Oct. 31, 1933. F. T. IRGENS 1,932,522

ARMATURE NUT AND PULLER

Filed June 19, 1930

FIG. 1.

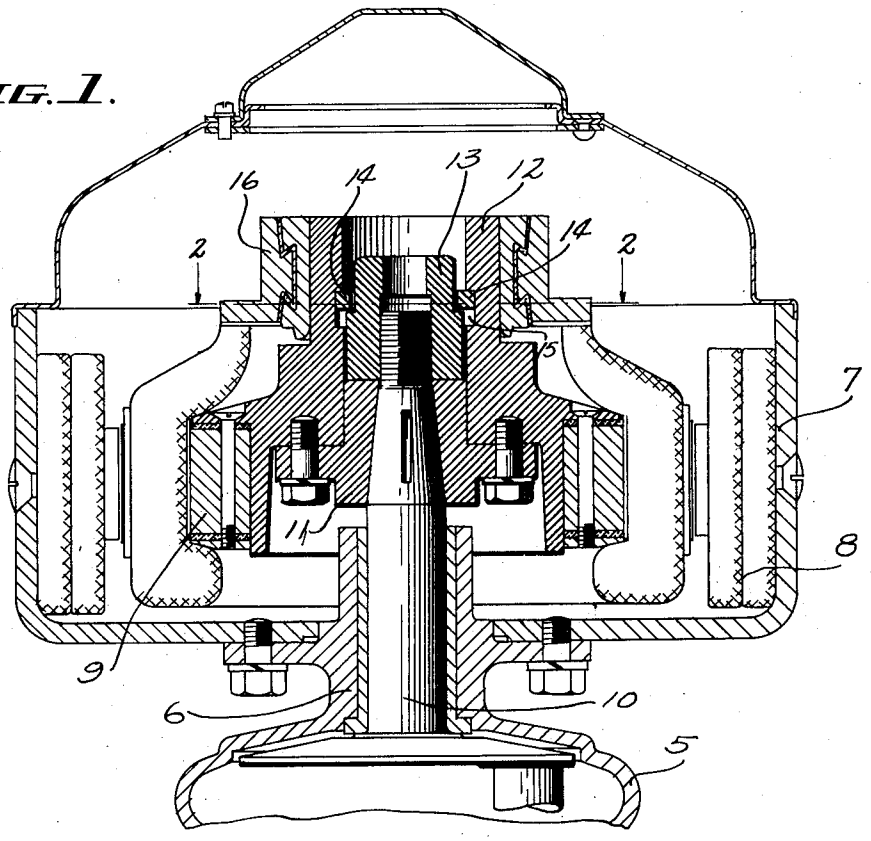
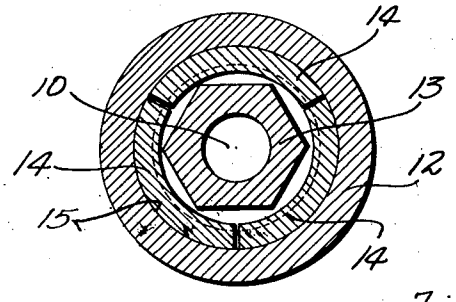



FIG. 2.




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## ARMATURE NUT AND PULLER

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5 Claims. (Cl. 287—53)

This invention relates to improvements in armature nuts and pullers. The invention is particularly adapted for use in connection with electric starting motors as applied to the engines of outboard motor structures.

It is the primary object of the invention to provide a novel and simple means whereby the nut used to hold a starting motor armature on the crank shaft of an outboard motor engine may also be used to pull said armature from said shaft when repair or replacement is necessary.

In the drawing:

Figure 1 is a vertical axial section through a device embodying this invention.

Figure 2 is a detail view taken in section in the plane indicated at 2—2 in Fig. 1.

Like parts are identified by the same reference characters throughout the several views.

