Sept. 16, 1930. G. M. BALL 1,775,635

CAM ENGINE

Filed April 2, 1928 3 Sheets-Sheet 1

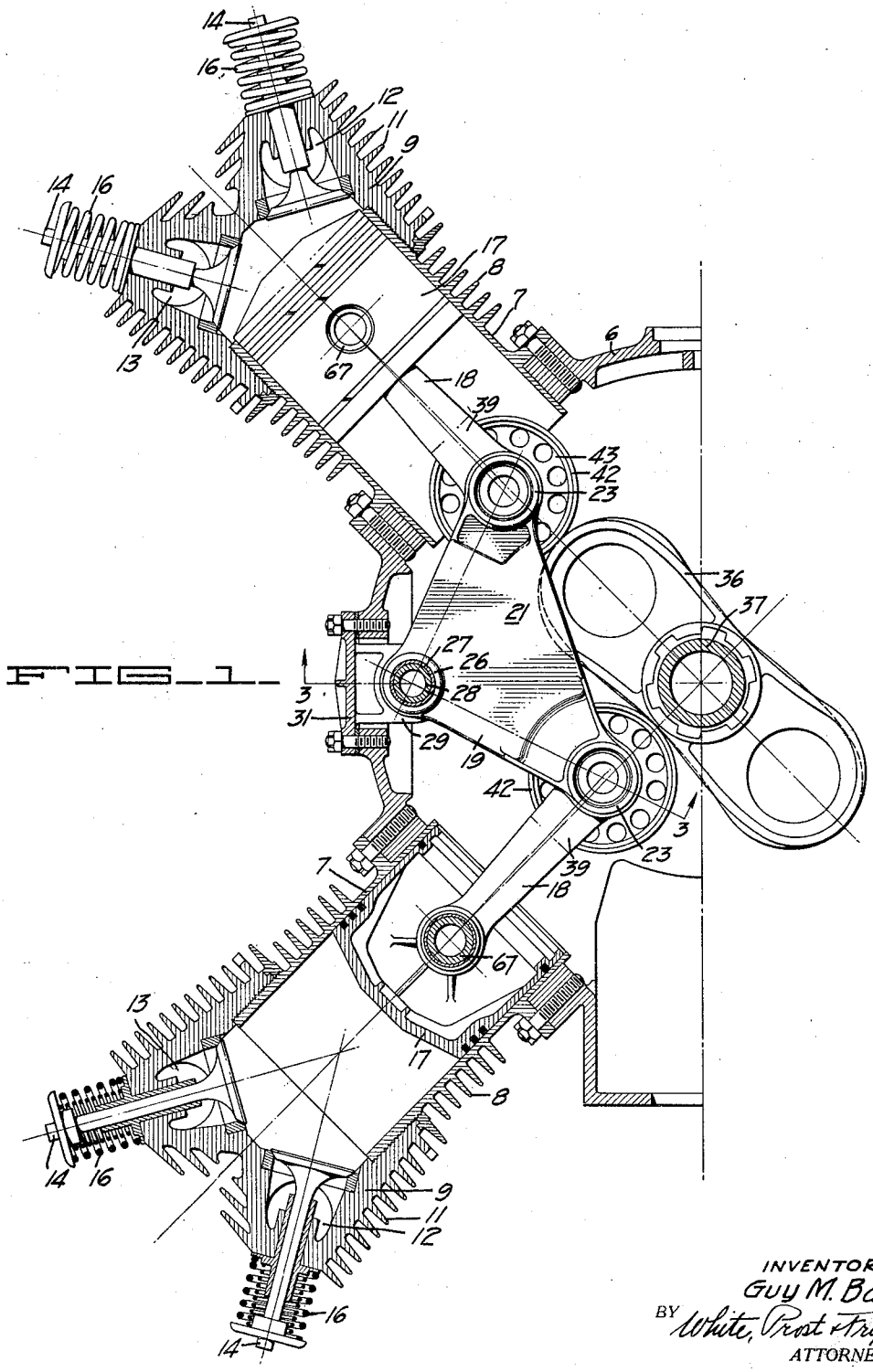


FIG. 1

