R. B. HOLMES.

MOTOR.

APPLICATION FILED AUG. 17, 1914.

1,224,642.

Patented May 1, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

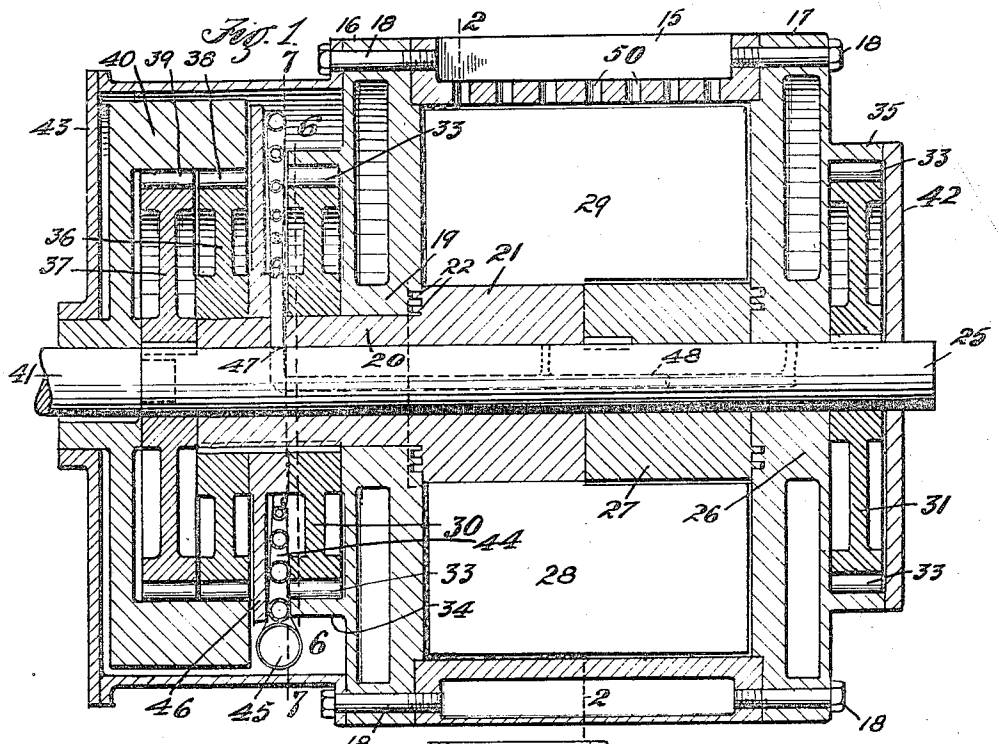
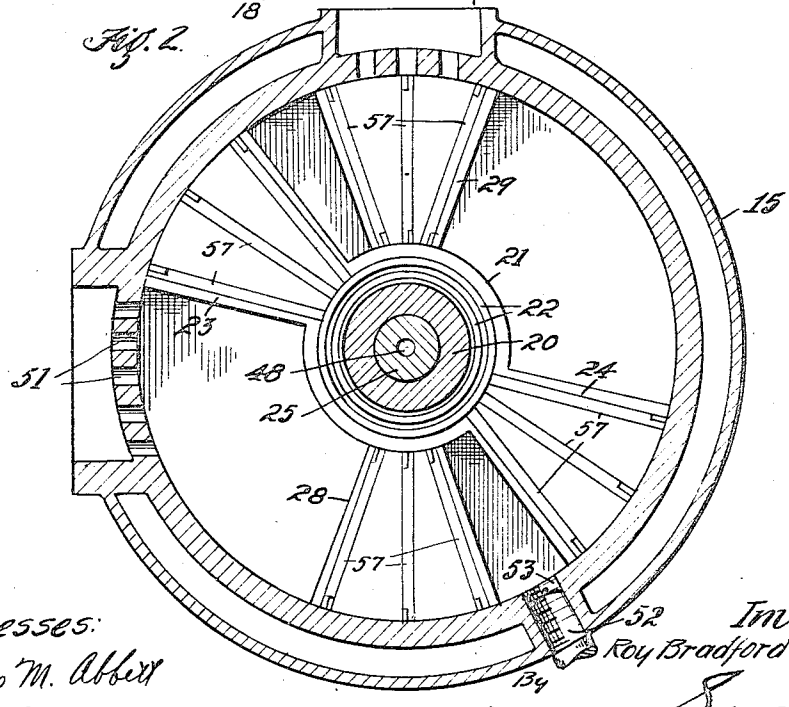


