

W. J. SPIRO.
ENGINE STARTER.
APPLICATION FILED APR. 16, 1919.

1,322,069.

Patented Nov. 18, 1919.
2 SHEETS—SHEET 1.

Fig. 1.

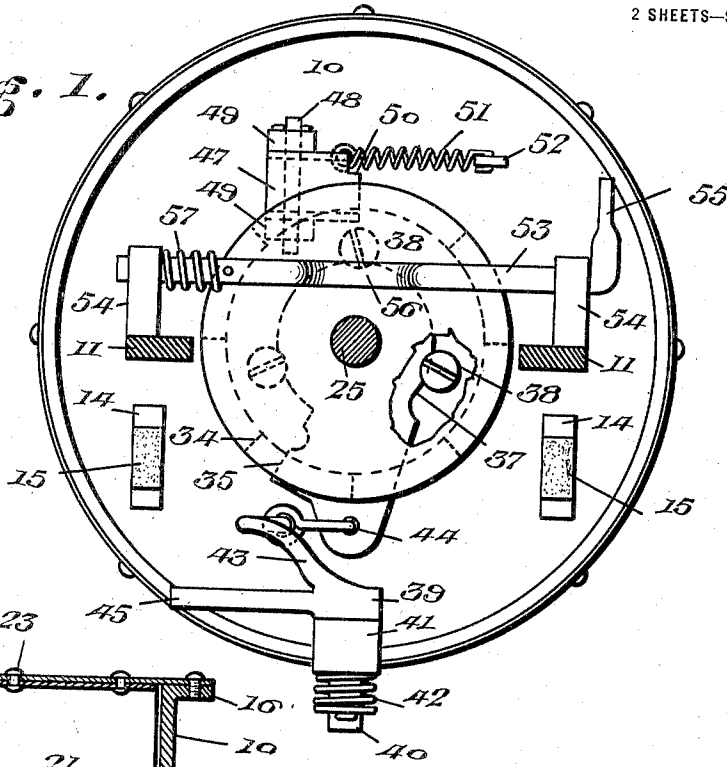
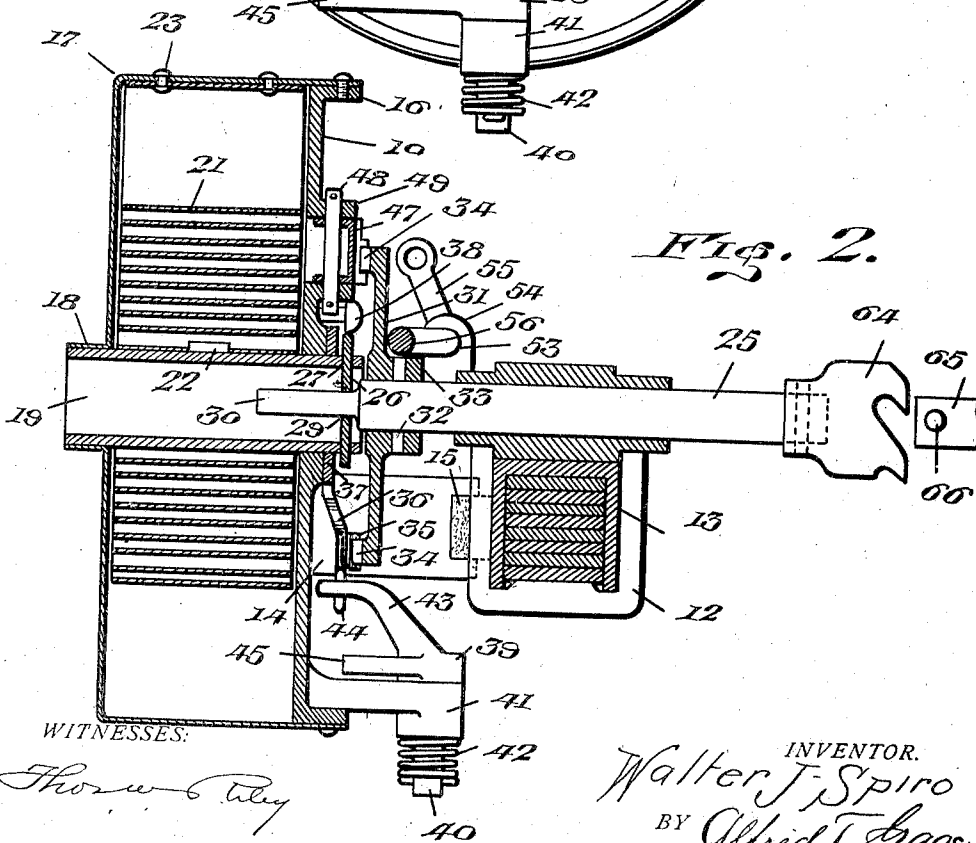


