April 24, 1956 F. O. ADE ET AL 2,742,887

ROPE STARTER MECHANISM

Filed May 18, 1953

2 Sheets-Sheet 1

Fig. 1

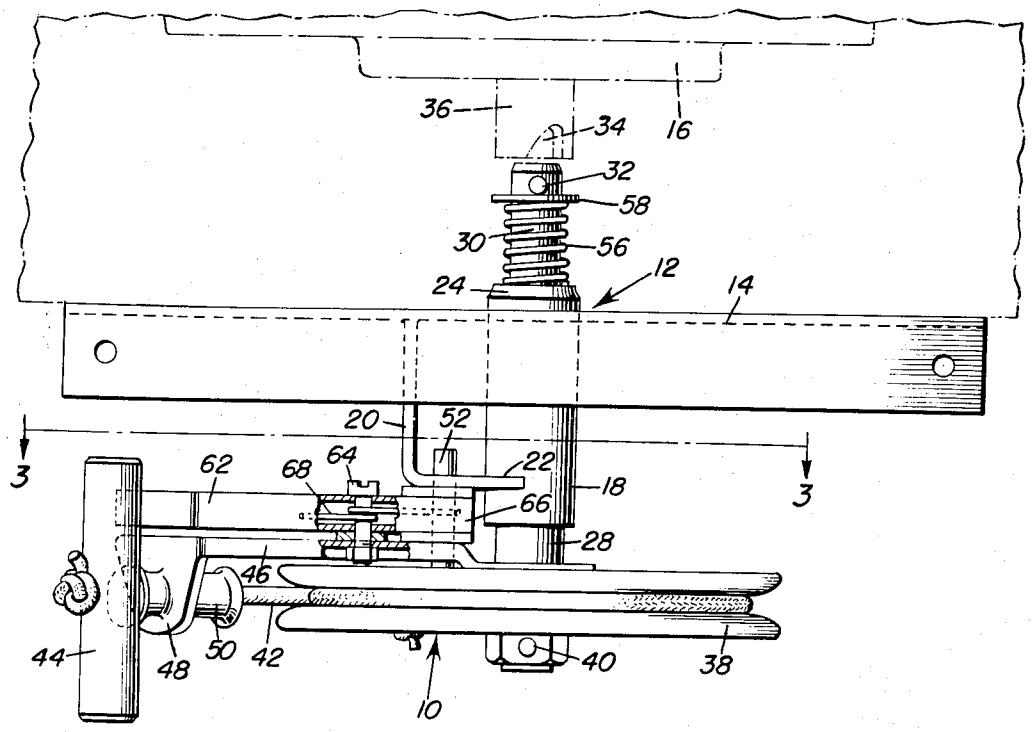
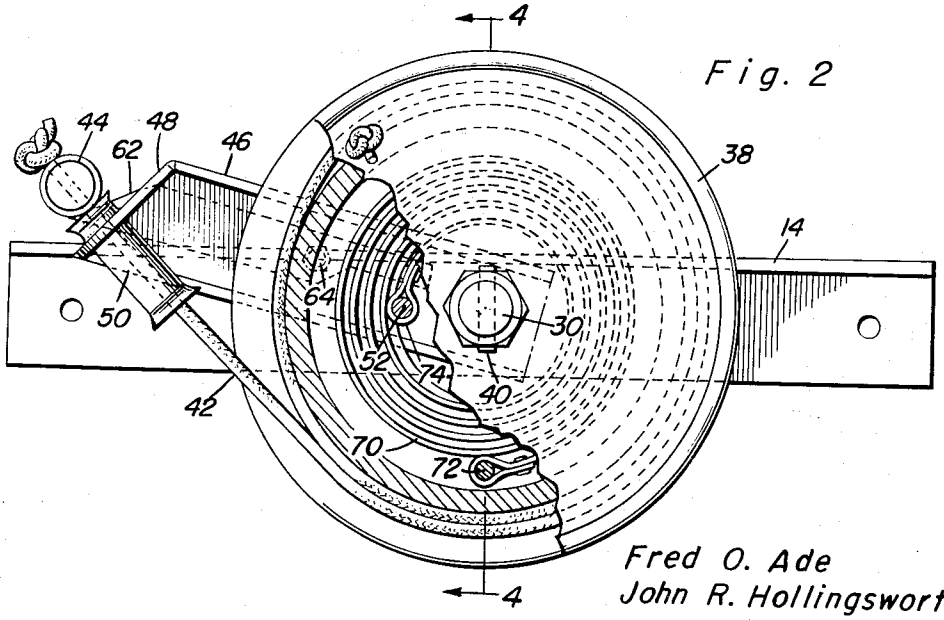


