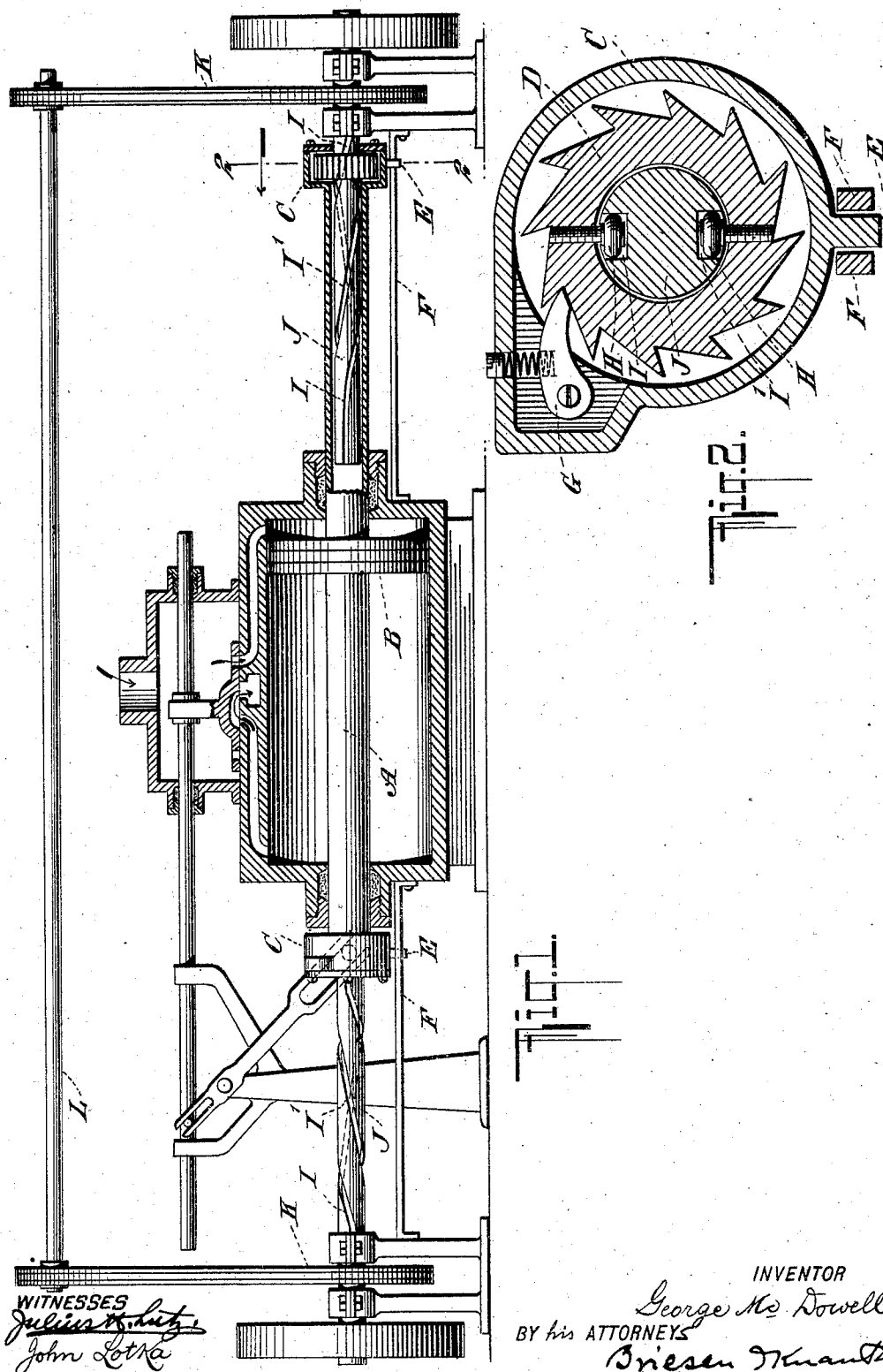


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G. McDOWELL.
ENGINE.

APPLICATION FILED OCT. 4, 1905.



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GEORGE McDOWELL, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
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ENGINE.

No. 850,953.

Specification of Letters Patent.

Patented April 23, 1907.

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To all whom it may concern:

Be it known that I, GEORGE McDOWELL, a citizen of the United States, and a resident of borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Engines, of which the following is a specification.

My invention relates to engines, particularly those of the piston type, whether steam-engines, explosive-engines, or any other variety.

My invention is designed to obtain the full and complete efficiency of the piston on each stroke without increasing the working pressure.

The accompanying drawings illustrate my invention.

Figure 1 is a longitudinal section of an engine containing my improvements. Fig. 2 is a section of the mechanism, taken on line 2 2 of Fig. 1.

In the drawings I have shown my invention as embodied in an ordinary steam-engine, to illustrate which in detail is not considered essential in view of the familiarity of mechanics with such engines. Of course all such engines have the usual two inlet-ports for steam and the connections with the exhaust and means for changing the inlet to outlet ports and the outlet to inlet ports, according to the motion of the piston.

