F. M. ESLICK.

RECIPROCATING ENGINE.

APPLICATION FILED DEC. 14, 1911.

1,053,799.

Patented Feb. 18, 1913.

2 SHEETS—SHEET 1.

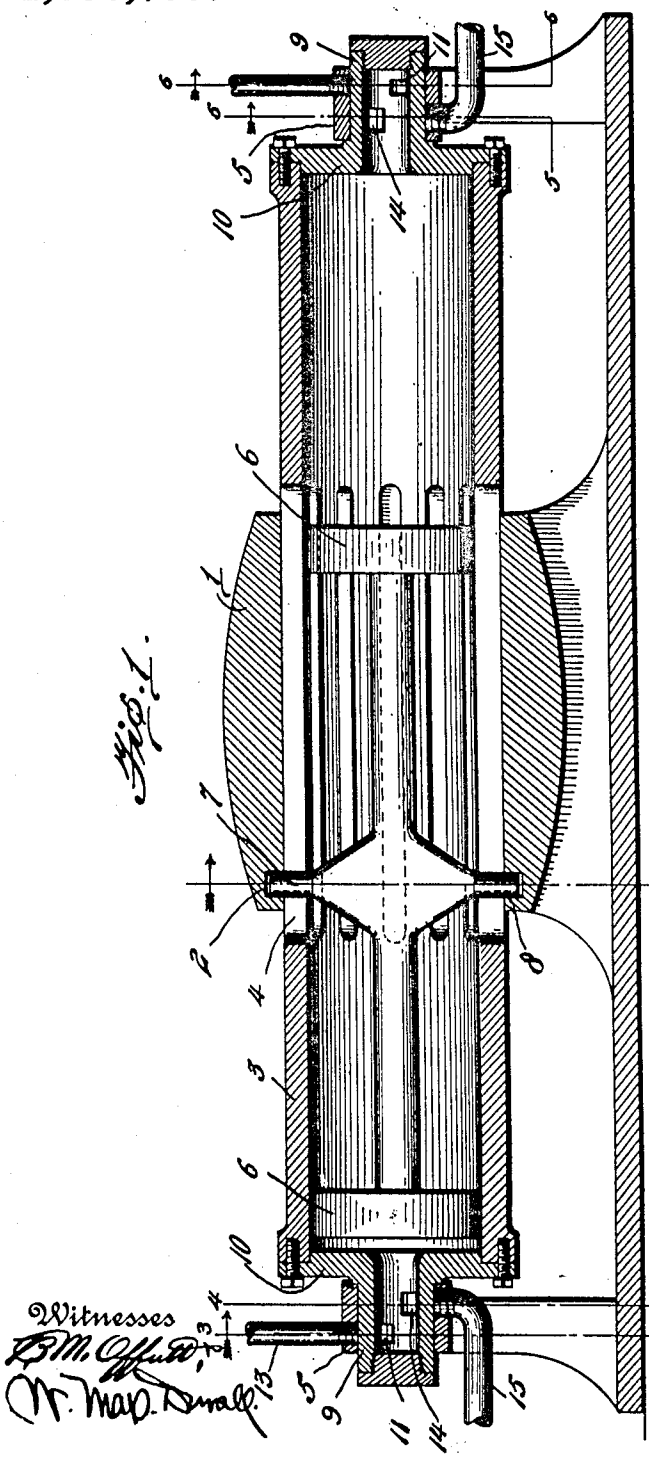

Fig. 1.

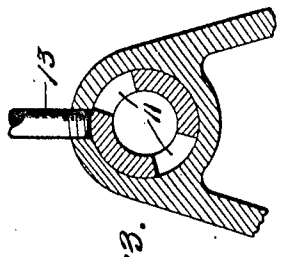

Fig. 3.

