C. F. BATT.

ENGINE.

APPLICATION FILED DEC. 21, 1910.

1,206,800.

Patented Dec. 5, 1916.

3 SHEETS—SHEET 1.

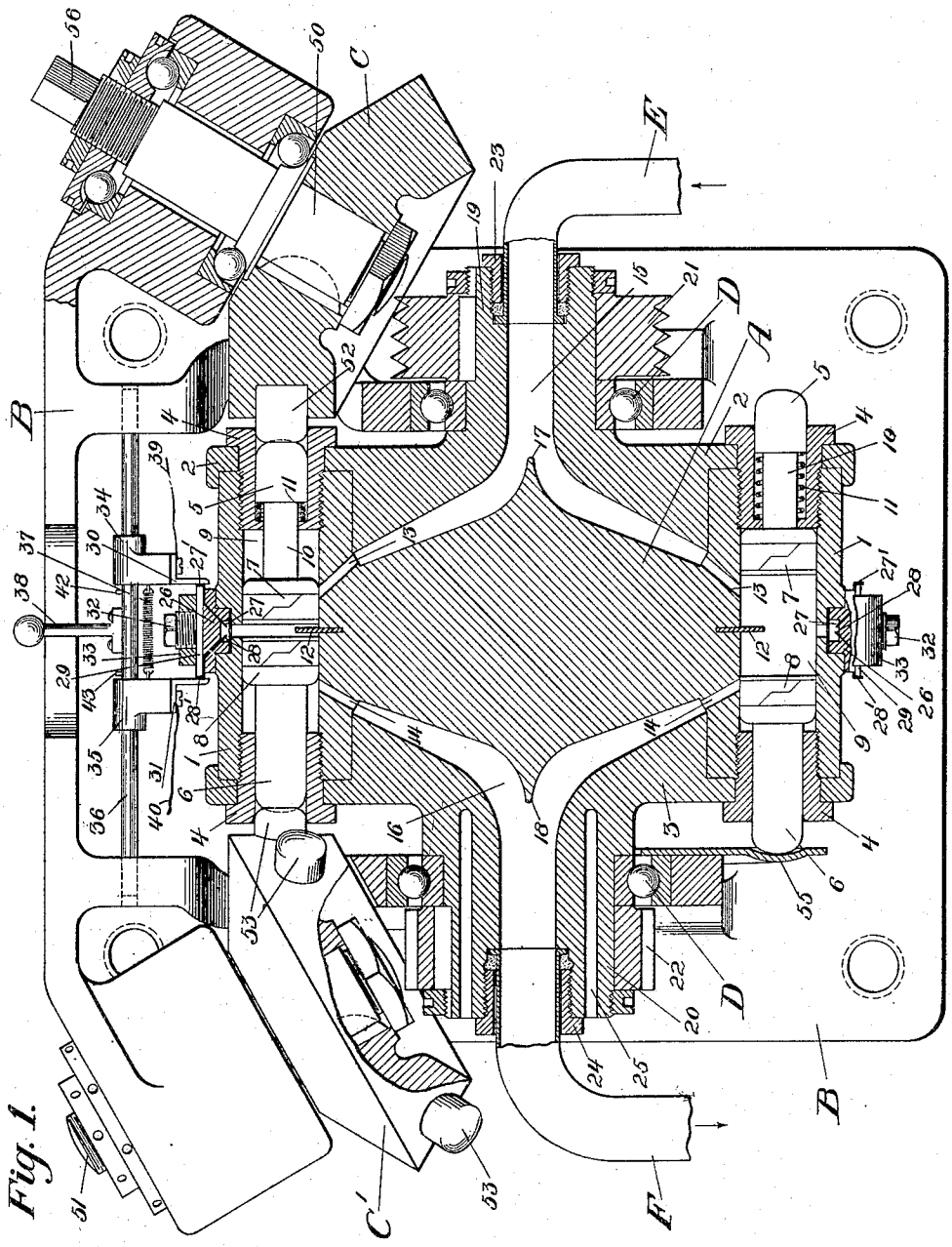

Fig. 1.

