W. W. OWEN.

ENGINE CRANKER MECHANISM.

APPLICATION FILED OCT. 8, 1909.

970,261.

Patented Sept. 13, 1910.

4 SHEETS—SHEET 1.

Fig. 1.

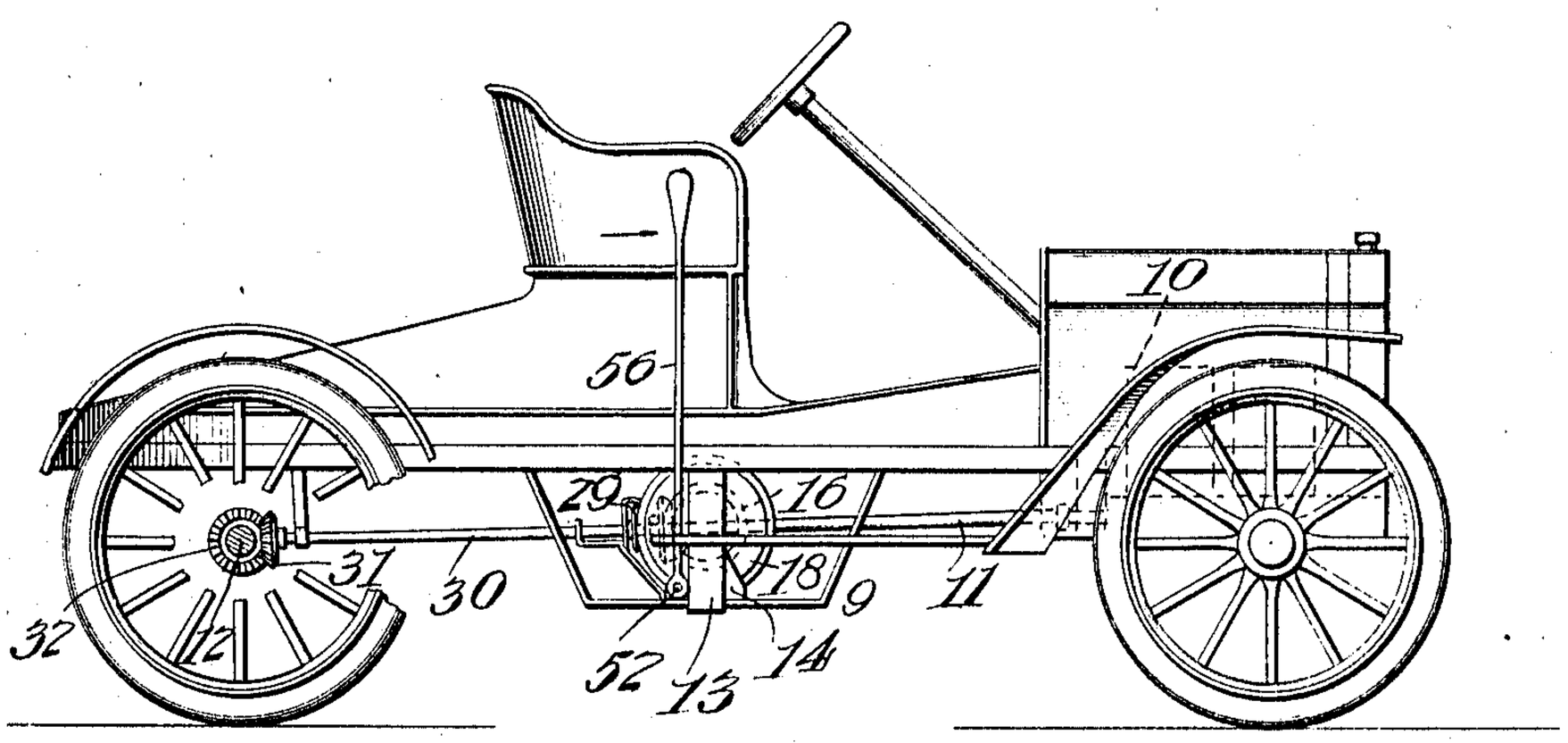
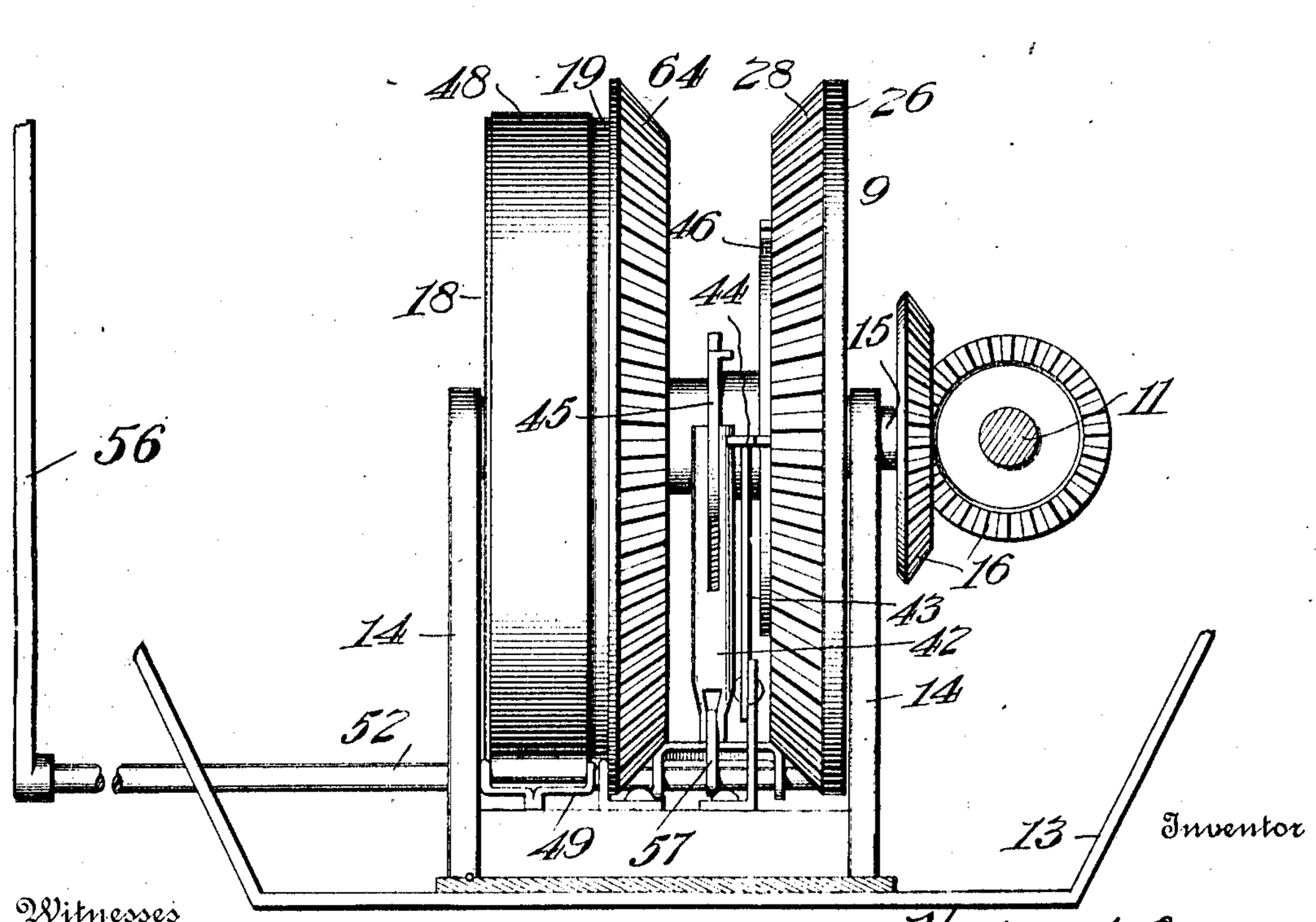


