W. E. MINUE.

ROTATING CYLINDER ENGINE.

APPLICATION FILED SEPT. 21, 1910.

1,019,908.

Patented Mar. 12, 1912.

3 SHEETS—SHEET 1.

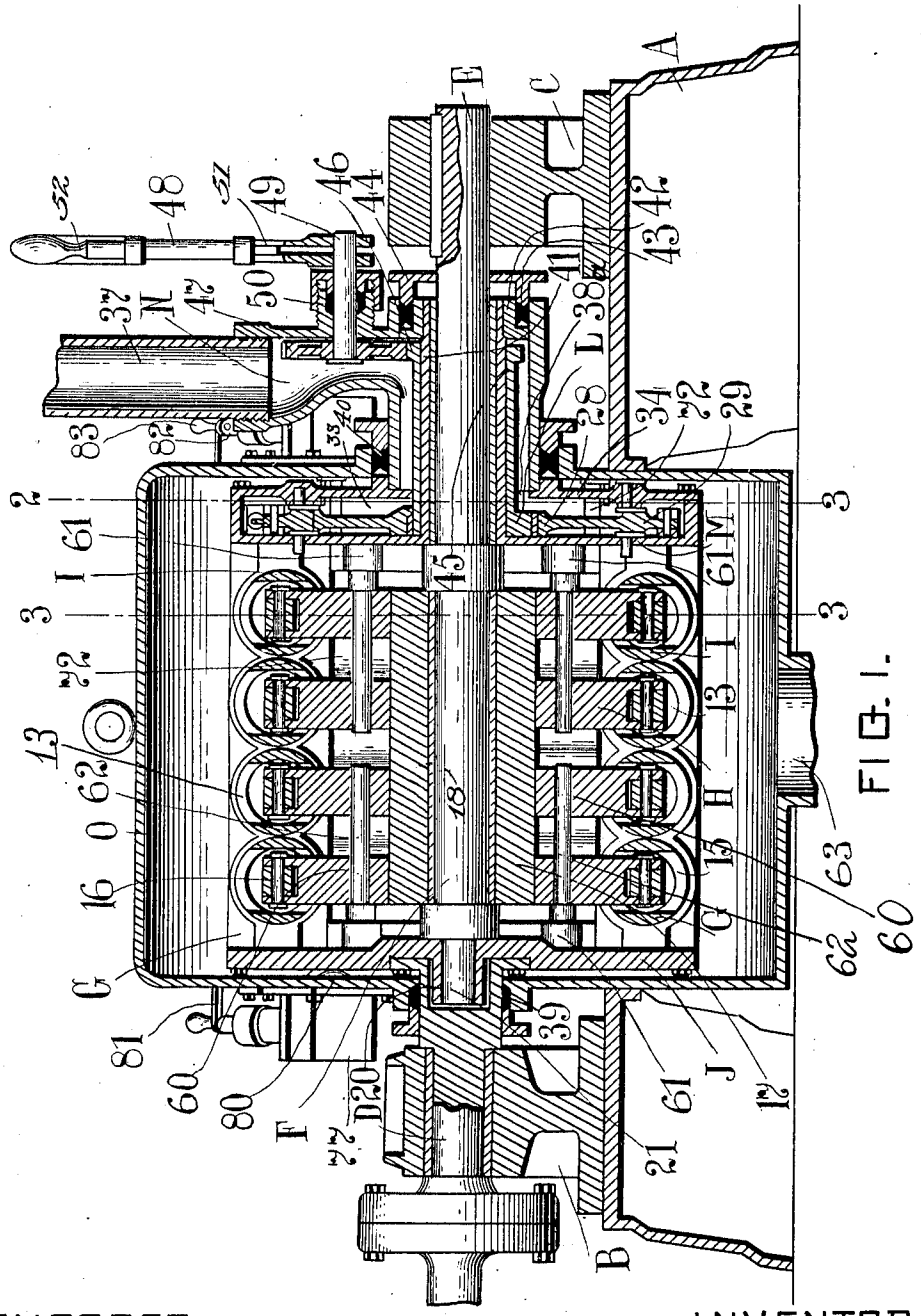

FIG. 1.

WITNESSES

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3 SHEETS—SHEET 2.

FIG. 8.

