

March 29, 1932.

B. LOEFFLER

1,851,051

MOTOR

Filed Sept. 12, 1929

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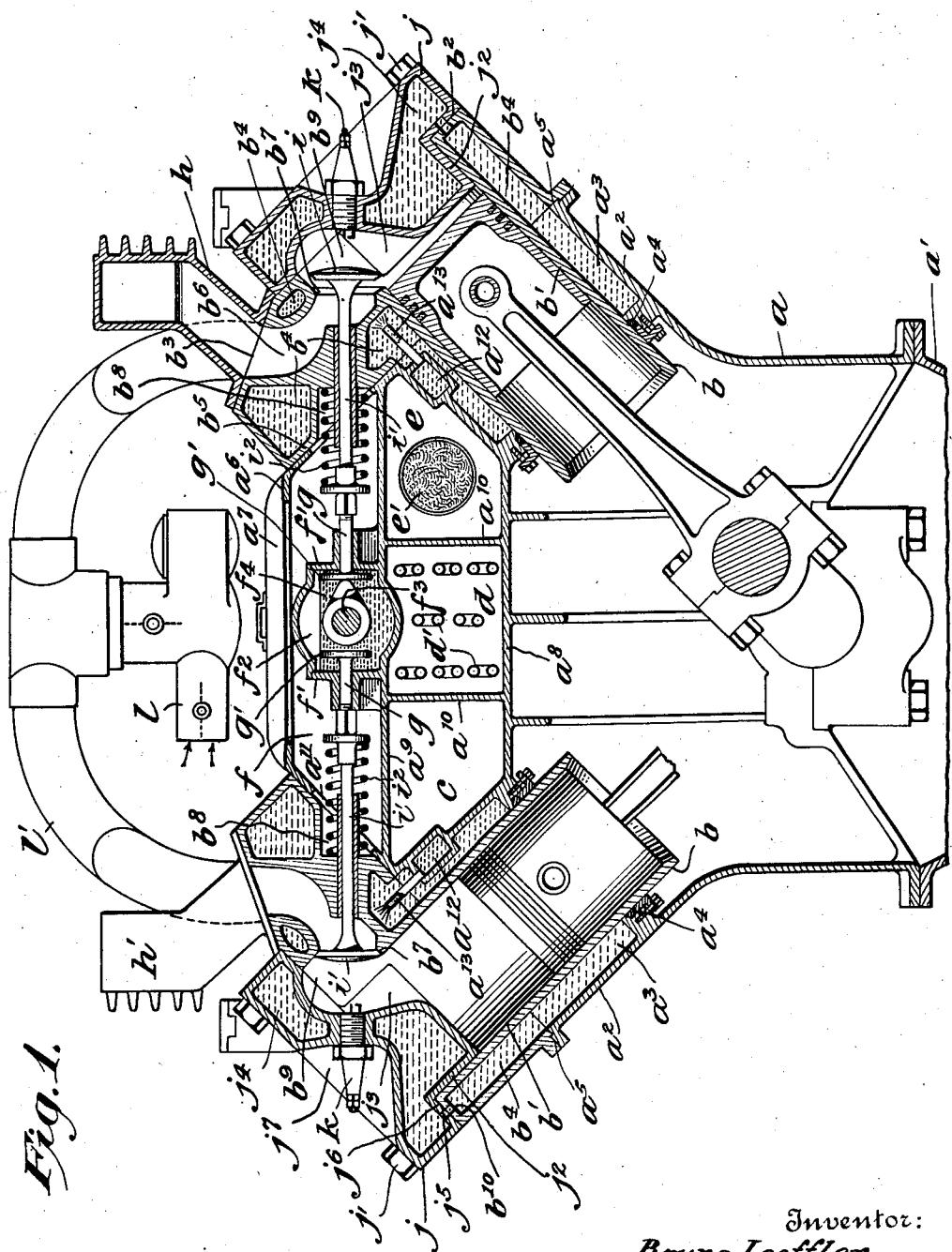


Fig. 1.

