Dec. 28, 1943. D. P. KEARNEY 2,337,559

ENGINE STARTER DRIVE

Filed July 15, 1942

Fig. 1

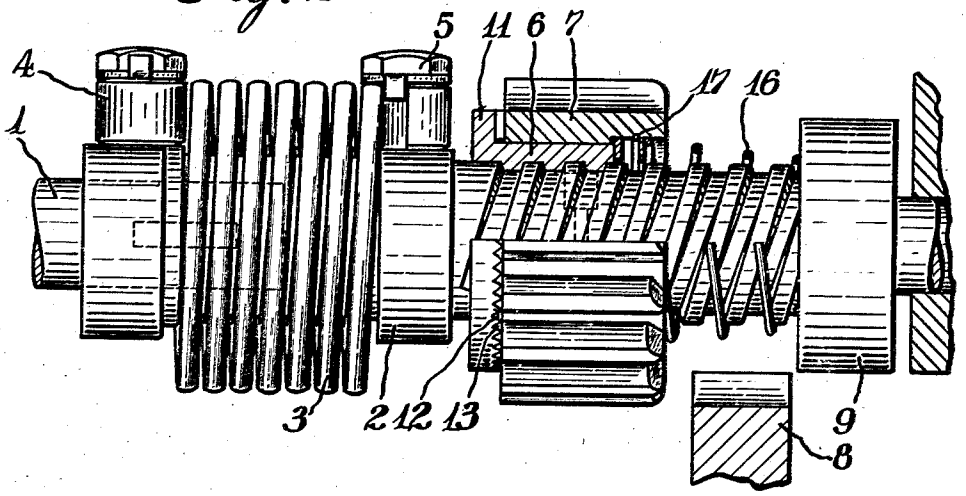


Fig. 2

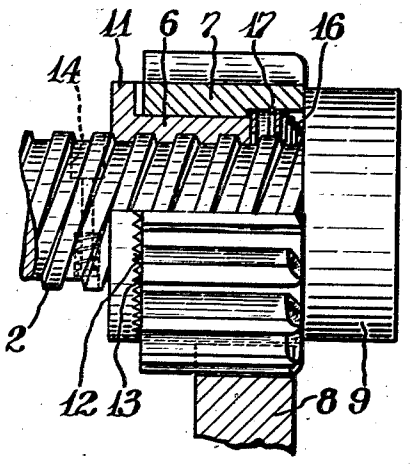
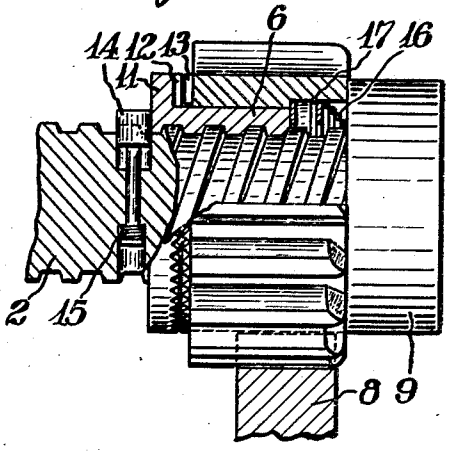


Fig. 3



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ENGINE STARTER DRIVE

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3 Claims. (Cl. 74—7)

The present invention relates to an engine starter drive and more particularly to that type of drive which maintains the gear connection between the starting motor and engine until the engine is reliably self-operative.

It is an object of the present invention to provide a novel starter drive of this type which is reliable and efficient in operation and simple and economical in construction.

It is another object to provide such a device which is particularly well adapted for heavy duty installations.

It is another object to provide such a device which includes an overrunning clutch connection to the pinion.

It is a further object to provide such a device incorporating a unitary means for preventing the pinion from drifting away from its idle position and for holding the clutch in initial engagement.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawing in which:

Fig. 1 is a side elevation partly broken away and in section of a preferred embodiment of the invention.

Fig. 2 is a detail in side elevation and partly in section of the drive pinion and associated parts in cranking position, and

Fig. 3 is a view similar to Fig. 2 showing the parts in the positions assumed during overrunning of the pinion while held in cranking position.