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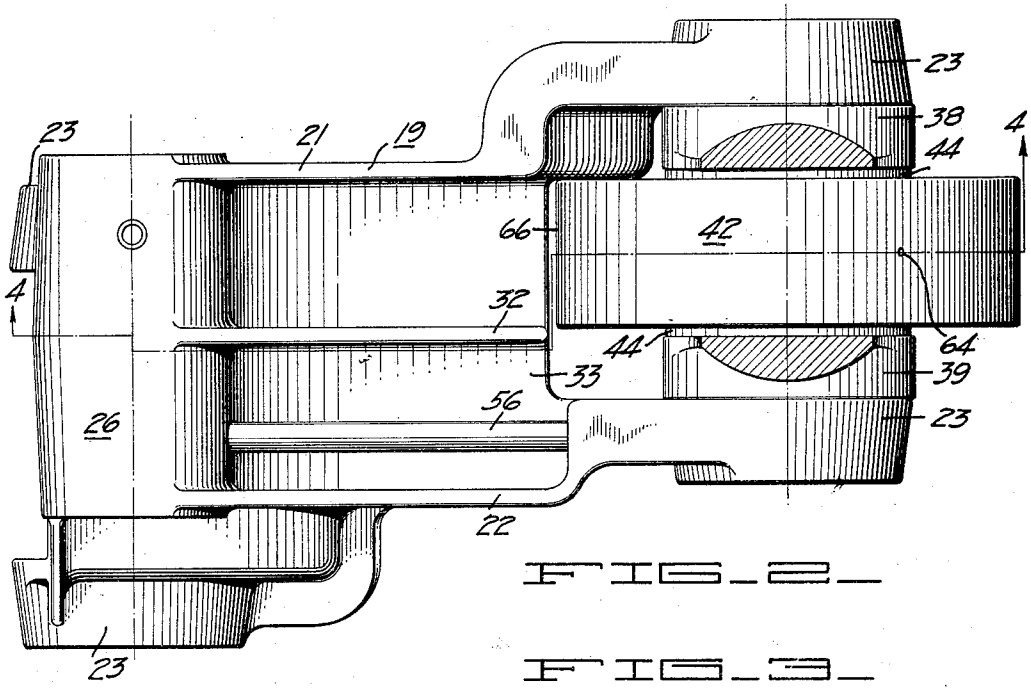
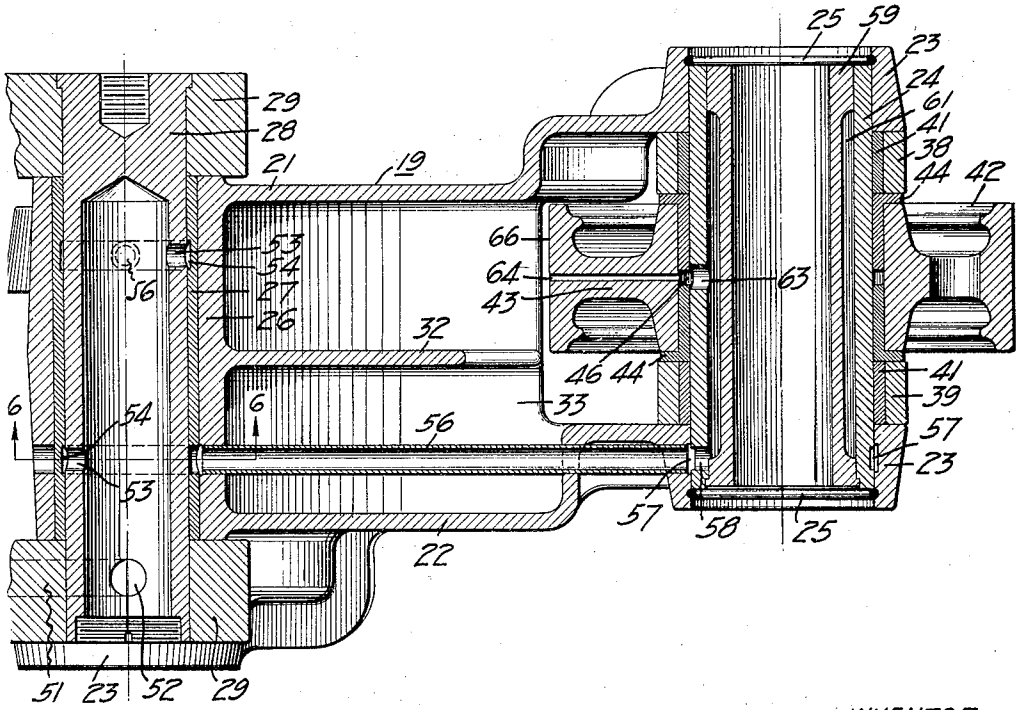


