No. 669,290.

Patented Mar. 5, 1901.

F. STOER.

ENGINE.

(Application filed June 22, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. II.

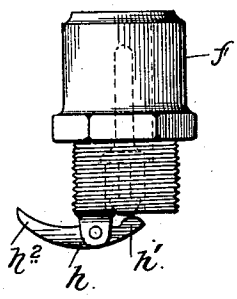


Fig. I.

Fig. III.

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Fig. IV.

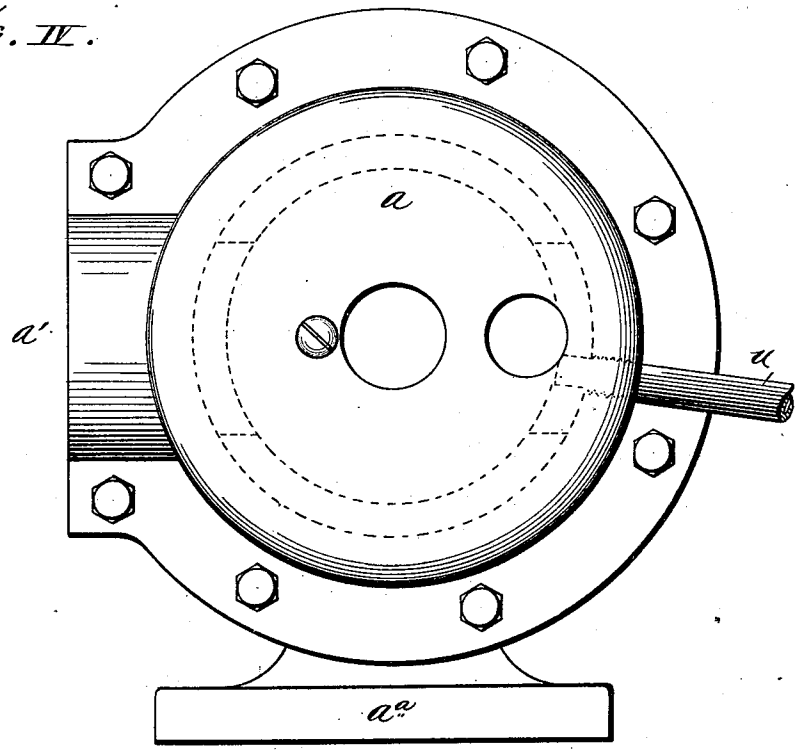


Fig. V.

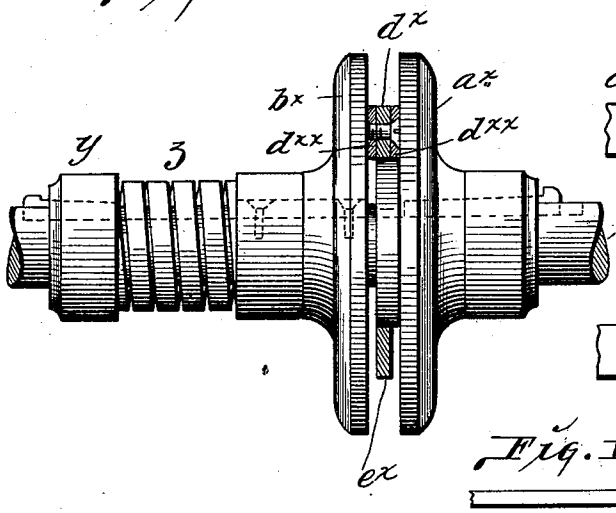


Fig. VI.

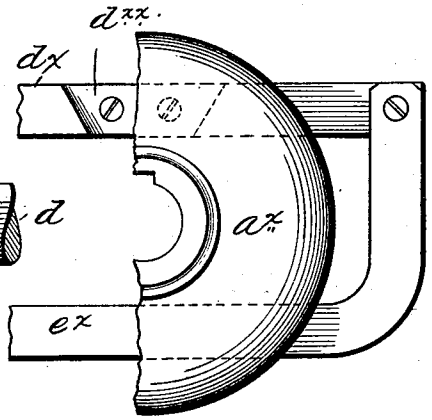


Fig. VII.



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UNITED STATES PATENT OFFICE.

FREDRICK STOER, OF ST. LOUIS, MISSOURI.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 669,290, dated March 5, 1901.

Application filed June 22, 1900. Serial No. 21,246. (No model.)

To all whom it may concern:

Be it known that I, FREDRICK STOER, a citizen of the United States, residing in the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an engine that may be constructed of small size and is suitable for use in furnishing power for automobiles, small boats, or other apparatus requiring but limited power for their operation.

The invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a longitudinal sectional view of the engine. Fig. II is a detail view of the inlet-valve housing. Fig. III is a detail view of the inlet-valve housing, taken from a position approximately at right angles to that seen in Fig. II. Fig. IV is a face view of the inner end of one of the engine-cylinder members. Fig. V is a view of the starting and reversing device and brake. Fig. VI is a detail view in elevation of the parts shown in Fig. V, one of the disks and a part of the other being omitted. Fig. VII is an edge view of the starting, reversing, or brake lever.

I have shown in detail and will describe but one end of the engine; but it will be understood that the opposite end is of the same construction, and the mechanism operates similarly at the undescribed end to the one described.

The cylinder is composed of two hollow members a, having their inner opposing ends flanged and joined together by coupling-screws inserted in the flanges.

a' is a bearing-box for the crank-shaft d, one half of the box being formed upon one of the members a and the other half upon the other member of the cylinder. One of the cylinder members is provided with a base a^a, upon which the cylinder is supported and held.

b b designate the two heads of the piston, which are connected by a central portion having a slot b', through which an oil-pipe u enters to the interior of the piston from the exterior of the engine-cylinder. b^2 is a slot also in the central portion of the piston, in which the crank-shaft d revolves as it turns in the reciprocation of the piston. These slots b' and b^2 are indicated by dotted lines, Fig. I. The oil-pipe u extends to the interior of the piston and serves to deliver lubricant to all of the interior working parts of the engine. m represents packing-rings seated in the piston-heads b. The crank-shaft d is connected to the piston by a coupling c, that is joined by a connecting-pin w to a knuckle-joint e, seated in one of the heads of the piston, as seen in Fig. I.

f designates a housing seated in the end of the cylinder and closed at its outer end by a recessed plug k. Within the housing f is a valve-chamber f', that contains the inlet-valve g and into which the pressure medium is introduced through an inlet-opening v. (See Fig. III and dotted lines, Fig. I.)

h is a pawl pivotally connected to the inner end of the valve-housing f and having an arm h', extending across the inner end of the inlet-valve g, and an arm h^2, extending in the opposite direction.

i designates a cushion-plunger loosely seated in the end of the cylinder and extending into the cylinder-chamber, where it normally rests against the arm h^2 of the pawl h. The head of the plunger i is located in a cushion-chamber x, that is closed by a screw-plug j and receives pressure medium from the valve-chamber f' through a communicating duct f^2.

l designates a hook carried by the engine-piston and seated in the head thereof. This hook is designed to engage the arm h^2 of the pawl h each time that the piston returns toward the inlet-valve and unseat said valve for the admission of pressure medium to the cylinder-chamber. As the piston approaches the end of the cylinder the hook l passes the pawl-arm h^2 and after completing its stroke begins the return stroke. As the piston moves back the hook l catches the point of the pawl-arm h^2 and carries it therewith, consequently throwing the arm h' inwardly against the inlet-valve g, moving said valve from its seat, and permitting the admission of pressure medium from the valve-chamber f' to the cylinder-chamber. The hook l retains engagement with the pawl h until the piston

has moved approximately one-third of its stroke and the crank-shaft d is a little past a dead-center. The pawl is then released by the hook moving away from it, the remainder of the stroke of the piston being accomplished by the expansion of the pressure medium in the cylinder and the inlet-valve g being closed by the pressure medium within the valve-chamber f'. As the inlet-valve closes the pawl-arm h' is carried inwardly and the arm h^2 is thrown in the opposite direction and strikes against the inner end of the cushion-plunger i, which is cushioned by the pressure medium flowing into the cushion-chamber x, thereby providing for the return of the parts to their former positions without jar or sudden impact, that would occasion undue wear.

n designates the exhaust-valve housing, and o the exhaust-valve carried by the valve-rod p, which extends into the piston-head b nearest the exhanst-valve and plays loosely in a bushing p', inserted in the piston.

s s are two nuts carried by the valve-rod p at its inner end and arranged to move within a sleeve q, that abuts against the bushing p'. When in the operation of the engine the piston has traveled approximately four-fifths of its stroke, the nuts s come against the inner end of the bushing p', in which the valve-rod slides, and the continued movement of the piston causes the valve-rod to be opened for the escape of pressure medium on the return stroke of the piston. Between the sleeves q, at each end of the piston, and the inner ends of the nuts s, upon the valve-rods at the opposite ends of the engine, is a cushion-chamber t, and loosely arranged in this chamber is a plunger r, that receives pressure medium entering into the chamber p past the valve-rod and nuts s. This plunger is designed to act against the pressure medium that has entered from the opposite side and carries the exhaust-valve to its seat upon the return stroke of the piston.

