Aug. 11, 1925. 1,549,015

J. H. McCARTHY

ROTARY GASOLINE ENGINE

Filed Feb. 12, 1923 2 Sheets-Sheet 1

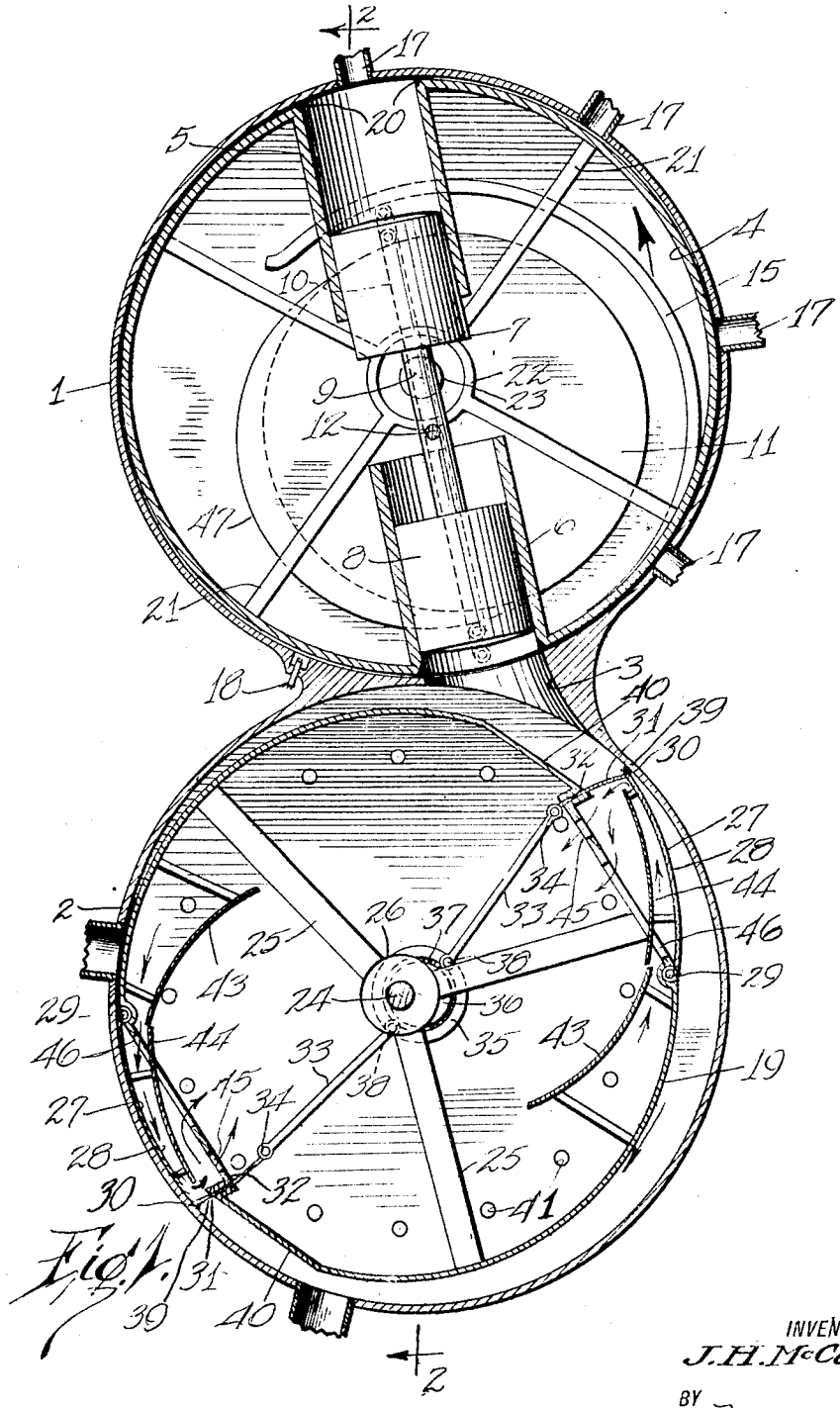


Fig. 1.

