H. P. WOODWORTH.

OILING SYSTEM.

APPLICATION FILED DEC. 12, 1919.

1,393,875.

Patented Oct. 18, 1921.

2 SHEETS—SHEET 1.

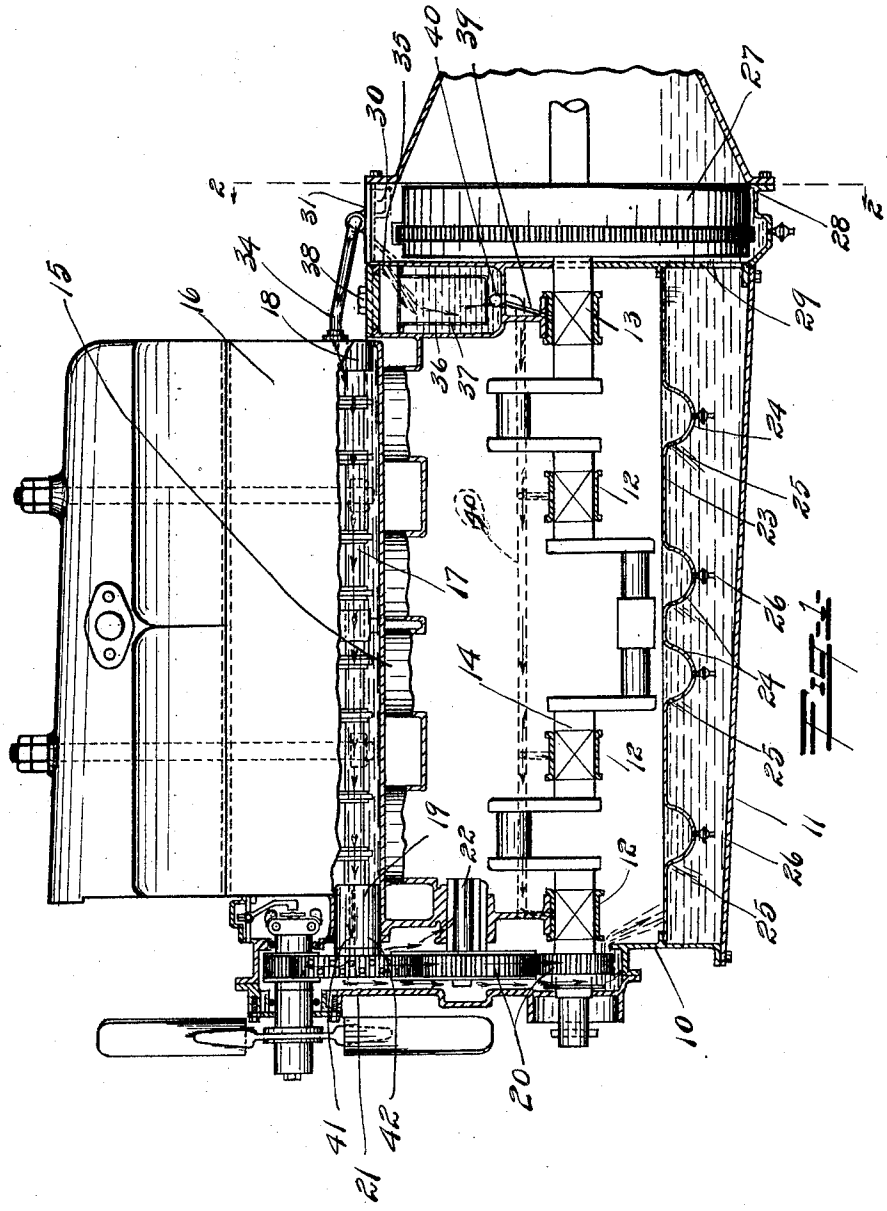


Fig. 1.

Inventor

Howard P. Woodworth.

By Munn & Fearman.

Attorneys.

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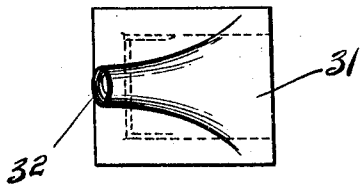


Fig. 3.

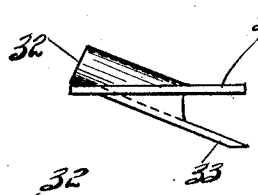


Fig. 5.

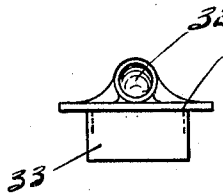


Fig. 4.

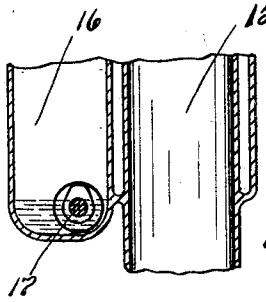


Fig. 6.

