Jan. 26, 1943. F. ARENA 2,309,434

DIESEL ENGINE

Filed Nov. 3, 1941 2 Sheets-Sheet 1

Fig. 1.

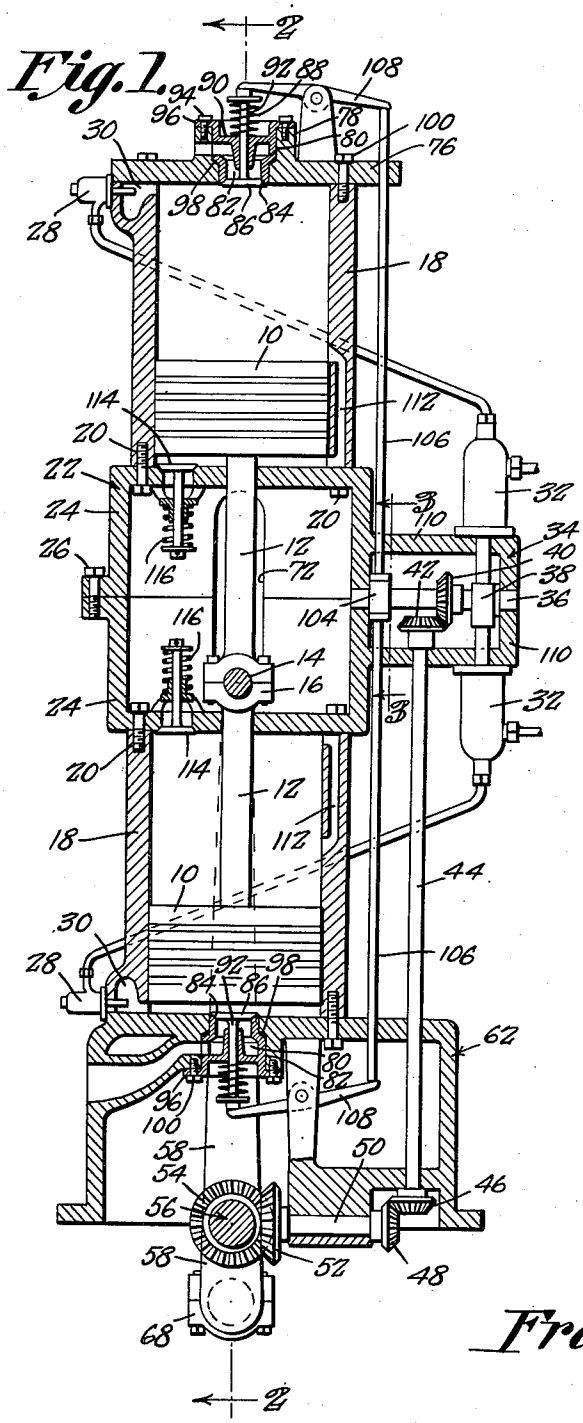
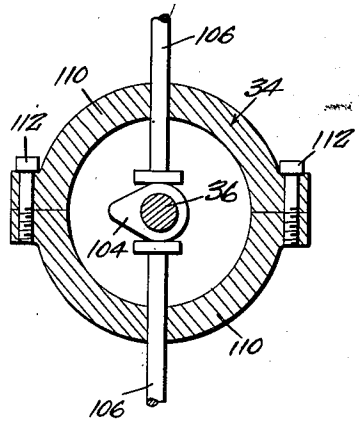


Fig. 3.