Fig. 2



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Fig. 3

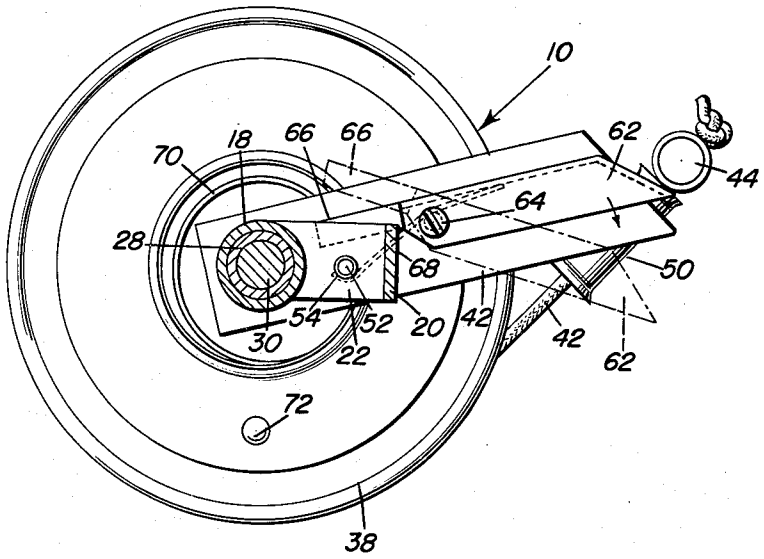
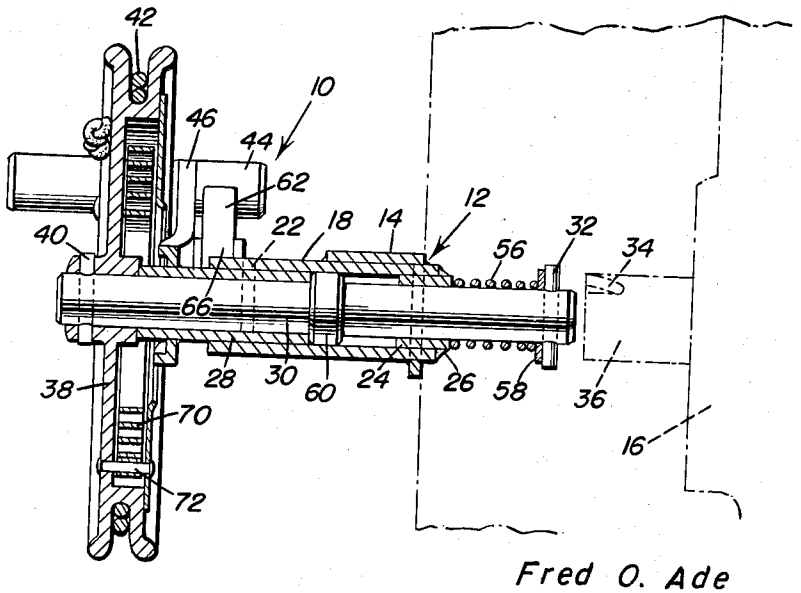


Fig. 4



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ROPE STARTER MECHANISM

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Application May 18, 1953, Serial No. 355,818

5 Claims. (Cl. 123—185)

This invention relates in general to improvements in starter mechanisms, and more specifically to an improved rope starter mechanism.

