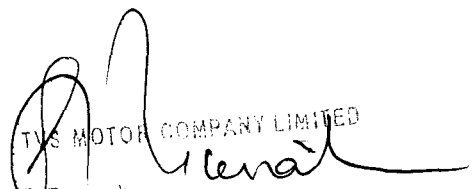


ABSTRACT

The present subject matter relates to a drive system for a lubrication pump comprising a first interlocking member **3** operatively engaged with a second interlocking member **1** through a lantern wheel **5** wherein the first interlocking member **3** is driven by the drive received from the lantern wheel **5**. The drive system is simple, compact, inexpensive and light weight.

ABSTRACT TO BE ACCOMPANIED WITH FIG. 3


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We claim:

1. A drive system located inside a crankcase **7** of a four cycle internal combustion engine and configured to drive a lubrication pump, comprising:

5 a rotatable first interlocking member **3** mounted on a lubrication pump shaft **4**,

 a rotatable second interlocking member **1** mounted on a clutch shaft **15** of a four cycle internal combustion engine,

 a lantern wheel **5** interposed between and continuously engaged
10 with the first interlocking member **3** and the second interlocking member **1**,

 wherein the first interlocking member **3** is driven by the drive received from the lantern wheel **5**, and drives the lubrication pump connected to the first interlocking member **3** and located away from the clutch shaft **15**.

15 2. The drive system as claimed in claim 1, wherein the lantern wheel **5** is mounted on, or connected to, a lantern wheel shaft **8**.


3. The drive system as claimed in claim 2, wherein the lantern wheel shaft **8** is rotatably supported on a protruding portion **11** of a holder plate **6** fixed to a crankcase **7**.

20 4. The drive system as claimed in claim 1, wherein the lantern wheel is disposed at a side of, and internal to, the crankcase **7**.

5. The drive system as claimed in claim 1, wherein the first interlocking member **3** and the second interlocking member **1** are sprockets.
6. The drive system as claimed in any of the preceding claims, wherein the internal combustion engine powers an automotive vehicle.

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Dated this **1 AUG 2014** day of 20


TWS MOTOR COMPANY LIMITED
S. Ramiah
Member-P.S.I.

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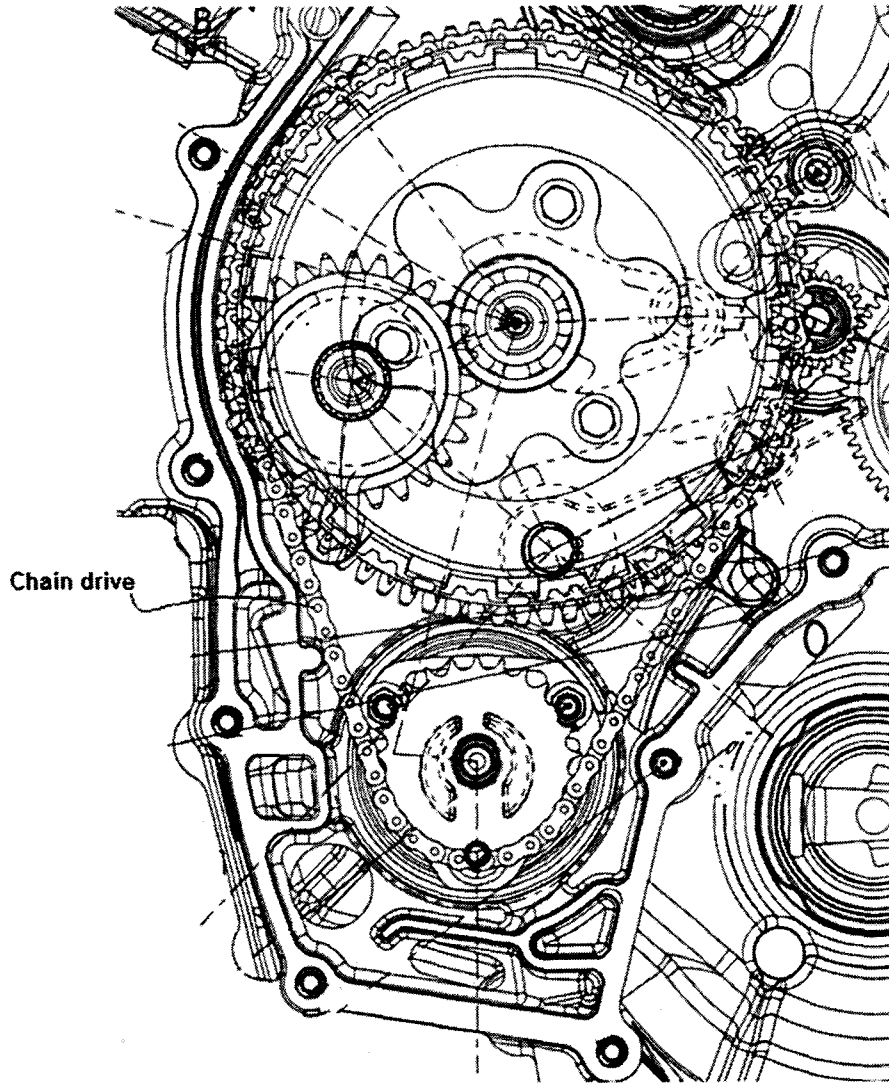


