C. J. MONTGOMERY.

PETROL OR GAS INTERNAL COMBUSTION OR STEAM ENGINE DRIVING GEAR.

APPLICATION FILED MAY 12, 1908.

905,823.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

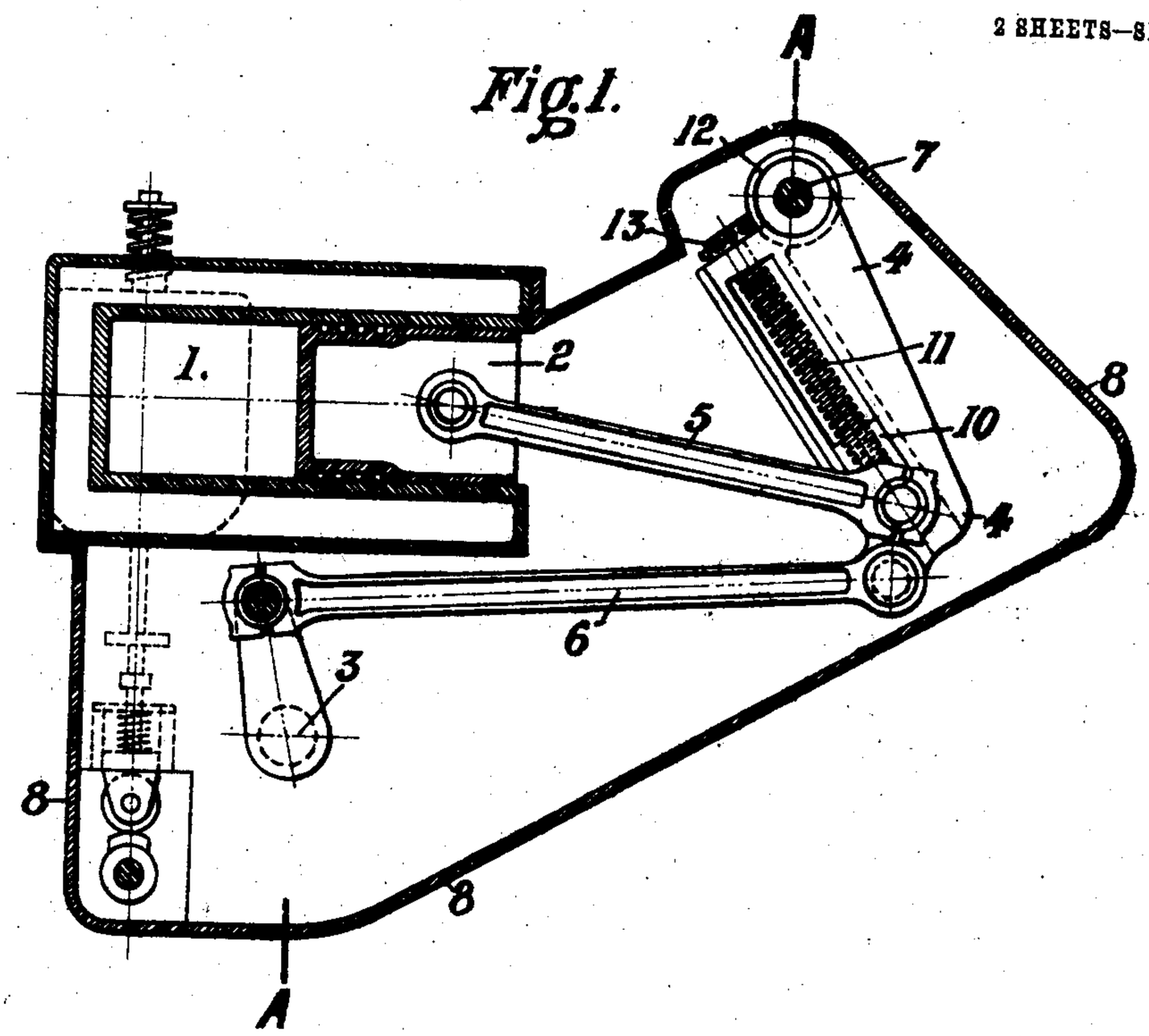
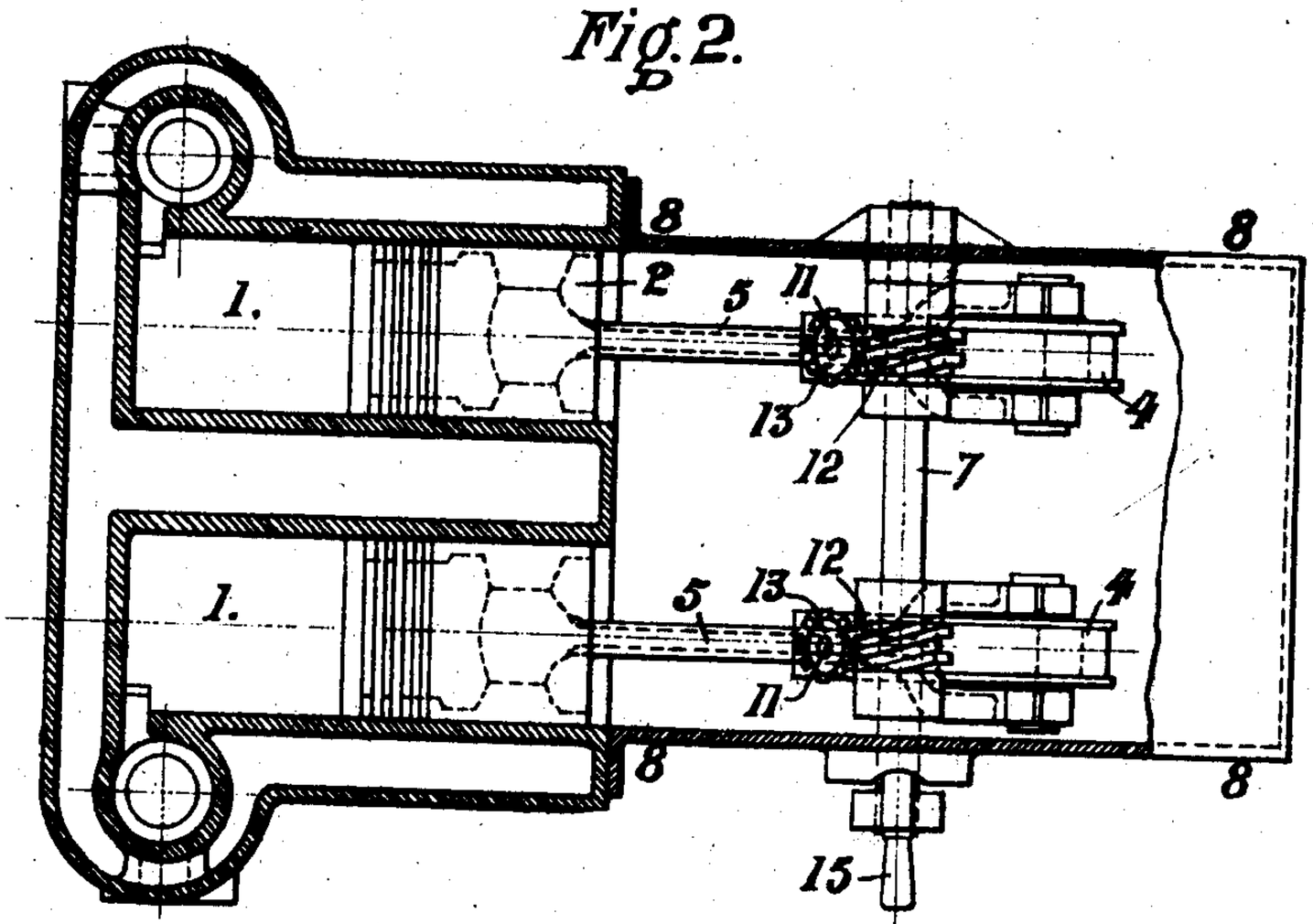


Fig. 2.



