Feb. 20, 1945. E. R. MUNN 2,369,747

ENGINE

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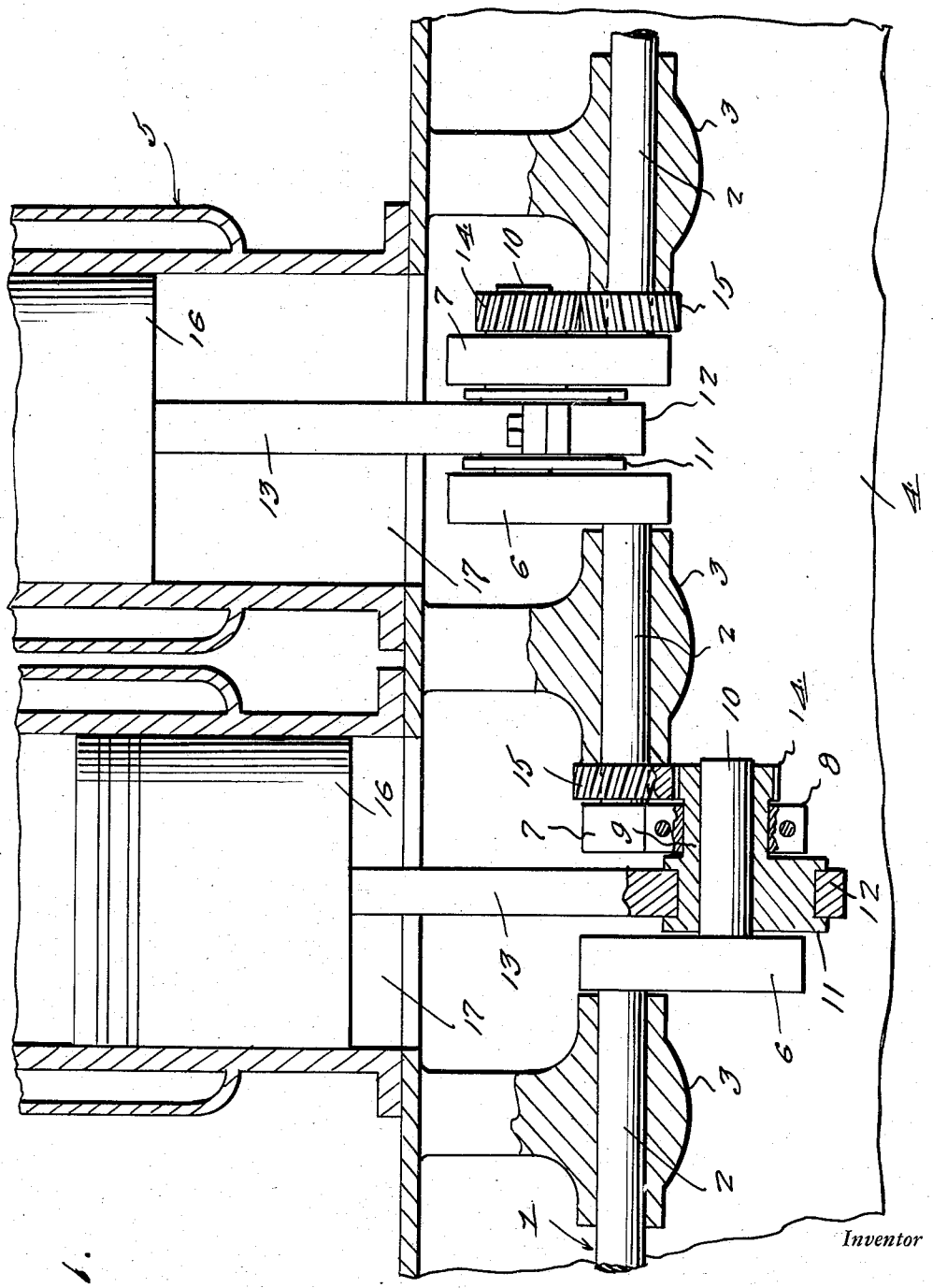


Fig. 1.