Fig. 2.



Witnesses:

James M. Abbett

R. S. Berry

Inventor.

Roy Bradford Holmes.

By Howard Thomas.

Atty's.

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2 SHEETS—SHEET 2.

Fig. 3

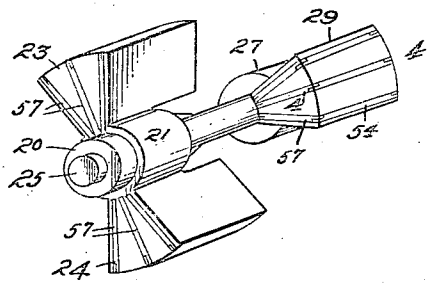


Fig. 4

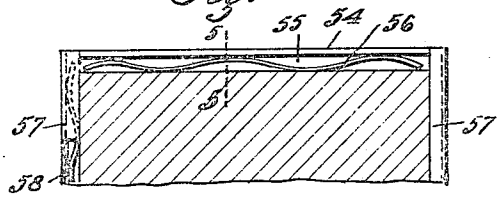


Fig. 5.

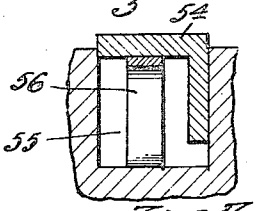
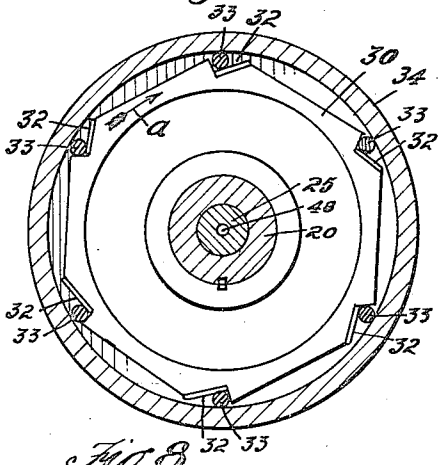


Fig. 7.

Fig. 6.



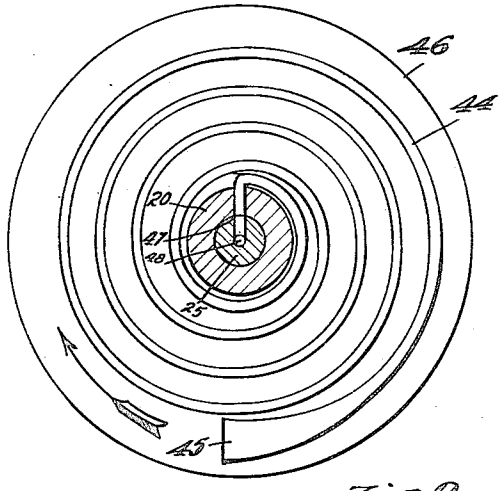


Fig. 8.

