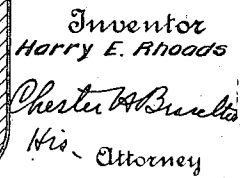


1,410,125.

Fig. II.



UNITED STATES PATENT OFFICE.

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OIL PUMP.

1,410,125.

Specification of Letters Patent. Patented Mar. 21, 1922.

Application filed November 11, 1918. Serial No. 281,963.

To all whom it may concern:

Be it known that I, HARRY E. RHOADS, a citizen of the United States of America, residing at Toledo, Lucas County, State of Ohio, have invented certain new and useful Improvements in Oil Pumps, of which I declare the following to be a full, clear, and exact description.

This invention relates to a novel type of pump construction and pump operating means for the lubricating system of an internal combustion engine. The objects of the invention are to provide a novel, simplified pump construction and to a novel supporting arrangement therefor in which certain parts including certain oil conduits and piston cylinder, for example, may, if desired, be cast integrally with a portion of the crank casing of the engine to provide a simple method of making these parts, the invention contemplating, however, as suggested, a novel arrangement of pump valves and operating piston regardless of the feature referred to of casting certain of the conduits and the cylinder for the plunger integral with the casing for the engine. Further objects of the invention are to provide a novel and simplified means for operating a pump in an internal combustion engine, by actuating the same by a cam or eccentric connection to the engine valve operating shaft—such as the cam shaft in a poppet valve engine, or the eccentric shaft in a sliding sleeve type of engine.

Further objects of the invention are to provide a pump for the lubricating system of an internal combustion engine, which is particularly simple in construction and in which the assembly and disassembly of the mechanism may be readily facilitated. This invention further contemplates the provision of a mechanism of the character referred to, in which the number of parts are reduced to a minimum, and the cost of production is thereby materially decreased; the invention thus having for its broad object to provide a simple and efficiently operating pump for the purpose specified.

Further objects of the invention relate to economies of manufacture as to the details of construction as will hereinafter appear from the detailed description to follow. I accomplished the object of my invention in one instance by the devices and means described in the following specifica-

tion, but it is evidenced that the same may be varied widely without departing from the scope of the invention, as pointed out in the appended claims. A structure constituting one embodiment of my invention, which may be the preferred, is illustrated in the accompanying drawing forming a part hereof, in which:

Fig. I is a cross-sectional view partly in elevation of an engine with my novel type of pump and pump operating means disclosed therein.

Fig. II is a large sectional view of the valve chamber and means for retaining a portion of the plunger operating mechanism therein.

Fig. III is a sectional view taken on the line III—III of Fig. II.

Referring in detail to the particular embodiment of the invention illustrated herein, the cylinder 10 is shown as supported on the upper portion of the crank case 12, the lower portion 13 of the crank case being secured thereto in a manner well known in the art. The crank shaft 14 of the engine is illustrated as operating the connecting rod 15 for the piston and the valve operating shaft 17, which in the case of a poppet valve is a cam shaft and in the case of a sliding sleeve type of valve is usually termed an eccentric shaft, constitutes in the present instance the operating means for driving the novel pump provided herein. The valve operating shaft 17 may be driven in any suitable manner as by connections with the crank shaft 14 as is well understood.

The crank casing 12 may be provided with a cylinder 19, which if desired, may be cast integrally with said crank casing. Moreover there may be provided an integral downwardly extending oil conduit 20 also cast integrally with the crank casing 12. It is to be understood, however, that the cylinder 19 and the conduit 20 may be in the form of separate pipes secured in any desired manner in the proper location within the crank casing 12. The cylinder 19 may terminate in an enlarged valve chamber 22 as is clearly shown in the drawing and any suitable means such as a screw threaded plug 23 may be used to close the outer end thereof. The inner portion of the enlarged valve chamber 22 may be provided with a transverse diaphragm or plate 25 provided with an opening 26 therein leading to the

cylinder 19 with which is connected the conduit 20. The transverse partition 25 is adapted to form a valve seat 28 cooperating with which is the valve 29 normally held seated by a spring 30. The spring 30 may be supported and carried by an inwardly directed cup 31 carried by the closure plug 23. In the particular type shown the valve 29 may be made in the form of an inverted cup to fit over and slide on the projection 31 on the plug 23. Extending horizontally from the valve chamber 22 is a second oil conduit 33, which may either lead to the various bearings to be lubricated or to an oil receiving reservoir from which the oil may be distributed to the various bearings by gravity.

