(No Model.)

2 Sheets—Sheet 1.

J. T. CASE.

STEAM ENGINE AND SHAFT HANGER.

No. 373,880. Patented Nov. 29, 1887.

Fig. 1.

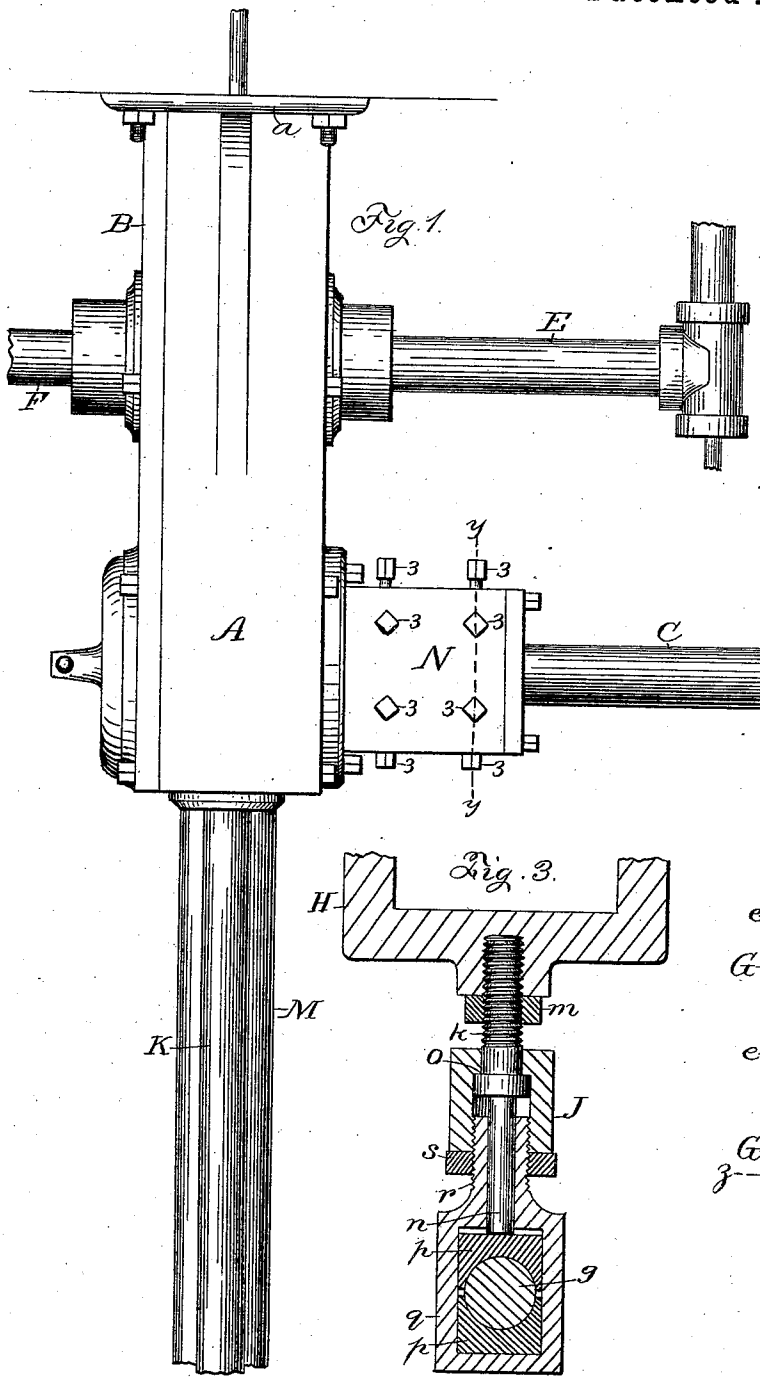


Fig. 2.

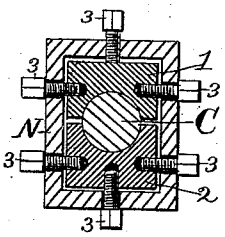


Fig. 3.

Fig. 4.

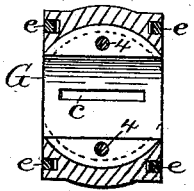
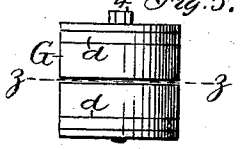


Fig. 5.



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(No Model.)

2 Sheets—Sheet 2.

J. T. CASE.

STEAM ENGINE AND SHAFT HANGER.

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Fig. 6.