INVENTOR
J.H. McCarthy
BY Munn Geo
ATTORNEYS

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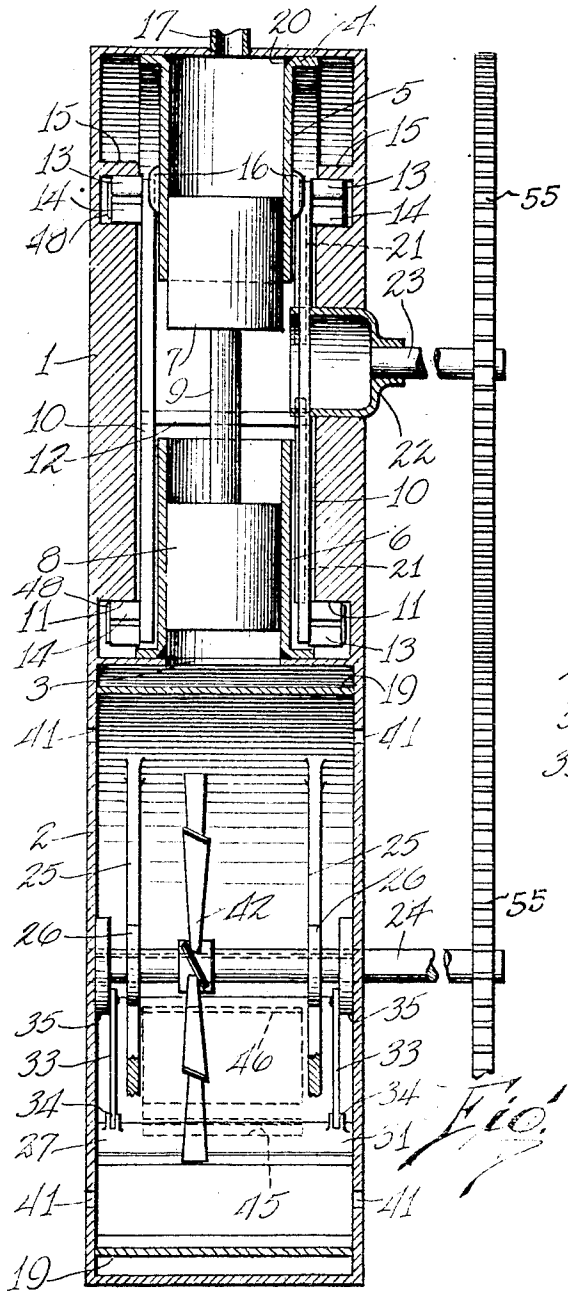


Fig. 2.

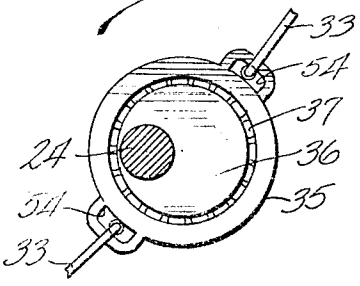


Fig. 3.

INVENTOR
J. H. McCarthy
BY Munn & Co.
ATTORNEYS

Patented Aug. 11, 1925. 1,549,015

UNITED STATES PATENT OFFICE.

JOHN H. McCARTHY, OF CHICAGO, ILLINOIS.

ROTARY GASOLINE ENGINE.

Application filed February 12, 1923. Serial No. 618,643.

To all whom it may concern:

Be it known that I, JOHN H. McCARTHY, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Rotary Gasoline Engines, of which the following is a full, clear, and exact description.

My invention relates to improvements in rotary gasoline engines, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide an improvement over that form of the device disclosed in my Patent No. 1,439,629, of December 19, 1922. In said patent there is disclosed a rotary gas engine which consists of a cylinder which is adapted to be rotated by means of expanding gases, these gases being subjected to a high pressure by means of a reciprocating piston. In the present form of the device, I have shown a novel means for counteracting the centrifugal force which tends to force the blades of the rotating cylinder into engagement with the engine casing.

A further object of my invention is to provide a novel air cooling means for the device.

A further object of my invention is to provide a device of the character described which is relatively simple in construction, durable and efficient for the purpose intended, and which combines the merits of the reciprocating engine and the rotary engine in a single machine.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application, in which

Figure 1 is a vertical section through the device,

Figure 2 is a section along the line 2—2 of Figure 1, and

Figure 3 is a plan view of a modified form of the device.

In carrying out my invention, I provide two cylindrical casings 1 and 2 which communicate with each other by means of a passageway 3. The cylinders 1 and 2 are adapted to be cast in a single piece and may be made of any desired size. A drum 4 is rotatably mounted in the cylinder 1 and is spaced slightly from the peripheral walls of the cylinder. The drum carries two cylinders 5 and 6 which are alined with each other, and which extend diametrically across the drum 4. Pistons 7 and 8 are slidably disposed in the cylinders 5 and 6 and are rigidly connected to each other by means of a rod 9. In Figure 1 I have shown the piston 7 as being disposed adjacent to the center of the cylinder 1, and the piston 8 as being disposed adjacent to the passageway 3.

