J. McELWAIN.

ENGINE.

APPLICATION FILED JUNE 20, 1914.

1,127,267.

Patented Feb. 2, 1915.

2 SHEETS—SHEET 1.

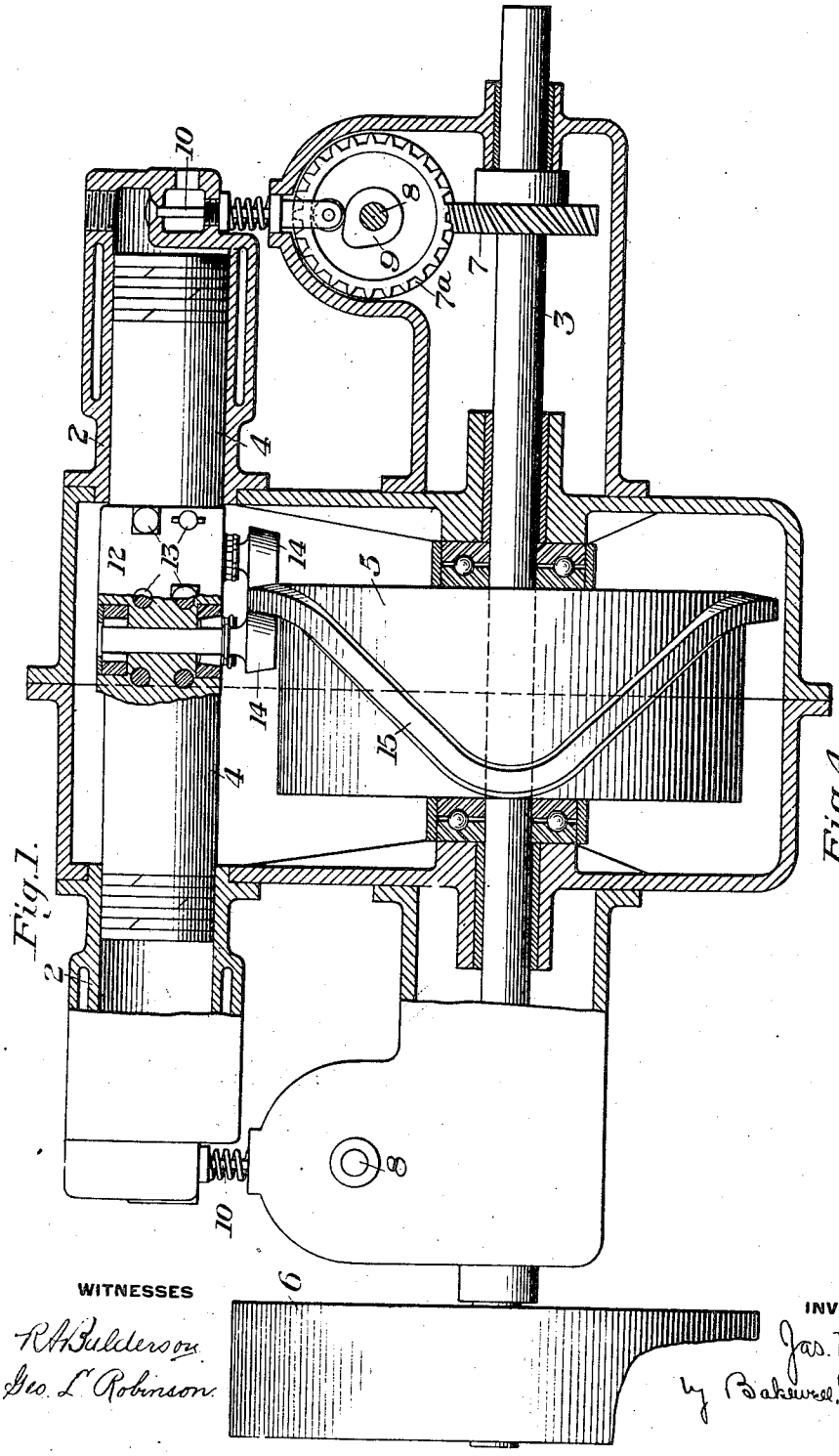


Fig. 1.

