A. A. GROSE.

SELF STARTER FOR EXPLOSIVE ENGINES.

APPLICATION FILED MAR. 7, 1914.

1,144,410. Patented June 29, 1915.

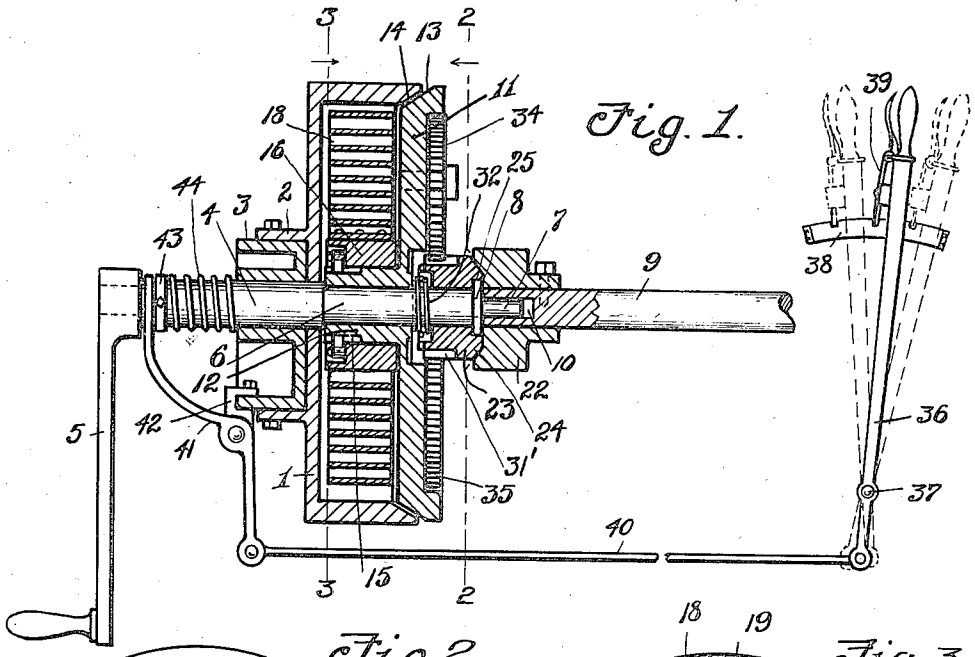

Fig. 1.

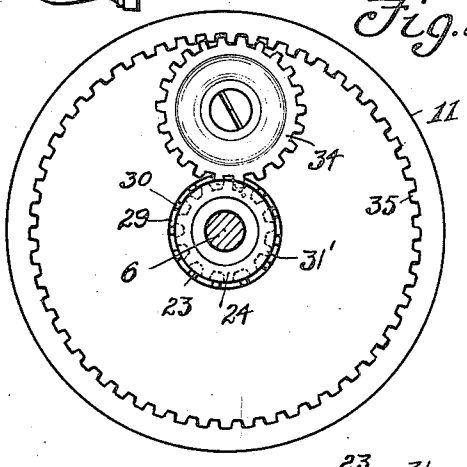

Fig. 2.

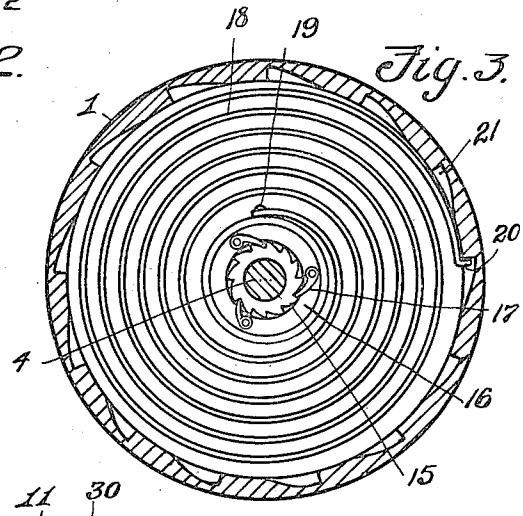

Fig. 3.

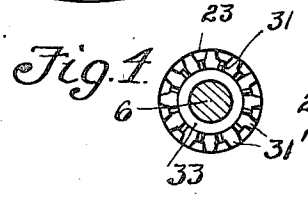

Fig. 4.

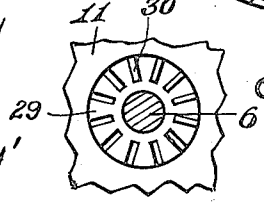

Fig. 5.

