

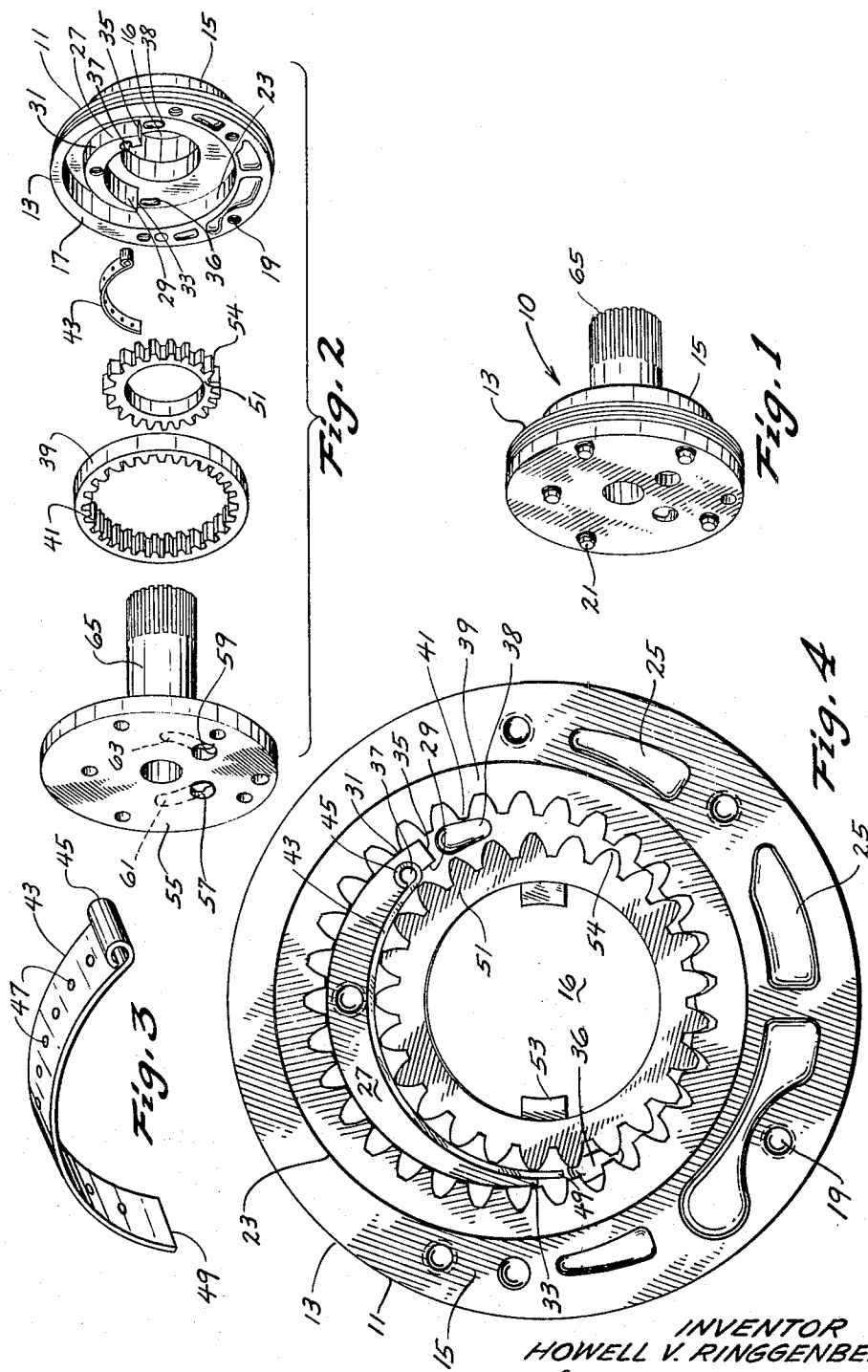
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OIL PUMP

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OIL PUMP

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This invention relates to an oil pump and more particularly to an oil pump of the rotary gear type for automatic transmissions and the like.

Rotary gear oil pumps are commonly used in automatic transmissions. Ordinarily, front and rear oil pumps are provided at the front and rear ends of the automatic transmissions respectively, to cause the oil to be passed through various components of the transmission to supply driving power to the wheels of the vehicle.