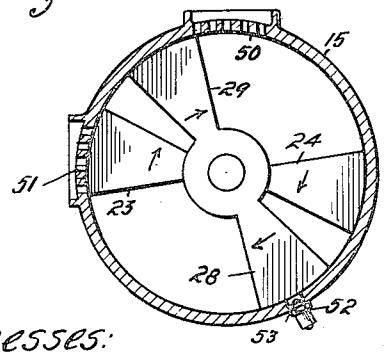
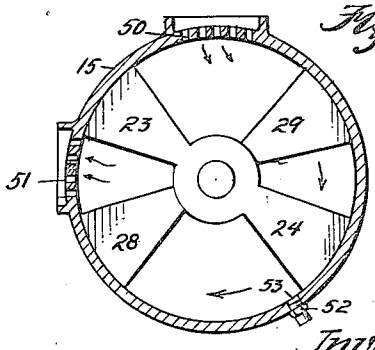


Fig. 9.



Witnesses:
James M. Alles
R. S. Berry.

Inventor.
Roy Bradford Holmes.
By Howard Thomas
Attys.

UNITED STATES PATENT OFFICE.

ROY B. HOLMES, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO HOLMES MOTOR CORPORATION, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

MOTOR.

1,224,642. Specification of Letters Patent. Patented May 1, 1917.

Application filed August 17, 1914. Serial No. 857,030.

To all whom it may concern:

Be it known that I, ROY B. HOLMES, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Motors, of which the following is a specification.

This invention relates to a motor, and particularly pertains to a rotary motor of the internal combustion type.

It is the object of this invention to provide an internal combustion motor in which the force exerted by the explosion of the gaseous mixture will be delivered directly to a rotary shaft without the interpositioning of reciprocating parts.

Another object is to provide a motor having revoluble blades or vanes connected to a rotary shaft and so arranged that an intermittent rotary movement of the blades will be effected by the explosion of a gaseous mixture between certain of the blades at frequent intervals, and in which the intermittent movement of the blades will effect a constant rotation of the shaft.

Another object is to provide an internal combustion rotary motor in which the explosion of a compressed gaseous mixture between one pair of blades will effect the compression of a charge of gaseous mixture between a succeeding pair of blades; the compressed charge operating when pressed to a predetermined degree to advance the preceding blade and thereby move the compressed charge to the point of ignition so that a series of explosive impulses will be imparted to the rotor member in one revolution thereof from one point of ignition.

Another object is to provide an internal combustion motor in which the intake of explosive mixture, compression, explosion and scavenging of the burnt mixture will be effected a plurality of times during one rotation of the rotor.

A further object is to provide a motor capable of generating high power in proportion to its size and weight, and which consists of few simple parts readily manufactured and assembled.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a view in vertical section of a motor constructed in accordance with this invention.

Fig. 2 is a view in vertical section and elevation on the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of the rotor blades as removed from the motor casing with one set of blades moved out of operative relation with the other set of blades.

Fig. 4 is a detail longitudinal section of one of the blades as seen on the line 4—4 of Fig. 3 illustrating the manner of packing the blades to effect a close sliding connection between the blades and the motor casing.

Fig. 5 is an enlarged detail section on the line 5—5 of Fig. 4.

Fig. 6 is a detail section and elevation on the line 6—6 of Fig. 1 illustrating the roller ratchet.

Fig. 7 is a detail section and elevation on the line 7—7 of Fig. 1 showing the oil distributing device.

Figs. 8 and 9 are diagrams in section illustrating the principle of operation of the invention; Fig. 8 showing the parts as positioned at the time of firing the explosive mixture, and Fig. 9 showing the parts as positioned immediately after the explosion of the charge and illustrating the manner in which the exhaust of the previously fired charge, the intake of a fresh charge, and the compression of the previous charge is effected.

More specifically, 15 indicates a cylindrical water-jacketed casing fitted with end plates 16 and 17 detachably secured thereto by means of bolts 18 which pass through the end plates 16 and 17 and are screwed in the ends of the cylinder 15. The end plate 16 is formed with a boss 19 constituting a bearing for a tubular shaft 20 which passes therethrough and has an enlarged portion or hub 21 on its inner end extending approximately one-half the length of the cylinder 15.