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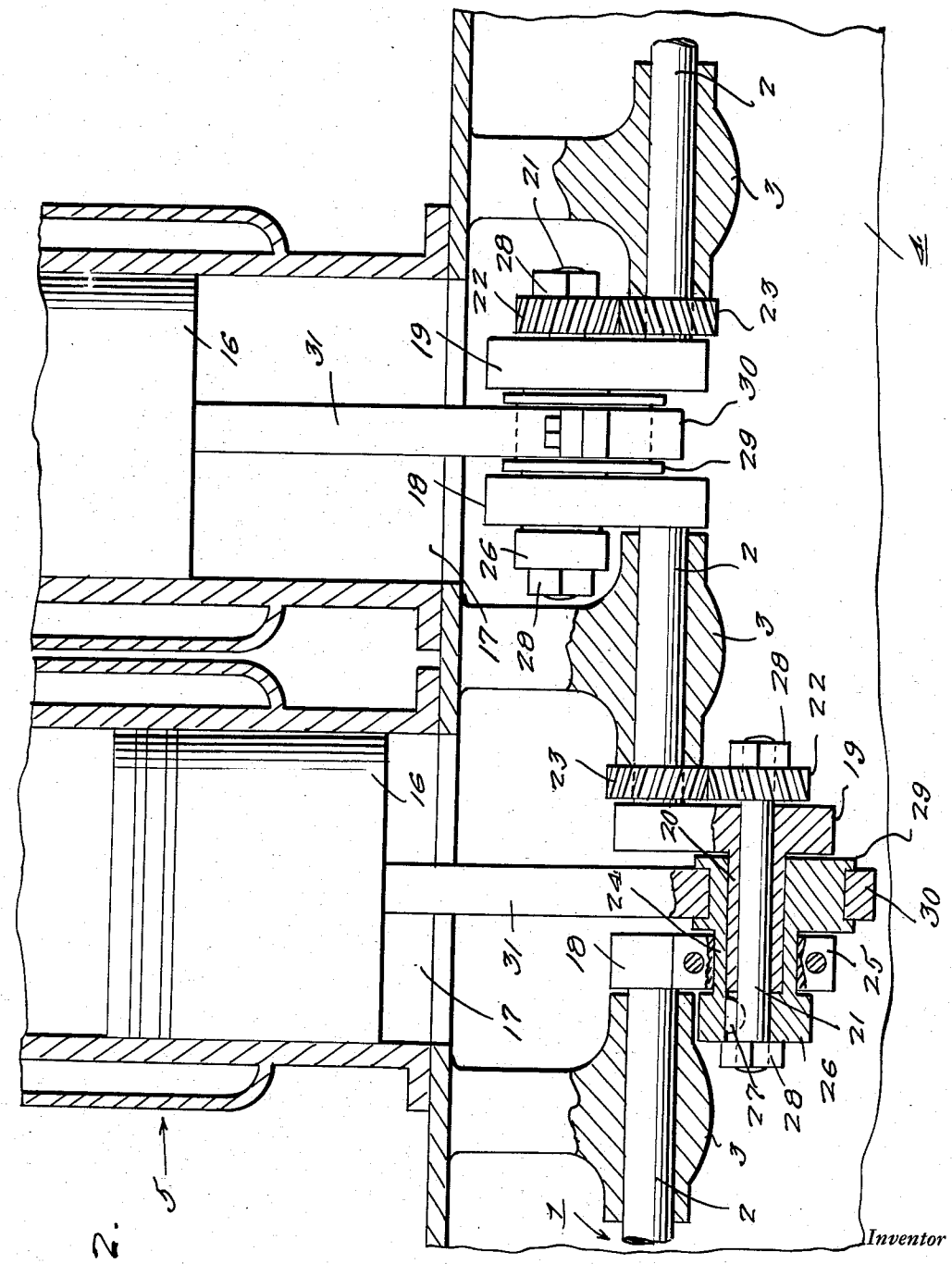


Fig. 2.