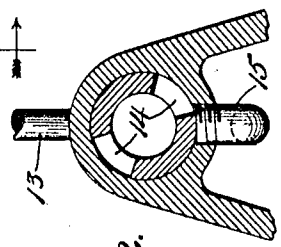

Fig. 2.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

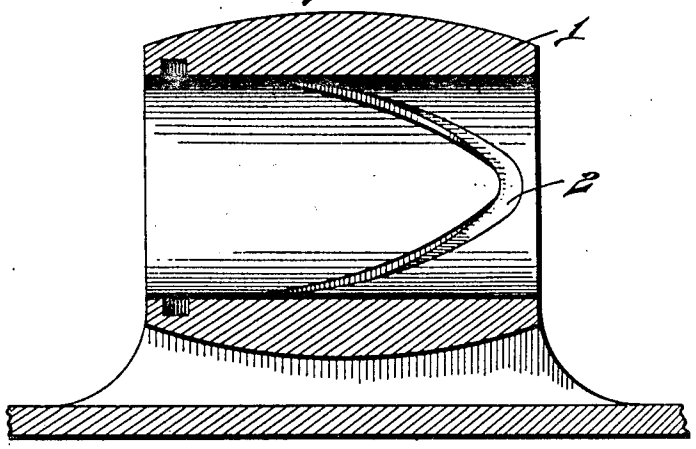


Fig. 5.

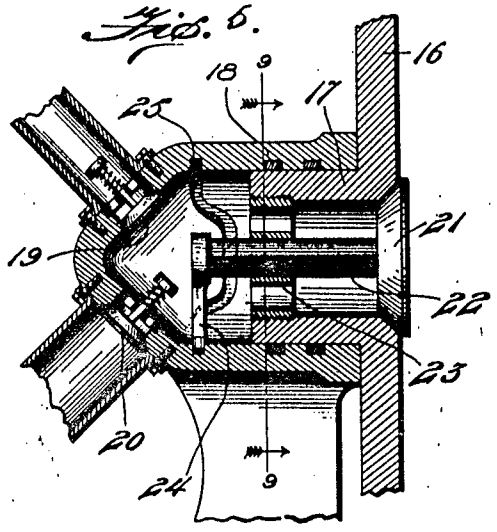
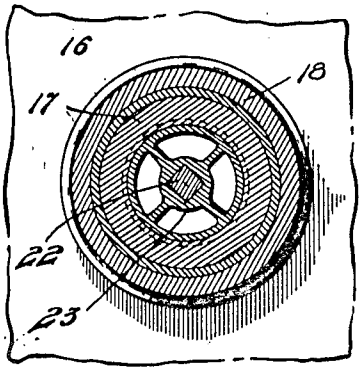


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

FREDERICK M. ESLICK, OF THE UNITED STATES NAVY.

RECIPROCATING ENGINE.

1,053,799. Specification of Letters Patent. Patented Feb. 18, 1913.

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To all whom it may concern:

Be it known that I, FREDERICK M. ESLICK, captain, U. S. Marine Corps, a citizen of the United States, at present stationed at the navy-yard, Washington, District of Columbia, have invented certain new and useful Improvements in Reciprocating Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in reciprocating engines, and it consists in the constructions, combinations and arrangements herein described and claimed.

An object of my invention is to provide an improved reciprocating engine adapted for operation at high speeds with a minimization of back pressure and leakage losses.

A further object of my invention is to provide an improved reciprocating engine in which all reciprocating parts and valve mechanism are inclosed by a single rotating element; thereby providing a compact and powerful construction in which the moving parts are advantageously protected from injury and the entrance of dust.

In the accompanying drawings, forming a part of this application and in which similar reference symbols indicate corresponding parts in the several views:—Figure 1 is a vertical, axial section, illustrating one embodiment of my invention; Figs. 2 and 3 are detail sections on the lines 5—5 and 6—6 of Fig. 1; Fig. 4 is an axial section of the stationary casing for rotatably supporting the power cylinder; Fig. 5 is a detail section, illustrating a modification; and, Fig. 6 is a section on the line 9—9 of Fig. 8.