The end of the hub 21 adjacent the end plate 16 is formed with annular flanges or ribs 22 which project into corresponding channels on the inner face of the end plate 16 and form packing members. Formed on the hub 21 is a pair of oppositely extending blades 23 and 24 which diverge outwardly from their point of juncture with the hub 21 and with their side faces extending in radial relation to the center of the hub which is the axis of the cylinder 15. The outer faces

of the blades 23 and 24 are curved to conform to the inner circumferential wall of the cylinder 15 and are adapted to slidably contact with the latter throughout the length thereof between the inner faces of the end plates 16 and 17; the ends of the blades 23 and 24 slidably contacting the inner faces of the end plates. The blades 23 and 24 thus project beyond the ends of the hub 21 with their inner faces extending in continuation of the outer face of the hub 21.

Projecting through the tubular shaft 20 is a shaft 25 which passes through a boss 26 on the end plate 17 and bears therein, and mounted on the shaft 25 is a hub 27 extending between the end of the hub 21 and the inner face of the end plate 17. Mounted on the hub 27 is a pair of oppositely disposed blades 28 and 29 corresponding in construction to the blades 23 and 24; the outer ends of the blades 23 and 24 projecting over the hub 27 and the outer ends of the blades 28 and 29 extending over the hub 21 and forming the interior of the cylinder 15 into a series of four chambers arranged between the blades in each of which chambers a charge of explosive mixture may be drawn, compressed, exploded and scavenged successively.

The shafts 20 and 25 are designed to rotate in but one and the same direction and as a means for preventing reverse rotation each shaft is provided with a roller ratchet comprising disks 30 and 31 keyed on the shafts 20 and 25 respectively having notches 32 formed on their peripheries in which rollers 33 are mounted; the rollers 33 being adapted to travel up inclined walls of the notches 32 into engagement with the inner circumferential faces of annular flanges 34 and 35 formed on the end plates 16 and 17 exteriorly thereof. The construction of the roller ratchets is particularly shown in Fig. 6 which illustrates a common form of such ratchets which permit the ratchet disks to rotate freely in the direction indicated by the arrow *a* in Fig. 6, but inhibit their rotation in reverse direction.

A corresponding pair of roller ratchet disks 36 and 37 are mounted on the outer ends of the shafts 20 and 25 where the shaft 25 projects beyond the outer end of the shaft 20; the disks 36 and 37 being arranged alongside of each other with the rollers 38 and 39 carried thereby adapted to engage the inner circumferential wall of a fly wheel 40 mounted on a drive shaft 41 disposed in alinement with the shaft 25.

The disks 36 and 37, however, are arranged with the inclined faces of the notches 32 thereon extending in the opposite direction to the inclination of the inclined notches 32 on the disks 30 and 31 so that intermittent rotary movement of the shafts 20 and 25 will be imparted to the fly wheel 40 and the shaft 41 to rotate the latter continuously in one direction.

The ratchet disk 31 is housed in the flange 35 by means of an end plate 42 secured to the flange 35, and the ratchet disks 30, 36 and 37 and the fly wheel 40 are incased in a housing 43 secured to the end plate 16; the housing 43 being adapted to contain a quantity of oil by which the various rotating parts are lubricated. As a means for distributing the lubricant from the housing 43 to the bearings at the opposite end of the casing, a coiled tube 44 having an enlarged open outer end 45 is mounted on a disk 46 carried by the tubular shaft, the inner end of which tube passes through the tubular shaft 20 and is adapted to register with an opening 47 in the shaft 25 communicating with a passage 48 having outlets leading to the bearings of the shaft 25.

The tube 44 on rotating with the shaft 20 in the direction indicated by the arrow in Fig. 7 causes the lubricating oil to be forced into the open end 45 of the tube and be thereby delivered through the tube 44 to the distributing passage 48 in the shaft 25.

