Oct. 8, 1935. L. B. HUTHSING 2,016,745

TIMING GEAR SILENCER

Filed March 13, 1935

Fig. 1.

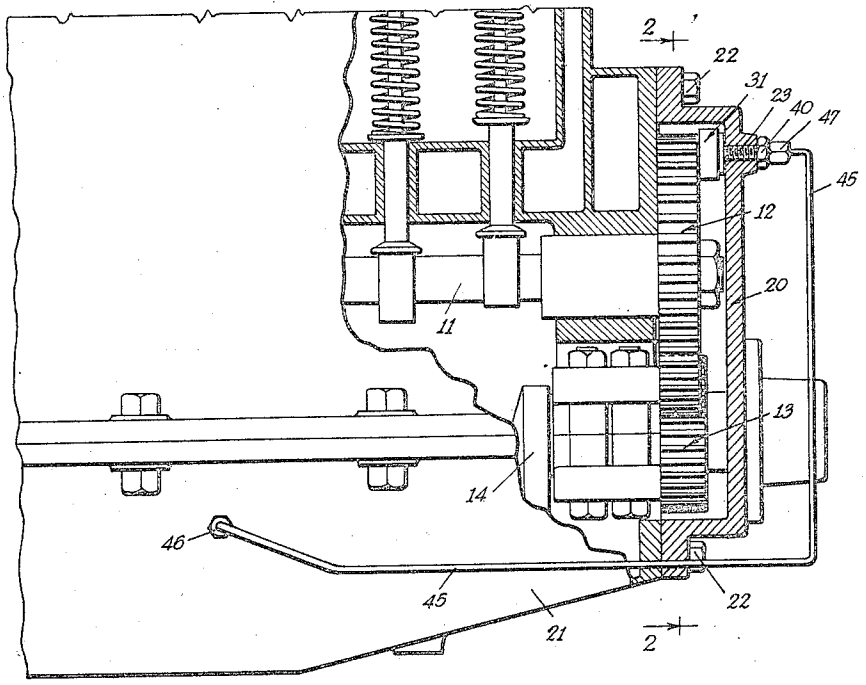


Fig. 2.

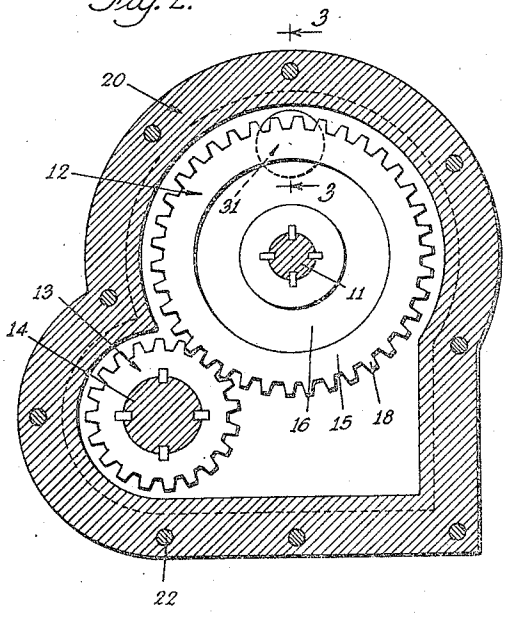
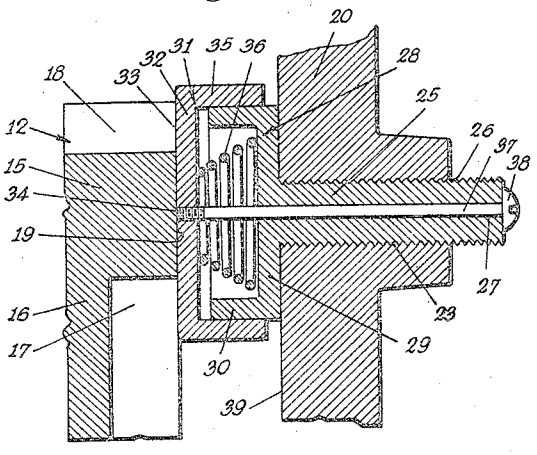


Fig. 3.



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TIMING GEAR SILENCER

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12 Claims. (Cl. 188—83)

My invention relates to a device which has a slight retarding or braking action on one of the timing gears such as used in automobile internal combustion engines.

In such gears it is usual to have a fiber gear or the equivalent operating with a metal gear. When these become worn the wear being principally in the fiber gear, a back lash action is developed which creates a noise. It is usual to have the fiber gear on the cam shaft and hence in the operation of this shaft the cams actuating the tappets of the valves, the back lash action is developed.

A further object and feature of my invention is the employment of a friction shoe which is mounted on the timing gear casing and which shoe is pressed by a spring against the flat rim of one of the timing gears, the practice being usually to press this against the fiber gear. Therefore the shoe creates a slight frictional resistance against the flat face of the fiber gear and thus reduces the backlash action, causing a more or less constant driving pressure between the teeth of the two meshing gears.

