

March 18, 1941.

Y. SEKELLA

2,235,121

ENGINE STARTER DRIVE

Filed Feb. 24, 1938

Fig. 2

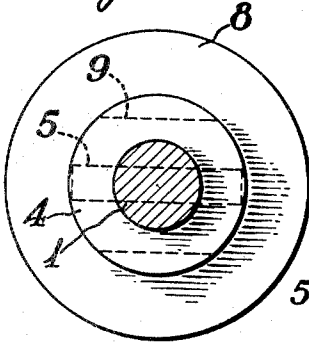


Fig. 1

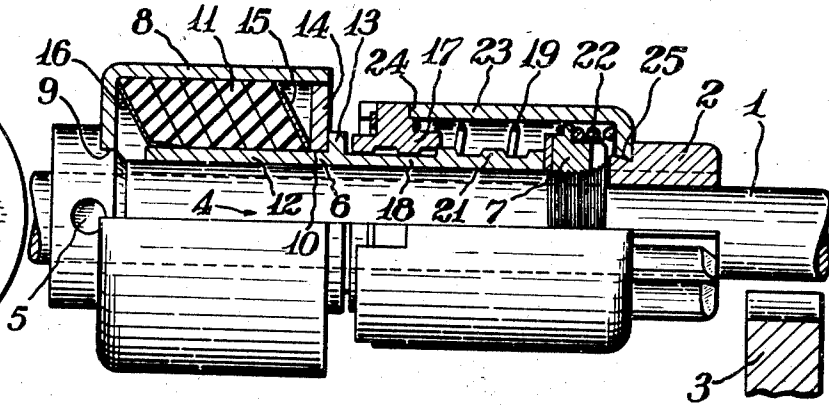
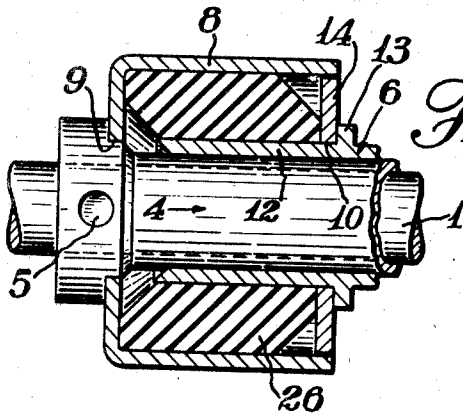


Fig. 4



Elastic material

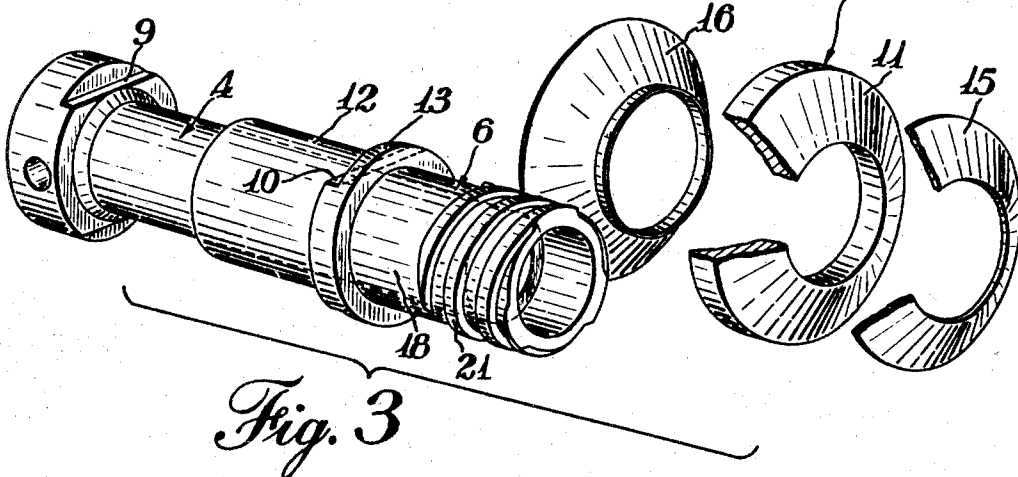


Fig. 3

Witness:

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2,235,121

ENGINE STARTER DRIVE

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Application February 24, 1938, Serial No. 192,291

5 Claims. (Cl. 74-7)

The present invention relates to engine starter drives and more particularly to a yielding driving connection between a starting motor and a member of an engine to be started.

It is an object of the present invention to provide an engine starter drive incorporating a novel yielding driving connection which is efficient and durable as well as simple and economical in construction.

It is another object to provide such a device which is self-tightening in its action so as to gradually apply the cranking load.

It is a further object to provide such a device which may be arranged to transmit comparatively high torque without increasing the overall dimensions of the parts beyond usual practice.

It is another object to provide such a device which is arranged for convenient inspection and replacement of the parts.

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 in section of a preferred embodiment of the invention;

Fig. 2 is an end view from the left in Fig. 1;

Fig. 3 is a detail in perspective of certain of the parts illustrated in Figs. 1 and 2, shown in disassembled relation and partly broken away;

and Fig. 4 is a detail partly in side elevation and partly in section showing a second embodiment of the invention.

In Fig. 1 of the drawing, there is illustrated an engine starter drive comprising a drive shaft 1 which may be the extended armature shaft of a starting motor, not illustrated. A pinion 2 is slidably journaled on the shaft 1 for longitudinal movement into and out of engagement with a member such as a ring gear 3 of an engine to be started.

Means for actuating the pinion 2 from the driving shaft are provided comprising a hollow shaft 4 anchored to the driving shaft as by means of pin 5, a screw shaft 6 slidably journaled on the hollow shaft and retained thereon by means of a stop nut 7, and operative connections between the hollow shaft 4 and screw shaft 6 and between the screw shaft 6 and pinion 2.

