W. F. & C. P. GROLL.

MEANS FOR STARTING INTERNAL COMBUSTION ENGINES.

APPLICATION FILED AUG. 24, 1914.

1,149,978.

Patented Aug. 10, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

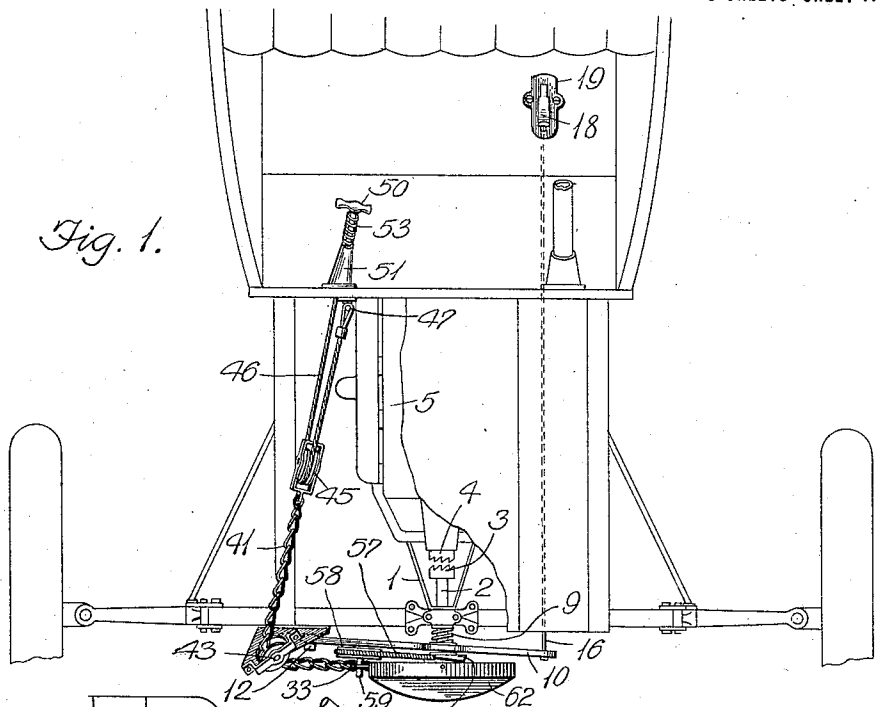
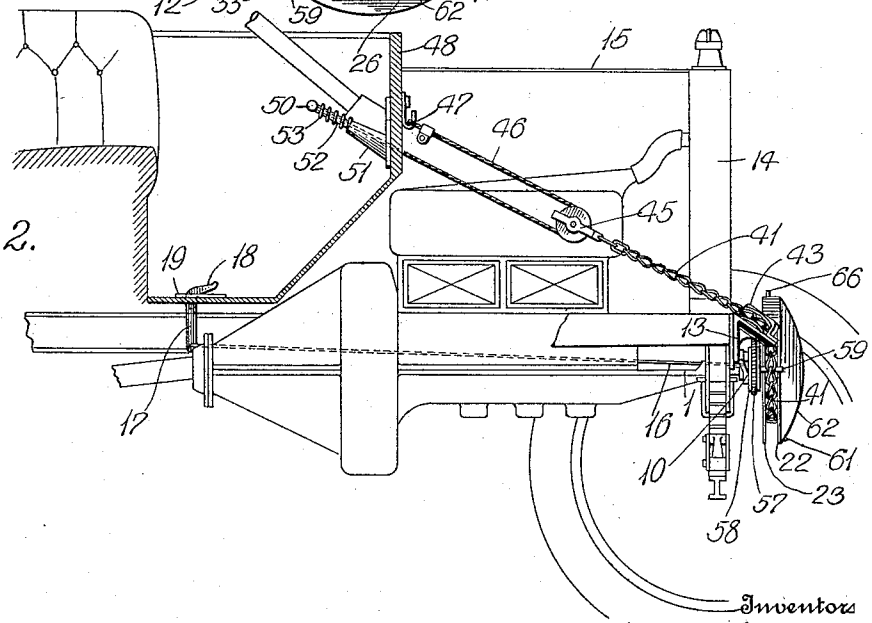