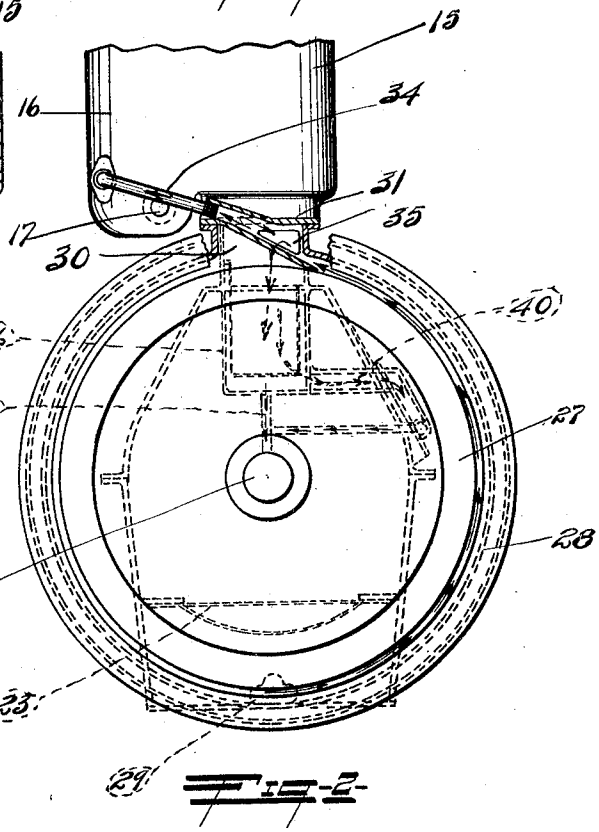


Fig. 2.

Inventor
Howard P. Woodworth.
By Munn & Fairman
Attorneys

UNITED STATES PATENT OFFICE.

HOWARD P. WOODWORTH, OF BAY CITY, MICHIGAN.

OILING SYSTEM.

1,393,875. Specification of Letters Patent. Patented Oct. 18, 1921.

Application filed December 12, 1919. Serial No. 344,390.

To all whom it may concern:

Be it known that I, HOWARD P. WOODWORTH, a citizen of the United States of America, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Oiling Systems, of which the following is a specification.

The present invention relates to oiling systems adapted particularly for use in internal combustion engines.

An object of the present invention is to provide an oiling system which may be embodied in the construction of an internal combustion engine and wherein the fly wheel of the engine may be used for circulating a supply of oil and insuring the proper lubrication of the engine when in motion.

Another object of the invention is to provide an oiling system wherein at the initial running of the engine the main bearings will be first lubricated, and wherein the minor bearings will be subsequently supplied with the lubricant.

A further object of the invention is to provide an oil containing casing for the fly wheel, the casing having a sight opening in the top thereof for inspection of the fly wheel in timing the engine, and to provide a closure for the inspection opening which carries a collecting device for gathering lubricant from the fly wheel for distribution throughout the oiling system.

The above, and various other advantages and objects of this invention will in part be described in, and in part be undertsood from the following detailed description of the present preferred embodiment, the same being illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation, partly in section, of an internal combustion engine constructed with an oiling system according to the present invention.

Fig. 2 is a transverse section through the same taken on the line 2—2 of Fig. 1.

Fig. 3 is a detail top plan view of the combined cover plate and scoop employed.

Fig. 4 is an end elevation of the same, and

Fig. 5 is a side elevation of the combined cover plate and scoop.

Fig. 6 is a fragmentary sectional view showing the oil in the cam shaft pocket.

Referring now to the drawings, 10 designates the crank case of an internal combustion engine having a bottom 11 and end and intermediate bearings 12 and 13 for supporting a crank shaft 14. The crank case 10 carries cylinders 15 of any suitable construction and a receptacle 16 extending along one side of the cylinders, and in which a cam shaft 17 is mounted. Bearings 18 and 19 support the cam shaft and suitable timing gears 20 connect the crank and cam shafts 14 and 17 and are inclosed within a sealed casing 21 mounted upon the forward end of the engine. The crank case 10 has one or more bearings 22 for supporting the one or more intermediate timing gears 20.

Spaced above the bottom of and within the crank case 10 is a false bottom or pan 23 which may extend the entire length of the crank case, and which is provided with depressions or cups 24 opposite the cranks of the shaft 14 and which have overflow openings 25 leading to the crank case beneath the pan 23. Drain cocks 26 are also provided at the bottom of the cups 24 for emptying the latter into the crank case when desired. The flywheel 27 of the engine is mounted in the usual manner on the rear end of the crank shaft 14, and is inclosed in a sealed casing 28 which communicates with the rear end of the crank case 10 through an opening 29 in the same.

