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PULLER FOR TIMING GEARS OF INTERNAL COMBUSTION ENGINES

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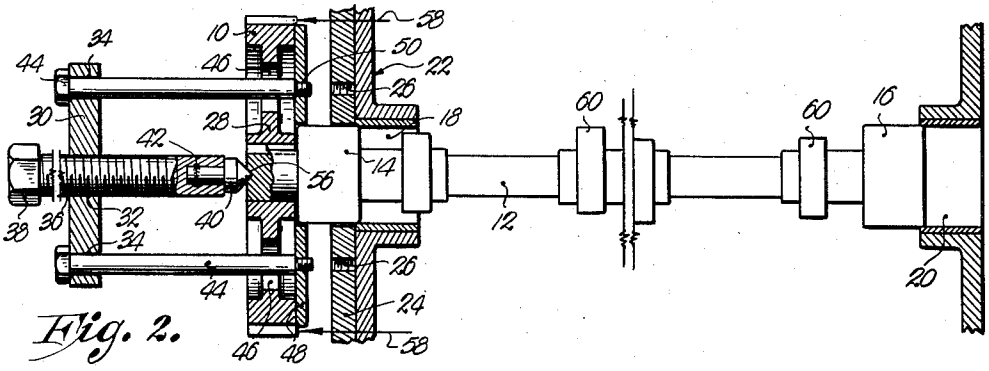


Fig. 2.

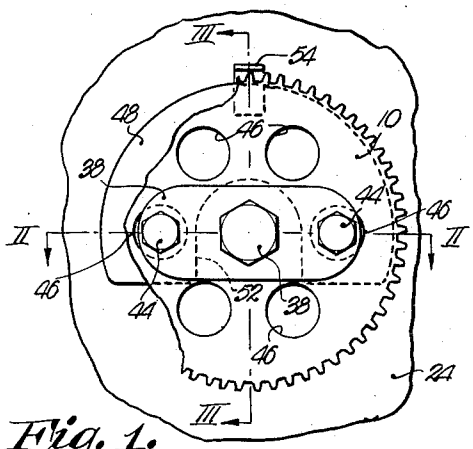


Fig. 1.

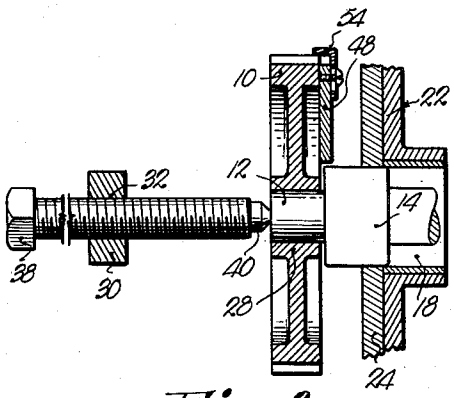


Fig. 3.

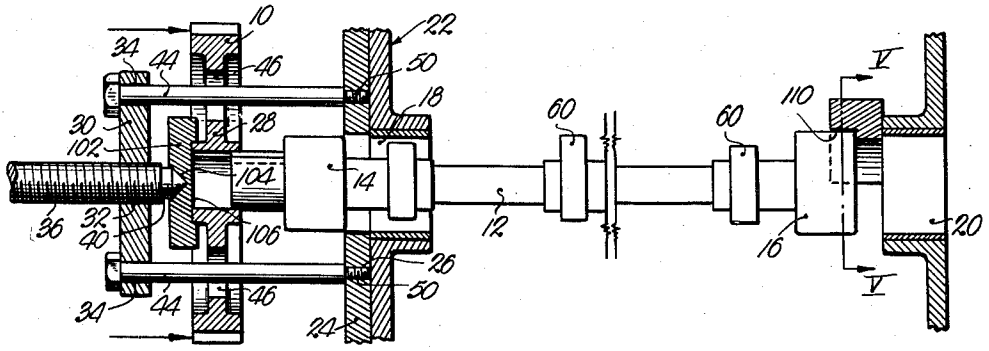


Fig. 4.

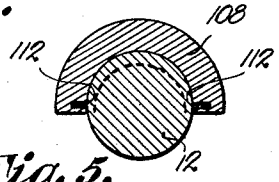


Fig. 5.