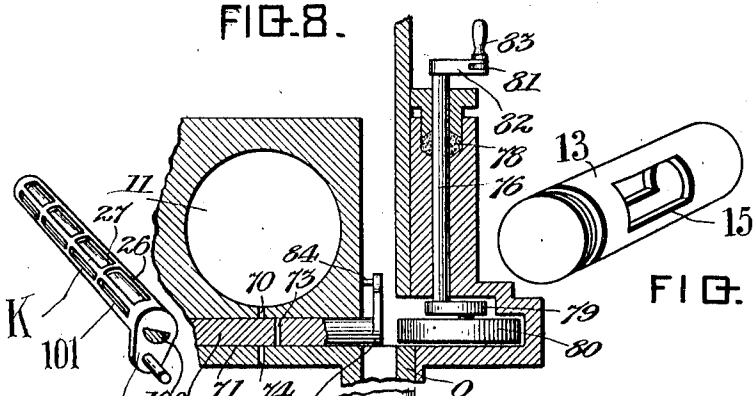

FIG. 4.

FIG. 3.

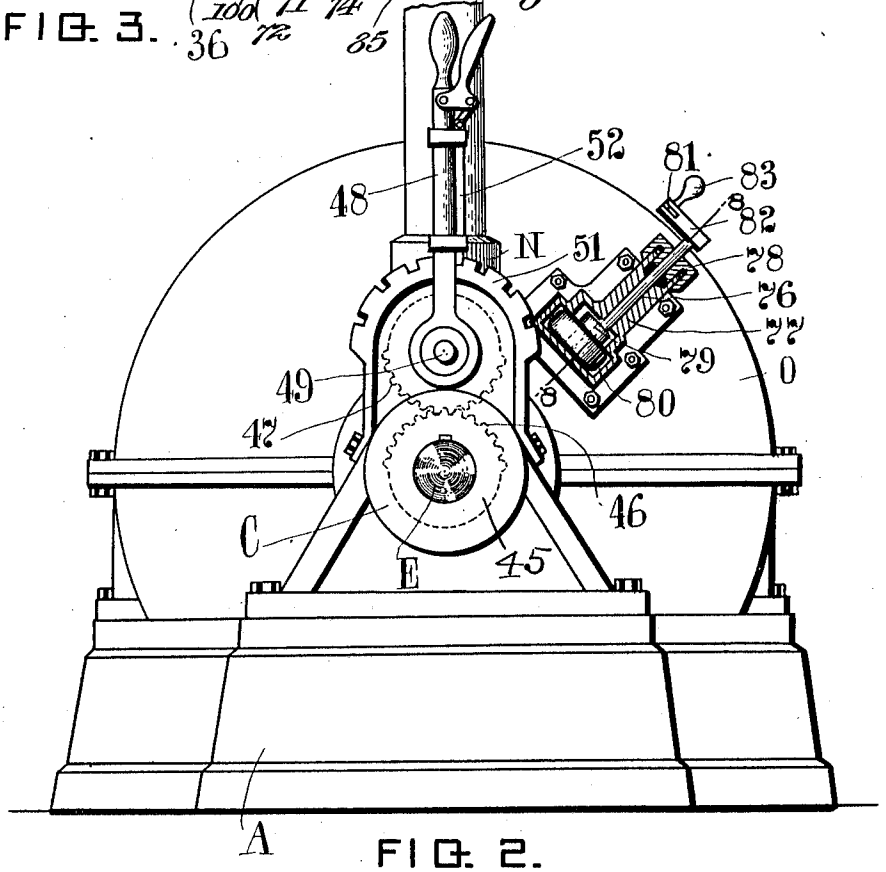

FIG. 2.

WITNESSES

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3 SHEETS—SHEET 3.