It is the primary object of this invention to provide an improved rope starter mechanism which may be operatively connected to a small internal combustion engine for the selective rotation of the same for starting purpose.

Another object of this invention is to provide an improved rope starter mechanism which may be conveniently mounted with respect to the small internal combustion engine for operative engagement therewith, the mounting of the rope starter mechanism requiring a minimum of modification for mounting of the internal combustion engine.

Another object of this invention is to provide an improved rope starter mechanism for a small internal combustion engine which is of a relatively simple construction and which is formed of readily obtainable material so as to be economically feasible.

A further object of this invention is to provide an improved rope starter mechanism which is semi-automatic in operation, the rope starter mechanism requiring merely the manual unlatching of lock means thereof and the pulling on a pull rope to rotate a starter shaft thereof to impart a rotary movement to an associated internal combustion engine.

A still further object of this invention is to provide an improved rope starter mechanism which is extremely compact so that the same may be mounted at the front of an internal combustion engine and occupy a minimum of space.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a top plan view of the rope starter mechanism which is the subject of this invention and shows the same in relation to a crank shaft of an internal combustion engine, portions of latch means of the rope starter mechanism being broken away and shown in section in order to clearly illustrate the details thereof;

Figure 2 is a front elevational view of the rope starter mechanism of Figure 1, a portion of the pulley of the starter shaft being broken away as shown in section in order to clearly illustrate the manner in which a pull rope is attached thereto and the manner in which an elongated spring is operatively connected to the pulley for returning the same to an initial position whereby the pull rope is automatically rewound thereon;

Figure 3 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 3—3 of Figure 1 and shows the general relationship of latch means for retaining the starter shaft in an inoperative position, the latch means being shown in a starter shaft released position by dotted lines; and

Figure 4 is a longitudinal sectional view taken substantially upon the plane indicated by the section line 4—4 of Figure 2 and shows the general construction of the rope starter mechanism.

Referring now to the drawings in detail, it is seen that the rope starter mechanism is referred to in general by the reference numeral **10**. The rope starter mechanism **10** includes a mounting bracket assembly which is referred to in general by the reference numeral **12**. The mounting bracket assembly **12** includes a transversely extending angular member **14** which is normally a radiator support for an internal combustion engine **16** for which the rope starter mechanism **10** is intended. Carried by the angle member **14** is a longitudinally extending sleeve **18** which is rigidly secured to the angle member **14** and projects both forwardly and rearwardly thereof. The mounting bracket assembly **12** also includes an angular base member **20** which has a longitudinally extending leg thereof secured to the angle member **14** and a forward transversely extending leg **22** which is connected to the sleeve **18** adjacent the forward end thereof.

Referring now to Figure 4 in particular, it will be seen that the rear portion of the sleeve **18** is provided with an internal bushing **24** which is secured to the sleeve **18** by welding as at **26**. Disposed in the forward portion of the sleeve **18** is an elongated bushing **28** which projects out of the forward end of the sleeve **18**. It will be noted that closest or nearest ends of the respective bushings **24** and **28** are spaced apart a considerable distance for a purpose to subsequently become apparent.

Rotatably mounted within the bushing **28** and **24** is an elongated starter shaft **30**. The starter shaft **30** has disposed at the rear end thereof a transversely extending pin **32** which is disposable in a pair of diametrically opposed notches **34** in a starter engaging extension **36** of a crank shaft (not shown) of the internal combustion engine **16**.

The forward end of the starter shaft **30** has mounted thereon for rotation therewith a pulley **38**. The pulley **38** is removably secured to the starter shaft **30** by a pin **40**. Entrained about the pulley **38** is a pull rope **42** which has secured to a free end thereof a handle **44**. It will be understood that when the handle **44** is pulled the pull rope **42** is pulled off of the pulley **38** which results in rotation of the pulley. Rotation of the pulley **38** will obviously result in rotation to the starter shaft **30**.

