No. 812,094. PATENTED FEB. 6, 1906.

G. B. SELDEN, JR.

STARTING CRANK FOR ENGINES.

APPLICATION FILED JAN. 30, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

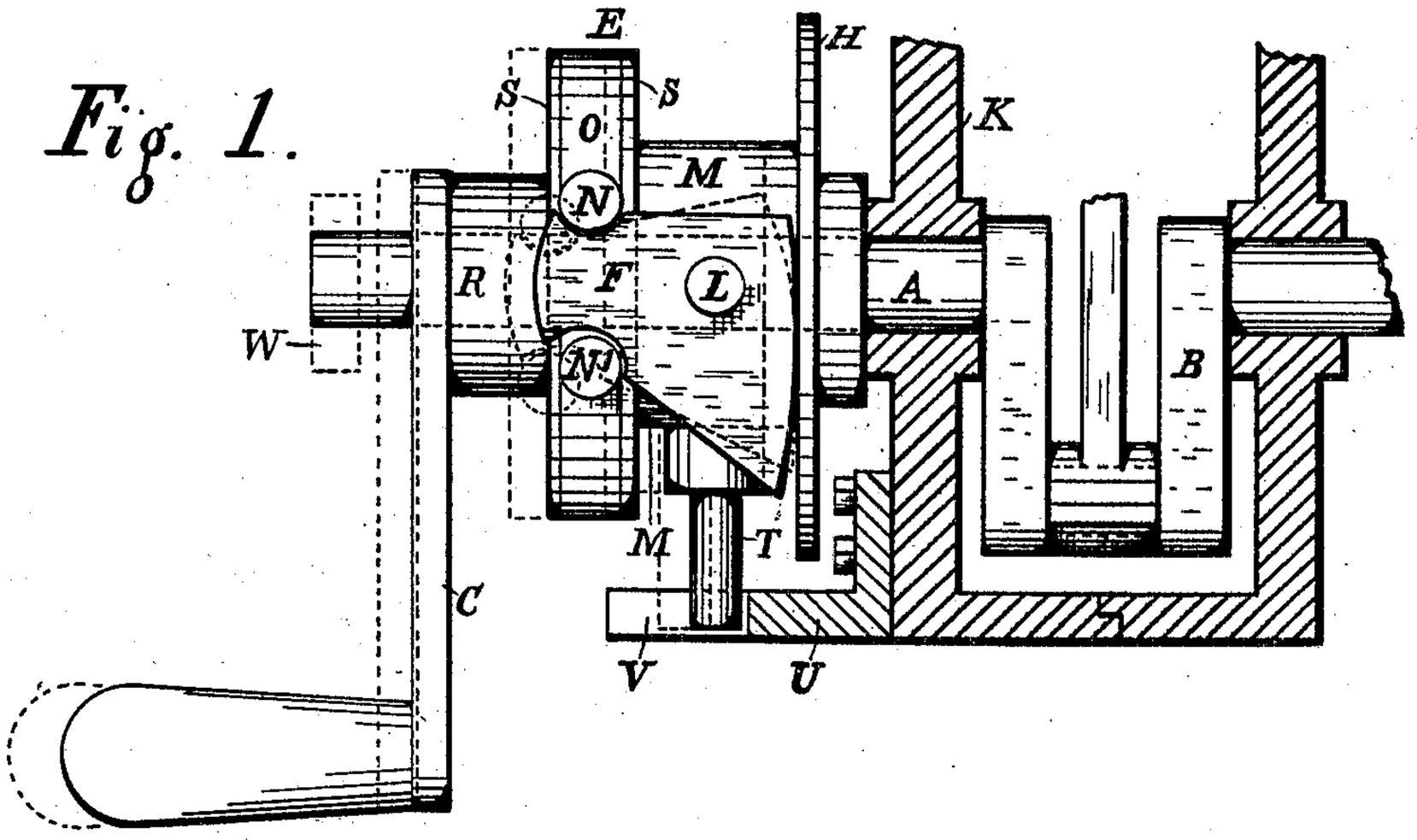
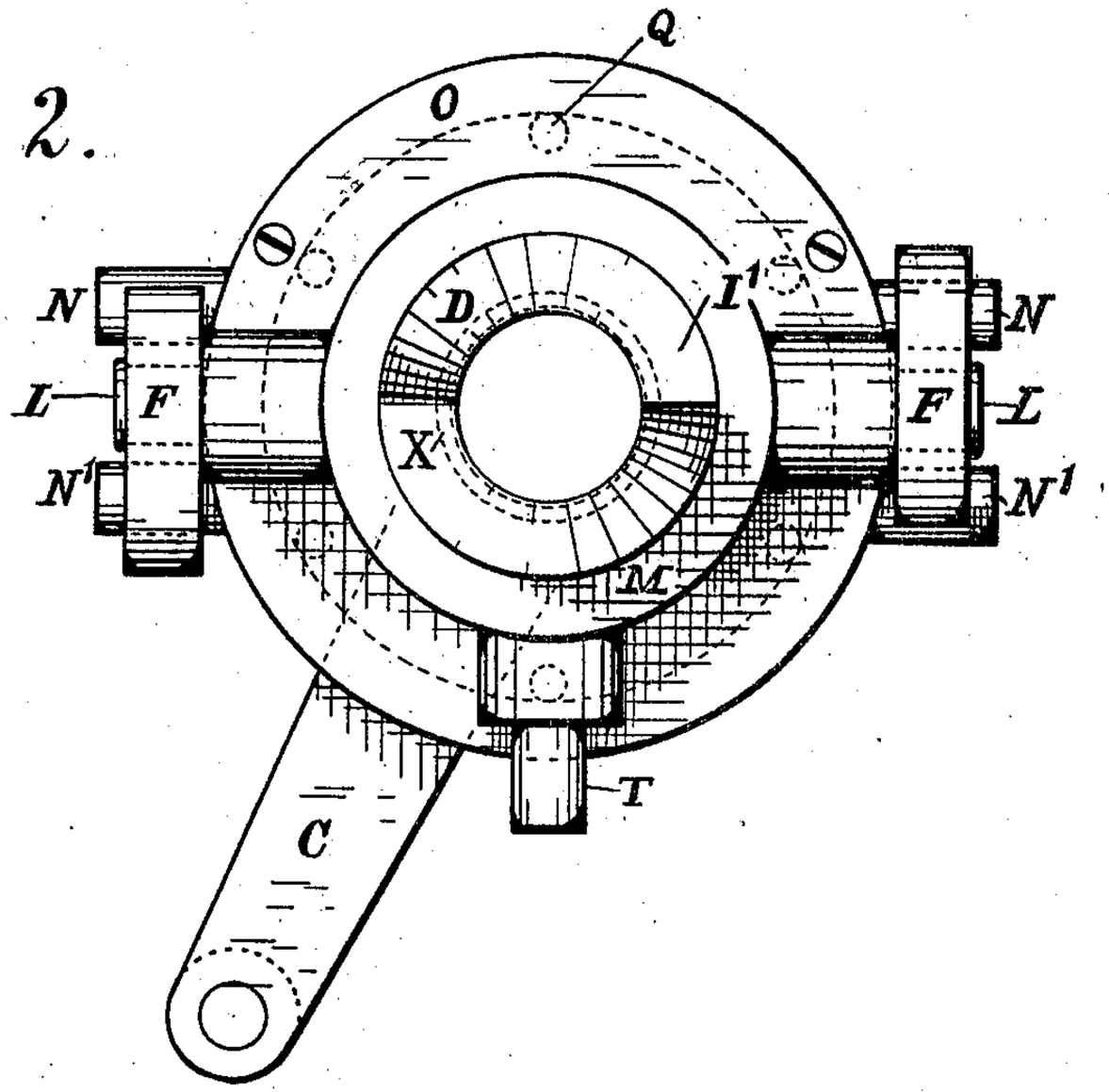


