2 Sheets—Sheet 1.

T. F. SEARS.

Oscillating-Piston Engine.

No. 206,833. **Patented Aug. 6, 1878.**

Fig. 1.

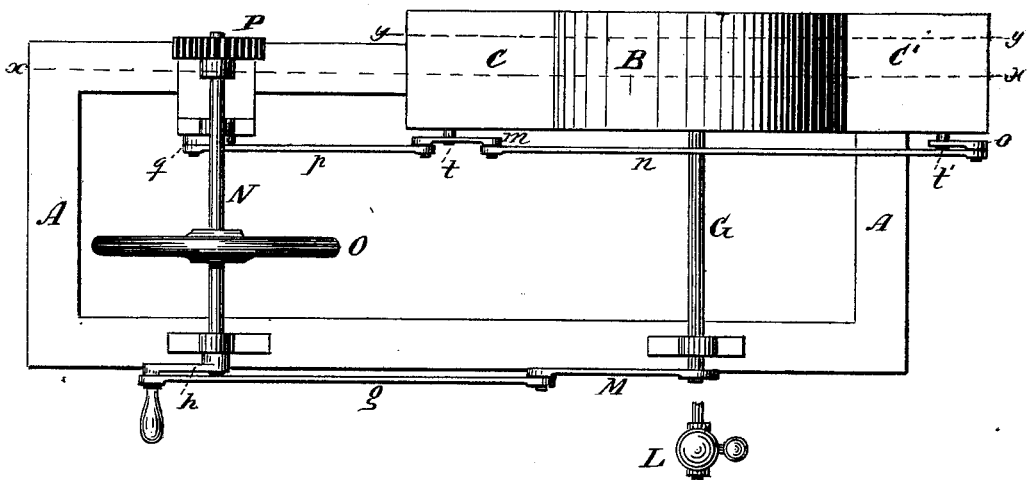
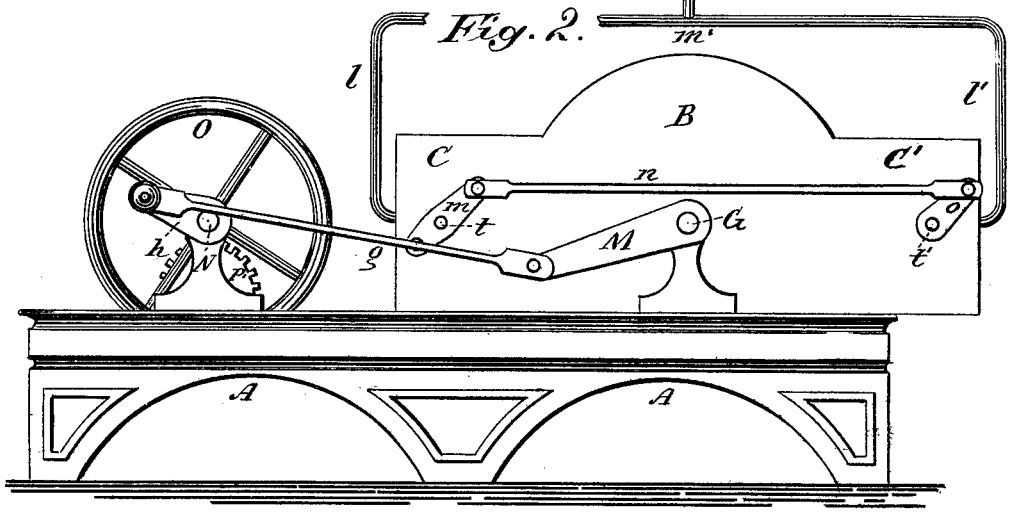


Fig. 2.



Attest:
M. Clements.
Jno. P. Brooks.

Inventor:
Thomas F. Sears
by C. A. Snow & Co.
his Attorneys.

2 Sheets—Sheet 2.

T. F. SEARS.

Oscillating-Piston Engine.

No. 206,833. Patented Aug. 6, 1878.

Fig. 3.