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PULLER FOR TIMING GEARS OF INTERNAL COMBUSTION ENGINES

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Application September 25, 1953, Serial No. 382,444

1 Claim. (Cl. 29—258)

This invention relates to mechanics' tools and has for its primary object to provide a device for facilitating removal and replacement of the timing gear normally attached to one end of the cam shaft of an internal combustion engine.

It is the most important object of the present invention to provide a timing gear puller having parts engageable with the gear and the cam shaft when the timing gear is to be pulled and accessory parts engageable with the gear and a part of the engine itself when the said timing gear is to be replaced upon the cam shaft.

Another important object of this invention is to provide a tool of the aforementioned character that includes a plate especially made to partially embrace the cam shaft and engage the timing gear when the tool is used as a puller, the remaining essential components of the puller including a cross head having a thrust screw bearing against one end of the cam shaft, together with a number of bolts adapted to pass through the timing gear and engage with the plate.

A still further object of this invention includes the way in which bolts forming a part of the tool engage with a thrust plate on the engine block when the tool is used to replace the timing gear, together with the way in which an accessary plate is provided for rotatably receiving the thrust screw and bearing against the gear to be replaced on the cam shaft.

Other objects include the manner in which the shaft embracing plate is provided with adjustable means for aligning the same; the manner of providing an end segment to receive the thrust of the cam shaft when the gear is placed thereon, together with many additional more minor objects, all of which will be made clear or become apparent as the following specification progresses.

In the drawing:

Figure 1 is an end elevational view of a puller for timing gears of internal combustion engines showing the same operably mounted ready for pulling the timing gear from the cam shaft of the engine.

Fig. 2 is a cross-sectional view taken on line II—II of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a fragmentary, cross-sectional view taken on line III—III of Fig. 1.

Fig. 4 is a cross-sectional view similar to Fig. 2, illustrating the puller hereof with the necessary accessory parts for adapting the same to replacement of the timing gear upon the cam shaft; and

Fig. 5 is a detailed, cross-sectional view taken on line V—V of Fig. 4.

It is well understood by mechanics generally that a considerable amount of repair and replacement work in internal combustion engines necessitates pulling and replacement of the timing gear, particularly when the cam shaft and the cams thereon are to be repaired or replaced. The timing gear is mounted on one end of the cam shaft with an extremely tight press fit and the task of removal and replacement is time-consuming and normally rather difficult. As will hereinafter appear,

the tool forming the subject matter hereof renders such removal and replacement of the timing gear relatively simple and quickly accomplished.

The tool and its component parts when used for removing timing gears **10** of internal combustion engines, is shown in Figs. 1 to 3 inclusive of the drawing. Figure 2 clearly illustrates the way in which the gear **10** is normally mounted on one end of a cam shaft **12** forming a part of an internal combustion engine. Shaft **12** is provided with end bearings **14** and **16** mounted within bushings **18** and **20** respectively of engine block **22**. An engine thrust plate **24** rigidly secured to the block **22** in surrounding relationship to the bearings **14**, is conventionally provided with a number of internally threaded openings **26**.

The timing gear **10** has a hub **28** that is fitted tightly over one end of the shaft **12** adjacent the bearing **14** as is clear in Figs. 2 and 3.

The tool as shown in Figs. 1 to 3 inclusive, includes an elongated cross head **30** provided with a centrally disposed, internally threaded bore **32** and a pair of holes **34** equally spaced from the bore **32**. The bore **32** is adapted to receive an elongated thrust screw **36** having a tool-receiving head **38** on one end thereof, and a pivot pin insert **40** removably mounted on its opposite end. A spring-loaded detent **42** releasably holds the pin **40** attached to the screw **36**.

The holes **34** are adapted to receive elongated bolts **44** that extend through clearance openings **46** that are formed in the gear **10**. A substantially semi-circular plate **48** has a pair of diametrically opposed, internally threaded openings **50** therein for receiving the bolts **44** and a slot **52** for clearing the bearing **14** on shaft **12** as shown in Figs. 1, 2 and 3. Plate **48** is disposed between the gear **10** and plate **24** when the tool is used for pulling the gear **10** from the shaft **12** and a small adjustable, L-shaped bracket **54** on the plate **48**, aids in aligning the openings **50** with the openings **46**. It is noted that bracket **54** extends into overlying engagement with the gear **10** when the plate **48** is properly aligned to receive the bolts **44**.

