J. J. SHIVELY.

EXPLOSIVE ENGINE.

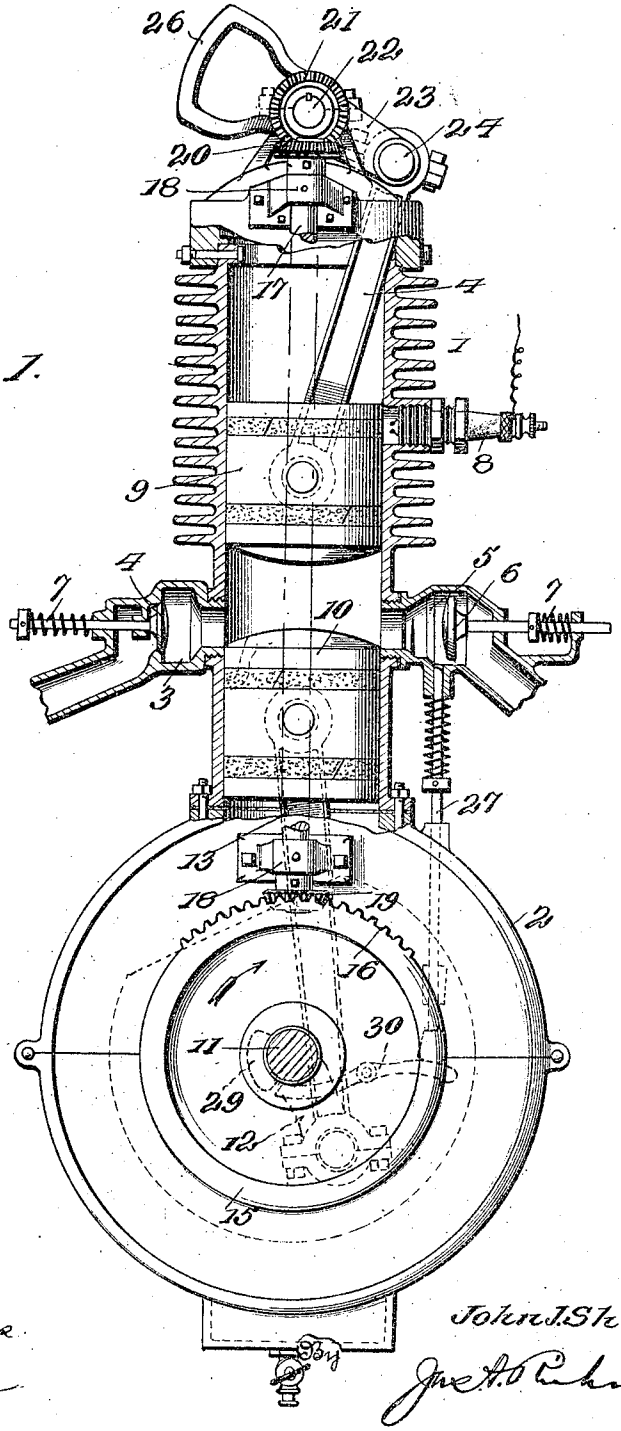
APPLICATION FILED MAY 26, 1910.

1,075,307.

