

G. G. F. BOSWELL.
 STARTER FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED FEB. 8, 1911.

1,022,820.

Patented Apr. 9, 1912.

3 SHEETS—SHEET 1.

Fig - 1 -

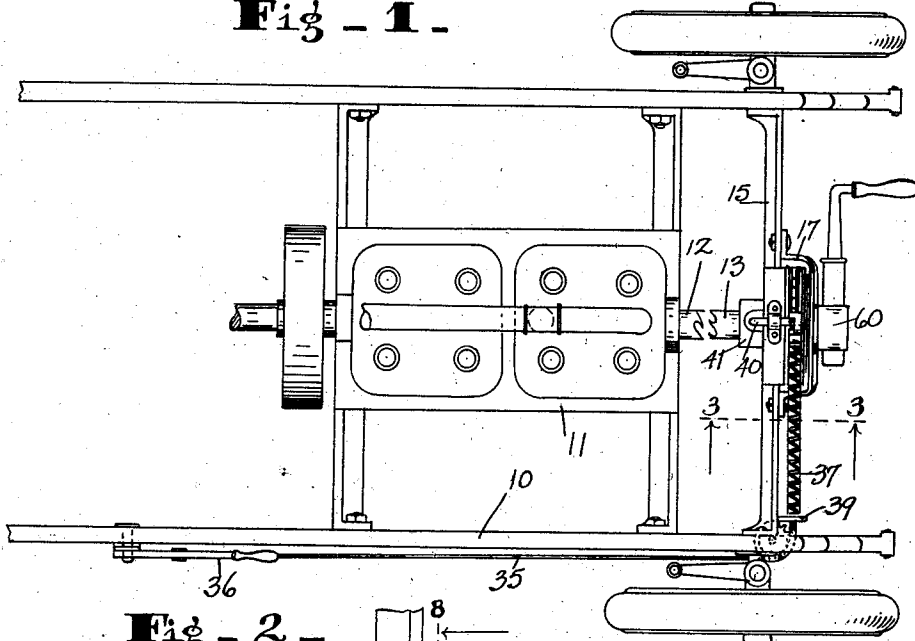
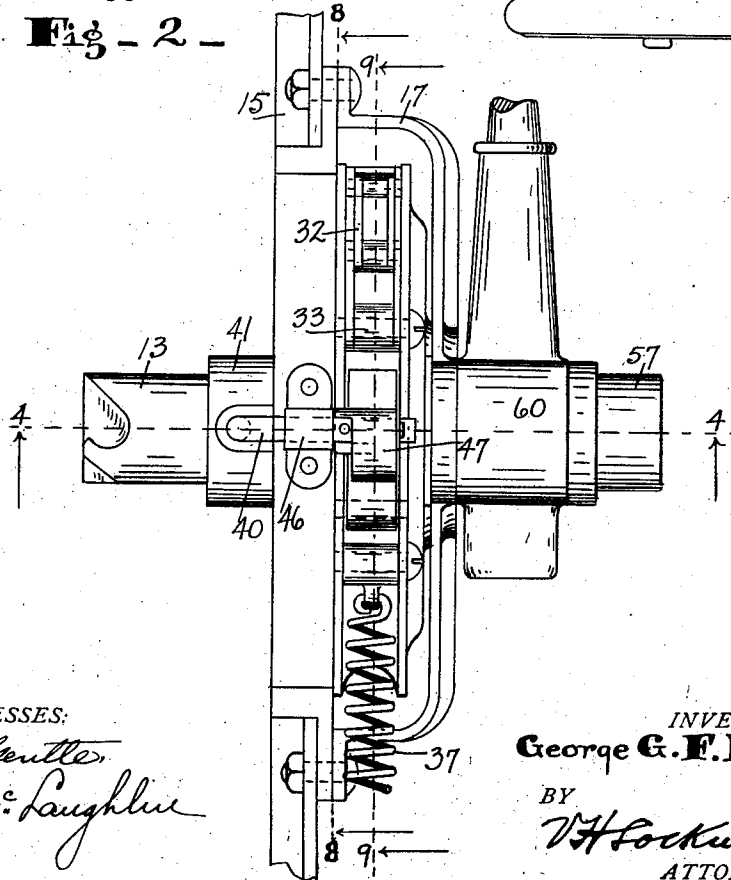


Fig - 2 -



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3 SHEETS-SHEET 2.

