E. J. GULICK.

GAS ENGINE BASE.

APPLICATION FILED SEPT. 22, 1909.

1,031,785.

Patented July 9, 1912.

4 SHEETS—SHEET 1.

Fig. 1.

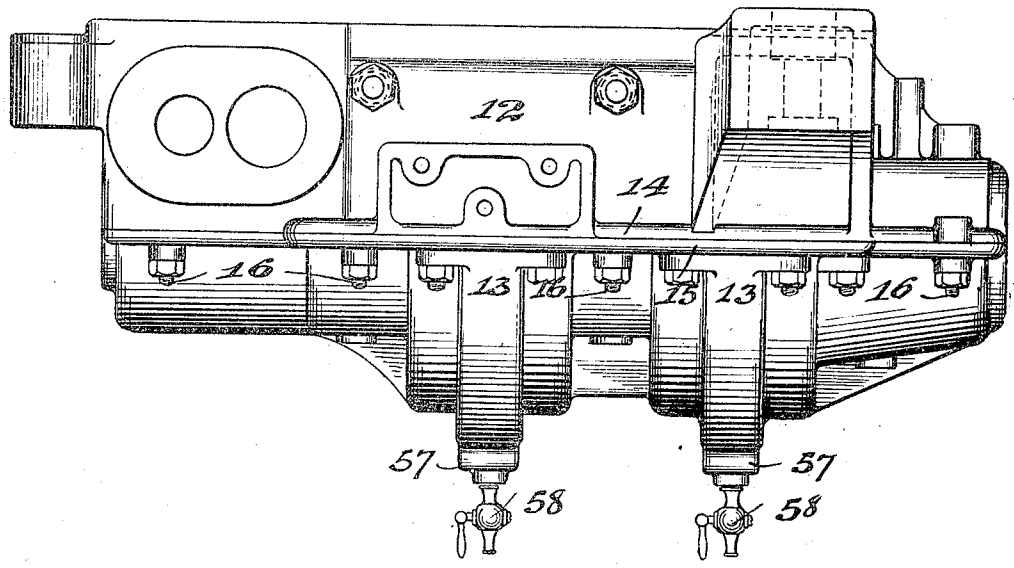
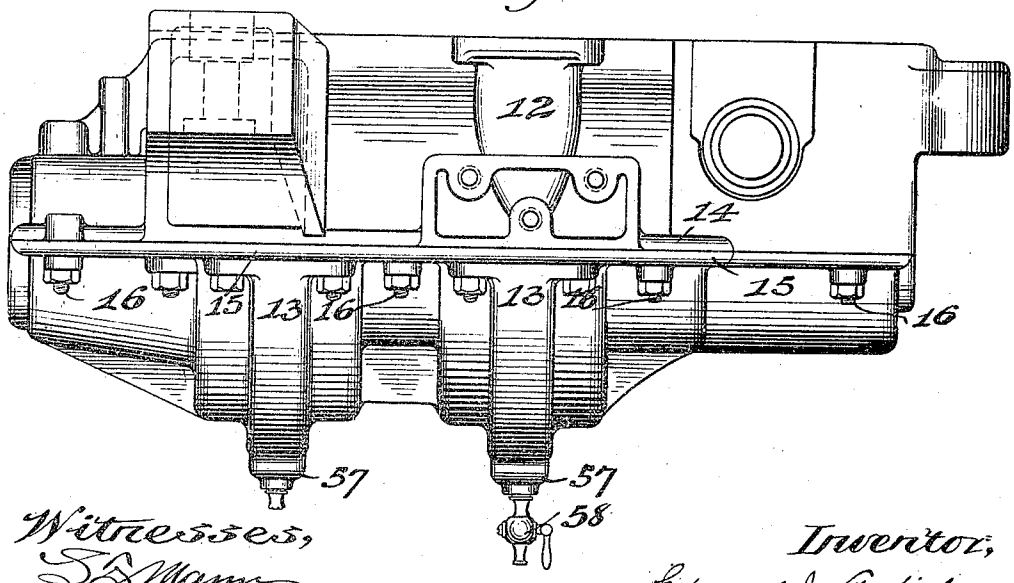


Fig. 2.



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4 SHEETS—SHEET 2.

Fig. 3.