Inventor:
Bruno Loeffler

By his Attorneys
Redding, Greely, O'Shea & Campbell

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B. LOEFFLER

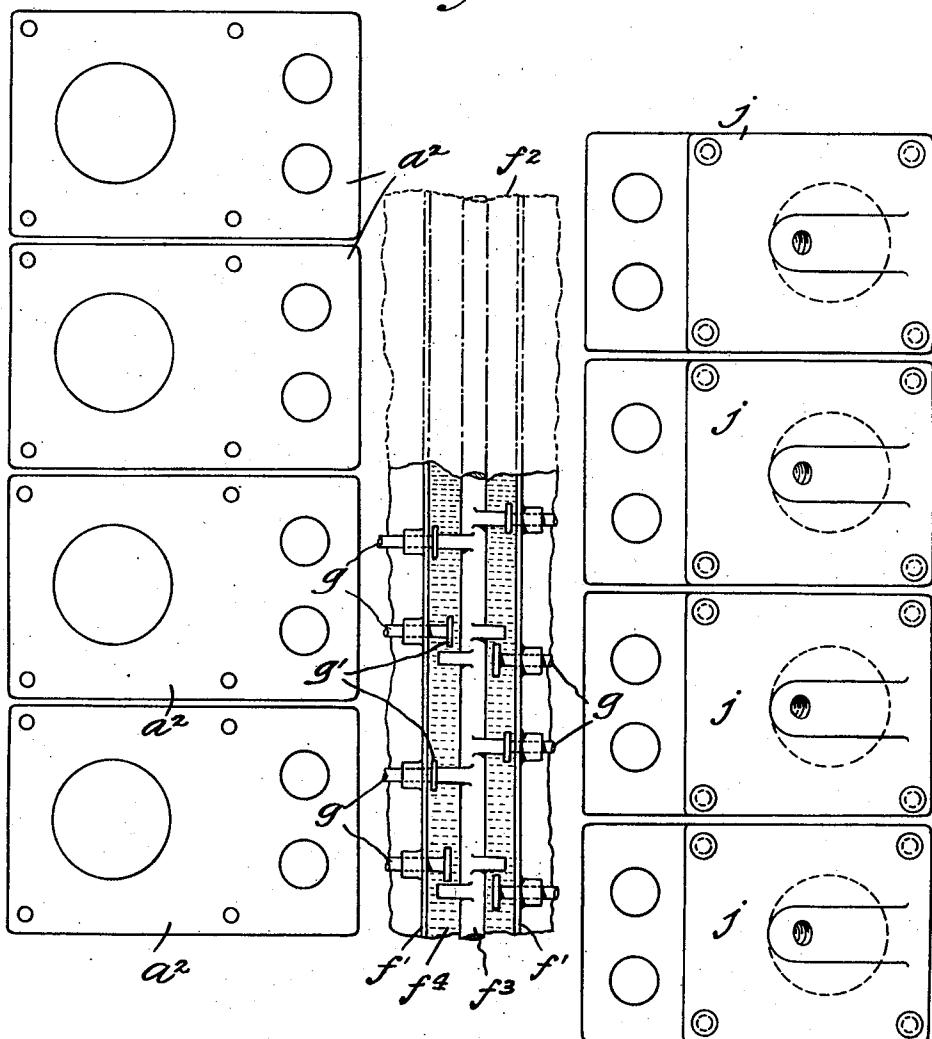
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Fig. 2.



Inventor:

Bruno Loeffler

By his Attorneys
Redding, Greeley, O'Lea & Campbell

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UNITED STATES PATENT OFFICE

BRUNO LOEFFLER, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO INTERNATIONAL MOTOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

MOTOR

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The present invention relates to engines and embodies an improved construction for an internal combustion engine in which the cylinders are independently mounted within a common crank case in such manner that the replacement thereof is facilitated.

In the designs now available, particularly in the construction involving six or more cylinders, the cylinder heads are usually cast in a single piece, the cylinder heads thus being in a single unit for each bank of cylinders, where more than one bank is used.

The complicated mechanism required in the design of such constructions presents a serious disadvantage in the servicing of such engines and, in addition thereto is quite expensive.

An object of the present invention is to provide an improved V-type engine in which the crank case is so constructed as to receive the cylinder castings and cylinder heads individually to facilitate the replacement thereof.

A further object of the invention is to provide a construction of the above character in which the crank case is so formed as to afford greater cooling of the heated portions of the engine than available in existing designs.

30 A further object of the invention is to provide a construction of the above character in which the oil reservoir, oil cooling, and oil cleaning compartments are located between the cylinders of the engine and in which the cam shaft and valve lifter mechanism are housed in an improved manner.

A further object of the invention is to provide a construction of the above character in which the cylinder heads are so constructed as to afford the highest possible efficiency in the burning of the fuel charge in the cylinders.

Further objects, not specifically enumerated above, will be apparent as the invention is described in greater detail in connection with the accompanying drawings, wherein:

Figure 1 is a view in section, taken 50 in a vertical plane extending transversely

through an engine casting constructed in accordance with the present invention.

Figure 2 is a plan view, partly broken away and diagrammatically illustrating the disposition of the valve mechanism with respect to the cylinder castings and heads constructed in accordance with the present invention.