Fig. 2.



Witnesses

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4 SHEETS—SHEET 2.

Fig. 3.

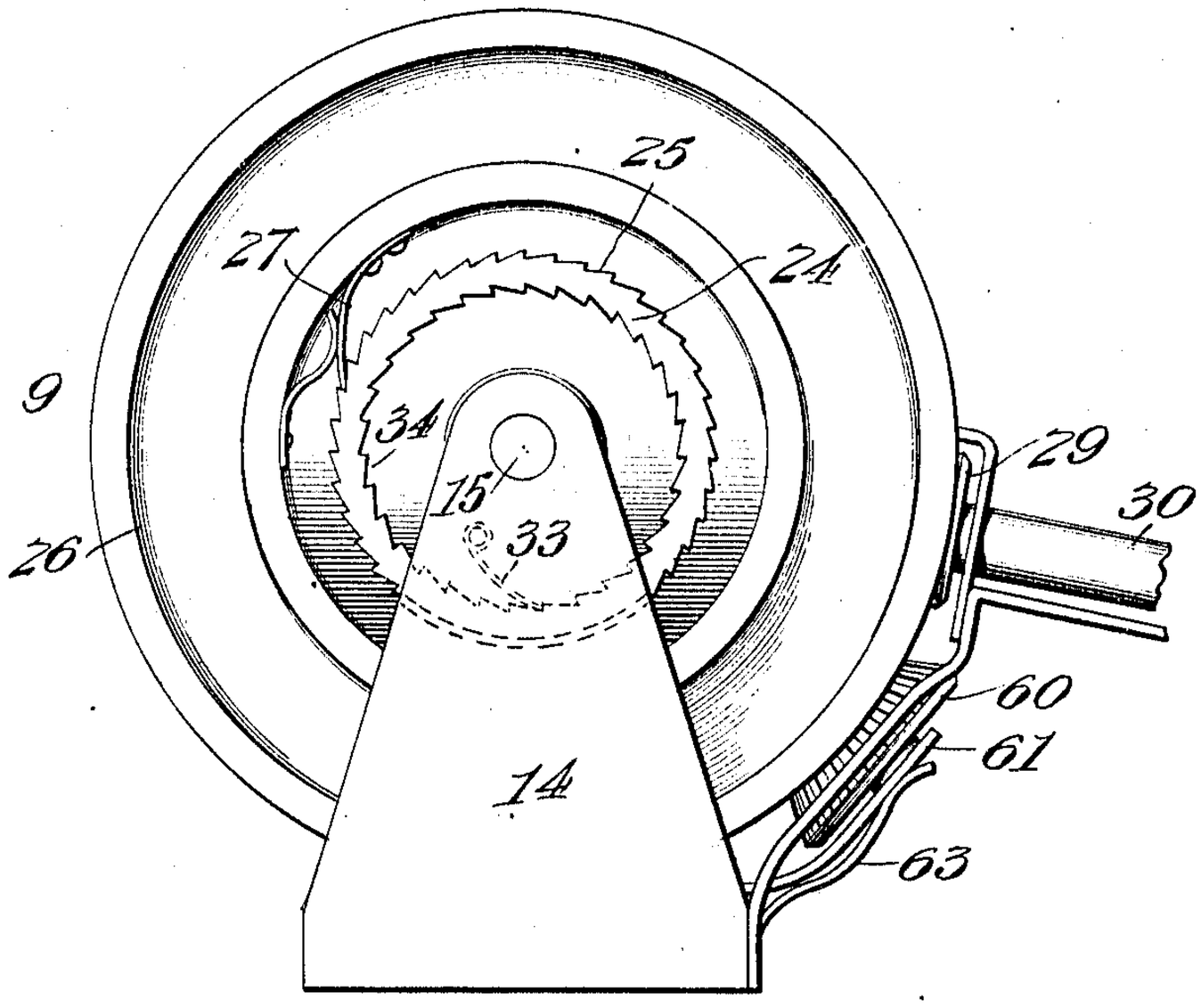
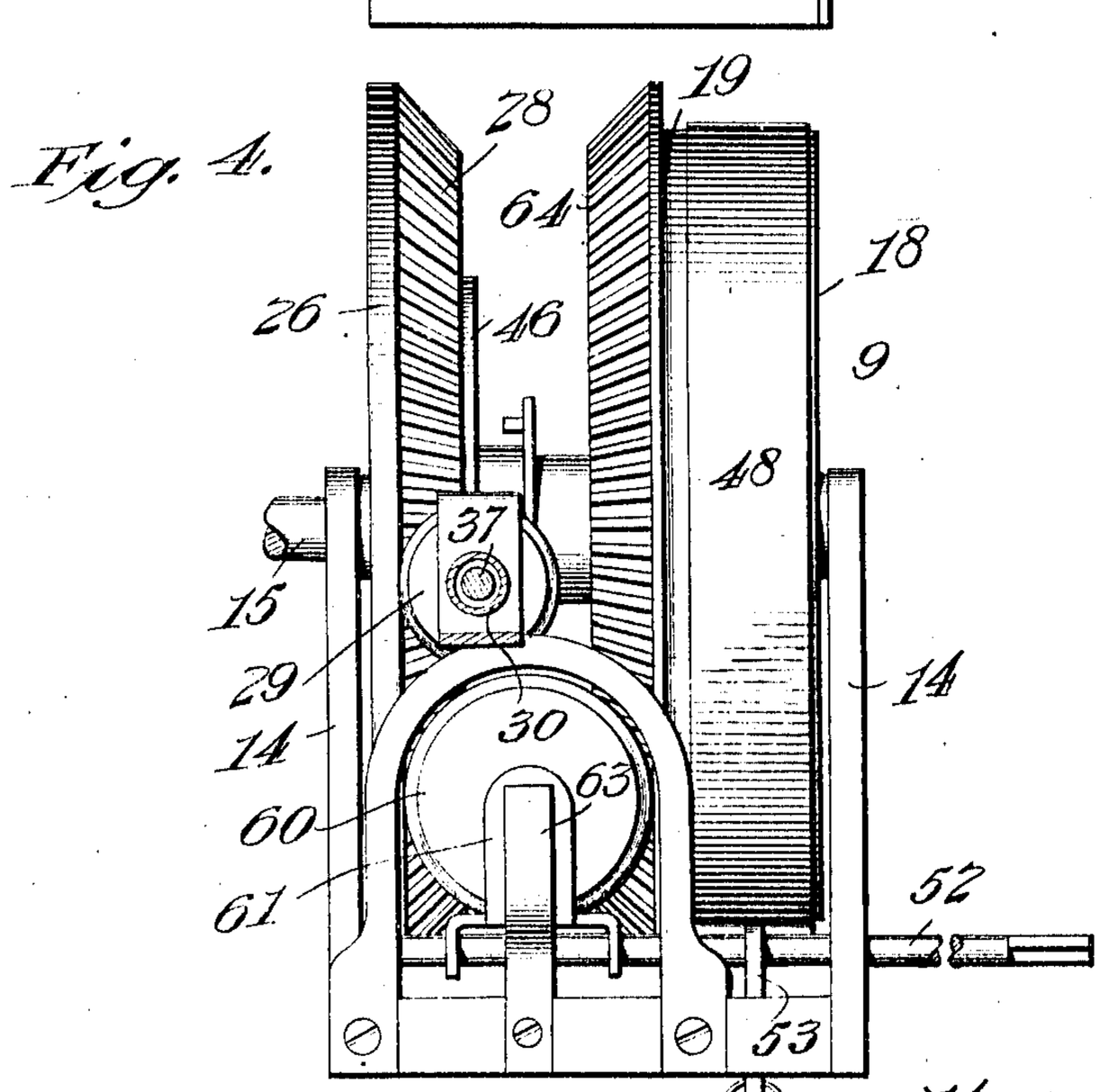


Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 5.