The driving connection for the screw shaft 6 comprises a barrel member 8 non-rotatably mounted as indicated at 9 on the hollow shaft 4, and a plurality of conical discs or dished members 11 of elastic material having a high coefficient of friction such as rubber occupying the

annular space between the barrel 8 and a smooth portion 12 of the screw shaft 6 extending coaxially within said barrel member.

Screw shaft 6 is provided with an abutment flange 13 having flattened shoulders 14 cut therein, and a thrust ring 14 having a central opening of "double-D" shape conforming to the shoulders 14 is non-rotatably mounted thereon and so positioned that longitudinal movement of the screw shaft 6 into the barrel causes the thrust ring 14 to flatten the conical discs 11 against the end of the barrel 8 whereby said discs are caused to engage frictionally and grip the interior of the barrel and the periphery of the shaft 6 so as to couple said elements together. Wear plates or rings 15 and 16 are preferably interposed between the discs 11 and the thrust ring 14 and the end of the barrel 8.

In order to actuate the pinion 2 from the screw shaft 6, a nut 17 is normally maintained on a second smooth portion 18 of the screw shaft by means of an anti-drift spring 19, but is yieldably engaged with the ends of the threads 21 of the screw shaft by means of a reentry spring 22. A barrel member 23 is rigidly connected to the nut 17 as indicated at 24, and to the pinion 2 as indicated at 25 whereby motion of the nut is transmitted to the pinion to engage and rotate the ring gear 3.

Longitudinal movement of the nut 17 in a direction to mesh the pinion 2 is limited by the stop nut 7 which thus serves to define the meshing position of the pinion.

In the operation of the device, rotation of the drive shaft 1 is transmitted through the hollow shaft 4 to the barrel 8, and by the frictional engagement of the discs 11 to the screw shaft 6. It will be understood that the stop nut 7 is arranged to locate the screw shaft 6 so that the thrust ring 14 maintains the discs 11 under a slight amount of compression for maintaining an initial frictional connection between the barrel and screw shaft.

Rotation of the screw shaft 6 causes the nut 17 to thread itself thereon into engagement with the stop nut 7, thus meshing the pinion 2 with the ring gear 3. Thereafter, further rotation of the screw shaft causes it to be threaded away from the stop nut 7, such screw jack action serving to actuate the thrust ring 14 to flatten the disc members 11 and cause them to tighten their frictional engagement with the barrel and screw shaft.

When sufficient torque has been built up to rotate the engine ring gear, cranking takes place,

and when the engine starts, the overrunning action of the ring gear causes the parts to be returned to their idle positions.

It will be understood that the yielding driving connection formed by the dished members 11 is both elastic and frictional, the torque being transmitted elastically through the substance of the discs, and frictionally by reason of their gripping engagement with the barrel and screw shaft.

In Fig. 4 an embodiment of the invention is illustrated in which a single dished or conoidal member 26 is substituted for the plurality of discs illustrated in Fig. 1. The operation of this embodiment of the invention is substantially similar to that previously described with the exception that since the elastic frictional body 26 is formed as an integral unit, it is not so limber with respect to flattening forces, and the elastic transmission through the block will be somewhat less damaged than in the first embodiment of the invention.

Although but two embodiments of the invention have been shown and described in detail, it will be understood that other embodiments are possible and 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 drive shaft, a pinion movable thereon into and out of engagement with a member of an engine to be started, and means for actuating the pinion from the drive shaft including a driven shaft slidably journaled on the drive shaft, a barrel member fixed to the drive shaft and surrounding one end of the driven shaft, a conoidal annulus of elastic material having a high coefficient of friction located on the driven shaft within the barrel, and a connection between the driven shaft and pinion including torque-responsive means for moving the driven shaft longitudinally to flatten the annulus into gripping engagement with the barrel and drive shaft.

2. In an engine starter drive, a drive shaft, a pinion movable thereon into and out of engagement with a member of an engine to be started, and means for actuating the pinion from the drive shaft including a screw shaft having a

threaded connection with the pinion, a barrel member fixed to the drive shaft, surrounding a portion of the screw shaft, a coned ring of elastic material fitting in the barrel on the screw shaft, means limiting longitudinal movement of the pinion on the drive shaft, and means whereby longitudinal movement of the screw shaft flattens the ring to cause it to frictionally couple the screw shaft for rotation with the barrel.

3. In an engine starter drive, a pair of concentrically spaced cylindrical members, a power shaft connected to one of said members, a pinion having a releasable connection to the other member, and a dished annular member of elastically deformable material loosely fitting in the space between the concentric cylinders, said releasable connection including torque-responsive means for flattening the dished member to cause it to frictionally couple the concentric cylinders.

4. In an engine starter drive, a pair of concentrically spaced cylindrical members, a power shaft connected to one of said members, a pinion having a releasable connection to the other member, a dished annular member of elastically deformable material loosely fitting in the space between the concentric cylinders, said releasable connection including torque-responsive means for moving one of said cylinders longitudinally with respect to the other, and means whereby such longitudinal movement causes the dished member to be flattened to grip the cylindrical members by its inner and outer peripheries to frictionally transmit torque therebetween.

5. In an engine starter, a drive shaft having a barrel member anchored thereon, a pinion adapted to engage and drive a member of an engine to be started, and means for transmitting rotation from the barrel member to the pinion including a driven shaft having a threaded connection with the pinion, a plurality of conical discs of elastic material having a high coefficient of friction seated on the driven shaft in the barrel member, means limiting longitudinal movement of the pinion on the drive shaft in a direction away from the barrel member, and means whereby longitudinal movement of the driven shaft toward the barrel member flattens the discs and causes them to frictionally couple the driven shaft to the barrel.

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