July 12, 1932. G. E. FRANKLIN 1,867,504

ENGINE

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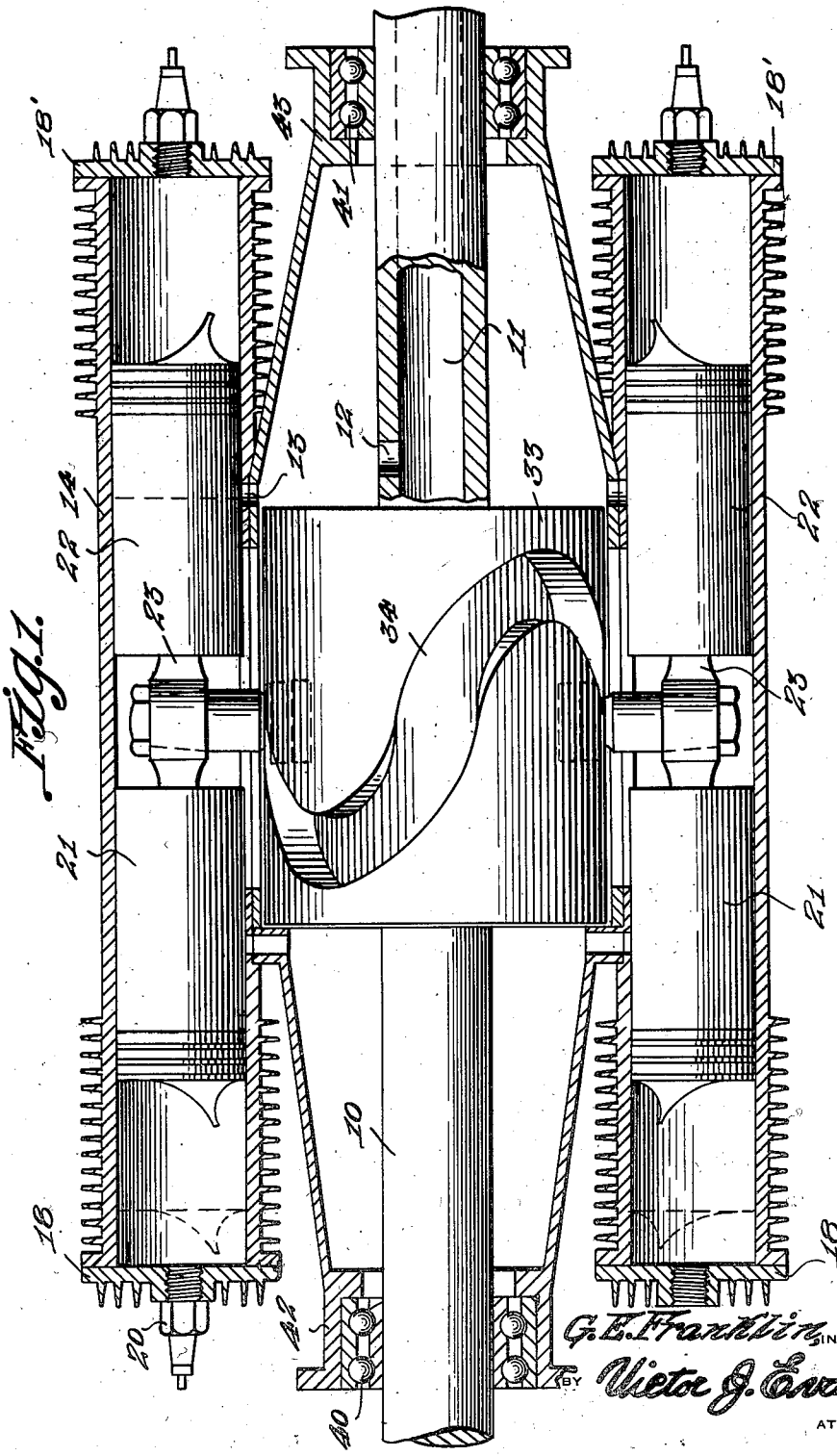


Fig. 1.

G. E. Franklin INVENTOR

BY Victor J. Evans

ATTORNEY

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Fig. 2.

