

July 22, 1952

R. J. JACKSON
COMBINED STARTER CONTROL AND BELT TIGHTENER
FOR INTERNAL-COMBUSTION ENGINES

2,603,974

Filed April 11, 1950

2 SHEETS—SHEET 1

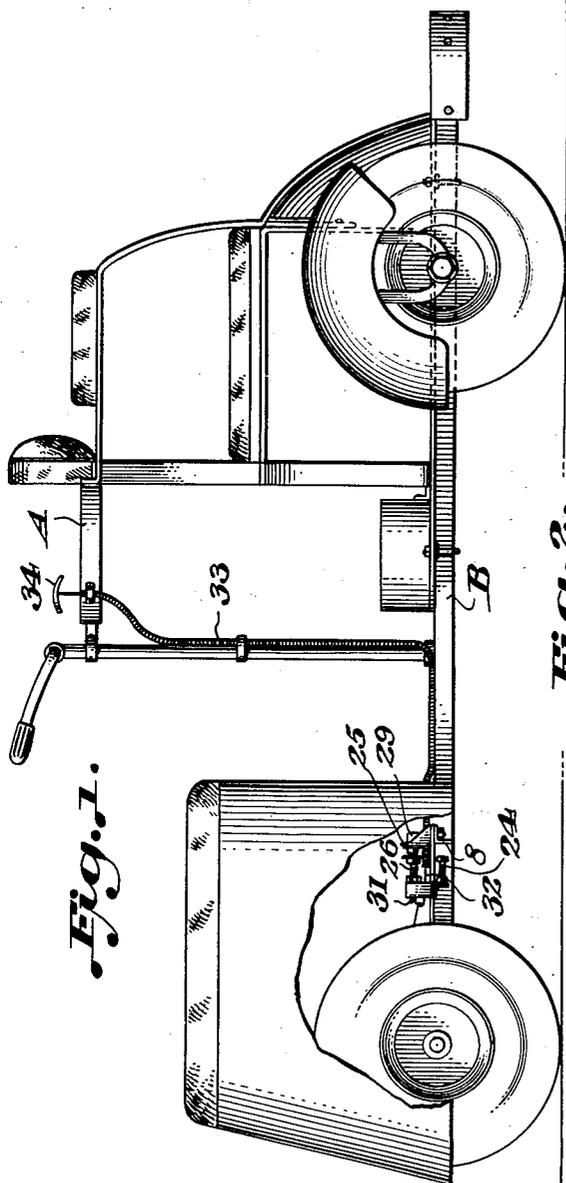


Fig. 1.

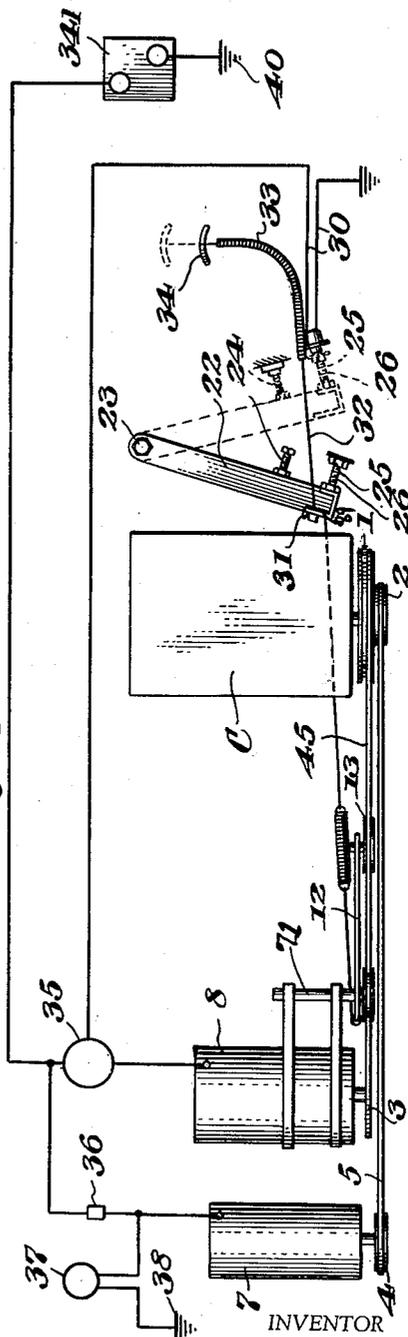


Fig. 2.