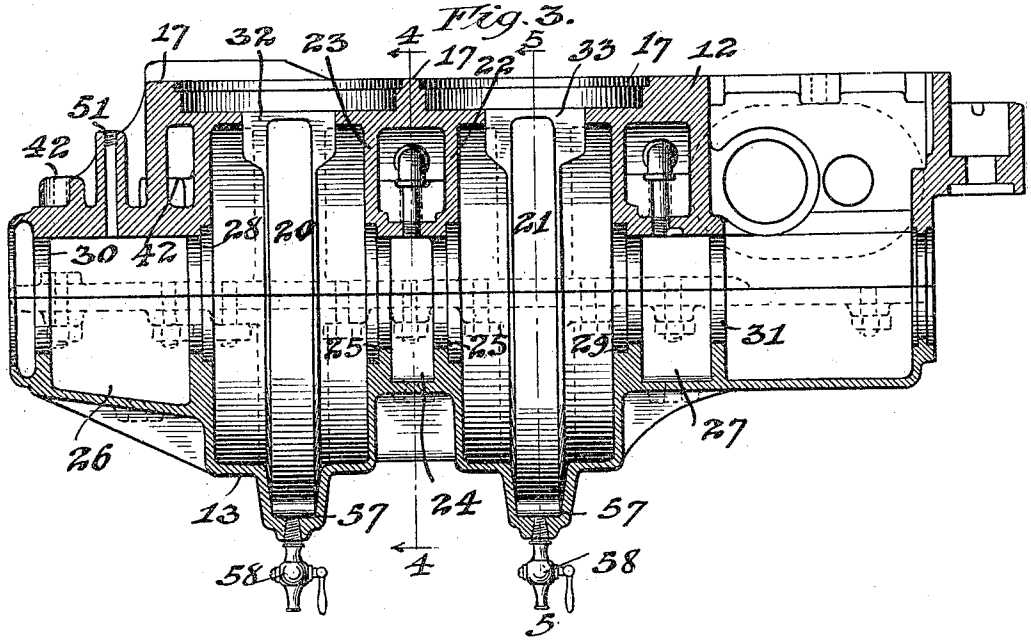


Fig. 4.

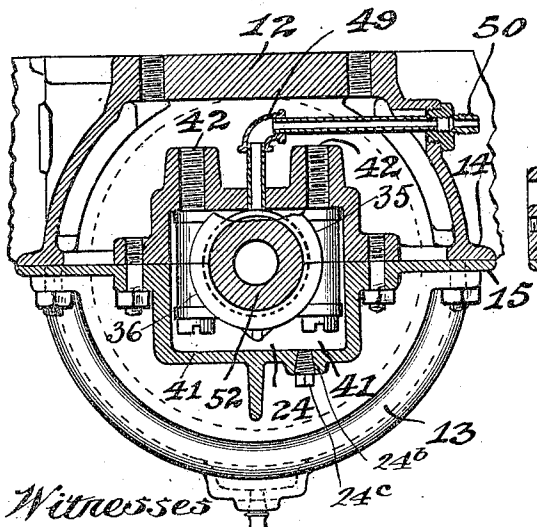
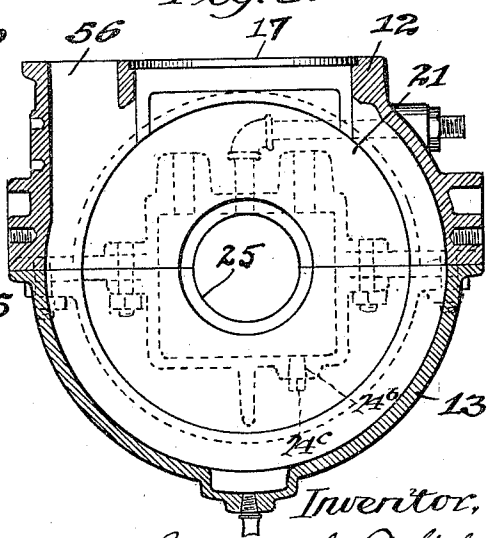


Fig. 5.



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4 SHEETS—SHEET 3.

Fig. 6.

