July 16, 1929. J. MacBLANE 1,720,962

STARTER FOR INTERNAL COMBUSTION ENGINES

Filed April 10, 1928

Fig 1

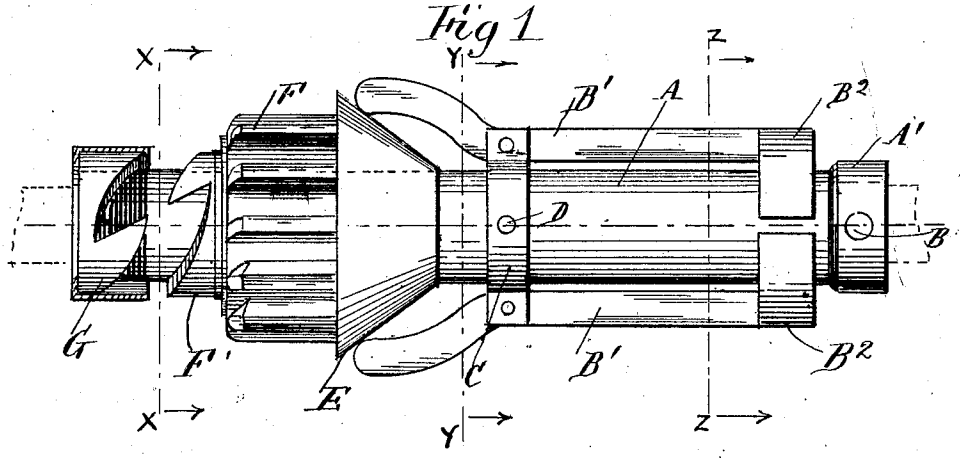


Fig 4

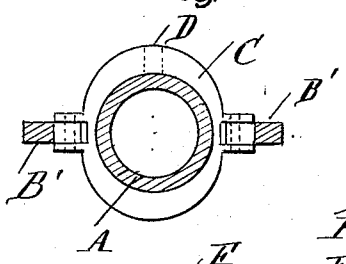


Fig 2

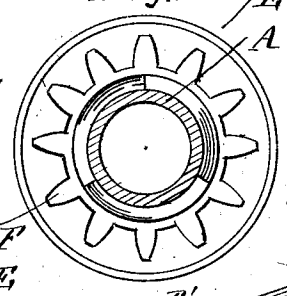
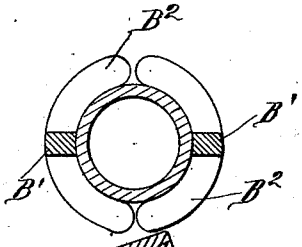


Fig 5



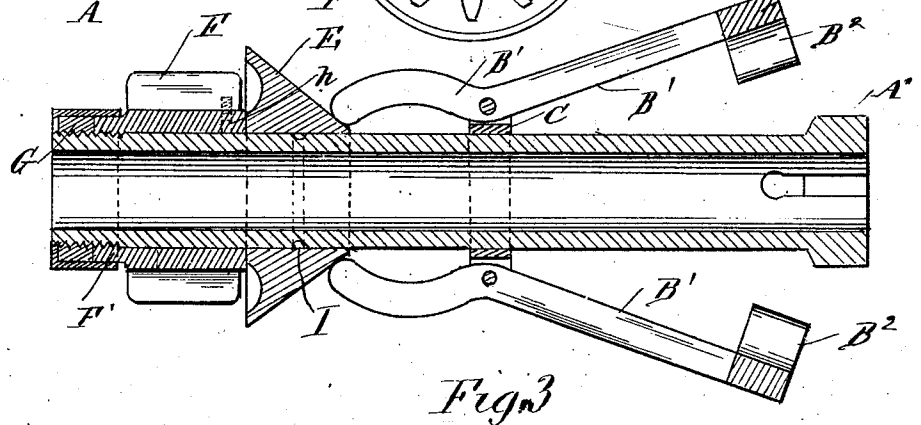


Fig 3

James MacBlane Inventor

By Connolly Bros

Attorney

Patented July 16, 1929. 1,720,962

UNITED STATES PATENT OFFICE.

JAMES MacBLANE, OF ELMIRA, NEW YORK, ASSIGNOR OF ONE-THIRD TO JOHN J. MURRAY AND ONE-THIRD TO J. JOHN HASSETT, BOTH OF ELMIRA, NEW YORK.

STARTER FOR INTERNAL-COMBUSTION ENGINES.

Application filed April 10, 1928. Serial No. 268,993.

This invention has relation to internal combustion engine starters, designed and adapted specially for starters of motor vehicles.

The object of the invention is to provide novel and effective means for bringing the starter into operative connection with the main shaft of the engine, so as to rotate the same and, after such operation to throw the starter out of gear with the motor shaft.

