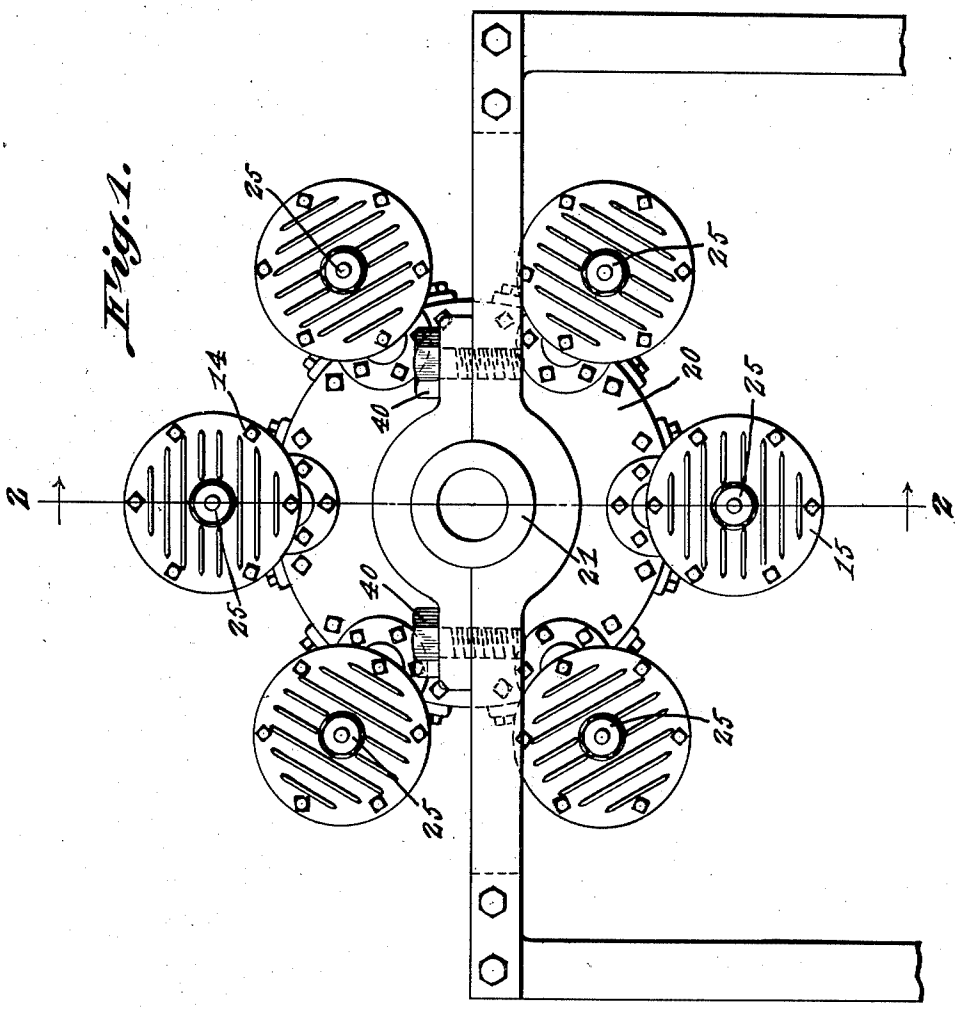
June 10, 1930. G. E. FRANKLIN 1,762,437

ENGINE

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Fig. 1.



