No. 847,489. PATENTED MAR. 19, 1907.

C. H. MILLAR.

ROTARY ENGINE.

APPLICATION FILED JULY 29, 1904.

4 SHEETS—SHEET 1.

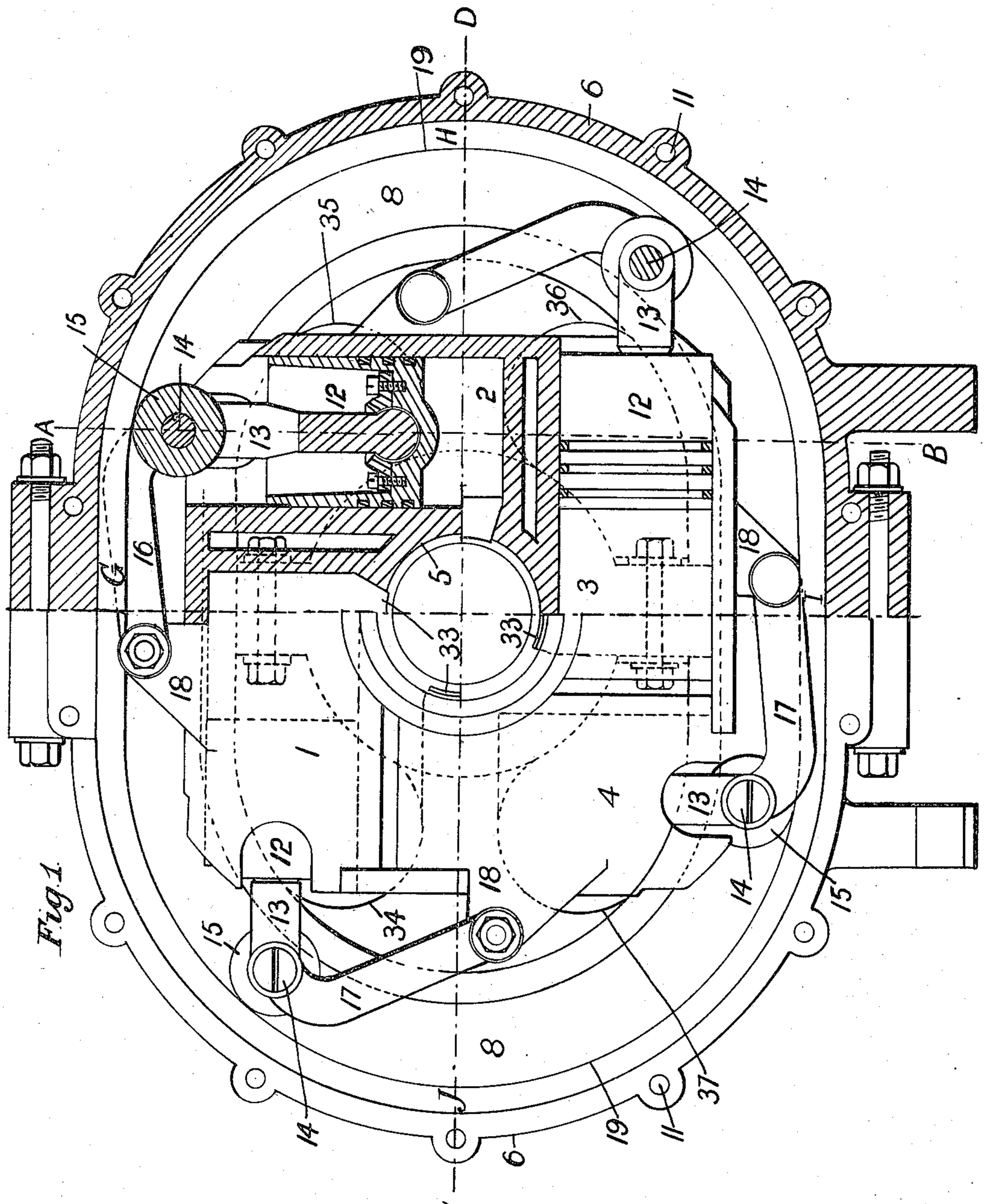

Fig 1.