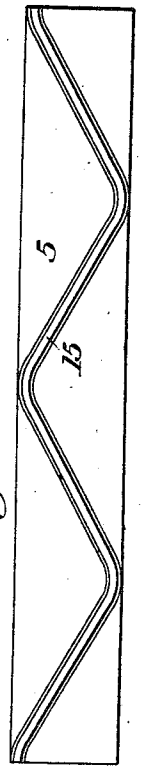


Fig. 4.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

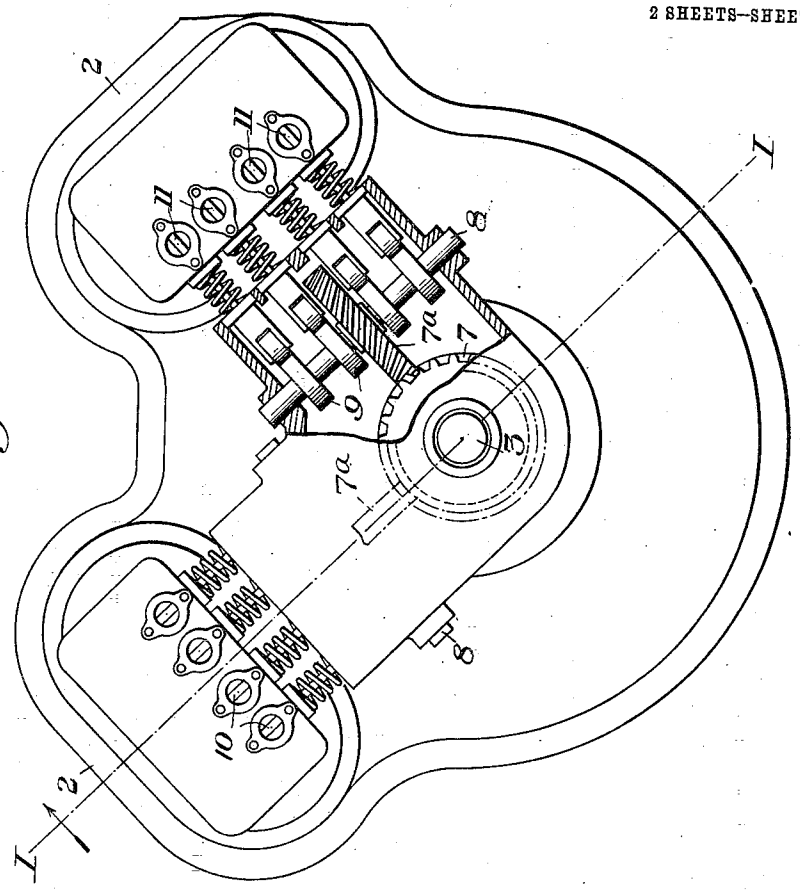
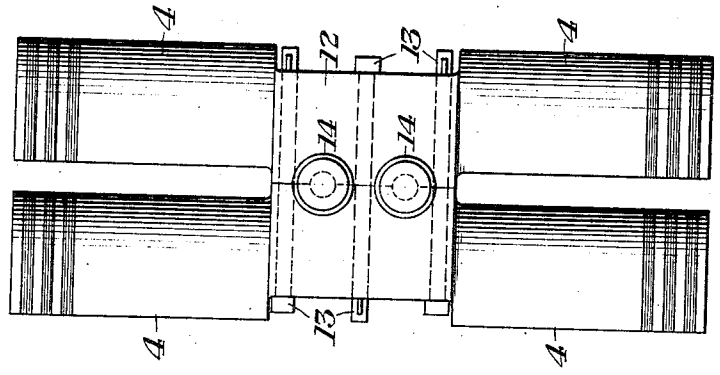


Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES McELWAIN, OF WHEELING, WEST VIRGINIA, ASSIGNOR OF ONE-HALF TO BENJAMIN A. LAWS, OF PITTSBURGH, PENNSYLVANIA.

ENGINE.

1,127,267. Specification of Letters Patent. Patented Feb. 2, 1915.

Application filed June 20, 1914. Serial No. 846,360.

To all whom it may concern:

Be it known that I, JAMES McELWAIN, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented a new and useful Improvement 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, in which—

Figure 1 is a longitudinal sectional view on the line II—II of Fig. 2 of one form of my improved engine. Fig. 2 is an end view partially in section, and Fig. 3 is a plan view of one set of pistons. Fig. 4 is a developed plan view of the cam.

This invention relates to an improvement in reciprocating engines and is designed to provide a cheap and efficient device of this character in which the reciprocating motion of the pistons will be directly converted into rotary motion without the use of connecting rods or cranks, and in which I provide plural sets of cylinders so that one set will be working against the other set and thereby avoid end thrusts on the main shaft.

In the drawings, I have shown my invention applied to an internal combustion engine of the four-cycle type, and the numeral 2 designates the cylinders and 4 the reciprocating pistons.

I have shown an engine having eight cylinders and pistons in two sets, each set containing four, the one set being placed at 90° from the other about the driving shaft 3. This driving shaft 3 is provided with a cam 5 and a balance wheel 6. Connected adjacent to each end of the driving shaft 3 is a skew gear 7 which meshes with skew gears 7^a on shafts 8 at right angles thereto, there being two of these shafts at each end of the cylinder, each of which is provided with cams 9 arranged to actuate the valves 10 and 11 for admitting the explosive mixture to the cylinder and also for permitting the spent gases to be exhausted therefrom.