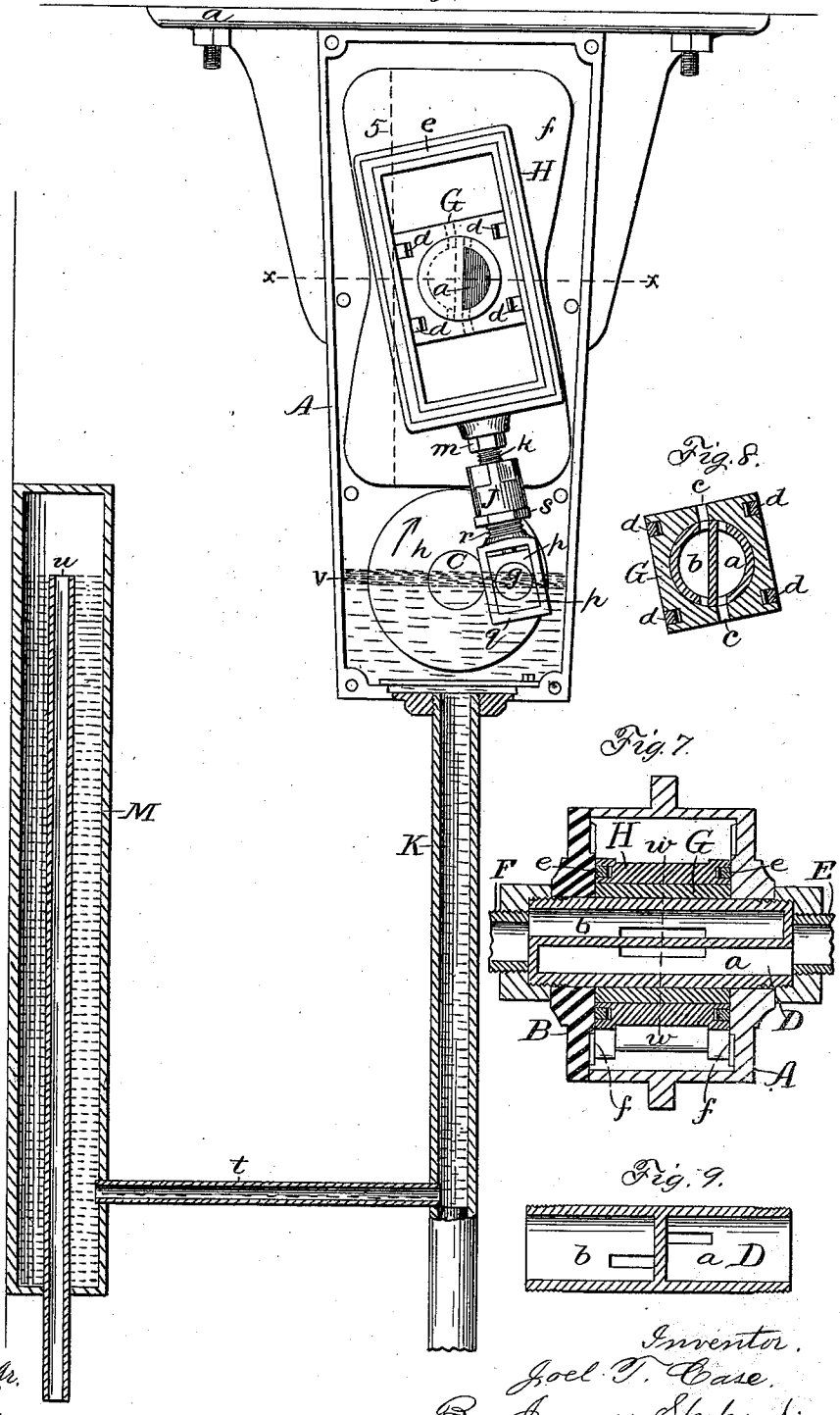


Fig. 8.

Fig. 7.

Fig. 9.

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UNITED STATES PATENT OFFICE.

JOEL T. CASE, OF BRISTOL, ASSIGNOR TO THE J. T. CASE ENGINE COMPANY, OF NEW BRITAIN, CONNECTICUT.

STEAM-ENGINE AND SHAFT-HANGER.

SPECIFICATION forming part of Letters Patent No. 373,880, dated November 29, 1887.

Application filed June 13, 1887. Serial No. 241,094. (No model.)

To all whom it may concern:

Be it known that I, JOEL T. CASE, a citizen of the United States, residing at Bristol, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Steam-Engines and Shaft-Hangers, of which the following is a specification.

My invention relates to improvements in steam-engines; and the objects of my invention are to simplify the construction, to bring the engine into a compact form, to increase the efficiency of the machine, and to adapt the engine for use as one of the hangers for a line of shafting.