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

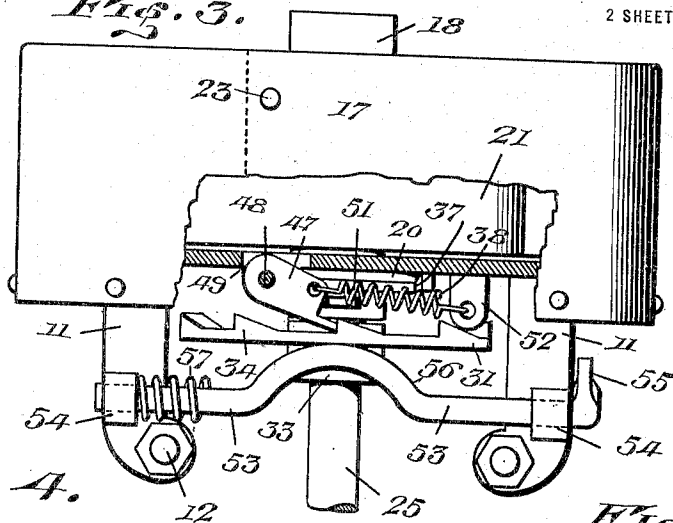


Fig. 4.

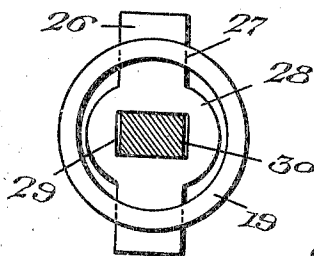


Fig. 5.

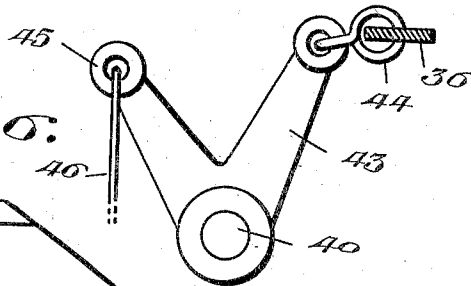
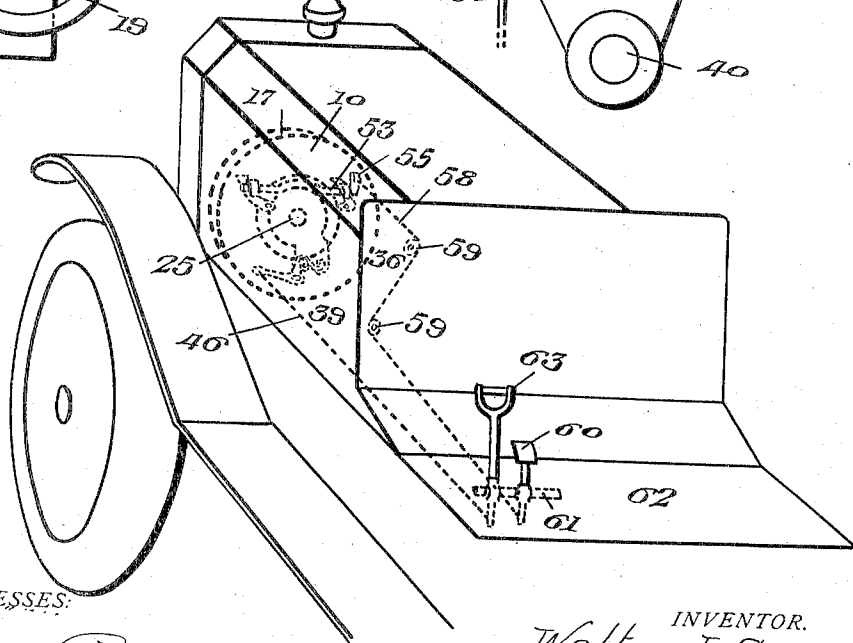


Fig. 6.



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WALTER J. SPIRO, OF WHITE PLAINS, NEW YORK.

ENGINE-STARTER.

1,322,069.

Specification of Letters Patent.

Patented Nov. 18, 1919.