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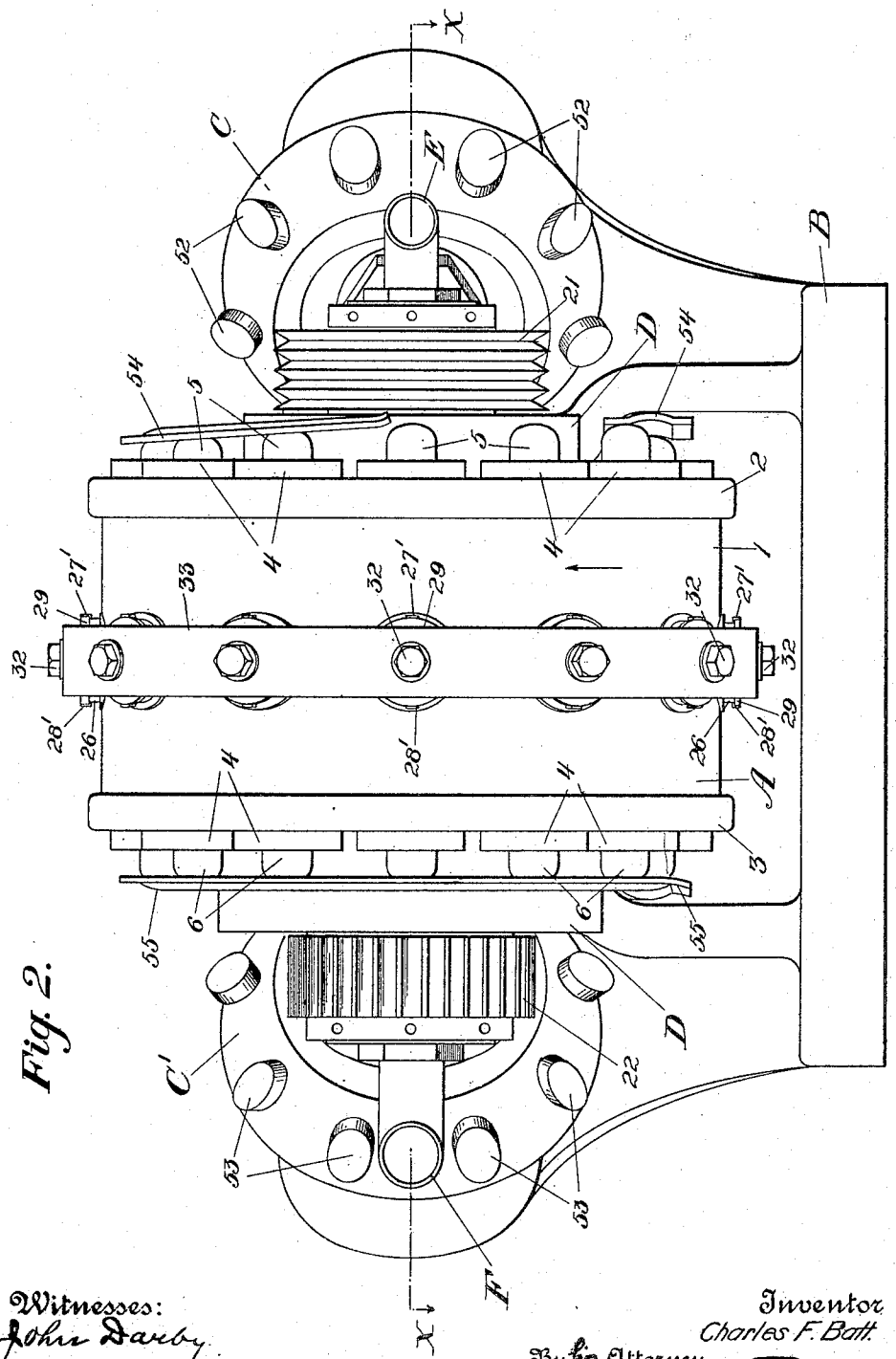

Fig. 2.

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3 SHEETS—SHEET 3.