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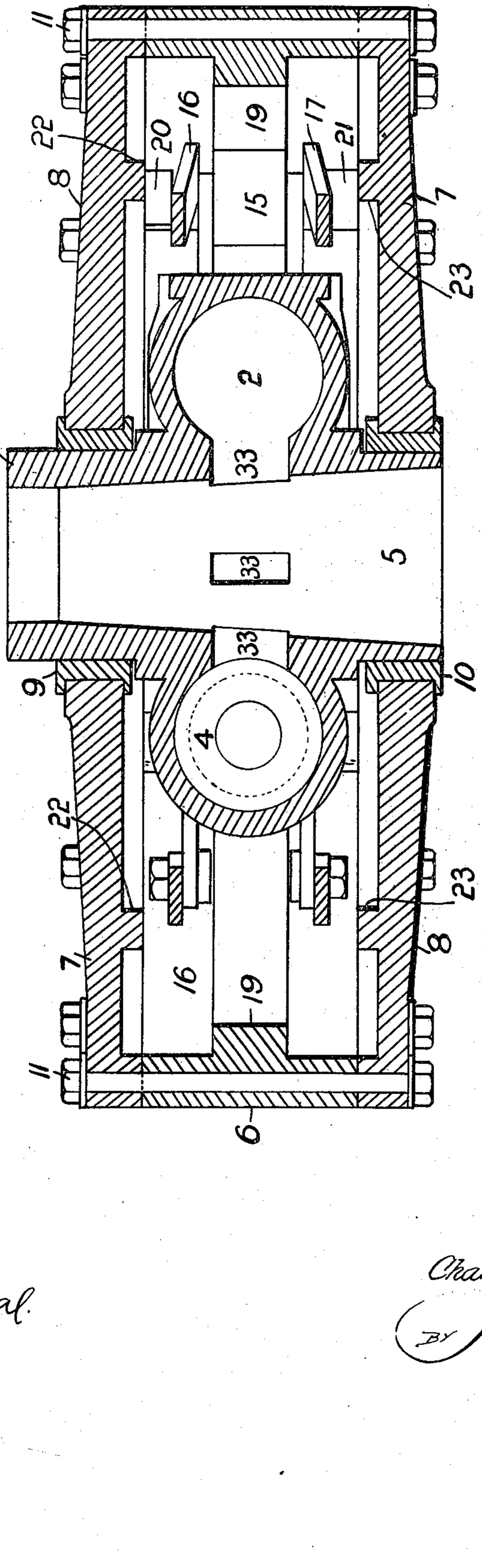
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