Formed in the upper wall of the cylinder 15 is a series of intake openings 50 which are adapted to be connected to a suitable source of gas supply and formed in the side of the cylinder 15 is a series of exhaust ports 51 arranged at a point on the cylinder at right angles to the intake openings.

A spark plug 52 is mounted in an aperture 53 in the cylinder 15 at a point to one side of the vertical center of the casing opposite the side on which the exhaust ports 51 are formed.

The blades 23, 24, 28, and 29 are fitted with packing members 54 on their outer curved faces extending longitudinally thereof and mounted in channels 55 formed in the blades. The packing members 54 are L-shaped in cross section with one of the members slidably engaging one side of the channel 55, as particularly shown in Fig. 5, and interposed between the bottom of the channel 55 and the other member of the packing 54 is a plate spring 56 which normally operates to maintain the packing member 54 in slidable contact with the inner circumferential wall of the cylinder 15. The ends of the blades, 23, 24, 28 and 29 are also provided with packing members 57 which extend in radial channels formed on the ends of the blades and correspond in construction to the packing members 54; plate springs 58 bearing against the packing members 57 to maintain them in close sliding contact with the inner faces of the end plates 16 and 17.

Assuming the parts to be positioned as shown in Fig. 8, with the blades 23, 24, and 28 and 29 rotating in unison in the direction indicated by the arrows with the chamber

between the blades 29 and 24 open to the intake ports 50, the chamber between the blades 23 and 28 about to open to the exhaust ports 51, and the chamber between the blades 24 and 28 filled with a compressed charge of explosive gases. The operation will then be as follows:

Continued advance movement of the blades will bring them to the position shown in Fig. 2 opening the chamber between the blades 23 and 28 to the exhaust ports 51, closing the intake ports 50 by blade 29 with the chamber between the blades 29 and 24 filled with a charge of explosive mixture previously drawn thereinto by the suction induced in said chamber by the advance movement of the blade 24, and the chamber between the blades 24 and 28 containing the compressed explosive charge positioned in communication with the aperture 53 containing the spark plug 52. At this moment a spark is formed by the plug 52 in the usual manner, thereby igniting the compressed explosive charge which will expand and exert opposed pressures between the blades 24 and 28 tending to advance the blades in opposite directions in relation to each other. The blade 24 is prevented from moving rearwardly by the action of the roller ratchet member on the shaft 20 so that the impulse effected by the expansion of the exploded gases between the blades 28 and 24 will be exerted on the blade 28, thereby advancing the latter and the blade 29 simultaneously therewith; the blades 23 and 24 remaining stationary as illustrated in Fig. 9.

This movement of the blades 28 and 29 effects an impulsive rotary movement of the shaft 25 which movement is transmitted through the roller ratchet members 39 to the fly wheel 40, thereby rotating the drive shaft 41. The advance movement of the blade 28 effects the scavenging of the previously burned charge in advance of the blade 28 through the exhaust ports 51 and the advance movement of the blade 29 operates to compress the explosive charge between the blades 29 and 24; the back pressure on the blade 24 induced by the explosion and expanding of the gases in advance of the blade holding this blade stationary in opposition to the pressure exerted thereagainst by the compression of the charge induced by the blade 29. The moment the compression of the charge exerts a pressure on the blade 24 in excess of the pressure exerted by the expanding exploded charge which gradually diminishes, the blades 23 and 24, 28 and 29 will again advance in unison as before described in reference to Fig. 8, thus positioning the chamber between the blades 29 and 24 containing the compressed explosive charge in communication with the aperture 53 containing the spark plug 52 and the operation is repeated.

In the next impulse the blade 24 will be advanced and a rotary impulse will be transmitted to the fly wheel 40 through the medium of the roller ratchet 38; the blade 29 being held against retrograde movement by the action of the roller ratchet member 31.