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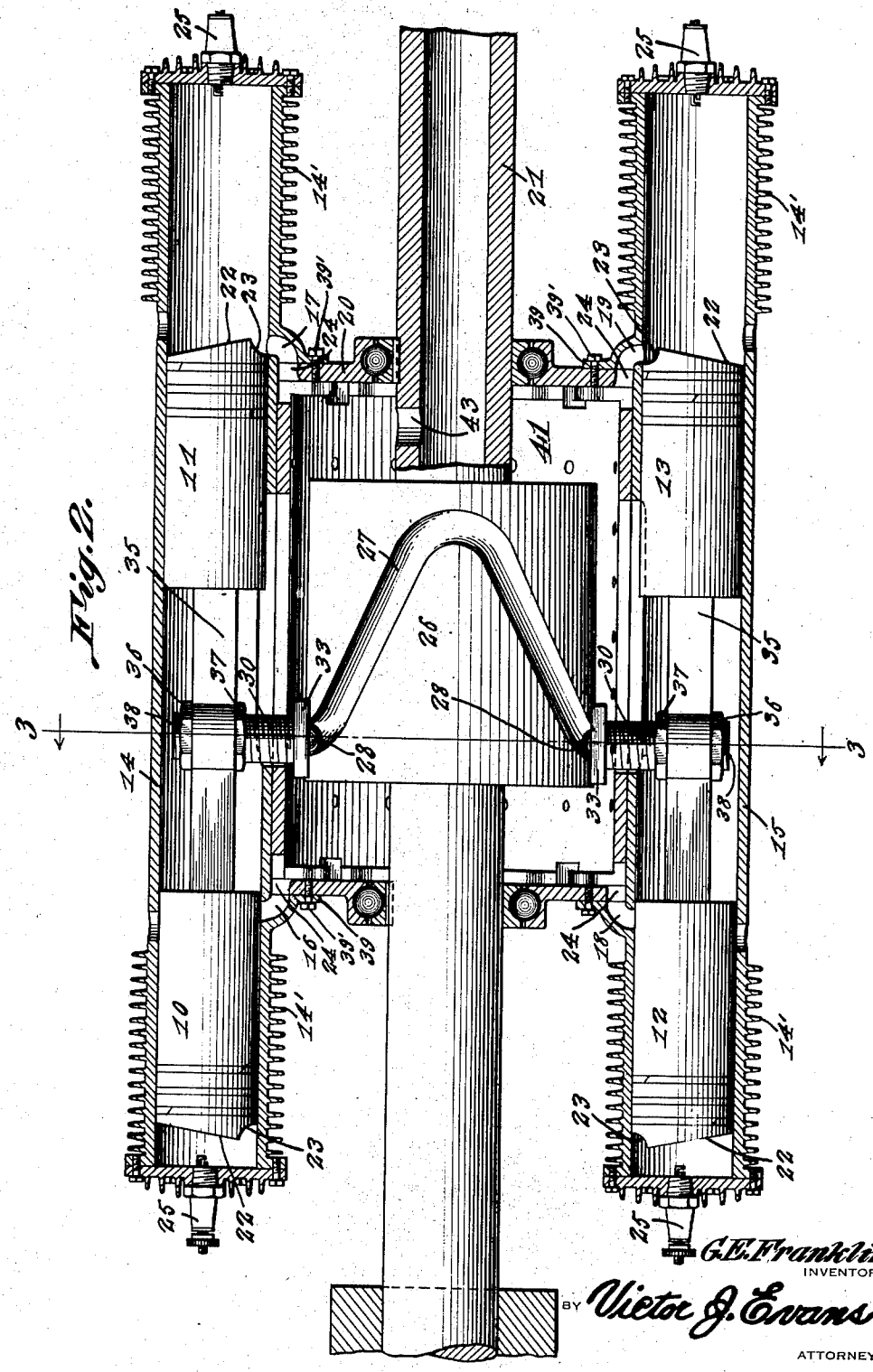


Fig. 2.