The conventional oil pumps include a central drive gear which drives an internal driven gear of larger internal diameter than the outside diameter of the drive gear. A crescent is provided in the pump between the two gears just described so that the teeth of the drive gear are closely adjacent one side of the crescent while the teeth of the driven gear are closely adjacent the other side of the crescent. The purpose of the crescent is to divide the space between the gears thereby creating spaced apart feed and discharge chambers. Oil is drawn into the feed chamber, carried by the spaces between the gear teeth of the drive gear across the crescent and discharged at the higher pressure from the discharge chamber.

The space between the crescent and the teeth of the drive gear must be maintained in a close tolerance if the pump is to pump oil efficiently. After the pump has been used for some time, the inner face of the crescent becomes worn and thereby causes a larger tolerance between the crescent and the gear teeth of the drive gear. The large gap or tolerance necessarily reduces the efficiency of the oil pump, hence the efficiency of the automatic transmission is also reduced and the vehicle suffers a loss of power. In the past, the oil pumps have been replaced when the crescent becomes worn. Needless to say, this is an expensive procedure.

Therefore, a principal object of this invention is to provide an oil pump which eliminates the necessity of constant replacement thereof.

A further object of this invention is to provide an oil pump which has a pivoting shim element adjacent the inner face of the crescent.

A further object of this invention is to provide an oil pump having a shim element adjacent the inner face of the crescent which is automatically self-compensating for wear of the shim.

A further object of this invention is to provide an oil pump having a shim element adjacent the inner face of the crescent which has holes formed therein to permit a degree of equalization of pressure on both sides of the shim.

A further object of this invention is to provide an oil pump having a stainless steel shim element adjacent the inner face of the crescent.

A further object of this invention is to provide a shim element for an oil pump which is economical of manufacture and durable in use.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of the oil pump in an assembled condition;

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FIG. 2 is an exploded perspective view of the oil pump; FIG. 3 is a perspective view of the shim element; and FIG. 4 is a front elevational view of the oil pump with the stator support removed therefrom to more fully illustrate the invention.

The numeral 10 generally designates the oil pump which is shown in its assembled condition in FIG. 1. Pump 10 includes a pump body 11 having a peripheral flange portion 13, a central hub portion 15, an axial hole 16 in hub 15 and a face portion 17. Pump body 11 is provided with a plurality of tapped holes 19 extending thereto which are adapted to threadably receive bolts 21. Pump body 11 has a cylindrical recess 23 formed in its face portion which has its center off-set with respect to axial hole 16. As seen in FIG. 2, pump body 11 is provided with a plurality of channels 25 formed in its face and has a crescent 27 which includes a curved inner face 29, a curved outer face 31, feed end 33 and discharge end 35. As best seen in FIG. 2, pump body 11 is also provided with a feed channel 36 formed therein adjacent the feed end 33 of crescent 27 and a discharge channel 38 formed therein adjacent the discharge end 35 of crescent 27. Crescent 27 has an arcuate bore 37 extending thereto as seen in FIGS. 2 and 4.

The numeral 39 designates a driven gear having internal gear teeth 41. Driven gear 39 rotates in pump body 11 between the shoulder formed by recess 23 and the outer face of crescent 27.

The numeral 43 generally designates an arcuate shim having one of its ends 45 rolled upon itself to form a curled or looped portion which is adapted to be pivotally received by bore 37. Shim 43 is provided with a plurality of holes 47 extending therethrough along its center length. The curvature of shim 43 corresponds to a curvature of inner face 29 of crescent 27 as seen in FIG. 4. It should be noted that end 49 of shim 43 extends slightly beyond feed end 33 of crescent 27.

A drive gear 51 having lugs 53 and gear teeth 54 is mounted in pump body 11 as seen in FIG. 4 and is operatively connected to a converter shaft (not shown) extending through axial hole 16 which is in turn connected to the engine. Drive gear 51 rotates in pump body 11 in an axial alignment with axial hole 16 and engages the gear teeth of driven gear 39 as seen in FIG. 4 to drive the same. It can be seen that drive gear 51 rotates in close proximity to the outer face of shim 43.

The numeral 55 generally designates a stator support having a feed opening 57 and a discharge opening 59 formed therein. The face of stator support 55 (not shown) is provided with channels 61 and 63 formed therein which are in communication with feed opening 57 and discharge opening 59 respectively. When the oil pump is assembled (FIG. 1), openings 57 and 59 are positioned adjacent to but spaced from channels 36 and 38 respectively.

