W. L. McGRATH.

ENGINE STARTER.

APPLICATION FILED OCT. 17, 1917.

1,288,087.

Patented Dec. 17, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

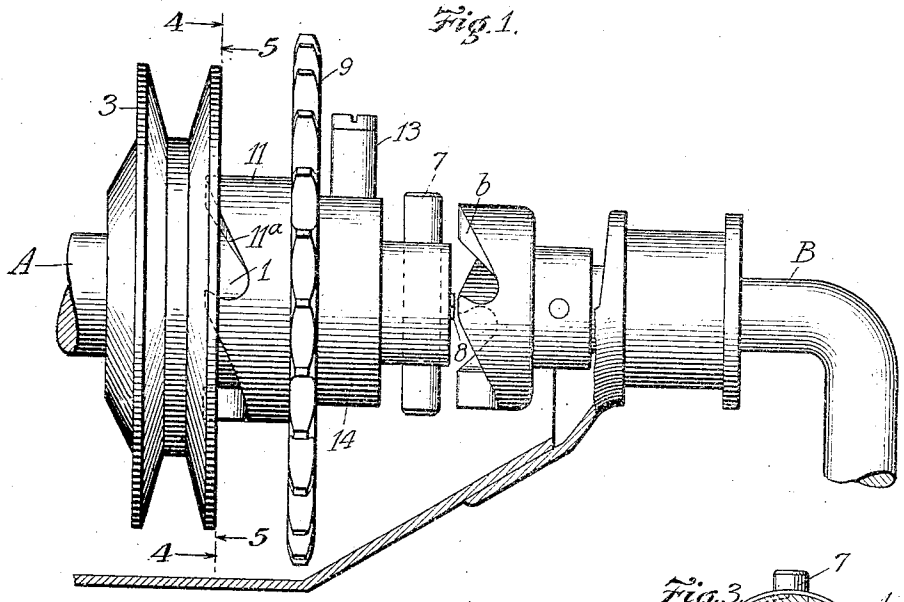


Fig. 3.

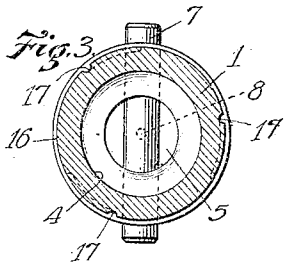
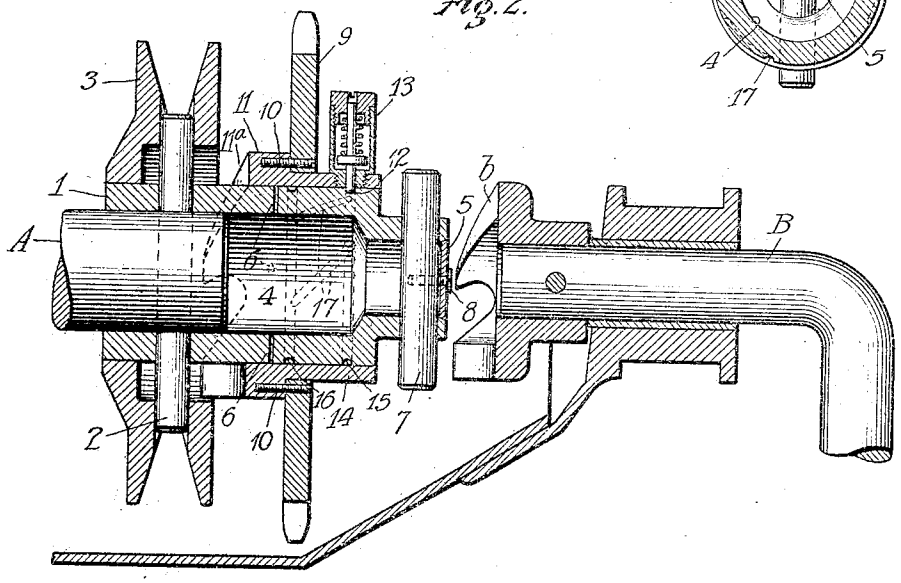


Fig. 2.



Witnesses
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2 SHEETS—SHEET 2.

Fig. 4.