G.E. Franklin,
INVENTOR

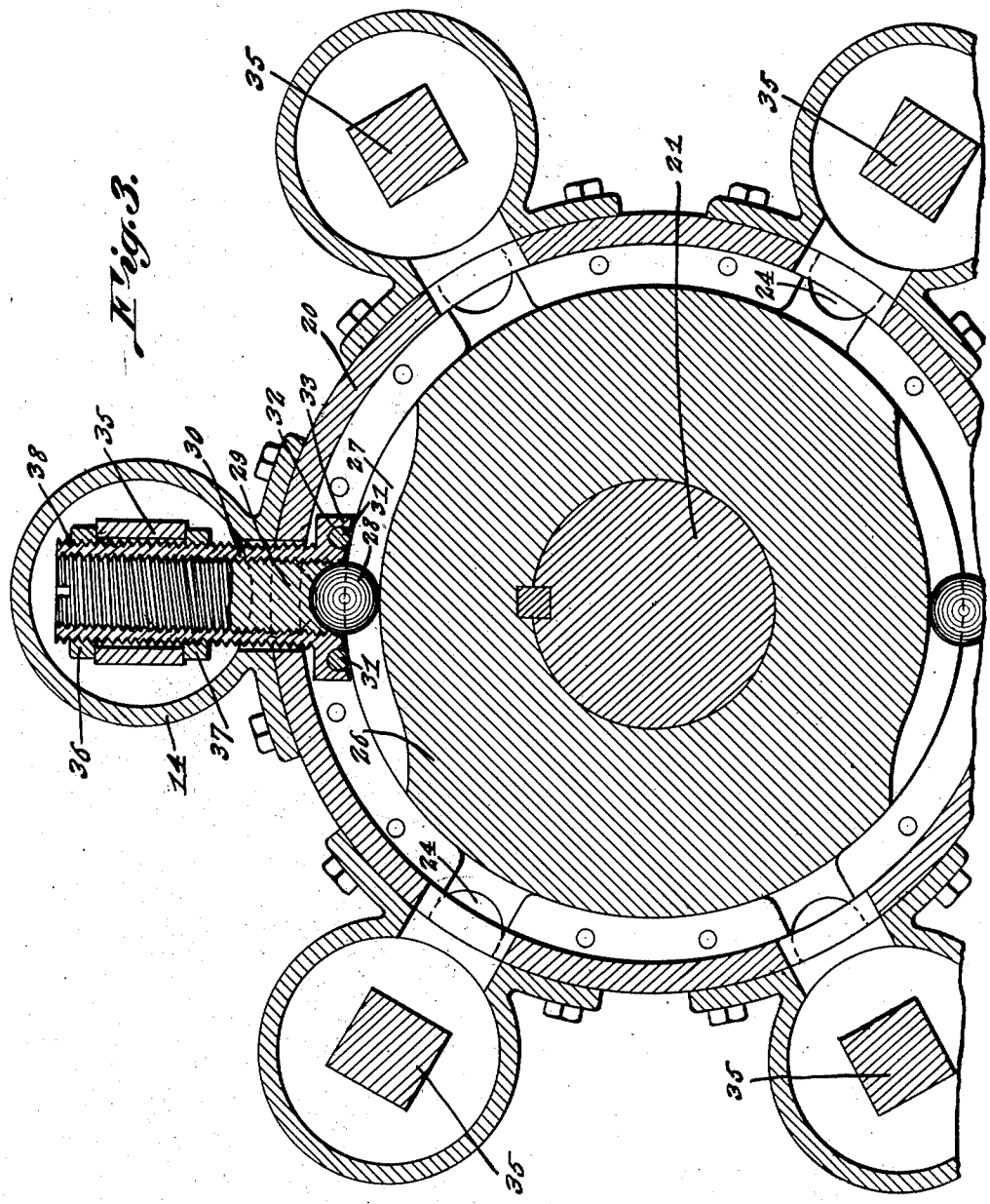
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Fig. 3.



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Fig. 5.

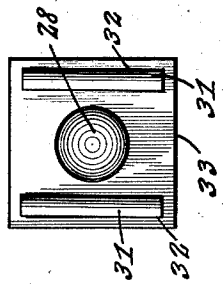


Fig. 4.