Frank Arena,
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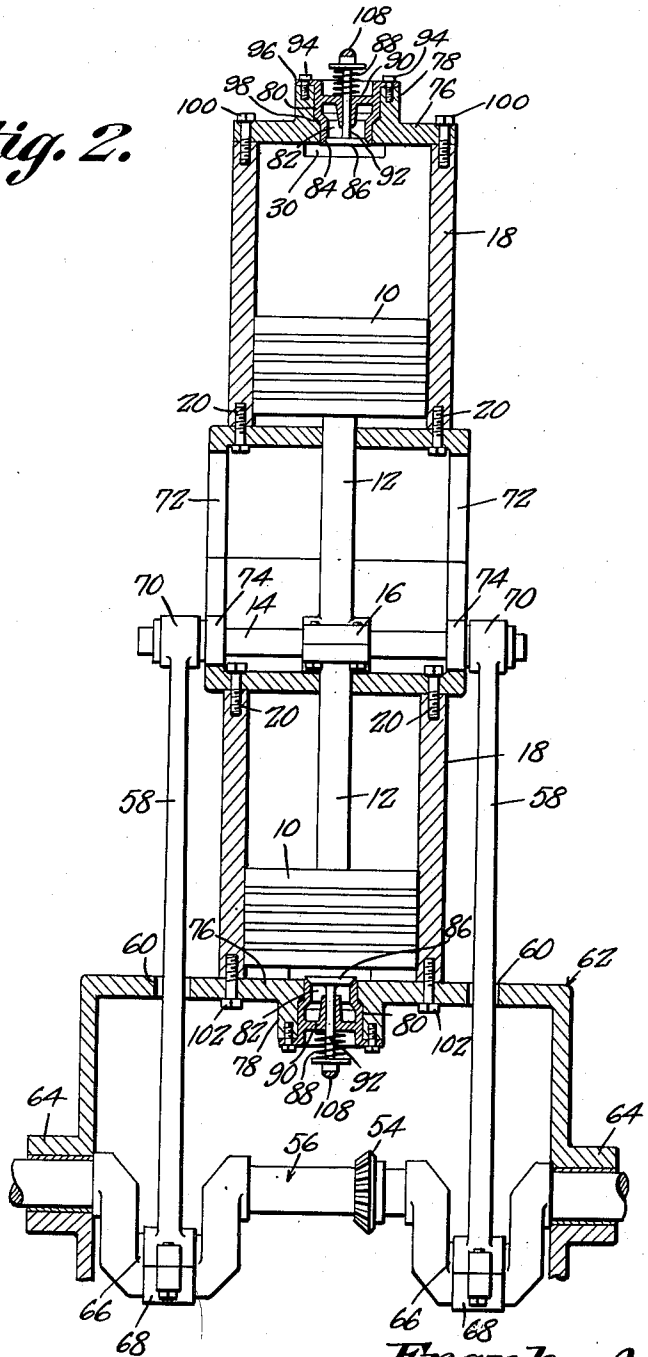
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Fig. 2.



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DIESEL ENGINE

Frank Arena, Elba, N. Y.

Application November 3, 1941, Serial No. 417,707

2 Claims. (Cl. 123—57)

My invention relates to internal combustion engines and has among its objects and advantages the provision of an improved Diesel engine.

An object of my invention is to provide a Diesel engine of the two-cycle type, wherein opposed pistons are connected with a crosshead to eliminate side thrust on the pistons, in which the engine is simple in construction and embodies relatively few parts so fashioned as to facilitate assembly and repair, and in which the engine is designed to operate efficiently and economically in the matter of fuel consumption.

In the accompanying drawings:

Figure 1 is a longitudinal sectional view of an engine in accordance with my invention;

Figure 2 is a sectional view taken along the line 2—2 of Figure 1; and

Figure 3 is an enlarged sectional view taken along the line 3—3 of Figure 1.

In the embodiment selected to illustrate the invention, two opposed pistons 10 are connected as a unit through the medium of rods 12 secured to a crosshead pin 14 through the medium of a bolted coupling 16. Each piston 10 operates in a cylinder 18, the cylinders being arranged in axial alignment and bolted at 20 to a casing guide 22. This case is made up of two sections 24 fixedly secured in a unitary structure by bolts 26.

Each cylinder 18 is provided with a conventional fuel injection nozzle 28 communicating with a precombustion chamber 30 having communication with its respective cylinder. Conventional fuel injection pumps 32 are provided for the nozzles 28, which pumps are mounted on a gear case 34 projecting from one side of the casing guide 22. A shaft 36 is rotatably mounted in the gear case 34 and is provided with a cam 38 which operates the respective pumps 32.