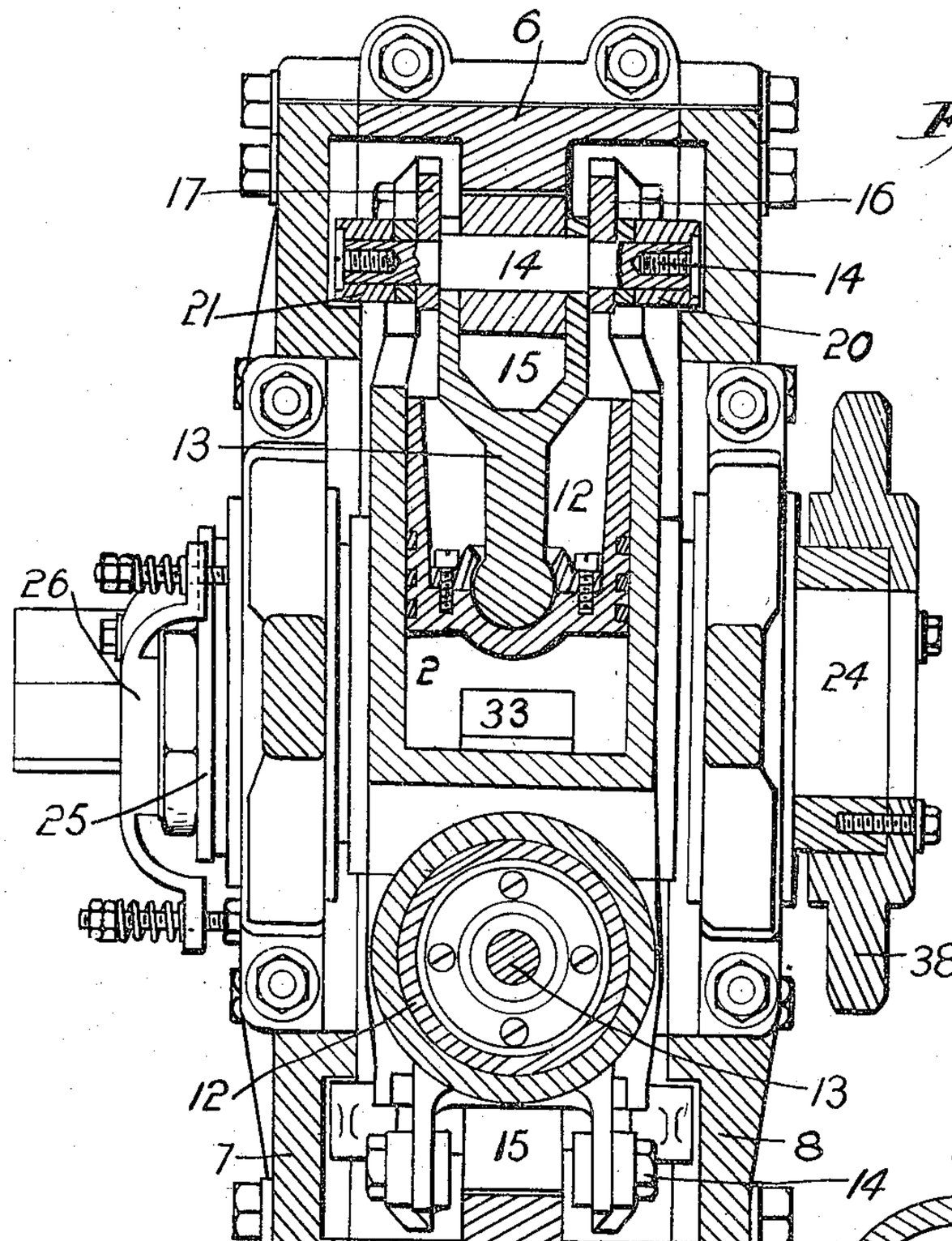