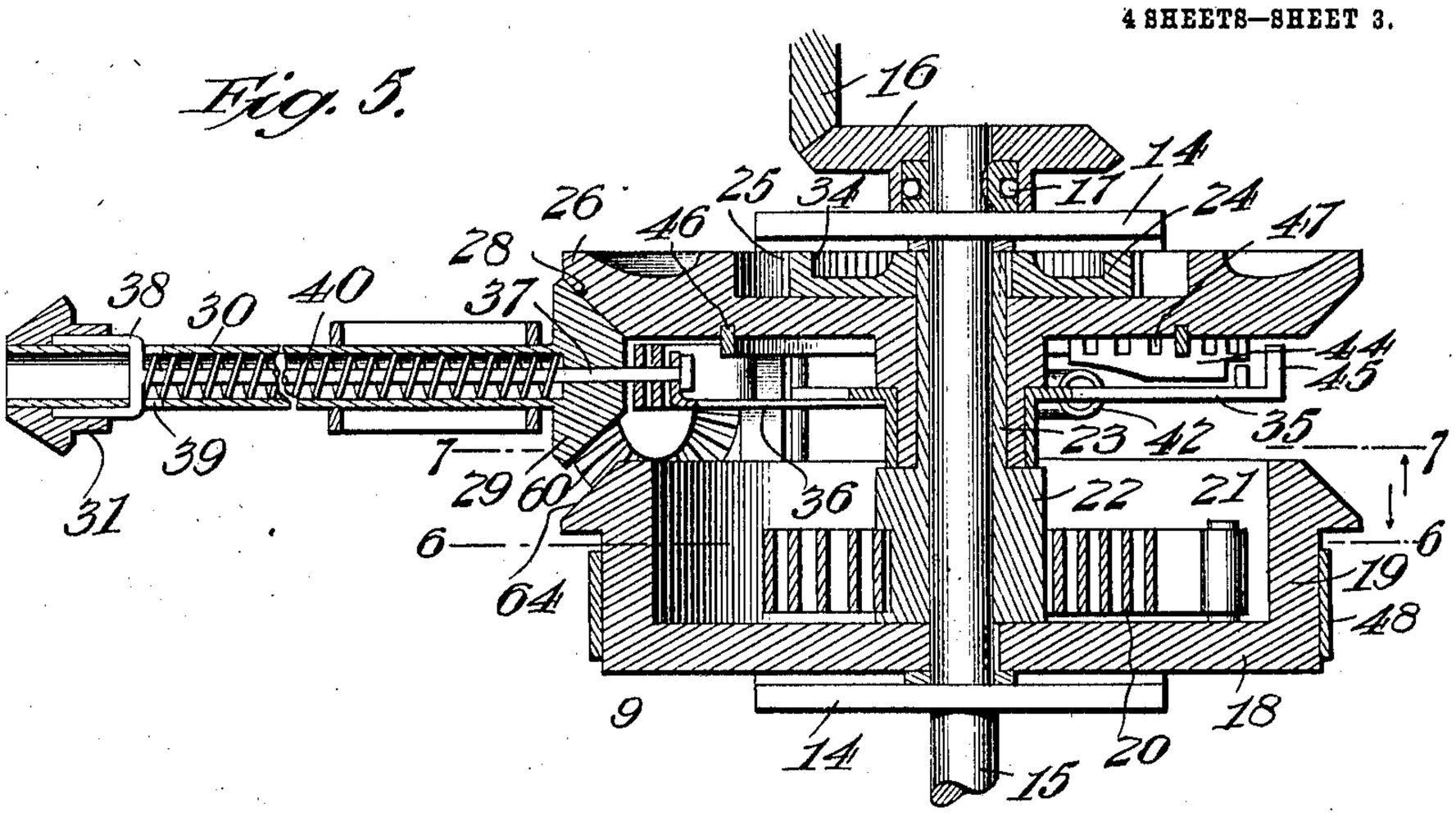
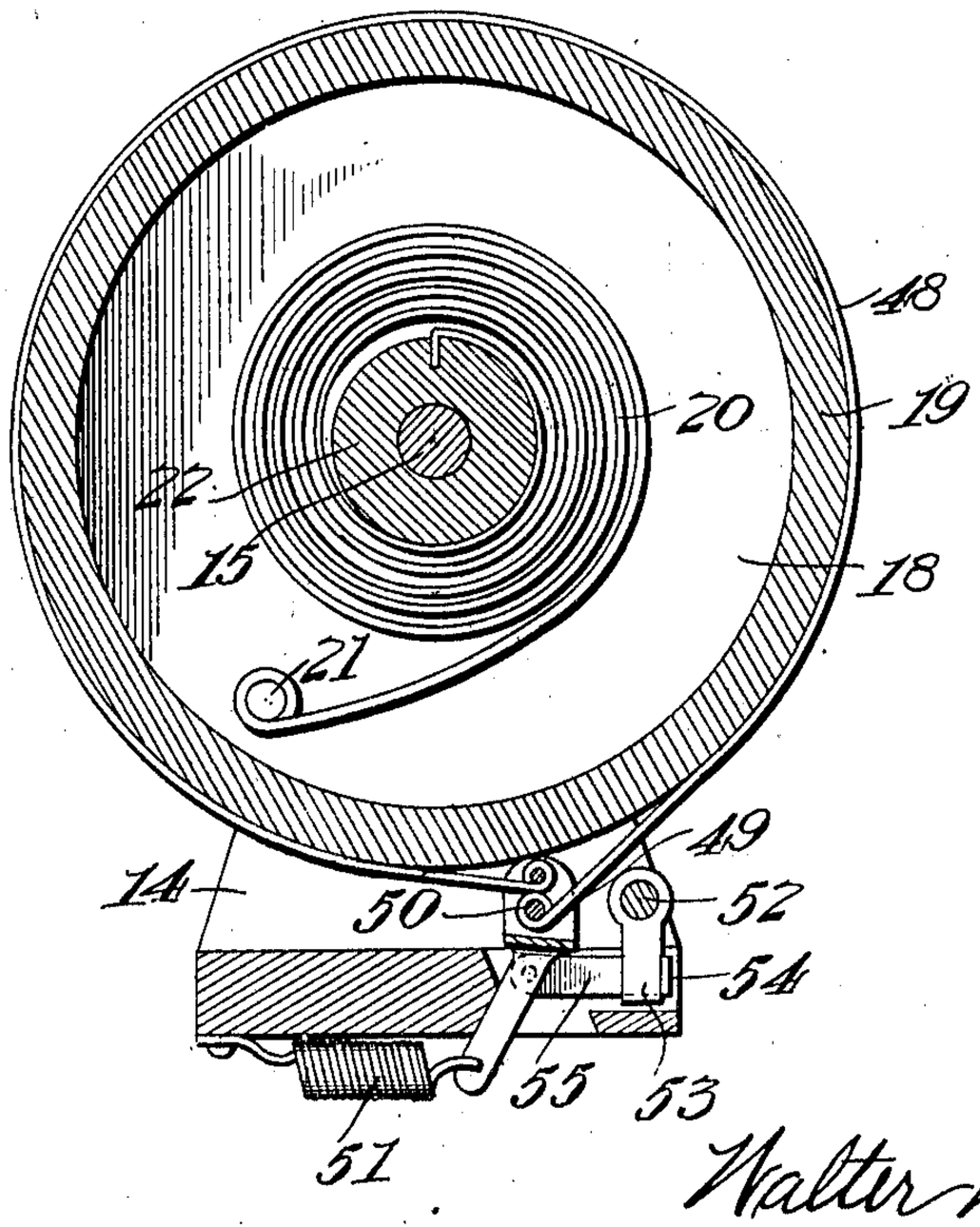