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

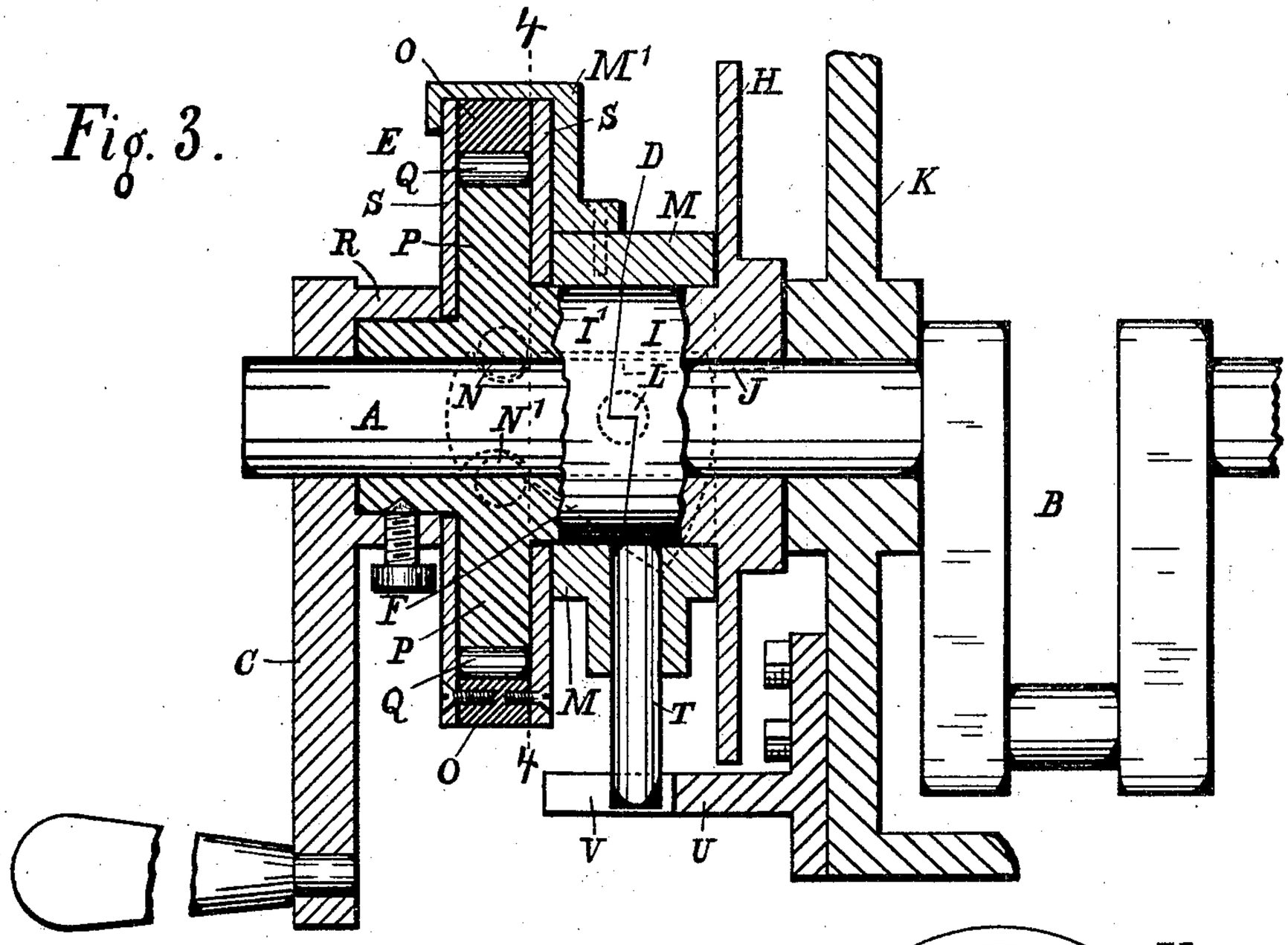


Fig. 4.

