J. JACOBSEN.

ROTARY INTERNAL COMBUSTION ENGINE.

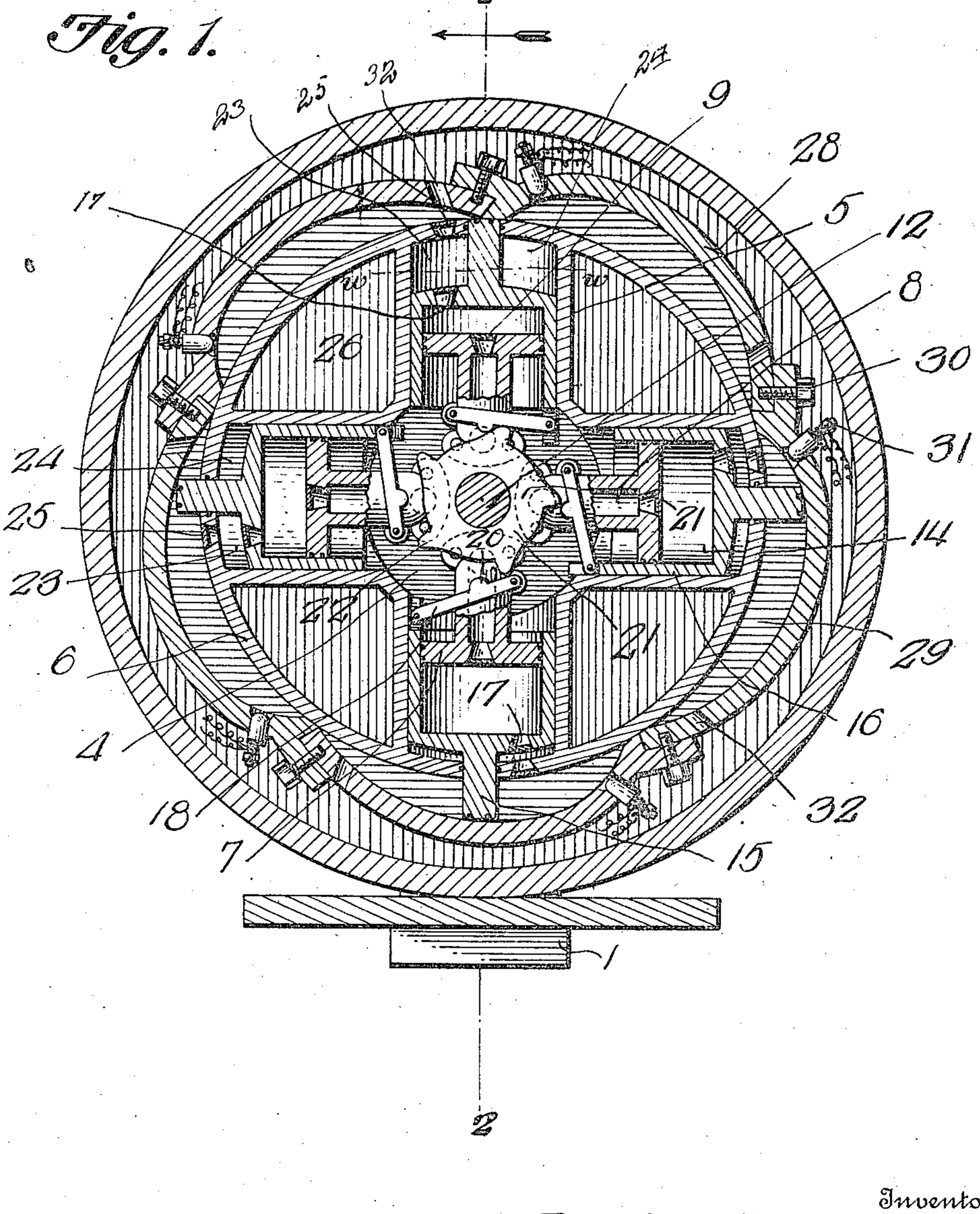
APPLICATION FILED NOV. 10, 1909.

997,824.

Patented July 11, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

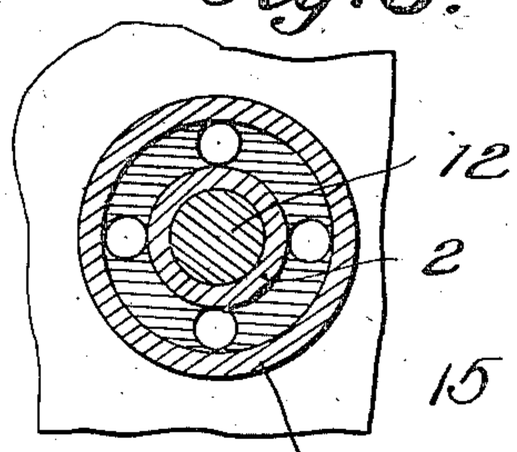

Fig. 2.

Fig. 4.

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UNITED STATES PATENT OFFICE.