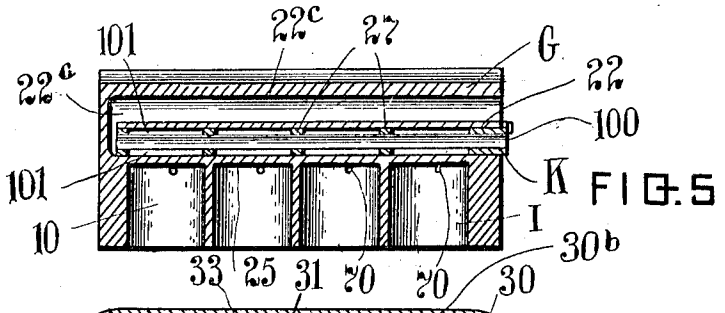

FIG. 5

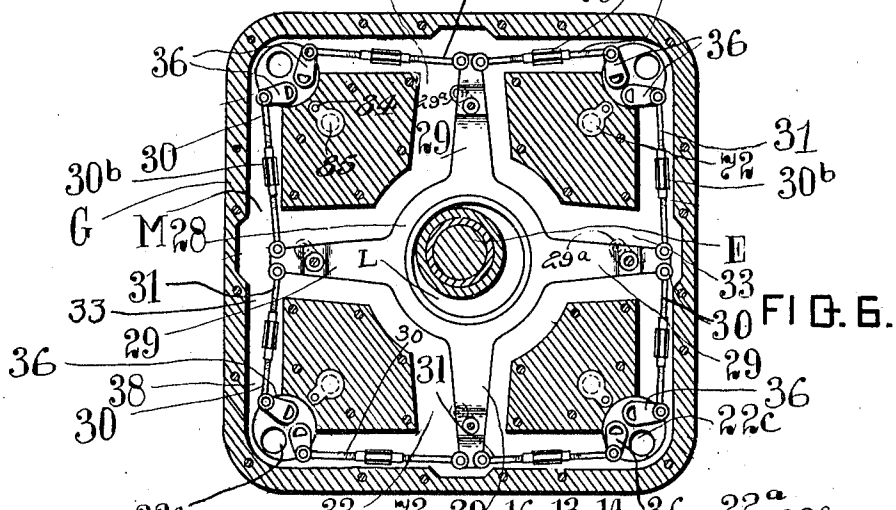

FIG. 6.

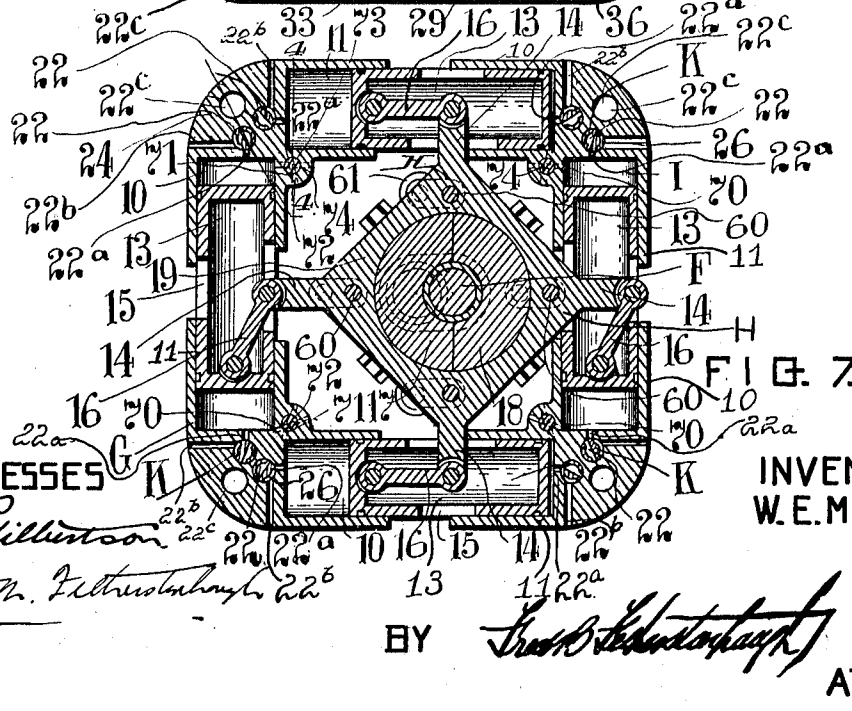

FIG. 7.

WITNESSES

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WILLIAM EDGAR MINUE, OF FREDERICTON, NEW BRUNSWICK, CANADA.

ROTATING-CYLINDER ENGINE.

1,019,908. Specification of Letters Patent. **Patented Mar. 12, 1912.**

Application filed September 21, 1910. Serial No. 583,087.

To all whom it may concern:

Be it known that I, WILLIAM EDGAR MINUE, of Fredericton, in the Province of New Brunswick, Canada, have invented certain new and useful Improvements in Rotating-Cylinder Engines, of which the following is a specification.