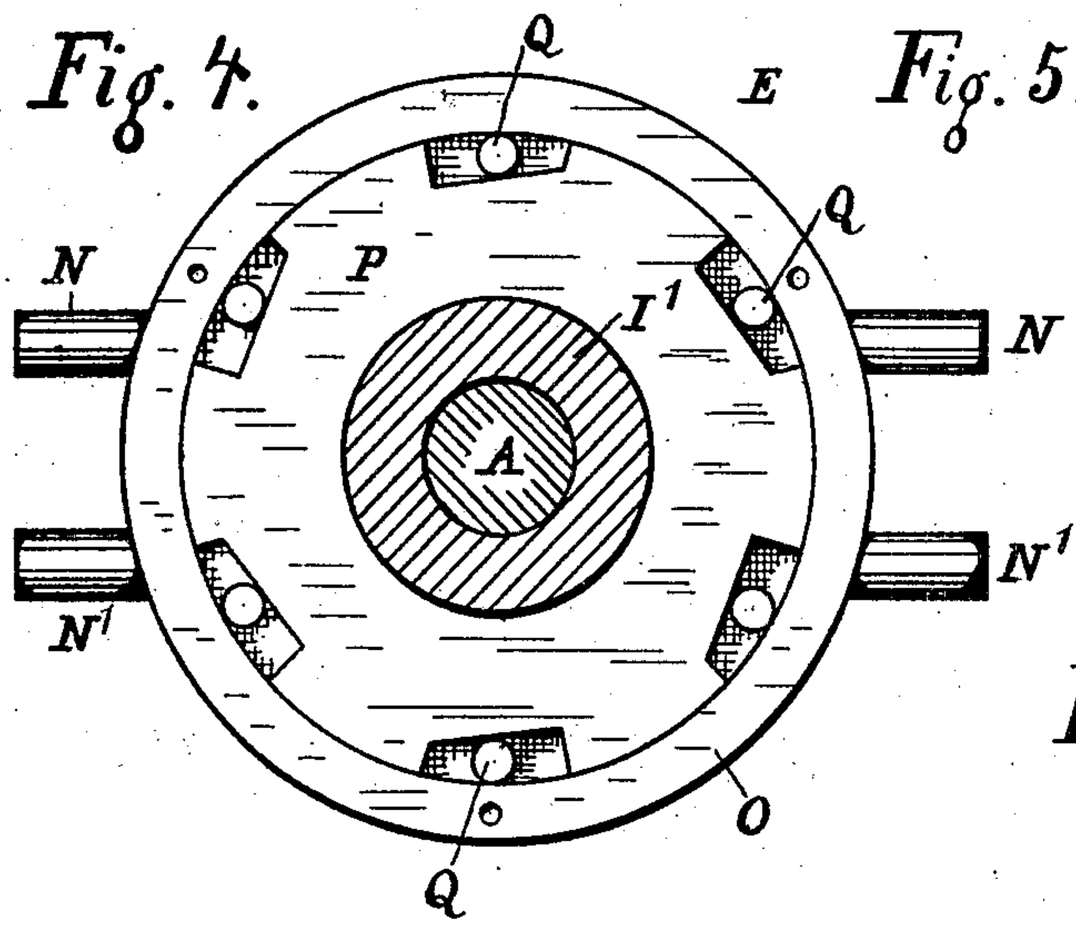


Fig. 5.