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To all whom it may concern:

Be it known that I, WALTER J. SPIRO, citizen of the United States, residing at White Plains, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Engine-Starters, of which the following is a specification.

This invention relates to an engine starter and particularly to a construction adapted for application to an automobile and comprising a manually wound driving spring with means for retaining and releasing the same.

The invention has for an object to provide a novel and improved construction comprising a starting shaft mounted for axial movement and connected to a driving spring, said shaft being provided with a winding ratchet for said spring adapted to be released and automatically disconnected from its retaining means.

Another object of the invention is to provide an improved form of spring drum having a rotatable winding arbor and a starting shaft connected thereto for lateral and axial movement, together with winding means connected to said shaft by which it may be rotated for winding purposes and released for the starting action.

A further object of the invention is to present a novel structure of axially movable starting shaft provided with a rotatable ratchet disk and coöperative retaining means upon a fixed part disposed to automatically shift said disk when released from a holding device.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings—

Figure 1 is a rear elevation of the starter;

Fig. 2 is a substantially central vertical section of the same applied to an automobile;

Fig. 3 is a top plan, with parts broken away;

Fig. 4 is a detail elevation of the shaft and arbor connecting device;

Fig. 5 is a plan of the winding crank lever; and

Fig. 6 is a perspective in diagram of the actuating connections for the starter.

Like numerals refer to like parts in the several figures of the drawings.

The numeral 10 designates the main frame which may be of any desired construction or configuration and mounted in any preferred manner. It is herein shown as provided with rearwardly extending lugs 11 for this purpose adapted to be secured by clips 12 to a fixed part 13 of an automobile or other structure upon which it may be desired to mount the starter. The frame is also provided with buffer arms 14 carrying cushioning blocks 15 of rubber or other material and adapted to rest against the part 13, as shown in Fig. 2, to form a resilient support.

The frame is formed at its outer periphery with a flange 16 to which a drum casing 17 is secured, and the front of this casing is provided with a hub 18 within which a winding arbor 19 is disposed. This arbor has a bearing at its opposite end within the hub 20 of the frame 10 and is connected to the coiled tension spring 21 as at 22, while the opposite end of this spring is connected to the drum at 23.

At the rear of the frame a starter shaft 25 is suitably mounted and connected to the arbor 19 for lateral and axial movement by any desired means. A preferred construction for this purpose comprises a dog 26 extending diametrically of the arbor and slidably mounted in slots 27 therein. The central enlarged portion 28 of this dog is formed with an angular aperture 29 to receive the angular end 30 of the shaft 25. This produces a loose connection between the parts to provide for eccentricity or angularity of their axes by vertical movement, and also permits an axial movement of the shaft.

Upon the shaft 25 a ratchet disk 31 is secured, for instance, by a pin 32 disposed at its hub 33, and the inner face of this disk is provided with the ratchet teeth 34 arranged to coöperate with the winding pawl 35 carried by the arm 36 pivotally mounted upon the extended end of the arbor 19. As shown by dotted lines in Fig. 1, the bearing portion 37 of this arm is retained in position by headed screws 38 mounted in the frame and having their flange overlapping the bearing portion. The space between the flange of the screws and the hub of the frame is sufficient to permit a lateral play of the bearing portion so that it may recede to ride over the ratchet teeth in a return stroke of the arm. The pawl is drawn

into contact with such teeth in the winding stroke by its actuating connection. A desirable structure for this purpose is shown in Figs. 1 and 5, where the bell crank lever 39 has its pivot 40 mounted upon a bracket from the frame 10, as shown at 41. This pivot has secured thereto a retracting spring 42 the opposite end of which is secured to the bracket. The arm 43 of the lever 39 is connected by a link 44 with the winding pawl arm 36, and the other arm 45 of the lever has extended therefrom an operating connection 46.

The winding ratchet is retained in position to hold the spring under tension by a detent device such as shown in Fig. 3, wherein the detent 47 has its pivot 48 mounted in lugs 49 extended from the main frame 10. The tooth 50 of this detent seats behind the teeth 34 of the ratchet disk and is held in proper alinement and restored after release by a tension spring 51 extending from the detent to a lug 52 from the frame. It will be seen that this detent is disposed at an acute angle to the vertical plane of the disk and has a constant tendency due to the back pressure of the winding disk to force the disk axially away from the frame. Such movement is resisted by any desired form of holding device by which axial movement of the shaft and the ratchet disk carried thereby are prevented.