In the accompanying drawings, Figure 1 is a front elevation of my engine, together with a portion of the shafting which it drives. Fig. 2 is a transverse section of said shafting and bearings on line *y y* of Fig. 1. Fig. 3 is an enlarged view, partly in longitudinal section and partly in elevation, of the connecting-rod and crank for my engine. Fig. 4 is a transverse sectional view of my steam-box and piston slightly modified, the plane of section being indicated by the line *z z*, Fig. 5. Fig. 5 is an elevation of the piston shown in Fig. 4. Fig. 6 is a partial section and side elevation of my engine with the cap-plate removed. Fig. 7 is a horizontal section of the same on line *x x* of Fig. 6. Fig. 8 is a transverse section of my piston and steam-pipe, the plane of section being indicated by the line *w w*, Fig. 7; and Fig. 9 is a longitudinal section of my steam-pipe in a slightly-modified form.

The frame or case for my engine is in the form of a flat thin box, A, having a removable cap, B, upon one side. In the preferred form I provide its upper end with a flange, *a*, to enable it to be secured overhead in a pendent position to any suitable support, and thereby serve as one of the hangers for the main line of shafting, of which C designates one end. Extending transversely through the case I extend a hollow axle, D, which is preferably divided into two longitudinal chambers, *a b*, each having a port upon their upper and lower sides, opening radially, as shown in Figs. 7 and 8. The steam-pipe E is connected with the chamber *a*, and the exhaust-pipe F extends from the chamber *b*. Surrounding this hollow axle is what I term the "piston" G, said piston being provided with a port, *c*, Fig. 8, at each end, the same being also indicated by the broken lines in Fig. 6. Surrounding the piston G and fitted thereto is a steam-box or frame, H, the piston being preferably fitted to the sides of this steam-box with packing rings or strips *d*, of ordinary construction. The open sides of this frame or steam-box are covered and closed by the broad sides of the frame or case A and its cap B, which steam-box may be fitted to the sides of the frame by means of similar packing-rings, *e*. For convenience of fitting, that surface of the inside of the frame over which the steam-box travels may be elevated a little from the rest of the surface, as shown by the elevation *f* in Fig. 6. This steam-box, when closed by the sides of the frame, constitutes in effect the cylinder of an engine, excepting that it reciprocates over the piston instead of having the piston reciprocate through the steam-box.

g designates the crank-pin on the disk *h* of the shaft C. I connect the steam-box H to the crank-pin *g* by means of the connecting-rod *k*, which is screwed into one end of the steam-box H and held in place by a set-nut, *m*. The lower end of the connecting-rod is provided with a round shank, *n*, and a shoulder, *o*. The crank-pin *g* is held between two half-boxes, *p p*, Fig. 3, which boxes are secured within a frame, *q*, having a threaded neck, *r*, through which the shank *n* of the connecting-rod passes and presses upon one of the half-boxes. A recessed nut, J, having a hole in one end through which the threaded portion of the connecting-rod *k* extends, is placed on said rod *k*, with the bottom of the recess bearing upon the shoulder *o*. This recessed nut is screwed upon the threaded neck *r* to press the end of the stem *n* firmly upon the half-box, and is secured in place, when properly adjusted, by the set-nut *s*.

Within the lower part of the frame or case I secure a pipe, K, which may be extended downward to the floor and form a standard to assist in supporting the engine in place. At one side of said pipe is a branch pipe, *t*, the pipe K being plugged up or closed below said branch pipe. This branch pipe *t* is connected with a chamber, M, which chamber is provided with a central outlet-pipe, *u*, which ex-

tends upward to a point about level with the axis of the shaft C. In use I fill the chamber M with water, which flows through the branch pipe *t* and into the pipe K and rises to the level of the upper end of the outlet-pipe *u*. Within the frame or casing A of the engine I place oil on top of the water, all as indicated at *v*, Fig. 6, the water within the parts below the oil being indicated by coarser transverse lines. The motion of the parts will cause the oil to be distributed through the case or frame, so as to keep the parts amply lubricated.

The chamber M is of greater diameter than the overflow-pipe *u* situated therein, in order that the disturbance of the liquid within the engine-casing by the rapidly-rotating crank-shaft and pitman shall not affect the overflow to such an extent as to materially vary the height of liquid within the engine-casing.

The bearing for the shaft C, I secure to one side of the case or frame A, as shown in Fig. 1, and the half-boxes thereof, 1 and 2, are adjusted to bring the shaft into proper position by means of the several adjusting-nuts, 3.