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Fig. 3.

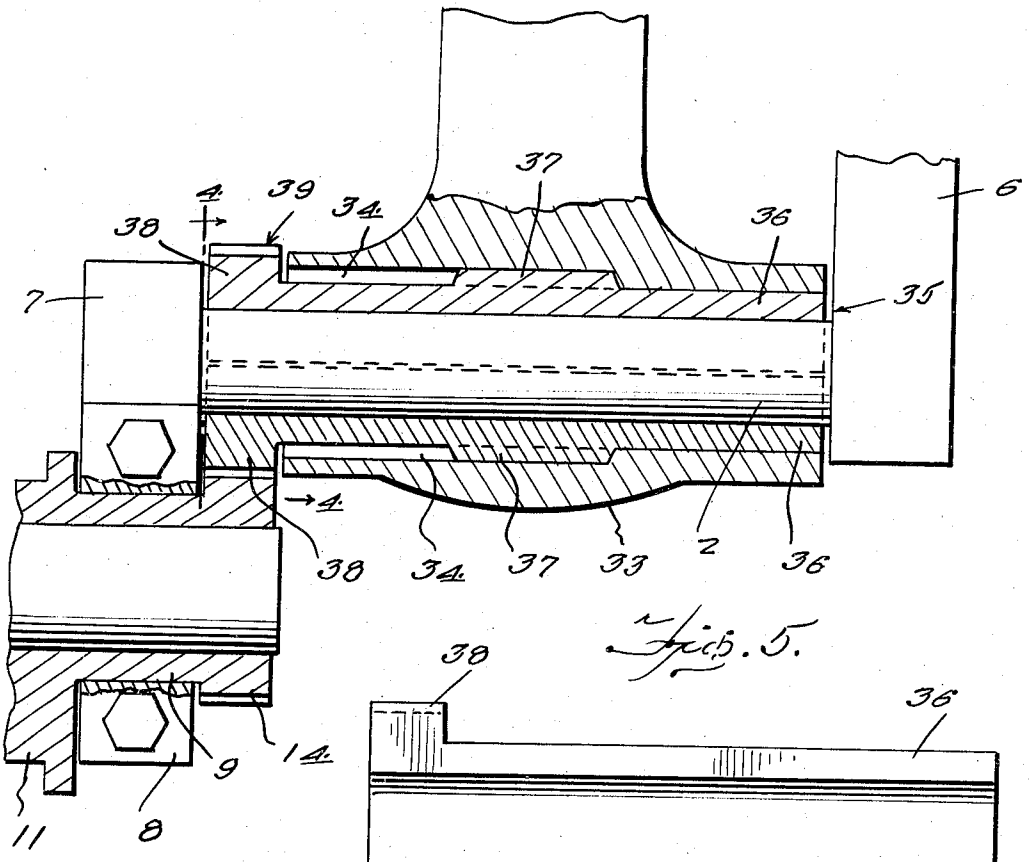


Fig. 5.

Fig. 4.

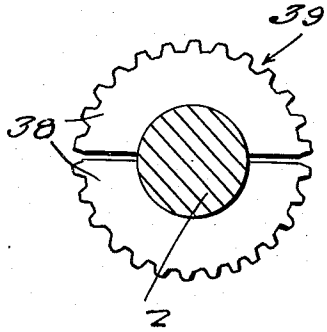
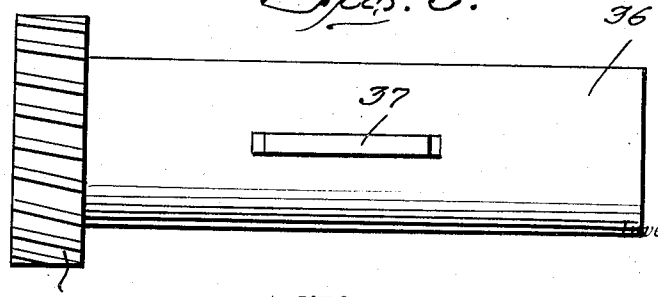


Fig. 6.