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

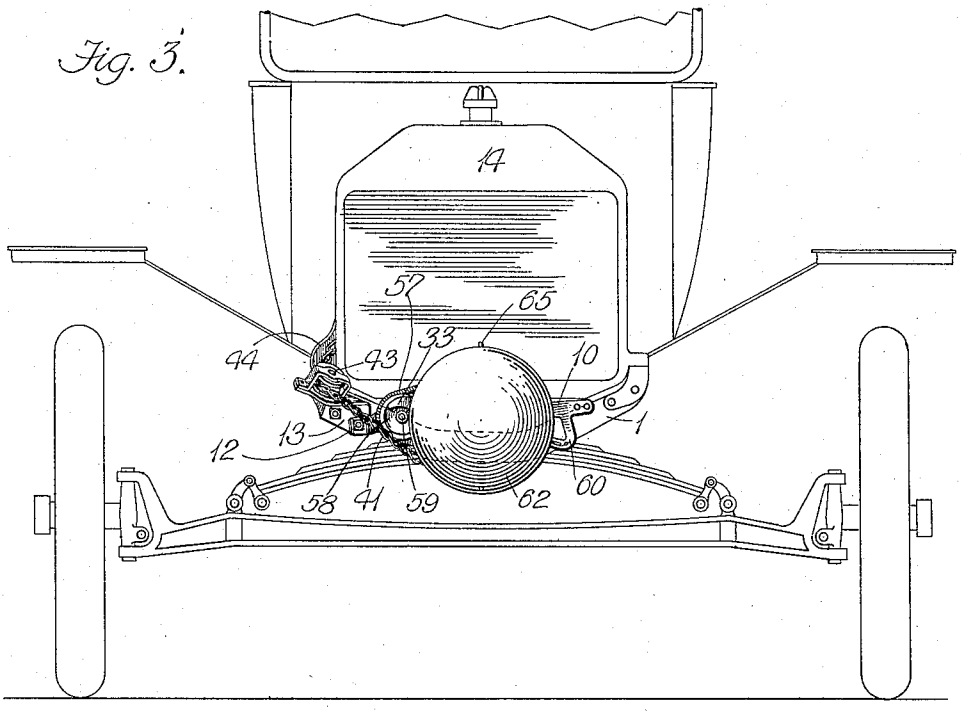


Fig. 6.

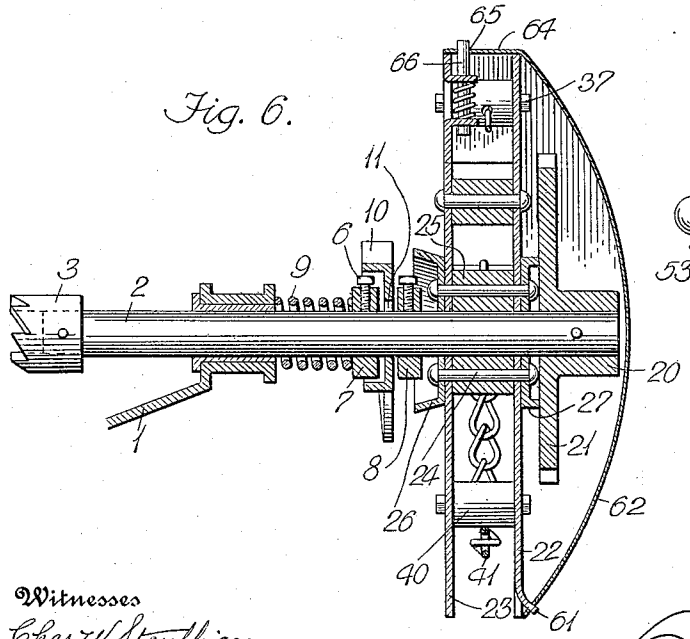
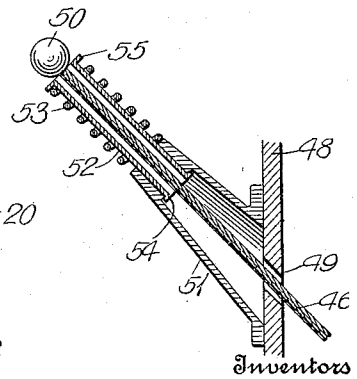


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 4.