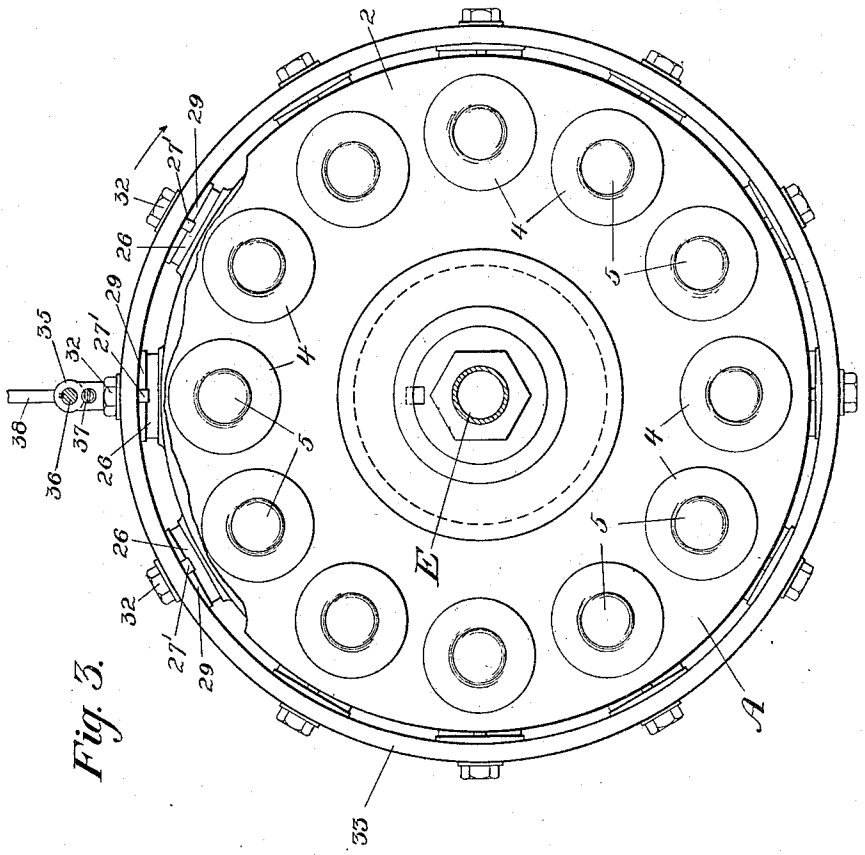

Fig. 3.

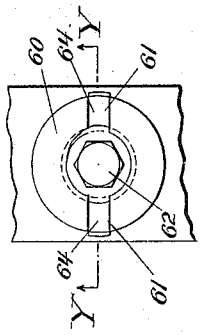

Fig. 4.

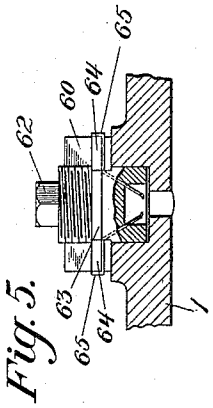

Fig. 5.

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UNITED STATES PATENT OFFICE.

CHARLES F. BATT, OF NEW YORK, N. Y.

ENGINE.

1,206,800. Specification of Letters Patent. Patented Dec. 5, 1916.

Application filed December 21, 1910. Serial No. 598,662.

To all whom it may concern:

Be it known that I, CHARLES F. BATT, a citizen of the United States, residing at 327 Jefferson avenue, in the borough of Brooklyn, city and State of New York, have invented certain new and useful Improvements in Engines, of which the following is a description, reference being had to the drawings forming a part hereof.

My invention relates to engines utilizing the power of expansive gases, and more particularly its distinct type may be designated as rotary cylinder.

Among the objects of my invention is the production of a motor in which the direction of movement of the major mass of the engine is constantly in the direction of the applied power, and the applied power practically constant; also to eliminate positive connection of reciprocating parts.

In one respect fundamentally, the motor consists of a magazine of cylinders with actuating parts revolving in a fixed plane, with reaction idlers traveling in the same direction at the points of contact, but in different planes. Fuel, in gaseous form, passing centrally through the magazine is diverted through ports into the cylinders; there compressed, fired and exhausted, motion, constant in direction being imparted through the pistons by reaction to the magazine and idlers, which constitute a revolving unit.

In the accompanying drawings I have illustrated one form of embodiment of my invention, while various modifications in arrangement and construction, as well as details, are within the scope of my invention.

In the particular form shown and hereafter described: Figure 1 is a section and part elevation on line X X of Fig. 2. Fig. 2 is a front elevation. Fig. 3 is an elevation of the rotating magazine viewed from the intake side. Fig. 4 is an enlarged detail of a modified form of the spark plug. Fig. 5 is a section of Fig. 4 on line Y Y.

In the drawings, A is the magazine, B the base or supporting frame, C, C′ idlers, D anti-friction bearings in which the magazine rotates, E intake for the explosive gases, F the exhaust outlet.