The conduit 20 may be provided with an extension 20' in the form of a tube secured to the conduit 20 as by bolts, terminating adjacent to the lower portion of the crank casing 13. The extension 20' carries the oil pump 35 provided with a screen 36 and the plate 35' is adapted to form a valve seat 37 for the ball valve 38 located therein. It is evident, however, that any other form of check valve may be substituted for that illustrated in this part of the construction.

Within the cylinder 19 is located the plunger 40 adapted to be reciprocated in one direction or maintained in operative position by the coiled spring 41 bearing at one end against one end of the plunger 40 and at the other end against the transverse partition or plate 25 as is clearly illustrated in the drawing. The opposite end of the plunger 40 is maintained by the spring 41 in contact with a suitable cam 42 secured to the valve operating shaft 17. It will be seen that, upon a rotation of the valve shaft 17, the cam 42 operates to reciprocate the plunger 40 in the direction opposite to that in which the plunger is moved by the spring 41 in maintaining the same in contact with the cam.

Operation of the entire mechanism will, it is believed, be readily understood from the foregoing description. The plunger when reciprocated operates to raise oil from the bottom of the crank case which constitutes an oil reservoir past the valve 38 and forces the same up the conduits 20' and 20 past the valve 29 and through the oil conduit 33 to be distributed to the various bearings of the engine or to an oil reservoir and hence distributed to the bearings by gravity, the valves operating automatically as will be readily understood.

In assembly of the pumping mechanism it will be seen that the plunger 40 is located in the transversely arranged cylinder 19 and may be readily inserted therein, the spring being placed behind the plunger 40 and the transverse partition 25 then screwed home into proper place at the end of the valve chamber. The valve 29 is then put in place

and the plug 23 carrying the retaining means for the spring 30 of the valve 29, is then screwed home and the device is assembled. By a reverse of these operations the entire mechanism may be readily withdrawn for the purpose of cleaning or repair as may be necessary. The oil extension conduit 20' carrying the valve 38 and the oil receiving terminal 35 may be readily detached from the conduit 20 when the lower portion of the crank casing 13 has been removed, and the assembly of this portion of mechanism is likewise readily accomplished.

While I have described my invention in more or less detail and as being embodied in certain forms, I do not desire or intend to be limited thereto, as on the contrary, my invention contemplates broadly all proper changes in form, construction, and arrangement of the parts as well as the omission of immaterial elements, and the substitution of equivalents therefor as circumstances may suggest, or necessity render expedient.

Having thus described my invention, what I desire to secure by Letters Patent of the United States is:

1. In a pumping mechanism for the lubricating system of an internal combustion engine, the combination of a horizontally arranged cylinder, a valve chamber located adjacent one end of said cylinder, a perforated partition between said valve chamber and said cylinder adapted to form a valve seat, a plunger in said cylinder operated in one direction from an element of the internal combustion engine, a spring bearing against this partition for moving said plunger in the opposite direction, and a conduit extending from said cylinder to the bottom of the crank casing.

2. In a pumping mechanism for the lubrication of an internal combustion engine, the combination of a horizontally arranged cylinder, a valve chamber, a perforated partition located between said cylinder and said valve chamber, a valve therefor, an oil passage including said valve chamber whereby oil may be delivered therethrough from the crank casing of the engine and carried to the bearings thereof, a second valve therein, and a plunger in said cylinder adapted to be reciprocated to operate said valves.

3. In a pumping mechanism for lubricating an internal combustion engine, the combination of a horizontal cylinder cast integrally with the crank casing of an engine, a valve chamber integral with said casing and connected with said cylinder, a perforated partition in an end of said valve chamber and between said valve chamber and said cylinder, a conduit integral with said crank casing connected to the said cylinder on the opposite side of said partition from said valve chamber, a plunger in said cylinder and a valve in said valve chamber, and a

valve associated with said conduit, each of said valves adapted to be operated by said plunger whereby oil may be raised from the bottom of the crank casing and delivered through said conduit so as to be distributed to the bearings of said engine.