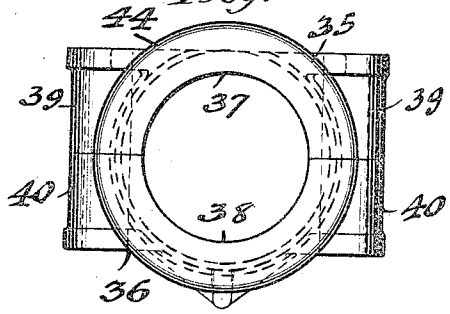


Fig. 7.

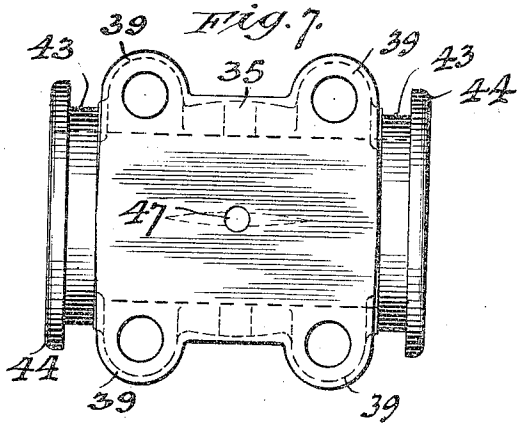


Fig. 8.

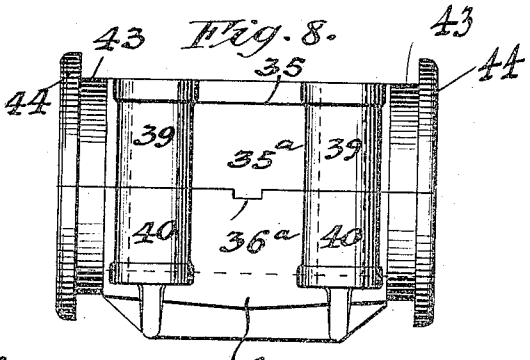


Fig. 9.

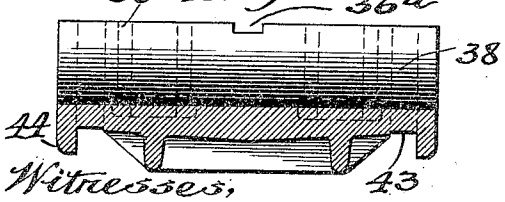
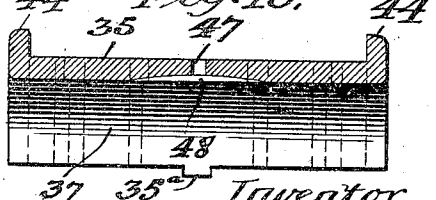


Fig. 10.