FIG. 1

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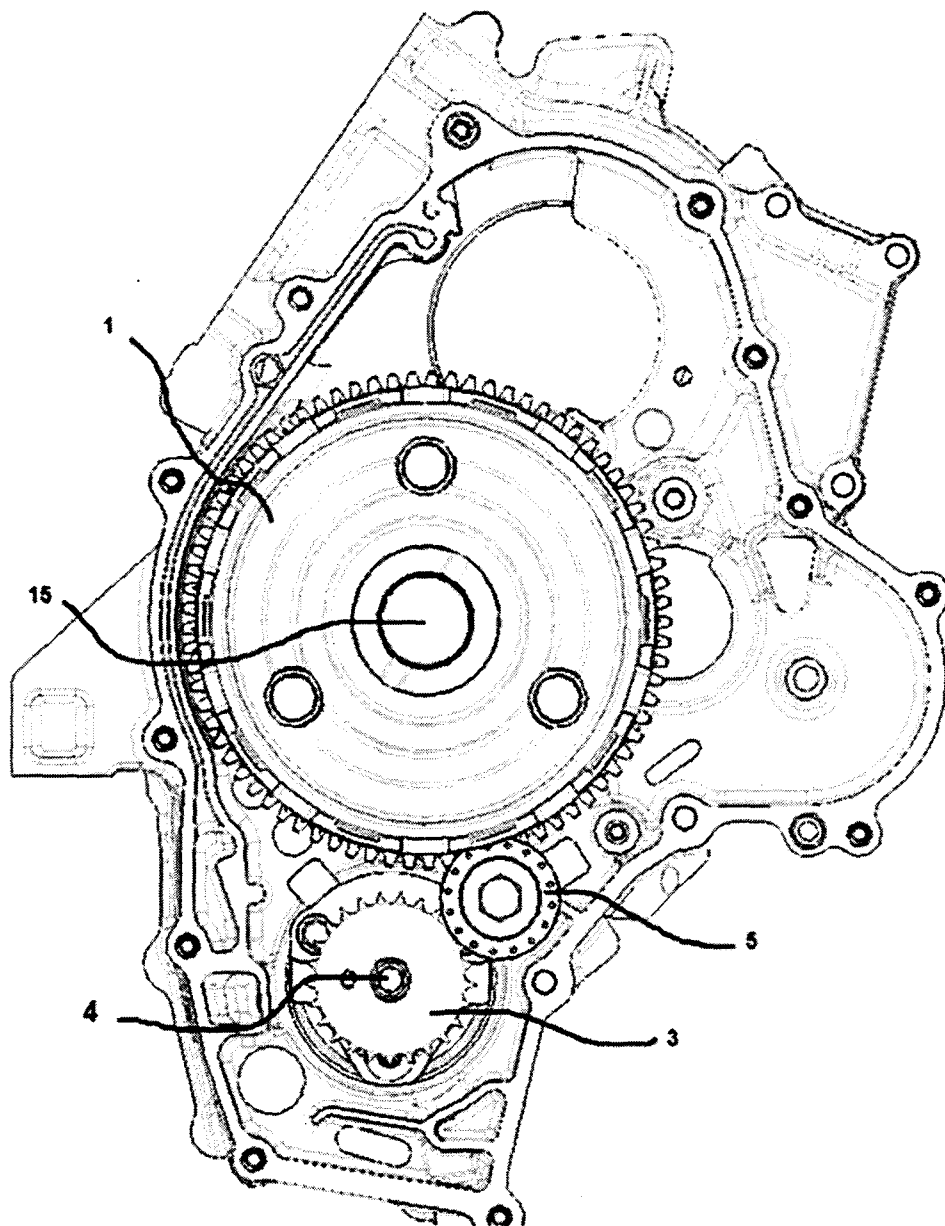