Fig - 3 -

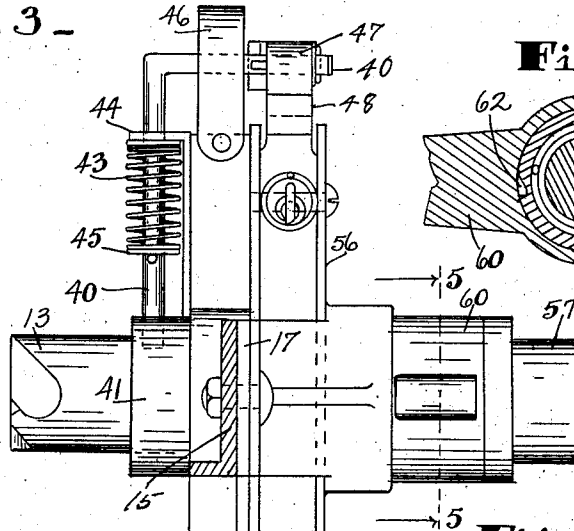


Fig - 5 -

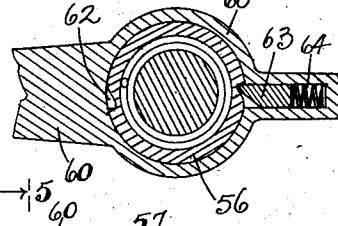


Fig - 4 -

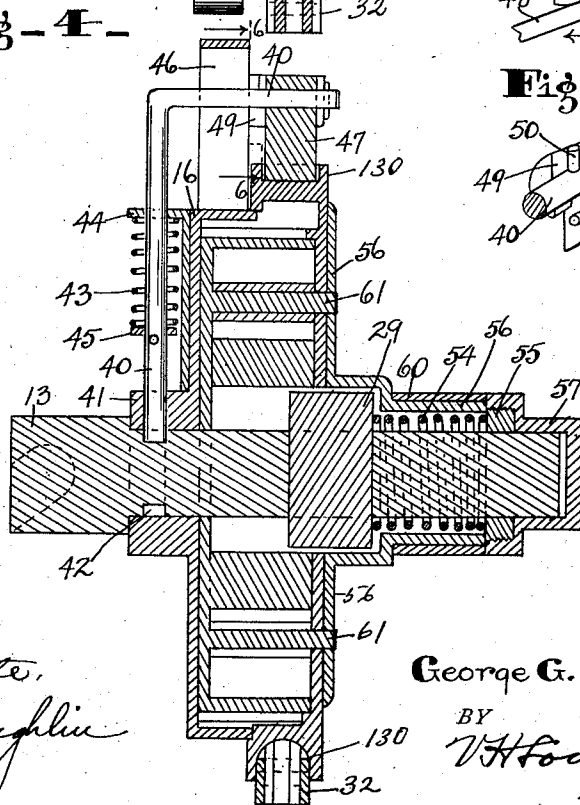


Fig - 6 -

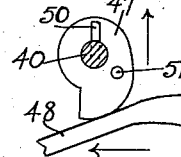
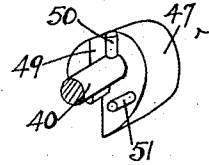


Fig - 7 -



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3 SHEETS—SHEET 3.