Carried by the bushing **28**, whose forward end engages the hub portion of the pulley **38** is a transversely extending stop member **46**. As is best illustrated in Figure 1, the stop member **46** has an offset outer end **48** which carries a tubular guide **50** through which the pull rope **42** passes.

Carried by the stop member **46** adjacent its connection with the bushing **28** is a longitudinally extending pin **52**. The pin **52** has a rearwardly extending portion which is slidably received in a bore **54** in the transverse leg **22** of the brace member **20**. The pin **52** also has a forwardly extending portion which is disposed within the confines of the central portion of the pulley **38**.

From the foregoing description of the various elements of the rope starter mechanism, it will be seen that the bushing **28** is limited to longitudinal movement with respect in the sleeve **18** due to the connection of the pin **52** with the leg **22** on the brace member **20**. However, the starter shaft **30** may be moved either longitudinally through the sleeve **18** or rotated with respect thereto. In order that the starter shaft **30** may be urged longitudinally through the sleeve **18** to the rear thereof, there is carried by the rear portion of the starter shaft **30** a coil spring **56**. The coil spring has one end thereof abutting the bushing **24** and the other end thereof engaging a washer **58** carried by the starter shaft **30**. The washer **58** is retained against longitudinal movement on the starter shaft **30** by the pin **32**. In order that longitudinal movement of the starter shaft **30** to the rear may be

limited, the same is provided with an intermediate shoulder 60 which engages the rear of the bushing 24. It will be understood that the shoulder 60 is reciprocable longitudinally through the sleeve 18 toward and away from the bushing 24.

It will be understood that when the starter shaft 30 is moved rearwardly in response to urging of the coil spring 56, the pin 32 engages in the notches 34 so that when the starter shaft 30 is rotated the crank shaft of the internal combustion engine 16 will be correspondingly rotated. It will also be understood that the notches 34 are so formed whereby when the internal combustion engine 16 begins to run the pin 32 is thrown out of the notches 34 and the starter shaft 30 moved forwardly by such reaction.

In order to retain the starter shaft 30 in a forward position, the stop member 46 is provided with a latch 62. The latch 62 is pivotally carried by a pivot pin 64 supported by the stop member 46 intermediate its ends. The latch 62 is generally channel shaped in cross section and includes an enlarged end portion 66 which is disposable between the stop member 46 and the leg 22 of the brace member 20. In order that the latch 62 may have its end portion 66 disposed between the stop member 46 and the leg 22, there is carried by the pivot pin 64 a spring member 68 which has one end hooked over the pin 52. The other end of the spring 68 engages the underside of the outer portion of the latch 62 to urge the same upwardly with the result that the end portion 66 thereof is moved downwardly between the stop member 46 and the leg 22. The end portion 66 engages the pin 52 and is retained in the desired latching position.

It will be understood that when the latch 62 is in the desired latching position, the stop member 46 is prevented from moving rearwardly with respect to the sleeve 18. This results in the retention of the bushing 28 against rearward movement which also results in the retention of the pulley 38 against rearward movement. The retention of the pulley 38 retains the starter shaft 30 in a forward position.

In order that the pull rope 42 may automatically be rewound upon the pulley 38, the pulley 38 has mounted therein a spring member of the clock spring type, the spring member being referred to by the reference numeral 70. The spring member 70 has an outer end thereof secured to the pulley 38 by pin 72. The inner end of the spring member 70 is provided with a loop 74 which is engaged over the pin 52.