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 7.

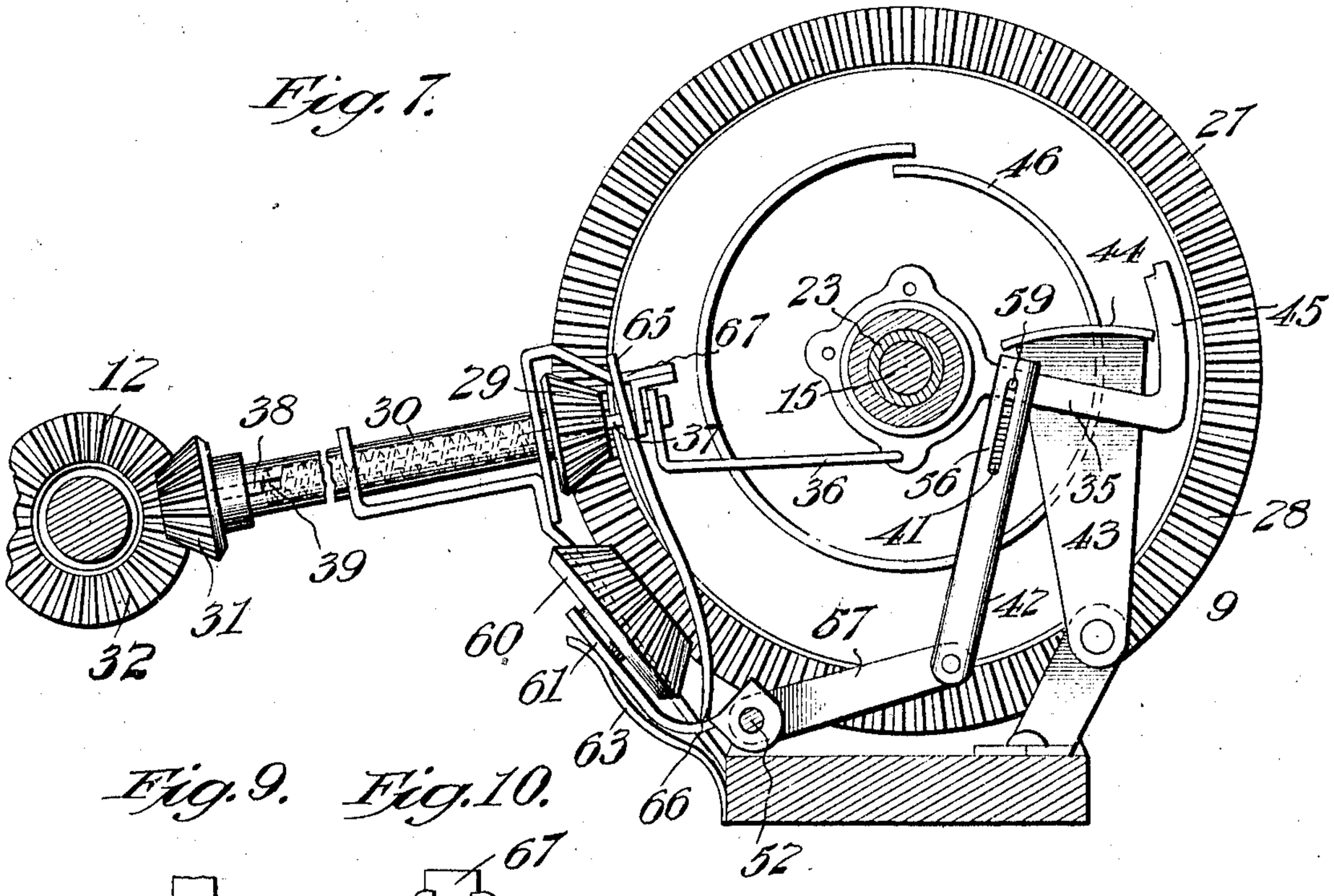

Fig. 9.

