July 11, 1939. B. H. McMANEUS 2,166,014

SELF-STARTER FOR ENGINES

Filed March 29, 1938

Fig. 1.

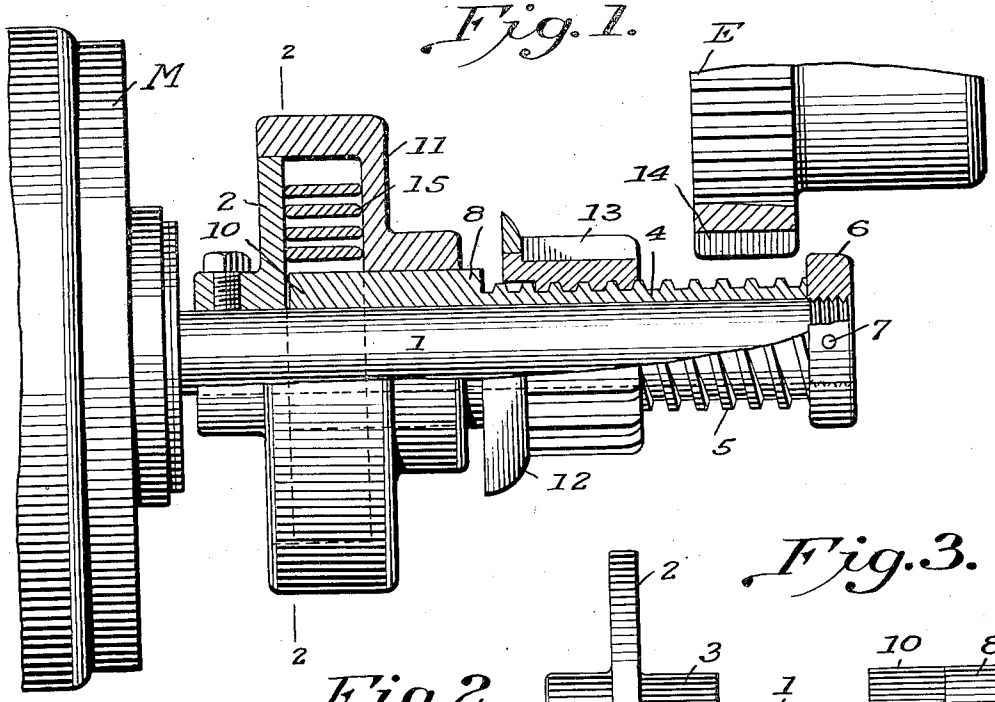


Fig 2.

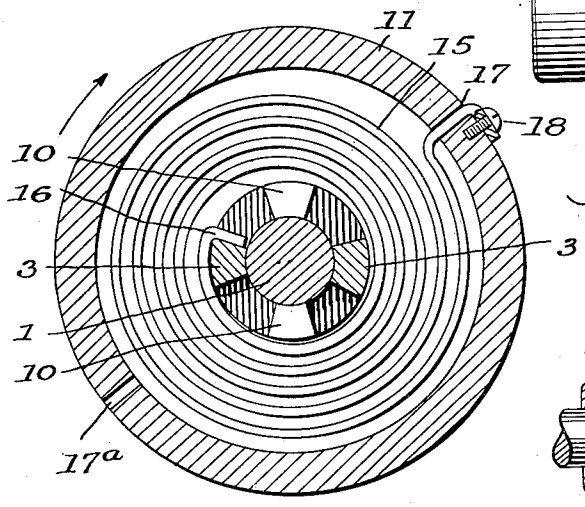


Fig. 3.

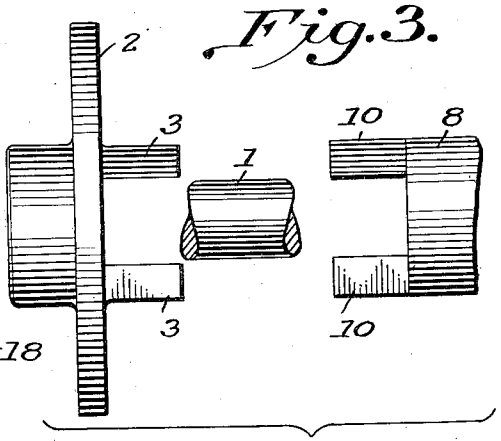
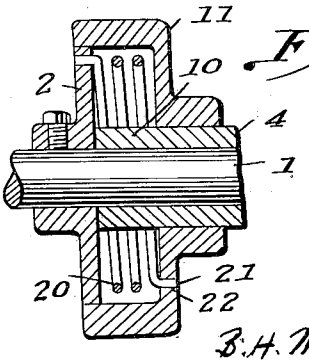


Fig. 4.



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SELF-STARTER FOR ENGINES

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Application March 29, 1938, Serial No. 198,766

3 Claims. (Cl. 74—7)

This invention relates to self-starters for engines and more particularly to a drive connection between the conventional electric starting motor and the flywheel of an internal combustion engine.

An object of the invention is to provide a drive means from the starting motor shaft to the engine flywheel of a "Bendix" type starting mechanism which will insure starting of the engine under all conditions.

A further object of the invention is to so construct a motor drive having a resilient coupling interposed between the motor and engine to thereby lessen the initial shock or jar when the parts of the drive are engaged.

Another object is to provide a direct or positive engagement of the starter pinion regardless of the resilient coupling so that in the event of breakage or weakening of the cushioning interposed in the coupling the starting motor will always rotate the starting pinion to engage the flywheel.

It has been customary in the prior art to utilize a coil spring for connecting the starting motor shaft and the screw threaded sleeve on which the starting pinion rotates and travels. In the event that this spring weakens or is broken there is no connection between the starting motor shaft and the pinion and unless a hand crank is available the operator is unable to start the engine.