WITNESSES

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Fig. 3.

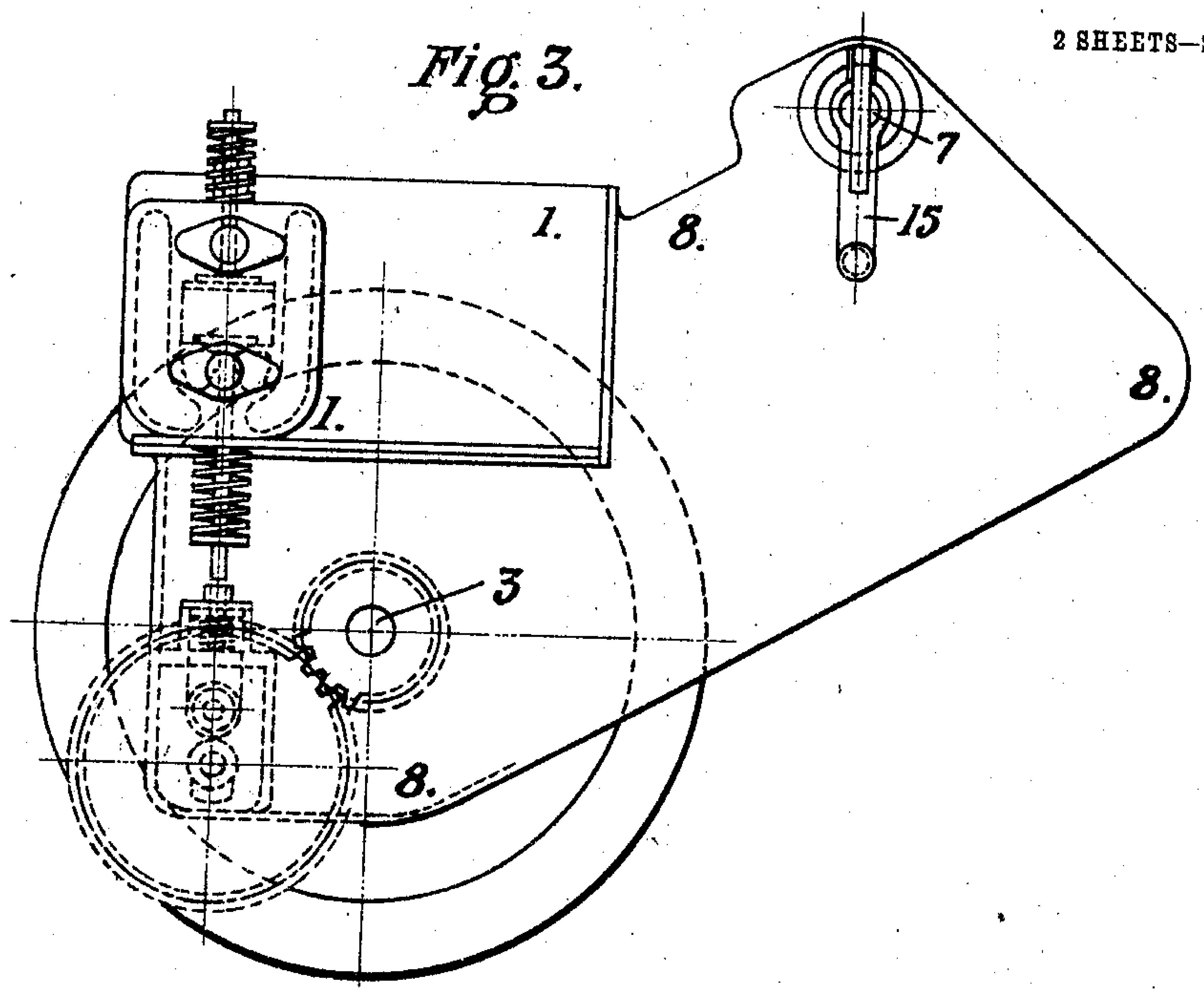