FIG. 2

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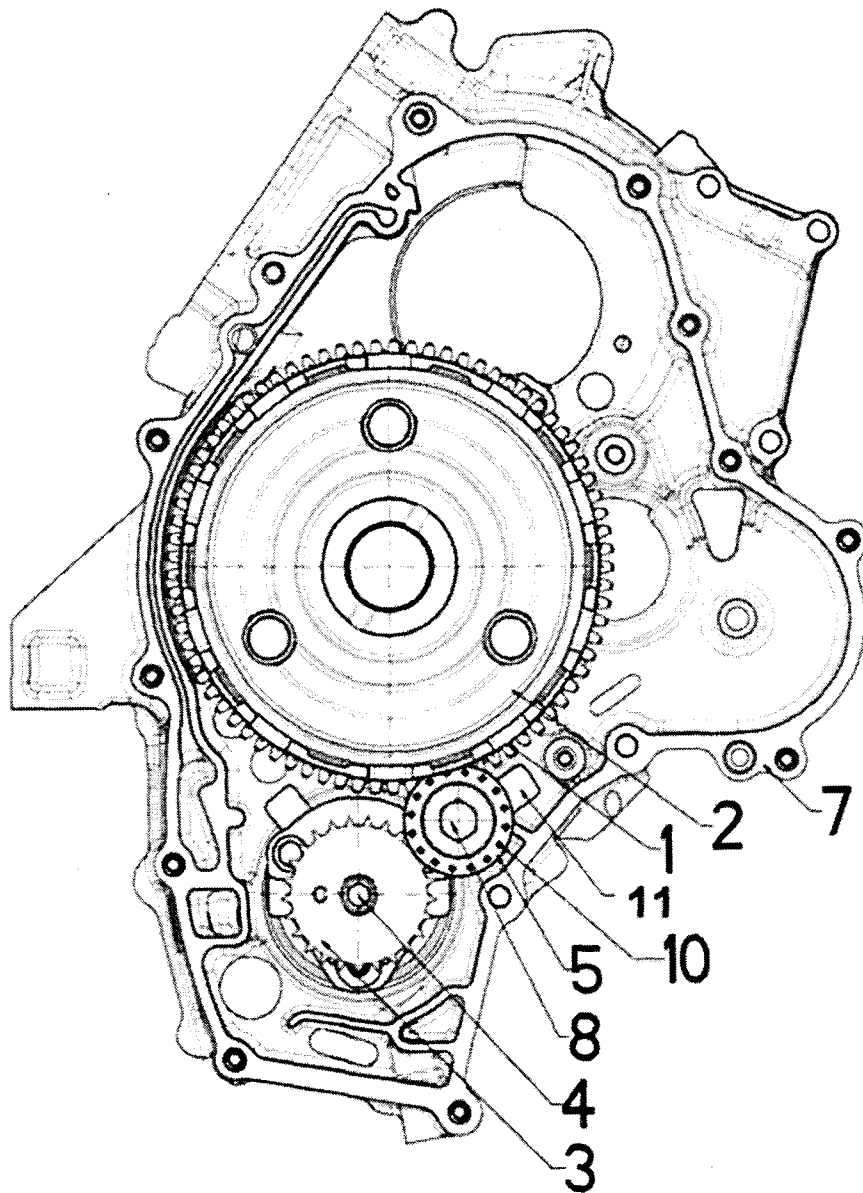