In the drawing:

Fig. 1 is a partial side elevation of the drive connection between the starting motor and the engine flywheel, the resilient connection being shown partly in cross section;

Fig. 2 is a vertical cross section taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmental view illustrating the positive drive means between the pinion sleeve and the driving head secured to the starting motor shaft;

Fig. 4 is a vertical cross section of a modified drive coupling as would be taken on line 4—4 of Fig. 2.

In the drawing letter "M" denotes a conventional electric starter motor having an extended shaft 1 to which is bolted a flanged driving head or plate 2. A pair of spaced longitudinally extending drive lugs or prongs 3 are formed integrally with or are welded to the face of the driving head 2 and lie parallel with the shaft 1. It is preferable to give the prongs a bevelled cross section, as illustrated.

An elongated sleeve member 4 having an externally screw threaded portion 5 is loosely mounted on shaft 1, and retained thereon by circular plate 6 threaded to the outer end of the 1 and affixed thereto by pin 7. The portion 8 of the sleeve 4 is thickened and machined to form a pair of spaced driven lugs or prongs 10, similar to and adapted to cooperate with driving prongs 3. An enlarged diameter cup shaped flange 11 is welded or otherwise secured to the sleeve portion 8 and concentrically overlies the driven lugs 10. The flange 11 also extends over and encompasses the driving head or plate 2.

A pinion 12 is threaded over the portion 5 of the sleeve and rotates freely thereon, its movement being confined between the edge of sleeve portion 8 and end plate 6. The pinion carries teeth 13 which mesh with corresponding teeth 14 cut on the flywheel of an engine E.

Referring again to the driving and driven lugs or prongs 3 and 10 (see Fig. 2), it will be seen that both sets of prongs, together with the driving head 2 and cup plate 11 are connected through the medium of a flat concentrically wound coil spring 15. To insure a firm contact of the prongs, one of the lugs 10 may be slightly thinner in section than the other to compensate for the thickness of the spring 15.

The inner end of the spring 15 is bent inwardly at 16 and hooked over one of the driving prongs 3, while the outer end of the spring is passed through a slit 17 cut in the edge of the flange 11. If desired, a set screw 18 may be tapped into the flange for holding the outer end of the spring. A diametrically opposed cut 17*a* is also provided so that the apparatus may be used on either a right or left hand starter drive.

In operation, rotation of shaft 1 of electric motor "M" moves the driving prongs 3 clockwise, carrying with them the free end 16 of the spring 15. Tension of the spring is immediately created and tends to slightly cushion or snub the rotation of the shaft. This braking action is of small magnitude and is only sufficient to prevent jar or shock to the device when the prongs 3 strike the driven prongs 10 affixed to the sleeve 4.

As actual contact occurs, the driving prongs move the driven prongs to rotate the sleeve 4 and thus feed the pinion 13 outwardly along the screw threads 5. When the pinion strikes end nut 6, its movement is arrested and it has meshed with the teeth 14 on the periphery of the flywheel of engine E. Continued rotation of shaft 1 will thus rotate the flywheel and start the engine. As the engine picks up under its own power, the starter motor is stopped and the combined kick back of the flywheel teeth, together with the re-

leased tension of the spring 14, feeds the pinion 13 back to its starting point. Incidentally, it is customary to weight a portion of the pinion to keep it in position.

Thus all of the advantages of the conventional starter drive are screwed together with a positive engagement of the driving and driven elements, and even though the resilient coupling weakens or breaks, the operator is believed to engage the starter pinion to start his engine. By interposing the coiled tension spring 14 within the compartment formed by plate 2 and cup flange 11, and because the spring acts as a cushioning means only and not as a driving connection, its useful life is increased many fold. The noise incident to starting of the car is vastly decreased as there is no violent contacting of moving parts with attendant shock to the mechanism.

Fig. 4 is a modification of the starter drive wherein a slightly different form of spring is utilized, the remainder of the drive mechanism being identical to that previously described. Instead of the flat torsional spring 14 of the first form of the invention a coiled tension spring 20 is substituted therefor. The bent ends 21 of spring 20 are retained in openings 22 formed in the driving head 2 and flanged disc 11. The action of the coil spring 20 is similar to the action of spring 14, in that the rotation of the motor shaft 1 takes up the initial tension of the spring and cushions the contact of the lugs 3 and 10 before applying torque to the sleeve 4. The position of spring 20 is adjustable to provide for right or left hand rotation of the starter shaft by merely reversing its position.

What I claim is:

1. An engine starter comprising a prime mover shaft having a driving head thereon, an externally threaded driven shaft sleeved on said prime mover shaft and adapted to screw threadedly engage a starter pinion, a housing carried on one end of said driven shaft adjacent said head, fingers projecting from said head and said driven shaft within said housing and in overlapping relationship.

2. An engine starter comprising a prime mover shaft having a driving head thereon, an externally threaded driven shaft sleeved on said prime mover shaft and adapted to screw threadedly engage a starter pinion, a housing carried on one end of said driven shaft adjacent said head, fingers projecting from said head and said driven shaft within said housing and in overlapping relationship, and resilient means connecting said head and driven shaft for permitting relative rotation therebetween.

3. An engine starter comprising a prime mover shaft having a driving head thereon, an externally threaded driven shaft sleeved on said prime mover shaft and adapted to screw threadedly engage a starter pinion, a housing carried on one end of said driven shaft adjacent said head, fingers projecting from said head and said driven shaft within said housing and in overlapping relationship, and resilient means connecting said head and driven shaft for permitting relative rotation therebetween, said resilient means comprising a torsion spring having one end secured to said housing and its opposite end to a finger on said driven shaft.

BENNETT HAYES McMANEUS.