My invention relates to improvements in rotating cylinder engines, and the general object of my invention is to provide a simple and compact form of engine, of increased efficiency, and which will enable an extremely uniform torque to be simultaneously exerted on opposite sides of the crank shaft.

Another object is to provide an instrumentality of the class specified, which from an operative standpoint will in usage, possess a high degree of efficiency and effectiveness and which structurally considered will be of the greatest possible simplicity, being composed of but a few parts, all adapted for being made at a minimum cost and individually so formed as to be capable of being readily assembled in a compact arrangement for accomplishing the purpose intended.

Other objects and advantages will be in part obvious and in part pointed out hereinafter.

With those and other ends in view, this invention accordingly consists in the features of construction, combination of parts, and arrangement of elements hereinafter more explicitly set forth as an exemplification of the underlying principles of the invention.

In order that this invention may be more fully understood and be comprehensive to others skilled in the art, drawings illustrating a convenient means of carrying out the same are pointed out as a part of this specification and while the controlling principles of the invention may be otherwise applied by modifications falling within the scope of the claim, the hereinafter disclosed embodiment is that which will ordinarily be preferable to employ in practice. In such drawings it is to be noted that like numerals refer to corresponding parts throughout all the figures in the drawings, in which:—

Figure 1 is a longitudinal sectional view through the engine. Fig. 2 is an end elevation partially in section. Fig. 3 shows a perspective view of one of the valves. Fig. 4 is a perspective view of one of the pistons. Fig. 5 is a transverse sectional detail through the valves, on the line 4—4 Fig. 7. Fig. 6 is a sectional view on the line 2—2, Fig. 1. Fig. 7 is a sectional view on the line 3—3, Fig. 1. Fig. 8 is a section on the line 8—8 Fig. 2.

Referring to the drawings, A represents the pedestal of suitable form to support the working parts and carrying standards B and C: the standard B supporting and journaling the driving shaft D, while the standard C rigidly supports the crank shaft E, which latter is non-rotatable with respect to the standard.

G represents the primary rotating element which is rigidly secured to, and rotated with the shaft D and which carries the cylinders, pistons, and other working parts of the engine.

H represents the secondary, or eccentrically mounted rotating element which is rotatably mounted on the crank F of the crank shaft E.

The energy for driving the engine is derived from a plurality of sets of cylinders I, each set of cylinders comprising a plurality of pairs of cylinders 10 and 11, the individual cylinders of each pair diverging from each other, and having a valve mechanism for the motive fluid located at their meeting point. It will be found convenient to form the pairs of cylinders in four elbows, and when this is done, the rotating member G will be substantially rectangular in cross-section, and the cylinders of adjacent pairs will be in alinement with each other as shown in Fig. 7.

Double headed pistons 13 are provided adapted to enter each two alined cylinders, said pistons being tubular in form, and connected with the rotary member by arms 14 extending through slots 15 in the pistons, and connected by longitudinally extending links 16 with the pistons, said links having articulated joints at opposite ends with the pistons and arms respectively.

In the embodiment illustrated, the rotary member H is formed with inner semi-cylindrical members 17 and 18 which fit around the crank shaft F and are held in position by the outer section 19 which is bolted to said inner members. The cylinders which meet at right angles to each other are preferably cast integral with each other, thus forming an elbow, and the elbows of the different sets of cylinders are all cast integral with each other, the different elbow castings

being all connected and retained together by the end plates J and M, the end plate J being rotatably mounted on the shaft D and being formed with a socket 20 to receive an extension 21 from the crank shaft F, which extension is co-axial with the shaft D and E. When the cylinders are arranged as above described, it is possible to control the inlet of motive fluid in each cylinder by an extremely simple form of valve mechanism comprising a pivoted valve member K, more or less cylindrical in form and fitting in a cylindrical bore 22 which extends transversely across all the cylinders, said bore being placed in communication with the cylinders by short ports 22^a. The cylinders are also provided with exhaust ports 22^b which open on the exterior of the rotary member, a separate exhaust port being provided for each cylinder, and all the exhaust ports opening into the bore 22 and being controlled by the valve member K as hereinafter described. The steam is adapted to pass into the bore 22 from a steam chest N through channels 33 in the end plate M as hereinafter described. In order to admit the steam to both ends of the bore an additional passage way 22^c is provided communicating with the passage way 33 and leading to the opposite end of the bore 22, said passage way and bore stopping short of the end of the cylinder as shown in Fig. 5.

