

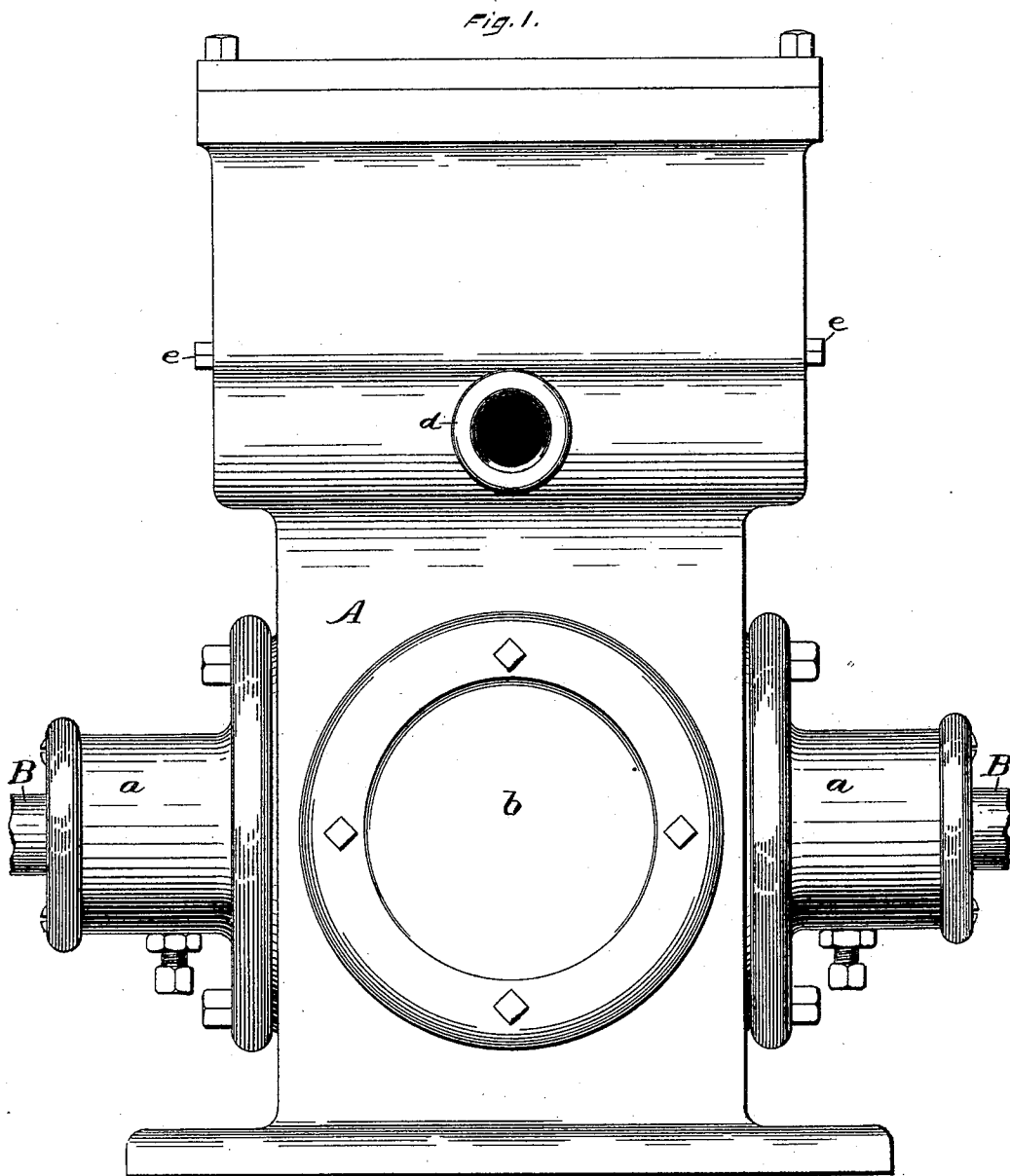
(No Model.)

4 Sheets—Sheet 1.

J. T. CASE.
STEAM ENGINE.

No. 394,911.

Patented Dec. 18, 1888.



Witnesses.

John Edwards Jr.
Thomas Crescaden.

Inventor.

Joel T. Case.
By James Shepard.

Atty.