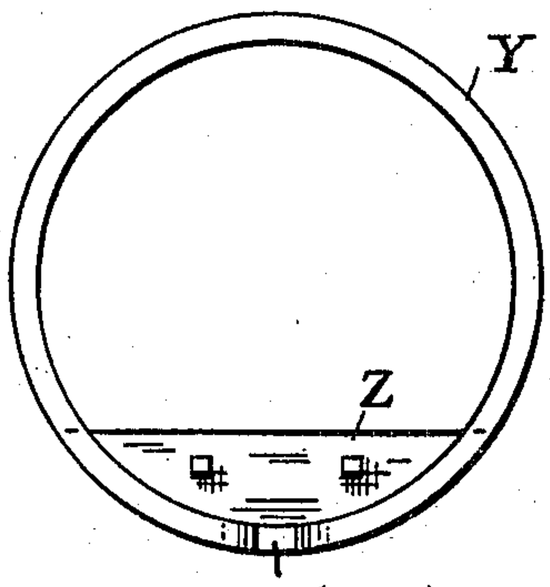
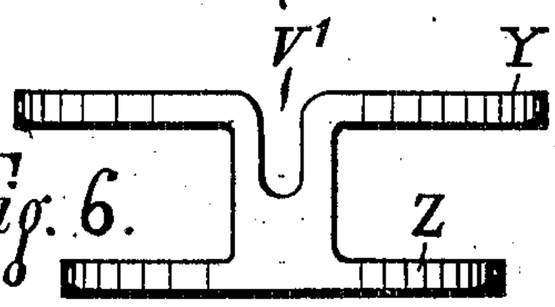


Fig. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE B. SELDEN, JR., OF ROCHESTER, NEW YORK.

STARTING-CRANK FOR ENGINES.

No. 812,094. Specification of Letters Patent. Patented Feb. 6, 1906.

Application filed January 30, 1905. Serial No. 243,390.

To all whom it may concern:

Be it known that I, GEORGE B. SELDEN, Jr., a citizen of the United States, residing at Rochester, New York, have invented an Improved Starting-Crank for Engines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to an improved construction of the starting-cranks of internal-combustion or other engines, which improvement is fully described and illustrated in the following specification and the accompanying drawings, the novel features thereof being specified in the claims annexed to the said specification.

In the accompanying drawings, representing my improved starting-crank, Figure 1 is a side elevation, a portion of the crank-casing being shown in section. Fig. 2 represents the crank detached, as seen from the inner end or from the right in Fig. 1. Fig. 3 is a longitudinal section. Fig. 4 is a transverse section on the line 4 4, Fig. 3, showing the roller-clutch. Fig. 5 represents the guide-ring detached. Fig. 6 is an inverted view of the same.

A is the crank-shaft, provided with the crank B, and C is the starting-crank. In the accompanying drawings I have represented my improved starting-crank as applied to an engine which normally runs left-handed, or in a direction opposite to that taken by the hands of a watch. The starting-crank carries the clutch D, which causes the crank-shaft to revolve in the normal direction when the starting-crank is turned, and the starting-crank is provided with the roller or other clutch E, which through one or more levers F disengages the clutch D on a slight reverse rotation of the crank-shaft by shifting the starting-crank lengthwise of the shaft, as indicated by the full and dotted lines in Fig. 1. The starting-crank, the roller-clutch, the levers, and the ring or collar M, to which they are pivoted, are all detachable in one piece from the crank-shaft. The disk or plate H is secured on the crank-shaft immediately outside the crank-casing and revolves with the crank-shaft. The disk H may be made in one piece with the member I of the clutch D, which revolves with the crank-shaft, being secured thereon by the key J, Fig. 3, or other suitable device. The lever or levers F are pivoted at L to the supporting-ring M and bear at their inner ends on the disk H and are connected at their outer ends by a pin or pins N N′ with the outer member O of the roller or ratchet clutch E.

The inner member P of the clutch E is secured to or made in one piece with the member I′ of the point-clutch D, which engages with the opposite clutch member I on the crank-shaft.

Q, Figs. 3 and 4, represents the rollers located in recesses cut with inclined surfaces in the edge of the inner clutch member P. If a roller-clutch be used, springs may be inserted to force the rollers along in the recesses in any usual or preferred manner; but I have found in practice that gravity alone is sufficient to insure the engagement of the clutch when a sufficient number of rollers are employed.

