

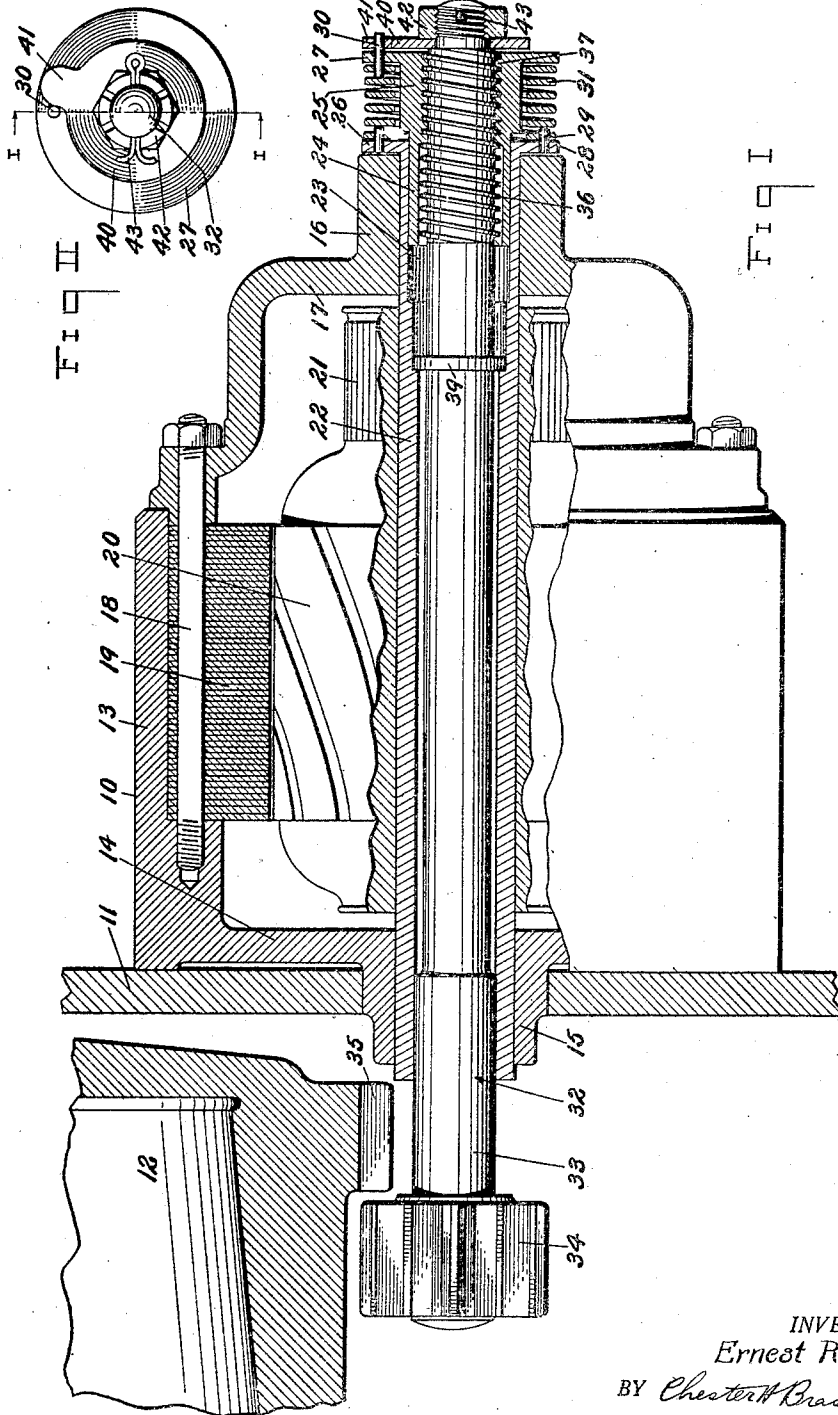
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ENGINE STARTING MECHANISM

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ENGINE-STARTING MECHANISM.

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To all whom it may concern:

Be it known that I, ERNEST R. HUNTLEY, a citizen of the United States, residing at Los Angeles, county of Los Angeles, and State of California, have invented certain new and useful Improvements in Engine-Starting Mechanism, of which I declare the following to be a full, clear, and exact description.

10 This invention relates to starting mechanism for engines particularly internal combustion engines as used on automotive vehicles.

15 An object of the invention is the provision of a type of drive in connection with a starting motor wherein the driving pinion of the motor is moved automatically into and out of engagement with the engine member.

20 Another object is the utilization of driving mechanism in which the shock of engagement at starting and the variation in load is yieldingly absorbed.

25 A further object is to provide a spring element which will permit safe enmeshment of the gears when the teeth of pinion and engine member do not properly engage at the initial meshing movement.

30 Still another object is to employ an arrangement of pinion motor connection which permits transmission of power from motor to engine only when the pinion is in close juxtaposition to the pinion shaft bearing thereby preventing undue strain on the drive shaft.

35 An object also is to provide a mechanism in which the parts most needing inspection are placed in an easily accessible position.

40 Further objects and objects relating to economies of manufacture and details of construction will definitely appear from the following detailed description and the accompanying drawings in which

45 Figure I is a longitudinal view partly in section of the device connected to an electric motor, the drive pinion being adjacent the engine fly-wheel; and

50 Figure II is a view of the drive shaft and associated mechanism at the end of the motor opposite from that to which the pinion is attached.

