

May 26, 1925.

1,539,752

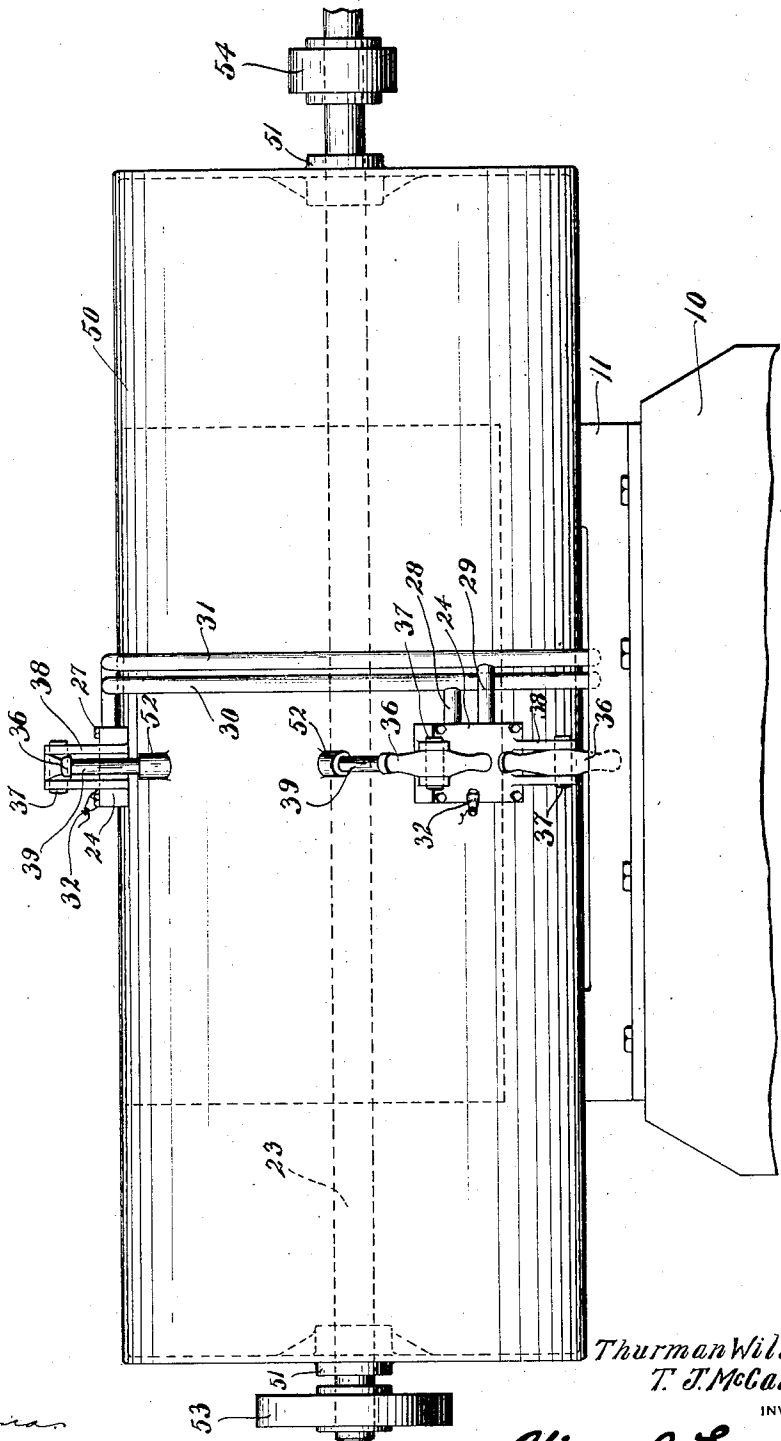
T. J. McCain ET AL

CRANKLESS ENGINE

Filed Nov. 17, 1922

3 Sheets-Sheet 1

Fig. 1.