The starting-crank C is secured to the inner member P of the roller-clutch by the hub R or other suitable means, so that the starting-crank, the inner member P, and the clutch member I′ revolve as one piece. The outer member O of the roller-clutch E is a ring having a plain inner surface adapted to engage with the rollers Q and held in place laterally on the inner member P by the plates S, Fig. 3, on one or both sides. In the construction shown it is provided on one side or on opposite sides, if two levers F be employed, with the projecting pins N N′. These pins engage in notches in the outer ends of the levers F, whereby the levers although permitted sufficient freedom of movement connect the roller-clutch with the supporting-ring M, so that it may be detached from the crank-shaft with the starting-crank and the roller-clutch. The supporting-piece M is so connected with the casing K or the frame of the engine that it does not revolve with the starting-crank. In the construction shown the ring M is provided with a projecting arm or pin T, which engages with a slot V in a bracket U, attached to the frame or casing. The slot V is open at its outer end, so that the pin can be freely introduced therein or removed therefrom.

The operation of my improved safety starting-crank is as follows: The starting-crank and its connected parts being applied to the crank-shaft with the pin T of the supporting-ring M inserted in the slot V, the two members I I′ of the clutch D are engaged together and the engine is started by turning the starting-crank in the usual manner. If, however, there should occur from premature ignition or other cause a reverse rotation of

the crank-shaft, commonly known as "back-kick," which has frequently caused severe injuries to the operator, the roller-clutch is engaged by the backward rotation of its inner member, and this motion carries the outer member with it, which causes the lever F, pivoted to the non-rotating support M, to swing from the position indicated by the full lines in Fig. 1 to that approximately shown by the dotted lines, and the inner or cam-shaped end of the lever F, bearing against the disk H, forces the starting-crank and its attachments outward lengthwise of the crank-shaft, so that the members of the point-clutch D are disengaged from each other, the pin T sliding in the slot V and the starting-crank remaining at rest without injury to the hand or arm of the operator even if the backward rotation should be prolonged through several revolutions. For facility of illustration in the accompanying drawings the amount of lateral shifting to disengage the starting-crank is exaggerated, said distance depending upon the length of the engaging surfaces of the point-clutch, which the constructor will proportion in accordance with the requirements of any particular case, the size of the engine, the frequency with which it must be started, the number of engaging surfaces in the point-clutch, and various other considerations. In my own constructions I have secured sufficient engaging surfaces in a point-clutch with two lifts, and the disengagement of the point-clutch when a reverse rotation of the crank-shaft of one-fiftieth of a revolution occurs, in which case there is not even a perceptible jar to the hand of the chauffeur, especially if the handle of the starting-crank be covered with or made of rubber.

In case it be desired to retain the starting-crank permanently on the crank-shaft a collar or other suitable device W, Fig. 1, is employed on the end of the crank-shaft and a coiled spring X, Fig. 2, is inserted between the members of the point-clutch D in a suitable recess, or other suitable means may be employed to hold the starting-crank away from the casing, so that the starting-clutch is disengaged and the starting-crank does not revolve. In this case on starting the engine the operator presses the starting-crank inward, so as to engage the starting-clutch, the arm T sliding in the groove V.

To facilitate the entrance of the arm T into the slot V when the starting-crank has been removed from the crank-shaft and is to be again used for starting the engine, I employ the guide-ring Y, Figs. 5 and 6, instead of the slotted bracket U. This ring is attached to the frame or casing by any suitable support Z and is provided with a notch or slot V′, in which the pin T engages when the starting-crank is applied to the crank-shaft and revolved with an inward pressure. The pin T bears against the ring Y until, as it revolves, it comes opposite the slot and enters into it, thereby permitting the engagement of the starting-clutch, after which the continued rotation of the starting-crank rotates the crank-shaft, the inner member of the roller-clutch revolving freely within the outer member. It will be observed that there is no wear whatever on the roller-clutch except at the time of a reverse rotation of the crank-shaft.