JACOB JACOBSEN, OF SAN FRANCISCO, CALIFORNIA.

ROTARY INTERNAL-COMBUSTION ENGINE.

997,824.

Specification of Letters Patent. Patented July 11, 1911.

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To all whom it may concern:

Be it known that I, JACOB JACOBSEN, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Rotary Internal-Combustion Engines, of which the following is a specification.

The present invention appertains to internal combustion engines of the rotary type, the purpose being to devise a construction which will admit of the interior of the engine being readily accessible for repairs or other purpose and which in operation will be effective and develop a maximum amount of force which may be utilized without necessitating the special provision of a fly wheel, the rotary member being of such formation and mass as to obviate the necessity of providing a balance wheel to overcome the inertia of the parts.

A further purpose of the invention is the provision of a rotary member comprising a plurality of combustion chambers each being separately formed and so arranged as to admit of ready access thereto for removing carbon or for other purpose necessary to maintain the engine in prime working condition.

The invention also has for its object to devise a stationary member of novel formation comprising a central chamber and a plurality of cylinders radiating therefrom and connected at their outer ends by means of a circular rim, which forms a closure for and constitutes the inner wall of the combustion chambers, said stationary member, pistons and plungers being preferably a single structure.

The invention consists of the novel features, details of construction and combination of parts, which hereinafter will be more particularly set forth, illustrated in the accompanying drawings, and pointed out in the appended claims.

Referring to the drawings, forming a part of the specification, Figure 1 is a vertical central section of an engine of the type aforesaid embodying the invention, said section being taken on the line 1—1 of Fig. 2. Fig. 2 is a transverse section of the engine on the line 2—2 of Fig. 1. Fig. 3 is a sectional detail on the line *x—x* of Fig. 2. Fig. 4 is a horizontal section on the line *w—w* of Fig. 1.

The engine comprises a rotary member and a stationary member. The stationary member is supported in any substantial way and comprises a standard 1, inner and outer journals 2 and 3 respectively, a central chamber 4, cylinders 5 radiating from the chamber 4, a circular rim 6 connecting the outer ends of the cylinders 5 and plungers 7. These parts may be of any construction found most advantageous in the building of the engine. The plungers 7 are formed with hollow stems 8 and are provided with valved outlets 9. The hollow stems 8 communicate at their inner ends with the space 10 formed between the inner and outer journals 2 and 3, said space being connected by means of a pipe 11 with a carbureter or other source of supply of gaseous mixture constituting the motive medium of the engine. The shaft 12 of the engine is supported in any manner and is mounted in a standard 13 and fits snugly within the inner journal 2.

A piston 14 is provided for each cylinder 5 and comprises an abutment 15 and a cylinder 16, the latter operating in the cylinder 5 and receiving the plunger 7. Each piston is formed with a valved outlet 17. The abutments 15 operate through openings formed in the circular rim 6 and their outer ends fit against the inner walls of the several combustion chambers in a manner to be explained. A lever 18 is provided for each piston and is pivotally connected at one end to an extension of the cylinder 16 and is similarly connected at its opposite end to the hollow stem 8. Each lever 18 is provided with a projection 20, which is adapted to cooperate with a cam 21 fast to the engine shaft 12 and rotatable therewith. The cam 21 consists of a disk provided around its edge with a series of cam portions 22, which are adapted to engage with the projections 20 of the levers 18 and move the pistons so as to compress the gaseous mixture and at the same time force the abutments 15 outward against the inner walls of the combustion chamber to maintain a close fit therewith to prevent escape of the motive medium. The abutments 15 are flat and their opposite edges fit close against the walls of the cylinders 5 at diametrically opposite points. By reason of this construction the space at the outer end of each cylinder is divided by the abutments 15 forming chambers 23 and 24. The valved outlets 17 of the pistons and 25 of the circular rim 6 communicate with the chambers 23.

The rotary member is keyed or otherwise secured to the shaft 12 to rotate therewith and comprises side plates 26 and 27 and cap pieces 28, the latter being provided or otherwise secured to the outer edges of the side plates, both being outwardly flanged to receive the connecting bolts. The side plate 27 is mounted upon the journal 3 and rotates thereon. The side plate 26 is fastened to the shaft 12 to rotate therewith. Both side plates embrace opposite sides of the cylinders 5 and the side plate 26 closes the open side of the central chamber 4. The outer walls of the cap pieces 28 are longitudinally curved and inclose spaces forming combustion chambers 29. There may be as many combustion chambers as found advantageous, but usually the number of combustion chambers will exceed the number of cylinders 5 by one, so that one of said cylinders may occupy a neutral position, while the remaining are in various stages of operation. This is indicated most clearly in Fig. 1. The abutting ends of the cap pieces overlap and are connected by bolts or analogous fastenings 30, the construction being such as to admit of any one of the cap pieces being removed without disturbing the remainder. Each combustion chamber is provided at one end with an igniter 31 and at its opposite end with an exhaust 32. The igniter 31 consists of the usual spark plug. The exhaust 32 may be an outlet formed in any manner according to the design of the engine. When the engine is air cooled the products of combustion discharge into the open air through the exhausts 32 and in the event of a casing surrounding the rotary member, exhaust from the several combustion chambers is discharged into said casing and the latter connects with a common pipe for carrying off the exhaust to a suitable point of discharge. If the engine is to be water cooled a casing envelops the rotary member and water is adapted to be circulated through the space inclosed by said casing. In this construction the exhausts 32 are formed so as to discharge without interfering with the circulation of water through the casing.