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SELF-STARTER FOR EXPLOSIVE-ENGINES.

1,144,410. Specification of Letters Patent. Patented June 29, 1915.

Application filed March 7, 1914. Serial No. 823,212.

To all whom it may concern:

Be it known that I, AMOS A. GROSE, a citizen of the United States, residing in Madison township, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Self-Starters for Explosive-Engines, of which the following is a specification.

The invention relates to a self-starter for engines of the explosive type, being particularly directed to a mechanical means adapted in its operative actuation to impart the necessary starting movement to the engine, the means being in turn reset for successive operative actuation under the normal engine movement.

The main object of the present invention is the provision of a mechanical starter involving an actuating spring and coöperating elements, with manual means for the control of the latter, whereby the spring may be placed within the influence of the engine for winding to the proper tension and locked in such wound condition, the manual control providing for the coupling of the spring directly to the engine shaft to utilize its tension as a means for the initial starting of the engine.

The invention in the preferred form of details will be described in the following specification, reference being had particularly to the accompanying drawings, in which:—

Figure 1 is a sectional view partly in elevation illustrating the self-starter. Fig. 2 is a section on line 2—2 of Fig. 1. Fig. 3 is a section on line 3—3 of Fig. 1. Fig. 4 is a face view of the gear clutch. Fig. 5 is a broken face view of the winding disk.

The improved starter is shown as primarily adapted for use with automobile engines, though it will be understood that its use is contemplated with any type of explosive engine.

In detail structure, in the preferred embodiment shown in the drawings, the improved starter comprises a drum shaped case 1 fixedly secured, in any appropriate manner, to the front chassis beam of an automobile, or other suitable support.

The forward face of the case is formed with a sleeve extension 2, within which is fixed a bearing member 3, and mounted for a limited sliding movement in said bearing member is what I term a crank stem 4. The crank stem extends through and beyond the case, its forward end being formed for the removable reception of an ordinary crank handle 5. Within the case the crank stem is reduced in diameter as at 6, and its rear terminal further reduced to provide a guiding projection 7, a disk 8 being arranged upon the stem at the forward terminal of the guiding portion. The crank shaft 9 of the engine, mounted in the usual manner, is arranged to aline with the crank stem, and is formed in its forward end with a recess 10 to receive the guiding projection 7 of the crank stem.

A winding disk 11 is mounted for coöperation with the case, said disk having a forwardly projecting hub 12 rotatably mounted upon the crank stem within the case. The disk 11 is designed to close the open end of the case, and its peripheral edge is formed with an inclined clutch surface 13, adapted when the disk is forced into contact with the case to coöperate with a similar edge 14 on the case, whereby to hold the disk against independent movement. The jeripheral surface of the hub near its forward edge is formed with a series of teeth 15, and a sleeve 16 is rotatably mounted upon the hub and provided with dogs 17 operating under the influence of gravity to engage the teeth, as clearly shown in Fig. 3.

An operating spring 18 is arranged within the case, being coiled about the sleeve 16, one end of the spring being secured to the sleeve as at 19, and the opposite end being formed with a hook terminal 20 to engage any one of a series of notches 21 formed in the inner surface of the peripheral wall of the case. The connection of the outer end of the spring is important in the improvement, as it provides an automatic adjuster to prevent over-winding of the spring, as in the event of such over-winding, the contraction of the spring due thereto will withdraw the hooked end 20 from the particular notch 21 and permit the spring to move independently until the winding mechanism is thrown out of gear.

Secured upon the forward terminal of the crank shaft 9 is a clutch member 22, and slidably mounted upon the crank stem immediately in advance of the disk 8 is what I term a gear clutch 23. The gear clutch comprises a sleeve-like member formed on its rear face with a clutch surface 24 adapted for coöperation with the clutch face of the clutch 22, the gear clutch being formed

within the clutch face with a recess 25 of a size to receive the disk 8.

The rear face of the winding disk is formed with a depression 29 of a size to slidably receive the gear clutch, and the forward wall or bottom of this depression is formed with a series of radial depressions 30, as clearly shown in Fig. 5. The forward face of the gear clutch is provided with a series of radial teeth 31, of a size and so positioned as to coöperate with the depressions 30, and the peripheral edge of the gear clutch is formed with a series of gear teeth 31′. A spring 32 encircles the crank stem between the winding disk and gear clutch, said spring seating within a recess 33 in the forward face of the gear clutch and serving to normally operate said gear clutch to force the teeth 31 from coöperation with the depression 30.