FIG. 2.

FIG. 3.



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FIG_4_

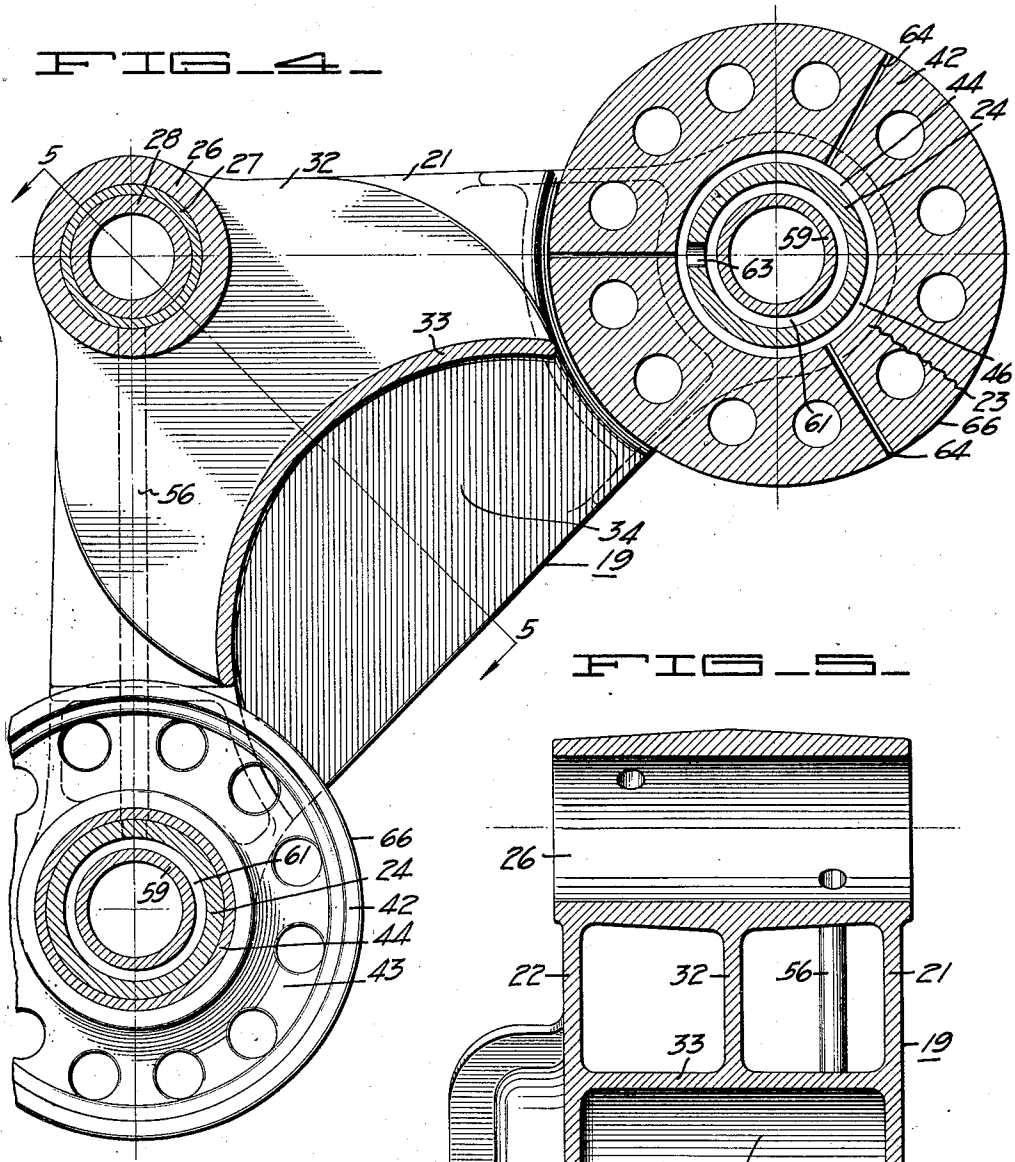
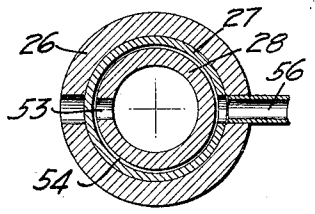