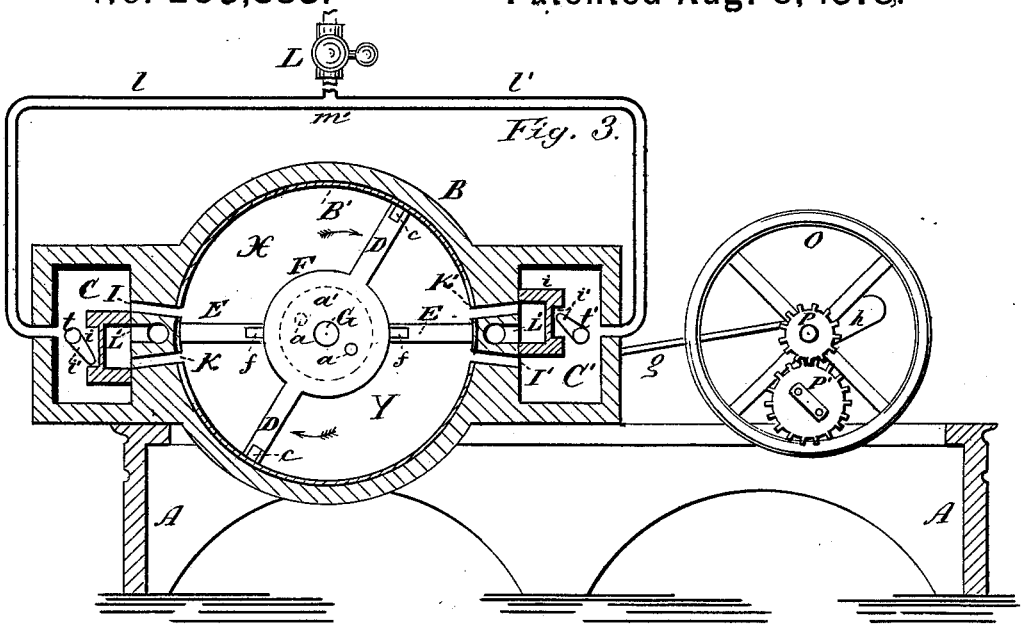


Fig. 4.

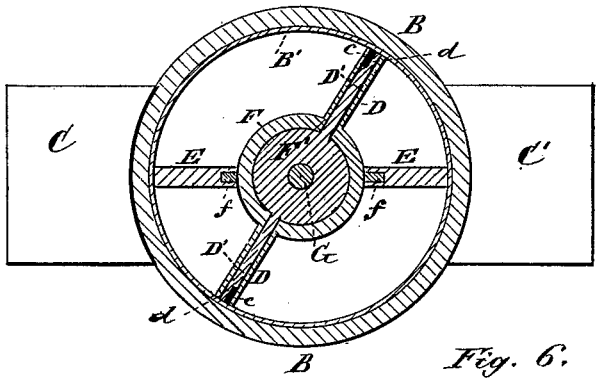


Fig. 5.

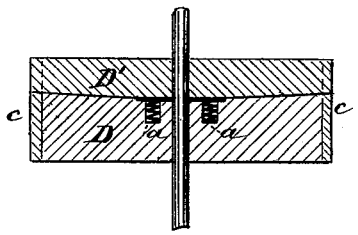
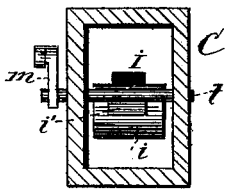


Fig. 6.



Attest:
M. Clements.
Jno. P. Brooks.

Inventor:
Thomas F. Sears.
by C. A. Snow & Co.
his Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS F. SEARS, OF BATTENVILLE, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE TEFFT, OF SALEM, NEW YORK.

IMPROVEMENT IN OSCILLATING-PISTON ENGINES.

Specification forming part of Letters Patent No. **206,833**, dated August 6, 1878; application filed August 31, 1877.

To all whom it may concern:

Be it known that I, THOMAS F. SEARS, of Battenville, in the county of Washington and State of New York, have invented certain new and useful Improvements in Oscillating-Piston Engines; and I do hereby declare that the following is a full, clear, and exact description of my invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a top plan. Fig. 2 is a side elevation. Fig. 3 is a vertical longitudinal section on the line *x x*, Fig. 1. Fig. 4 is a similar section on the line *y y*. Fig. 5 is a transverse section of the piston and piston-hub; and Fig. 6 is a front view of one of the steam-chests, the covering-plate having been removed.

Similar letters of reference indicate corresponding parts in all the figures.

My invention relates to oscillating-piston engines; and it consists in an improved construction and combination of parts, as hereinafter more fully described, and pointed out in the claim.

