P. ECHTER.

ENGINE STARTING DEVICE.

APPLICATION FILED MAY 16, 1916.

1,281,314.

Patented Oct. 15, 1918.

2 SHEETS—SHEET 1.

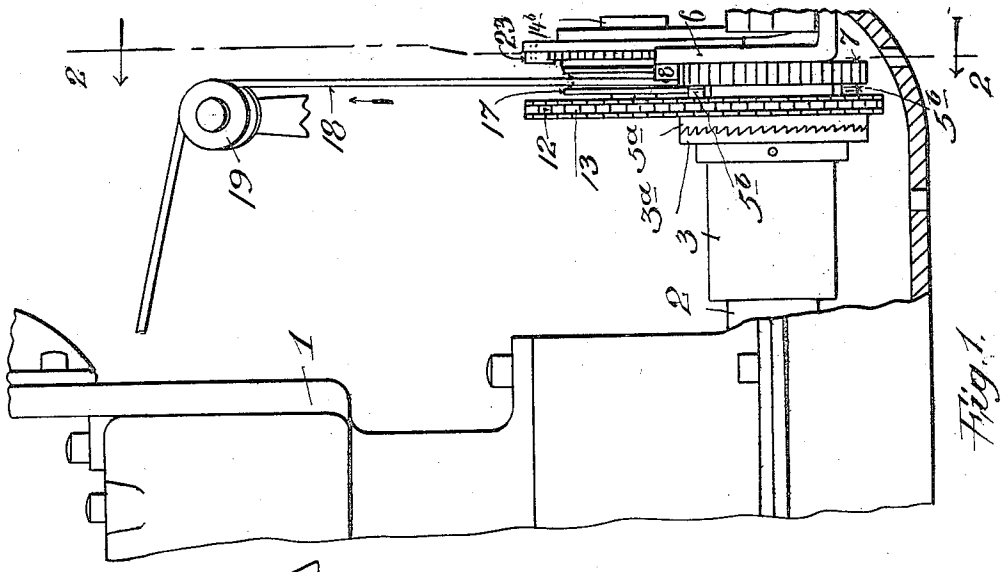


Fig. 1.

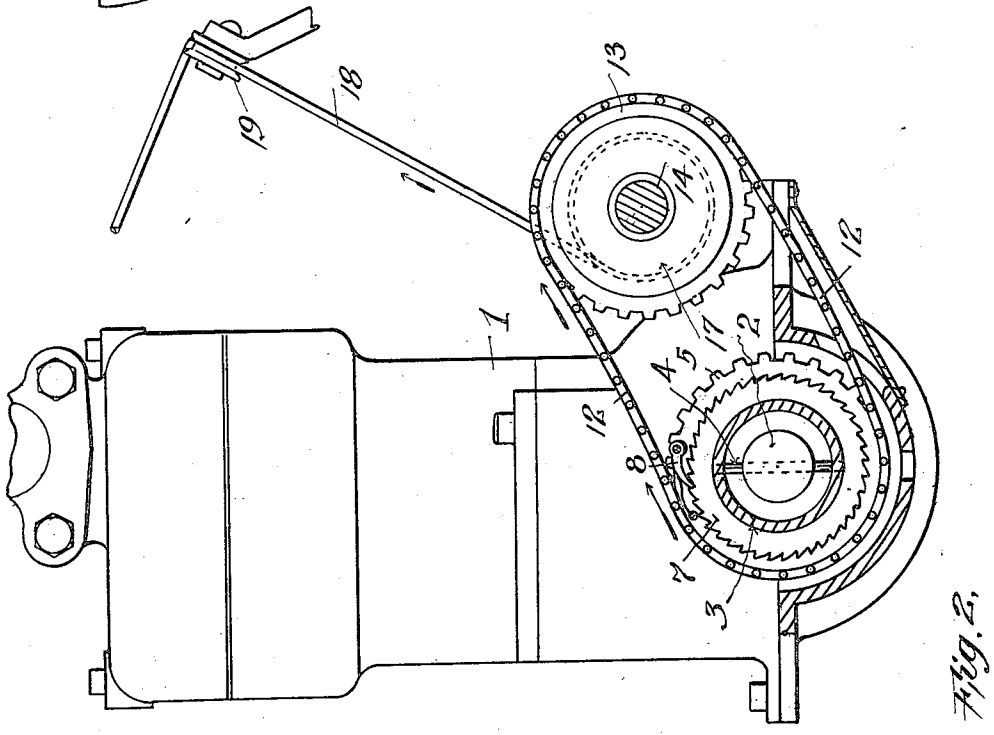


Fig. 2.

