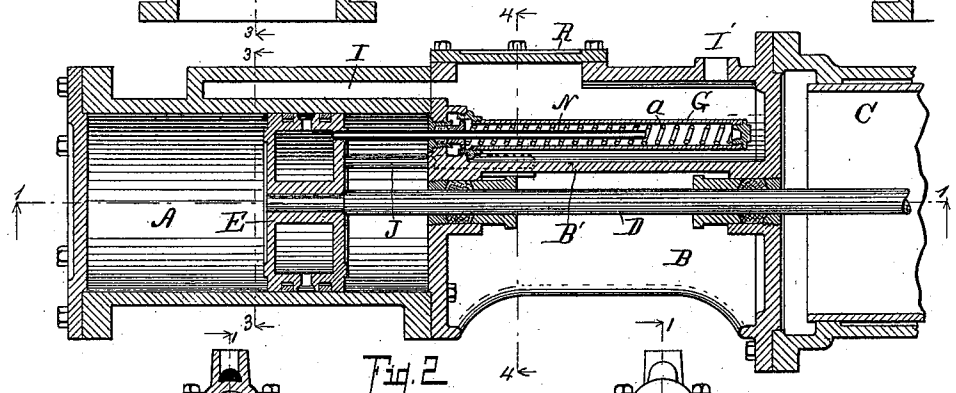

Fig. 2

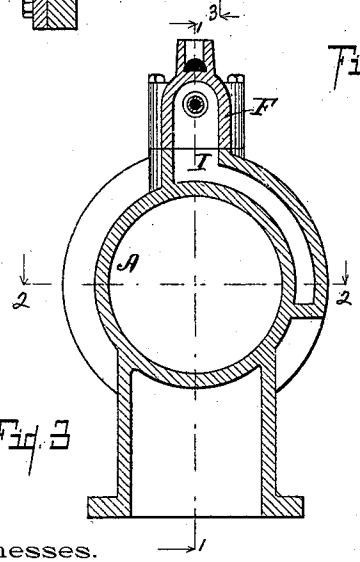

Fig. 3

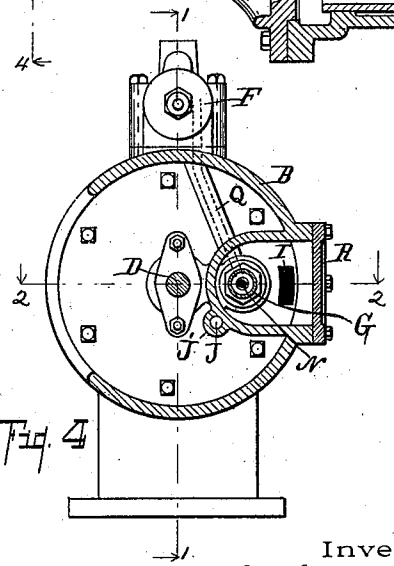

Fig. 4

Witnesses.

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UNITED STATES PATENT OFFICE.

ILA N. MOORE, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO THE UNION STEAM PUMP COMPANY, OF SAME PLACE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 598,949, dated February 15, 1898.

Application filed February 9, 1897. Serial No. 622,718. (No model.)

To all whom it may concern:

Be it known that I, ILA N. MOORE, a citizen of the United States, residing at the city of Battle Creek, in the county of Calhoun and State of Michigan, have invented a certain new and useful Improvement in Steam-Engines, of which the following is a specification.

My invention relates to improvements in steam-engines, and more particularly to steam-engines having automatic steam-actuated valves in which live or boiler steam is delivered through the piston-head to trip the valve.

The objects of this invention are, first, to simplify the construction of such devices; second, to provide a steam-engine which when used with the steam-pump enables the production of a short pump and engine combined; third, to provide improved means of heating the trip-tube and receiver to prevent any condensation at that point; fourth, to provide an engine of this class in which the actuating piston-rod is left intact, so that it is not weakened in any way.

Further objects will appear definitely in the detailed description.

I accomplish these objects of my invention by the devices and means described in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view through an engine and portions of a steam-pump embodying the features of my invention, taken on line 1 1 of Fig. 2. Fig. 2 is a longitudinal horizontal sectional view of the same, taken on line 2 2 of Fig. 1. Fig. 3 is a vertical transverse sectional view of the same on line 3 3 of Figs. 1 and 2. Fig. 4 is a transverse sectional view taken on line 4 4 of Figs. 1 and 2, showing the relation of the trip-tube, of the guiding-rod for the piston, and the steam-passages from the valve to the trip-tube and the exhaust-passage for heating the trip-tube and receiver.

In the drawings similar letters of reference refer to similar parts throughout the several views, and all of the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines.

In the drawings, A represents the steam-cylinder, which is supported on a suitable base. On the upper side of the same is an automatic steam-actuated engine-valve F, made in accordance with the design illustrated and described in my patent granted June 9, 1896, No. 561,682. The live-steam ports and exhaust-ports for actuating the valve and live-steam and exhaust ports of the engine cylinder and valve are substantially the same.

My invention relates to the connections for delivering live steam to the interior of the piston-head and to devices in connection therewith and does not relate particularly to the valve, which can be of any of the well-known patterns of this class of valve or a valve of any other suitable design adapted to these connections.