FIG. 3

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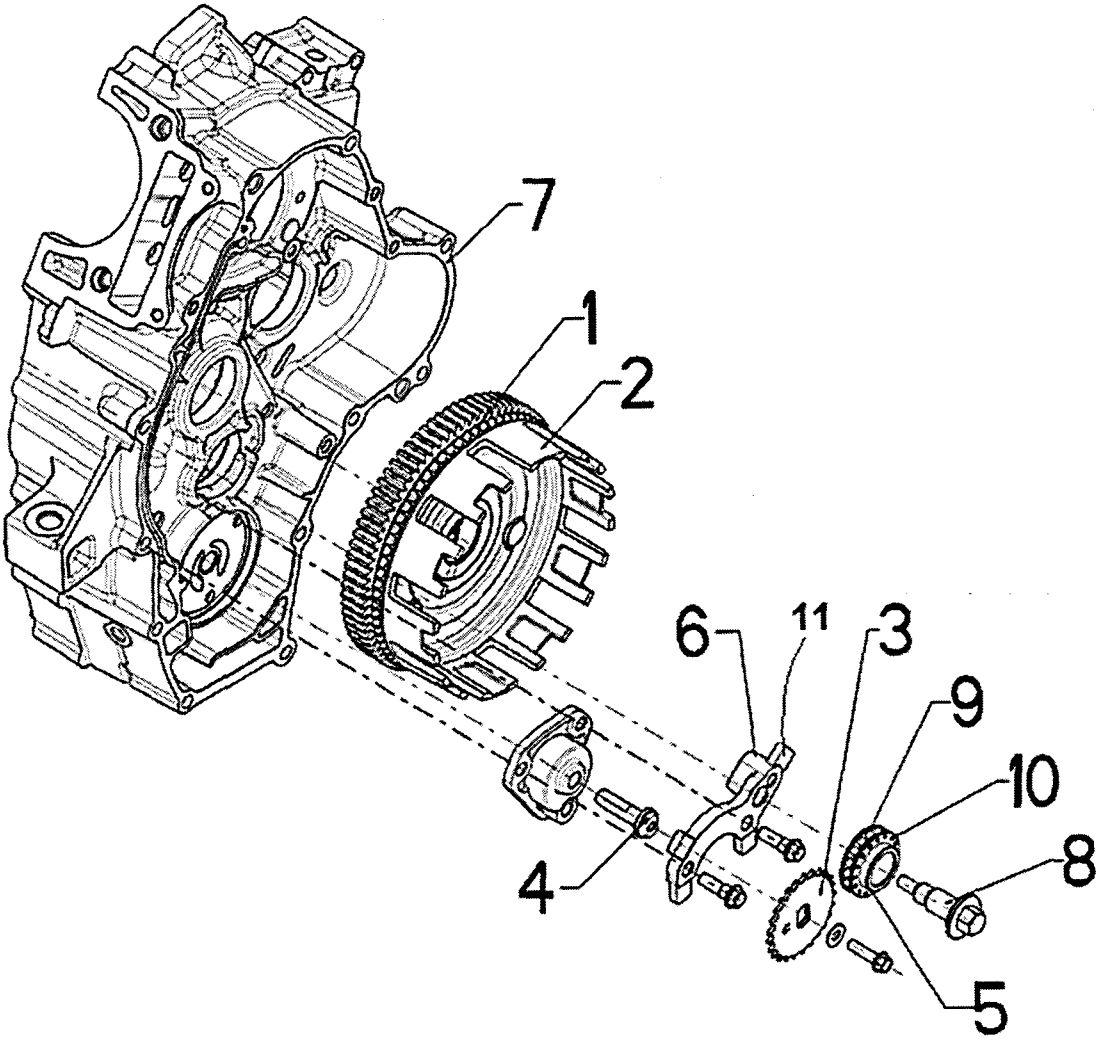


FIG. 4

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LUBRICATION PUMP

FIELD OF THE INVENTION

[0001] The present invention relates generally to a lubrication pump and more particularly, but not exclusively, to a drive system for a lubrication pump disposed in an internal combustion engine.

BACKGROUND OF THE INVENTION

[0002] Generally, an automotive vehicle includes an internal combustion engine for powering the vehicle. The engine has an lubrication pump located in a crankcase and adapted to force a lubricant through the engine passages to distribute the lubricant to various engine components including piston, crankshaft bearing, cam shaft, valves, valve seats, rocker arm assembly and rocker shaft. Proper lubrication of the engine not only reduces friction between moving parts but is also the main method by which heat is removed from it.

[0003] The lubrication pump is generally located near or far from the crankshaft depending upon the engine layout and is driven by a drive system accordingly. Where the lubrication pump is disposed near the crankshaft, the lubrication pump drive system may include a drive gear mounted on the crankshaft and a driven gear attached to the lubrication pump shaft. The location of lubrication pump near the crankshaft enables direct gear meshing between the drive gear and driven gear and thereby getting the drive to pump the lubricant. Further, the drive gear may be common for lubrication pump driven gear as well as for one more gear provided on the clutch housing which drives the transmission

gears to transmit the engine power. In some drive systems, two separate drive gears are mounted on the crankshaft, one for driving the lubrication pump driven gear and the other for driving the gear mounted on the clutch housing.

[0004] Where the lubrication pump is located away from the crankshaft due to engine layout requirements, the lubrication pump drive system uses a continuous chain drive arrangement as shown in **FIG. 1**. The chain drive arrangement comprises of a first chain wheel connected to the lubrication pump shaft and a second chain wheel connected to the clutch shaft. A chain connects the first chain wheel with the second chain wheel. The chain drive arrangement, however, leads to wear and tear of the chain as well as chain slack and may result in transmission losses. Chain tensioners are employed to prevent substantial chain slack thereby increasing the overall manufacturing cost of the engine.