A desirable form of holding device comprises the crank shaft 53 pivotally mounted in bearings 54 upon the supporting lugs 11 and provided with an operating arm 55. The crank portion 56 of the shaft bears against the ratchet disk, as shown in Fig. 3, and is adapted to be restored to such position by a spring 57 surrounding shaft 53 and secured at one end thereto and at its opposite end to one of the bearings 54. The arm 55 has an operating connection 58 extending therefrom over bearings 59 to a release pedal 60 mounted upon a bearing 61 adjacent the dash board of an automobile 62, as shown in Fig. 6. The winding connection 46 extends to a winding lever 63 upon the bearing 61.

The starter shaft may be provided with any preferred clutch connection with the engine shaft, and in Fig. 2 a very desirable form is shown in which a toothed clutch member 64 is secured to the starter shaft and the engine shaft 65 provided with a co-operating pin 66 which when engaged with a tooth of the member 64 continues and completes the axial travel of the starter shaft to release the ratchet disk from its detent and pawl and permit the tension of the spring to be applied to the starting action. When the power of the spring is spent the continued revolution of the engine shaft will cam the toothed clutch member out of engagement with the pin, and pressure having

been removed from the release pedal, the ratchet disk will resume its initial position and be held therein by the crank shaft 53 bearing under spring tension thereon.

The operation of the invention will be apparent from the foregoing description and it will be seen that the driving spring is placed under tension through the rotation of the winding arbor by the step by step action of the pawl arm upon the ratchet disk carried by the starter shaft which has a laterally and axially movable connection with this arbor. The tension of the starting spring on the ratchet disk when held by the detent creates an axial pressure against the former acting to force the disk and swing the detent away from the main frame when the disk is released from the crank shaft. The releasing of the disk and the movement of the starter shaft into clutch with the engine shaft are thus automatically effected and are not dependent upon manual operation except to relieve the holding device for the disk.

The invention presents a simple, efficient and economically manufactured construction of spring actuated engine starter adapted for application to the engine of a motor vehicle or to a stationary gas engine or other form of motor requiring an initial starting force.

While the details of the structure shown have been specifically described and may comprise a preferred form of the invention, still the invention is not limited thereto as changes and alterations may be made within the scope of the following claims.

What I claim is—

1. In an engine starter, a frame, a tension spring secured at one end thereto, a rotatable arbor secured to the opposite end of said spring, a starter shaft mounted on said arbor for rotary movement therewith and axial movement relative thereto, a ratchet disk secured to said shaft, means for rotating said disk, means for axially shifting said disk, and means for holding said disk in winding position and releasing the same therefrom.

2. In an engine starter, a frame, a tension spring secured thereto, a rotatable arbor secured to said spring, a starter shaft mounted upon said arbor for rotary movement therewith and axial movement relative thereto, winding means secured to said shaft and arranged to retain said spring under tension, means for holding said winding means in operative position and releasing the same therefrom, and tensioned means for automatically shifting said winding means and shaft after their release from the holding means.

3. In an engine starter, a frame, a tension spring secured thereto, a rotatable arbor secured to said spring, a starter shaft mounted upon said arbor for rotary move-

ment therewith and axial movement relative thereto, winding means carried by said shaft, means for holding said winding means in operative position and releasing the same therefrom, and a tensioned retaining device for the winding means disposed upon a fixed part to automatically shift said winding means when the latter is released.

4. In an engine starter, a frame, a tension spring secured thereto, a rotatable arbor secured to said spring, a starter shaft mounted upon said arbor for rotary movement therewith and axial movement relative thereto, a ratchet winding disk carried by said shaft, means for releasably holding said disk in operative position, and a tensioned retaining detent disposed upon the frame at an angle to the plane of the disk to automatically shift the disk when released.

5. In an engine starter, a frame, a tension spring carried thereby, a starter shaft connected to said spring and mounted for rotary and axial movement, a ratchet disk carried by said shaft in a plane parallel with the frame, a winding pawl for said disk, a pivoted retaining detent upon the frame to engage said disk and tensioned thereby to axially shift the disk, and means for releasably holding said disk in winding position.

6. In an engine starter, a frame, a tension spring carried thereby, a starter shaft connected to said spring and mounted for rotary and axial movement, a ratchet disk carried by said shaft in a plane parallel with the frame, a winding pawl for said disk, a tensioned retaining detent disposed between the disk and frame, and a crank device for releasably holding said disk in winding position.