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3 Sheets-Sheet 2

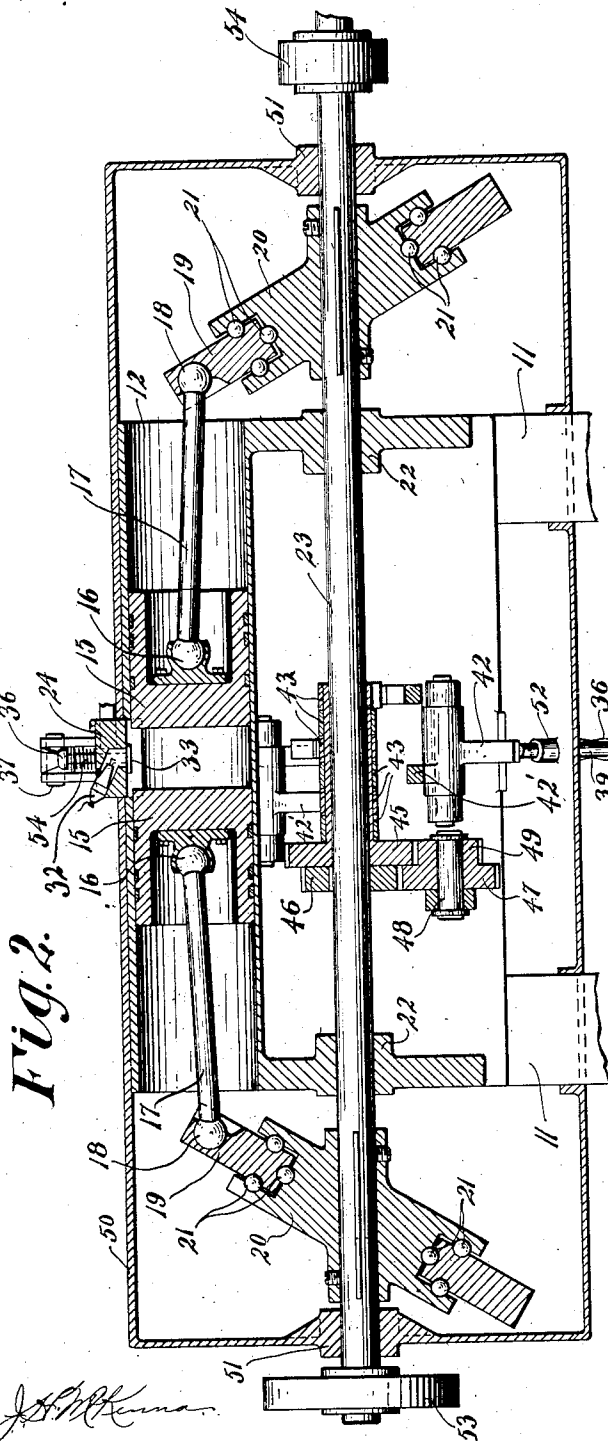


Fig. 2.

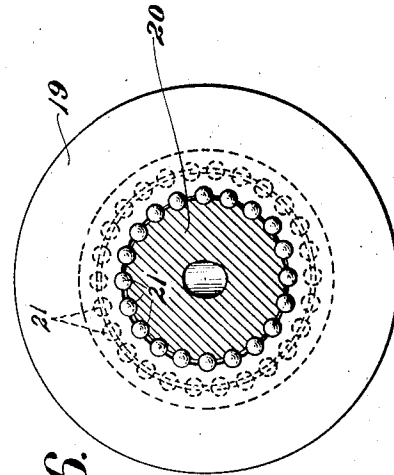


Fig. 6.

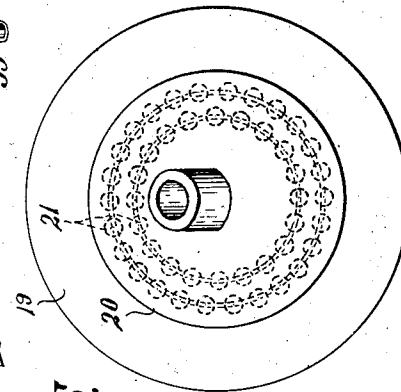


Fig. 5.