Fig - 8 -

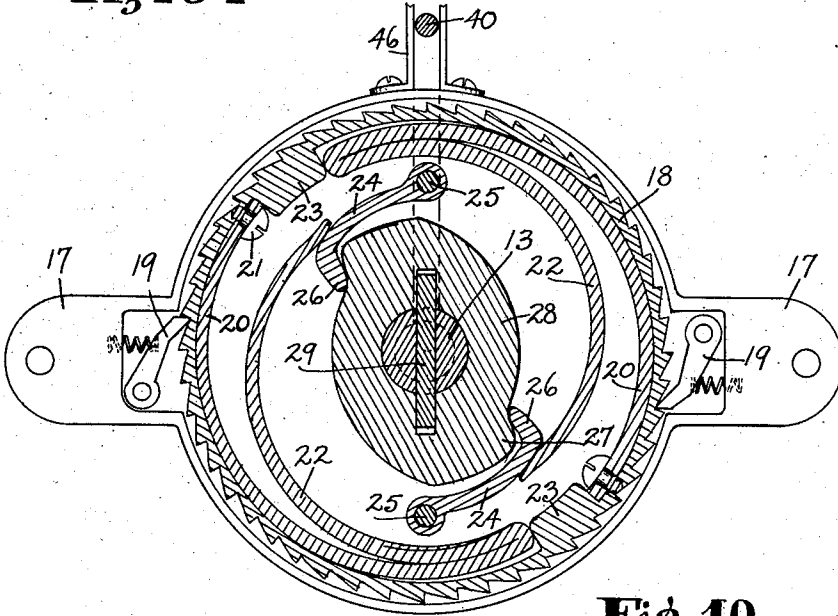
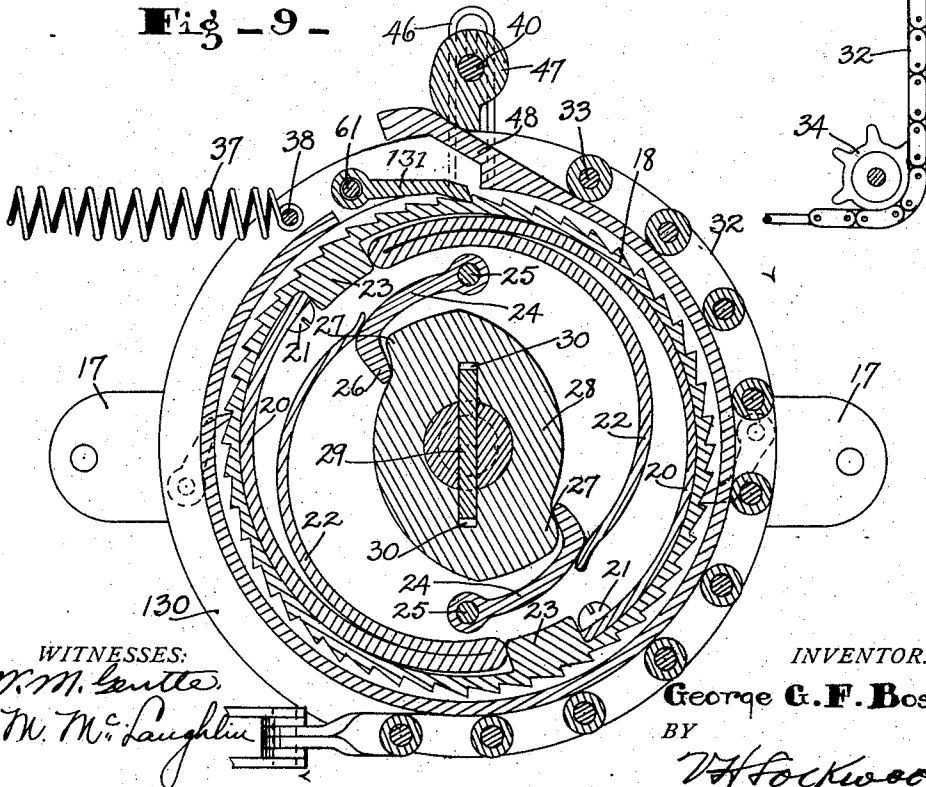


Fig - 10 -



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UNITED STATES PATENT OFFICE.

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STARTER FOR INTERNAL-COMBUSTION ENGINES.

1,022,820.

Specification of Letters Patent.

Patented Apr. 9, 1912.

Application filed February 6, 1911. Serial No. 606,695.

To all whom it may concern:

Be it known that I, GEORGE G. F. BOSWELL, of Indianapolis, county of Marion, and State of Indiana, have invented a certain useful Starter for Internal-Combustion Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

10 The object of this invention is to provide an improved mechanical starter for internal combustion engines.

The nature of the improvements will be understood from the following description 15 and claims and the accompanying drawings.

In the drawings Figure 1 is a plan view of the front end of an automobile chassis, the rear portion being broken away. Fig. 2 is a plan view of the starting mechanism of the central forward portion of the chassis, as shown in Fig. 1, but on a larger scale and parts being broken away. Fig. 3 is a section on the line 3—3 of Fig. 1 showing the starting shaft in side elevation. Fig. 4 25 is a section on the line 4—4 of Fig. 2, showing the starting shaft located out of engagement with the engine shaft. Fig. 5 is a section on the line 5—5 of Fig. 3. Fig. 6 is a section on the line 6—6 of Fig. 4. Fig. 7 is a perspective view of the cam, the rod with which it is connected being partly broken away. Fig. 8 is a section on the line 8—8 of Fig. 2. Fig. 9 is a section on the line 9—9 of Fig. 2. Fig. 10 is a plan view of a 35 portion of the chain for actuating the starting device, and the sprocket wheel about which it extends.