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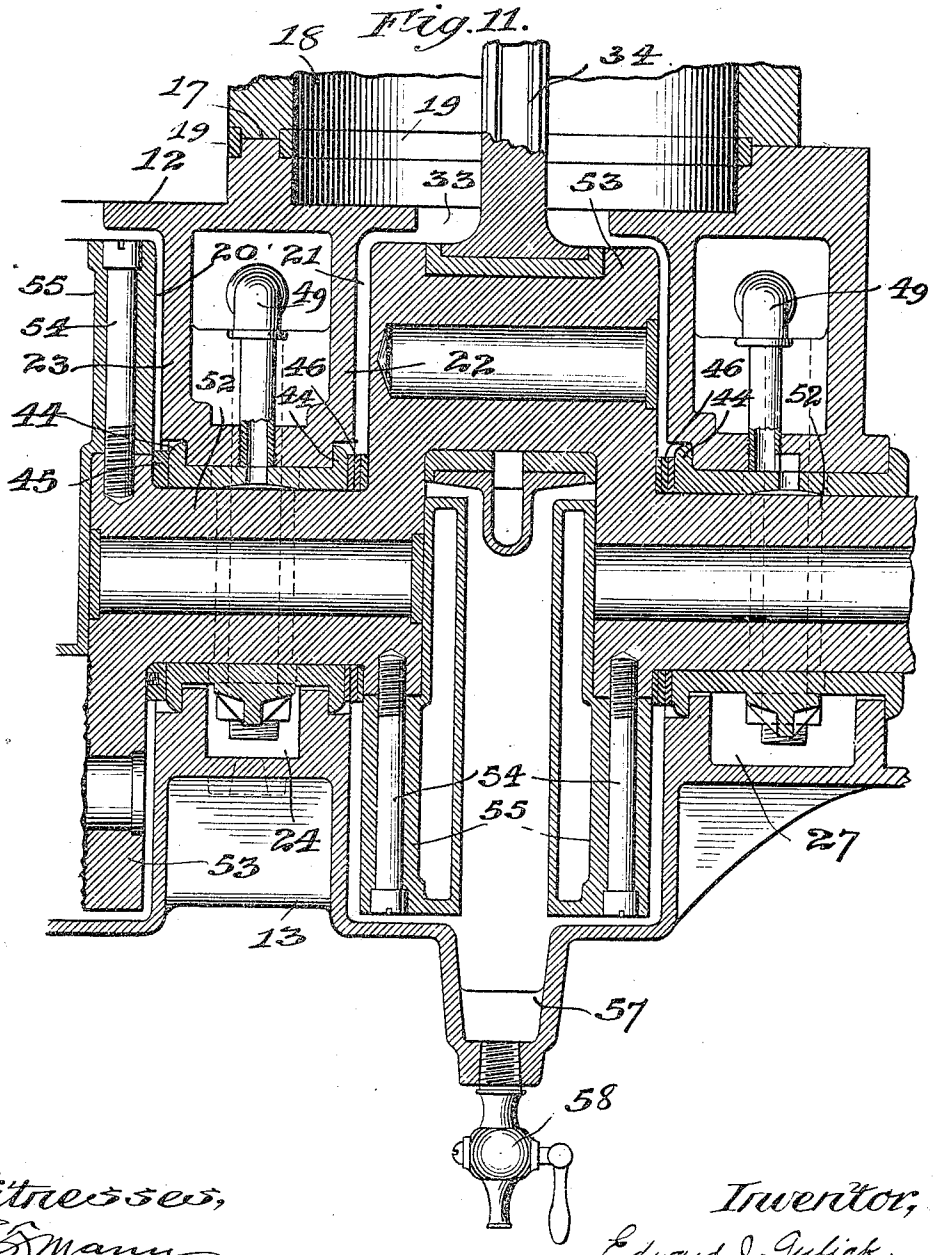
APPLICATION FILED SEPT. 22, 1909.

1,031,785.

Patented July 9, 1912.

4 SHEETS—SHEET 4.

Fig. 11.



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UNITED STATES PATENT OFFICE.

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GAS-ENGINE BASE.

1,031,785. Specification of Letters Patent. Patented July 9, 1912.

Application filed September 22, 1909. Serial No. 518,966.

To all whom it may concern:

Be it known that I, EDWARD J. GULICK, a citizen of the United States, residing at Mishawaka, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Gas-Engine Bases, of which the following is a specification.

This invention relates to the art of gas engines, and has reference more particularly to a novel structure of gas engine base adapted for use in connection with two-cycle engines wherein the explosive charge is compressed by the piston on its outer or working stroke into a chamber surrounding the crank, and passes thence through a by-pass into the cylinder of the engine. A fault which is very prevalent in engines of this type resides in the tendency of the compressed gases in the crank chamber to leak out either where the base is secured to the inner end of the cylinder, or through the bearings of the crank-shaft in the crank-chamber or base.

One object of my invention is to provide a construction of gas engine base whereby this leakage may be prevented.

Another object of the invention is to provide a base frame construction of such character that it may be readily opened to afford easy access to the crank-shaft, bearings, journal boxes, etc., without the necessity of removing anything except a portion of the base frame itself.

To these and other minor ends, the invention consists in the novel features of construction hereinafter described and more particularly pointed out in the claims.

One practical form in which my invention may be embodied is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevational view of my engine base. Fig. 2 is a similar view from the opposite side thereof. Fig. 3 is a central longitudinal vertical section through the base frame, the contained parts being omitted for the sake of clearness. Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 3, also showing one of the journal boxes in elevation and the crank-shaft in cross-section therein. Fig. 5 is a cross-section on the line 5—5 of Fig. 3. Fig. 6 is an end elevation of one of the journal boxes. Fig. 7 is a top plan view of Fig. 6. Fig. 8 is a side elevation of the journal boxes shown in Figs. 6 and 7. Figs. 9 and 10 are central longitudinal sections of the lower and upper halves of the journal boxes, respectively; and Fig. 11 is an enlarged central longitudinal section through the intermediate portion of the base structure shown in Fig. 3, with the crank and its bearings and other accessories therein, and also showing a portion of the cylinder secured to said base.