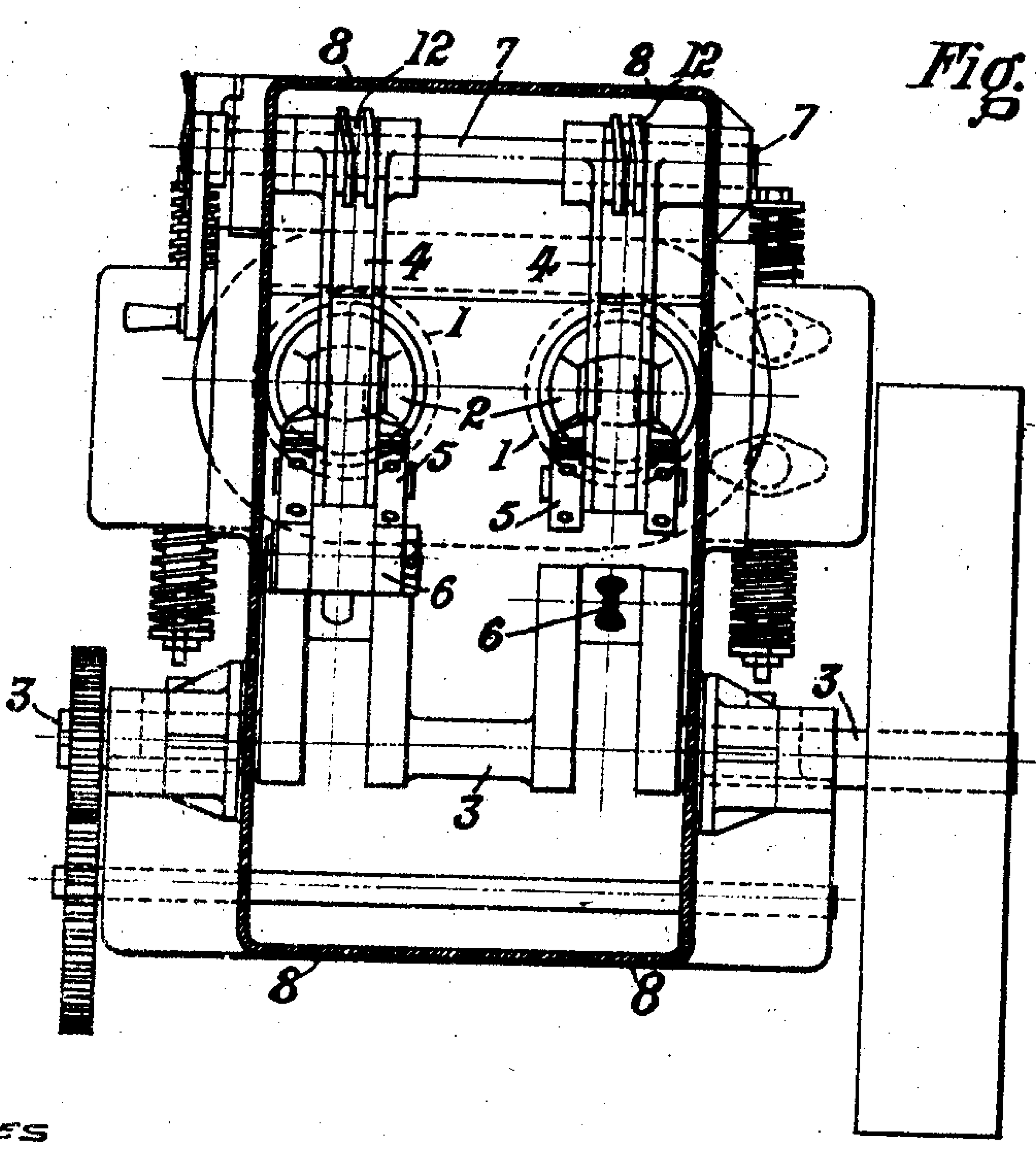


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHRISTOPHER JOHN MONTGOMERY, OF ROCK FERRY, ENGLAND.