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UNITED STATES PATENT OFFICE

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ENGINE

Elvin R. Munn, Fair Play, Mo.

Application July 30, 1942, Serial No. 452,959

4 Claims. (Cl. 74—44)

The present invention relates to new and useful improvements in engines of the reciprocating piston type of a generally similar character to that constituting the subject matter of my copending application, Serial No. 440,866, filed on April 28, 1942.

The primary object of the present invention is to provide, in a manner as hereinafter set forth, an engine of the aforementioned character comprising a crank shaft embodying a novel construction and operation.

Another very important object of the invention is to provide an engine of the character described which includes a unique construction of main bearing.

Other objects of the invention are to provide an engine of the character set forth which will be comparatively simple in construction, strong, durable, highly efficient and reliable in operation, compact, and which may be manufactured at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings, wherein like characters of reference designate corresponding parts throughout the several views, and wherein:

Figure 1 is a view principally in vertical longitudinal section through a portion of an engine constructed in accordance with the present invention.

Figure 2 is a view principally in vertical section through a modification.

Figure 3 is a view in vertical longitudinal section through the main bearing structure.

Figure 4 is a cross sectional view, taken substantially on the line 4—4 of Figure 3.

Figure 5 is a plan view of one of the main bearing sleeve sections.

Figure 6 is an elevational view of one of the main bearing sleeve sections, taken at right angles to Figure 5.

Referring now to the drawings in detail, and to Figure 1 thereof in particular, it will be seen that reference character 1 designates generally a crank shaft. The crank shaft 1 includes a plurality of spaced, longitudinally aligned sections 2 which are journaled in main bearings 3 in the crank case 4 of an engine 5.

Arms 6 and 7 are fixed on the adjacent ends of the crank shaft sections 2. Journaled in a bearing 8 on the arm 7 is a sleeve 9. Projecting from the arm 6 is a pin 10 which is journaled in the sleeve 9.

The sleeve 9 is provided, on one end, with an integral peripherally grooved or channeled eccentric 11. A bearing 12 on one end of a piston connecting rod 13 is journaled on the eccentric 11. Formed integrally with the other end of the sleeve 9 is a gear 14. The gear 14 is in mesh with a gear 15 which is fixed on one end portion of the adjacent main bearing 3.

In operation, the crank shaft sections 2, with the arms 6 and 7 thereon, rotate in unison. Thus, the gear 14 travels around the stationary gear 15, thereby rotating the sleeve 9 with the eccentric 11 thereon. The construction and arrangement is such that, at an intermediate point in the upstroke of the piston 16 in its cylinder 17 on the connecting rod 13, there is a momentary pause or hesitation. When this pause occurs during the compression stroke of the piston 16, the charge in the cylinder is given a chance to mix more thoroughly before it is fired.

In the embodiment illustrated in Figure 2 of the drawings, the crank shaft sections 2 are provided, on their adjacent ends, with arms 18 and 19. Projecting from the arm 19 is a tubular pin 20. A shaft 21 is journaled in the tubular pin 20 and extends through the arm 19. It will be observed that the end portions of the shaft 21 project beyond the arm 19 and the tubular pin 20. A gear 22 is fixed on one end portion of the shaft 21 adjacent the arm 19. The gear 22 meshes with and travels around a gear 23 on one end portion of the adjacent main bearing 3.

Rotatably mounted on the tubular pin 20 is a sleeve 24. The sleeve 24 is journaled, at an intermediate point, in a bearing 25 which is provided therefor on the arm 18. The sleeve 24 includes an enlarged end portion 26 which is keyed, as at 27, to the corresponding end portion of the shaft 21. Retaining nuts 28 are provided on the end portions of the shaft 21.

The sleeve 24 is provided, on its other end, with an integral, peripherally grooved or channeled eccentric 29. A bearing 30 on one end of a piston connecting rod 31 is journaled on the eccentric 29.