When the tool is mounted as shown in Figs. 1 to 3 inclusive, it is but necessary to apply a suitable wrench to the head **38** of screw **36** and to turn the screw **36** in the proper direction for exerting a pull upon the cross head **30** and therefore, upon the plate **48** through the bolts **44**. By virtue of the fact that the pivot pin **40** is seated within a cavity **56** formed in the proximal end of shaft **12**, gear **10** will be forced from the shaft **12** in the direction of arrows **58** in Fig. 2, all without damaging either the gear **10** or the shaft **12** or shifting the latter with respect to the block **22** within which it is mounted. After removal of the timing gear **10**, the shaft **12** and/or cams **60** thereon may be removed or repaired in the usual manner.

The plate **48** and bracket **54** are not utilized when the tool is employed for the purpose of replacing the timing gear **10** upon the shaft **12** in the manner shown by Fig. 4 of the drawing. Screw **36** in cross head **30** is utilized, the holes **34** in cross head **30** receive bolts **44**, and the same are adapted to extend through the openings **46** into threaded engagement with the internally threaded openings **26** of the thrust plate **24**.

A circular plate **102** is utilized to rotatably receive the pivot pin **40** by means of a complementally-shaped cavity **104** in one face of plate **102**. A cavity **106** in the opposite face of the plate **102** receives the hub **28** of gear **10**.

It is seen that as torque is applied in one direction to the screw **36**, bolts **44** attached to the plate **24**, will hold the cross head **30** against outward movement away from the plate **24** and that consequently, the force applied

to the plate **102** will be imparted to the gear **10** and cause the hub **28** thereof to slip over the proximal end of shaft **12**.

In order to avoid any damage to the shaft **12** and to prevent the same from inward movement as gear **10** is forced thereon, an arcuate thrust segment **108** is provided as shown in Figs. 4 and 5. Segment **108** has an arcuate groove **110** therein for receiving the bearing **16** and is adapted as shown in Fig. 4 of the drawing for fitting between the bearing **16** and block **22** during the time that gear **10** is being mounted on the shaft **12**. A pair of diametrically opposed, spring-loaded detents **112** yieldably hold the thrust segment **108** in place.

Inasmuch as the cross head **30** remains stationary with respect to the block **22** during use of the tool as a means for replacing the gear **10**, cross head **30** may well be adapted in any suitable manner for attachment to the block **22** and/or any other part of the engine. To this end, it is but necessary to merely extend the cross head at one end thereof for attachment to the crank shaft pinion (not shown) that normally meshes with the gear **10** and to extend the opposite end of the cross head **30** for attachment to the engine block **22** such as through use of bolts in the screw holes of the fuel pump of the internal combustion engine.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

In apparatus for pulling the timing gear from the cam shaft of an internal combustion engine, a tool comprising a cross-head having a central, internally threaded bore and a pair of holes spaced equally from the bore;

a thrust screw threaded in said bore and engageable with the cam shaft; a bolt in each hole respectively, said gear having clearance openings therein for passage of said bolts; a generally inverted U-shaped, circularly segmental, gear-engaging plate having threaded openings therein disposed upon a horizontal diameter thereof for receiving said bolts, said plate having a central slot extending upwardly from the bottom, chord edge thereof for clearing the cam shaft, the bolts having heads thereon engageable with the cross-head for limiting the extent of movement thereof when the screw is turned whereby, upon further turning of the screw, the plate engages the gear to pull the same from the shaft; and an L-shaped bracket having one leg thereof attached adjustably to the plate at the top of the latter and on a central axis of the slot and the other leg thereof extending across the plate in a direction toward the cross-head, said other leg being engageable with the top of the gear for aligning the openings of the plate with the openings of the gear during installation of the apparatus.

References Cited in the file of this patent

UNITED STATES PATENTS

1,305,322	Towler	June 3, 1919
1,383,382	Brockway	July 5, 1921
1,559,885	Kelley	Nov. 3, 1925
2,298,408	Moyer	Oct. 13, 1942

FOREIGN PATENTS

829,129	Germany	Jan. 24, 1952