The magazine A carrying, in the present embodiment, twelve pistons, is comprised of three parts, a central cylinder portion 1, in which the cylinders are formed and two outer flanged portions, 2 and 3, secured to the central portion 1 by means of the hollow nuts 4 through which pass the stems or rods 5 and 6, of the pistons 7 and 8, working in the cylinders 9, 9. The nuts 4, 4 serve not only to bind together the three parts of the rotating magazine, but form a guide for the piston stems and a ready means of removal for the pistons. The pistons 7, 7, on the intake side of the magazine have shouldered stems or rods 10, which may be secured to said pistons in any suitable manner after assembling in the nuts 4, 4. The stems 5, 5, are reduced in size at a point forming a collar and space to receive compression springs 11, 11 which act to force the pistons 7, 7 beyond the intake port in case the misfiring of the charge fails to perform this function.

A baffle plate 12, is inserted at the center of each cylinder to act as a deflector to the incoming gases and to form a limiting stop to the inward travel of the pistons 7 and 8.

Inlet ports 13, 13 and exhaust ports 14, 14 are provided, connecting the inlet passage 15 and the exhaust passage 16, with the cylinders 9, 9.

The portion of the magazine A is brought to cone points 17 and 18, at the center of the intake passage 15 and exhaust passage 16, to give direction to the incoming and outgoing gases.

The outer or flanged portions, 2 and 3, of the magazine A have extensions or trunnions, 19 and 20, which are suitably supported in the bearings D, and carry friction gear 21 and spur gear 22, respectively, as means of transmitting the power generated in the magazine A.

The intake pipe E and the exhaust pipe F, are connected to the trunnions 19 and 20, in any suitable manner, as by bushings 23 and 24. The exhaust passage 16 is provided with an annular air recess 25 for cooling effect of the bearing on the exhaust side of the magazine.

Ignition of the compressed charge in the cylinders is provided for by the insertion of spark plugs 26, centrally located with respect to the cylinders in recesses on the periphery of portion 1 of the magazine A.

Spark plugs 26 are comprised of a central portion in which are located the terminals 27 and 28, extending diagonally through the plug and having upturned ends 27′ and 28′ bearing against the washer 29, and adapted to engage the brushes 30 and 31, as the magazine rotates. Washers 29, and the

central portion of the spark plug are firmly secured in place by the plugs 32 screwed into the ring 33 encircling the magazine. The brushes 30 and 31, are carried by insulating blocks 34 and 35, splined to and slidably mounted on the rod 36, rotatably supported in the frame B. Brushes 30 and 31 are connected by wires 39 and 40 to any suitable electrical source, such as a magneto or battery, and are normally drawn together by a tension spring 37, against stops 42 and 43. Handle 38 attached to rod 36 provides means for rocking the brushes 30 and 31, to advance or retard the spark.

Fixed to stud shafts 50 and 51, carried in anti-friction bearings formed in the base B, are idler or reaction wheels C, C′, their axes of rotation being inclined to, but in the same plane with the axis of the magazine A.

Reaction wheels C, C′ are formed with conical surfaces, carrying pins 52 and 53 slightly convex at their outer ends and adapted to engage the stems 5 and 6 of pistons 7 and 8, carried by the magazine A as it rotates. The bushings 4 are slightly rounded at the outer edges of their bore, to facilitate the entering of pins 52 and 53.

Cam rings 54 and 55, adapted to engage the outer ends of stems 5 and 6, for the proper control of compression in the cylinders, are suitably mounted on the base B.

Without departing from the spirit of my invention, I may vary the details of construction, such as, for instance, using compression springs on the stems 6, 6 similar to those on the stems 5, 5, or I may vary the mounting of the spark plugs as shown in Figs. 4 and 5, where the encircling ring 33 carrying the screw plugs 32, is omitted and the raised bosses 60 on the central portion 1 of the magazine A, are substituted. The bosses 60 are provided with slots 61 and bored and tapped to receive the screw plugs 62 which bear against the washer 63; said washer has radiating ears 64, 64 adapted to engage the slots 61 in the bosses 60 and form surfaces against which the upturned ends 65, 65 of the spark plug terminals bear. A starting crank may be attached to either of the idler shafts as shown at 56, or the engine may be started by any suitable means connected to the main frame B.