The normal method of operation is as follows. The oil pump is mounted rearwardly of a torque converter or the like and is supported by shaft 65 of stator support 55 extending forwardly to the stator. As described before, drive gear 51 is rotated by its being connected to a converter shaft extending from the converter. Oil is drawn into the oil pump through feed opening 57 in stator support 55. The oil enters the feed chamber defined by channels 61 and 36 at the feed end of the crescent 27. The clockwise rotation of the gears, as viewed in FIG. 4, causes the oil to be moved to a discharge chamber defined by channels 63 and 38 at the discharge end of crescent 27 and then outwardly through discharge opening 59 at a greater pressure than when it entered the pump. The majority of the oil will travel from the feed cham-

ber to the discharge chamber trapped between the teeth of gear 51 and the inner surface of shim 43. However, some oil will be forced behind the shim between the shim and crescent 27. This is due partly to the inherent pressure within the chamber and partly due to the fact that the feed end of shim 43 protrudes slightly beyond the feed end of crescent 27. The oil which is trapped behind the shim escapes therefrom through the holes 47 provided in shim 43 and permits a substantial equalization of the pressure at either side of the shim. However, the pressure between crescent 27 and shim 43 is slightly greater than the pressure between gear 51 and shim 43. The fact that the shim can pivot towards the teeth 54 on gear 51 means that effective oil pressure will always be produced regardless of the wear of the shim. The pressure at the back side of the shim will always be slightly greater than the pressure on the front side of the shim to cause the shim to be pivoted towards teeth 54 of gear 51. As the inner face or the shim wears, the shim simply pivots closer towards the teeth of gear 51. Preferably, shim 43 is constructed of stainless steel which increases its longevity.

The shim is installed in conventional pumps by simply shaving the inner face of crescent 27 and drilling hole 37 therein.

Thus it can be seen that a shim for conventional oil pumps has been provided which extends the normal operating life of the pump and which permits a pump to be easily repaired so that the desired oil pressure is once again provided. It can also be appreciated that a shim has been described that is self-compensating for its own wear, that is, as the shim element wears, the shim simply pivots slightly towards gear 51 to maintain the required spacing in order to produce adequate pressure.

Thus it can be seen that the device accomplishes at least all of its stated objectives.

Some changes may be made in the construction and arrangement of my oil pump without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. In a rotary gear oil pump having a fluid chamber formed therein,
 - a crescent in said fluid chamber having an inner face, and a curved shim pivotally mounted on the inner face of said crescent.
2. The oil pump of claim 1 wherein said shim has a plurality of holes extending therethrough.
3. The oil pump of claim 1 wherein said shim has a plurality of holes extending therethrough along its center length.
4. The oil pump of claim 1 wherein said shim is

elongated and is pivotally secured at one of its ends to said crescent adjacent one end thereof.

5. The oil pump of claim 4 wherein the other end of said shim extends beyond the other end of said crescent.

6. The oil pump of claim 4 wherein said oil pump has a feed chamber and a discharge chamber in said fluid chamber and the other end of said shim terminates in said feed chamber and said one end of said shim is in said discharge chamber.

7. In a rotary gear oil pump,

- a pump body having a central hub portion on one side thereof and a face portion on its other side, said hub portion having an axial hole extending there-through, said pump body having a cylindrical recess formed in its face portion in communication with said axial hole and offset therefrom,
- a crescent in said recess and having curved inner and outer faces and opposite ends,
- a curved shim mounted on the inner face of said crescent and having one of its ends pivotally secured to said crescent,
- a driven gear rotatably mounted in said recess and having internal gear teeth passing in close proximity to the outer face of said crescent,
- and a drive gear rotatably mounted in said recess in axial alignment with said axial hole, said drive gear having external gear teeth in mesh with some of the internal gear teeth of said driven gear, said gear teeth of said drive gear passing in close proximity to said shim.

8. The oil pump of claim 7 wherein said shim has a plurality of holes formed along its length.

9. The oil pump of claim 7 wherein said shim pivots towards said gear teeth on said drive gear to maintain a close tolerance therebetween regardless of the wear of said shim.

10. The oil pump of claim 7 wherein shim has opposite ends and its free end extends beyond the other end of said crescent.

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