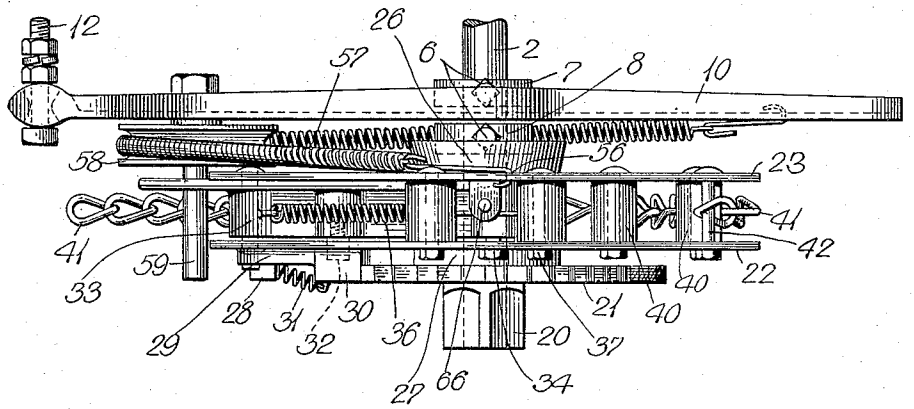
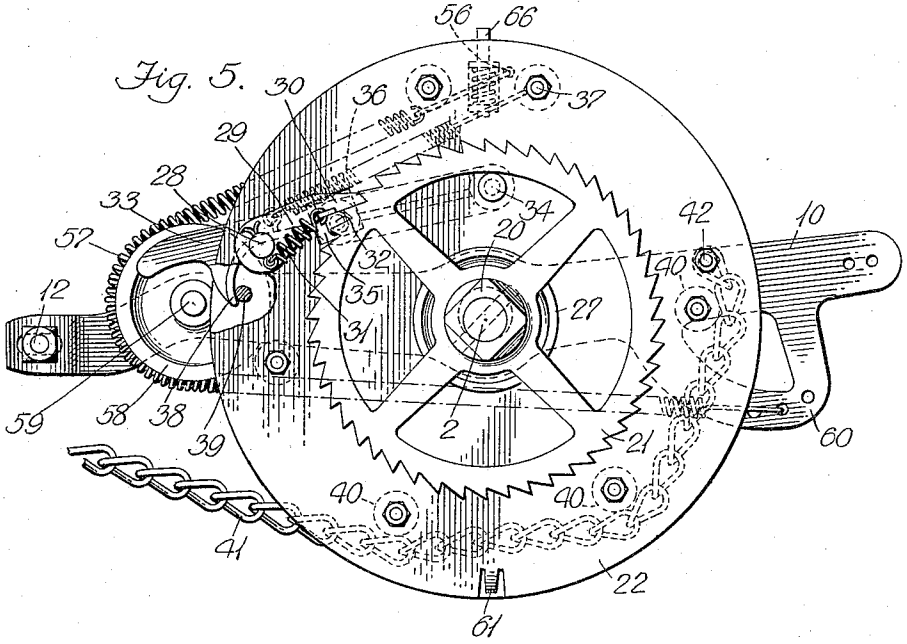


Fig. 5.



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MEANS FOR STARTING INTERNAL-COMBUSTION ENGINES.

1,149,978. Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed August 24, 1914. Serial No. 858,401.

To all whom it may concern:

Be it known that we, WILLIAM F. GROLL and CHARLES P. GROLL, citizens of the United States of America, residing at Waldo, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Means for Starting Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to means for starting internal combustion engines, and more particularly to a mechanism that has been especially designed for starting the engines of automobiles and similar vehicles. The mechanism is manually operated in contradistinction to those starting devices utilizing electricity, air and motive fluids.

The primary object of our invention is to provide positive and reliable means, in a manner as hereinafter set forth, for expeditiously starting or cranking the shaft of an internal combustion engine, without the necessity of taking a position in front of an automobile, eliminating dangers incident thereto, besides preventing racing of an engine.

Another object of the invention is to provide a manually operated starting device for engines wherein provision is made for back firing or back lashing in order that the starting mechanism will not be injured.

A further object of our invention is to provide an engine starting device consisting of comparatively few parts that are inexpensive to manufacture, durable, easy to assemble and highly efficient, particularly in connection with the Ford type of automobiles.

With the above and other objects in view the invention resides in the novel construction, combination and arrangement of parts to be hereinafter specifically described and then claimed, and reference will now be had to the drawing, wherein,

Figure 1 is a plan of the engine starting device as applied to a portion of an automobile; Fig. 2 is a side elevation of the same; Fig. 3 is a front elevation of the engine starting device; Fig. 4 is an enlarged plan of a portion of the device with the cover or casing thereof removed; Fig. 5 is a front elevation of the same; Fig. 6 is an enlarged longitudinal sectional view of the principal part of the engine starter, and Fig. 7 is an enlarged longitudinal sectional view of a tension device associated with the starting casing.

In describing our invention by aid of the views above referred to, we desire it to be understood that the same are merely illustrative of an example whereby our invention may be applied in practice, and we do not care to confine ourselves to the precise construction and arrangement of parts shown. The following description is therefore to be broadly construed as including substitute arrangements and constructions which are the obvious equivalents of those hereinafter referred to.

In the drawings, 1 denotes the front end bearing of an automobile and journaled in the said bearing is a starter shaft 2 adapted to be shifted longitudinally thereof whereby a clutch member 3 of said shaft can be placed in engagement with a complemental clutch member 4, carried by the shaft of an internal combustion engine 5.