The pistons 7 and 8 are reciprocated in the cylinders 5 and 6 by means of guide arms 10 that in turn are reciprocated by eccentrics 11. The guide arms 10 are connected to the rod 9 by means of a shaft 12. The free ends of the arms 10 carry rollers 13 and 14. The outer rollers 13 engage with an eccentric flange 15, while the inner rollers 13 engage with the eccentric 11. The arms 10 are rotated with the drum 4 by means of lugs 16 that are carried by the cylinders 5 and 6. The eccentric 11 and the eccentric flange 15 actuate the arms 10 so that the arms cause the pistons 7 and 8 to move to their outermost position when the pistons are just past the passageway 3. It will be noted from Figure 1 that the piston 8 is spaced slightly from the inner periphery of the drum 1 when the cylinder 6 is alined with the passageway 3. The piston 8 will continue to move toward the drum 1 and will be at the outer end of the cylinder 6 when the left hand side of the cylinder, shown in Figure 1, is adjacent to the right hand side of the passageway 3. When the cylinders 5 or 6 are moving by the intake pipes 17, the pistons therein are being moved toward the center of the drum 1, thereby drawing gas into the cylinders. The compression stroke takes place between the last intake pipe 17 and the spark plug 18. The gases are fully compressed when the cylinders are opposite the spark plug 18. At this point the gases are ignited, and of course are expanded.

The cylinders 5 and 6 are moving at a high speed and the gases which are ignited by the spark plug 18 will be conveyed to the passageway 3 instantly. The gases then rush from the cylinder through the passageway 3 and actuate the drum 19. Each of the cylinders 5 and 6 is provided with a packing 20 at its outer end, this packing

engaging with the inner periphery of the cylinder 1. In this manner, a gas-tight packing is assured between the cylinders 5 and 6 and the cylinder 1. The drum 4 is supported by spokes 21 which in turn are carried by a hub 22. The hub 22 is rotatably mounted in one wall of the cylinder 1 and is rigidly secured to a shaft 23.

It is obvious that the drums 4 and 19 must rotate at the same speed. To accomplish this purpose, the shaft 23 is connected to a shaft 24 of the drum 19 by means of two gears 55, so that the drums will rotate at the same speed, but in opposite directions with respect to each other. The drum 19 is provided with spokes 25 which extend from a common hub 26, the hub in turn being mounted upon the shaft 24. In the present form of the device I have shown the drum 19 as being provided with two blades 27. It will be obvious that as many blades as desired may be employed without departing from the spirit and scope of my invention. The drum 19 is mounted eccentrically with respect to the cylinder 2. The blades 27 are adapted to move outwardly with respect to the drum 19 so as to keep their outer ends in abutting engagement with the inner periphery of the cylinder 2.

To this end I provide novel means for positively moving the blades 27 with respect to the drum 19, and at the same time for preventing the blades from gouging into the inner wall of the cylinder 2 due to centrifugal force. Each of the blades consists of a curved plate 28 that is adapted to aline with the outer periphery of the drum 19. This plate is hinged at 29. The plate 28 is bent at 30 and is arcuate in shape as at 31. The portion 31 is adapted to be received in a guiding slot 32 of the drum 19. The curved portion 31 is a portion of an arc which has the hinge 29 for its center. Both of the blades 27 are identical in construction.

The blades are guided in their movement toward and away from the drum 19 by means of links 33. The links are pivotally secured to the inner ends of the portions 31 as at 34. The inner ends of the links 33 are pivotally mounted upon a ring 35. The ring 35 is concentrically disposed with respect to the cylinder 2, and is rotatably mounted upon a disc 36. Ball bearings 37 are disposed between the disc 36 and the ring 35. It will be noted that the points 38, to which the links 33 are pivotally secured to the ring 35, are diametrically disposed with respect to each other. It will be noted from this construction that the links will permit the points 30 of the blades 27 to abut the inner periphery of the cylinder 2 at all times. These links not only permit the blades 27 to move in the manner above described, but prevent the blades from gouging into the inner surface of the cylinder 2. When the inner ends of the links 33 come the nearest to the shaft 24, the blades 28 will be in their closed position. At this point, the periphery of the drum 19 is disposed adjacent to the inner periphery of the cylinder 2. The packing 39 is disposed adjacent to the point 30 and frictionally engages with the inner periphery of the cylinder 2. In this manner a gas-tight packing is assured between the blade 27 and the cylinder 2.

It will be noted from Figure 1 that the outer periphery of the drum 19 is bent inwardly at 40. This construction provides a relatively wide expansion chamber for the gases. The drums 4 and 19 rotate so as to cause one of the cylinders 5 or 6 to aline with the passageway 3 when one of the blades 27 is in the position shown in Figure 1. The expanding gases which are ejected from the cylinder 5 and 6 impinge upon the blades 27 and cause the drum 19 to rotate. The drum 19 in turn rotates the drum 4. The shaft 24 is the power shaft of the device, and at the same time acts as a cam shaft.