To facilitate inspection of the flywheel 27 for timing the engine, the casing 28 is provided at its top with an opening 30, and the opening 30 is adapted to be closed by a cover plate 31 which is detachably secured to the casing 28.

The cover plate 31, as best seen in Figs. 3, 4 and 5, is relatively flat and provided with a nipple 32 on its upper side which is inclined toward one end of the plate and opens downwardly therethrough to communicate with the top of the fly wheel casing 28. The plate 31 has upon its under side a scoop or lifting flange 33 inclining toward the fly wheel 27 and adapted to lie close thereto but out of contact therewith. The scoop 33 is inclined at substantially the same angle as is the nipple 32 and is adapted to deliver lubricant raised from the fly wheel to the nipple as the engine gathers speed. The scoop 33 is removable with the plate 31 to admit access to the fly wheel and for the timing of same.

A feed pipe 34 is connected at one end, detachably, to the nipple 33 and at its other end to the tank 16 at a point above the bottom thereof for delivering the oil or lubri-

cant to the tank. The top of the flywheel casing 28 has a lateral opening or passage 35 which opens into the rear end of the crank case 10, and a receptacle 36 is located within the top of the crank case beneath the opening 35 to receive the lubricant. The receptacle 36 is provided with a removable strainer 37 into which the lubricant is directly deposited, the strainer being removable through the top of the crank case by first removing a plug 38. An oil duct 39 leads from the bottom of the receptacle 36 to the adjacent crank shaft bearing 13 to supply the lubricant thereto, and a branch duct 40 also leads from the bottom of the receptacle 36 to the side of the crank case 10, being carried along the side of the crank case and branching inwardly to lubricate the other bearings 12 in the crank case. It is of course understood that the duct 40 may be extended to various other bearings which may be placed in or about the crank case.

The forward bearing 19 of the cam shaft is positioned through the front wall of the tank 16 and is provided with a passage or duct 41 extending through the bearings to carry the lubricant from the tank to the gears 20, and the top gear may be provided with distributing openings 42 formed radially therein for feeding the lubricant to the intermeshing gears the excess lubricant flowing downwardly over the gears and intermediate bearing 22, and thence upon the pan of the false bottom 23 of the crank case. The excess lubricant in the bearings 12 and 13 also flows onto the pan and fills the cups 24.

In operation, oil is placed in the bottom of the crank case and the bottom of the intercommunicating fly wheel housing or casing 28, and when the engine is first started, the fly wheel 27, a portion of which is immersed in the lubricant, raises the same to the top of the casing and the lubricant on the peripheral surface of the fly wheel is caught by the scoop 23 and elevated into the top of the casing 28, the lubricant flowing from the scoop through the opening 35 and into the receptacle 36. From the receptacle 36 the lubricant is fed by gravity through the ducts 39 and 40 to the main bearings of the engine, thus insuring lubrication of the main bearings as soon as the engine is set in motion.

When the engine is operated at increased speed centrifugal force causes the lubricant to flow upwardly over the scoop 33 and into the nozzle 32, and as the area of this nozzle is limited the remainder will be diverted into the oil pocket through the opening 35, in this manner the lubricant is directly applied to the cam shaft 17 and its bearings 18 and 19, the lubricant being conducted through the bearings 19 to the gears 20 as above set forth. The pan 23 collects the lubricant flowing from the bearings and the cups 24 are arranged beneath the crank portions of the shaft 14 to supply oil to the connecting rod bearings as the latter are dipped into the cups as the crank shaft revolves. Excess lubricant in the cups flows through the overflow openings 25 into the bottom of the crank case and is returned to the fly wheel casing.

It is important when the engine is started and running on low speed to first supply the lubricant to the main bearings, and this I accomplish in the present system, the oil being caught by the scoop and directed upwardly, the centrifugal force of the flywheel however is not sufficient to force the oil into the tank 16 when the engine is running on low speed, the oil therefore flows into the oil screen and thence to the main bearings, but as the speed of the engine is increased, the oil is driven higher to the cam shaft and other parts upon which stress and strain are practically negligible during the slow running of the engine, and I wish to call attention to the fact that the tank 16 forms a natural oil pocket in which oil is contained at all times.

It is of course understood that the system above described may be modified within the scope of the following claims to adapt the system to various types of engines without departing from the spirit of this invention.