In carrying the invention into effect there is mounted on the spindle, or shaft, of the usual electromagnetic starting motor a tubular sleeve, which is secured to the said motor shaft so as to rotate therewith. Upon this sleeve is loosely mounted a cone, a pinion in close proximity to the base of the cone, having a neck formed with clutch teeth to form one member of a clutch, a rigidly secure clutch member with which the first named member is adapted to engage and a pair of arms pivotally mounted on a collar secured to the sleeve, and having divergent arms, the ends of which contact with the tapering surface of the cone. These arms are weighted at one end and so arranged that when the sleeve is rotated by the starter motor the weighted ends of said arms will be thrown outward by centrifugal force, causing their other ends to exert pressure on the cone and drive it lengthwise of the sleeve, the result being that the pinion will be brought into engagement with the teeth of the fly-wheel on the main shaft, and that at the same time the two clutch members will be brought into engagement with each other and the pinion locked upon the sleeve, thus causing the engine motor shaft to be rotated.

While such rotation is taking place, the resistance between the fly-wheel and the pinion due to the starting of the engine will cause the clutch members to separate by the relief angles on the clutch teeth, so that as soon as the motor has started and is operating under its own power the clutch members and pinion will have become disconnected therefrom and restored to normal.

The invention consists in the construction and combination of elements hereinafter more fully described and claimed.

In the accompanying drawings Fig. 1 is a side view of a device embodying the invention.

Fig. 2 is a transverse view on the line X—X, Fig. 1.

Fig. 3 is a central longitudinal sectional view.

Fig. 4 is a transverse sectional view on the line Y—Y of Fig. 1.

Fig. 5 is a transverse sectional view on the line Z—Z of Fig. 1.

In the drawings, "A" is a shaft with a hole all the way through it, and with a head A^1 formed on one end, tapped for a set screw B and having a woodrift key slot threaded on the other end.

"B" is a throw in lever made heavy on one end by a semi-circular piece bent to fit half way around the shaft. Two levers of the same kind are used.

"C" is a collar made to slide over the shaft and fastened by a set screw, slotted on two sides to act as a swivel bearing for "B".

"D" is a set screw holding "C".

"E" is a steel cone preferably about 2 inches at large diameter and 7/8 inch at small end and 5/8 inch long made to slide free on the shaft.

"F" is a gear with teeth cut to correspond with the teeth in the fly wheel of the engine with a pilate F^1 left on one end cut to form a three jawed clutch, bored to fit free on the shaft.

"G" is a nut which screws on to the threaded end of the shaft, milled to form a three jawed clutch to correspond with "F".

"H" is a small plunger and spring inserted in a hole inside the gear "F" which rides on the shaft to hold the gear from working forward when not in use, said shaft having a circumferential groove "I" in which said plunger is received.

The starter is first fastened to the starting motor shaft by sliding over the end and inserting key and set screw.

When the motor starts to revolve, the heavy ends of the levers "B" spread out causing the opposite ends to close together forcing "E" against "F" which inserts the teeth of "F" into the fly-wheel and then to the clutch "G" which starts to drive the fly-wheel. When the engine starts, the gear "F" is thrown back to its neutral position

by means of the relief angle on the clutch teeth of "F" and "G", and is there held back by the plunger "H" free from the fly-wheel. This relief angle on "F" and "G" does away with any springs.

As the teeth of gear "F" have gone or must go into the teeth of the fly-wheel before the clutch engages, this eliminates the stripping of the teeth of the fly-wheel.

The teeth on the clutch "F" and "G" are cut on a 29 degree angle on the driving face to insure full mesh of the teeth at all times before driving the engine.

I claim:

1. In a starter for internal combustion engines, the combination with the starting motor shaft, of a sleeve keyed thereto, a cone loosely mounted thereon and movable lengthwise of said shaft a weighted lever pivotally mounted on said shaft and having an arm adapted to impinge against and move said cone under centrifugal force due to the rotation of said sleeve, a pinion loosely mounted on said sleeve and carrying a clutch member, a clutch member secured to said shaft and engaging with the other clutch member, said pinion being arranged and adapted to be brought into engagement with a gear wheel on the engine motor shaft, when moved through the action of the cone and the clutch members interlocked, the parts being so combined that under reactionary rotation of the motor shaft by the engine power the said clutch members will be separated and the pinion disengaged from the motor gear.

2. In a starter for internal combustion engines, the combination with the starter shaft, of a shaft driven thereby, a sliding cone on said shaft a centrifugally operated lever adapted, under rotation of said shaft to impinge against and move said cone lengthwise of said shaft, a loose pinion on said shaft arranged and adapted to be moved by said cone, and carrying a clutch member, and another matching clutch member keyed to said shaft and adapted to be brought into engagement with the opposing member said pinion being arranged and adapted to engage with the fly-wheel of the engine when moved lengthwise in one direction, by the cone and to be disengaged therefrom under the reactionary power of the engine, when the latter is operating under its own power.

3. In a starter for internal combustion engines, a starting motor, a shaft rotated thereby, a pinion slidably mounted on said shaft, centrifugally operated means for bringing said pinion into engagement with the motor shaft of the engine, and means including clutch members, whereby the starter and engine are disconnected by the reacting power of the engine.

In testimony whereof I have affixed my signature.

JAMES MacBLANE.