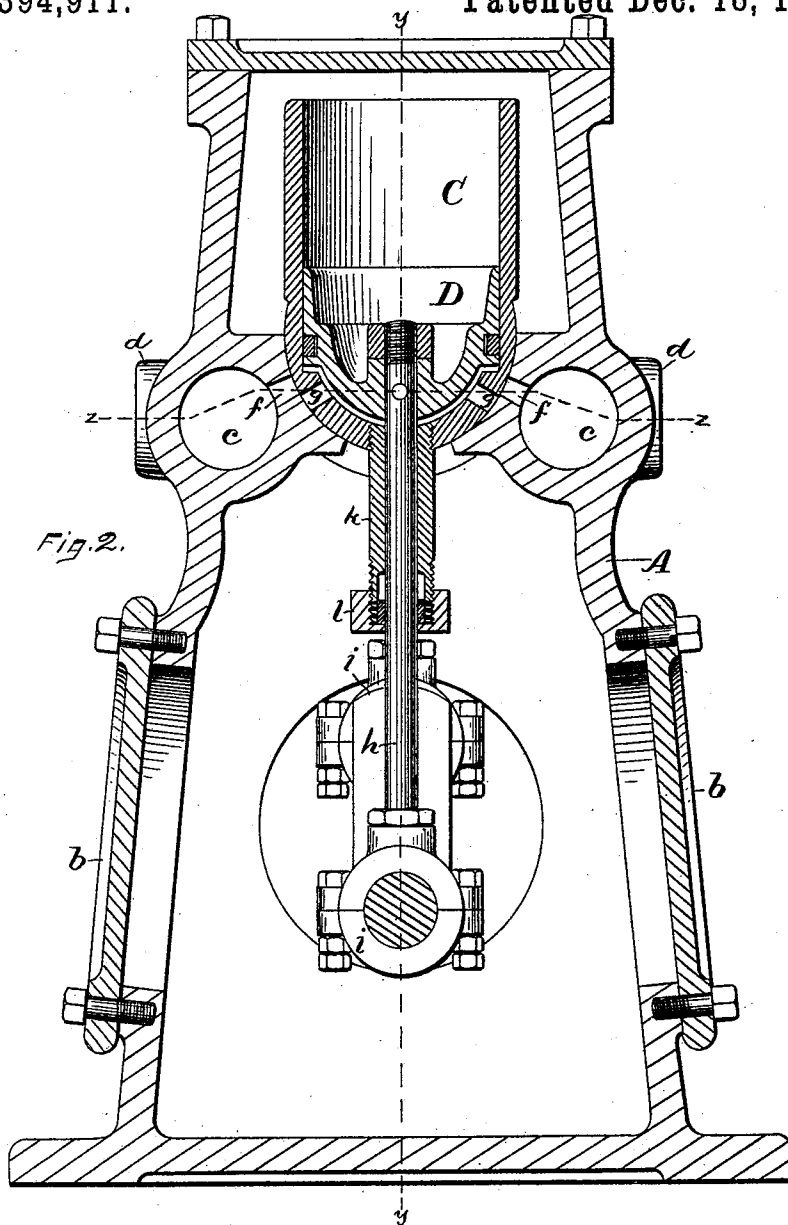
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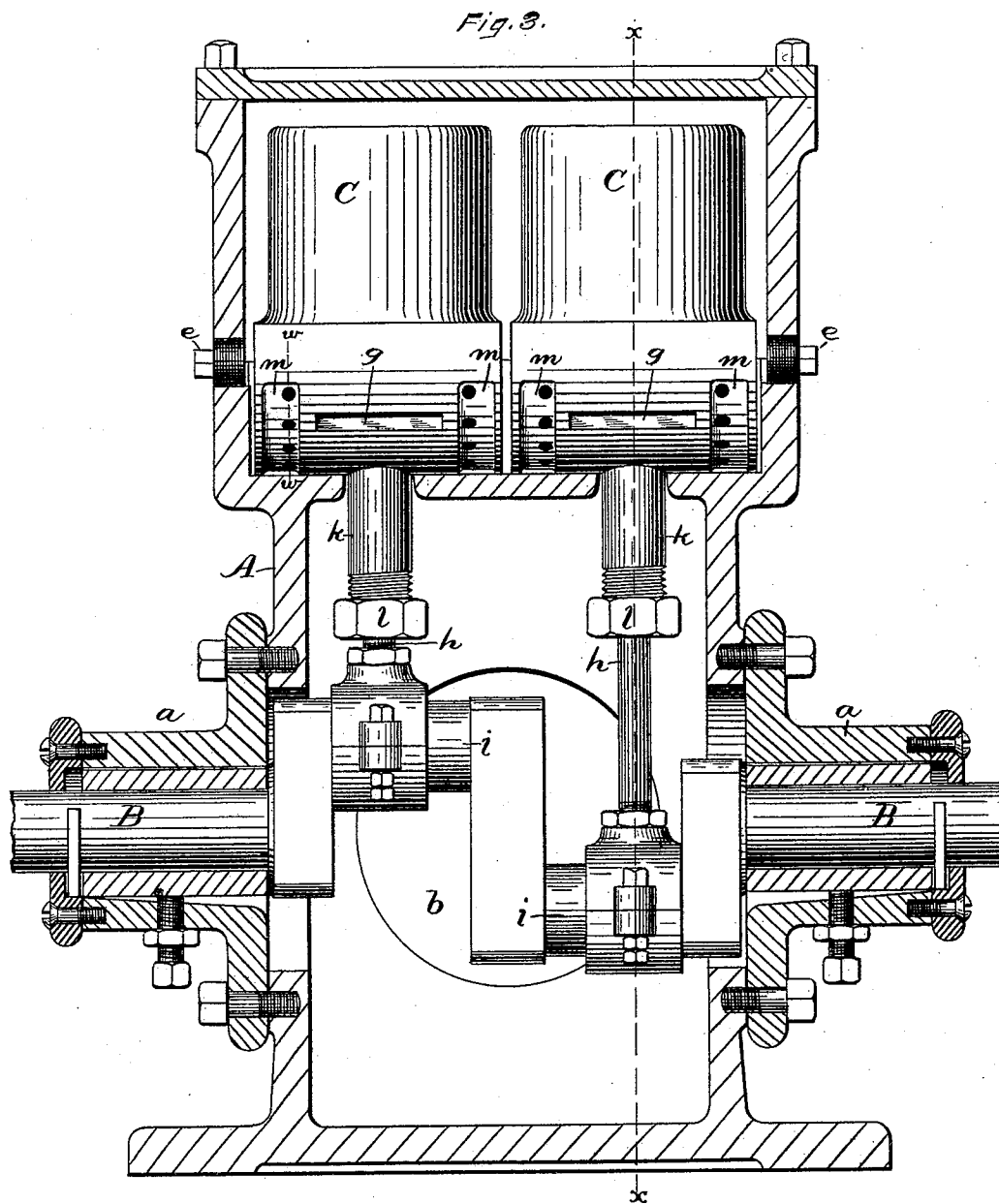
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