What is claimed is:

1. In an oiling system for internal combustion engines, the combination of a crank case having the usual bearings therein and a crank shaft, a fly wheel on the crank shaft, a casing inclosing the fly wheel and communicating with the crank case, oil ducts carried by crank case leading to the bearings, a cam shaft connected to the crank shaft, other oil ducts leading to the cam shaft, and collecting means associated with the fly wheel for collecting lubricant therefrom and delivering the lubricant to all of said ducts.

2. In an oiling system for internal combustion engines, the combination with a crank case, a crank shaft having bearings in the crank case, a fly wheel on the crank shaft, a cam shaft connected to the crank shaft and bearings for the cam shaft, a casing for the fly wheel adapted to contain a lubricant, collecting means arranged at the top of the fly wheel casing for removing lubricant therefrom, ducts leading from the collecting means to the bearings of the crank shaft and other ducts leading from the collecting means to the cam shaft and its bearings.

3. In an oiling system for internal combustion engines, the combination with a crank case, a crank shaft having bearings in the crank case, a fly wheel on the crank shaft, and a cam shaft having bearings above the crank

case and connected to the crank shaft, a tank arranged above the crank case about the cam shaft and its bearings, a casing for the fly wheel, a collector arranged in the fly wheel casing for removing oil therefrom, ducts leading from the collector to the bearings of the crank shaft for supplying oil thereto, ducts leading from the collector to the tank for raising oil into the tank to lubricate the cam shaft and its bearings.

4. In an oiling system for internal combustion engines, the combination of a crank case, a crank shaft having bearings in the crank case, a fly wheel on the crank shaft, a tank arranged above the crank case, a cam shaft journaled in the tank, gears connecting the cam shaft with the crank shaft, a casing inclosing the gears, a collector arranged above the fly wheel for removing lubricant therefrom, ducts leading from the collector to the crank shaft bearings to supply lubricant thereto at all speeds of the engine, a second duct from the collector to the cam for raising oil to the tank at higher speeds of the engine, the bearing of the cam shaft and the said gears having passages therein to receive lubricant from the tank and for returning excess lubricant to the crank case, and cups arranged in the crank case beneath the crank portions of the crank shaft for lubricating the crank portions.

5. In an oiling system for internal combustion engines, the combination of a crank case, a crank shaft having bearings in the crank case, a fly wheel on the shaft, a casing for the fly wheel adapted to contain oil, a cover plate removably mounted on the top of the fly wheel casing and having a scoop adapted to project into close proximity to the fly wheel for collecting oil therefrom and having a nipple opening through the cover plate about the scoop, said fly wheel casing having an opening therein above the scoop leading into the crank case for receiving oil at all speeds of the engine, a receptacle arranged in the top of the crank case beneath said opening to receive oil from the scoop, ducts leading from the receptacle to the bearings of the crank shaft, a tank arranged above the crank case, a cam shaft in the tank, and a duct leading from said nipple to the tank for delivering oil from the scoop to the tank when the engine is operated at normal speed.

6. In an oiling system for internal combustion engines, the combination of a crank case, a tank mounted above the crank case, a crank shaft in the crank case, a cam shaft in the tank, gears connecting the shafts, a casing inclosing the gears and opening into the crank case, a fly wheel for the crank shaft, a casing for the fly wheel adapted to contain oil to be lifted by the fly wheel a plate for closing the top of the fly wheel casing, a collector carried by the plate for collecting oil from the fly wheel, a receptacle communicating with the collector to receive oil therefrom, ducts leading from the receptacle to the crank shaft to oil the same, and a duct leading from the collector to the tank for supplying oil to the cam shaft and to said gears.

7. In an oiling system for internal combustion engines, the combination of a crank casing, a crank shaft in the casing, a fly wheel on the crank shaft, a casing for the fly wheel adapted to contain a lubricant and having an opening near its top communicating with the crank case, a cover plate for the casing provided with a scoop adapted to collect oil from the fly wheel and deliver the oil to said opening, a receptacle in the crank case for receiving the oil from the opening, a strainer detachably mounted in the receptacle for directly receiving the oil, a removable plug in the top of the crank case over the strainer to allow removal thereof, and ducts leading from the receptacle to the bearings of said crank shaft.

8. In an oiling system for internal combustion engines, the combination of a crank case, a crank shaft in said case, a fly wheel on the crank shaft, a casing for the fly wheel communicating at its top and bottom with the crank case and adapted to contain oil, a collector arranged in the top of the casing to remove oil from the fly wheel and direct the oil into the top of the crank case, means in the crank case for receiving the oil and directing it to the crank shaft, means in the bottom of the crank case for catching excess oil from the crank shaft and delivering the oil to the crank portions thereof, a cam shaft above the crank case, and means associated with the collector for delivering a quantity of the oil collected to the cam shaft.

In testimony whereof I affix my signature.

HOWARD P. WOODWORTH.