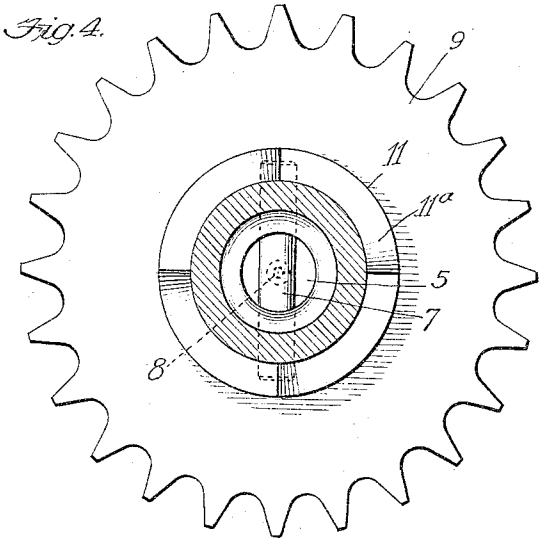


Fig. 5.

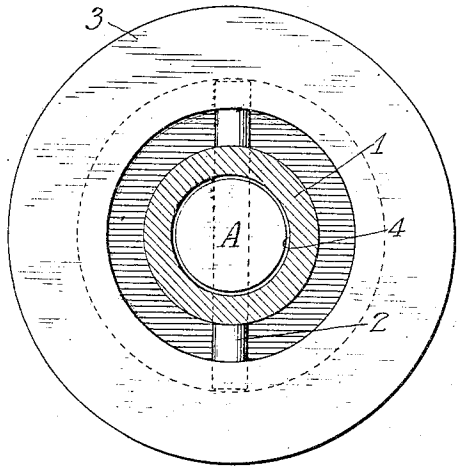
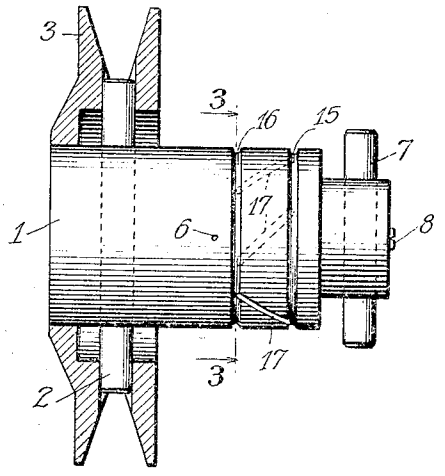


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM L. McGRATH, OF ELMIRA, NEW YORK, ASSIGNOR TO ECLIPSE MACHINE COMPANY, OF ELMIRA, NEW YORK, A CORPORATION OF NEW YORK.

ENGINE-STARTER.

1,288,087. Specification of Letters Patent. Patented Dec. 17, 1918.

Original application filed August 22, 1917, Serial No. 187,624. Divided and this application filed October 17, 1917. Serial No. 197,163.

To all whom it may concern:

Be it known that I, WILLIAM L. McGRATH, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Engine-Starters, of which the following is a specification.

My invention relates to engine starters and the object thereof is to provide a simple, efficient and reliable construction of starter capable of working in connection with either a starting motor alone or both a starting motor and a generator. My starter is also so constructed and designed as to be readily applied to internal combustion engines of standard manufacture or those now extensively in use.

This application is divisional of an application filed by me on August 22, 1917, Serial Number 187,624.

In the drawings Figure 1 is an elevation of my engine starter shown applied to the crank shaft of an internal combustion engine; Fig. 2 a longitudinal section thereof; Fig. 3 a cross section on the line 3—3 of Fig. 6; Fig. 4 a section of the device shown in Fig. 1 looking in the direction of the arrows 4—4; Fig. 5 a section on the same line of Fig. 1 but looking in the direction of the arrows 5—5; and Fig. 6 a detail sectional elevation of the sleeve and driven wheel.

Referring to the embodiment of my invention herein shown, I have shown my starter as applied to the crank shaft A of an internal combustion engine, not otherwise shown, but it will be understood that such starter may be applied to any rotatable member of or connected with such engine. My starter device is adapted to be operated by a suitable prime mover such as an electric motor (not shown) and is also associated with means for driving a generator (not shown). However, my device may be used merely as a starter and not be associated with any generator driving means. In the present instance the engine is provided with the usual crank shaft B having a clutch jaw *b* adapted to be operatively connected with the crank shaft for cranking the engine or motor by hand if desired.