Patented Oct. 7, 1913.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

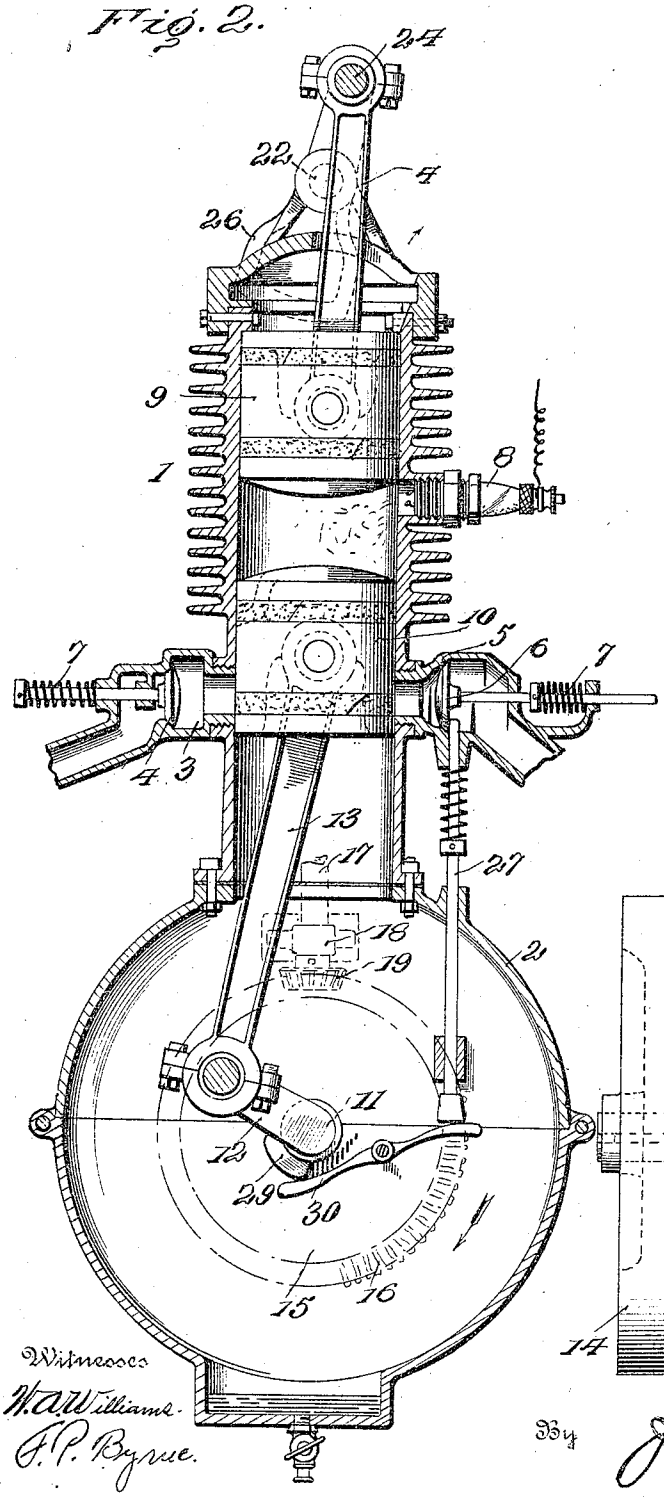
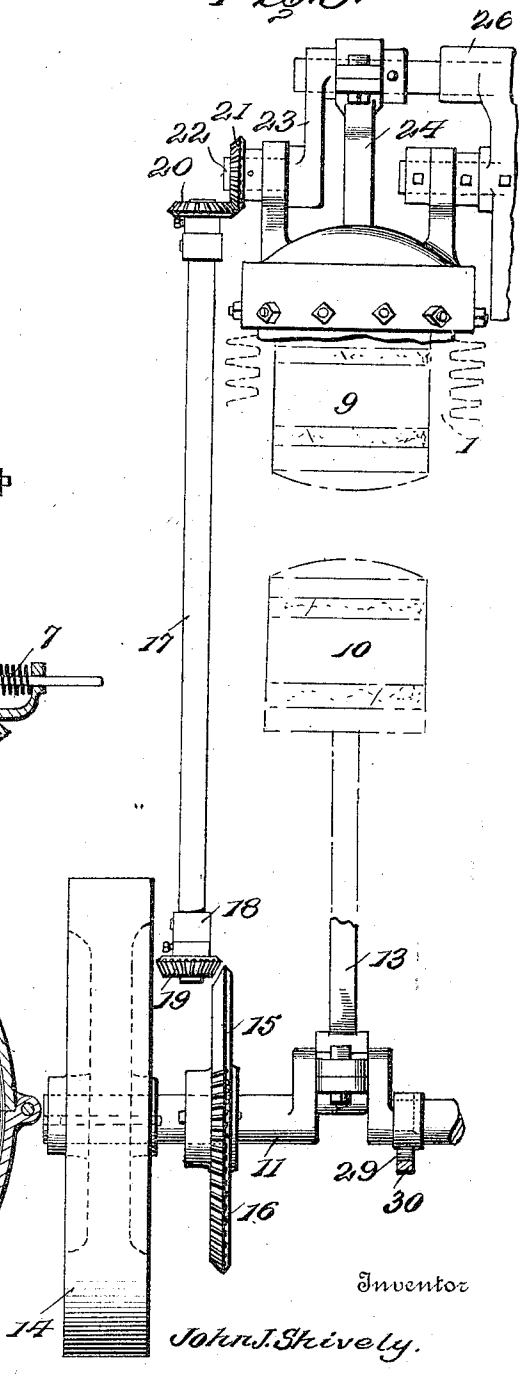


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN JOEL SHIVELY, OF WASHINGTON, DISTRICT OF COLUMBIA.

EXPLOSIVE-ENGINE.

1,075,307. Specification of Letters Patent. Patented Oct. 7, 1913.

Application filed May 26, 1910. Serial No. 563,654.

To all whom it may concern:

Be it known that I, JOHN JOEL SHIVELY, a citizen of the United States, and a resident of Washington, in the District of Columbia, have invented a certain new and useful Explosive-Engine, of which the following is a specification.

One of the principal objects is to dispense with crank case compression.

Another object is to secure maximum efficiency by effecting the compression in the cylinder and out of contact with lubricating oil.