From this it will be seen that the operation of my engine is as follows: Rotation is righthand or clockwise as viewed from the intake side. When the magazine is rotated a charge of the explosive mixture is forced into the cylinders 9, 9 by centrifugal force, or suitable blower through the intake ports 13, inward movement of the pistons to close the ports is effected by the cam ring 54 engaging the ends of stems 5 and carrying them into active contact with compression pins 52 on reaction idler C; the exhaust ports 14 are closed by the action of cam ring 55 on pins 6, at the proper time after the gas charge begins entering the cylinder, and by said cam ring, pins 6 are brought into engagement with the compression pins 53 on reaction idler C′. The compression pins 52 and 53 force inwardly the pistons 7 and 8, compressing the charge to the point of explosion, which takes place immediately after the engaging pistons and compression pins have passed their dead center line. The compression pins 52 and 53 enter the ends of the hollow nuts 4, 4,—this construction gives positive action and maintains the fixed relative position of the parts of the system to each other. At the dead center line of contact of the piston pins with the compression pins of the idlers, the arcs of contact of the latter are practically tangent to the outer faces of the rotating magazine carrying the piston pins, but the planes of the arcs of rotation of the compression pins are inclined to the faces of the magazine. The power developed by the explosion of the compressed charge forces outwardly the piston pins, which react against the compression pins of the idlers with increasing leverage as the arcs of contacts diverge, imparting a rotary movement to the magazine and idlers, and bringing another cylinder of the magazine into operative connection with the next set of pins on the idlers, thus developing a continuous rotary movement. When the compressed charge has been fired, the exhaust port is opened by the piston at the exhaust end of the operating cylinder, as it approaches the end of its stroke; in advance of the opening of the intake port; this lead is accomplished by making the pins on the reaction idler C′ somewhat shorter than those on reaction idler C or by the cam ring 54, being so arranged or shaped as to retard the outward movement of the piston at the intake end of the cylinder to open the intake port, until the burnt gases have been discharged. Lubrication of cylinders and pistons is provided for, by introducing oil into the gaseous charge, as customary with two-cycle explosive engines. The projecting points of the piston stems may be wiped every revolution by oil soaked felt placed in the base of the engine. Throttle control of the incoming gases is provided by any suitable means, placed between a carbureter and the intake passage 15.

The advantages claimed for this construction, are increased efficiency through the absence of jointed reciprocating parts, the relative smallness and absence of joints of said parts reducing the strains due to centrifugal force to a minimum, each set of reciprocating parts reciprocating along an elemental line of its cylinder, cylinders all independent of each other, and by changing their guide cams the phase of operation of

each cylinder may be varied, and any number of cylinders may be idle during a part of their revolution. In general advantages are due to increased economy through the explosion of small volumes, compactness of construction for given powers, simplicity of construction and operation, range of throttle and uniformity of torque, reversible direction of motor and high speed efficiency.

I may in cases wish to duplicate the set of reaction idlers or a plurality of idlers may be arranged at different points about the face of the magazine, and their position may also be arranged so that the point of combustion effected at each set of idlers will be successive so as to still further unify the torque delivered.

It will also be noted that all the main parts of my motor are cylindrical in construction, facilitating to the utmost the manufacture. This may prove of importance as compared with crank-shafts, connecting rod constructions and other elements of the now common internal combustion engine. By my arrangement I get a direct rotative effort to produce the power by movement of the magazine and this eliminates the connecting rod with its bearings and its effect as a reciprocating part of the ordinary engine, and this enables me to secure a perfect balance in the construction of my motor when considered with the other features. By the use of the two opposed pistons contained in the rotating magazine, their mutual reaction against the idlers with fixed axes insures an internal balance without transmitting a reaction through the cylinders or other parts, as in the case of the ordinary reciprocating engine in which such parts are also associated with the other functions of the engine.

The invention is not confined to explosive engines, as by a suitable arrangement of valves, provision could be made for the employment of steam or any other expansive gas as a motive force.

Numerous other variations may be made in the arrangement and details of construction which would still be within the intent of my invention, and I do not therefore confine myself to the exact construction herein shown and described, but

What I claim and desire to secure by Letters Patent is:

1. A motor consisting of a magazine of cylinders with floating pistons and rods, supports for said magazine, revolving reaction idlers having supports in rigid relation with the supports of the magazine of cylinders, whereby engagement between the piston rods and the reaction idlers is afforded and said rods engage the reaction idlers in sequence.

2. A motor having a plurality of cylinders, with floating pistons and rods assembled to revolve on a fixed axis, in combination with a separate base arranged to carry a revolving reaction means for said pistons.