Mounted upon the starter shaft 2, in advance of the front end bearing 1, by set screws 6 or other fastening means, are collars 7 and 8, the former serving as an abutment for a coiled compression spring 9 that encircles the shaft 2 and bears against the bearing 1. This spring is adapted to hold the shaft 2 normally retracted and to shift said shaft to such position after the cranking or starting of the engine 5. The collars 7 and 8 are spaced apart to provide clearance for a controlling lever 10, said lever having an opening 11 through which the starter shaft 2 extends. One end of the controlling lever 10 is loosely mounted or fulcrumed upon a stud bolt 12 connected to an angle bracket 13, carried by the front end bearing 1. The angle bracket 13 is positioned at the lower corner of the radiator 14 of the automobile in proximity to the engine hood or casing 15.

The opposite end of the controlling lever 10 is connected to a rod or cable 16 extending rearwardly at one side of the crank case of the engine 5 and said rod or cable is connected to the long arm or depending end 17 of a treadle 18 supported by a plate 19 secured to a floor board of the automobile contiguous to the operator's seat. Pressure upon the treadle 18 shifts the controlling lever 10 in a lateral plane, moving the starter shaft 2 and placing the spring 9 under greater tension. With the foot upon the treadle 18 the starter shaft 2 is inter-

locked with the engine shaft for rotative continuity in the one direction therewith, but permits of counter-clockwise movement caused by back-firing or back-lashing of the engine.

Mounted upon the extreme forward end of the starter shaft 2 is the hub 20 of a large ratchet wheel 21, and loosely mounted upon the starter shaft 2, between the ratchet wheel 21 and the collar 8 is a drum. The drum is composed of large disks or circular plates 22 and 23 arranged in parallelism and connected by rivets 24 or other fastening means to a hub 25 and spacing members 26 and 27. The front side of the disk 22 is provided with a stud 28 and pivotally mounted upon said stud is a pawl 29 provided with an off-set tooth 30 normally engaging the ratchet wheel 21. The stud 28 is connected to the tooth 30 by a coiled retractile spring 31 and it is through the medium of this spring that the tooth 30 remains normally in engagement with the ratchet wheel. The tooth 30 is also engaged by a projection 32 of a kick-off arm 33 between the disks 22 and 23 and pivotally supported by a pin 34 connecting said disks. The front disk 22 of course has an opening 35 providing clearance for the projection 32 and when said kick-off arm is raised the projection kicks the pawl 29 out of engagement with the ratchet wheel 21 and allows a counter-clockwise movement thereof. The kick-off arm 33 is connected by a coiled retractile spring 36 to a pin 37 connecting the disks 22 and 23 of the drum, and said kick-off arm has a hooked off-set portion 38 latched or temporarily held by a pin 39 connecting the disks to the drum. The hooked off-set portion 38 and the pin 39 hold the kick-off arm 33 against the action of the spring 36 until the kick-off arm is positively shifted, as will presently appear, and then the spring 36 positively shifts the kick-off arm rapidly.

The disks 22 and 23 of the drum, adjacent to the periphery thereof, are connected by spacing members 40 coöperating with the disks 22 and 23 in providing a groove or segmental support for a chain 41 which has an end thereof held by a transverse pin 42 connecting the disks 22 and 23 of the drum. The opposite end of the chain 41 passes over a revoluble sheaved or grooved pulley 43 supported by the angle brackets 13 of the front end bearing 1. The end of the chain 41 extends through an offset portion 44 of the engine hood 15 and is connected to a block 45 around which there is trained a tackle or cable 46. One end of the tackle or cable 46 is anchored, as at 47 to the dash board 48 of the automobile and the opposite end extends through an opening 49 provided therefor in the dash board and is provided with a knob 50 or suitable handle. The tackle or cable 46 also extends through a hollow conical shaped member 51 connected to the dash board 48 and associated with the member 51 is a tension device comprising a sleeve 52 and a coiled compression spring 53. The ends of the sleeve 52 are flanged, as at 54 and 55, the flange 54 engaging the upper end of the member 51 and limiting the outward movement of the sleeve 52. The spring 53 encircles the sleeve between the flange 55 and the upper end of the member 51 and said spring and sleeve coöperate in supporting the knob 50 in position to be gripped, in maintaining the tackle or cable 46 taut, and in allowing the tackle or cable 46 to yield when there is a counter-clockwise movement of the drum.