The engine herein described is intended for use in pairs in the same manner as marine engines are used, the crank-shafts of the two engines being arranged at right angles to each other, so as to avoid the occurrence of dead-centers in either.

In Figs. V to VII, inclusive, I have shown a starting and reversing or brake mechanism, which will now be described. $a^\times$ designates a disk rigidly mounted on the crank-shaft d. $b^\times$ is a sliding disk mounted on the crank-shaft d and held from turning thereon by a feather. (Shown by dotted lines in Fig. V.) The disk $b^\times$ is held toward the disk $a^\times$ by a spiral spring z, backed by a collar y, rigidly keyed to the crank-shaft. $e^\times$ is a yoke suitably supported in a position between the disks referred to. $d^\times$ is a lever pivoted to the yoke $e^\times$ and having applied thereto a pair of wedge-plates $d^{\times\times}$, arranged to be moved into a position between the disks $a^\times$ and $b^\times$. When it is desired to start the engine or to reverse the rotation of the crank-shaft d, the lever $d^\times$ is moved to carry the wedge-plates $d^{\times\times}$ into a position between the disks $a^\times$ and $b^\times$. On forcing the wedge-plates into such position the sliding disk $b^\times$ moves outwardly, and the frictional engagement between the wedge-plates and the disks causes the disks and the crank-shaft by which they are carried to be rotated a sufficient distance to carry the piston to a position at the end of either stroke, when the inlet-valve will be opened and pressure medium introduced into the cylinder-chamber to start or reverse the engine, as desired.

When the engine is in operation and it is desired to break its momentum, the lever $d^\times$ is moved into the position described for starting and reversing the engine, and the wedge-plates by frictional contact with the disks $a^\times$ and $b^\times$ produce a braking action to retard the rotation of the crank-shaft d.

I claim as my invention—

1. In an engine, the combination with a cylinder and piston arranged to operate therein; of an inlet-valve, a pawl adapted to press against said valve and means carried by said piston arranged to engage said pawl and unseat said valve, substantially as described.

2. In an engine, the combination with a cylinder and piston arranged to operate therein; of an inlet-valve, a pawl adapted to press against said valve, and a hook carried by said piston adapted to engage said pawl and unseat said valve, substantially as described.

3. In an engine, the combination with a cylinder and piston arranged to operate therein; of an inlet-valve, a pawl arranged to press against said valve, means carried by said piston adapted to engage said pawl, and a cushion-plunger located in the rear of said pawl, substantially as described.

4. In an engine, the combination with a cylinder and piston arranged to operate therein; of an inlet-valve, a valve-housing, a cushion-plunger having the head thereof arranged in a cushion-chamber provided with communication from the valve-chamber, a pawl adapted to press against said inlet-valve, and a hook carried by said piston arranged to engage said pawl and unseat said valve, substantially as described.

5. In an engine, the combination with a cylinder and piston arranged to operate therein; of an exhaust-valve; a valve-rod by which said valve is carried and by which it is connected to said piston, a sleeve in said piston, and a nut carried by the end of said rod within said sleeve, substantially as described.

6. In an engine, the combination with a cylinder and piston arranged to operate therein; of an exhaust-valve, a rod by which said valve is carried and by which it is connected to said piston, a nut on the inner end of said rod, a sleeve in which said nut is arranged to operate, and a plunger loosely arranged in said piston adapted to play therein, substantially as and for the purpose set forth.

7. In an engine, the combination of a cylinder, an inlet-valve in said cylinder, a piston, means carried by said piston whereby said valve is unseated on the stroke of said piston, and means located exterior of said cylinder by which said piston is moved to unseat said valve in starting or reversing the action of the engine, substantially as described.

8. In an engine, the combination of a cylinder, an inlet-valve in said cylinder, a piston, means carried by said piston whereby said valve is unseated during the stroke of said piston, a crank-shaft connected to said piston, and means carried by said crank-shaft exterior of said cylinder by which said piston is moved to unseat said inlet-valve in starting or reversing the action of the engine, substantially as described.

9. In an engine, the combination of a cylinder, inlet-valves arranged in said cylinder at each end thereof, a piston, and means whereby said valves are unseated on the movement of the piston in a direction away from either of said valves, substantially as described.

10. In an engine, the combination of a cylinder, inlet-valves arranged in said cylinder at each end thereof, a piston, means arranged to move against said valves to unseat them, and means carried by said piston adapted to engage and trip said valve-unseating means, substantially as described.

In testimony that I claim the foregoing I have set my hand this 1st day of June, A. D. 1900.

FREDRICK STOER.

Witnesses:
M. A. SEED,
C. S. MOODY.