In Fig. 3, I have shown in plan view, a set of pistons for one set of cylinders, which comprises two pistons 4, at each end thereof, one cylinder at each end being connected to a similar cylinder at the other end in alinement therewith by means of a block 12. These blocks are faced off along adjacent faces and are secured together by means of through pins 13. Connected to the blocks 12 along the longitudinal center thereof and on opposite sides of the transverse centers are rollers 14, which engage the rib 15 on the cam 5.

It will readily be understood by those familiar with the art that as there are four cylinders in each set, a charge will be fired in each cylinder for each set, so that for every four reciprocations there will be a charge fired in each cylinder, and as there are two sets of cylinders there will be two charges fired for each reciprocation. In order to overcome the thrusts on the shaft 3, a cylinder of one set at the left hand side of the cam is fired at the same time that a cylinder at the right hand side of the cam of the other set is fired. It will also be understood by those familiar with the art that I can increase or decrease the number of cylinders of each set, as well as increase the number of sets of cylinders around the shaft.

As the skew gears 7 and 7^a on the shafts 3 and 8 are the same size, the shafts 8 will make one revolution for each revolution of the shaft 3, so that each valve 10 and 11 will be actuated by its cam once for every revolution of the main shaft.

As before stated, I have shown my invention applied to an explosive engine, but it will be readily understood by those familiar with the art that the principle is adapted to reciprocating motors of any type, in which it is desired to transpose a reciprocating motion to a rotary motion. It will also be understood that the valve mechanism as well as the actuating device therefor can be changed and actuated in any desired manner.

The advantages of my invention result from the provision of a motor having a plurality of reciprocating pistons and a shaft in line therewith, together with connections for transposing the reciprocating motion of the pistons to a rotary motion of the shaft. Another advantage results from the provision of means for causing the movement of one piston to be counteracted by a similar piston and thereby overcome the thrusts on the main shaft.

I claim:

1. A reciprocating motor having a rotary shaft and a plurality of cylinders, a piston in each cylinder arranged to reciprocate approximately parallel with the longitudinal

axis of the shaft, mechanism connected to the shaft and one of the pistons for rotating the shaft, driving mechanism oppositely acting at all times connected to the shaft and the other piston, said driving mechanisms engaging the shaft to simultaneously exert a torque thereon in the same direction while the pistons are moving in opposite directions; substantially as described.

2. A reciprocating motor having a rotary shaft, a plurality of sets of cylinders approximately parallel with the longitudinal axis of the shaft, each set having one cylinder at opposite ends of the motor, a piston in each cylinder, shaft-driving mechanism connecting one set of pistons with the shaft, and driving mechanism oppositely acting at all times connecting the other set of cylinders with the driving shaft, said driving mechanism engaging the shaft to simultaneously exert a torque thereon in the same direction while the pistons of one set are moving in an opposite direction to the pistons of the other set; substantially as described.

3. A motor having a rotary shaft, a cam on said shaft having diverging acting portions of equal length in degrees, a plurality of sets of cylinders, each set having one cylinder at each end of the motor, a piston in each cylinder of each set connected to each other and arranged to reciprocate parallel with the longitudinal axis of the shaft, driving mechanism connecting the cam and one set of pistons, and driving mechanism connecting the cam and the other set of pistons and spaced from the first mechanism a number of degrees divisible by the number of degrees in the cam portions, whereby said driving mechanisms engage diverging cam portions to simultaneously exert a torque on the shaft in the same direction while the pistons of one set move in the opposite direction to the pistons of the other set; substantially as described.

4. A reciprocating motor having a rotary shaft, a cam on said shaft having diverging acting portions of equal length in degrees, a plurality of sets of cylinders approximately parallel with the longitudinal axis of the shaft, said sets of cylinders being disposed at different radial positions about the shaft, each set having two cylinders at each end of the motor, a piston in each cylinder, the four pistons of each set being connected to each other so as to reciprocate together, driving mechanism connecting the cam and one set of pistons, and driving mechanism connecting the cam and the other set of pistons and spaced from the first mechanism a number of degrees divisible by the number of degrees in the cam portions, whereby said driving mechanisms engage diverging cam portions to simultaneously exert a torque on the shaft in the same direction while the pistons of one set move in the opposite direction to the pistons of the other set; substantially as described.

In testimony whereof, I have hereunto set my hand.

JAMES McELWAIN.

Witnesses:
D. J. GIBSON,
B. A. LAWS.