Another object and feature of my invention is connecting an oil pipe with an oil feed through the shoe to the flat rim of the fiber timing gear. This not only lubricates the contact faces between the shoe and the gear but also provides additional oil for lubricating the timing gears.

A further detailed feature of my invention is constructing the shoe in the form of a cup with a disk face, the cup of the shoe fitting over a stationary cup which is formed integral with a tubular threaded stem. The stem is threaded through a threaded hole in the timing gear casing until the stationary cup seats on the inside face of the casing. With this assembly I use a coil compression spring between the two cups which thrusts the shoe with a resilient pressure against the flat rim of the gear. The lubrication is provided for by connecting the oil pipe from the oiling system of the engine to the outer end of the tubular stem. The oil thus flows through the stem, filling the two cups and flowing through a perforation in the shoe.

Another feature of my invention relates to the assembling of the device on the gear casing, in that I pass a long stemmed screw through the tubular stem, the fixed cup, the space having the spring, and thread this into the shoe; the head of the screw engaging the outer end of the stem. This holds the spring compressed and the two cups in assembly while the device is being fitted in the timing gear casing. With some types of automobiles it is necessary to tilt the casing for purposes of assembly. The screw must be removed before the oil pipe can be connected to the tubular stem.

My invention is illustrated in connection with the accompanying drawing, in which,

Fig. 1 is a side elevation of an engine partly broken away, to show the position of the timing gears and my silencer in assembled position.

Fig. 2 is a transverse section on the line 2—2 of Fig. 1 in the direction of the arrows.

Fig. 3 is a partial longitudinal section through the silencer assembly and may be considered as taken on the line 3—3 of Fig. 2 in the direction of the arrows.

In the drawing, a cam shaft is indicated by the numeral 11 and this is driven by usually a fiber driven gear 12, which driven gear meshes with a driving gear 13 which is usually of metal. Such driving gear is usually mounted on a crank shaft 14 or similar shaft driven in synchronism with the movement of the engine crank. The fiber timing gear 12 usually has an annular rim 15 which extends outwardly at the sides from the main body portion 16, there being a circular recess 17. The teeth 18 extend outwardly from the rim and the rim usually has a flat face 19, this face being in a plane at right angles to the axis of the cam shaft or the shaft on which such gear is mounted.

The timing gears are enclosed by a gear casing 20 this being secured to the engine block and crank case 21, by bolts 22 and in certain types of engines there is a threaded perforation 23 in the gear casing, but where there is no such perforation this may be drilled and tapped in the proper position relative to the rim face 19 of the fiber timing gear.

My silencer assembly illustrated in section in Fig. 3, utilizes a tubular stem 25 exteriorly threaded as indicated at 26 and having a small bore passage 27. On the end of this stem there is an inner circular cup 28 which has a base 29 and a circular rim 30. The friction shoe 31 has a base 32 with a circular or disk-like bearing surface 33. This disk of the shoe is provided with a perforation 34, such perforation being at least partly threaded. The shoe has an annular flange 35 and thus forms a cup, the rim 30 of the fixed cup and the flange 35 of the cup forming the full overlap. A coil compression spring 36 which is preferably of the combined spiral and helical type, thus forming a cone-shaped spring, is fitted between the cup forming the shoe and the cup attached to the stem. In order to secure

these elements together for assembly purposes, I utilize a long stemmed screw **37** which passes through the bore **27** of the stem and is threaded into the threaded perforation **34** of the base of the shoe. This screw has a head **38** which bears against the outer end of the stem.

The manner of assembly is as follows: On account of the area of the shoe being much larger than the area of the perforation **23** in the gear casing, it is necessary in most types of engines to which my invention may be applied, to loosen the bolts **22** and at least partly tilt the casing outwardly at the top. This allows inserting of the tubular stem **25** from inside the casing and it is screwed in by hand until the base **29** of the cup **28** seats on the inside surface **39** of the gear casing **20**. During this assembly the two cups are held in clamped relation by the bolt **37** and there is no chance of the bearing shoe being forced out of the assembled position by the compression spring **36**. When the housing or casing of the gears is again firmly secured to the engine block and the crank case, the screw **38** may be removed. A lock nut **40** is then threaded on the outer end of the stem and holds the stem from an unscrewing rotation in the perforation **23**. When the bolt **37** is removed the spring forces the shoe **31** longitudinally as regards the axis of the stem and brings the flat face of the shoe into contact with the flat annular surface **19** of the rim of the fiber gear.

It is preferable to assemble the device and locate the perforation **23** so that the axial center of the shoe is approximately midway between the inner and outer periphery of the flat surface **19** of the rim of the gear. If desired, this bolt **37** may be removed before the bolts **22** clamping the gear casing in place are screwed down tight.