3. A motor having a plurality of cylinders with pistons and rods assembled to revolve on a fixed axis, in combination with a base carrying revolving reaction idlers against which said rods react upon engagement during a portion of each revolution.

4. A motor having a plurality of cylinders with pistons and rods assembled, the axis of said cylinders arranged parallel to a fixed axis around which the engine revolves, in combination with a base carrying revolving reaction idlers against which said rods react by engagement during a portion of each revolution.

5. A motor having a plurality of cylinders with pistons and rods assembled to revolve on a fixed axis, in combination with a base carrying reaction idlers, said idlers having pins against which said rods react by engagement during a part revolution only.

6. A motor having a magazine of cylinders, arranged to revolve about a fixed axis, floating pistons in said cylinders, centrally located intake and exhaust chambers, with ports into the cylinders arranged whereby said pistons open and close said ports.

7. A motor having a plurality of cylinders arranged to revolve about a fixed axis parallel to the cylinders, floating opposed pistons in said cylinders, reaction idlers and means to transmit the reaction of the pistons, during a portion of the revolution of the cylinders, from the idlers to revolve the cylinders, and independent means to control the motion of the pistons during the remainder of the revolution of the cylinders.

8. A motor having a driving element actuated by reaction, a cylinder and a pair of opposed pistons within said cylinder, revolving reaction elements and means connected with said pistons to periodically engage said reaction elements, and connections to the driving element to revolve the same.

9. A motor having a driving element of constant rotation direction, a plurality of cylinders in said element on axes parallel to the axis of said rotation element, opposed pistons in each of said cylinders, revolving reaction elements and means for periodic connection between said pistons and the reaction elements.

10. A motor having a plurality of cylinders each having a piston and rod, assembled to revolve about a common axis, a base carrying a plurality of revolving reaction abutments coöperating in sequence with said piston rods and so arranged that a plurality of said rods and abutments, respectively, are at all times in engagement.

11. A motor having a driving element ac-

tuated by reaction, a plurality of cylinders each having opposed pistons and piston rods, moving reaction abutments adapted to engage and disengage periodically the rods of said pistons whereby a plurality of piston rods and abutments are at all times in engagement to effect the reaction, and connections to transmit rotary motion due to said reaction to said driving element.

12. A motor having a plurality of cylinders with pistons and rods assembled to revolve on a fixed axis, a base and bearings to support said revolving motor, revolving reaction idlers carried on said base supported with relation to the motor proper whereby the piston rods will have periodic engagement with the idlers.

13. A motor comprising a main casing supported to revolve, a plurality of cylinders in said casing having their axes parallel with the axis of the casing, revolving reaction idlers rotating adjacent to the casing on fixed axes, opposed pistons in each of said cylinders having axial projections beyond the casing, adapted to move in proximity to said revolving idlers, projections on said idlers adapted to engage said piston projections in sequence on a plurality of pistons.

14. A motor having a revolving casing containing a plurality of cylinders with their axes parallel to the axis of revolution of the casing, reaction idlers adjacent to the periphery of the casing, pistons in said cylinders, means to cause reaction upon the movement of the piston against the reaction idlers during a portion of the revolution of the casing, and separate means to control the movement of the pistons independently of the idlers at other portions of the revolution of the casing.

15. A motor having a plurality of cylinders and pistons lying in parallelism, rods actuated by said pistons, reaction idlers supported so that the piston rods coöperate with said idlers during a portion of their revolution, a frame-work supporting bearings for said idlers and having means to rotatively support the cylinders to coöperate with said idlers, whereby a relatively rotary movement between said frame work and cylinders is caused by the reaction with said idlers.

16. A motor comprising a main casing, a plurality of cylinders in said casing having their axes parallel, revolving reaction idlers rotating adjacent to the casing, opposed pistons in each of said cylinders having projections beyond the casing adapted to engage said revolving idlers, projections on said idlers for engagement with said piston projections in sequence, a frame-work having bearings to support the reaction idlers and having bearings for the main casing, whereby the reaction of the pistons on the idlers causes a relative rotary movement between said frame and casing.

17. A motor having a rotary driving element actuated by reaction, a plurality of cylinders each having a pair of opposed pistons in each cylinder, a coöperating frame, reaction elements mounted in said frame and means connected with said pistons to periodically engage said reaction elements whereby relative rotation is produced between said frame and cylinders, and connecting means with said driving element to impart rotation thereto.

This specification signed and witnessed this 19th day of December, A. D., 1910.

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