PETROL OR GAS INTERNAL-COMBUSTION OR STEAM ENGINE DRIVING-GEAR.

No. 905,823. Specification of Letters Patent. Patented Dec. 1, 1908.

Application filed May 12, 1908. Serial No. 432,543.

To all whom it may concern:

Be it known that I, CHRISTOPHER JOHN MONTGOMERY, a subject of the King of England, residing at 39 Rock Park, Rock Ferry, in the county of Lancaster, England, have invented new and useful Improvements in Petrol or Gas Internal-Combustion or Steam Engine Driving-Gear, of which the following is a specification.

This invention has reference primarily to that type of petrol or gas internal combustion engines, having means connected with same, by which the power given out to the driven part, such as a crank, by the motor can be varied as and when required, while the engine is running, and wherein the capacity of the compression chamber within the engine in which the charge is contained in a compressed state at the moment of ignition, is adapted to be varied, and the radius at which the piston acts upon a vibrating part (such as an arm or lever) from its point of vibration is adapted to be varied, and so with it, the length of the stroke of the piston; so that the leverage or power at which the piston acts upon the vibrating part is capable of being varied, as well as the degree of pressure of the charge of combustible fluid at the moment of ignition is approximately constant.

The invention will be described in connection with the accompanying drawings, which show an engine in which the improvements hereunder are involved; and with regard to the invention claimed as novel, this is set out in the statement of claim, comprising the several claiming clauses concluding the specification.

In the drawings illustrating the invention, Figure 1 is a sectional elevation of the engine; Fig. 2 is a plan in section; Fig. 3 is a full side elevation; and Fig. 4 is a cross section, taken through the lines A A Fig. 1.

The engine shown, may be assumed to be worked on the ordinary four stroke cycle.

Referring to the drawings, 1 represents the engine cylinders, of which there are two in the case shown; 2 are the pistons; and 3 is the crank shaft.

4 generally designates vibrating arms or levers, to which the pistons 2 are connected by connecting rods 5; and 6 are the rods connecting the free end of these arms or levers 4 with the cranks of the crank shaft 3. The arms or levers 4 are supported at their upper end upon a pivot pin or shaft 7 carried by the casing or frame 8 of the engine.

The connecting rods 5 are forked at their lower ends, and connected up with the levers or arms 4 by a block 10, having pins at each side, onto which the forked ends of the rods fit. Each block is moved nearer to or farther from the pivot shaft 7 by the screwed rod 11 carried in this arm, so as to render the leverage or power less or greater, as the case may be, or in other words, to vary it; and as will be seen, the line along which the block 10 will move, is oblique to the line extending between the axis of the pivot shaft 7 carrying the arm 4, and the pins of the block 10, so that the charges introduced, and the capacity of the compression space at the inner end of the cylinder 2 are diminished, and the degree of compression of the charges is approximately maintained for all radii of the block 10 from the shaft 7.

Each arm 4 is provided with a slot within which the screwed shaft 11 lies; and the block 10 slides up and down in this slot, and is borne by the metal forming its edges, so that the outward thrust which comes upon the block 10 when the engine is working, is mainly received by, and transmitted to, the arm 4 itself, and not the shaft 11. The threaded shaft 11 is revolved, and the block 10 moved up and down, by worm gearing, one of the wheels 12 of which—the worm—is fixed on the shaft 7, and the other wheel, 13, which is in the form of a stud wheel, is mounted on the upper end of the shaft 11.

The studs of the wheel 13 mesh in between the threads of the worm wheel 12; and a portion of this thread is in the plane at right angles to the axis, and has no pitch, but the rest of it has pitch, and this latter portion serves to revolve the wheel 13 when it acts upon its rollers or projections in its rotation; while the parallel portion is adapted to be placed and stand, after the wheel 12 has been actuated, in such a position that in the reciprocation of the arm or lever 4, the teeth or projections of 13 will move up and down in it—this parallel and non-pitch portion—without receiving any rotative motion.