FIG_5_

FIG_6_



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UNITED STATES PATENT OFFICE

GUY M. BALL, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO NORDWICK ENGINE COMPANY, INC., OF RENO, NEVADA, A CORPORATION OF NEVADA

CAM ENGINE

Application filed April 2, 1928. Serial No. 266,491.

My invention relates to cam engines of the beam type and particularly to the kind of engine disclosed in the Nordwick Patent No. 1,630,273, issued May 31, 1927.

An object of my invention is to improve the running characteristics of such engines.

Another object of my invention is to provide a superior construction for various of the moving parts of the engine.

Another object of my invention is to improve the means for lubricating the engine parts.

The foregoing and other objects are attained in the embodiment of the invention shown in the drawings, in which

Fig. 1 is a cross section thru one half of a generally symmetrical engine embodying my invention.

Fig. 2 is a plan of the beam in my engine showing a roller and connecting rod assembled thereon.

Fig. 3 is a cross section, the planes of which are indicated by the line 3—3 in Fig. 1.

Fig. 4 is a cross section, the planes of which are indicated by line 4—4 in Fig. 2.

Fig. 5 is a cross section on the line 5—5 of Fig. 4.

Fig. 6 is a cross section on the line 6—6 of Fig. 3.

In its preferred form, the cam engine of my invention preferably comprises a beam, generally of box construction, having trianular webs at the apices of which are situated journals for pivoting the beam and to receive cam followers, the beam usually being provided with a recess to permit the passage of a revolving cam and also being provided with ducts to carry lubricant to various portions of the beam assembly.

In the preferred modification of my invention disclosed in the drawings, the engine comprises a crankcase 6 of the barrel type faced at regular intervals for the reception of suitable cylinders 7. In the present modification, the engine is air cooled and the cylinders carry radiating fins 8. Preferably screwed to the outer ends of the cylinders 7 are cylinder heads 9 of cast metal carrying cooling fins 11 and having valve ports 12 and 13. Valves 14, provided with springs 16, control the ports and are actuated by suitable mechanism, not shown.

In each of the cylinders 7 reciprocates a piston 17 of the customary kind provided with a connecting rod 18. Preferably, the connecting rods are joined in pairs by beams 19. These beams are important factors in affecting the operation of the engine as a whole. I have found that beams constructed according to the present invention materially reduce vibration of the engine, permit higher piston speeds to be obtained, and greatly increase the life of the associated parts.

My beam is preferably made of box construction and is formed usually with two sides 21 and 22 which are webs triangular in contour. At two of their apices, the triangular webs carry bosses 23 to receive hollow bushings 24 held by rings 25 while at the remaining apex the webs carry a boss 26 lined with an anti-friction bushing 27. A bearing for the bushing 27 is provided by a hollow pivot pin 28 detachably secured within ears 29 formed on a plate 31 bolted to the crank case 6. The main body of the beam and the boss 26 are preferably alined but the ends of the beam are generally offset equal amounts in opposite directions inasmuch as the two cylinders of a pair are usually offset.