Referring to the drawings, 1 indicates a stationary cylindrical casing provided with an internal, endless, spiral groove 2, and rotatably supporting a power cylinder 3 provided with a medial series of axially-extending slots 4 which extend past the ends of said casing 1; said cylinder being confined against axial shifting by end bearings 5. The slots 4 constitute exhaust openings for permitting free initial exhaust of the actuating fluid from the power cylinder, upon overriding of said slots by the power piston on approach of the latter to the end of its power stroke. A double-acting piston 6 is shown reciprocatingly mounted in the power cylinder and adapted to travel past the ends of said medial slots 4, for uncovering the latter at the end of each piston stroke. Projections 7 extend from said piston 6 through the cylinder slots 4 into sliding engagement with the spiral groove 2 of the stationary casing, for causing axial rotation of said cylinder and piston upon reciprocation of the latter; said projections being preferably provided with friction sleeves or rollers 8. Coaxial hollow bosses 9 on the cylinder heads 10 communicate with the cylinder 3 and are journaled in the stationary bearings 5; said bosses being provided with admission ports 11 for cooperating with a supply pipe 13, and with exhaust ports 14 for cooperating with a discharge pipe 15.

Figs. 1–4 illustrate my invention applied to a double-acting steam engine; the power piston 6 being shown just beginning its right-hand stroke, see Fig. 1. In this position of the parts, the admission port 11 of the left-hand boss 9 is just opening to the steam pipe 13 for admitting steam during the right-hand stroke of the piston 6, and the exhaust port 14 of said boss has just closed the exhaust pipe 15, the exhaust port 14 of the right-hand boss being open to the exhaust pipe and the admission port of said boss cut off from the steam pipe. The endless, spiral slot 2 in the stationary casing 1 is so formed that the power piston and cylinder are caused to rotate through 90° during each piston stroke; such rotation of the power cylinder advancing the admission and exhaust ports 90°, and thereby shifting said ports to position for admitting steam to the right-hand end of the power cylinder 3 and opening the exhaust at the left-hand end of said cylinder. The power piston 6 overrides the medial cylinder slots 4 at the inner end of its stroke and permits free exhaust of steam through said slots; thereby eliminating all danger of losses through back pressure even when the steam, or other actuating fluid, is admitted throughout the entire power stroke. The medial cylinder slots 4 may communicate with the outside air, or with a condenser for receiving the steam, and power can be taken directly from the rotating power cylinder 3 in any suitable manner, as by securing a pulley thereon.

Figs. 5 and 6 illustrate my invention adapted to a four-cycle internal combustion engine. In this construction, the cylinder

heads 16 carry hollow bosses 17 journaled in stationary bearings 18, in a manner similar to that previously described in reference to Fig. 1. The bearings 18 are provided with chambers communicating with the hollow bosses 17, and provided with induction and eduction check-valves 19 and 20. A main valve 21 for controlling the opening through each hollow boss 17 is carried by a spindle 22 slidably mounted in a spider 23 in said boss; the outer end of said spindle being provided with a tappet 24 for engaging an endless groove 25 in the bearing 18. The groove 25 is formed in an obvious way for maintaining the valve 21 firmly seated during the compression and power strokes of the piston, and to maintain said valve 21 open during the exhaust and suction strokes of said piston.

While I have illustrated means for adapting my invention for use with steam or an explosive mixture, it will be clear that it is equally adaptable for use with other gaseous or liquid actuated mediums.

I claim:—

1. In an engine, the combination of a cylindrical casing provided with internal spiral grooves, a power piston, a power cylinder having its medial portion journaled in said casing and provided with slots of greater axial extent than the stroke of said piston, and means carried by said piston in engagement with the walls of such slots and grooves.

2. In an engine, the combination of a cylindrical casing provided with internal spiral grooves, a power piston, a power cylinder having its medial portion journaled in said casing and provided with slots of greater axial extent than the stroke of said piston, means carried by said piston in engagement with the walls of such slots and grooves for rotating said cylinder and piston, and means operated by such rotation for controlling the supply of actuating fluid to said cylinder.

3. In an engine, the combination of a cylindrical casing provided internally with an endless groove, a power piston, a double-acting power cylinder having its medial portion journaled in said casing and provided with slots of greater axial extent than the stroke of said piston and adapted to be uncovered by said piston at each end of the latter's stroke, and means carried by said piston in engagement with the walls of such slots and grooves.

In testimony whereof, I affix my signature, in presence of two witnesses.

FREDERICK M. ESLICK.

Witnesses:
N. CURTIS LAMMOND,
G. AYRES.