M′, Fig. 3, represents one or more clips or guides which may be employed for the purpose of holding the supporting-ring M in proper relation with the starting-crank and roller-clutch when detached from the crank-shaft. This clip is fastened to the ring and extends over the edge of the outside member of the roller-clutch, which rotates freely within the clip.

It will be understood that many changes or alterations may be made in my improved starting-crank without departure from the constructive principles involved therein. Thus the disk H may be stationary or the ends of the levers F may bear directly on a suitable portion of the frame or on the casing, in which case, as the levers do not revolve with the crank-shaft, there will be a reduction in the friction. Instead of the pins N N′ and the notches on the opposite sides of the outer end of the lever to receive them a single pin may be employed, entering a suitable slot in the lever. It will be noticed from Fig. 1 that the notch for the pin N′ is cut away to permit the swinging movement of the lever on its pivot L. It has already been intimated that a single lever on one side only of the shaft may be employed, and while I prefer to use two levers the choice depends on the relative dimensions of the various parts, the length of the bearing of the starting-crank on the crank-shaft, and various other considerations. It will also be understood that the clutches may be inclosed in a suitable casing. A ratchet or other suitable clutch may also be employed in place of the roller-clutch shown.

I claim—

1. The combination of a crank-shaft, a starting-clutch member revolving therewith, a starting-crank provided with a clutch member corresponding to that on the shaft, a non-rotating support, a movable lever on the support for disengaging said clutch members when said crank-shaft revolves backward, and means arranged at right angles to the axis of revolution to actuate said cam on said backward movement, as and for the purposes set forth.

2. The combination of a crank-shaft, a starting-clutch member revolving therewith, a part having a plane surface at right angles to the crank-shaft, a starting-crank provided with a clutch member corresponding to that on the shaft, a second clutch mounted on the

starting-crank, and means operating between said second clutch and the plane surface to disconnect the starting-clutch members from each other, as and for the purposes set forth.

3. The combination of a crank-shaft, a starting-clutch member revolving therewith, a disk, a starting-crank provided with a clutch member corresponding to that on the shaft, and provided with a second clutch, and means operating between said second clutch and said disk to disconnect the starting-clutch members from each other, as and for the purposes set forth.

4. The combination of a crank-shaft, a starting-crank, a starting-clutch member revolving with said crank-shaft, a movable part having a plane surface at right angles to the crank-shaft, an oppositely-acting clutch member carried by the starting-crank, and means located between said clutch members and the plane surface for disconnecting said clutch members on the reverse rotation of the crank-shaft, as and for the purposes set forth.

5. The combination of a crank-shaft, a starting-crank, a starting-clutch member revolving with said crank-shaft, a part having a plane surface at right angles to the crank-shaft, an oppositely-acting clutch member carried by the starting-crank, a non-rotating support, and means operating between the clutch members and the plane surface to disconnect the clutch members on the reverse rotation of the crank-shaft, as and for the purposes set forth.

6. The combination of a crank-shaft, a starting-crank, a starting-clutch member revolving with said crank-shaft, a part having a plane surface at right angles to the crank-shaft, an oppositely-acting clutch member carried by the said starting-crank, a non-rotating support, a lever pivoted to said support and bearing at one end against said plane surface and connected at the other end with the clutch member on the starting-crank, as and for the purposes set forth.

7. The combination of a crank-shaft, a starting-crank, a starting-clutch member revolving with said crank-shaft, a part having a plane surface at right angles to said crank-shaft, a clutch on the starting-crank, said clutch comprising an inner member having a part adapted to engage with the starting-clutch member, and an outer member adapted to engage with the inner member on the reverse rotation of the crank-shaft, a non-rotating support, and means attached to the support and operated by the outer member of said clutch for disconnecting the members of the starting-clutch, as and for the purposes set forth

GEORGE B. SELDEN, JR.

Witnesses:
GEORGE B. SELDEN,
HENRY R. SELDEN.