The drum 19 is cooled in a novel manner. The cylinder 2 has openings 41 which permit air to pass through the cylinder 2. The shaft 24 carries a small fan 42 (see Figure 2) or other like air moving means. The fan is adapted to draw air through the openings on one side of the cylinder 2 and to expel it through the openings on the other side of the cylinder. The drum 19 carries curved deflector plates 43 which are disposed adjacent to the blades 27 and which are adapted to direct the air against the sides 28 of the blades. A second deflector plate 44 is carried by the blades 27 and with the portion 28, provides an air passageway. The plate 44 stops short of the portion 31 so as to permit the air to flow between the plate 44 and the plate 28 and into contact with the portion 31. From this point the air passes through the wall of the drum 19 by means of an opening 45. The air enters the passageway formed by the plates 28 and 44 by means of an opening 46. From this construction it will be apparent that a current of air will be continuously forced along the inner sides of the portions 28 and 31. In this manner the blades 27 are effectively cooled.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. In operation, the power shaft 24 rotates the drum 4 so as to cause the cylinders to aline with the passageway 3 when one of the blades 27 is disposed adjacent to the passageway. The pistons 7 and 8 are moved so as to draw gas into the cylinders 5 and 6 as the cylinders are passing the intake pipes 17, and to

compress the gas in the cylinders when the cylinders are moving between the last intake pipe and the spark plug 18. The eccentric 11 and the eccentric flange 15 are relatively large so as to provide a long surface over which the rollers 13 and 14 ride. In this manner a great deal of force is exerted upon the pistons 7 and 8 without reducing the speed of the shaft 23 to any appreciable extent. By providing two rollers 13 and 14 instead of one, I cause the rollers to rotate in one direction only. The eccentric 11 is enlarged, as at 47, so as to cause the inner rollers 14 to always engage with the outer periphery of the eccentric. The outer ends of the rollers 13 and 14 are secured to each other by means of a link 48.

The blades 27 are controlled in their movement by means of the links 33 and the ring 35. This mechanism permits the blades 27 to be disposed adjacent to the inner periphery of the cylinder 2 during the entire movement of the drum 19. The special purpose of this mechanism is to prevent the blades from gouging into the inner wall of the cylinder 2. It will also be noted that the blades are kept cool during the entire operation of the device. Moreover, the cold air is directed to the portions of the blades which are subjected to the greatest amount of heat. The device is relatively simple in construction and provides a novel means for combining the advantages of the reciprocating engine with the advantages of the rotary engine.

In Figure 3, I have shown a modified form of a means for moving the blades 27 toward and away from the drum 19. In this form of the device the links 33 are slidably mounted in slots 54 of the ring 35. The inner ends of the links 33 are adapted to swing slightly with respect to the ring 35. It will be noted that when the points 34 of the blades 27 are in alinement with a line that extends through the axis of the shaft 24 and the disc 36, the links 33 are disposed in alinement with each other. It will further be noted that when the points 34 are in the position shown in Figure 1, the links 33 are not in alinement with each other. By providing slots 54 in the ring 35, I permit the inner ends of the links 33 to move slightly with respect to the ring 35 so as to permit the links to swing slightly in order to always position the links in a radial direction with respect to the axis of the disc 36. It is obvious that this movement is very slight.

I claim:

1. In a device of the class described, a cylinder having openings in its side walls, a drum mounted eccentrically within said cylinder, angularly shaped blades hingedly carried by said drum, a plate carried by said blades and forming an air passage with said blades to cause air to flow to the end of the blade, the periphery of said drum having air inlet and outlet openings communicating with said passageway, a deflector plate carried by said drum and being adapted to guide the air to said passageway, and means for drawing the air into the cylinder through the openings on one side of said cylinder and for forcing the air out through the openings on the other side of said cylinder.

2. A rotary gasoline engine comprising a cylinder, a drum eccentrically mounted in said cylinder, blades carried by said drum, said blades being adapted to contact with the inner surface of said cylinder during the entire rotation of said drum, said drum having openings for permitting air to pass to and from the inner sides of said blades and means for forcing air to and from said blades.

3. A rotary gasoline engine comprising a cylinder, a drum eccentrically mounted in said cylinder, blades carried by said drum, said blades being adapted to contact with the inner surface of said cylinder during the entire rotation of said drum, said drum having openings for permitting air to pass to and from the inner sides of said blades means for forcing air to and from said blades, and means for conveying the air to the ends of said blades.

4. A rotary gasoline engine comprising a cylinder, a drum eccentrically mounted in said cylinder, blades carried by said drum, said blades being adapted to contact with the inner surface of said cylinder during the entire rotation of said drum, said drum having openings for permitting air to pass to and from the inner sides of said blades, means for forcing air to and from said blades, means for conveying the air to the ends of said blades, and means for drawing air into the cylinder and for forcing the air from said cylinder.

JOHN H. McCARTHY.