The cylinder valve member K has peripherally and longitudinally extending channels 26 thereon, adapted in a certain position to afford communication between the ports 22^a and 22^b and thus permit the exhaust of the cylinders. The channels for the different cylinders are separated by means of partitions 27.

The live steam is introduced and passes through a longitudinal channel 100 in the valve member, and through radial ports 101 also in the valve member, said radial ports being adapted to communicate with the ports 22^a of the cylinders when the valve member is in a certain position, the valve member being adapted to be moved from one position to another through the medium of cranks 36 on the extremities of the same which are actuated by mechanism hereinafter described. The valve members are adapted to be automatically actuated by the rotary movement, and I accomplish this in the embodiment illustrated by providing an eccentric member L, having a strap 28 and being provided with four radially extending arms 29 the extremities of which have links 30 and 31 pivoted thereto and extending in opposite directions to the valve members, the outer ends of the links being connected to the cranks 36 on the valve members. The said links are also each conveniently formed in two parts connected by a turn buckle 30^b which facilitates adjustment. The links 30 and 31 are located in recesses 38 in the end plate. The movement of the strap is regulated by means of a plurality of bell crank levers 29^a which have one end connected to an arm 29 on the straps and the opposite end to the face plate M, the passage ways 33 thereon being adapted to receive the strap, arms and links. It will be seen that when the rotary member rotates the straps will be shifted by the fixed eccentric to operate the valves in proper sequence.

In order to provide for drainage of the water formed by the condensed steam in the cylinders, small ports 70 are provided in each cylinder, the ports in the meeting cylinders opening into a common bore 71 in which extends a longitudinally slidable rod 72 having transverse passage ways 73 adapted when the rod is moved in a certain position to place the ports 70 in communication with corresponding ports 74 see Fig. 8 which open on the center side of the cylinders. Manually operable means are provided for moving these rods longitudinally to such positions as will drain the cylinders. These means comprise a pair of radially extending shafts 76 see Fig. 8 located in corresponding position on opposite ends of the casing member O, said shafts being each provided with a gland 78 to prevent leakage of steam from the interior. The shaft 76 is connected by means of an eccentric 79 to a roller 80 so that, as the shaft 76 is turned, the roller 80 is forced against the end of a rod 72 to force the same forward to open the ports 70. The shafts 76 on opposite ends are arranged to be operated simultaneously, which is accomplished by connecting them together by means of a link 81 which is pivoted at opposite ends to arms 82 formed on the shafts, one of said arms being formed with a handle 83, by which it may be manually operated. The rods 72 are prevented from turning on their axes by means of pins 84 which extend through small plates 85 secured to the ends of the rods, the rods being free to slide longitudinally but not to rotate. It will be seen that the rollers, arms and shafts are all carried on the stationary casing member but the rollers are adapted to be moved into the path of the ends of the rods 72 and thereby force said rods to move longitudinally in order to clear said rollers.

To supply the cylinders with steam, a steam chest N is provided itself supplied through a suitable conduit 37, said steam chest opening against an aperture 38^a provided in the side of the plate 34. See Fig. 1. It will be seen that all the working parts of the valve mechanism are exposed to the action of the incoming steam.

The exhaust steam is adapted to discharge on the exterior of the rotary member H, thus lubricating all parts exposed, and both rotary members are desirably inclosed by a

casing member O which has a gland 39 at the point of juncture with the shaft D and has a gland 40 at the point of juncture with the steam chest N. The exhaust steam discharges into the casing O, and in order to conduct it away, an exhaust conduit 63 may be connected to the casing.

In order to secure an effective tight joint between the steam chest and the rotary member and prevent the escape of live steam, the end plate M is provided with a cylindrical extension 41 fitting closely around the shaft E and having a collar 42 mounted at its extremity which is adapted to abut the inner-side of cylindrical apertures 43 formed in the steam chest: a gland 44 being provided around said apertures adapted to pack against the collar. There is thus a metal joint between the rotating part and the collar 42, while any steam escaping between said joint would still have to pass through the gland 44.