In operation, when it is desired to utilize the rope starter mechanism 10, the latch 62 is first manually moved to an inoperative position. When the handle 44 is grasped and the pull rope 42 pulled through the guide 50 with the result that it is reeled off of the pulley 38 and the pulley is rotated. Rotation of the pulley 38 results in rotation of the starter shaft 30. Inasmuch as the starter shaft 30 was initially moved rearwardly by the coil spring 56 upon release of the latch 62 and the pin 32 engaged in the notches 34, it will be seen that the crank shaft of the internal combustion engine 16 is rotated. If the internal combustion engine 16 is not started on the first pull of the pull rope 42, the same is released and the spring member 70 automatically rewinds the same on the pulley 38. The pull rope 42 is continued to be pulled until such time as the internal combustion engine 16 starts. As pointed out above, when the internal combustion engine starts the starter shaft 30 is urged rearwardly. It will be understood that the starter shaft 30 moves rearwardly a distance sufficient for the latch 62 to once again engage between the stop member 46 and the leg 22 with the result that the starter shaft 30 is retained in a forward position and out of the engagement with the starter extension 26 of the internal combustion engine 16. It will therefore be seen that the operation of the rope starter mechanism 10 is semi-automatic.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A rope starter mechanism comprising a mounting bracket, a starter shaft rotatably carried by said mounting bracket, means for selectively rotating said starter shaft, said starter shaft being movable longitudinally through said mounting bracket for driving engagement with an engine, said starter shaft being urged longitudinally through said mounting bracket into driving engagement with an engine by resilient means, latch means for rendering said resilient means ineffective, bushing elements slidably supported for longitudinal movement on the starter shaft, a stop member carried by said bushing element for longitudinal movement only, said stop member being engageable by said latch means.

2. A rope starter mechanism comprising a mounting bracket, a starter shaft rotatably carried by said mounting bracket, means for selectively rotating said starter shaft, said starter shaft being movable longitudinally through said mounting bracket for driving engagement with an engine, said starter shaft being urged longitudinally through said mounting bracket into driving engagement with an engine by resilient means, latch means for rendering said resilient means ineffective, bushing elements slidably supported for longitudinal movement on the starter shaft, a stop member carried by said bushing element for longitudinal movement only, said stop member being engageable by said latch means, said stop member being non-rotatably carried by said mounting bracket.

3. A rope starter mechanism comprising a mounting bracket, a starter shaft rotatably carried by said mounting bracket, means for selectively rotating said starter shaft, said starter shaft being movable longitudinally through said mounting bracket for driving engagement with an engine, said starter shaft being urged longitudinally through said mounting bracket into driving engagement with an engine by resilient means, latch means for rendering said resilient means ineffective, bushing elements slidably supported for longitudinal movement on the starter shaft, a stop member carried by said bushing element for longitudinal movement only, said stop member being engageable by said latch means, said rotating means including a pulley having a pull rope entrained therearound, a guide for said pull rope carried by said stop member.

4. A rope starter mechanism comprising a mounting bracket, a starter shaft rotatably carried by said mounting bracket, means for selectively rotating said starter shaft, said starter shaft being movable longitudinally through said mounting bracket for driving engagement with an engine, said starter shaft being urged longitudinally through said mounting bracket into driving engagement with an engine by resilient means, latch means for rendering said resilient means ineffective, bushing elements slidably supported for longitudinal movement on the starter shaft, a stop member carried by said bushing element for longitudinal movement only, said stop member being engageable by said latch means, said rotating means including a pulley having a pull rope entrained thereover, spring means for urging said pulley to a rewind position.

5. A rope starter mechanism comprising a mounting bracket, a starter shaft rotatably carried by said mounting bracket, means for selectively rotating said starter shaft, said starter shaft being movable longitudinally through said mounting bracket for driving engagement with an engine, said starter shaft being urged longitudinally through said mounting bracket into driving engagement with an engine by resilient means, latch means

for rendering said resilient means ineffective, bushing elements slidably supported for longitudinal movement on the starter shaft, a stop member carried by said bushing element for longitudinal movement only, said stop member being engageable by said latch means, said rotating means including a pulley having a pull rope entrained thereover, spring means for urging said pulley to a rewind position, said stop member being engaged over a pin carried by said mounting bracket, one end of said spring means being connected to said pin.

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