The structure shown in the drawings is adapted for use with a two-cylinder engine of the two-cycle type; and the base structure which contains the crank chambers in which the mixture is compressed and supports and incloses the crank-shaft bearings is formed in two main horizontal sections, the upper of which is designated as an entirety by 12 and the lower by 13. The said sections are provided on their inner or meeting edges with flanges 14 and 15, respectively, adapted to be securely united at suitable intervals by bolts 16. The upper section 12 of the base is formed with annular seats 17 to receive the lower ends of the cylinders, a fragment of which latter is indicated at 18 in Fig. 11. The seats 17 and the lower ends of the cylinders resting thereon are both counterbored, as shown in Fig. 11, to receive tightly fitting metal packing rings 19 which overlap the joint formed between the cylinder and its seat, and thus prevent escape of the compressed gases at that point. The upper and lower base sections are, in casting, suitably cored to form crank chambers 20 and 21 separated by double spaced walls 22 and 23, between which latter is formed a substantially rectangular chamber 24 having the double function of a housing for the central journal box of the crank-shaft and a gas-trapping chamber to prevent leakage of the compressed mixture around the journal box. A drain opening 24^b is formed in the bottom wall of the chamber 24 and is closed by a suitable screw plug 24^c. This chamber 24 communicates on opposite sides with the crank chambers 20 and 21 through counterbored circular openings 25 which receive the packing flanges on the ends of the stuffing boxes, as hereinafter more particularly described. On the outer sides of the crank chambers 20 and 21 are formed chambers 26 and 27 similar in function and construction to the chamber 24 and communicating on their in-

ner sides with the crank-chambers 20 and 21 through similar counterbored openings 28 and 29, respectively. The outer side walls of the chambers 26 and 27 have plain openings 30 and 31, respectively, forming supports for the outer ends of the journal boxes contained in said chambers. The upper walls of the crank chambers 20 and 21 have openings 32 and 33, respectively, to accommodate the pitmen 34 (Fig. 11) and permit the mixture undergoing compression to pass into the crank chambers.

Figs. 6–10, inclusive, show in detail a form of journal box adapted to be secured within the chamber 26; the same box, in a shortened form, and with but a single pair of fastening lugs, one on each side, being adapted to the shorter or narrower chambers 24 and 27. This box comprises upper and lower mating sections 35 and 36 having semi-cylindrical bearing surfaces 37 and 38, respectively, and formed with laterally projecting lugs 39 and 40, respectively, that are bored to receive machine screws 41 (Fig. 4) by which said sections are united to each other and to the upper wall of the containing chamber by means of internally threaded bosses, such as 42 on the latter. Beyond the lugs 39 and 40 the journal box sections are rounded, as shown at 43 to fit the round openings in the side walls of their containing chambers; and such rounded ends are provided with laterally projecting packing flanges 44 ground flat on their inner sides, which flanges, as best shown in Fig. 11, form a close joint with the annular shoulders formed by the counterboring of the openings 25, 28 and 29, as also with the outer sides of the outer end walls of the chambers 26 and 27, which latter do not require to be counterbored for the sake of clearance, as do the walls of the crank-chambers. These annular flanges on the ends of the journal boxes are chiefly instrumental in preventing leakage of the compressed gases in the crank-chamber around the journal boxes; and leakage of such gases between the crank-shaft and its journal boxes is guarded against by annular packing strips or washers such as 45 and 46 (Fig. 11). To guard against any relative lengthwise play between the upper and lower sections 35 and 36 of each journal box, I form on the meeting edges thereof coöperating lugs 35^a and notches 36^a, respectively (Fig. 8).