Referring to the above drawings, a indicates a crank case having an oil pan a' . The crank case is formed with outwardly diverging portions a^2 which receive cylinder linings and associated mechanism as described more fully hereinafter. The extensions a^2 are formed of a plurality of housings a^3 , within which cylinder linings b are received. Suitable packing joints a^4 provide a water-tight connection about the cylinder lining and thus afford a tight cooling system.

The outer extensions a^2 are finished along faces a^5 which extend at right angles to the axes of the cylinder liners b . The converging portions of the faces a^5 extend upwardly and merge into a horizontal face a^6 upon which a cover a^7 may be secured.

The lower partition a^8 defines the upper extremity of the crank case and thus provides a compartment between the partition a^8 , upper face a^6 , converging portions of the faces a^5 , and adjacent walls of the extensions a^2 . A horizontal partition a^9 is formed within this compartment and vertical portions a^{10} divide the lower portion of the compartment, defined by the partitions a^8 and a^9 into three compartments c , d , and e . The portion of the main compartment between the upper face a^6 and the partition a^9 forms a compartment f within which the valve mechanism is housed.

The compartment c serves as an oil reservoir, while the intermediate compartment d receives oil cooling mechanism d' and the compartment e carries an oil cleaner e' . In this manner, the entire oiling mechanism is received within these sub-divisions of the main compartment and are in a centralized and effective location.

The upper compartment f , carrying the valve mechanism, is in an effective position, not only for lubrication but also for ready inspection and repair.

Within the compartment f , walls f' form a trough f^2 within which a cam shaft f^3 is received for operating the valve lifting mechanism. The trough f^2 carries an oil bath f^4 , 5 within which the cam shaft f^3 rotates, thus serving to lubricate the mechanism effectively. Valve lifters g are journaled within the opposed walls f' and the heads g' thereof are adapted to be engaged by the respective cams 10 on the cam shaft.

The crank case is constructed to receive a desired number of cylinders in each extension thereof, such extensions being sub-divided into housings a^5 , as described above. 15 These housings are adapted to receive independent cylinder liners which are formed with cylinder walls b' for receiving the pistons. The liners extend upwardly above the plane of the faces a^5 and are finished upon 20 faces b^2 which are parallel to the respective faces a^5 . Faces b^3 lie at angles to the respective faces b^2 and are adapted to receive the manifolds h and h' . The cylinder walls b' are spaced from the outer and inner walls of 25 the liners and form fluid ducts b^4 through which a cooling medium may circulate. The liners are generally L-shaped and are formed with faces b^5 which are seated upon faces a^5 . Within the L-shaped portions of the liners, 30 passages b^6 are provided for carrying the fuel through the cylinder liners to the valves. The ducts b^4 extend around the passages b^6 and the valve seats b^7 in order to cool the heated portions of the liner.

35 A valve i , mounted upon a valve stem i' , is journaled within the L portions of the liner and springs i^2 normally maintain the valves seated. Suitable recesses b^8 are formed in the cylinder liners and cooperate with apertures a^{11} to communicate with the compartment f which carries the valve mechanism.

40 Adjacent the valve seats b^7 , the cylinder liner is cut away at b^9 to provide the desired ignition chamber communicating with the cylinder. Auxiliary ducts a^{12} are formed in the inner walls of the extensions a^2 and communicate with nozzles a^{13} which direct the cooling fluid from such auxiliary ducts upon the hottest portions of the valve seats.

45 Each cylinder liner receives a head j which may be secured to the respective liners by means of bolts j' . The heads are formed with inwardly extending portions j^2 which are received within the upper portion of the cylinder walls b' and terminate adjacent the upper limit of the movement of the pistons. A sufficient clearance between the piston and portion j^2 is maintained, and a cut away portion j^3 is provided for communicating with the duct b^8 in order to provide a combustion chamber of the desired type. The heads are hollow and formed with ducts j^4 within which a cooling fluid is circulated, such ducts communicating with the ducts b^4 through apertures j^5 and b^{10} . Each head is formed with a