To shift the position of the thrust blocks 10 and alter their radius from the shaft 7, the shaft 7 is revolved by a hand actuated lever 15 on the shaft 7 outside the casing 8, and so the rod 11 is revolved. In the case

shown, the connecting rod 6 and crank shaft 3 are placed below the cylinder, but if desired, they may be placed above it, or in any other suitable position in relation to it.

When the connecting rods 5 operating the vibrating arms or levers 4 are at the point farthest away from the pivot shaft 7, as shown in the drawings, the power will be greatest, as the stroke of the piston will be greatest, and the charge drawn in and compressed by the pistons 2 at the maximum; and as the points of connection of the connecting rods 5 with the arms or levers 4 are reduced as regards their distance from the pivot 7 by the variable setting screw gear described, the strokes of the pistons become diminished, and therefore the charge drawn in and power given out, less; but the rate of revolutions may be the same, or may be increased. At the same time, with the moving in of the connecting rod as just described, and the reduction of the radius of action from the pivot 7, the capacity of the combustion chamber is decreased, and so although the charge drawn in is less, the compression may be kept the same, or approximately the same, this being accomplished by the oblique arrangement of the screw 11 and slot described.

In the application of this invention to motor-cars, or other self-propelled vehicles, to which it is especially applicable, by its use, the employment of tooth or equivalent gearing may be avoided, as the variable power is produced by the variations of stroke.

The improvements hereunder have been described mainly in connection with the petrol or gas internal combustion engine shown, but it is to be stated that it is not restricted to the particular manner of carrying it out therein shown and set forth. Also, especially for some purposes, such as driving self-propelled vehicles, it may be serviceable in connection with steam motors, such as those which are employed for propelling such vehicles. In this case, it may be assumed that the engine will have steam delivered to its cylinder at each outward movement of the piston, the supply being regulated and cut off at the desired points; and the engine generally will be so designed in a way to suit steam engines, as will be well understood by those conversant with steam engines. In this case, the adjustment of the block 10 so as to be a greater or less radius from the shaft 7, will produce a difference in the length of strokes of the pistons.

What is claimed is:—

1. An engine comprising a cylinder, a piston therein, a crank shaft, a shaft 7, a worm on said shaft, a lever 4 pivoted at one end to said shaft, a link connecting the other end of said lever with the crank shaft, a screw threaded shaft carried by said lever, a block on the lever adapted to be moved by said screw threaded shaft, a link connected at one end to the piston and at its other end to said block, and means on the screw threaded shaft engaging with the worm on the shaft 7.

2. An engine comprising a cylinder, a piston therein, a crank shaft, a shaft 7, a lever 4 pivoted on said shaft 7, and connected with the piston, a screw 11 mounted in said lever 4, and arranged obliquely to a line passing through the center of the said shaft 7 and the point at which said lever is connected with the piston, a nut 10 mounted on the screw and connected with the piston, a worm 12 mounted on and adapted to be rotated on the shaft 7, and a toothed wheel 30 on the end of the shaft 11 and meshing with the worm 12, substantially as set forth.

3. An engine comprising a cylinder, a piston therein, a crank shaft, a shaft 7, a lever 4 pivoted on said shaft 7 and connected with the crank shaft, a screw 11 mounted in said lever 4, and arranged obliquely to a line passing through the center of the said shaft 7 and the point at which said lever is connected with the crank shaft, a nut 10 mounted on the screw and connected with the piston, a worm 12 mounted on and adapted to be rotated on the shaft 7, said worm having a portion of its teeth straight, and a toothed wheel 13 on the end of the shaft 11 and meshing with the worm 12, substantially as set forth.

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

CHRISTOPHER JOHN MONTGOMERY.

Witnesses:
SOMERVILLE GOODALL,
GUY MANNING OKE.