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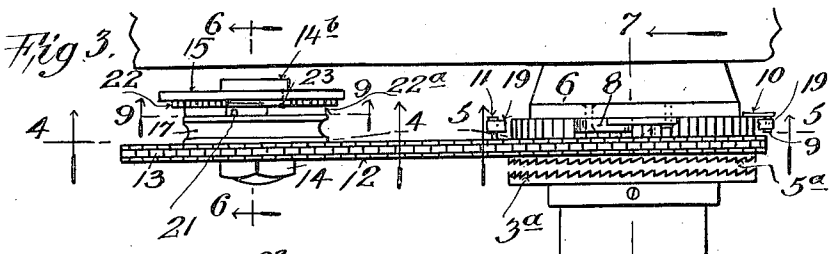
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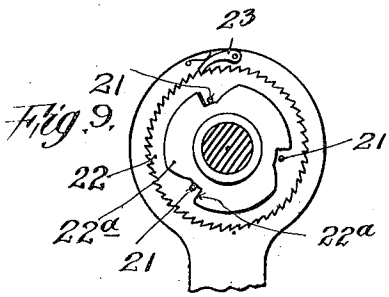
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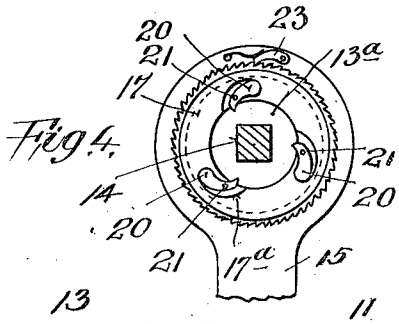
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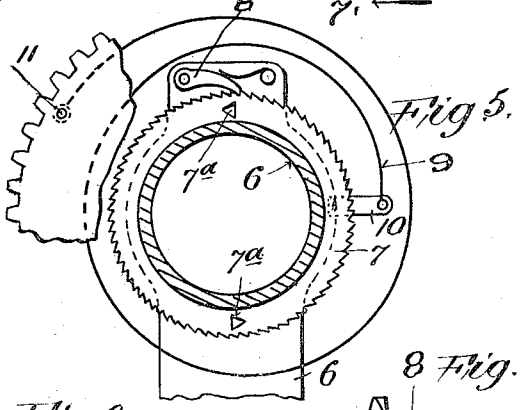
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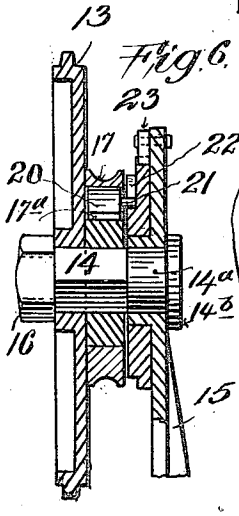
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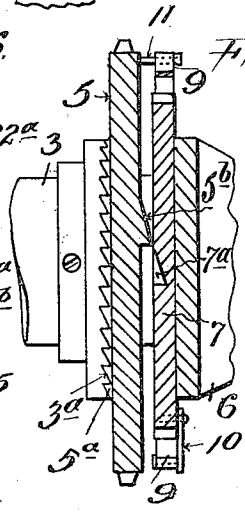


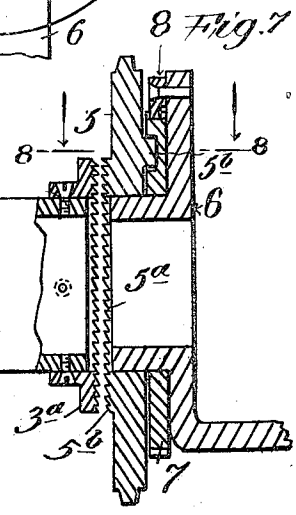












Inventor

Paul Echter.

By his Attorney

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UNITED STATES PATENT OFFICE.

PAUL ECHTER, OF NEW YORK, N. Y.

ENGINE STARTING DEVICE.

1,281,314. Specification of Letters Patent. Patented Oct. 15, 1918.