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3 Sheets-Sheet 3

Fig. 4.

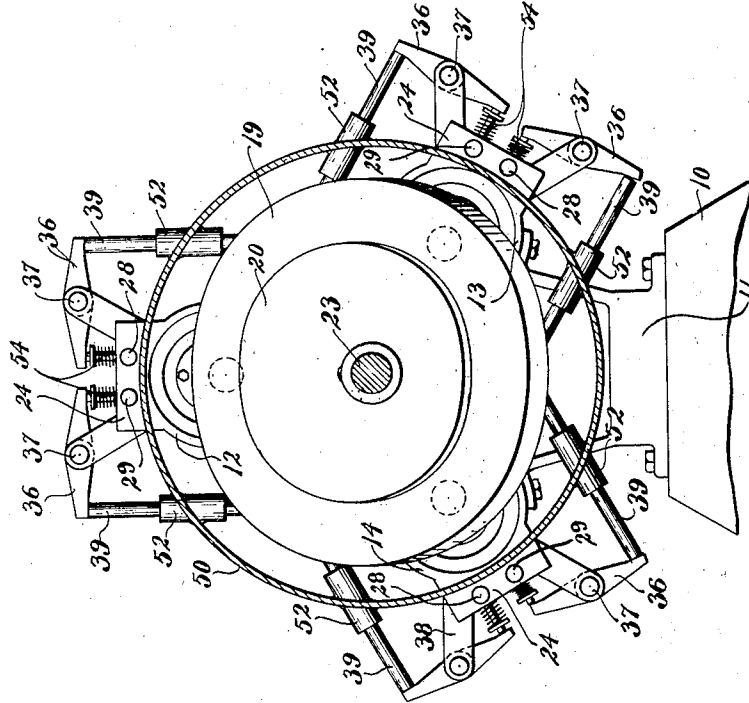
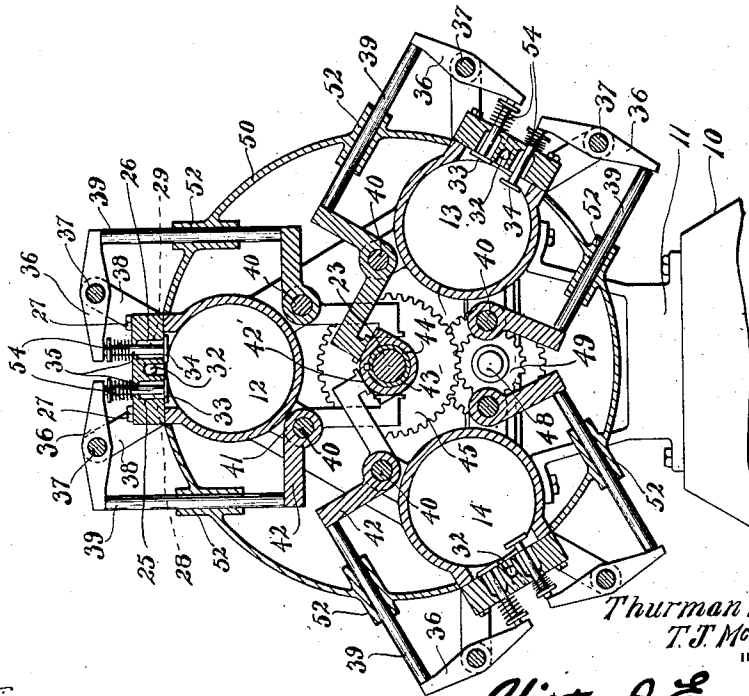


Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS J. McCAIN AND THURMAN WILSON, OF FORT PIERCE, FLORIDA.