4. In a pumping system for internal combustion engines, a cylinder cast integral with the crank casing of the engine, a valve chamber integral therewith, and constituting an enlargement of said cylinder, a perforated partition removably secured to the inner end of said valve chamber and dividing said cylinder therefrom, a conduit connecting said cylinder with the bottom of the crank case of the engine, a cap for closing said valve chamber, said cap being provided with means to retain a valve in position in front of the perforation in said partition, and a spring between said valve and said cap for normally closing said valve.

5. In a pumping mechanism for an internal combustion engine, a plunger cylinder cast integral with the crank casing, an oil passage for conducting oil from the crank casing so as to be distributed to the bearings of the engine, said passage including a portion cast integrally with said crank casing, said passage adapted to receive a plurality of valves and said cylinder adapted to receive a plunger for operating said valves.

6. In a lubricating pumping system for an internal combustion engine, the combination of an aligned cylinder and valve chamber formed in the crank case casting, an annular valve seat element mounted at the intersection of said cylinder and valve chamber, a plunger in said cylinder, a coiled spring in said cylinder arranged to bear against said plunger and said annular valve seat element, a valve in said valve chamber adapted to fit said seat, and a cap for the outer end of said valve chamber.

7. In a lubricating pumping system for an internal combustion engine, the combination of an aligned cylinder and valve chamber formed in the crank case casting, an annular valve seat element mounted at the intersection of said cylinder and valve chamber, a plunger in said cylinder, a coiled spring in said cylinder arranged to bear against said plunger and said annular valve seat element, a valve in said valve chamber adapted to fit said seat, and a cap for the outer end of said valve chamber, said cap carrying a guiding and supporting member for said valve.

8. In a lubricating pumping system for an internal combustion engine, the combination of an aligned cylinder and valve chamber formed in the crank case casting, an annular

valve seat element mounted at the intersection of said cylinder and valve chamber, a plunger in said cylinder, a coiled spring in said cylinder arranged to bear against said plunger and said annular valve seat element, a valve in said valve chamber adapted to fit said seat, and a cap for the outer end of said valve chamber, said cap carrying an inwardly extending hollow support arranged to telescope with the sides of said valve for supporting and guiding the latter, and a spring mounted in said hollow support and engaging said valve.

9. In a lubricating pumping system for internal combustion engines, the combination of an aligned cylinder and valve chamber formed in the crank case casting, a partition at the intersection of said cylinder and chamber, said partition having a perforation therethrough and a valve seat surrounding said perforation on the chamber side, a plunger in said cylinder, a coiled spring therein between said plunger and partition, a valve in said valve chamber adapted to co-operate with said valve seat, and a cap for the outer end of said valve chamber.

10. In a lubricating pumping system for internal combustion engines, the combination of an aligned cylinder and valve chamber formed in the crank case casting, a partition at the intersection of said cylinder and chamber, said partition having a perforation therethrough and a valve seat surrounding said perforation on the chamber side, a plunger in said cylinder, a coiled spring therein between said plunger and partition, a valve in said valve chamber adapted to co-operate with said valve seat, and a cap for the outer end of said valve chamber, said cap carrying supporting and guiding means for said valve.

11. In an oil pump, a casting containing two aligned bores extending inwardly from one wall of the casting, the outer bore being of larger diameter than the inner, a partition at the intersection of said bores, said partition having a perforation therethrough and a valve seat surrounding said perforation on the side toward the larger bore, a plunger and an operating spring mounted in said smaller bore, said spring being interposed between the plunger and said partition, a valve in the larger bore adapted to co-operate with said valve seat, and a cap for the outer end of said larger bore whereby the cap, valve, partition, spring and plunger may be removed in the order named through the outer end of the larger bore.

In testimony whereof, I affix my signature.

HARRY E. RHOADS.