In this manner a series of four impulses will be imparted to the shafts 20 and 25 during each revolution thereof, which impulses will be transmitted to the fly wheel 40 and operate to rotate the latter and the shaft 41 continuously in one direction; the advance movement of each blade in effecting such impulse acting to scavenge a previously burned charge and to simultaneously compress a fresh explosive charge.

What I claim is:

1. In an internal combustion engine, a cylinder, end walls on said cylinder, outwardly extending annular flanges on said end walls, a tubular shaft extending into the cylinder through one of the end walls, a second shaft mounted in the tubular shaft extending through the other end wall, means on the shaft and tubular shaft engageable with the annular flanges for preventing reverse rotation of said shafts, and blades on said shafts within the cylinder adapted to be advanced by explosive impulses to rotate said shafts.

2. In an internal combustion engine, a cylinder, end walls on said cylinder, outwardly extending annular flanges on said end walls, a tubular shaft extending into the cylinder through one of the end walls, a second shaft mounted in the tubular shaft extending through the other end wall, disks on the shaft and tubular shaft engageable with the annular flanges for preventing reverse rotation of said shafts, and blades on said shafts within the cylinder adapted to be advanced by explosive impulses to rotate said shafts.

3. In an internal combustion engine, a cylinder, end walls on said cylinder, outwardly extending annular flanges on said end walls, a tubular shaft extending into the cylinder through one of the end walls, a second shaft mounted in the tubular shaft extending through the other end wall, disks on said shaft and tubular shaft adjacent the end walls of the cylinder, means on said disks engageable with the annular flanges for preventing reverse rotation of said shafts, and blades on said shafts within the cylinder adapted to be advanced by explosive impulses to rotate said shafts.

4. In an internal combustion engine, a cylinder, end plates thereon, annular flanges on the outer faces of said plates, a tubular shaft extending into the cylinder through one plate, a shaft revolubly mounted in the tubular shaft extending through the other end plate, disks mounted on said shaft and tubular shaft adjacent the outer faces of

the plates having ratchet faces on their outer edges, rollers disposed in said ratchets adapted to engage the flanges to prevent reverse rotation of the shafts, and blades on said shafts within the cylinder adapted to be advanced by explosive impulses to rotate the shafts.

5. In an internal combustion engine, a cylinder, end plates thereon, annular flanges on the outer faces of said plates, a tubular shaft extending into the cylinder through one plate, a shaft revolubly mounted in the tubular shaft extending through the other end plate, disks mounted on said shaft and tubular shaft adjacent the outer faces of the plates having ratchet faces on their outer edges, rollers disposed in said ratchets adapted to engage the flanges to prevent reverse rotation of the shafts, blades on said shafts within the cylinder adapted to be advanced by explosive impulses to rotate the shafts intermittently, a drive shaft, a fly wheel on the drive shaft, and means on said shaft and tubular shaft engageable with said fly wheel whereby intermittent movement of the shaft and tubular shaft will effect a continuous rotation of the drive shaft.

6. In an internal combustion engine, a cylinder, end plates thereon, annular flanges on the outer faces of said plates, a tubular shaft extending into the cylinder through one plate, a shaft revolubly mounted in the tubular shaft extending through the other end plate, disks mounted on said shaft and tubular shaft adjacent the outer faces of the plates having ratchet faces on their outer edges, rollers disposed in said ratchets adapted to engage the flanges to prevent reverse rotation of the shafts, blades on said shafts within the cylinder adapted to be advanced by explosive impulses to rotate the shafts intermittently, a drive shaft, a fly wheel on the drive shaft, a disk mounted on each of said shafts having ratchet faces on their outer edges, and rollers disposed in said ratchets engageable with the fly-wheel whereby intermittent movement of the shaft and tubular shaft will effect a continuous rotation of the drive shaft.

In witness that I claim the foregoing I have hereunto subscribed my name this 23rd day of July, 1914.

ROY B. HOLMES.

Witnesses:
MARGUERITE BATES,
MARIE BATTEY.