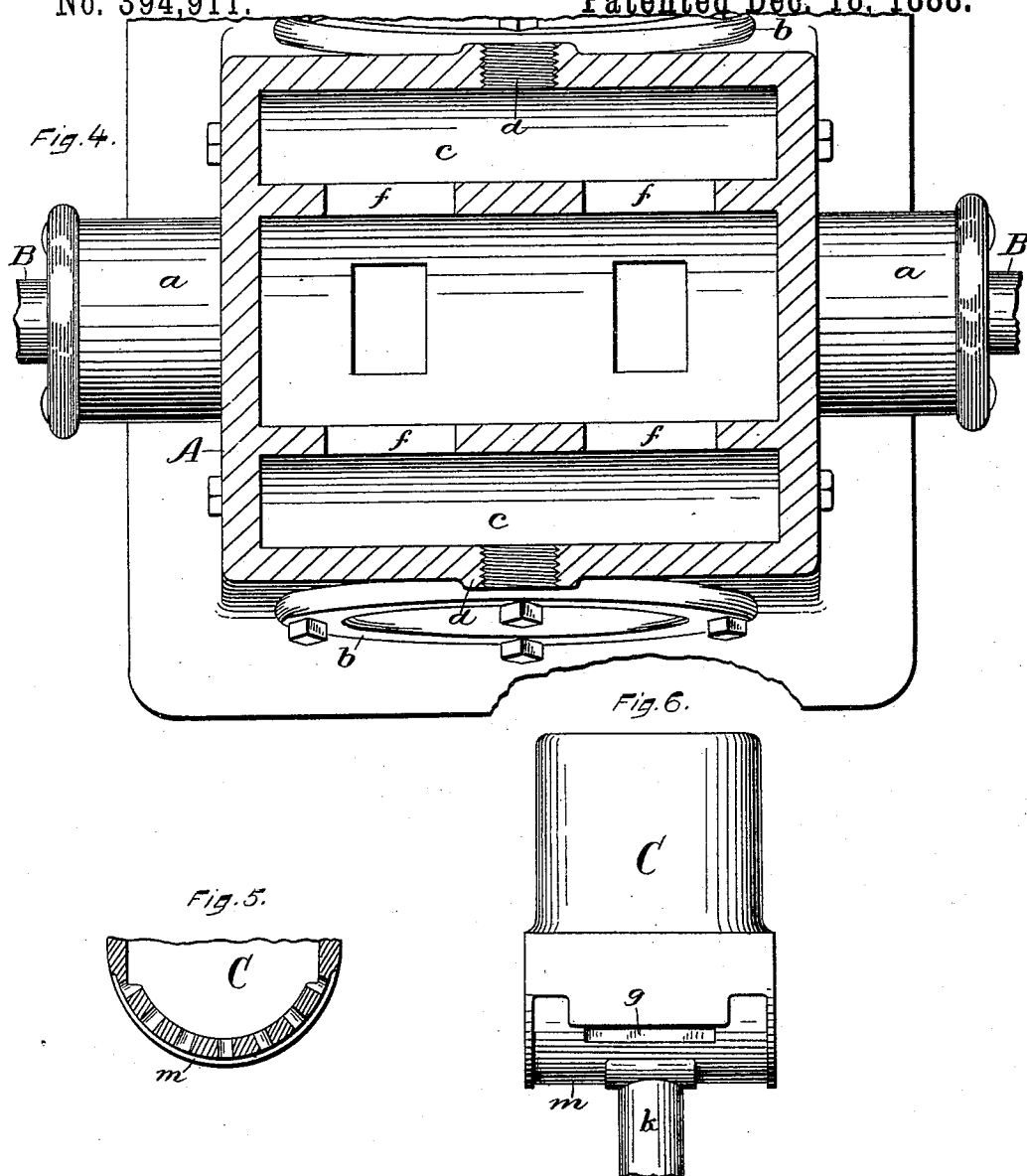
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WITNESSES.
John Edwards Jr.
Thomas Corradini