The usual horizontal crank case 5 which is customarily used in an outboard motor engine is provided with a bearing 6 to which is bolted a starting motor housing 7 carrying a field 8. The armature 9 is mounted on crank shaft 10 by means of a special adapter 11 which accommodates the armature shaft 12 to the tapered ends of various diameters of crank shaft within wide limits. The nut 13 screwed to the threaded end of the crank shaft above the taper thereof engages the adapter and forces it into intimate contact with the tapered crank shaft portion. The armature shaft 12 of the starting motor is bolted to the adapter and is rigidly connected to the crank shaft thereby.

In order to pull the armature from the shaft it has heretofore been necessary to use force in a manner tending to distort the parts. In order to facilitate the removal of armatures and adapters from crank shafts in this class of installations, I have shouldered the nut 13 to engage a sectional ring 14 which is loosely positioned in a groove 15 undercut in the armature shaft 12.

The armature fully wound, and mounted, with commutator 16, upon the armature shaft 12 and adapter 11, may be set over the tapered end of the crank shaft and the nut 13 used to unite the parts by downward pressure on the adapter. When it is desired to pull the armature, the nut 13 is rotated reversely and its upward pull is exerted through the central ring 14 upon the shoulder of the armature shaft 12 which bounds screw 15 therein. Thereby the upward pressure of the screw is exerted on the armature shaft and is transmitted to adapter 11 through the bolts which secure it to the armature shaft, to the end that the whole assembly is smoothly drawn from the tapered end of crank shaft 10.

It will be noted that during the mounting or removal of the armature assembly, the adapter 11, tubular armature shaft 12, and the sectional ring 14 function in fact as one member and may be regarded as such. The sectional ring 14 is the equivalent, during this operation, of a shoulder formed integrally upon armature shaft 12 which may, if desired, be substituted for the sectional ring at slightly increased expense. It is only in treating of the assembly and disassembly of the component parts of the armature unit that these parts are dealt with separately in the appended claims.

The armature of the starting motor herein disclosed functions as a fly wheel and it will be apparent, therefore, that the means of attachment and removal herein disclosed may be used to fasten any member to a shaft, although, obviously, it has peculiar advantages in the particular combination disclosed.

I claim:

1. The combination with a tapered shaft, of a tapered adapter fitted to the shaft, an annular armature shaft surrounding the adapter and rigidly connected therewith, a nut rotatable within the armature shaft and abutting the end of the adapter, and means abutting said armature shaft and confining said nut therein in opposition to the end of the adapter.

2. The combination with a tapered shaft, of a tapered adapter fitted to the shaft, an annular armature shaft surrounding the adapter and rigidly connected therewith, a nut rotatable wholly within the armature shaft and abutting the end of the adapter, and means confining said nut within the armature shaft in opposition to the end of the adapter, said nut being shouldered and said confining means comprising a sectional ring projecting from a groove undercut internally in said armature shaft.

3. In a device of the character described, the combination with a shaft having a threaded portion, of an armature shaft having a central opening, a member within said central opening having a central bore and provided with a nut engaging abutment portion within the central opening, said member being positioned between the first mentioned shaft and the armature shaft, a nut on the threaded portion of the first mentioned shaft engaging said abutment portion and means engaged with said armature shaft within said opening and confining said nut within said opening when being removed from said shaft.

4. In a device of the character described, the combination with a shaft having a threaded portion adjacent the end thereof; of a member having concentric bores of different diameters, the smaller bore being provided with an annular groove; an adapter secured on the shaft adjacent the threaded portion and having a flange within the larger bore of said member and a cylindrical portion extending into the smaller bore of said member; means detachably securing the said flange to said member; a nut on the threaded portion of said shaft and abutting the cylindrical portion of said adapter, said nut having an annular flange; and a ring segment within the annular groove in the smaller bore of said member and extending into the path of said flange when the nut is removed from the shaft.

5. In a device of the character described, the combination with a shaft having a threaded portion, of a member having a central bore larger in diameter than the shaft, an intermediate part connected with said member and closing the end of said bore about said shaft and providing a nut engaging abutment, said bore having an annular groove above said abutment, a nut provided with a flange and engaged on the threaded portion of said shaft in contact with said abutment, and a ring segment within the groove of said bore engaging the flange on said nut to receive and transmit the thrust of said nut to said part and said member when said nut is unscrewed from said shaft.

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