Upon the forward end of the crank shaft and extending forwardly thereof, there is secured a sleeve 1 by means of a cross pin 2 which also forms the means of securing stationarily upon such sleeve the driven wheel 3, which is here shown as in the form of a pulley adapted to drive a fan or generator or both by means of a belt or the like.

By means of the extended portion of this sleeve there is formed therewithin a chamber 4 which, at its reduced forward end, is closed by a suitable closure such as the plate 5. This chamber is adapted to contain a suitable lubricant which is adapted to flow through the ports 6 to the exterior surface of such sleeve at a point where the same forms a bearing for the driving wheel hereinafter described. A pin 7 passes transversely through the reduced forward end of the sleeve and projects therebeyond in such manner as to be engaged by the jaw *b* of the hand crank. For the purpose of holding both this pin and plate 5 in position I employ suitable means such as the screw 8 passing through the plate and screwing into the pin.

The driving wheel 9, which is here in the form of a sprocket wheel, is by preference and as shown, made in two parts, the wheel proper and its hub, such parts being connected together by the screws 10. This hub extends on both sides of the wheel proper, the inner portion 11 of which is provided on its inner face or edge with clutch means such as the jaws 11^a, adapted to be operatively connected with the crank shaft by the engagement of such jaws with the pin 2.

The driving wheel is mounted concentric of and has a bearing upon the sleeve 1, being capable of a rotary movement thereon and a longitudinal or axial movement thereof for the purpose of engagement with the pin 2 and the driving of the crank shaft thereby.

Means are provided for automatically shifting the driving wheel longitudinally to cause such engagement, such means consisting of the spring-pressed pin 12 mounted in the casing 13 which is screw-threaded into the forwardly extending hub portion 14 of the driving wheel. This pin projects through such hub portion and is adapted to coöperate with peripheral and inclined grooves in the bearing portion of the sleeve 1. As shown in detail in Fig. 6 there are two peripheral grooves 15 and 16 and a series of connecting inclined cross grooves 17, which are deeper than the other grooves so that the spring-pressed pin will enter and

follow these deeper grooves. When the parts are in normal or disengaged position as shown in Figs. 1 and 2, this pin is positioned in the groove 15, but when the driving wheel is rotated the pin will enter one of the cross grooves which will cause a longitudinal or lateral movement of the driving wheel whereby its clutch means will engage the pin 2 and drive the engine or motor, at which time the pin is positioned in the other peripheral groove 16. When the motor or engine has started on its own power the excess speed of rotation will cause a longitudinal retracting movement of the driving wheel because of the inclined edges of the clutch jaws, and will thereby cause a disengagement of the driving wheel from said operating connection with the crank shaft. The driving wheel is held in its normal position with respect to the sleeve by means of the pin 12 which is at this time in the peripheral groove 15.

I claim:

1. In combination with a rotatable member of the engine to be started, a rotatable and axially movable wheel arranged concentric thereof and provided with a clutch means, a second clutch means connected with said member and arranged in the path of movement of the first named clutch means, and means for automatically moving the driving wheel to bring said two clutch means into engagement, consisting of a yielding pin mounted in said driving wheel, and a sleeve secured to said member and having peripheral and inclined grooves with which said pin coöperates.

2. In combination with a rotatable member of the engine to be started, a rotatable and axially movable wheel arranged concentric thereof and provided with a clutch means, a second clutch means connected with said member and arranged in the path of movement of the first named clutch means, said driving wheel having a hub on the inner end of which its clutch means is located, and means for automatically moving the driving wheel to bring the two clutch means into engagement consisting of a yielding pin mounted in the outer end portion of the hub, and a sleeve secured to said member and having peripheral and inclined grooves with which said pin coöperates.

3. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, means for securing said driven wheel to said member and adapted to be engaged by the clutch means, and means for automatically moving the driving wheel axially into clutching engagement with said securing means.

4. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, a pin for securing said driven wheel to said member, and means for automatically moving the driving wheel axially into clutching engagement with said pin.

5. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and having complementary clutch means, such driven wheel being disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, and means for automatically moving the driving wheel axially to cause clutching engagement with the driven wheel.

6. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, a sleeve which is concentric of said member and on which the driving wheel is loosely mounted and the driven wheel is fixedly mounted, means in common with the driven wheel and sleeve for securing them to said member, and means for automatically moving the driving wheel axially to cause clutching engagement and a coupling of the driving and the driven wheels.

7. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, a sleeve which is concentric of said member and on which the driving wheel is loosely mounted and the driven wheel is fixedly mounted, a pin for securing the driven wheel and sleeve to said member, and means for automatically moving the driving wheel axially to cause clutching engagement with said pin.

8. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and having complementary clutch means, such driven wheel being disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel

is loosely and the driven wheel fixedly mounted, and means for automatically moving the driving wheel axially to cause clutching engagement with the driven wheel, said sleeve being closed at its outer end and extending forward of the end of said member to form a chamber adapted to contain a lubricant, said sleeve having a port between said chamber and the bearing formed between the sleeve and the driving wheel.

9. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and having complementary clutch means, such driven wheel being disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, means for automatically moving the driving wheel axially to cause clutching engagement with the driven wheel, said sleeve being closed at its outer end and extending forward of the end of said member to form a chamber adapted to contain a lubricant, said sleeve having a port between said chamber and the bearing formed between the sleeve and the driving wheel, and a projection on the outer end of such sleeve adapted to be engaged by an ordinary hand crank.

10. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and having complementary clutch means, such driven wheel being disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, means for automatically moving the driving wheel axially to cause clutching engagement with the driven wheel, said sleeve being closed at its forward end and extending forward of the end of said member to form a chamber adapted to contain a lubricant, said sleeve having a port between said chamber and the bearing formed between the sleeve and the driving wheel, and a transverse pin in the outer end of the sleeve and adapted to be engaged by an ordinary hand crank.

11. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and having complementary clutch means, such driven wheel being disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, means for automatically moving the driving wheel axially to cause clutching engagement with the driven wheel, said sleeve being closed at its outer end and extending forward of the end of said member to form a chamber adapted to contain a lubricant, said sleeve having a port between said chamber and the bearing formed between the sleeve and the driving wheel, a transverse pin in the outer end of the sleeve adapted to be engaged by an ordinary hand crank, a plate for closing such end of the sleeve, and means for securing the plate and pin together to hold both in place.

12. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and having complementary clutch means, such driven wheel being disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, means for automatically moving the driving wheel axially to cause clutching engagement with the driven wheel, said sleeve extending forwardly of said member, and a projection on the outer end of such sleeve adapted to be engaged by an ordinary hand crank.

13. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof and provided with a clutch means, a driven wheel also arranged concentric of said member and having complementary clutch means, such driven wheel being disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, means for automatically moving the driving wheel axially to cause clutching engagement with the driven wheel, said sleeve extending forwardly of said member, and a transverse pin on the outer end of such sleeve adapted to be engaged by an ordinary hand crank.

14. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, said two wheels being provided with complementary driving means, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, and means for automatically moving the driving wheel axially to bring it into

driving engagement with the other wheel, such means consisting of a yielding pin mounted in the driving wheel and coöperating with circumferential and inclined grooves formed in the outer surface of the sleeve.

15. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, said two wheels being provided with complementary driving means, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, said driving wheel having a hub fitting upon the sleeve, and means for automatically moving the driving wheel axially to bring it into driving engagement with the other wheel, such means consisting of a yielding pin mounted in such hub and extending therethrough, and the sleeve having circumferential and inclined grooves with which such pin coöperates.

16. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, said two wheels being provided with complementary driving means, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, said driving wheel having a hub fitting upon the sleeve, and means for automatically moving the driving wheel axially to bring it into driving engagement with the other wheel, such means consisting of a casing mounted on said hub, a spring pressed plunger within the casing and extending therethrough, said sleeve having circumferential and inclined grooves with which said plunger pin coöperates.

17. In combination with a rotatable member of the engine to be started, a rotatable and axially movable driving wheel arranged concentric thereof, a driven wheel also arranged concentric of said member and disposed laterally of the driving wheel, a sleeve which is secured to said member and on which the driving wheel is loosely and the driven wheel fixedly mounted, a pin for securing the driven wheel and sleeve to said member, said driving wheel having a hub, the inner end of which has a clutch face to engage the pin, and means mounted on the outer portion of the hub for automatically moving the driving wheel laterally consisting of a spring pressed pin passing through such portion of the hub, said sleeve having circumferential and inclined grooves with which the pin coöperates.

WILLIAM L. McGRATH.