55 In Figure I, I have shown the electric motor 10 secured to the engine casing 11 at a point in close proximity to the engine fly-wheel 12. The motor is of conventional type and as shown consists in a main cylindrical

casting 13 with an integral base 14 the central portion of which is extended through the casing 11 to form a bearing 15. The outer bearing 16 is formed in the end plate 17, which latter is fastened to the main casting 13 by means of bolts 18. The bolts 18 serve also to hold the field laminations 19 in place.

60 The armature 20 is positioned so that the commutator 21 is at the outer end and the whole is fixed to a hollow shaft 22 journaled in the above mentioned bearings 15 and 16. This shaft has for the main part a uniform inner diameter but at the commutator end a portion 23 has an enlarged inner diameter. 65 Adapted to have a limited sliding and rotary engagement with the enlarged portion 23 of the hollow shaft is a cylinder or sleeve 24, the outer part 25 of which protrudes beyond the shaft and is enlarged so that a 70 shoulder 26 is formed to limit the movement of the sleeve into the shaft.

75 The outer end of the sleeve is formed with a flange 27. Similarly the outer end of the hollow shaft 22 has an outwardly extending flange 28, and to the two flanges, by means of rivets 29 and 30, the flat coil spring 31 is attached, thus forming a resilient connection between the sleeve and hollow shaft. For a purpose hereinafter to be described the 80 rivet 30 joining the spring and sleeve is extended beyond the sleeve flange 27.

85 Loosely mounted within the hollow shaft 22 so as to have rotary and sliding movement relative thereto, is a drive shaft 32. 90 The driving end 33 of the shaft 32 adjacent the bearing 15 is fitted snugly to the hollow shaft; but the major portion of the drive shaft has a diminished diameter so that friction between the shafts is reduced to a minimum. The driving end carries the drive 95 pinion 34 which is adapted to mesh with the radially projected teeth 35 of the fly-wheel 12.

100 The commutator end of the drive shaft is screw threaded, as at 36, the threads meshing with an internal thread 37 formed on the interior of the outer portion 25 of the sleeve 24. Rotation of the drive shaft will cause it to move axially in the sleeve and 105 in order to limit this movement there is provided two sets of stops. For limiting meshing movement a ring stop 39 integral with the drive shaft is utilized which is adapted to engage with the inner end of the sleeve 24 110

when the pinion is fully in mesh with the fly-wheel teeth. The engagement of the stop 39 and inner end of the sleeve 24 prevents further relative rotation of sleeve and shaft and hence the drive is from the hollow shaft through the spring directly to the drive shaft.

It is desirable to have a stop for limiting disengaging movement of the pinion and for this purpose a washer 40 non-rotatably mounted on the shaft is employed having a projecting tongue 41 at its edge which in rotation is adapted to engage the projecting end of the rivet 30 when the pinion is completely disengaged from the engine fly-wheel. The pitch of the screw thread is such that a complete rotation of the drive shaft relative to the sleeve when the stop 30 and tongue are in contact will move these parts relatively in an axial direction so that further contact is prevented.

A nut 42 locked to the shaft by a cotter pin 43 secures the washer to the shaft.

In describing the operation of the motor it is assumed that the parts are in the position shown in Figure I, that is, in inoperative position. Upon the energization of the motor, the sleeve, driven by the spring through the hollow motor shaft, is rotated. Thereupon, the drive shaft, because of its screw threaded connection to the sleeve and because of its inertia, is moved axially, the drive pinion meshing with the fly-wheel gear.

Upon complete enmeshment the ring stop 39 contacts the sleeve end and prevents further axial movement of the drive shaft, power then being transmitted from the motor shaft, through the yielding spring, directly to the drive shaft.

When the engine starts up under its own power the drive shaft, because of the higher speed imparted to it than that from the motor, is screwed out of mesh until the tongue stop engages the pin 30.

In the event that the pinion fails to mesh

properly with the engine gear in the initial movement the gear teeth meeting end to end, the sleeve yields toward the pinion until the rotation of the pinion brought about by the increased frictional grip of the rotating sleeve on the drive shaft, permits the pinion teeth to slip into mesh. As jamming of parts and breakage results unless this mechanism is provided the drive is thus made operable and satisfactory under all conditions of use.

What I claim is:

1. In a starter drive for engines the combination of a motor having a hollow shaft; a drive shaft, screw threaded adjacent one end; a stop arm extending radially from the drive shaft at the end adjacent the screw threaded portion; a drive wheel fixed to the other end of the shaft; a sleeve screw threaded to the threaded shaft portion, said sleeve carrying a pin adapted to engage the stop arm; a spring coiled around the shaft and adapted to form a driving connection between the hollow shaft and sleeve; said stop arm engaging said stop pin only when the sleeve is at its outer limit of movement on the drive shaft.

2. In an engine starting mechanism, the combination of a hollow shaft; a drive shaft slidable within the hollow shaft; a pinion fixed to the drive shaft; a sleeve intermediate the hollow shaft and drive shaft; a yielding driving connection between the sleeve and hollow shaft; a screw threaded connection between the sleeve and drive shaft; cooperative means on said drive shaft and sleeve adapted to limit the movement of the drive shaft into the hollow shaft; and additional cooperative means on said sleeve and drive shaft operative to limit movement of the drive shaft out of the hollow shaft.

In testimony whereof, I affix my signature.

ERNEST R. HUNTLEY.