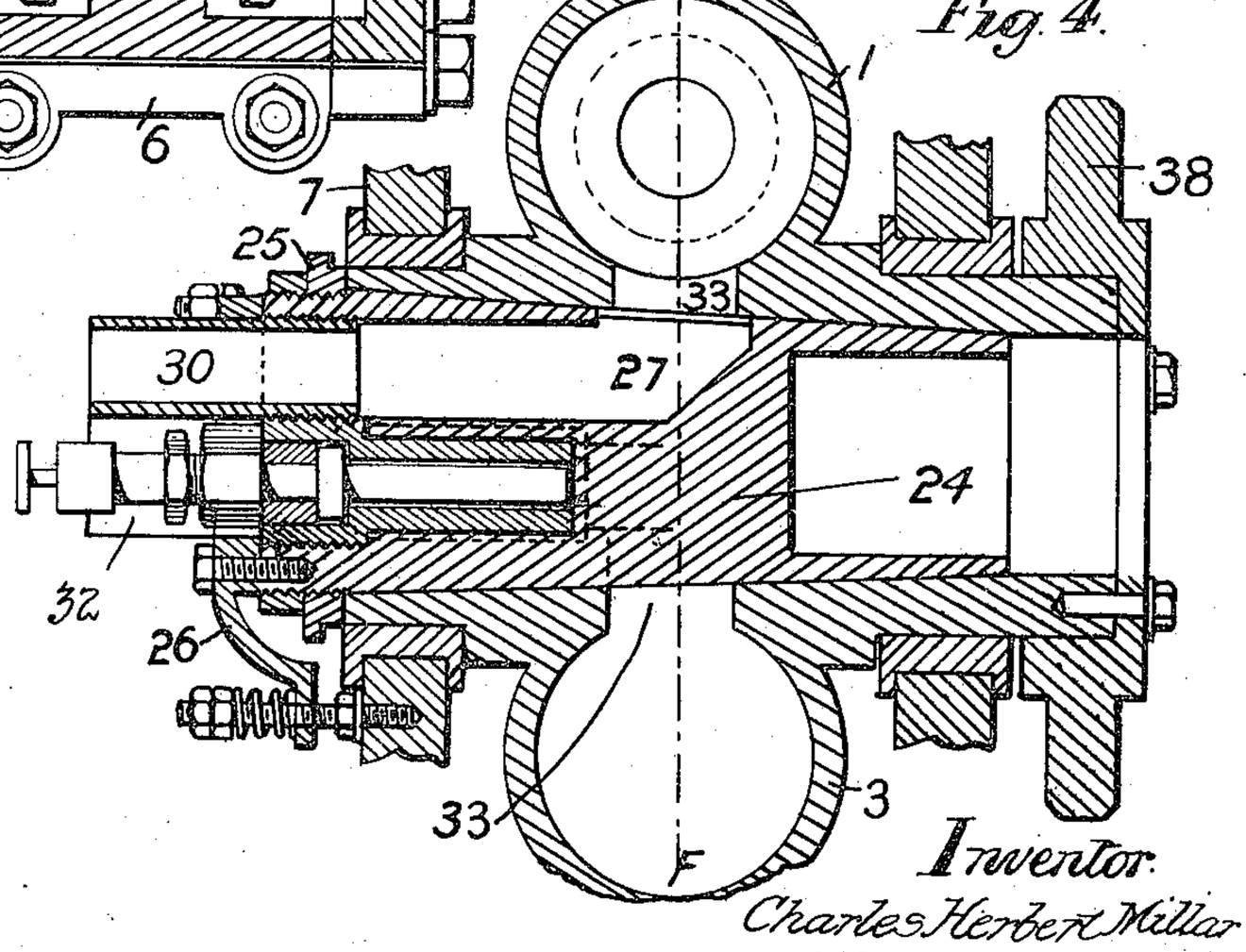