CRANKLESS ENGINE.

Application filed November 17, 1922. Serial No. 601,631.

To all whom it may concern:

Be it known that we, THOMAS J. McCAIN and THURMAN WILSON, citizens of the United States, residing at Fort Pierce, in the county of Saint Lucie and State of Florida, have invented new and useful Improvements in Crankless Engines, of which the following is a specification.

This engine relates to engines and has for its object the provision of an engine in which the usual crank shaft is entirely eliminated, the engine consisting of a plurality of cylinders arranged in parallel relation and each having operating therein opposed pistons which are connected with rings exerting a wedge action upon guide members arranged diagonally upon the drive shaft, the engine being equipped with cam operated valve mechanism driven by the drive shaft for controlling the inlet and exhaust of gas.

An important object is the provision of an engine of this character in which the oscillating rings engaging the guide members on the drive shaft are provided with anti-friction means.

Another object is the provision of an engine of this character in which the opposed relation of the pistons in the cylinders will operate to prevent vibration and insure smooth running combined with unusual power.

An additional object is the provision of an engine of this character which will be comparatively simple and inexpensive in manufacture, efficient and durable in service and a general improvement in the art.

With the above and other objects and advantages in view the invention consists in the details of construction to be hereinafter more fully described and claimed and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation,

Figure 2 is a longitudinal section,

Figure 3 is a cross section taken through the valve mechanism on the line 3—3 of Figure 1,

Figure 4 is a cross section on the line 4—4 of Figure 2 and

Figs. 5 and 6 are detail views of an oscillating ring and guide member.

Referring more particularly to the drawings we have shown the engine as comprising a suitable base 10 upon which is mounted a frame 11 carrying three cylinders 12,

13 and 14 arranged in spaced parallel relation and all of similar construction. Operating within each cylinder are two pistons 15 arranged in opposed relation and having ball and socket connections 16 with connecting rods 17 which extend beyond the ends of the cylinders. At each end of the engine the rods 17 have a ball and socket connection 18 with an oscillating ring 19 which operates in conjunction with a grooved collar like guide 20, bearing balls 21 being interposed between these elements to prevent friction.

Journaled longitudinally of the frame in suitable bearings 22 is the drive shaft 23 which is located at the center of all of the cylinders and the guides 20 are rigidly secured upon this drive shaft 23 in diagonal relation thereto. It will be noted that these guides are reversed with respect to each other.

At their intermediate portions the centers of the cylinders are equipped with valve chests 24 formed with ports and valve seats 25 and 26 leading into the cylinders, the ports 25 being for the inlet of the fuel mixture and the ports 26 being for the exhaust of burnt gases. These chests are shown as detachably mounted to permit access to the cylinders and they are illustrated as being held in place by bolts 27. The chests also have associated therewith inlet and exhaust pipes 28 and 29 respectively communicating with the ports throughout and leading to inlet and exhaust manifolds 30 and 31 respectively. Any suitable carburetor structure, not shown, is associated with the inlet manifold in case the engine is intended to be of the internal combustion engine type and any suitable muffler, not shown, might be associated with the exhaust manifold in the same instance. If the engine is to be of the internal combustion type spark plugs 32 must be located at the centers of the cylinders. However, the engine might be operated by means of compressed air or steam, in which event any suitable source of fluid pressure would be connected with the inlet manifold 30 instead of a carburetor structure.

The ports 25 and 26 are normally closed by inwardly opening inlet and exhaust valves 33 and 34, respectively, having stems 35 slidable through the valve chest and engaged by the free ends of rocker arms 36 pivoted at 37 upon supports 38 and en-

gaged by tappet rods 39. Pivoted on the frame at 40 are angle levers 41 which have one arm 42 engaging against the associated tappet rods 39 and which have their other ends formed with bearing portions 42' disposed in the path of travel of a plurality of cams 43 which are formed on a sleeve 44 rotatable on the drive shaft and carried by a gear 45.