finished face j^6 which engages the appropriate face b^2 in order to afford a tight connection. The outer portion of each head is formed with a recess j^7 to receive a spark plug k which is mounted in the desired position with respect to the combustion chamber j^8 . The above construction affords a cylinder head of great depth and correspondingly great strength, the head cooperating with the cylinder to afford a combustion chamber of a highly effective and desirable type, this chamber being formed between the cylinder liner and the head. The resulting construction combines the advantages of an L head engine with that of an over-head type without the use of valve sleeves, thus affording better cooling and easier replacement. The sleeve valve type engine is usually leaky and it is very difficult to maintain tight joints therein. The combustion chamber is directly over the heater and, by recessing the cylinder head into the cylinder, there results a combustion chamber which is partly in the cylinder and partly in the cylinder head, thus affording easy accessibility and ready inspection. A carburetor l is mounted above the upper portion of the crank case and communicates with intake manifolds l' , the positioning of the carburetor at this point thus affording a fresh supply of air with the amount of included oil reduced to a minimum. By maintaining the cam shaft and valve lifters in the oil trough f^2 , adequate lubrication is afforded for such mechanism and the existence of the chamber f between such mechanism and the valve stem bushings prevents oil from leaking into the cylinder through the valve stem mountings. The compartments affording housings for the oil cooler and oil cleaner are conveniently located with respect to the compartment serving as an oil reservoir and the entire mechanism is easy to clean and inspect.

The cylinder liners, as well as the cylinder heads are simple to construct, the ducts therein being formed in such manner that the coring is greatly facilitated, enabling the metal projecting within the walls to be readily cleaned and thus insuring effective circulation of the cooling medium.

What I claim is:

1. An engine comprising a crank case, diverging extensions on the crank case each having a plurality of housings, a plurality of individual cylinder liners seated on the extensions, the liners having cylinder barrels extending coaxially of the respective housings and transverse portions seated on the ends of the extensions, cooling ducts in the transverse portions, valves seated in the transverse portions, cylinder heads mounted on the respective liners and spaced from the extensions thereby, and combustion spaces formed in the adjacent portions of the liners, cylinder heads and extensions therein.

2. An engine comprising a crank case, di-

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verging extensions on the crank case each having a plurality of housings, a plurality of individual cylinder liners seated on the extensions, the liners having cylinder barrels 5 extending coaxially of the respective housings and transverse portions seated on the ends of the extensions, cooling ducts in the transverse portions, valves seated in the transverse portions, and cylinder heads mounted 10 on the respective liners and spaced from the extensions thereby.

3. An engine comprising a crank case, diverging extensions on the crank case each having a plurality of housings, spaced horizontal partitions in the crank case between the extensions, a lubricant trough in the compartment between the partitions and mounted on one of the partitions, valve operating mechanism in the trough, valve lifters journaled in the walls of the trough, removable cylinder liners mounted in the extensions, and valves journaled in the liners and operated by the lifters. 15

4. An engine comprising a crank case, diverging extensions on the crank case each having a plurality of housings, spaced horizontal partitions in the crank case between the extensions, valve mechanism in the compartment between the partitions, and cylinder liners carried by the extensions and communicating with the compartment to receive the valve mechanism. 20

5. An engine comprising a crank case, diverging extensions on the crank case each having a plurality of housings, spaced horizontal partitions in the crank case between the extensions, and vertical partitions between the horizontal partitions forming closed compartments. 25

40 6. An engine comprising a crank case, diverging extensions on the crank case each having a plurality of housings, the extensions terminating in converging planes at right angles to the axes of the respective extensions, compartments in the crank case between the extensions and within the converging portions thereof, individual cylinder liners in the housings, means to secure the liners independently to the extensions, and individual cylinder heads on the respective liners. 30

7. An engine comprising a crank case, an extension on the crank case having a housing, an L-shaped cylinder piece comprising a portion engaging the housing and forming a continuation thereof, an inner liner spaced from the housing, means affording a closed duct between the liner and housing, a fuel passage in the L portion of the liner, a valve port in the liner communicating with the passage, a head mounted on the liner, a combustion space in the head adjacent the port, and communicating ducts in the head and liner. 35

8. An engine comprising a crank case, an extension on the crank case having a housing, an L-shaped cylinder piece comprising a portion engaging the housing and forming a continuation thereof, an inner liner spaced from the housing, means affording a closed duct between the liner and housing, a fuel passage in the L portion of the liner, a valve port in the liner communicating with the passage, a head mounted on the liner, and a combustion space in the head adjacent the port. 40

9. An engine comprising a crank case, an extension on the crank case having a housing, a cylinder piece comprising a portion engaging the housing and forming a continuation thereof, an inner liner spaced from the housing, means affording a closed duct between the liner and housing, a fuel passage in the liner, a valve port in the liner communicating with the passage, a head mounted on the liner, and a combustion space in the head adjacent the port. 45

10. An engine comprising a crank case, an extension on the crank case having a housing, a cylinder piece comprising a portion engaging the housing and forming a continuation thereof, an inner liner spaced from the housing, means affording a closed duct between the liner and housing, a valve port in the liner, a head mounted on the liner, and a combustion space formed in the head. 50

This specification signed this 6th day of Sept., A. D. 1929.

BRUNO LOEFFLER.

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