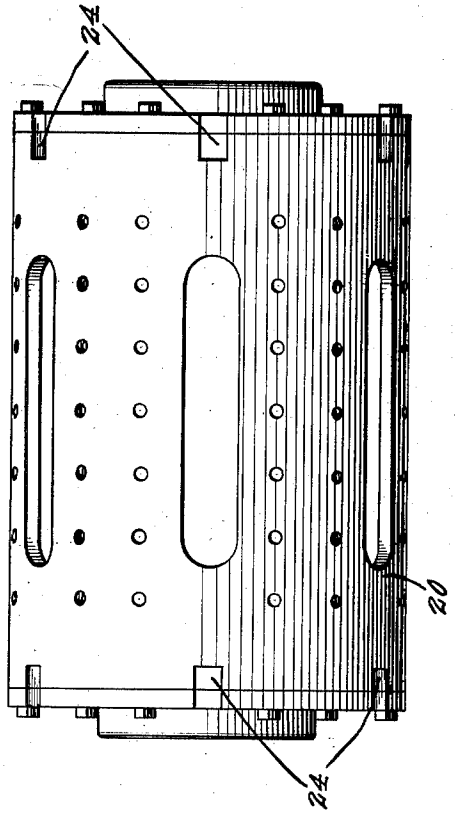
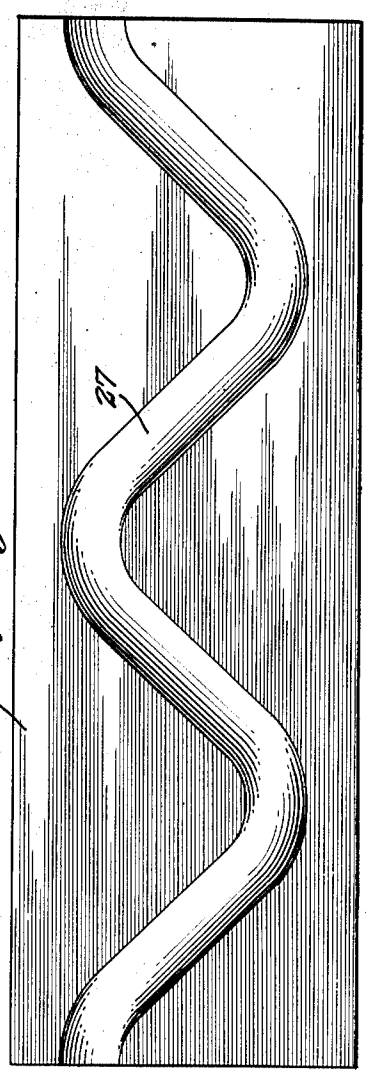


Fig. 6.



G. E. Franklin
INVENTOR

BY Victor J. Evans

ATTORNEY

Patented June 10, 1930 1,762,437

UNITED STATES PATENT OFFICE

GEORGE E. FRANKLIN, OF MILES CITY, MONTANA

ENGINE

Application filed November 30, 1927. Serial No. 236,762.

The object of this invention is to provide an internal combustion engine employing a plurality of cylinders arranged circumferentially of a housing, each cylinder having alined pistons therein, and a driven element within the housing, this element having a cam groove engaged by devices carried by or controlled by connecting rods between alined pistons, and the driven element being carried by the main shaft of the engine.

A further object is to make special provision for the incoming fuel and for the exhaust gases, and to provide a two-cycle engine of the type indicated which shall be efficient in operation and of economical construction.

With these and other objects in view, the invention consists in the novel assembly 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 end elevation,

Figure 2 is a view in longitudinal section,

Figure 3 is a transverse section on line 3—3 of Figure 2,

Figure 4 is an elevation of a cylinder forming the housing of Figure 2, and provided with slots for the accommodation of the elements carrying balls for engaging the cam groove of the driven element,

Figure 5 is a detail view of the ball holding device, which also carries roller bearings,

Figure 6 is a diagrammatic view representing the grooved surface of the driven element.

The engine herein disclosed is especially adapted for airplane purposes, and may include six cylinders having a pair of alined pistons therein, the pistons of the oppositely located cylinders of Figure 2 being in the relative position shown, at a given time, and these pistons being designated 10, 11, 12, 13. The cylinders are shown at 14 and 15 and carry two pistons each, but each cylinder may be regarded as constituting two cylinders, in view of the mode of operation of the engine.