Application filed May 16, 1916. Serial No. 97,769.

To all whom it may concern:

Be it known that I, PAUL ECHTER, a subject of the Czar of Russia, and resident of New York city, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Engine Starting Devices, of which the following is a specification.

My invention relates to improvements in means for starting internal combustion engines and analogous machinery, and has for its objects to provide efficient means for the purpose stated adapted to be operated from any convenient position; to cause automatic unclutching or release of the starting devices from the engine shaft when the latter rotates under its own power, and to cause release of the starting devices in case the engine "back kicks," in order to prevent injury.

My invention comprises novel details of improvement and combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein,

Figure 1 is a side view of a portion of an internal combustion engine equipped with my improvements, showing the parts in position for starting the engine, spring 9 being omitted;

Fig. 2 is a section on the line 2, 2, in Fig. 1;

Fig. 3 is a plan view illustrating the device unclutched from the engine shaft;

Figs. 4, 5, 6, 7 and 9 are sectional views, respectively taken substantially on lines 4, 4, 5, 5, 6, 6, 7, 7 and 9, 9, in Fig. 3; and

Fig. 8 is a plan view partly in section on the line 8, 8, in Fig. 7.

Similar numerals of reference indicate corresponding parts in the several views.

The numeral 1 in the accompanying drawings indicates a portion of an internal combustion engine, and at 2 is its crank shaft. At 3 is a coupling or sleeve secured upon said shaft, which coupling or sleeve may be a portion of a fan belt pulley, if desired. At 4 is a pin connecting sleeve or coupling 3 with shaft 2 and which may serve to receive the clutching end portion of a crank shaft for starting the engine by hand in an ordinary manner. At 5 is a wheel shown mounted to rotate upon a hollow guide 6 adapted to be secured to a suitable support in register with the axis of shaft 2, as to the frame of an automobile whereby the starting crank may be pushed through the bore of guide 6 for starting the engine by hand. Clutching means are provided between wheel 5 and sleeve or coupling 3, whereby said wheel, when rotated, may rotate shaft 2. I have shown sleeve 3 provided with teeth 3^a adapted to be engaged by teeth 5^a on the side of wheel 5, for rotating shaft 2 when wheel 5 is rotated. The clutch members 3^a and 5^a are normally out of engagement, and means are provided to cause their engagement when wheel 5 is rotated, and to cause disengagement of such clutch devices when shaft 2 is rotated by the engine under its own power. For such purpose I have shown wheel 5 provided with a projection 5^b (Fig. 8) having an outer inclined surface adapted to coact with a corresponding reëntrant portion, such as a depression or recess 7^a in a toothed wheel 7 that is mounted to rotate freely upon guide 6 (Figs. 5, 7 and 8). A spring pressed dog 8 is shown carried by guide 6 and adapted to engage the teeth of wheel 7 (Figs. 5 and 7) to limit rotation of said wheel in one direction. A coiled spring 9 is shown connected at one end with wheel 7 as by the projection 10, and at the opposite end said spring is connected with wheel 5 by pin 11. The tendency of spring 9 is to cause wheel 5 to rotate reversely to its direction of rotation for starting the engine, whereby to cause the teeth 3^a, 5^a when the teeth 5^a travel reversely along the teeth 3^a, to tend to move wheel 5 outwardly to cause projection 5^b to enter recess 7^a and for unclutching members 3 and 5. If a "back kick" of the engine shaft occurs while the clutch members 3 and 5 are in engagement, the wheel 7 may rotate reversely under dog 8, as compelled so to do by reverse rotation of wheel 5 through spring 9. When wheel 5 is rotated in the direction of the arrows in Fig. 2, its projection 5^b will ride along the inclined face of recess 7^a of wheel 7, to cause wheel 5 to move to the left in Fig. 8, to cause clutching of members 3 and 5, the wheel 7 being prevented from rotating in a corresponding direction by dog 8. Hence, shaft 2 will be rotated, and as the teeth 3^a, when the engine speeds up on starting, then slip along the teeth 5^a said teeth will be unclutched, since the projection 5^b registers with recess 7^a, the spring 9 permitting rotation of wheel 5 independent from wheel 7 for such purpose, said spring, however, causing projection 5^b to remain seated in recess 7^a until the next starting operation.