Inventor.
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By James Shepard. Atty.

UNITED STATES PATENT OFFICE.

JOEL T. CASE, OF BRISTOL, CONNECTICUT.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 394,911, dated December 18, 1888.

Application filed February 18, 1888. Serial No. 264,463. (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, of which the following is a specification.

My invention relates to improvements in steam-engines; and the objects of my improvement are to simplify the construction, and, in general, to increase the efficiency of the engine.

In the accompanying drawings, Figure 1 is a front elevation of my engine. Fig. 2 is a vertical section, partly in elevation, on line *x x* of Fig. 3. Fig. 3 is a vertical section, partly in elevation, on line *y y* of Fig. 2. Fig. 4 is a sectional plan view of the case on line *z z* of Fig. 2. Fig. 5 is a partial section of the cylinder on line *w w* of Fig. 3; and Fig. 6 is a side elevation of the cylinder, showing a modification in the form of the balancing-chamber.

A designates the case or frame, the lower part of which is provided with bearings *a a* for the crank-shaft B, and also with detachable caps *b b*, that cover holes through which access may be had to the interior of the lower part of said case. The upper part of the case is provided with two longitudinal side chambers, *c c*, to which pipes may be connected at the hubs *d d* for the admission and discharge of steam. Between these side chambers there is an upper chamber having a trough-shaped cylinder-seat semicircular in cross-section, and within which I arrange the cylinders C, said cylinders being semi-cylindrical at their lower ends, which ends are fitted to the cylinder-seat, as shown in Figs. 2 and 3. This cylinder-seat, of a semicircular form in cross-section, is easily turned out or finished by means of a boring-bar inserted through holes in the ends of the case, which holes are afterward filled by plugs *e*. Steam-ports *f f* are formed in the case leading from the longitudinal side chambers, *c c*, to the cylinder-seat of the upper chamber, and the semi-cylindrical ends of the cylinders are provided with ports *g* at points which traverse over the ports *f* during the oscillating movement of the cylinders. Within each cylinder I place a piston, D, Fig. 2, the same being connected

by a piston-rod, *h*, to the cranks *i* of the shaft B. The cylinder-seat is slotted, as shown, in order to allow the necessary swinging movement of the piston-rods. I prefer to attach to each cylinder C a sleeve, *k*, through which the piston-rod extends, and in the end of which may be arranged a stuffing-box, *l*, to make a tight joint.