7. In an engine starter, a frame, a tension spring carried thereby, a starter shaft connected to said spring and mounted for rotary and axial movement, a ratchet disk carried by said shaft, a winding pawl for said disk, a retaining detent upon the frame disposed to exert an axial pressure upon said disk and to be tensioned by said spring, and means for releasably holding said disk in winding position.

8. In an engine starter, a frame, a tension spring carried thereby, a starter shaft connected to said spring and mounted for rotary and axial movement, a ratchet disk carried by said shaft and having a toothed inner face, a winding arm pivoted upon the frame and provided with a pawl engaging said face, a retaining detent pivoted upon the frame and disposed at an acute angle to said disk to be tensioned by said spring, and pivoted means engaging said disk for releasably holding it in winding position.

9. In an engine starter, a frame, a tension spring carried thereby, a starter shaft connected to said spring and mounted for rotary and axial movement, a ratchet disk

carried by said shaft, a winding arm pivoted upon the frame for lateral movement relative to said disk and provided with a pawl engaging the same, a retaining detent pivoted upon the frame and engaging said disk to be tensioned by said spring, and pivoted means engaging the disk for releasably holding it in winding position.

10. In an engine starter, a frame, a tension spring carried thereby, a starter shaft connected to said spring and mounted for rotary and axial movement, a ratchet disk carried by said shaft and having teeth upon its inner face, means for winding said disk, a retaining detent pivoted upon the frame intermediate said disk and having a tooth to engage the same, a spring extending from the free end of said detent to a fixed support upon the frame, and means for releasably holding said disk in winding position.

11. In an engine starter, a frame, a tension spring secured at one end thereto, a rotatable arbor secured to the opposite end of said spring, a dog slidably mounted in said arbor for movement laterally of its axis and having a shaft aperture, a starter shaft mounted for rotary and axial movement and having an angular end extending through said aperture, means carried by said shaft for winding said spring, and means for retaining and shifting said shaft for the starting action.

12. In an engine starter, a frame, a tension spring secured at one end thereto, a rotatable arbor secured to the opposite end of said spring, a dog having an apertured body within said arbor and vertically disposed and extending through slots therein, a starter shaft mounted for rotary and axial movement and having a free end slidably mounted in said aperture, and means for effecting the rotary and axial movement of said shaft.

13. In an engine starter, a frame, a casing carried thereby and provided with a hub portion at its front, a rotatable arbor having bearings in said hub and frame, a tension spring connected to said casing and arbor, a starter shaft connected to said arbor for constant rotary movement therewith and axial movement relative thereto, winding means secured to said shaft and arranged to retain said spring under tension and means for effecting such movements of said shaft.

14. In an engine starter, a frame provided with a supporting lug and a buffer arm carrying a cushion block below the lug, a tension spring supported from said frame, a starter shaft mounted for rotary and axial movement and connected to said spring, winding means secured to said shaft, and means for effecting such axial movement of said shaft and winding means.

15. In an engine starter, a frame, a tension spring carried thereby, a starter shaft mounted for rotary and axial movement and connected to said spring, a ratchet disk 5 carried by said shaft, a winding arm having a cooperating pawl and pivotally mounted upon the frame for lateral movement relative to the disk, an actuating lever for said arm disposed to draw the same 10 toward said disk, means to axially shift said disk, and means for releasably holding said disk in winding position.

16. In an engine starter, a frame, a tension spring carried thereby, a starter shaft 15 mounted for rotary and axial movement and connected to said spring, a ratchet disk carried by said shaft parallel to said frame, an intermediate winding arm having a pawl cooperating with said disk and a hub piv- 20 otally mounted upon said frame, retaining means for said hub spaced therefrom to permit lateral movement relative to the disk, an actuating crank lever having a link connection with said arm, means to axially 25 shift said disk, and means for releasably holding said disk in winding position.

17. In an engine starter, a frame, a tension spring carried thereby, a starter shaft mounted for rotary and axial movement 30 and connected to said spring, a winding disk carried by said shaft, means for shifting and retaining said disk, and a rock shaft disposed at one side of said disk and having means to engage and hold the same 35 in winding position.

18. In an engine starter, a frame, a tension spring carried thereby, a starter shaft mounted for rotary and axial movement and connected to said spring, a winding disk 40 carried by said shaft, means for shifting and retaining said disk, a rock shaft provided with a crank portion disposed to releasably hold said disk in winding position, means for manually releasing said rock 45 shaft, and means connected to said shaft to automatically restore it to holding position.