10 Secured upon the drive shaft is a gear 46 which meshes with a gear 47 of the same size rotatable upon a counter-shaft 48 suitably journaled in the frame. Formed integrally upon the gear 47 is a smaller gear 15 49 which meshes with the gear 45. Gear 45 is twice the size of gear 49. With this arrangement it will be seen that the sleeve 44 carrying the cams 43 is driven at one-half the speed of the drive shaft so that the inlet and exhaust valves 33 and 34 will be 20 opened at the proper time to control the inlet of fuel and exhaust of burnt gases.

The entire engine is illustrated as being surrounded by a housing 50 which is oil 25 tight and which is provided at its ends with bearings 51 receiving the drive shaft and which is provided at various points with bushings 52 through which the tappet rods 39 operate.

30 In the operation it will be seen that on the compression stroke in each cylinder the pistons 15 move toward each other and upon reaching the inner limit of their movement ignition of the explosive charge occurs, 35 whereupon the pistons are forced outwardly. This action occurs in the successive cylinders in the proper order and the effect is to oscillate the ring members 19. As these ring members are rotatable with respect to 40 the grooved collar guides 20 which are secured upon the drive shaft, and as these guides are disposed diagonally of the drive shaft it is apparent that the force exerted by the pistons on the oscillating rings 19 45 will exert a wedging or inclined plane action on the guides which will naturally result in turning the drive shaft. It might be mentioned here that the drive shaft is preferably equipped with a suitable fly wheel 53 and connecting device 54 by means of which 50 power may be taken off, or the connecting device might be a pulley. As the drive shaft is turned by the oscillating movement of the rings 19 engaging the guides 20, the gear 46 drives the two gears 47 and 49 and the latter drives the gear 45 which carries the cams 43. These cams are of peculiar 55 shape so as to move the angle levers 41 very quickly from one position to the other so that through the instrumentality of the 60 push rods 39 and rocker arms 36 the inlet

and exhaust valves 33 and 34 will be successively opened to control the entrance of fuel and exhaust of burnt gases. It should be mentioned that these valves are provided 65 with springs 54 which return them to closed position after being opened by the cam mechanism.

From the foregoing description and a study of the drawings it will be apparent 70 that we have thus provided a comparatively simple engine embodying a plurality of cylinders and in which the construction is such that use of the ordinary crank shaft is entirely eliminated. Owing to the fact that 75 each cylinder is equipped with two pistons moving oppositely therein vibration at one end of the engine will be counter-balanced by the vibration at the other end so that there will be no shock or jar and vibration 80 will be consequently eliminated. The engine will thus be smooth running and it is obvious that it will develop an unusual degree of power.

85 While we have shown and described the preferred embodiment of the invention it is of course to be understood that we reserve the right to make such changes in the form, construction and arrangement of parts as will not depart from the spirit of the in- 90 vention or the scope of the subjoined claim.

Having thus described our invention we claim:

An engine comprising a plurality of cylinders, pistons operating in said cylinders, 95 a drive shaft, means for transmitting power from said piston to the drive shaft to rotate the latter, and valve controlled means associated with each cylinder to effect inlet and permit exhaust of the fuel 100 and burnt gases respectively thereto and therefrom, the valve mechanism consisting of valve chests at the centers of the cylinders provided with inlet and exhaust ports, spring pressed valves normally closing said 105 ports, rocker arms pivotally mounted and engaging the stems of said valves, tappets engaging said rocker arms, angle levers pivoted adjacent the cylinders and having one end engaging the tappets, a sleeve journaled 110 on the drive shaft and engaging a series of cams cooperating with the other arms of the angle levers and formed upon a gear, a counter shaft having a pinion meshing with said gear and formed upon a gear, and 115 a gear secured upon the drive shaft and meshing with said last named gear.

In testimony whereof we affix our signatures.

THOMAS J. MCCAIN.
THURMAN WILSON.