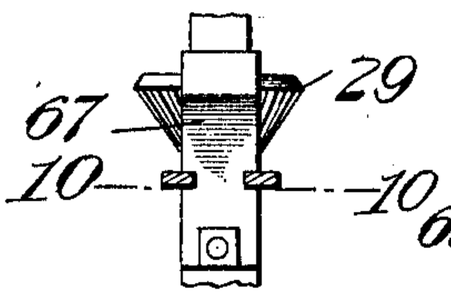

Fig. 10.

Fig. 8.

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UNITED STATES PATENT OFFICE.

WALTER W. OWEN, OF YOUNGSTOWN, OHIO.

ENGINE-CRANKER MECHANISM.

970,261. Specification of Letters Patent. **Patented Sept. 13, 1910.**

Application filed October 8, 1909. Serial No. 521,720.

To all whom it may concern:

Be it known that I, WALTER W. OWEN, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Engine-Cranker Mechanism, of which the following is a specification.

The present invention relates to means for cranking explosive or analogous engines, for the purpose of starting the same, and the primary object is to provide simple apparatus that is compact, so that it will occupy but little space, and is entirely automatic in its nature, being automatically moved to set position or condition to operate and automatically operating to set the engine in motion when released.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of an automobile, showing the starter in place thereon. Fig. 2 is an end elevation of said starter, the same being shown on an enlarged scale. Fig. 3 is a side elevation of the same. Fig. 4 is a view opposite to that illustrated in Fig. 2. Fig. 5 is a horizontal sectional view. Fig. 6 is a sectional view on the line 6—6 of Fig. 5. Figs. 7 and 8 are sectional views on the line 7—7 of Fig. 5, showing the controller for the winding mechanism in its two positions. Fig. 9 is a detail sectional view on the line 9—9 of Fig. 8. Fig. 10 is a detail sectional view on the line 10—10 of Fig. 9.

Like references designate corresponding parts in the several figures of the drawings.

In the embodiment disclosed, the starting apparatus is illustrated on an automobile, designated generally by the reference numeral 9, though it will be understood that it may be employed in connection with an explosive engine of any character, regardless of its position or use. The engines are shown in dotted lines, and designated 10, and the shaft 11 connects the starting apparatus with the engine.

Supported by suitable brackets 13, underneath the machine and at one side of the axle, is the starting apparatus. This apparatus is preferably provided with a pair of supporting plates or standards 14, in which is journaled a driving shaft 15 having a bevel or other gear connection 16 with the engine shaft. A clutch 17 is preferably employed to permit the shaft 11 to revolve under the impulse of the engines, without imparting motion to the shaft 15, but said shaft 15 transmitting motion to the shaft 11 through the gears 16, as hereinafter explained.

Fixed to the shaft 15 is a main driving wheel 18 having a peripheral rim 19 that houses a coiled motor spring 20, the outer end of which is secured, as shown at 21, to said wheel. The inner end of the spring is fixed to the hub 22 of a sleeve 23 that is rotatable on the shaft, and secured to the opposite end of this sleeve is a ratchet wheel 24 having a peripheral series of ratchet teeth 25.

A winding wheel 26 is loosely journaled on the sleeve 23, and carries a spring pressed pawl or dog 27 that engages with the ratchet teeth 25 of the wheel 24. Said wheel 26 is in the form of a beveled gear, as illustrated at 28, and meshing with this gear is a beveled pinion 29 fixed to the front end of a tubular shaft 30 that extends rearwardly, and has mounted thereon a slidable beveled pinion 31, which pinion, however, cannot rotate on said shaft. The pinion 31 is movable into and out of mesh with a gear 32 secured to the rear axle 12.

As a result of the above construction, it will be evident that if the automobile is in operation, and the gear 31 is in mesh with the gear 32, the winding wheel 26 will be rotated and through the dog and ratchet connection, the sleeve 23 will be revolved, thus winding the spring 20. To prevent the retrograde rotation of the ratchet wheel 24, under the impulse of the spring 20, a dog or pawl 33 is employed that is mounted on one of the standards 14, as shown in dotted lines in Fig. 3, and engages an internal series of ratchet teeth 34 formed on the ratchet wheel.