Wheel 5 may be rotated in any suitable

manner, as by means of a chain 12 passing over the teeth of said wheel, or by a belt or other transmitting means. I have shown chain 12 passing over a toothed wheel 13 that is secured upon a shaft 14, as by means of squared portions of said wheel and shaft. Said shaft is rotatively supported by a bracket or the like 15 adapted to be secured to the frame of an automobile, or on any other suitable support spaced from shaft 2. Shaft 14 is shown provided with an annular portion 14^a rotative in a bearing in bracket 15 and having a head 14^b bearing against said bracket, a nut 16 on said shaft retaining the latter in its bearings (Fig. 6). I have shown wheel 13 provided with an annular hub 13^a upon which is rotatively mounted a belt wheel or pulley 17 adapted to receive a belt or the like 18, which may be pulled to cause operation of the starting mechanism. The belt 18 may be guided by a pulley 19 and carried to any suitable position adjacent to an operator, and there provided with any desired pulling device, in a well known manner. Parts 13 and 13^a may be made in a single piece or in separate pieces secured together. The wheel 17 carries one or more dogs 20, which are shown located in corresponding recesses 17^a in said wheel and adapted to engage notches or teeth in the periphery of hub 13^a (Fig. 4), whereby when band 18 is pulled and wheel 17 is rotated the wheel 13, through dogs 20, will be correspondingly rotated to operate chain 12 and wheel 5 for causing starting of the engine shaft. The reverse rotation of wheel 5 by means of spring 9 causes chain 12 to reverse the rotation of wheels 13 and 17 to rewind belt 18 on the latter. To cause disconnection of the dog or dogs 20 from wheel 13, in case the engine should back kick when being started, I provide the dogs 20 with projections 21 that are adapted to coact with cam-like or outwardly inclined portions 22^a on a rotative member or wheel 22 that is mounted to rotate upon a hub or bearing of bracket 15 (Figs. 6 and 9). The member 22 is provided with stops 22^a adjacent to the cam-like portions 22^b to be engaged by projections 21. Rotative member 22 is provided with peripheral teeth adapted to be engaged by spring pressed pawl 23 pivotally carried by bracket 15.

The arrangement is such that when wheel 17 is rotated by belt 18, the projections 21 of dogs 20, by engaging stops 22^a on member 22, will cause rotation of the latter, its teeth slipping under pawl 23. If the engine back kicks while the clutch members 3 and 5 are in engagement, the reverse rotation of wheel 13 caused by wheel 5 reversing the travel of chain 12, carries dogs 20 reversely, causing the projections 21 of said dogs to immediately ride on the cam-like portions 22^a and then, since member 22 is restrained from reverse rotation by pawl 23, the dogs 20 will be lifted out of engagement with the teeth of hub 13^a, and thus pulley 17 will be released from the influence of the reverse rotation of the engine shaft, and injury to the parts and to the operator will be prevented. As soon, however, as shaft 2 comes to rest and band 18 is again pulled by the operator the dogs 20 will be moved and their projections 21 will pass down the cam-like inclines 22^a to permit the dogs to again engage teeth of hub 13^a for operating chain 12 and starting the engine shaft as required.

From the foregoing it will be understood that the operator need merely pull band or belt 18 to communicate motion through dogs 20 to wheel 13, the latter then operating chain 12, thereby to cause rotation of wheel 5 and the automatic engagement of clutch members 3, 5, whereupon a continued pull upon belt 18 will cause rotation of engine shaft 2, and that when the pull upon belt 18 is released the spring 9 will cause reverse rotation of said parts and rewinding of belt 18 upon wheel 17 ready for another operation, it being noted that as soon as the engine starts to rotate under its own power the clutch members 3, 5, will be disengaged, in the manner before stated, for continued rotation of the shaft without continued rotation of the parts of the starter mechanism other than clutch member 3. My invention, therefore, comprises the advantages of automatic clutching and unclutching of the members 3 and 5, and automatic release of the starting devices from the pulling band or belt in the event of "back kick" of the engine.

While I have illustrated a practical and efficient mechanism for the purpose stated, it will be understood that changes may be made in the details of construction and arrangement of parts set forth within the scope of the appended claims, without departing from the spirit of the invention.