The exhaust I from the valve F extends down outside of the engine-cylinder, as clearly appears in Fig. 3. The engine here illustrated is shown in connection with a pump-cylinder C for forming a steam-pump. The head of the engine-cylinder A and of the pump-cylinder C are made integral with the central yoke B, which joins them together and which also joins the engine and pump cylinder together. This yoke B is made hollow, with an opening at one side, as clearly appears in Fig. 4, to permit of the adjustment of the stuffing-boxes on the piston-rod D, which connects with the piston E of the engine-cylinder. The piston E is made entirely hollow, preferably, and the hollow is connected by a suitable opening to the periphery of the piston to permit the passage of steam to the ports of the engine-valve to supply steam thereto for actuating the same, substantially as shown in my former patent above referred to. A tube N, which I will hereainfter call the "trip-tube," is connected to the hollow within the piston E and extends out through a suitable opening in the head of the cylinder A. Around the trip-tube N is a suitable stuffing-box to form a steam-tight joint to allow the same to recip-

rocate therethrough. Outside of this tube N is a steam-receiver F, which is preferably a larger-sized tube of brass or other suitable material. Within this receiver is a spring *a*, which passes against the outer end of the receiver and the gland of the stuffing-box and retains it in position. The passage Q connects with the receiver G, and the live steam of the boiler or steam-supply pipe, or engine-valve, or other source of steam-supply, as illustrated clearly in Figs. 1 and 4. A rod or pin J is placed upon the piston E of the engine and is positioned to slide into a suitable aperture J′ in the piston-head and casing to guide the piston-head and prevent its rotation, which would put strain upon the trip-tube N and prevent its perfect operation. By making the trip-tube large and heavy this pin J can be dispensed with; but it is desirable to make the trip-tube light and put in a pin which will serve the purpose. The pin J is tapered at the point and enters the hole J′. The hole J′ is of sufficient size so that the pin can enter without compressing air or steam back of it. This means of preventing the rotation of the engine-piston is of great advantage, as it causes the same to wear evenly and enables a more practical packing of the piston, and consequently prevents any leakage of the steam.

A portion of the yoke B is partitioned off by a partition B′, which forms a chamber around the receiver. A suitable hand-hole is provided opening into this chamber, which is covered by the lid R, which permits free access to the same to pack the stuffing-box around the trip-tube N and also permit of the proper insertion of the receiver and tube. This chamber is connected with the passage I (see Figs. 2 and 4) and steam is allowed to exhaust through the chamber and pass out at the port I′, as clearly appearing in Fig. 2.

Having thus described the improvement of my engine, I desire to state that its operation is substantially as follows: Steam is turned on in the usual way and live steam passed down through the passage Q to the receiver G and is delivered to the trip-tube N out to the piston for it to actuate the valve above the same, as in my patent above referred to. The exhaust-steam when the engine operates exhausts into passage I and circulates past the receiver G and keeps the same hot. This prevents any appreciable condensation of steam in the trip-tube and leaves it free for the passage of pure dry steam at all times. The construction accomplishes the saving of perforating the piston-rod D. It has heretofore been necessary to hollow out or cut away to accommodate the trip-tube or steam-passage. Also guiding the piston within the cylinder saves wear over the entire surface of the same and preserves the fit of the surfaces, as in making a ground joint.

It is needless to say that the partition B′ might be omitted with only the effect that the heating effect of the exhaust-steam is lost.

I also desire to state that the receiver might be directly connected with a source of steam or other pressure and that the engine would operate just the same.

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

1. In a steam-engine the combination of an engine-cylinder A; an automatic steam-actuated valve F, connected therewith; a hollow piston-head having an opening in its periphery to deliver steam to actuate the valve; an independent trip-tube N, connected to said hollow piston-head and extending out through the cylinder-head parallel with the piston-rod; a receiver G, for said tube N, connected with the source of steam-supply; a chamber surrounding said tube; an exhaust-passage I, connecting to said chamber to deliver the exhaust to heat the receiver; a pin J, on said piston-head parallel with the piston-rod and a register-hole in a suitable casing J′, to receive said pin to guide the piston all coacting as specified.

2. In a steam-engine the combination of an engine-cylinder A; an automatic steam-actuated valve F, connected therewith; a hollow piston-head having an opening in its periphery to deliver steam to actuate the valve; an independent trip-tube N, connected to said hollow piston-head and extending out through the cylinder-head parallel with the piston-rod; a receiver G, for said tube N, connected with the source of steam-supply; a chamber surrounding said tube; an exhaust-passage I, connecting to said chamber to deliver the exhaust to heat the receiver; all coacting as specified.

3. In a steam-engine the combination of an engine-cylinder A; an automatic steam-actuated valve F, connected therewith; a hollow piston-head having an opening in its periphery to deliver steam to actuate the valve; an independent trip-tube N, connected to said hollow piston-head and extending out through the cylinder-head parallel with the piston-rod; a receiver G, for said tube N, connected with the source of steam-supply; a pin J, on said piston-head parallel with the piston-rod and a register-hole in a suitable casing J′, to receive said pin to guide the piston all coacting as specified.

4. In a steam-engine the combination of an engine-cylinder A; an automatic steam-actuated valve F, connected therewith; a hollow piston-head having an opening in its periphery to deliver steam to actuate the valve; an independent trip-tube N, connected to said hollow piston-head and extending out through the cylinder-head to one side of and parallel with the piston-rod; a receiver G, for said tube N, connected with the source of steam-supply; all coacting as specified.

5. In a steam-engine the combination of an engine-cylinder; an automatic steam-actuated valve connected to said cylinder; a piston-head within said cylinder with a hollow having an opening to its periphery to deliver steam to actuate the valve and having a suitable tube connecting to the hollow of the piston-head and extending out through the cylinder-head and parallel with the piston-rod; a steam-receiver for said trip-tube connected with live-steam pressure for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

ILA N. MOORE. [L. S.]

Witnesses:
H. A. LATTA,
C. W. BRAINARD.