In the drawings, A is the bed or frame of the engine. B is the cylinder, and C C′ are the steam-chests. Placed inside of the cylinder, fitting tightly against its sides, is a cylindrical shell, B′, which forms the wearing-surface of the oscillating piston D. E E are the partition-walls, which are secured firmly on the inner side of shell B′ opposite to each other, their ends impinging upon the cylindrical piston-hub F, so as to divide cylinder B into two steam-tight compartments, X and Y. The ends of the walls or abutments E E are slotted to receive the spring-packing *f* and insure a steam-tight joint with hub F.

The oscillating piston consists, essentially, of three parts—viz., the central core or hub F, already referred to, the wings or arms D D, and an auxiliary packing-piston consisting of a central core, F′, and two wings or arms, D′ D′. Hub F has a circular recess or depression on one side, into which fits closely the auxiliary hub F′, which is pressed outward against the side wall or covering-plate of the cylinder by springs *a a*, sunk into the hub so as to work against the face of the auxiliary hub F′ and press it, with its wings, outwardly. The wings D′ D′ of hub F′ rest in slots in the arms D D, and the edges of arms D D D′ D′, which impinge upon shell B′, are provided with spring-packing *c*, to make steam-tight joints. The hub F′ has a central perforation, through which passes the rock-shaft G of piston D F D.

On each side of the cylinder are the inlet-ports I K I′ K′, which open into the steam-chests C C′, respectively, and the exhaust-ports L′ L′.

L is the steam-pipe, which branches off at *m′*, one branch, *l*, leading to the steam-chest C, and the other, *l′*, to the steam-chest C′.

M is the reciprocating crank of shaft G, which is connected by a rod, *g*, with the crank *h* of the drive-shaft N, to which a rotary motion is thus imparted.

O is the fly-wheel, and P P′ are belt-drums or gear-wheels, by means of which the machinery to be operated by the engine is set in motion.

The slide-valves *i k* are operated in the following manner: Each valve consists of a vertically-sliding plate, having a horizontal slot or recess, *i′ k′*, in its back part, in which works the projecting arm *k″* of an oscillating horizontal rod, *t t′*, which has its bearings in the sides of the steam-chest and projects through one side thereof. Rod *t* is operated by a crank, *m*, which connects by rod *n* with the reciprocating lever *o*, which latter has its fulcrum in the end of rod *t′*, and is operated by a rod, *p*, and eccentric or crank *q*, in the usual manner. By this arrangement valves *i k* will move in opposite directions, both admitting steam at I I′ simultaneously, and, when the stroke is reversed, at K K′ simultaneously.

From the foregoing description the operation of my improved oscillating-piston engine will be readily understood.

Steam entering the chambers X Y through ports I I′, respectively, the piston D F D is driven in the direction of the arrows until one-half revolution has been made, when the valves will shut off steam at I I′ and admit it at K K′, which causes piston D F D to be reversed

and rotate one-half revolution in the opposite direction, the steam escaping through the exhaust-ports L′. The next motion of the valves shuts off steam at K K′ and readmits it through ports I I′, which reverses the piston. At each up-and-down motion of valves *i k* the motion of the oscillating piston is in this manner reversed, each oscillation of the piston D F D, shaft G, and crank M causing one complete revolution of crank *h* and drive-shaft N.

If repairs to the piston or the dividing-walls E E are needed, these may readily be made by withdrawing shell B′ from the cylinder without disturbing the latter; and likewise, when this shell becomes worn by constant use of the engine too much to make a steam-tight joint with the piston, it may readily and without great expense be renewed.

If the partitions E E were secured upon the cylinder B itself, instead of upon its removable shell B′, it would be difficult to repair or replenish the spring-packing *f f*, which bears against and forms a steam-tight joint with the hub or core F of the oscillating piston; but by my improvement the partitions may be slid out with the shell, leaving the piston remaining in its place in the cylinder.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

As an improvement in oscillating-piston engines, the combination of the cylinder B, having steam-chests C C′, divided shell B′, having partitions E E, provided with the packing *f f*, and oscillating piston D F D, provided with spring-packing D′ F′ D′, substantially as and for the purpose hereinbefore set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

THOMAS F. SEARS.

Witnesses:

EDGAR S. HYATT,

JOHN D. HYATT.