The intake ports for the cylinders are designated 16, 17, 18, 19, and these communicate with the housing 20 which receives the charge through hollow shaft 21. Each piston has an inclined end wall 22 and a cut away portion at 23 permits of registration with the ports 24 of the housing. The cylinders have flanges 14′ for radiation, and carry spark plugs 25. At 23 the charge is directed along the cylinder wall, aiding the discharge of exhaust gases.

Shaft 21 mounts an element 26 to be driven, this element having a circumferential cam groove 27 shown in Figures 2 and 6, the groove being engaged by balls 28 mounted in the concave ends of plugs or pins 29, and in a seat in each flanged sleeve of the kind shown in Figure 3. Under these conditions it is obvious that the balls will be universally movable, or floating.

The sleeves just referred to, designated 30, are provided with roller bearings 31, 32 in the flanged portions 33, the rollers bearing on the surface of the grooved driven element. Pins 29 are threaded into the sleeves and are adjustable therein, and radially of the driven element 26.

Alined pistons are secured together by connecting rods, such as 35 and the sleeves are adjustable with reference to the rods, being held by nuts 36, 37 engaging external threads 38 on said sleeves. The cylinders are flanged at 39, and are secured to housing 20 by bolts 39′. The housing itself may be in two parts having flanged portions secured by bolts 40. The fuel chamber 41 within the housing is supplied through port 43, or through a plurality of ports if desired, and the carburetor connections, not shown, would be made at the right of Figure 2, and through hollow shaft 21.

The cam groove 27 provides for the admission, compression, power, and exhaust steps or strokes of each piston, and the timing will be such that there will be a power impulse simultaneously from opposite ends of the engine and the balance effected will reduce vibration to a minimum. The movement through the cam groove 27 is practical-

ly continuous and without abrupt jar as when passing a center in those engines employing a well known arrangement of cylinders and crank shaft. As an airplane motor, the stream from the propeller will have a clear sweep along all of the cylinders, insuring adequate cooling.

What I claim is—

1. In an engine, a housing, a plurality of cylinders having inlet and exhaust connections and mounted on the outer side of the housing, a plurality of pistons in each cylinder, a connecting rod between the pistons of each cylinder, a driven element having a cam groove and positioned within the housing, a shaft parallel with the cylinders and mounting the driven element, devices mounted on the connecting rods and engaging the cam groove of the driven element, and having universal movement between the walls of the groove, and rotary means on said devices, engaging a circumferential portion of the driven element adjacent to the groove and preventing binding of the devices engaging the groove.

2. In an engine, a housing, a plurality of cylinders having inlet and exhaust connections and mounted on the outer side of the housing, a plurality of pistons in each cylinder, a connecting rod between the pistons of each cylinder, a driven element having a cam groove and positioned within the housing, a shaft parallel with the cylinders and mounting the driven element, the shaft and housing admitting fuel to all of the cylinders, serving as a manifold, and devices extending laterally from the connecting rods, positioned radially of the driven element, and engaging the cam groove thereof.

3. In an engine, a housing, a shaft extending into the housing, a tubular element within the housing and surrounding the shaft, cylinders extending around the housing and shaft and mounted on said housing, alined pistons in each cylinder, rods connecting these pistons, in pairs, sleeves adjustably connected with the rods, pins adjustably mounted in the sleeves, the sleeves and pins having end portions proportioned to form a seat, a floating ball member within the seat at the end of each pin, a driven element mounted on the shaft and having a circumferential cam groove engaged by the floating ball members.

4. In an engine, a housing, a hollow shaft extending into the housing, cylinders extending around the housing, surrounding the shaft and parallel therewith, alined pistons in each cylinder, rods connecting these pistons in pairs, the housing being slotted longitudinally, devices operating through the slots and carried by the rods of the pistons, cam means on the shaft engaged by these devices carried by the rods, the cylinders having ports communicating with the housing, and the hollow shaft having a port communicating with the housing, the latter serving as a manifold for the cylinders, admitting fuel thereto, and inclosing the cam means.

In testimony whereof I affix my signature.

GEORGE E. FRANKLIN.