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

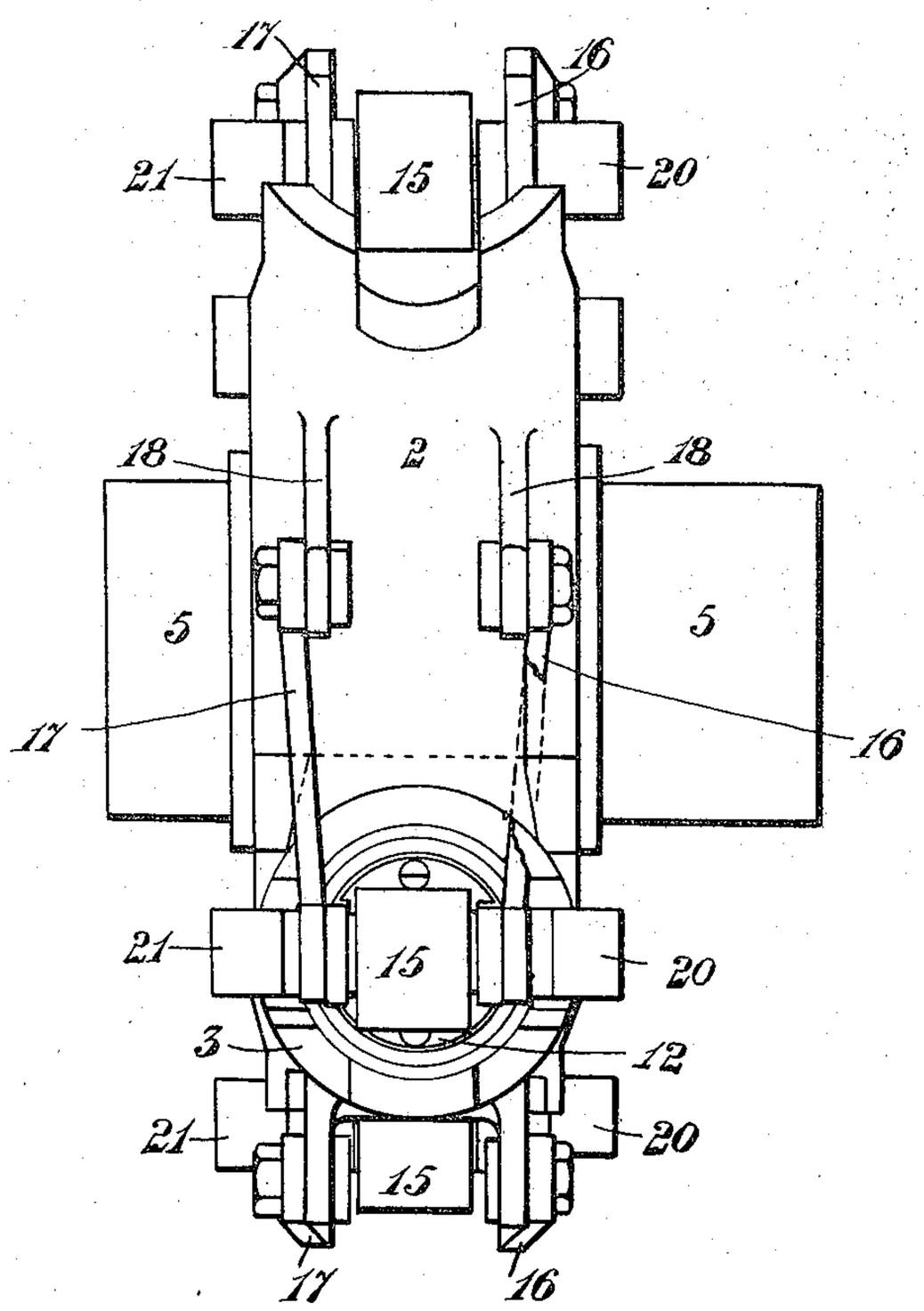


Fig. 6.

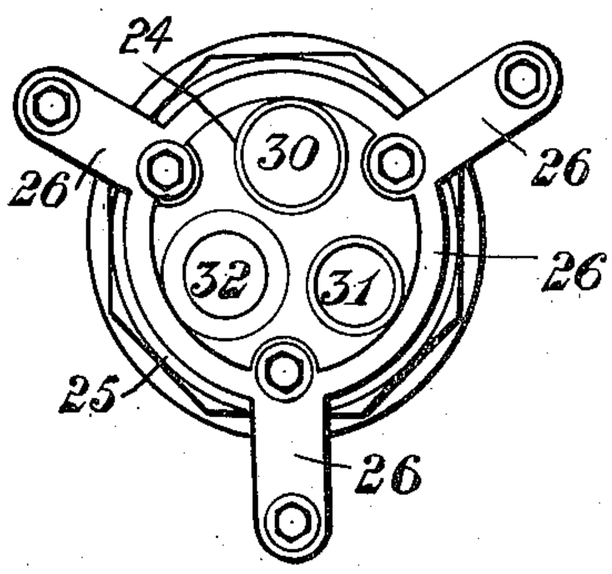
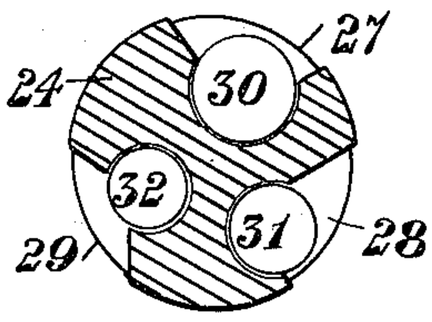


Fig 7



Witnesses.

