(No Model.)

W. P. & C. H. NORTON.

STEAM ENGINE.

No. 259,906. Patented June 20, 1882.

Fig. 1

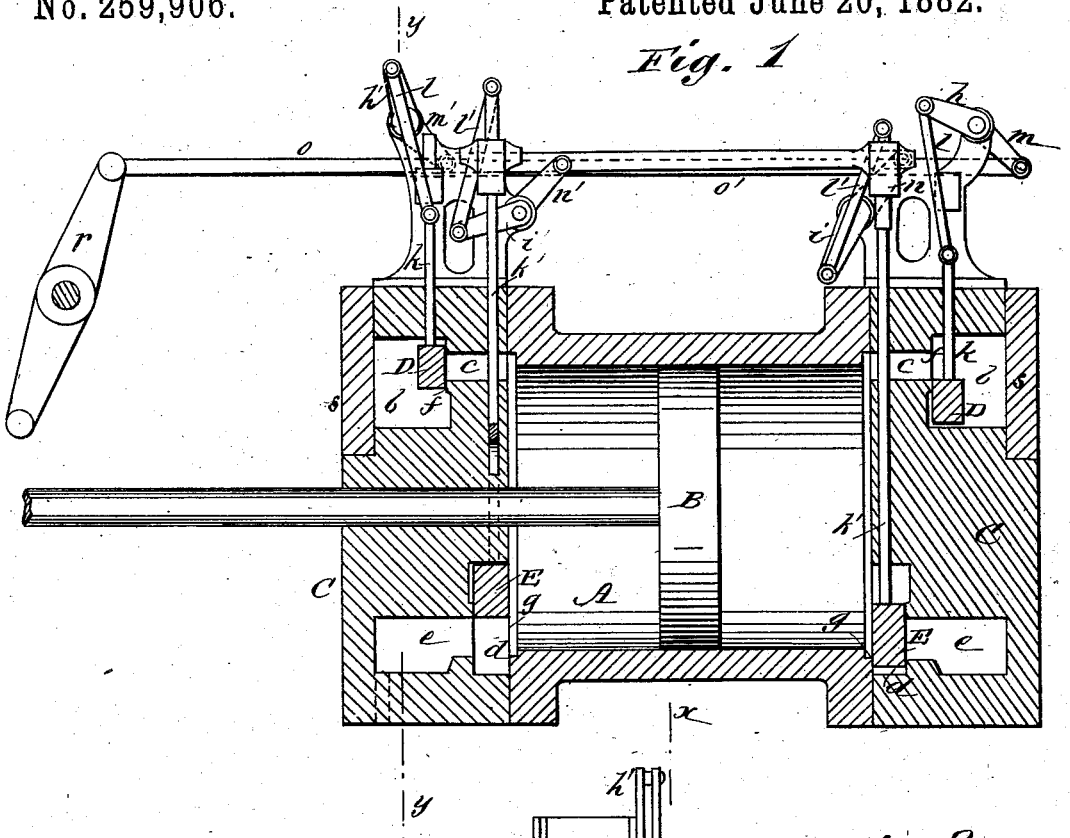
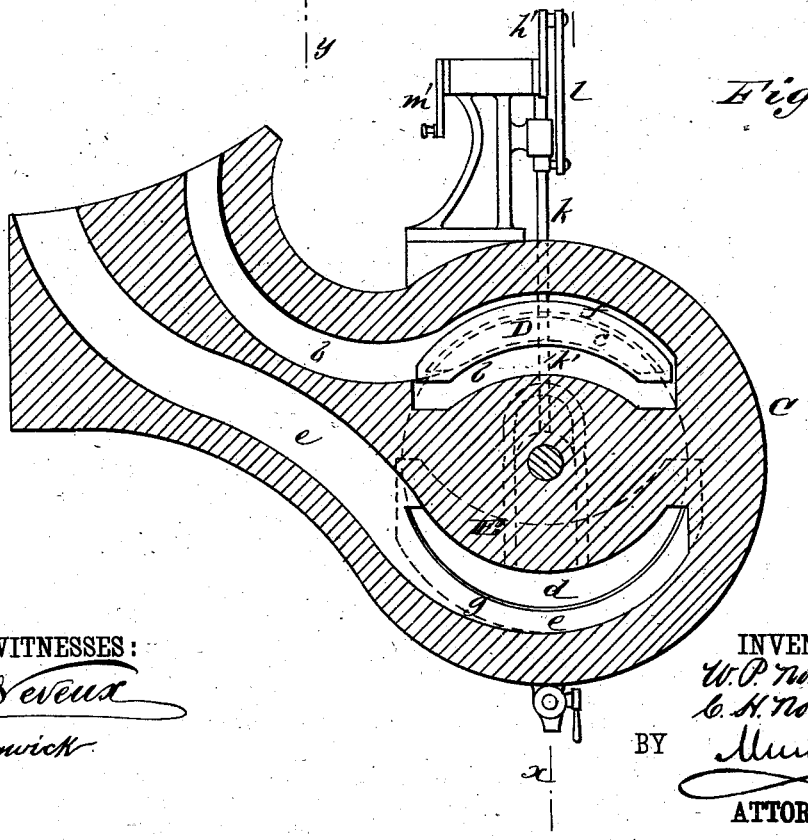


Fig. 2



WITNESSES:

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UNITED STATES PATENT OFFICE.