[0005] The present subject matter is directed to overcoming one or more problems as set forth above and thereby to obviate a lacunae in the prior art. Hence, it is an object of the present subject matter to provide a simple, inexpensive lubrication pump drive system having a first interlocking member, mounted on or connected to, the lubrication pump shaft and a second interlocking member, mounted on or connected to a clutch housing and wherein the drive is achieved without using a chain drive arrangement.

[0006] It is another object of the present subject matter to disclose a drive system for driving a lubrication pump when the lubrication pump is located away from the crankshaft due to engine layout requirements.

[0007] It is a further object of the present subject matter to provide a drive system for driving a lubrication pump wherein the lubrication pump is adapted to be mechanically operated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The present invention will now be briefly described with reference to the accompanying drawings in which:

FIG. 1 shows a chain drive arrangement for lubrication pump according to prior art.

FIG. 2 shows a side view of an internal combustion engine according to present subject matter in a state where the crankcase has been removed.

FIG. 3 shows a detailed side view of a drive system according to the present subject matter.

FIG. 4 shows an exploded view of the drive system of FIG. 2 according to the present subject matter.

BRIEF DESCRIPTION OF THE INVENTION

[0009] The subject matter disclosed herein relates to a drive mechanism for driving a lubrication pump in an internal combustion engine. Various other features of the drive system according to the present subject matter here will be discernible from the following further description thereof, set out hereunder. It is to be noted that the scope of the present description is limited to a lubrication pump located inside the crankcase of the internal combustion engine.

[00010] The drive system for the lubrication pump is illustrated now. **FIG. 2** shows a side view of an internal combustion engine in a state where the crankcase has been removed. The lubrication pump (not shown) is driven by a first interlocking member **3** which receives drive from a second interlocking member **1** through a lantern wheel **5**. Thus, the lantern wheel is interposed between, and continuously engaged with, the second interlocking member **1** and the first interlocking member **3**. According to an aspect of the present invention, the first interlocking member **3** is mounted on or connected to a lubrication pump shaft **4** and the second interlocking member **1** is mounted on or connected to the clutch shaft **15**. The lubrication pump is mounted on or connected to the lubrication pump shaft **4**.

[00011] The lubrication pump drive system is illustrated in more detail in **FIG. 3**. The lantern wheel **5** is located in an appropriate place on a holder plate **6**. The holder plate **6** is fixed to the crank case **7** mounting points and has a threaded location for incorporating a lantern wheel shaft **8** to support the lantern wheel **5**. According to an aspect, the lantern wheel **5** has number of rollers **9** supported on pins **10** which are riveted on the flange of the lantern wheel **5** at a calculated pitch diameter. The second interlocking member **1** transmits the power to the first interlocking member **3** through the lantern wheel **5**. The location of the lantern wheel is chosen such that one of the rollers **9** is always in contact with the second interlocking member **1** and at the same time another roller disposed at the pitch circle of the said lantern wheel **5** is in contact with the first interlocking member **3**. This enables the drive to be transmitted from the second interlocking member **1**

to the first interlocking member 3 and further to the lubrication pump shaft 8 which ultimately drives the lubrication pump.

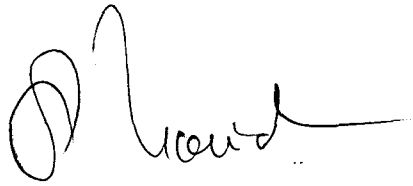
[00012] FIG. 4 shows an exploded view of the drive system according to the present subject matter showing the assembly of the drive system inside the engine crankcase. According to an aspect, the first interlocking member and second interlocking member may use any suitable parts, including, but not limited to, sprockets, pulleys or any combination thereof. The drive system as a whole is driven by a suitable driving force produced by the engine, such as rotational outputs of the crankshaft. The drive mechanism may be coupled to the driving force, such as the crankshaft directly or indirectly, via any suitable mechanism, such as shafts.

[00013] According to a further aspect of the present subject matter, the said internal combustion engine with the said lubrication pump may be used to power any system, preferably an automotive vehicle.

[00014] The present subject matter and its equivalent thereof offer many advantages, including those which have been described henceforth. The drive system eliminates the need of the chain drive arrangement for transmitting the power from the clutch shaft to the lubrication pump shaft. With the removal of chain drive, the requirement of slack and the chain tensioner is also eliminated which reduces the cost. Advantageously, the direction of rotation of the lubrication pump is retained as it is which does not require changes in the pump inlet and outlet.

[00015] The present invention is thus briefly described. The foregoing description is illustrative and not limitative of the scope of the invention and many variations in detail are possible in other embodiments. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the present invention.

7 AUG 2013

A handwritten signature in black ink, appearing to read "M. Howard", with a long horizontal flourish extending to the right.