The operation of the Figure 2 form of the invention is substantially similar to that of the Figure 1 embodiment. That is, the crank shaft sections 2 with the arms 18 and 19 thereon rotate in unison. However, as the gear 22 travels around the stationary gear 23, rotation is imparted to the sleeve 24 and the eccentric 29 on the tubular pin 20 through the shaft 21 extending through said tubular pin.

In Figures 3 to 6, inclusive, of the drawings, reference character 33 designates a main bearing for

the crank shaft sections 2, said main bearing having formed longitudinally therein keyways 34. In this embodiment, the crank shaft sections 2 are journaled in a sleeve 35 which is provided therefor in the main bearing 33. The sleeve 35 comprises complemental half sections 36 having formed thereon longitudinal keys 37 which are engaged in the ways 34. The sleeve sections 36 project from one end of the main bearing 33 and have formed thereon integral segments 38 constituting a gear 39. The gear 39, of course, is stationary and is adapted to mesh with the gears 14 and 22.

It is believed that the many advantages of an engine constructed in accordance with the present invention will be readily understood, and although preferred embodiments are as illustrated and described, it is to be understood that further modifications and changes in the details of construction may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:

1. In an engine of the character described, a crank case, a plurality of longitudinally aligned main bearings in said crank case, longitudinally spaced crank shaft sections journaled in said main bearings, arms fixed on the adjacent ends of the crank shaft sections, a pin projecting from one of the arms, the other arm having a bearing, a sleeve rotatably mounted in the bearing of said other arm and journaled on said pin, an eccentric on one end of the sleeve between said arms, a connecting rod having one end connected to a piston and its other end journaled on the eccentric, a gear on the other end of the sleeve at the outer side of said other arm, and a stationary gear on an adjacent main bearing engaged with the first-named gear for rotating the sleeve and the eccentric on the pin upon rotation of the crank shaft sections.

2. In an engine of the character described, a plurality of aligned main bearings, a gear fixed on one of said main bearings, crank shaft sections journaled in said main bearings, arms fixed on the adjacent ends of the crank shaft sections, a pin projecting from one of said arms, a bearing on the other of said arms, a sleeve journaled in the second-named bearing and on said pin, an eccentric on one end of said sleeve operable between the arms, a piston connecting rod having one end journaled on the eccentric, and a gear coaxial with and operatively connected to the sleeve, the last-named gear being disposed at the outer side of one of said arms and meshing with the first-named gear for rotating said sleeve and the eccentric upon rotation of the crank shaft sections.

3. In an engine of the character described, a plurality of longitudinally aligned main bearings, crank shaft sections journaled in said bearings, a gear fixed on one of the main bearings, arms fixed on the adjacent ends of the crank shaft sections, a tubular pin projecting from one of the arms, a bearing on the other of said arms, said tubular pin extending into the second-named bearing, a shaft journaled in the tubular pin, said shaft extending through said one arm and having its end portions projecting from said one arm and said tubular pin, a sleeve journaled in the bearing of said arm and rotatable on the tubular pin, means connecting one end portion of the sleeve to one end portion of the shaft for actuation by said shaft, an eccentric on the other end of the sleeve operable between the arms, a piston connecting rod journaled on said eccentric, and a gear fixed on the other end portion of the shaft and meshing with the first-named gear for actuation thereby for rotating the sleeve and the eccentric.

4. In an engine of the character described, a main bearing having longitudinal ways therein, a sleeve mounted in said bearing, said sleeve including complemental half sections, keys on said shaft sections engaged in the ways, a gear on one end of the sleeve, said gear including segments formed integrally with the sleeve sections, a crank shaft section journaled in the sleeve, an arm fixed on said crank shaft section and having a bearing, a sleeve rotatably mounted in the bearing of said arm, an eccentric for connection with a connecting rod provided on one end of the second-named sleeve, and a gear on the second-named sleeve meshing with the first-named gear for actuation thereby upon rotation of the crank shaft section.

ELVIN R. MUNN.