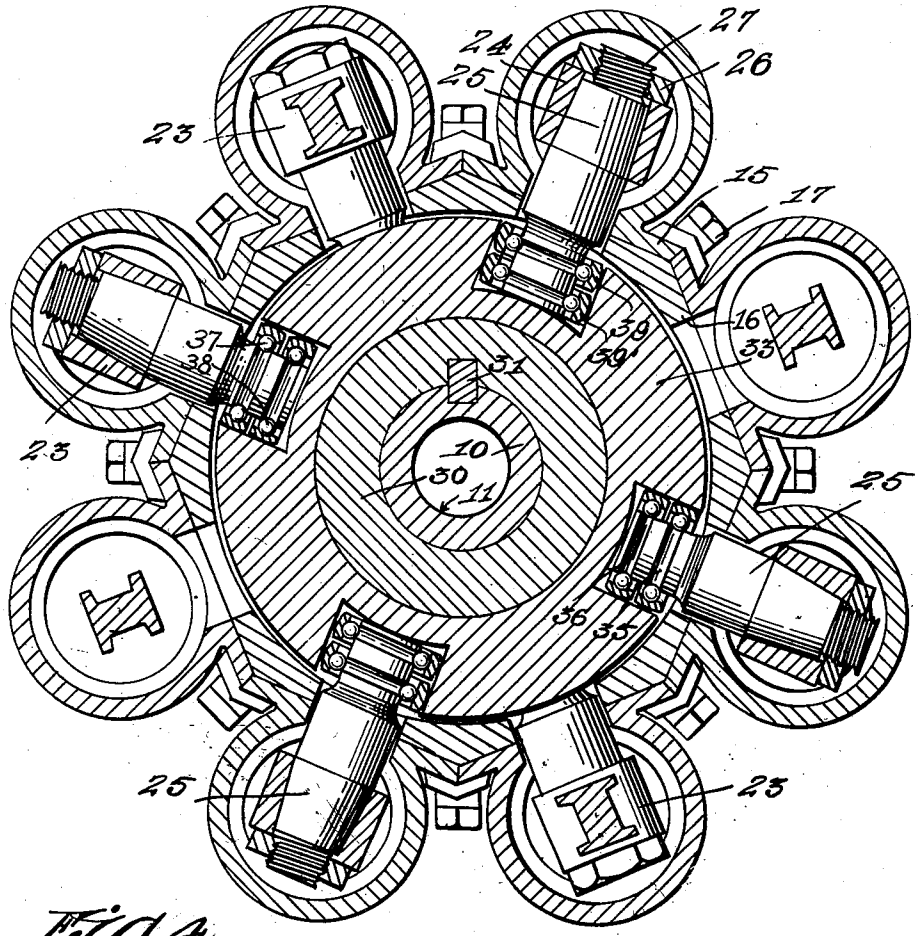


Fig. 4.

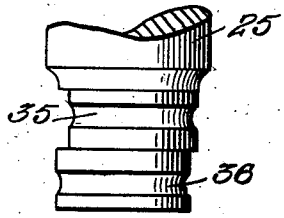
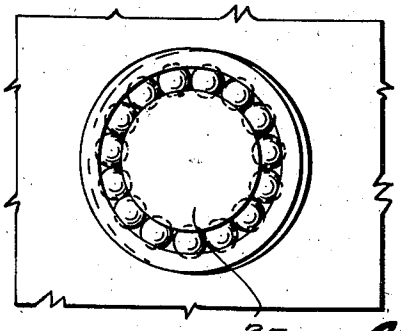


Fig. 3.



G. E. Franklin,
INVENTOR

BY Victor J. Evans
ATTORNEY

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Fig. 5.

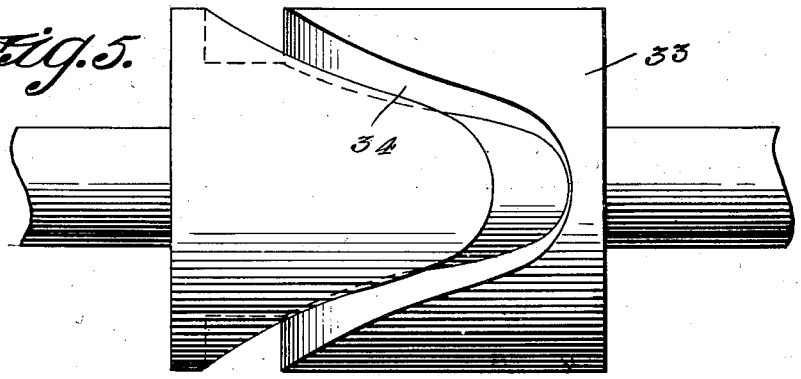


Fig. 6.

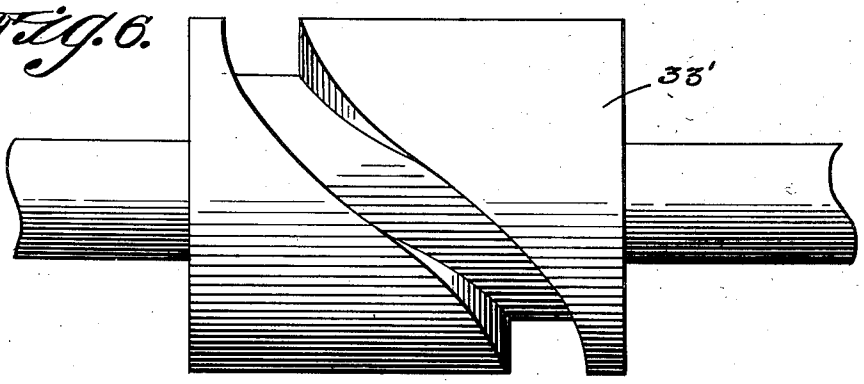


Fig 7.