In an explosive-engine, to which my invention may also be applied, the sparking mechanism and inlets, outlets, vaporizers, and the like necessary elements of the usual gasoline explosive-engine must of course be present. Confining myself, therefore, to the parts of my own invention as illustrated in the drawings in Fig. 1, A is a hollow piston-rod of a length substantially corresponding to twice the length of the cylinder. Located centrally with regard to this hollow rod A is the piston B, of any suitable variety. To each extremity of the hollow piston-rod is fastened, either integrally or otherwise, the hollow cross-head C, which is illustrated in Fig. 2 in section. These cross-heads are designed to receive the wheels D in such a way that the sides of each wheel D will have a bearing engagement with the inside walls of the cross-heads C, so that as the piston-rod moves from right to left, or vice versa, the wheel will be carried loosely in the box by

means of the contact of its sides with the inner walls of the cross-head. To prevent the piston from lateral vibration, I provide the tongue E, which is fastened to the cross-head C and which is guided between the cross-head slides F. The wheel D is centrally apertured and circumferentially ratcheted, as shown in Fig. 2. These circumferential ratchet-teeth are engaged by the spring-pressed pawl G, which, as is readily seen from Fig. 2, permits the wheel to rotate in one direction only—to wit, that of the return stroke of the piston. Two small wheels H are attached opposite each other on the interior of the wheel D, and these wheels are adapted to run in the grooves I I', which are cut on opposite sides of the rods J.

Confining ourselves to the right hand of Fig. 1, the rod J extends to a point within the bearings of the piston rod or tube on the one side and is in the drawings shown as carried by suitable supports and as connected with wheels designed to transmit power to a shaft controlled jointly by the action of the two rods J on each side of the engine. The grooves I I' are cut in such a way that each of them encircles the rod once spirally during the distance of travel of the piston-rod. At the point nearest the cylinder these grooves are straight for a short distance in order to allow the momentum gained by the opposite side to be utilized without jolting the machine and also for the purpose of preventing a binding action when the motion is started. Thus upon the beginning of motion of the piston in one direction the wheel on the opposite side will continue to transmit motion to the driving mechanism for a short time without the active assistance of the wheel on this side of the engine. The grooves I I' are cut in opposite directions on the two shafts, so that the motion of the wheels D will always be in the same direction. These wheels communicate, by means of suitable intermediary devices, with a common shaft, which is continuously rotated when my engine is started. In the drawings I have shown this connecting means as consisting of belts K, connecting with the common shaft L.

The operation of my engine will now be explained. As the piston travels from the position shown in Fig. 1 to the left the hollow rod A at the left of the piston will travel toward the left and the wheel D, carried in

the hollow cross-head C at the left of the engine, being held rigidly by means of the pawl G, will be pushed against the grooves on the left rod J through the intermediate agency of the small antifriction-wheels H. This action causes the rod J to be continuously rotated one complete revolution. In the meanwhile the wheel D on the right of the machine will turn in its cross-head without exercising any action on its rod J, the pawl G allowing the free rotation of the wheel D. On the return stroke of the piston from left to right the pawl G will allow the left-hand wheel D to slide along the grooves without action; but the wheel D on the right hand of the machine will be gripped by the pawl G and will rotate the right-hand shaft J.

Many modifications of my device may be made without changing the spirit of the invention. I am aware it is not new to convert reciprocating into rotary motion by means of a spirally-grooved cam; but what I have invented is an efficient construction of such devices particularly adapted for use in power-engines.

It will be obvious that an engine containing my improvements will have no dead-centers and will start with equal ease from any position in which it may happen to be stopped. The pitch of the spiral I or I' is equal to the active stroke of the driving member.

What I claim, and desire to secure by Letters Patent, is—

1. An engine comprising two axially-aligning spaced rotary driven members, a reciprocating driving member arranged between said driven members and constructed to op-

erate them alternately, and a connection between the driven members, situated exteriorly of the driving member.

2. An engine comprising a cylinder, a piston arranged to reciprocate therein, driven shafts arranged in line with the cylinder's axis, and driving members connected with the piston but located exteriorly of the cylinder and adapted to operate the said driven shafts alternately.

3. An engine comprising two axially-aligning spaced rotary driven members, provided with spiral grooves, a reciprocating driving member arranged between said driven members and adapted to engage said grooves and operate said driven members alternately, the pitch of each of the grooves being at most equal to the stroke of the driving member, and a connection between the driven members, situated exteriorly of the driving member.

4. In an engine, the combination with the cylinder and the reciprocating piston, of spirally-grooved shafts at each end of the cylinder, wheels surrounding said shafts and having projections engaging the grooves thereof, connections whereby said wheels are caused to reciprocate with the piston, and means for causing the said wheels alternately to run idle.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE McDOWELL.

Witnesses:

JOHN LOTKA,

JOHN A. KEHLENBECK.