In order to lubricate the silencer, I provide an oil pipe **45** which at one end **46** is connected to the engine and to the oiling pressure system thereof. The other end is attached by a threaded gland or nut **47** to the outer threaded end of the stem **25**. To assure that the bolt **37** will not inadvertently be left in place, this bolt must be removed before the oil pipe **45** can be attached to the stem.

The manner of operation and functioning of my invention is as follows: It will be obvious that the shoe **31** is pressed by the compression spring **36** against the flat annular face of the fiber timing gear. This shoe is prevented from displacement by the interfitting of the rim **30** of the flange **35** of the fixed cup structure **28** and the movable cup structure of the shoe **31**. However, there is no resistance to the rotation of this shoe on its axis should there be any force rotating it, but apparently it does not rotate on its axis. The shoe therefore gives a large surface which exerts a pressure sidewise on the flat annular surface of the gear, and hence as the gear rotates, there is a frictional resistance to such rotation. This resistance is sufficient to cause the teeth of the meshing gears to always have a pressure relation and hence eliminates the backlash and thus the clash and noise of the timing gears.

The flow of lubricating oil has an important function in my invention. This oil fills the hollow chamber containing the spring **36**, the fit of the rim **30** and flange **35** being such that but little oil escapes at this joint and practically all of the oil is discharged through the perforation **34** in the base of the shoe. This oil comes directly in contact with the flat annular face of the gear and hence lubricates the bearing surface of the shoe on the gear. This reduces the friction, but not sufficiently to allow the gears to have a backlash and become noisy. The oil also keeps the shoe and the gear cool and the spring **36** cool so these will not become hot through frictional heat. Moreover, the flow of oil thoroughly lubricates the timing gears, thus causing an improved power transmission between the metal and the driven fiber gear.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a device as described, the combination of an engine having a rotating timing gear, a casing for said gear having a perforation, a friction shoe, a supporting device for said shoe extending through the perforation, and a spring engaging the shoe to press the shoe into contact with a smooth surface of the gear.

2. In a device as claimed in claim 1, means to inject oil through the perforation and the casing to lubricate the said shoe and the said smooth surface of the gear.

3. In a device as described, the combination of a rotatable timing gear having a smooth annular surface, a casing for the gear having a perforation, a stem extending through the perforation, a shoe, a spring developing a pressure between the stem and the shoe, to press the shoe against the said surface of the gear, whereby a frictional resistance to the rotation of the gear is developed.

4. In a device as claimed in claim 3, the stem being hollow and the shoe having a perforation and an oil connection outside the casing to the stem for injecting oil to the contact surfaces of the shoe and the gear.

5. In a device as described, the combination of an engine having a rotating timing gear with a smooth annular surface, a casing for the gear having a perforation, a stem threaded in said perforation, a shoe having a circular face, a spring between the shoe and a portion of the stem to press the face of the shoe against the said annular surface of the gear and thereby create a resistance to the rotation of the gear.

6. In a device as claimed in claim 5, the stem being tubular, the shoe having a central perforation, an interconnection between the shoe and part of the stem to restrict the flow of oil through the perforation of the shoe, and an oil pipe secured to the end of the stem projecting on the outside of the casing.

7. In a device as described, the combination of an engine having a rotating timing gear with a smooth annular surface, a casing for the gear having a perforation, a stem extending through the perforation and having a cup-like head on the inside, a cup-like shoe interfitted with the cup of the stem, the said shoe having a smooth surface to engage the said surface of the gear, a spring between the said cups, whereby a friction resistance is developed between the shoe and the gear.

8. In a device, as claimed in claim 7, the stem and the cup attached thereto having a central bore, the shoe having a perforation and an oil pipe connected to the end of the stem outside of the casing.

9. In a device as described, the combination of an engine having a timing gear with a smooth annular surface in a plane at right angles to the axis of the gear, a casing for the gear having a perforation, a stem extending through the perfo-

ration, a cup-like head on the stem having a bearing on the inside of the casing, the said cup having an annular rim, a shoe having a disk with a friction surface and an annular flange interfitting with the rim of the cup, a coil spring between the cup and the shoe to press the shoe into contact with the annular surface of the gear.

10. In a device as claimed in claim 9, the stem and the cup connected thereto having a central bore, the cup having a central perforation, the fit formed by the rim and the flange restricting flow of oil and an oil pipe connected to the stem projecting outside of the casing.

11. In a device as claimed in claim 9 the stem and the cup secured thereto having a central bore, the shoe having a threaded socket, a bolt extending through the bore and threaded in the socket and having a head engaging the outside of the stem, the said bolt holding the stem, cup and shoe and the spring assembled for connection to the perforation in the casing.

12. In a device as described, the combination of an engine having a rotating timing gear, a casing for the gear, a shoe resiliently mounted on the casing and bearing against a portion of the gear adapted to create a frictional resistance to the rotation of the gear, and means to inject oil between the shoe and the gear to lubricate their contact surfaces.

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