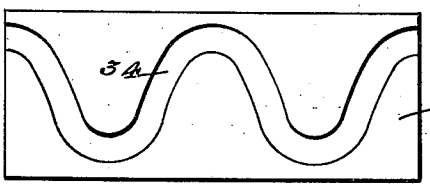
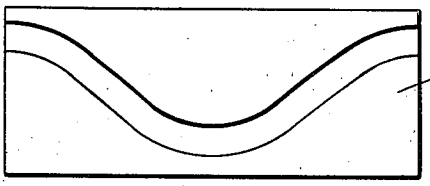


Fig. 8.



G. E. Franklin,
INVENTOR

BY Victor J. Evans
ATTORNEY

Patented July 12, 1932

1,867,504

UNITED STATES PATENT OFFICE

GEORGE E. FRANKLIN, OF KANSAS CITY, MISSOURI

ENGINE

Application filed October 22, 1928. Serial No. 314,195.

The object of this invention is to provide an engine of the general type of that described in my application Serial No. 236,762, filed November 30, 1927, in which application a central rotary cam element is driven from a plurality of devices mounted between aligned pistons, these devices constituting pins carrying bearing members which in the present case are of special construction, as disclosed below, and cooperate in an improved manner with the walls of a groove in the cam.

A further object is to provide, in an internal combustion engine, in which the cam must be rotated at high speed, a plurality of ball bearing units for each device or pin, these units being offset or eccentric with reference to each other and with reference to a main axis, so that engagement will be made with the walls of a groove in the cam in a more satisfactory manner than would otherwise be possible, when the stroke for imparting movement to the cam from the pistons is transferred from one side of the groove to the other side, upon passing the high point of the cam.

With the foregoing and other objects in view, the invention consists in the novel construction and arrangement of elements described, illustrated and claimed, it being understood that modifications may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming part of this application:—

Figure 1 is a view of the engine in longitudinal section.

Figure 2 is a view transversely thru the centrally driven element.

Figures 3 and 4 are views in elevation showing the offset mounting of the elements of the ball bearings.

Figures 5 and 6 are views of the cam, in elevation, from different sides thereof.

Figures 7 and 8 are further views showing how the cam may be grooved for different engines.

A shaft to be driven is designated 10 and is provided with a bore 11 thru which fuel is admitted, the fuel passing thence thru port or ports such as 12 and thru other ports 13 to the various cylinders designated 14.

A plurality of cylinders will be employed, as shown for instance in Figure 2, and these cylinders include flanged portions 15 to be secured to a housing 16, by bolts and by the use of any suitable elements 17 engaging the flanges. The particular construction of the housing is such that a plurality of flat surfaces are provided, extending longitudinally, for mounting the flanged portions of the cylinders.

The cylinders 14 each include a plurality of flanged end portions closed by means of cylinder heads such as 18, 18′, these elements last named also carrying flanges or fins or spaced elements of any suitable character, for well known reasons in connection with the radiation of heat. Each cylinder head carries a spark plug 20, and the cylinders are to be construed as two aligned cylinders, from the standpoint of operation of the engine.

Within each cylinder 14 I provide a plurality of pistons 21 and 22, connected by means of rods, bars or elements 23 each having a socket provided with a tapered wall, as shown in Figure 2, the sockets being designated 24.

A plurality of tapered pins 25 are employed, these elements extending radially with reference to the shaft 10, and being secured within the socket elements 24 by means of nuts 26 engaging threaded end portions 27.

The main shaft 10 has keyed thereon a sleeve 30, the key being shown at 31, and this sleeve mounts a cam 33 having a groove 34 formed in such manner as may be determined upon, depending upon the type of engine. The grooves of Figures 5 to 8 are sufficient to show the purposes of the particular type of bearing employed in this engine, and each radial device or pin 25 carries a plurality of ball bearings, the pins 25 having offset annularly grooved portions 35 and 36 with which the series of balls 37 and 38 cooperate. The outer race-ways of Figure 2 are designated 39 and 39′, and while the degree of eccentricity with reference to the main axis

of elements 25 is exaggerated in Figures 3 and 4, for purposes of illustration, the offset arrangement will permit of proper engagement with the groove 34 of the cam 33 during various stages of the operation of the engine.

It is the intention that the eccentric elements shall be so positioned they will maintain the rotary elements of the bearing in the most effective relation to the walls of the cam groove and with reference to the high and low points of the cam. Each unit comprises, as indicated, two individual bearing structures, and they should be in full balanced engagement with the walls of the groove under the conditions indicated as distinguished from unbalanced or uneven engagement at certain stages of the movement of the principal elements thru which power is transmitted from the pistons to the rotary element 33 and thence to the shaft 10 of the engine. This shaft is provided with ball bearings at 40 and 41 within the end portions 42 and 43 of the housing.

Having described the invention what is claimed is:

In a cam movement, a shaft, a grooved follower-driven cam fixed on the shaft, piston operated devices extending into the groove radially of the cam, and each including a plurality of grooved portions constituting the inner members of adjacent raceways, eccentric with reference to each other, threaded mounting means for the piston operated devices, the angular position of these devices determining the points of maximum and minimum eccentricity of the grooved portions thereof with reference to the walls of the cam groove, outer raceways surrounding the grooved radial devices and engaging the walls of the cam groove, and mounting means between the inner and outer race elements.

In testimony whereof I affix my signature.

GEORGE E. FRANKLIN.