For reenforcement I provide a generally central web 32 parallel to and intermediate the two triangular webs 21 and 22. This is usually formed as an integral part of the beam body and merges with an arcuate web 33 extending between the forked ends 23. The contour of the web 33 is preferably such that it provides a recess 34 between the side walls 21 and 22 of the beam body to permit the passage of a rotating duplex cam 36 secured to a central drive shaft 37 journaled in the crank case 6. By providing the recess 34 and permitting the side webs 21 and 22 to extend directly between the ends of the beam body, I provide a strong construction well able to resist strains tending to displace the beam apices and withal save considerable metal over the prior constructions.

To the bushings 24 the connecting rods 18 are pivoted. Usually the lower ends of the rods 18 are forked to provide two tines 38

and 39 which are bushed with sleeves 41 of antifriction material. Intermediate the forked ends of the rods 18, cam followers 42 are mounted. The followers preferably are rollers having webs 43 drilled to reduce the weight and to reduce the inertia forces. Each follower turns with a pair of flanged liners 44 placed symmetrically on the hollow bushing 24 and spaced to afford a central groove 46.

In order to provide lubrication for all of the moving parts of my construction, I preferably force oil thru a lead 51 in one of the ears of the cover plate 31 and introduce the oil thru an aperture 52 into the hollow interior of the pivot pin 28. From thence the oil passes thru drilled holes 53 into surrounding grooves 54 in the bushing 27 from which it flows thru two tubes 56 extending radially outward from the boss 26 and discharges into circular grooves 57 provided in each of the hollow bushings 24. A hole 58 pierces each bushing and permits the oil to flow to the interior thereof.

In order to reduce the quantity and weight of oil retained in the interior of the bushing I preferably provide a hollow plug 59 which is relieved, as at 61, for the greater part of its length to form an annular passage. Oil flowing thru the aperture 58 fills the annular passage and is distributed thruout the interior of the bushing 24. It then flows thru an aperture 63 into the central groove 46 and flows outwardly thru radial holes 64 drilled in the follower. The friction surfaces 66 between the rollers, the connecting rod sleeves 41, and the main bushing 24 are oiled by lubricant escaping from the various passages. Oil flowing radially from the holes 64 in the rapidly revolving rollers 42 covers the surface of the duplex cam 36 and provides complete lubrication for the interior of the cylinder walls 7. If desired, an oil lead can be provided thru the connecting rod 18 to oil the wrist pin connection 67 in the usual manner.

It is to be understood that I do not limit myself to the form of the cam engine shown and described herein, as the invention, as set forth in the following claims may be embodied in a plurality of forms.

I claim:

1. In a cam engine, a beam, a hollow pivot pin for said beam, a hollow bushing in said beam, a member moving on said bushing, and means including said hollow pin and said hollow bushing, for supplying lubricant to said member.

2. In a cam engine, a beam of box construction comprising a generally triangular web, a hollow pivot pin at one apex of said web, journals at the other apices of said web; the portion of said web adjacent said pin being laterally offset with respect to the portions adjacent said journals, hollow bushing in said latter portions, members moving on said bushings, and means including said hollow pin and said hollow bushings for supplying lubricant to said members.

3. In a cam engine, a beam of box construction having its main body portion disposed perpendicularly to the axis of rotation of a hollow pivotal journal provided at one extremity of said body portion, forks at the other extremities of said body portion offset in opposite directions from said body portion, a hollow bushing held in each of said forks, a member having forks moving on each of said bushings, rollers journaled on said bushings between the forks of said members, and means including said hollow journal and said hollow bushings for supplying lubricant to said members.

In testimony whereof, I have hereunto set my hand.

GUY M. BALL.