To the shaft 36 is secured a bevel gear 40 meshing with a bevel gear 42 keyed to a shaft 44. Rotation is imparted to the shaft 44 through the medium of a bevel gear 46 keyed to the shaft and meshing with a bevel gear 48 keyed to a shaft 50 provided with a bevel gear 52 meshing with a bevel gear 54 keyed to the crankshaft 56.

Reciprocatory motion of the piston stem transmits rotary motion to the crankshaft 56 through the medium of two arms 58, see Figure 2, extending through slots 60 in a crankcase 62 provided with crankshaft supporting bearings 64. Each arm 58 is connected with a crankpin 66 through the medium of a bearing 68, as well as with the crosshead pin 14 through the medium of bearings 70. Two walls of the casing guide 22 are provided with slots 72 for guiding the crosshead pin 14 in its reciprocatory travel, which crosshead pin is provided with bearings 74 guidably engaging the walls of the respective slots.

Each cylinder head 76 is provided with an annular flange 78 within which is fitted a cage 80 having a passage 82 communicating with its respective cylinder 18. The cages 80 are provided with valve seats 84 for coaction with exhaust valves 86 biased to a closed position by springs 88. Each cage 80 is provided with a guide 90 for the valve stem 92, and the cage is fixedly but detachably secured to its respective annular flange 78 by bolts 94 extending through openings in the cage flange 96 and threaded into the annular flange 78. Thus the valves 86 may be removed by unloosening the cage 80 and pulling the cages from the annular flanges. Gaskets 98 are provided for effecting a sealed condition between the cages 80 and the annular flanges 78.

One of the cylinder heads 76 is bolted at 100 to the upper cylinder 18 of Figure 2 and the lower cylinder head 76 comprises one wall of the crankcase 62, the lower cylinder 18 being secured to this cylinder head 76 by bolts 102.

In Figures 1 and 3, a cam 104 is secured to the shaft 36 for actuating rods 106 which operate rocker arms 108 acting on the valve stems 92. Figure 3 illustrates the gear housing 34 as comprising sections 110 fixedly secured one to the other by bolts 112. Each section 110 is cast integrally with one of the sections 24.

Each cylinder 18 is provided with a port 112 in its wall, which port has communication with the interior of the cylinder at its bottom end and at an intermediate point located to communicate with the space between the piston and the crosshead when the piston is in its lower position, as illustrated in connection with the upper cylinder of Figure 1. Each cylinder is provided with an air intake valve 114 biased to a closed position by a spring 116. These valves open as their respective pistons progress in their compression strokes to fill the cylinder space underneath the pistons with air. The air is compressed as the pistons progress on their power stroke and is admitted to the combustion chambers as the pistons approach the ends of their power stroke. Thus the compressed air is delivered forcibly into the respective combustion chambers to aid in scavenging the chambers, as well as admitting air thereto which is necessary for combustion purposes.

Without further elaboration, the foregoing will so fully illustrate my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. A Diesel engine of the two-cycle type comprising opposed cylinders arranged in axial alignment, a casing guide fixedly connecting said cylinders one with the other, said casing guide being provided with slots, pistons slidable in said cylinders, a crosshead member extending through said slots and slidably guided thereby, said pistons being fixedly connected with said crosshead member, an air inlet valve communicating with said cylinders and with said casing guide, said cylinders being provided with air passages for delivering air compressed by the respective cylinders to their combustion chambers upon completion of the power strokes of the respective pistons, said casing guide comprising two sections detachably connected together, a gear case carried by said casing guide comprising two sections each secured to one section of the casing guide, a shaft rotatably journaled in said gear case, said cylinders being provided with precombustion chambers, fuel injection means for delivering fuel to the precombustion chambers, a cam on said shaft for actuating said fuel injection means, exhaust valves, means operatively connecting the exhaust valves with said shaft, a crank shaft, arms connecting said crosshead member with said crank shaft, and gear means operatively connecting said crank shaft with said first-mentioned shaft.

2. The invention described in claim 1 wherein said cylinders are bolted to said casing guide, and wherein said arms are located exteriorly of said casing guide.

FRANK ARENA.