The chassis frame 10 carries the engine 11 of the engine shaft 12 provided with a clutch-formed end which is adapted to be engaged by the starting shaft 13, which has an engaging clutch-formed end so that the shaft 13 will move inwardly into engagement with the shaft 12 and turn and start 45 said shaft, but as soon as the engine starts the clutch-end of the shaft 12 will push the shaft 13 back out of the way to its disengaging position, which is its normal position.

The front frame bar 15 has secured to it 50 a stationary frame plate or disk 16 by means of screws through the ears 17. This plate is recessed and carries a ratchet wheel 18 adapted to be engaged by spring-actuated pawls 19 lying in recesses in the ears 17. 55 These pawls prevent backward movement

of the ratchet wheel. The ratchet wheel is closed disk-like on one side, the inner side, as shown in Fig. 4, and it is hollow or cylindrical and within it a pair of springs lie, see Fig. 8, each of these springs consisting 60 of an outer member 20 secured by the screw 21 to the inner periphery of the ratchet wheel. At the other end said member 20 is secured and preferably integral with the inner member 22 of the spring. In Fig. 8 two 65 members 20 and 22 are made of spring metal and bent about midway, and the outer member lies between the two abutments 23 oppositely located. The free end of the inner member 22 tends to spring inward and 70 bear against a friction pawl 24 which is pivoted at 25 to the side wall of the ratchet wheel 18. The two pawls 24 are oppositely located and have beveled hooked ends 26 adapted to engage beveled shoulders 27 on 75 a cam 28 which is mounted on the starting shaft 13 so as to rotate with said shaft but to permit it to be longitudinally slidable. To that end there is a key 29 extending diametrically through the shaft 13 and beyond it into longitudinal slots 30 in the cam 28. The key 29 is rigid in the shaft so that it and the shaft slide longitudinally without any corresponding movement of the cam. The object of this part of the construction, which is shown best in Figs. 8 85 and 9, is to permit the starting shaft 13 to rotate backwardly with the engine shaft on the occasion of back-firing, but backward movement of the engine shaft at other times 90 is prevented by the spring-pressed pawls 24 and cam 28, and these pawls are pressed so straight by the springs toward the cam as to prevent any such backward movement of the shaft 13 excepting when there is back-firing, and when there is back-firing, this 95 arrangement tends to stop the backward movement of the cam and starting shaft as quickly as possible. This arrangement also permits power to be transmitted from the 100 ratchet wheel 18 through the cam 28 to the starting shaft in order to start the engine, and yet will permit a reverse movement of the starting shaft during back-firing.

The ratchet wheel 18 is actuated by a peripherally grooved ring 130 which surrounds the ratchet wheel and carries the pawl 131, see Fig. 9, adapted to engage the ratchet wheel. Within the peripheral groove of the ring 130 a chain 32, see Figs. 110

9 and 10, is secured at 33 and extends about half-way around the ring and then laterally of the automobile around an idler sprocket wheel 34, see Fig. 10, to the connecting rod 35 which runs to the starting lever 36 mounted on the side of the chassis 10 in position to be actuated from the seat of the automobile. When that lever is pulled the chain just described will give the ring 130 and the ratchet wheel 18 about a half revolution, and also the cam, starting shaft and engine shaft, which sometimes will start the engine, and if it is not sufficient, two or three further operations of the lever 36 will suffice to start the engine. The ring 130 is returned between and after these actuating movements by the spring 37, which is secured to the ring 130 by the pin 38 and extends to the bracket 39 on the frame of the machines, as shown in Fig. 1. As the ring 130 is actuated, by pulling the chain 32, the spring lies in the channel of the ring just the same as the chain does.