It will be obvious that the indefinite winding of the spring 20 cannot take place, without injuring or breaking the mechanism, and means are therefore provided for automatically stopping the winding action when the spring has been placed under sufficient tension. This mechanism is preferably as follows: A swinging controlling arm 35 is journaled upon the hub of the winding wheel 26, and has a link connection 36 with a reciprocatory rod 37, that extends longitudinally through the tubular shaft 30, and has secured to its end a yoke 38 projecting through slots 39 in said shaft, and secured to the gear wheel 31. It will therefore be ob-

vious that if the arm 35 is moved upwardly, the gear wheel 31 will be disengaged from the driving gear 32, and on the other hand, if the arm 35 is depressed, the wheel 31 may move into mesh with the gear 32. Its movement in the latter direction is secured by a coiled spring 40 arranged within the tubular shaft 30, and bearing against the yoke 38. The arm 35 is urged upwardly by a spring 41 that bears against it, said spring being located in a tubular link 42, hereinafter described. The arm 35, is, however, normally held in its lowermost position by a swinging retaining plate 43 having an outstanding flange 44 at its upper end, beneath which the upturned terminal 45 of the arm is normally disposed. The plate 43 is automatically moved back and forth by a cam track 46 secured to the inner face of the winding wheel 26, the ends of this cam track being overlapped and spaced apart, as shown in Figs. 7 and 8, and said cam track operating between a series of teeth 47 formed upon the upper end of the plate 43 on the opposite side of the flange 44, these teeth being shown particularly in Fig. 5.

The operation of the above described portion of the structure is substantially as follows: Assuming the upturned end 45 of the arm 35 beneath the flange 44, the gear 31 will be in mesh with the gear 32, as already described, and consequently, if the machine is in motion, the winding wheel 26 will be rotated, thus winding the spring. As said winding wheel 26 revolves, the cam track 46 successively entering the spaces between the teeth 47 will cause the plate 43 to swing inwardly until it passes from over the upturned end 45 of the arm 35, thereupon the spring 41 acts to raise said arm 35, and consequently withdraw the beveled gear 31 from the beveled gear 32 against the tension of the spring 40, thereby stopping the winding action, and leaving the spring 20 wound.

In order to effect the winding of the spring, it will be obvious that the wheel 19 must be held against rotation, and this is accomplished by means of a band brake 48 that surrounds the rim of said wheel, and has its ends connected to a lever 49 fulcrumed between its ends, as illustrated at 50. A spring 51 engaged with the lever, normally holds the band 48 in its clamping position, but said lever can be moved to release the wheel 19. To this end, a rock shaft 52 is employed having a crank arm 53 that engages the offset end 54 of a link 55 pivoted to the lever 49. The rock shaft has a handle lever 56, and therefore if this lever is moved from its normal rearmost position forwardly, the crank arm 53 will swing rearwardly, pulling upon the link 55 and turning the lever 49 against the tension of the spring 51, thereby loosening the band 48, and permitting the wheel 19 to rotate under the action of the spring 20. This results in the rotation of the shaft 15, which transmits motion through the beveled gears 16 to shaft 11, and effects its initial rotation. It will be remembered, however, that the controlling arm 35 in the above description, was left in its uppermost position, as shown in Fig. 7, and it becomes necessary to lower it and effect the return of the holding plate 43 to the position shown substantially in Fig. 8, in order that the spring may be automatically rewound. This is done by the following means: Secured to the rock shaft 52 is a crank arm 57 to which the link 42 is pivoted, and said link has slots 58, through which passes a pin 59 carried by the arm 35. When, therefore, the handle lever 56 is moved forwardly and the rock shaft 52 consequently turned, the arm 57 moves forwardly, carrying the link 42 in a corresponding direction, and therefore through the medium of the pin 59, the arm 35 will be depressed. The flange 44 of the plate 43 must now be carried over said depressed arm plate, and this is accomplished by automatically rotating the winding wheel 26 in the reverse direction to which it is rotated through the driving shaft 30 and gear wheel 31. This reverse rotation is obtained by means of a beveled gear 60 journaled on an arm 61 that is carried by the rock shaft 52, a spring 63 being preferably arranged to bear against said arm. The gear wheel 60 is movable into mesh with the teeth 28 of the winding wheel 26, and likewise into mesh with oppositely disposed gear teeth 64 on the wheel 19.

Assuming the parts in the position illustrated in Fig. 7, and the spring wound, if now the handle lever 56 is moved forwardly, the wheel 19 is unbraked, as already disclosed, and will rotate under the action of the spring 20. At the same time that the brake band is loosened by the said movement of the handle lever, the idler gear 60 is brought into mesh with the teeth 64 of said wheel 19, and the teeth 28 of the wheel 26. Consequently said wheel 26 is rotated in the opposite direction to that given by the gear wheel 31, the shaft 30 and gear wheel 29, and the cam track will cause the return movement of the plate 43. As already explained, the arm 35 has been depressed by the forward movement of the handle lever, and consequently the flange 44 of said plate 43 will move over the upturned end 45 of said arm 35. This would of course result in permitting the spring 40 to act and force the beveled gear 31 into mesh with its driving gear 32 on the rear axle, but it will be obvious that this must not be done, as it would result in the shaft 30 and gear wheel 29 rotating upon the winding wheel 26 in opposition to the idler gear 60. To prevent this, a holding yoke 65 is movable

into and out of binding engagement with the rod 37, and has a connection 66 with the rock shaft. Therefore, when the rock shaft moves forwardly to accomplish the above cycle of movements, the yoke 65 is elevated, and will bind upon the rod 37, so that although the arm 2 is depressed, the spring 40 cannot act to force the beveled gear 31 rearwardly until the handle lever is moved again to its rearmost position to brake the wheel 19 after the cranking operation has been completed. The upper end of the yoke 65 has a slidable interlocking engagement with a frame-piece 67.