By pulling upon the knob or handle 50 the drum can be rotated clockwise and when the treadle 18 is held depressed the engine 5 can be cranked or started. To restore the drum to normal position a coiled retractile spring 57 is connected to the disk 23, as at 56, and is trained around a grooved pulley or sheave 58, loosely mounted upon a stub shaft 59, carried by the controlling lever 10. The opposite end of the coiled retractile spring 57 is connected to an off-set portion 60 of the controlling lever 10 and said spring is placed under additional tension when the drum is partially rotated. The stub shaft 59 just referred to serves as a stop for the kick-off arm 33, said arm impinging the stub shaft or stop when the drum is moved counter-clockwise, thereby throwing the pawl 29 out of engagement with the large ratchet wheel 51 and allowing the starting shaft 2 to rotate counter-clockwise as is incurred by back-firing or back-lashing of the engine.

The lower edge of the front disk 22 of the drum is slitted and bent to provide a forwardly projecting tongue 61 adapted to extend into an opening provided therefor in the lower edge of a convexo-concave cover or casing 63 adapted to house the large ratchet wheel 31 and the forward end of the starter shaft 2. The upper edge of the cover or casing 62 has a segment-shaped rim 64 provided with an aperture 65 to receive a spring pressed pin or latch 66, carried by the inner side of the rear disk 23 of the drum. By reference to Fig. 3 of the drawings it will be observed that the cover or casing imparts a neat appearance to the starting device, besides excluding dirt and such foreign matter that would tend to impair the starting mechanism.

The knob or handle 50 and the treadle 18 are located at the operator's seat of the automobile and in proximity to the throttle of the engine, and it is possible for the operator to crank or start the engine and have full control of the same. It is not necessary to leave the automobile except when there is back-firing or back-lashing

and then it is necessary to re-set the kick-off arm 33.

What we claim is:—

1. In an engine starter, the combination with an engine shaft, and a starter shaft, of means for yieldingly holding said starter shaft in engagement with said engine shaft, a drum carried by said starter shaft and adapted to move clockwise with said starter shaft, means including a block and tackle for imparting movement to said drum, and a kick-off arm in said drum and projecting therefrom to impinge the first mentioned means by a counter-clockwise movement of said drum for releasing said drum relative to said starter shaft.

2. In an engine starter, the combination with an automobile, an engine shaft, and a starter shaft, of means adapted to be manually actuated at the dash board of said automobile for shifting said starter shaft into engagement with said engine shaft, a drum loosely mounted upon said starter shaft and adapted to be held for a clockwise movement with said shaft, means manually actuated at the dash board of said automobile for imparting a clockwise movement to said drum, and a kick-off arm in said drum and projecting therefrom to impinge the shifting means of said starter shaft by a counter-clockwise movement of said drum for releasing said drum relative to said starter shaft.

3. In an engine starter, the combination with an automobile, an engine shaft, and a starter shaft, of means including a controlling lever manually actuated from the dash board of said automobile for yieldingly holding said starter shaft in engagement with said engine shaft, a stub shaft carried by said controlling lever, a drum on said starter shaft held for a clockwise movement therewith, means manually actuated at the dashboard of said automobile and including a block and tackle for imparting a clockwise movement to said drum, means in said drum and adapted to impinge said stub shaft by a counter-clockwise movement of said drum for releasing said drum relative to said starter shaft, and means connected to said controlling lever for restoring said drum to normal position.

4. In an engine starter, the combination with an automobile, an engine shaft, and a starter shaft, of treadle actuated lever adapted to yieldingly hold said starter shaft in engagement with said engine shaft, a stub shaft carried thereby, a drum upon said starter shaft, a ratchet wheel secured to said starter shaft, means carried by said drum and adapted to engage said ratchet wheel for rotating said starter shaft, means manually actuated at the dash board of said automobile for imparting a clock-wise movement to said drum, a kick-off arm in said drum and adapted to impinge said stub shaft by a counter-clockwise movement thereof for releasing said drum relative to said ratchet wheel, and means connected to said drum and trained over said stub shaft for restoring said drum to normal position.

5. In an engine starter, the combination with an engine shaft, and a starter shaft, of a treadle actuated lever for yieldingly holding said starter shaft in engagement with said engine shaft, a stub shaft carried by said lever, a drum on said starter shaft, a ratchet wheel carried by said starter shaft, means carried by said drum and engaging said ratchet wheel for moving said starter shaft clockwise, means for imparting movement to said drum, and a kick-off arm carried by said drum and adapted to impinge said stub shaft by a counter-clockwise movement of said drum for releasing said drum relative to said ratchet wheel.

In testimony whereof we affix our signatures in presence of two witnesses.

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CHARLES P. GROLL.

Witnesses:
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O. H. APT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."