Normally, the starting shaft 13 is held out of engagement with the engine shaft by the vertically movable locking pin or rod 40, see Fig. 4, the lower end of which operates through a hole in the hub 41 of the disk 16 which is stationary, and projects into an annular groove 42 in the starting shaft. Said rod 40 is pressed downward normally by the spring 43 which surrounds the rod and lies between a bracket 44 secured to the disk 16, and is, therefore, stationary and there is a washer 45 on the rod. The upper end of the rod 40 is turned at a right-angle so as to extend over the ring 130, as shown in Fig. 9 and is vertically movable in the fixed guide 46 which extends up from the upper part of the disk 16, see Fig. 4. The horizontal portion of the rod 40 carries a cam 47 the projection from which is adapted to be engaged by the inclined projection or lug 48 on the ring 130. The cam 47 is loosely mounted on the rod 40 so as to have a slight revoluble movement, about ninety degrees, this movement being limited in one direction by a shoulder 49 adapted to engage a pin 50 in the rod 40, and its movement in the other direction is limited by the pin 51 from the cam engaging the pin 50, see Fig. 7. The cam is normally in the position shown in Fig. 9, with the projection extending down in front of the inclined projection 48 on the ring 30, so that when the lever 36 is actuated to start the engine, the first movement of the ring 130 will cause the inclined projection 48 to engage the projection of the cam 47 and push the rod 40 upward out of engagement with the starting shaft, that is, the lower end of the rod 40 will be elevated out of the groove 42 of the starting shaft, as shown in Fig. 4. Then the starting shaft will be thrown inward into engagement with the engine shaft by

the spring 54 which surrounds the starting shaft and lies between the pin 29 and a reduced portion 55 of a cover plate 56 which closes one side of the device. A nut 57 screws on to the reduced portion 35, see Fig. 4. The further operation of the lever 36 will tend to start the engine, and when there is a return movement of the ring 130 the cam 47 will turn far enough to permit the return movement of the inclined projection 48 to its normal position, and then the cam by gravity will return to its normal position shown in Fig. 9. When the starting shaft is thrown back by the engine shaft, the rod 40 will be in position to enter the groove 42 under the action of the spring 43, and thereafter hold the starting shaft away from the engine shaft.

If it be desired to actuate the starting shaft by a crank at the front of the automobile instead of from the seat, a crank 60 may be placed on the part 56 so as to rotate said part 56, and, therefore, the ratchet wheel 18 with which said plate 230 is connected by the pawl pins 61. Back action of the crank is prevented by the sleeve 56 having notches 62 in it, see Fig. 5, in which a pin 63 is adapted to be pressed by the spring 64.

I claim as my invention:

1. Starting means for internal combustion engines including a longitudinally movable starting shaft adapted to be moved into and out of engagement with the engine shaft, a spring tending to push said starting shaft into engagement with the engine shaft, means for holding said shaft out of engagement with the engine shaft, means revolubly mounted on said starting shaft for actuating the same, a connection between said actuating means and the starting shaft arranged to transmit power to the starting shaft and permit the starting shaft to have reverse movement independently of said actuating means in the case of back-firing of the engine, and means moved by said actuating means for releasing said starting shaft and permitting the engagement thereof with the engine shaft.

2. Starting means for internal combustion engines including a longitudinally movable starting shaft adapted to be moved into and out of engagement with the engine shaft and provided with a peripheral groove, a spring tending to push said starting shaft into engagement with the engine shaft, a rod radially movable into said groove for holding said shaft out of engagement with the engine shaft, a spring tending to push said rod into the groove in said starting shaft, revoluble actuating means mounted on said starting shaft for actuating the same, a connection between said actuating means and the starting shaft arranged to transmit power to said starting

shaft and permit the starting shaft to have reverse movement independently of said starting means in the case of back-firing of the engine, and means actuated by said revoluble actuating means for disengaging said rod from the groove in said shaft.

3. Starting means for internal combustion engines including a longitudinally movable starting shaft adapted to be moved into and out of engagement with the engine shaft and provided with a peripheral groove, a spring tending to push said starting shaft into engagement with the engine shaft, a rod radially movable in said groove for holding said shaft out of engagement with the engine shaft, a ratchet wheel revolvably mounted in said starting shaft for actuating the same, a cam mounted on said shaft so as to rotate therewith and yet permit the longitudinal movement of the shaft

and provided with beveled shoulders, pawls pivoted to said ratchet wheel with beveled ends to engage said shoulders, springs carried by said ratchet wheel which press the shoulders into engagement with said cam, a ring surrounding the ratchet wheel, a pawl carried by said ring for engaging and actuating said ratchet wheel, means for giving the ring revoluble movement, and an inclined projection on said ring adapted to cause the disengagement of said rod from the groove in the starting shaft.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named.

GEORGE G. F. BOSWELL.

Witnesses:

G. H. BOINK,
H. J. WELLS.

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