In the operation of the engine movement is imparted to the rotary member to start the engine, after which the engine continues to revolve by the force developed by the successive explosions in the combustion chambers. As the rotary member moves forward the pistons 14 are caused to reciprocate in the cylinders 5, thereby drawing in a supply of gaseous mixture, then compressing the same and finally exploding the discharge which imparts rotary movement to the movable element. As the pistons are moved outward in the cylinders 5 a gaseous mixture is drawn into the space formed between the piston 14 and the plunger 7 and as said piston moves inward the gaseous mixture is forced from said space into the chamber 23 and upon the next outward movement of the piston the gas confined in the chamber 23 is compressed and at the same time forced through the valved outlet 25 into the combustion chamber and there exploded. As the pistons are gradually moved outward the outer ends of the abutments 15 are forced against the inner walls of the cap pieces, thereby confining the gaseous mixture. Inasmuch as the abutments 15 are stationary as regards any rotary movement it follows that the force of the explosion is expended against that portion of the piston chamber in advance of the abutment, hence the rotary member is driven forward in an anti-clockwise direction, as indicated by the arrow in Fig. 1. When the piston chamber moves to cause the exhaust 32 to clear the abutment 15 the confined gases escape. In the operation of the engine the explosions occur in rapid succession in the combustion chambers in regular order, hence the force is practically constant, thereby overcoming the necessity for a fly wheel. Moreover the momentum of the rotary member is such as to overcome the necessity for providing a fly wheel. By having the stationary member formed with a plurality of cylinders and adjunctive parts the engine involves a compact structure.

Having thus described the invention what is claimed as new, is:—

1. A rotary engine of the internal combustion type comprising a rotary shaft, a stationary member provided with a plurality of radially disposed cylinders, plungers fixedly supported at the inner ends of the cylinders and a circular rim connecting the outer ends of the cylinders, a rotary member fastened to said shaft and comprising a plurality of combustion chambers, and pistons arranged to operate in said cylinders and provided with abutments to operate through said circular rim across the space of the combustion chamber in successive order.

2. In a rotary engine of the internal combustion type, the combination of a rotary member comprising a plurality of combustion chambers, a cam having connection with said rotary member to turn therewith, a stationary member comprising a plurality of cylinders, a circular rim connecting the outer ends of the cylinders and plungers located at the inner ends of the cylinders, pistons arranged to operate in said cylinders, each piston formed with an abutment to operate through the circular rim across the space of the combustion chambers, and means for operating the pistons from the aforesaid cam.

3. In a rotary engine of the internal combustion type, the combination of a rotary member comprising a plurality of combus-

tion chambers, a cam having connection with said rotary member to turn therewith, a stationary member comprising a plurality of cylinders, a circular rim connecting the outer ends of the cylinders and plungers located at the inner ends of the cylinders, pistons arranged to operate in said cylinders, each piston formed with an abutment to operate through the circular rim across the space of the combustion chambers, and levers having connection at one end with the pistons and pivotally supported at the opposite end and adapted to be operated by the aforementioned cam to impart movement to the pistons.

4. In an internal combustion rotary engine, the combination of a stationary member comprising a plurality of cylinders, a circular rim connecting the outer ends of the cylinders and valved plungers arranged within the cylinders, valved pistons arranged within the cylinders to operate between the plungers and circular rim, each piston being formed with an abutment to operate through said circular rim, a rotary member encircling the stationary member and provided with a series of combustion chambers, and means for imparting a reciprocating movement to the pistons as the rotary member moves in the operation of the engine.

5. In a rotary engine of the character described, the combination of a stationary member comprising a plurality of radially disposed cylinders, a circular rim connecting the outer ends of the cylinders, plungers located within the cylinders, pistons arranged to operate in the cylinders between the plungers and the circular rim, each piston having an abutment to operate through the circular rim and a cylinder to receive the plunger, and a rotary member comprising a plurality of combustion chambers.

6. In a rotary engine of the character described, the combination of a stationary member comprising inner and outer journals, a series of radially disposed cylinders, a circular rim connecting the outer ends of the cylinders and plungers arranged within the cylinders and formed with hollow stems which communicate with the space formed between said inner and outer journals, pistons arranged to operate in the cylinders between said plungers and the circular rim, each piston formed with an abutment to operate through an opening in the circular rim, and a rotary member comprising a series of piston chambers.

In testimony whereof I affix my signature in presence of two witnesses.

JACOB JACOBSEN.

Witnesses:

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