The sides of the piston and the walls of the steam-box which are fitted thereto are shown in Figs. 6, 7, and 8 as straight; but for convenience of fitting the piston and the confronting walls of the steam-box may be made of a circular form, with two sides of the piston slabbed off to fit the broad sides of the case or frame, as shown in Figs. 4 and 5. This difference in form makes no difference in the mode of operation. Instead of making the piston of a solid block bored through to fit it upon the hollow axle, it may be made in two parts, with a slight space between them, and secured together by means of bolts 4 4, as shown in Figs. 4 and 5, so that said two parts may be brought together slightly to adjust them to the hollow axle in case of wear. Inasmuch as it is the respective ends of the piston that are acted upon by the steam, this middle opening does no harm.

In Fig. 9 I have illustrated the hollow axle upon which the piston and steam-box are to be mounted as divided transversely instead of longitudinally; but its mode of operation is the same.

With live steam admitted through the pipe E when the parts are in the position shown in Figs. 6 and 8 the steam passes through the lower port *c* of the piston and drives the steam-box downwardly, so as to rotate the shaft in the direction indicated by the dart in Fig. 6, the exhaust-steam meantime escaping through the upper port *c* of the piston into the chamber *b* of the hollow axle D. As the crank *g* reaches the lowermost point of its stroke, both steam-ports *c* are closed by the solid metal between each pair of ports of the hollow axle, the crank imparting an oscillating motion to both the steam-box and piston. The further motion of the crank again opens the ports *c* of the piston, the upper one then registering with the port in the live-steam chamber *a* and the lower one with the port in the exhaust-chamber *b*, so that the steam-box H is driven in the upward direction, like changes being effected when the crank *g* reaches its highest point, and so on repeatedly as long as the steam is supplied.

While I prefer to arrange my frame or case in the form of a hanger, as my engine is compact enough to permit it to be so arranged, I do not wish to confine myself in all cases to such an arrangement, as it is evident that many features of my invention are the same without reference to this fact.

I have herein described the part G as the piston and compared the steam-box H to a cylinder, because the part G divides the box into two chambers, similar to the two ends of a cylinder. I am aware, however, that these parts are entirely different from the ordinary piston and cylinder of a steam-engine, so that it is difficult to determine which part most nearly resembles the ordinary piston, and therefore I wish my claims to be understood, wherein they specify the box H and the piston G, as referring to the parts which I have described by these names, or their manifest equivalents.

I do not claim as new, in an engine, a hollow axle having radial ports and a surrounding port-block mounted to rock thereon, so as to open and close the ports in said axle.

By the arrangement of the oscillating and reciprocating steam-box on the rocking piston the motions are smoother and can be run at a higher speed.

I claim as my invention—

1. In an engine, a hollow axle provided with a steam chamber and port, the oscillating piston mounted thereon, and also provided with a port for registering therewith, the box H, fitted to said piston and connected to a driving-crank, substantially as described, and for the purpose specified.

2. The combination of the hollow axle provided with steam and exhaust chambers, each having a steam-port, the piston G, mounted thereon and provided with a steam-port for registering alternately with the ports of the steam and exhaust chambers, and the reciprocating and oscillating box fitted to said piston and connected with a driving-crank, substantially as described, and for the purpose specified.

3. The combination of a driving-crank, the reciprocating and oscillating box, the piston fitted within said box, the case or frame covering the broad sides of said reciprocating and oscillating box and piston, and the hollow axle on which the piston is mounted, said axle and piston being provided with connecting ports, substantially as described, and for the purpose specified.

4. The combination of the hollow axle having steam and exhaust chambers each provided with ports, the rocking or oscillating piston fitted to said axle and provided with a port

at each end, and the reciprocating and oscillating box connected with a crank fitted to said piston and adapted to be driven both ways by the steam passing alternately through the ports at the respective ends of the piston, substantially as described, and for the purpose specified.

5. The combination, with an engine-casing, of a lubricating device consisting of the pipes K *t u* and the chamber M, the latter being of larger diameter than the overflow-pipe *u*, all arranged as shown, substantially as set forth.

6. The combination, with an engine-casing, of a lubricating device consisting of the pipes K *t u* and chamber M, the pipe K being constructed to extend downwardly and form a supporting-standard, all arranged as shown, substantially as set forth.

7. In an engine, the combination of the connecting-rod *k*, having shoulder *o* and stem *n*, the frame *q*, containing the boxes for the crank and having a threaded neck, *r*, and the recessed nut for receiving the collar *o*, screwed upon the threaded neck *r*, and pressing the stem of the connecting-rod upon the half-box of the crank, substantially as described, and for the purpose specified.

8. The combination of a driving-crank, the reciprocating and oscillating box, the piston fitted within said box and mounted on a shaft, so as to have a rocking motion thereon, and the case or frame covering the broad sides of said reciprocating and oscillating box and piston, substantially as set forth.

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