The upper section of each journal box is formed flat (with the exception of the end portions referred to) to fit squarely against the flat upper wall of its containing chamber; and such upper surface is formed with a central oil-duct 47 communicating with one or more oil-distributing grooves 48 (Fig. 10) on the under side of such top wall; the oil-duct 47, in the cases of the journal boxes occupying the chambers 24 and 27, registering with the lower end of a suitable oil-feed pipe 49 which extends through the wall of the upper base frame and is connected by a nipple 50 to a pipe leading from any suitable source of oil supply (not shown). The oil-duct of the journal box occupying the chamber 26 communicates with an integral internally threaded nipple 51 (Fig. 3), to which latter is secured an oil-supply pipe (not shown).

The hollow crank-shaft is shown in Figs. 4 and 11 at 52 and the cranks thereof at 53. To decrease the space in each crank-chamber and thereby effect a higher compression of the mixture, I attach to the crank-shaft by tap-screws 54 a filler-piece 55 which may be cored as shown, for the sake of lightness. The compressed gases pass from the crank-chamber upwardly to the cylinder through an escape port 56 formed in the upper base section (Fig. 5).

The purpose of forming by means of the chambers 24, 26 and 27 a considerable clearance space around three sides of each journal box (as shown in Fig. 4) is to provide between the two end bearings of each journal box in its supports a chamber or space into which so much of the compressed mixture as may find its way through the joints formed by the flanges 44 and the counterbored seats in the side walls of the crank-chambers will be trapped and confined; this entrapped gas in itself forming a sort of cushioned packing which will absorb such leakage as tends to arise at each compressive impulse of the piston, and will in large measure prevent such leakage from passing through the joint at the opposite or outer end of the journal box. I have found by experiment that a cushioning or gas-absorbing packing of this nature is much more efficient to prevent the escape of the gas than a plain cylindrical bearing equipped with ordinary stuffing-box packing. The packing ring 19, countersunk in the cylinder wall opposite the joint between the lower end of the latter and its seat on the base frame, effectively seals the lower end of the cylinder against the escape of gas at that point. From the above it will also be seen that the crank-shaft and its supporting and oiling devices and their accessories are supported from and by the upper section of the base, the lower section affording in part the necessary chamber space and constituting a closure or covering to seal the operating parts from dust, dirt and the like.

The construction described is chiefly intended for and especially applicable to engines used on automobiles and similar motor vehicles; and it will be seen that by simply unbolting and removing the lower section of the base, the shaft and its coöperating parts can be readily gotten at for the pur-

poses of cleaning, renewal, or repairs, etc. The lower portion of each crank-chamber is formed with a small well 57 equipped with the usual drip-cock 58.

I claim:

1. In a two-cycle gas-engine, the combination with a base formed in two longitudinal sections separably united and cored to form a crank-chamber and on either side of the latter a gas-trapping chamber, of longitudinally divided journal boxes in said gas-trapping chambers, means for securing the mating halves of said journal boxes together and to the top walls of said gas-trapping chambers, and a crank-shaft extending through said journal boxes, substantially as described.

2. In a two-cycle gas-engine, the combination with a base formed in two longitudinal sections separably united and cored to form a crank-chamber and on either side of the latter a gas-trapping chamber having a counter-bored circular opening in one of its side walls, of journal boxes in said gas-trapping chambers, the ends of said journal boxes lying in said openings and formed with flanges fitted to the counterbores of said openings, and a crank shaft extending through said journal boxes, substantially as described.

3. In a two-cycle gas-engine, the combination with a base formed in two longitudinal sections separably united and cored to form a crank-chamber and on either side of the latter a gas-trapping chamber having a counter-bored circular opening in one of its side walls, of journal boxes in said gas-trapping chambers and secured to the top walls thereof, the ends of said journal boxes lying in said openings and formed with flanges fitted to the counter-bores of said openings, a crank-shaft extending through said journal boxes, and annular packing strips or washers surrounding said crank-shaft and lying against the ends of said journal boxes, substantially as described.

4. In a two-cycle gas-engine, the combination with a base formed in two longitudinal sections separably united and cored to form a crank-chamber and on either side of the latter a gas-trapping chamber having a counter-bored circular opening in one of its side walls, of journal boxes in said gas-trapping chambers formed with oil-ducts and with flanges fitted to the counter-bores of said openings, a crank-shaft extending through said journal boxes, annular packing strips or washers surrounding said crank-shaft and lying against the ends of said journal boxes, and oil-conducting pipes extending through the top walls of said gas-trapping chambers and communicating with the oil-ducts of said journal boxes, substantially as described.

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