To recapitulate and describe the operation of the mechanism generally: If the spring 20 is wound and the engine is at a standstill, to start said engine, the operator has only to move the lever 56 forwardly, thereby releasing the wheel 18, and permitting the spring to act and rotate said wheel. Thus the beveled gear connections 16 rotate the shaft 11, and consequently crank the engine. The operator then swings the lever rearwardly to its normal position. When this has been done, the gear wheel 31 moves rearwardly into mesh with the gear wheel 32 on the rear axle, and the rewinding of the spring takes place. When rewound, the mechanism automatically stops, as above explained, leaving the apparatus in condition to recrank the engine whenever desired.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

I claim:

1. In engine cranking mechanism, the combination with a motor member, of winding means therefor including a winding member movable in opposite directions, means for moving the winding member in one direction to wind the motor member, means normally controlled by the winding member and released thereby when said winding member reaches a predetermined position for stopping such winding movement, and means operated by the motor member for moving the winding member in an opposite direction to again place said winding member in control of the said stopping means.

2. In engine cranking mechanism, the combination with a shaft, of a main driving wheel fixed thereto, a brake for holding and releasing the main driving wheel, a spring connected to the main driving wheel, a sleeve journaled on the shaft and connected to the spring, a ratchet wheel fixed to the sleeve, a winding wheel loosely journaled on the sleeve and having a dog that engages the ratchet wheel, means for rotating the winding wheel, and means controlled directly by the rotation of said winding wheel for stopping the same.

3. In engine cranking mechanism, the combination with a motor member, of winding means therefor including a winding member movable in opposite directions, means for moving the winding member in one direction to wind the motor member, means normally controlled by the winding member and released thereby when said winding member reaches a predetermined position for stopping such winding movement, and gearing for transmitting motion from the motor member to the winding member to move said winding member in an opposite direction and again place the same in control of the said stopping means, said gearing including elements that are movable into and out of mesh with each other.

4. In engine cranking mechanism, the combination with a motor member, of a winding wheel therefor, rotatable in opposite directions, automatic means for rotating the winding wheel in one direction to wind the motor member, means automatically controlled by the winding wheel to stop its movement, means for holding and releasing the motor member, and means controlled by the holding and releasing means to reset said automatic controlling means and effect the rotation of the winding wheel in an opposite direction.

5. In engine cranking mechanism, the combination with a motor member, of a winding wheel therefor rotatable in opposite directions, means geared to the wheel for rotating it in one direction to wind the motor member, means automatically controlled by the winding wheel to throw said rotating means out of gear and stop the movement of the winding wheel, means for holding and releasing the motor member, and means controlled by the holding and releasing means to gear together the motor and winding wheel and throw the rotating means for said winding wheel into condition to again operate.

6. In engine cranking mechanism, the combination with a motor member, of a winding wheel therefor, driving means for the winding wheel including a shiftable gear, a spring operated arm for shifting the gear, and a controlling device for the arm operated by the winding wheel.

7. In engine cranking mechanism, the combination with a driving member, of a spring for operating the same, a winding wheel for the spring, means for rotating the winding wheel including a shiftable member, a spring actuated arm for shifting the member, a swinging controlling device that

engages the arm, said device having teeth, and a cam track mounted on the winding wheel and engaging the teeth.

8. In engine cranking mechanism, the combination with a driving member, of a spring for rotating the same, a winding wheel for the spring rotatable in opposite directions, means for rotating the wheel in one direction, including a shiftable device, a spring actuated operating member for the shifting device, means actuated by the winding wheel for controlling the shifting of said operating member, and means for gearing together the driving member and the winding wheel.

9. In engine cranking mechanism, the combination with a driving member, of a spring for rotating the same, a winding wheel for the spring, means for holding and releasing the driving member, and means actuated by said holding and releasing means to gear together and ungear the driving member and winding wheel.

10. In engine cranking mechanism, the combination with a main driving wheel, of a spring connected thereto, a winding wheel for the spring, a band brake for the driving wheel, a lever connected to the brake, and a gear for connecting and disconnecting the driving wheel and winding wheel, said gear being connected to and operating with the lever.

11. In engine cranking mechanism, the combination with a main driving wheel, of a spring for operating the same, a winding wheel for the spring, means for rotating the winding wheel in one direction, including a shiftable gear, means for shifting the gear, a controller for the shifting means actuated by the winding wheel, a band brake for the driving wheel, and means connected to the band brake for operating the same, said means being also connected to the shifting means.

12. In engine cranking mechanism, the combination with a main driving wheel, of a spring connected thereto, a ratchet wheel connected to the spring, a winding wheel having a dog that engages the ratchet wheel, a driving shaft geared to the winding wheel and having a shiftable gear, a swinging arm connected to the shiftable gear, a swinging controller that engages the arm and is provided with teeth, a cam track on the winding wheel engaging the teeth, a band brake, a rock shaft having connections with the band brake, and with the swinging arm, means for operating the rock shaft, and a gear mounted on the rock shaft and moved thereby into and out of mesh with the winding wheel and the driving wheel to connect and disconnect the same.

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

WALTER W. OWEN.

Witnesses:

PAUL J. JONES,

HENRY GOLDSTEN.