Another object is to effect a complete expulsion from the engine cylinder of burnt gases and other products of combustion.

Another object is to secure a power stroke at each revolution of the shaft.

Other objects, as well as the nature, characteristic features and scope of the invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming a part hereof, wherein—

Figure 1, is a sectional view of an internal combustion engine embodying features of my invention, the cylinder being shown in the act of exhausting. Fig. 2, is a similar view with the parts in position for a compression stroke; and Fig. 3, is an elevational view showing more particularly the main shaft, top shaft, and intermediate power transmission.

Referring to the drawings, the numeral 1, represents a suitable cylinder mounted upon a crank case 2. The cylinder is equipped with an inlet port 3, and its complemental valve 4, and with an outlet port, or exhaust 5, and its complemental valve 6. The valves 4 and 6, are normally held against their seats under the solicitation of coil springs 7, and it will be understood that the intake valve is lifted from its seat by suction established in the cylinder by the upward movement of the piston and that the valve 6, is opened by a downward stroke of the upper piston, which at the same time positively insures the closing of the intake valve. The cylinder is further equipped with a spark plug 8. The parts mentioned may be of any suitable or well known construction and material.

There are two pistons, an upper piston 9, and a lower piston 10, and their purpose is to obviate crank case compression and to effect the compression in the cylinder, to insure a complete expulsion of the unconsumed gases and to otherwise enhance the efficiency of the engine.

A main or crank shaft 11, is suitably mounted in the crank case, and its crank 12, is operatively connected by means of a rod 13, with the lower piston 10. The crank shaft carries the usual balance or fly-wheel 14, and is further equipped with a disk or wheel 15, that is formed or provided with cog teeth 16, for substantially a quarter of its circumference, and the purpose of which is to effect a movement of the upper piston at a certain predetermined time. This is provided for as follows: A vertical or drive-shaft 17, sustained in suitable bearings 18, carries at its respective ends small bevel gears 19, and 20, whereof the gear 19, is in mesh at times with the teeth 16, and at other times is idle, and whereof the gear 20, is in mesh with a gear 21, carried by a small crank shaft 22. The latter may be supported in a suitable bearing at or near the top of the cylinder, and its crank 23, is operatively connected with the upper piston by a rod or lever 24, which is accommodated by a slot 25. The crank 23, is provided with a counter-balance weight 26, the function of which is to promptly lift the upper piston as soon as the disk 15, becomes idle. Obviously, the operative position of the disk 15, is opposite that of the throw of the crank 23.

Referring to Fig. 2, it will be noted that during the compression stroke or the upward stroke of the power piston 10, the piston 9, is at rest at the top of the cylinder, because the geared part of the disk 15, is removed from the gear wheel 19 and consequently shaft 17 is idle. Upon the downward stroke of piston 10, the geared part 16, of disk 15, approaches and ngages gear wheel 19, and transmits motion to shaft 17, so that the upper piston 9, is forced downward. This stroke of piston 9, tends to positively close the intake valve and open the exhaust and to expel the spent gases. As the piston 9, returns to its original or position of rest it tends to open the intake valve and admit a fresh charge for compression by the piston 10. The counter-balance weight 26, insures this return or suction stroke of piston 9.

The operation if not obvious will be largely understood from the foregoing.

It may be added that a gas tight space is formed between the pistons when both

are at the top of their strokes in which the gas sucked in by the upper piston is compressed by the lower piston and then exploded in the well known manner. During the down stroke the exhaust valve is opened by compression and the upper piston operates to completely expel the unconsumed gases. Provision is made to prevent the exhaust valve from opening prematurely and this is accomplished by a positively operated locking detent. This may be in the form of a rod or detent 27, which when advanced holds the valve to its seat, but which under the influence of a spring 28, is retracted. The rod 27, is suitably mounted and extends down in proximity with the main shaft, and a cam 29, on said shaft is arranged to bear upon a pivotal arm or tappet 30, which in turn bears upon the end of the rod or detent 27, and operates to advance the same.

It will be obvious to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention. Hence the same is not limited other than required by the prior state of the art.

Having described the nature and objects of the invention, what I claim as new and desire to secure by Letters Patent is:—

In an explosive engine, a cylinder and its complemental ports, two pistons arranged within said cylinder one above the other and whereof the lower is operated by the explosion, a crank-shaft operatively connected with the lower or power piston, a disk carried by said crank-shaft and provided with teeth for a quarter of its circumference, a crank-shaft carrying the upper piston, means for transmitting motion from said disk to the upper crank shaft for effecting a downward movement of the upper piston, and a counter-balance weight on said last-named crank-shaft to promptly lift the upper piston as soon as the disk becomes idle.

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

JOHN JOEL SHIVELY.

Witnesses:

JAS. A. RICHMOND,

J. D. YOAKLEY.