Having now described my invention what I claim is:—

1. The combination of a shaft provided with a clutch member, a wheel provided with a clutch member to coact with the first named clutch member, means to rotate said wheel, a second wheel, means coactive between said wheels to cause engagement of said clutch members when one wheel moves relatively to the other, means to restrain rotation of the second named wheel by the first named wheel, and means to permit rotation of the second named wheel by the first named wheel.

2. The combination of a shaft provided with a clutch member, a wheel provided with a clutch member to coact with the first named clutch member, means to rotate said wheel, a second wheel, means coactive between said wheels to cause engagement of

said clutch members when one wheel moves relatively to the other, means to restrain rotation of the first named wheel by the second named wheel, and a spring connected with said wheels to be wound upon rotation of the first named wheel and adapted to cause reverse rotation of said wheel.

3. The combination of a shaft provided with a clutch member, a wheel provided with a clutch member to coact with the first named clutch member, means to rotate said wheel, projecting and reëntrant parts between said wheels to permit normal disengagement of said clutch members and to cause engagement thereof when said projecting and reentrant parts move relatively one to another, the second named wheel being provided with teeth, a dog to coact with said teeth to restrain rotation of said wheel in one direction, and a spring connecting said wheels to permit the first named wheel to have limited rotation relatively to the second named wheel and to cause reverse rotation of the first named wheel.

4. The combination of a shaft, clutch members to rotate the shaft, means to retain said members in normal disengagement and to cause engagement of said members for rotation of the shaft, a wheel, means operatively connecting said wheel with one of said clutch members, a second wheel provided with a dog, the first named wheel having a tooth to engage said dog, said dog having a projection, a rotative member having a cam-like portion and a stop to coact with said projection, whereby said member may be rotated in one direction by said projection coacting with said stop, and means to prevent reverse rotation of said member to cause said cam-like portion to release said dog from said tooth.

5. The combination of a wheel having a tooth, a second wheel provided with a dog to engage said tooth, said dog being provided with a projection, means coactive with said projection and movable by and with the same in one direction, and means to stop reverse rotation of the last named means to cause release of said dog from said tooth upon reverse rotation of said dog.

6. The combination of a wheel having a tooth, a second wheel provided with a dog to engage said tooth, said dog being provided with a projection, a rotative member having a cam-like portion and a stop to coact with said projection, whereby said member may be rotated in one direction by said projection coacting with said stop, and means to prevent reverse rotation of said member to cause said cam-like portion to release said dog from said tooth.

7. The combination of a wheel having a tooth, a second wheel provided with a dog to engage said tooth, said dog being provided with a projection, a rotative member having a cam-like portion, and a stop to coact with said projection, whereby said member may be rotated in one direction by said projection coacting with said stop, said member having teeth, and a dog coactive with said teeth to permit rotation of said member with the dog in one direction and to prevent reverse rotation of said member when the dog rotates reversely.

8. The combination of a shaft, a wheel, clutch members between the shaft and wheel for operating the former by the latter, means coactive with said wheel for causing engagement of the clutch members when the wheel is moved in one direction and for causing disengagement of such members when the shaft moves in such direction, a second wheel, means operatively connecting said wheels, means to rotate said second wheel in one direction, and means to cause release of said wheel from said rotating means upon reverse rotation of said wheel.

9. The combination of a shaft, a wheel, clutch members between the shaft and wheel for operating the former by the latter, means coactive with said wheel for causing engagement of the clutch members when the wheel is moved in one direction and for causing disengagement of such members when the shaft moves in such direction, a second wheel, means operatively connecting said wheels, a third wheel, devices interposed between the second and third wheels for rotating one by the other in one direction, and means to cause disengagement of said devices upon rotation of the second named wheel by the first named wheel in a reverse direction.

10. The combination of a shaft, a wheel, clutch members between the shaft and wheel for operating the former by the latter, means coactive with said wheel for causing engagement of the clutch members when the wheel is moved in one direction and for causing disengagement of such members when the shaft moves in such direction, a second wheel, means operatively connecting said wheels, a third wheel provided with a dog, the second named wheel having a tooth to engage said dog, said dog having a projection, a rotative member having a cam-like portion and a stop to coact with said projection whereby said member may be rotated in one direction by said projection coacting with said stop, and means to prevent reverse rotation of said member to cause said cam-like portion to release said dog from said tooth.

Signed at New York city, in the county of New York and State of New York this 12th day of May, A. D. 1916.

PAUL ECHTER.