WENDELL P. NORTON AND CHARLES H. NORTON, OF THOMASTON, CONN.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 259,906, dated June 20, 1882.

Application filed April 4, 1882. (No model.)

To all whom it may concern:

Be it known that we, WENDELL P. NORTON and CHARLES H. NORTON, of Thomaston, in the county of Litchfield and State of Connecticut, have invented certain new and useful Improvements in Steam-Engines, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a longitudinal vertical section on the line *x x* in Fig. 2 of a locomotive-engine cylinder with piston therein and having our invention applied. Fig. 2 is a vertical transverse section of the same on the line *y y* in Fig. 1.

This invention is more particularly designed for locomotive-engines; and it consists in a novel system, or certain combinations within the cylinder heads or covers of the engine, of slide-valves which have an even and reduced wear, and which are restricted respectively either to admitting or exhausting the steam, and in certain constructions of the chambers and passages connected with said valves, whereby short steam-passages are obtained, thus reducing waste of the propelling-fluid, and the advantage of a separate exhaust and complete drainage, which are all provided for in a very simple manner, thereby supplying a want long felt in locomotive-engines, whereby, also, a longer port-opening is obtained at starting and other advantages are secured.

In the drawings, A indicates the cylinder of a locomotive-engine, B its piston, and C C its heads or end covers. Said covers C C are of a hollow construction, being formed respectively each with a curved steam-inlet passage, *b*, that communicates with an upper arched inlet-port, *c*, which has its concave surface uppermost and concentric, or approximately so, with the cylinder, and so that the longest chord of the arc is uppermost, or on the side from which the inlet-valve moves in opening.

On the opposite side of the axis of the cylinder to the inlet-port *c* is a reversely-arched exhaust-port, *d*, with the longest chord of the arc lowermost, or on the side from which the exhaust-valve moves in opening. This exhaust-port *d* communicates with an exhaust-passage, *e*, which forms a concave bottom below the port *d*, from which drainage-water is readily drawn. These ports *c* and *d* and passages *b e* are the same at both ends of the cylinder and in both cylinder-covers, and the exhaust ports and passages *d e* are made of larger area or capacity than the inlet ports and passages *c b* to give a free and quick escape for the exhaust-steam from opposite ends of the engine-cylinder successively.

Controlling the inlet-ports *c c* are independent slide-valves D D, of like shape with said ports, and which in opening move alternately radially inward toward the center of the cylinder; and controlling the exhaust-ports *d d* are similar but longer or larger slide-valves, E E, of corresponding shape, with their ports on their opening edges, and which also move alternately radially inward toward the center of the cylinder, the faces or seats *f g*, against which said inlet and exhaust valves work, lying in planes which are at right angles to the axis of the cylinder. These motions of said valves and their reverse or return movements may be communicated in timely relation with each other by any suitable valve-gear or mechanism to admit and exhaust steam to and from opposite ends of the engine-cylinder successively, and the valves have any desired amount of lap or lead given them. In the drawings said valves D and E are shown as operated by cranks *h i h' i'* and rods *k l* and *k' l'* from or by means of cranks *m n* and *m' n'*, actuated by rods *o o'*, by a rocking arm or beam, *r*.

The close arrangement of the several valves within the lids or covers C C to the ends of the cylinder makes the passages for waste of steam very short, and the arc or arch shape of the ports relatively to the movement of the valves insures a larger or longer port exposure and quick action when the valves are opening. An independent free exhaust is obtained by separate valves at the termination of each stroke, and complete drainage is provided for. The valves, being sliding ones, are not liable to unequal wear and will wear but slowly, and when necessary to repair or renew the inlet-valves D D the same may readily be done by removing and replacing them through openings closed by secondary covers *s s*, but this will seldom be necessary; and in case of the exhaust-valves E E, which are exposed to still less wear, they may be removed with no more

trouble than attends the removal of a steam-chest, and their removal will give access to the cylinder and piston at the same time. When the cylinder-heads are removed these valves E E can be taken out, their seats refaced in a lathe, and they can be replaced and set before securing the heads on again.

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

1. The combination, with either cylinder head or cover C, of the exhaust-passage *e*, having a concave draining-base within said head, the reversely-arched inlet and outlet ports *c d*, and the independent inlet and outlet slide-valves D E, for operation within the cylinder-heads and relatively to the ports, substantially as specified.

2. The combination, with a locomotive-engine cylinder and the independent slide-valves D E, of the heads C C, having the curved steam-inlet passages *b*, provided with the upper enlarged curved inlet-ports, *c*, concaved on the upper side concentrically with the cylinder, and the reversely-arched exhaust-port *d*, having a passage, *e*, concaved on the upper side, the exhaust ports and passages being larger than the inlet ports and passages, as and for the purpose specified.

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CHARLES H. NORTON.

Witnesses:
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