In order to prevent the rounded ends of the cylinders from being forced to their seat with such pressure as to cause a great friction thereon, I form between the confronting faces of the cylinder end and its seat a chamber or chambers, *m*, which chambers I connect by means of openings with the interior of the cylinders, so that steam may enter the balancing-chambers *m*, and thereby relieve the working-faces of the cylinder end and its seat from undue pressure. As shown in Figs. 3 and 5, these balancing-chambers are arranged upon each side of the port *g* and connected with the interior of the cylinder by means of perforations. In Fig. 6 I have shown said balancing-chamber as extending nearly the whole width of the cylinder end and running into the port *g*, so that said chamber communicates with the interior of the cylinder through said ports *g*. So long as the cylinder end at the upper side of the port fits the cylinder-seat the action of the cylinder and its ports with the cylinder-seat and the ports *f* is not changed.

Live steam is admitted to either one of the longitudinal side chambers, *c c*, as may be desired, in which case the chamber on that side is the live-steam chamber and that on the opposite side is the exhaust-chamber. Fig. 2 represents the cylinder in the central point of its throw, and consequently the ports on both sides are closed. As the crank-shaft revolves so as to open the ports of the live-steam chamber, the steam is admitted into the lower end of the cylinder, thereby forcing the piston upwardly the length of its stroke. As the cylinder is rocked by the motion of the crank-shaft, the ports on the live-steam side are closed and those on the exhaust side opened, so that the steam is discharged during the return-stroke of the piston.

The engine may be worked with only one cylinder; but inasmuch as the piston is forced

in one direction only I prefer to employ two cylinders and pistons, as shown, so that while one is driven upward under steam-pressure the other cylinder may be discharging steam and the piston making its return-stroke. The number of pistons and cylinders can be increased to three or more by simply making the engine longer.

Some of the advantages of my invention are as follows: The cylinders are wholly supported on the rounded seats, upon which they oscillate, and are thus afforded an extended bearing-surface, which prevents any uneven wear or undue friction of the parts. Further, the ports in the rounded end of the cylinder and its seat are so located that an unbroken and continuous steam-tight joint is formed at the opening provided for the piston-rod and sleeve, whereby said opening is rendered thoroughly steam-tight without the employment of packing or stuffing boxes for such purpose, and, further, the cylinder is steam-balanced on its rounded seat and the wear of the cylinder-bearing and its seat is reduced to the minimum.

I claim as my invention—

1. In an engine, the combination, with a casing or frame provided with a rounded seat, of a cylinder constructed with a rounded end which is fitted to and supported by the rounded seat, said rounded cylinder end and seat having ports for the admission and exhaust of steam, the ports in the seat and cylinder being relatively arranged to insure the regulation of the admission and exhaust of steam by the oscillatory movement of the cylinder on its seat, and also to form a steam-tight joint between the cylinder-bearing and its seat at and around the opening provided for the piston-rod and sleeve, and suitable steam chambers or passages formed between the extended steam-tight joint-bearings on opposite sides of the opening in the casing for balancing the cylinder and relieving its bearing and seat of undue pressure and wear, substantially as set forth.

2. In an engine, the combination of the case

or frame having a cylinder-seat and ports formed in the walls of said seat, the cylinder having a rounded end fitted to and supported by said seat, and also having ports formed in said rounded end, a balancing-chamber, *m*, formed between the rounded end of said cylinder and its seat and communicating with the interior of said cylinder, a piston and piston-rod, and crank to which said rod is connected, substantially as described, and for the purpose specified.

3. In an engine, the combination, with a case or frame provided with an elongated rounded seat, of two cylinders, each constructed with a rounded end which is fitted to and supported by the elongated rounded seat, said rounded cylinder ends and elongated rounded seat being provided with ports for the admission of steam to and its exhaust from each of said cylinders, substantially as set forth.

4. In an engine, the combination, with a case or frame provided with two rounded seats, each provided with an opening for the passage of a piston-rod and sleeve, of two cylinders, each being open at one end and at its opposite end formed with a rounded end which is fitted to and supported by one of the rounded seats, said rounded cylinder ends and rounded seats being provided with ports for the admission and exhaust of steam, and pistons, piston-rods, and sleeves for transmitting power to a crank-shaft, substantially as set forth.

5. In an engine, the combination, with a case or frame provided with a rounded seat having an opening for the passage of the piston-rod and sleeve, and a cylinder fitted to and supported by said rounded seat, of a sleeve secured to the cylinder, a piston-rod extending through the sleeve, and a stuffing-box on the sleeve for packing the piston-rod, substantially as set forth.

JOEL T. CASE.

Witnesses:

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JOHN EDWARDS, Jr.