In order to effect reversal of the engine and to adjust the operation thereof, means are provided for shifting the position of the eccentric member L, said means extending through the steam chest. In the embodiment illustrated, the eccentric member is formed with a tubular extension 45 which has a plurality of peripherally arranged teeth 46 at one end which are engaged by a pinion 47 actuated by a lever 48 on the exterior of the steam chest and connected to the pinion by a shaft 49 extending through a soitable stuffing box 50. The lever 48 is adapted to be held in any adjusted position by any suitable means, as by the usual expedient of an arcuate rack 15 and a latch 52 adapted to engage the same.

In order to guide and steady the rotary members in their relative rotary movement, a plurality of bell-cranks 60 are provided having sections 61 journaled in the face plates at opposite ends and sections 62 journaled in the secondary rotary member H.

It will be seen that each of the valves are supported firmly in position by the bore 22, equalizing the strain on opposite sides and providing a perfectly balanced valve. It may also be mentioned that each of the bearings or supports for the moving parts may be provided with bushings in a manner well known in the art, enabling wear to be readily taken up by changing the bushings.

It is of course evident that any form of governor and throttle may be employed to control the passage of the live steam prior to entering the engine.

Particular attention is also to be called to the lubrication of the engine. It will be seen that all the exterior parts receive their lubrication from the exhaust steam in the inclosed casing, thus providing a cheap and easily applied form of lubricant.

The utilization of the steam in the manner hereinafter described enables considerable economy to be effected, thereby, reducing the cost of operation of the engine.

Having now described the working parts of the engine, the operation of the same may be briefly set forth: The working fluid, which may be steam, compressed air, or gas passes through the steam chest N into the channels 33, thence passes through the channel 100 in the valve member and thence through such radial ports 101 of the valve members as are in communication with the port 22^a of the cylinder. The steam is arranged to be simultaneously admitted to the cylinder on opposite sides of the center, each diametrically opposite pair of pistons working and moving together. Thus referring to Fig. 7, it will be seen that the steam is about to be admitted to the right hand side of the cylinder at the top and bottom. This exerts a pressure on both pistons toward the left, and as the pressure is balanced on both sides there will be no torque exerted about the crank shaft F but there will be a pressure on said crank shaft, which reacting against the outer end of the cylinders receiving the fluid will cause the primary rotary member to move, and it will continue to move with respect to the secondary rotary member until the cylinder is exhausted and steam admitted to the opposite ends of the piston. In this case a reciprocatory movement will take place, the primary rotary member remaining stationary and the secondary rotary member moving until they assume their original relative position.

It will be seen that the rotary members of my engine have a very peculiar movement in that both rotary members continuously rotate about their respective axes but with respect to each other they have an oscillatory movement. Another peculiar and characteristic feature of the invention is that the pressure between members is simultaneously exerted tangentially in the same direction on opposite sides of the center and thus there is no moment about the center and the torque is produced through the eccentric mounting of the two members.

As many changes could be made on the above construction, and many apparently widely different embodiments of my invention within the scope of the claims constructed without departing from the spirit or scope thereof, it is intended that all matter contained in the accompanying specification and drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim as my invention is:

1. In an engine and in combination two rotary members mounted with freedom to rotate about eccentric axes, means for limiting the oscillatory movement of one rotary member with respect to the other, cylinders carried by one rotary member, pistons car-

ried by the other rotary member, said pistons and cylinders being connected in such a way that they will cause the members to continuously rotate about their own axes and at the same time oscillate with respect to each other.

2. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement, diametrically opposite tangential pistons all connected to one rotary member, cylinders for said pistons connected to the other rotary member, said cylinders and pistons being adapted to simultaneously exert a pressure between said members in the same direction on opposite sides of the center.

3. An engine having two rotary members one within the other and eccentrically mounted with freedom to rotate about eccentric axes, means for limiting the oscillatory movement of one rotary member with respect to the other and fluid pressure pistons carried by one member and cylinders carried by the other member, said pistons and cylinders being operatively connected between two members in such a way that they will cause the members to continuously rotate about their own axes and at the same time oscillate with respect to each other.

4. In an engine, and in combination, two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement, diametrically opposite and tangentially disposed pistons, on one member and cylinders on the other member, said pistons and cylinders extending between the rotary members and adapted to simultaneously exert a pressure on opposite sides of the center in the same direction.