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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

No. 847,489. Specification of Letters Patent. Patented March 19, 1907.

Application filed July 29, 1904. Serial No. 218,695.

To all whom it may concern:

Be it known that I, CHARLES HERBERT MILLAR, a subject of His Majesty the King of Great Britain and Ireland, residing at Ervillagh, Foxrock, in the county of Dublin, Ireland, electrical engineer, have invented a certain new and useful Improved Rotary Engine, of which the following is a specification.

This invention consists of the herein-described improved rotary engine, which is of the internal-combustion type driven by gas, petrol vapor, or other explosive mixture.

My invention is illustrated by the accompanying drawings, on which—

Figure 1 is a half-sectional side elevation of my improved engine. Fig. 2 is a sectional plan of the same on line C D of Fig. 1, but with certain parts removed. Fig. 3 is a sectional front elevation of the same on line A B of Fig. 1. Fig. 4 is a sectional plan of the central portion of the same engine. Fig. 5 shows in front elevation the rotary portions of the same engine separately. Fig. 6 is an end elevation of the central plug part of the same engine, and Fig. 7 is a cross-section of the same plug on line E F of Fig. 4.

The same reference-numerals indicate the same or corresponding parts in all the figures.

My improved rotary engine is constructed as follows:

The engine has four cylinders, (or there may be more than four cylinders,) marked, respectively, 1 2 3 4, cast or otherwise fixed together and to a hollow axle 5. The cylinders, with the axle, are inclosed in a box-like metal case, (the main parts of which are marked 6, 7, and 8,) the sides 7 and 8 of which have bearings 9 10, in which the hollow axle 5 revolves. For convenience of manufacture and access to the interior of the engine the said metal case is formed of two side plates 7 and 8 and an intermediate ring or distance-piece 6, which fits between them, the bolts 11 connecting the side plates 7 and 8 and distance-piece 6 together. The cylinders, which are single-acting, are each fitted with a piston 12, which has jointed to its back end a piston-rod 13, which latter at its outer end is forked and has a cross-joint pin 14, which carries a roller 15, and on this joint-pin there are side rods 16 17, which connect the outer end of the piston-rod to a lug 18, cast on the adjacent cylinder. The rollers 15 work round and bear against an elliptical curved track or rail 19, which is formed with the intermediate portion 6 of the engine-case. The joint-pin 14 projects through the side rods 16 17, and to each of these projecting ends there is fitted a roller, (marked, respectively, 20 21,) which travel along a pair of guide-rails 22 23, formed, respectively, on the inner sides of the sides 7 and 8 of the engine-case, so as to draw the pistons partly out of the cylinders on the outward strokes when starting the engine. The larger rollers 15 are always kept in contact with the rail 19 when the engine is running at its normal speed either by the force of the explosions in the cylinders or by the centrifugal force acting on the pistons.

Each of the pistons 12 makes two inward strokes and two outward strokes for every revolution of the cylinders and hollow axle 5 about the stationary plug-valve 24, hereinafter described. These movements of the pistons are due to the cylinders revolving in the center of the elliptical tracks 19 22 23, the curves of which the rollers 15, 20, and 21, connected with these pistons, have to follow. The four strokes made by each of the pistons are as follows, reference being made to Fig. 1, namely: first, the induction-stroke taking place as cylinders move from G to H; second, the compression-stroke taking place as cylinders move from H to I; third, the explosion or working stroke taking place as cylinders move from I to J; fourth, the exhaust-stroke taking place as cylinders move from J to G.