In Fig. 1 of the drawing there is illustrated a power shaft 1 and a screw shaft 2 yieldably connected to rotate therewith by means of a drive spring 3 anchored to the power shaft at 4 and to the screw shaft at 5.

A nut 6 is threaded on the screw shaft 2, and a pinion 7 is journalled on the nut in position to be carried thereby into and out of engagement with a gear 8 of an engine to be started. An abutment 9 on the screw shaft is adapted to be engaged by the end of the pinion 7 when in cranking position, and a flange 11 is formed on the nut for engaging the opposite end of the pinion and clamping it to the abutment by the screw jack action of the screw shaft and nut. Clutch teeth 12 and 13 are preferably provided on the pinion 7 and flange 11 to form a positive driving connection therebetween during the cranking operation.

According to the present invention centrifugal means are provided for preventing the nut 6 from returning to idle position while the screw shaft is rotating above a predetermined speed, the nut being permitted to back away sufficiently, however, to release the pinion and allow it to overrun freely. As here shown, this means is in the form of a latch 14 slidably mounted in the screw shaft and normally maintained by a spring 15 in a retracted position as shown in Fig. 2 where it does not interfere with the travel of the nut on the screw shaft. Rotation of the screw shaft above a predetermined speed during the cranking operation causes the latch to move out by centrifugal force to the position shown in Fig. 3 where it limits the return movement of the nut to an amount sufficient to release the pinion from its clutching engagement.

A spring 16 on the screw shaft is arranged to bear at one end against the abutment member 9 and at its other end against a thrust ring 17 within the bore of the pinion 7 whereby said spring holds the clutch teeth 12, 13 in initial engagement, and prevents the pinion from drifting away from idle position.

In operation, starting with the parts in the positions illustrated in Fig. 1, rotation of the power shaft 1 by the starting motor not illustrated is transmitted through the spring 3 to the screw shaft 2, whereby the nut 6 and its associated parts are caused to traverse to the right until the pinion 7 meshes with the engine gear 8 and engages the abutment 9. The pinion is then clutched positively to the screw shaft by the nut and is caused to rotate therewith to crank the engine.

When the engine starts, the acceleration of the engine gear 8 causes the pinion 7 to overrun the drive, thus threading the nut 6 back along the screw shaft until it engages the latch 14 as shown in Fig. 3. The clutch 12, 13 is thus opened permitting the pinion to overrun freely. If the engine should then fail to continue self-operative, cranking will be resumed as soon as the starting motor accelerates to a speed corresponding to the engine rotation. When the engine is reliably self-operative, deenergization of the starting motor by the operator permits the screw shaft to decelerate until the spring 15 withdraws the latch 14 whereupon the parts are returned to idle position.

Although but one embodiment of the invention has been shown and described in detail, it will be understood that other embodiments are possible and that various changes may be made in the design and arrangement of the parts without departing from the spirit of the invention as defined in the claims appended hereto.

What is claimed is:

1. In an engine starter drive a screw shaft, a nut threaded thereon, a pinion journalled on the nut, said nut having abutment means for transmitting its longitudinal movement to the pinion to move it into mesh with a gear of an engine to be started, a stop on the screw shaft arresting the longitudinal movement of the pinion when in operative position, the abutting surfaces of said nut and pinion being formed as clutch means which are closed by the longitudinal pressure of the nut on the pinion when the pinion engages said stop, and means preventing the nut from returning to idle position while the screw shaft is rotating above a predetermined speed.

2. In an engine starter drive a shaft, a nut having a radial flange formed with clutch teeth threaded on the shaft, a pinion slidably journalled on the nut having teeth adapted to cooperate with said clutch teeth, an abutment on the shaft defining the operative position of the pinion, and a centrifugal latch preventing return of the nut to idle position while the shaft rotates above a predetermined speed.

3. A starter drive as set forth in claim 2 including, further, spring means normally maintaining the pinion in idle position and holding the clutch teeth on the nut and pinion in engagement.

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