5. In an engine and in combination, two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement while rotating about their own axes, one of said members having a plurality of radial arms, tangentially arranged cylinders on the other member, pistons for the cylinders and links connecting the pistons with the arms.

6. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement while rotating about their own axes, tangentially arranged pairs of alined cylinders carried by one rotary member, double headed pistons each having one end extending in one cylinder of a pair and the other end in the other cylinder of the pair and means connecting the pistons with the other rotary member.

7. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement while rotating about their own axes, tangentially arranged pairs of alined cylinders carried by one rotary member, double headed pistons each having one end extending in one cylinder of a pair and the other end in the opposite cylinder of the pair and means connecting the pistons with the other rotary member, said means comprising links connected to the pistons and arms connecting the links with the rotary member.

8. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement while rotating about their own axes, alined pairs of cylinders carried by one of said members opening toward each other, hollow, double-headed pistons each having one end extending into one of the cylinders of each pair and the other end into the other cylinder, said pistons being formed with central longitudinal slots, links connected to said pistons and lying wholly within the same and arms on the rotary member extending through the slot in the piston and connected to the links.

9. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement diametrically opposite pistons and cylinders between said members adapted to simultaneously exert a pressure on opposite sides of the center and valves controlling the passage of motive fluid to the cylinders and being operated by the rotary movement, and bell cranks connecting the rotary members and limiting their oscillatory movement.

10. In an engine and in combination, two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement, a plurality of sets of tangentially disposed cylinders carried by one rotary member and arranged in transverse alinement, pistons in the cylinders connected to the opposite rotary members, a valve controlling mechanism comprising a single pivoted valve member extending across all the cylinders and means operated by the rotary movement of the cylinders for actuating the valve member.

11. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement while rotating about their own axes, a plurality of integrally cast tangential cylinders carried by one of the rotary members, the cylinders in said sets being arranged in transverse rows and in pairs opening toward each other, pistons in said cylinders and connecting means between the pistons and the other rotary member.

12. In an engine of the character de-

scribed, a rotary member having a plurality of tangentially arranged cylinders, a second eccentrically mounted rotatable member, pistons in the cylinders, means for operatively connecting the pistons with the opposite member, valve mechanism for the cylinders, a face plate carried by the first mentioned member and formed with passageways adapted to contain the working parts of the valve mechanism and a plate covering said passageways.

13. In an engine and in combination two rotary members mounted with freedom to rotate about eccentric axes, means for limiting the oscillatory movement of one rotary member with respect to the other, cylinders carried by one rotary member and pistons carried by the other rotary member, said pistons and cylinders being connected in such a way that they will cause the members to continuously rotate about their own axes and at the same time oscillate with respect to each other, a casing inclosing said members, and an exhaust conduit communicating with the casing.

14. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement while rotating about their own axes, a tubular extension formed on the member which carries the cylinder, a collar on said extension, a steam chest closing the extension and supplying motive fluid to the cylinder, a packing gland between the steam chest and collar and valve means for the cylinders operated by the rotary movement.

15. An engine of the character described comprising a crank shaft having an eccentric crank portion, a driven shaft, a rotary member connected to the driven shaft having a plurality of tangential cylinders thereon arranged in pairs opening toward each other, pistons in said cylinders, a second rotary member mounted on the eccentric portion of the crank shaft, means connecting the second member with the pistons, a casing inclosing both of said members, a gland between said casing and the driven shaft, a motive fluid chest communicating with said cylinders, means for controlling the passage of motive fluid and a packing gland between the casing and the motive fluid chest.

16. An engine of the character described comprising in combination a rotary driving member, a plurality of sets of tangentially arranged cylinders formed on said driving member, each set of cylinders being formed in diverging pairs the cylinders in adjacent pairs opening toward each other, said cylinders having a transverse bore extending through the juncture of the cylinders in all the pairs, a valve member pivotally mounted in said bore, means for actuating said valve member, and means for supplying the same with motive fluid.

17. An engine comprising a crank shaft, a pedestal fixedly supporting the same, a rotary member mounted on the eccentric portion on said crank, a second rotary member mounted on the axial portion of said crank, a shaft driven from said second rotary member, pairs of pistons carried by one rotary member and cylinders carried by the other rotary member and connected between the rotary members in such a way that a pressure may be simultaneously exerted in the same direction between the rotary members on opposite sides of the center and means for limiting the oscillating movement of one rotary member with respect to the other.