The inlet and exhaust valves are formed in the stationary plug-valve 24, which fits in the hollow axle 5 and is made taper, so as to take up for wear, and is fitted with an adjustable screwed collar 25 at its larger end, by which the fitting of the plug in the hollow axle 5 can be regulated. The plug-valve 24, about which the cylinders and hollow axle 5 revolve, fits easily in the latter and is held stationary by any convenient means, as by the bracket 26, which fixes the plug-valve 24 to the side 7 of the engine-casing. In the plug-valve 24 there are three side ports 27 28 29, communicating with longitudinal passages 30, 31, and 32, leading out to the end of the plug-valve 24. Of these ports that marked 27 is the exhaust-port for the products of combustion from the cylinders, 28 is the inlet-port for the explosive mixture to the cylinders, and 29 is the ignition-port. From the back end of each of the cylinders there is

a port 33, leading to the inner surface of the hollow axle 5, and these ports 33 are at equal distances apart, and they come opposite to and pass over the ports 27 28 29 in the plug-valve 24 as the cylinders revolve, thus making connection at the proper times with the rotating cylinders and the stationary plug-valve 24 for supplying the explosive gaseous mixture to the cylinders and for igniting and exhausting the same. The explosive mixture supplied to the cylinders is compressed in them by the pistons and ignited by an electric spark, the sparking taking place in a sparking plug in the passage 32, said sparking plug being of the kind generally used with internal-combustion engines, or any other suitable means may be adopted for obtaining the ignition.

The sparking plug is screwed or otherwise fixed in the hole 32 in the plug-valve 24, so that the spark will take place in the ignition-port 29. As the cylinders revolve round the stationary plug-valve 24 their ports 33 will in successive order come opposite the ports 28 29 27 in the stationary plug-valve, so that they will, as above stated, successively draw in a charge of explosive mixture through the inlet-port 28, and then this port will be closed and the charge in the cylinder compressed by the back stroke of the piston, and then the charge will be fired as the cylinder-port 33 comes opposite the ingition-port 29, thereby causing the piston to make its next forward stroke. Then the ignition-port will be closed and the exhaust-port 27 opened for the escape of the products of combustion as the piston returns, thus making the complete cycle. The spaces between the ports 27, 28, and 29 and the width of these ports are so proportioned as to give the proper openings and closings to the ports 33 of the cylinders at the proper times, as will readily be understood.

The cylinders are kept cool by air circulating past and around them as they revolve, and for this purpose the sides 7 8 of the engine-case have large openings—such, for instance, as 34 35 36 37—in them at both sides to allow the air to pass freely through the engine-case. Radiating-ribs may, if desired, be cast on or fitted to the cylinders, so as to expose a greater heated surface to the air and assist the cooling. Power is taken from the hollow axle 5 through the sprocket-pinion 38, fixed thereon, or by any other convenient means, according to the purpose for which the engine is required.

If preferred, a small fan may be fitted in the end of the hollow axle 5, so as to revolve with it and drive a current of air through longitudinal holes which are bored or otherwise formed from end to end of the plug-valve 24, so as to keep the same cool. In the larger size engines fans can, if desired, also be fitted to the hollow axle 5 in such a way that they will drive a larger quantity of air through the engine-case to cool the cylinders and other working parts.

The accompanying drawings show what I consider to be the best way of carrying my invention into practice; but it is to be understood that my invention is not limited to the precise details shown, as it will be evident that these may be varied to some extent without departing from the nature of my invention.

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

A rotary internal-combustion engine comprising cylinders revolving with a hollow axle about a stationary plug or valve said cylinders being arranged tangentially in relation to the axle, said plug or valve having inlet ignition and exhaust ports and passages corresponding with a port in each of the cylinders, means for igniting the charge in the ignition-port said cylinders having pistons provided with rollers which work against elliptical tracks in the casing which contains said cylinders and cause each piston to make two outward and two inward strokes for each revolution of the cylinders, said ports and passages beng so arranged as to obtain the proper cycle of induction of gaseous mixture into the cylinders, compression, ignition and exhaust for each cylinder in successive order, substantially as set forth.

In witness whereof I have hereunto set my hand in presence of witnesses.

CHARLES HERBERT MILLAR.

Witnesses:

RICH. MILLAR,

JAMES CARTER,

RICHARD CHUYTOR MILLAR.