The rear face of the winding disk is provided with a gear 34 coöperating respectively with the teeth 31′ of the gear clutch and with an internal gear rack 35 formed on the winding disk, as clearly shown in Fig. 2.

The starter is controlled by the driver through the medium of a hand lever 36 pivotally supported at 37 at a conveniently accessible point, the upper end of the lever being arranged for coöperation with a notch segment 38 and having the usual locking dog 39, the segment being formed to permit the locking of the lever in one of three positions. The lower end of the lever is connected through the medium of a rod 40 with an angle lever 41 pivotally supported upon a bracket 42 secured to the bearing 3, the upper end of the lever 41 loosely encircling the crank stem in advance of a collar 43 secured thereon, a spring 44 bearing between the collar 43 and the bearing 3 to normally project the crank stem in opposition to the influence of the lever 41.

In the use of the starter, the initial or first operation of the engine is imparted in the usual manner through operation of the crank 5. During this operation the lever 36 is set in the position shown in full lines in Fig. 1, in which the clutch faces of the gear clutch and clutch member 22 are in active coöperation. Under the running of the engine, the crank shaft 9 through the coöperation of the gear clutch and clutch member 22, the gear teeth 31′, the gear 34, and the gear rack 35, the winding disk is rotated in a direction to wind the spring 18. When the latter has been wound, the lever is shifted forward to the position shown in dotted lines, this movement forcing the winding disk toward the case so as to cause effective coöperation of the faces 13 and 14, and lock the disk against further rotation, or in other words, holds the spring locked in a wound relation. When it is desired to start the engine through the use of the starter, the lever is shifted to the remaining position, shifting the winding disk toward the gear clutch and forcing the latter into coöperation with the clutch member 22. This relieves the gear clutch from its neutral position, releases the winding disk from its locked relation to the case, and causes the teeth 31 of the gear clutch to be engaged by the depressions 30 of the winding disk. This permits the tension of the spring to be directly utilized for turning the crank shaft 9, through the connection of the winding shaft disk with the gear clutch and the connection of the latter with the clutch member 22.

The improved starter provides a mechanical device which may be readily controlled to be set by the engine, held in set or locked position during the operation of the engine, and released for actuating or turning the engine when desired to start the same. The construction is important in the details wherein provision is made against accidental breaking of the spring through overwinding, and in the certainty of the manual control of the operation of the parts.

What is claimed is:—

1. An engine self-starter including a crank stem, and automatic winding mechanism intermediate said stem and the engine shaft, said mechanism including a case formed with a series of peripheral notches, and a spring having its outer terminal formed with a hooked end to coöperate with either of said notches, whereby under undue winding of the spring the hooked end will automatically disengage from the particular notch and reëngage another notch.

2. An engine starter including a crank stem, a case in which said stem is rotatably mounted, means for moving the stem longitudinally, a winding disk rotatably mounted on the stem, a spring arranged within the case and under the control of the winding disk, said disk being movable with relation to the case, and a gear clutch mounted on the stem beyond the disk, said gear clutch being formed with means for independent coöperation with the disk and adapted respectively to arrange the clutch and disk for similar or reverse relative rotations.

3. An engine starter including a crank stem, a case in which the stem is rotatably mounted, manual means for shifting the stem, a winding disk rotatably mounted on the stem, a spring within the case and under the control of the winding disk, a gear clutch mounted on the stem and adapted for clutching coöperation with the engine shaft, gear connections between the gear clutch and winding disk, and means for directly locking said disk and clutch for similar movement.

4. An engine starter including a crank stem, and automatic mechanism intermediate said stem and engine shaft, said mechanism including a spring, a winding disk controlling the same, means for shifting the disk bodily, and adjustable member mounted on the crank stem for connecting the disk thereto, to selectively compel either a direct or relatively reverse movement of the disk with respect to the engine shaft, and means for locking the disk against movement in one position of the disk.

5. An engine starter including a crank stem, and automatic mechanism intermediate said stem and the engine shaft, said mechanism including a fixed case, a spring arranged therein, a winding disk controlling said spring, means for shifting the disk bodily with respect to the case, and coöperating locking faces formed on the disk and case to frictionally lock the disk against movement in one position of the disk.

6. An engine starter including a clutch for connection with the engine shaft, a spring, a winding member controlling the spring, and manually controlled means for establishing selective connections between the clutch, the winding member and the engine shaft, whereby to compel either a direct, a relatively reverse movement of, or a locking of the winding member against movement.

In testimony whereof I affix my signature in presence of two witnesses.

AMOS A. GROSE.

Witnesses:
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George J. Oltsch.