18. An engine comprising a crank shaft, a pedestal fixedly supporting the same, a rotary member mounted on the eccentric portion on said crank, a second rotary member mounted on the axial portion of said crank, a shaft driven from said second rotary member, pairs of pistons carried by one rotary member and cylinders carried by the other rotary member and connected between the rotary members in such a way that a pressure may be simultaneously exerted in the same direction between the rotary members on opposite sides of the center and stationary casing inclosing both rotary members, and packing boxes between said casing and the shaft at one end and the crank shaft at the other end and means for limiting the oscillating movement of one rotary member with respect to the other.

19. An engine comprising a crank shaft having an eccentric portion and axial portions at the opposite ends, a rotary member mounted on the eccentric portion, a plurality of pistons connected to said rotary member and arranged in diametrically opposite pairs, a second rotary member mounted at opposite ends on the axial portions of the crank shaft, said second rotary member carrying cylinders to receive the pistons aforesaid and having a face plate at one end formed with steam conducting passageways, a steam chest mounted about the axial portion of the crank shaft and communicating with the passageways in the face plate and means for limiting the oscillating movement of one rotary member with respect to the other.

20. An engine comprising a crank shaft having an eccentric portion and axial portions at the opposite ends, a rotary member mounted on the eccentric portion, a plurality of pistons connected to said rotary member and arranged in diametrically opposite pairs, a second rotary member mounted at opposite ends on the axial portions of the crank shaft, said second rotary member carrying cylinders to receive the pistons

aforesaid and having a face plate at one end formed with steam conducting passageways, a steam chest mounted about the axial portion of the crank shaft and communication with the passageways in the face plate, a packing box between the steam chest and the axial portion of the crank shaft, a fixed casing inclosing both rotary members and packing boxes between said casing and the steam chest.

21. In an engine and in combination two rotary members eccentrically mounted with respect to each other and adapted to have a relative oscillatory movement diametrically opposite the pistons and cylinders between said members adapted to simultaneously exert a pressure on opposite sides of the center and drainage means for the cylinders, said drainage means being thrown into operation when the engine is rotating.

22. An engine comprising a crank shaft having an eccentric portion and an axial portion at opposite ends, a driving shaft in axial alinement with the crank shaft and having a recess to receive the axial end portion of the crank shaft, a rotary member mounted on the eccentric portion of the crank shaft and carrying a plurality of pairs of pistons, the members of each pair being diametrically opposite to each other and each piston being double headed, a second rotary member comprising plates mounted on the axial portions of the crank shaft and sets of cylinders supported between the plates and adapted to receive the pistons and means for the admission of motive fluid to said cylinders and controlling the passage thereof.

23. An engine comprising a crank shaft having an eccentric portion and an axial portion at opposite ends, a driving shaft in axial alinement with the crank shaft and having a recess to receive the axial end portion of the crank shaft, a rotary member mounted on the eccentric portion of the crank shaft and carrying a plurality of pairs of pistons, the pistons of each pair being diametrically opposite to each other and each piston being double headed, a second rotary member comprising plates mounted on the axial portions of the crank shaft and sets of cylinders supported between the plates and adapted to receive the pistons and means for admitting motive fluid to said cylinders and controlling the passage thereof and bell cranks between the first and second rotary members.

24. An engine comprising a crank shaft having an eccentric portion and an axial portion at opposite ends, a driving shaft in axial alinement with the crank shaft and having a recess to receive the axial end portion of the crank shaft, a rotary member mounted on the eccentric portion of the crank shaft and carrying a plurality of pairs of pistons, the members of each pair being diametrically opposite to each other and each piston being double headed, a second rotary member comprising plates mounted on the axial portions of the crank shaft and sets of cylinders supported between the plates and adapted to receive the pistons and means for the admission of motive fluid to said cylinders and controlling the passage thereof, a steam chest supplying motive fluid for the cylinder and mounted about the axial portion of the crank shaft and at one end a casing inclosing the rotary members and having a packing box at one end extending about the driving shaft and a packing box at the opposite end extending about the steam chest.

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

WILLIAM EDGAR MINUE.

Witnesses:
THOS. L. KANE,
ROY R. FEENEY.