19. In an engine starter, a frame having supporting lugs provided with bearings, a tension spring carried by said frame, a 50 starter shaft mounted for rotary and axial movement and connected to said spring, a winding disk carried by said shaft, means carried by the frame to retain said disk and exert an axial pressure thereon, a rock shaft 55 mounted in said bearings and provided with a crank portion to engage said disk, means for manually releasing said rock shaft, and a restoring spring connected to said rock shaft and to one of said bearings.

20. In an engine starter, a frame, a tension spring carried thereby, a starter shaft mounted for rotary movement therewith 60 and axial movement relative to said spring, a winding device carried by said shaft, retaining means engaging said device under

tension and exerting an axial pressure thereon, and means for releasably holding such device against such pressure.

21. In an engine starter, a frame provided with a hub portion and supporting 70 lugs, a casing mounted upon said frame and having a hub portion, a tubular arbor mounted in said hub portions, a coiled tension spring secured to said casing and arbor, a dog 75 mounted in said arbor to slide laterally of the axis thereof, a starter shaft mounted for rotary and axial movements and having an angular end slidably mounted in an aperture in said dog, winding means carried by 80 said shaft, means for axially shifting said winding means, and retaining and releasable holding means cooperating with said winding means.

22. In an engine starter, a frame provided with a hub portion and supporting 85 lugs, a casing mounted upon said frame and having a hub portion, a tubular arbor mounted in said hub portions, a coiled tension spring secured to said casing and arbor, a dog mounted within said arbor to 90 slide laterally of the axis thereof, a starter shaft mounted for rotary and axial movements and having an angular end slidably mounted in an aperture in said dog, a 95 ratchet disk secured to said shaft and having a toothed inner face, a winding arm pivoted upon one end of said arbor for lateral movement thereon and provided with a pawl engaging said disk, a crank lever 100 connected to actuate said arm, a tensioned retaining detent carried by the frame to engage and shift said disk, and means for releasably holding said disk in winding position.

23. In an engine starter, a frame provided 105 with a hub portion and supporting lugs, a casing mounted upon said frame and having a hub portion, a tubular arbor mounted in said hub portions, a coiled tension spring secured to said casing and arbor, a dog 110 mounted with said arbor to slide laterally of the axis thereof, a starter shaft mounted for rotary and axial movements and having an angular end slidably mounted in an aperture in said dog, a ratchet disk secured 115 to said shaft and having a toothed inner face, a winding arm pivoted upon one end of said arbor and provided with a pawl engaging said disk, means connected to actuate said arm, a retaining detent pivoted 120 upon the frame and disposed at an angle to the plane of said disk to exert an axial pressure thereon, a spring extending from the free end of said detent to a fixed lug, and releasable means for holding said disk 125 in winding position.

24. In an engine starter, a frame provided with a hub portion and supporting 130 lugs, a casing mounted upon said frame and having a hub portion, a tubular arbor

mounted in said hub portions, a coiled tension spring secured to said casing and arbor, a dog mounted within said arbor to slide laterally of the axis thereof, a starter 5 shaft mounted for rotary and axial movements and having an angular end slidably mounted in an aperture in said dog, a ratchet disk secured to said shaft and having a toothed inner face, a winding arm 10 pivoted upon one end of said arbor and provided with a pawl engaging said disk, a retaining detent pivoted upon the frame and disposed at an angle to the plane of said disk to exert an axial pressure thereon, 15 bearings upon said supporting lugs, a rock shaft mounted in said bearings and having a central crank portion disposed to engage and hold said disk, means connected to said rock shaft for withdrawing the crank portion 20 from said disk, and a restoring spring connected to said rock shaft for automatically returning it to holding position.

25. In an engine starter, a frame provided with a tension spring, a starter shaft

connected thereto and mounted for rotary 25 and axial movements, means secured to said shaft for placing said spring under tension, a retaining device for said tensioning means disposed to exert an axial pressure upon 30 said means and shaft, a holding device for maintaining the shaft in tensioning position, means for releasing said holding device, and means for automatically restoring the holding device and parts controlled 35 thereby.

26. In an engine starter, a frame provided with a tension spring, a starter shaft connected to said spring and mounted for 40 rotary and axial movement, a winding member secured to said shaft, a unitary retaining and shifting member engaging the first mentioned member and held under tension thereby, and a member disposed to control the axial movement of the winding 45 member.

In testimony whereof I affix my signature.

WALTER J. SPIRO.