INVENTOR
Robert J. Jackson,
BY *Mason & Mason*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,603,974

COMBINED STARTER CONTROL AND BELT TIGHTENER FOR INTERNAL-COMBUSTION ENGINES

Robert J. Jackson, Houston, Tex.; Mae G. Jackson and South Texas National Bank of Houston executors of said Robert J. Jackson, deceased

Application April 11, 1950, Serial No. 155,286

8 Claims. (Cl. 74-6)

1

2

This invention relates to a mechanism for starting internal combustion engines and has particular application to engines which require many starts within a short period of time. Such engines operate at their greatest efficiency when the cylinders start to fire within the first 10 degrees of turning of the engine crankshaft by the engine starter, as otherwise the efficiency of the motor would be low, due to the large amount of gasolene fed to the engine during the many starts that have to be made. In other words, only a drop or two of gasolene would be lost should the engine crankshaft make a thirty-sixth of a revolution before firing would begin. A considerable consumption of gasolene or other engine fuel would take place during the continued starting and stopping and again restarting of the engine, during each day of use, where the crankshaft turned ninety degrees before firing would begin.

One of the principal objects of the invention is to provide an engine starter assembly which starts the engine substantially simultaneously with the manual operation of the starter actuator.

An additional object is to provide a device for tightening the motor drive means and for simultaneously completing the circuit to the motor.

A further object is to provide the combination of a manually operated belt tensioning device and switch means connected to each other whereby the starting of the engine is effected by a simple movement of a handle or other operating member.

Other objects will be found hereinafter throughout the specification.

In the drawings:

Figure 1 is a side elevation of a vehicle provided with the device of this invention, the motor cover being partly broken away to disclose parts of the device.

Figure 2 is a schematic layout of the parts as connected to the engine and the electric motor and the generator thereof of said engine, and showing the wiring circuit.

Figure 3 is a side elevation of the parts shown in Figure 2, but omitting the engine and the wiring circuit thereof.

Figure 4 is an enlarged detail view of the switch and supporting parts therefor, and

Figure 5 is a side elevation of the structure shown in Figure 4.

One of the principal purposes of the present construction is to provide a self starter assembly and belt tightener for use with the vehicle for transporting golf players, as disclosed in my Pat-

ent No. 2,463,972, granted March 8, 1949. It should be stated, however, that the device of the present invention has other uses and is adapted for use in starting and stopping the engine of any type of motor "scooter" or motor cycle, and may also be used with various types of engines for automobiles, boats, and with movable and stationary internal combustion engines, such as engines for driving pumps and other equipment.

The vehicle illustrated and claimed in my patent aforesaid is used for transporting as many as four players with their golf bags and a caddie around a golf course. The total number of plays or "shots" by a foursome during one round of golf may vary from less than three hundred to over five hundred. Over one-half of these "shots" are tee and fairway "shots" to the green, and the vehicle must be started and stopped for a majority of these "shots" until each green is reached. The motor is then stopped until putting is completed. Consequently, the motor of the vehicle must be started and stopped several hundred times for each round of golf. Frequently, 36 or 54 holes may be played in a single day by a foursome, entailing many hundreds of starts and stops during such play. The present invention permits no loss of time during such engine stops and starts, and permits a substantial saving of gasolene due to the substantially instantaneous starting and stopping of the engine with the device hereinafter described and claimed.

In Figure 1 of the drawings, A indicates a vehicle of the type shown in my patent that is provided with front and rear seats, supporting wheels and an engine, (not indicated in this figure) mounted for driving the rear wheel, a cover for the engine supporting the rear seat, receptacles for the golf bags behind the front seat, and suitable steering mechanism. A is a vehicle having a supporting framework B.

As seen in Figure 2, the engine is indicated generally at C, and is provided with a drive shaft which supports in driving relation the pulleys 1 and 2 (Figures 2 and 3).

The pulley 1 is connected in driving relation to a pulley 3 by the belt 45, and pulley 2 is drivingly connected to pulley 4 by belt 5.

Pulley 4 is mounted on the shaft of the generator 7, and pulley 3 is mounted on the shaft of the motor 8. Each of the pulleys 1, 2, 3 and 4 is fast upon its shaft.

The belt tightener mechanism consists of a freely rotatable pulley 11 mounted on a shaft 71 that may be fixed (not shown) to a stationary part of the engine. This shaft supports a bell

3

crank having arms 12 and 10. Arm 12 supports a pivot pin 76 on which is freely rotatable a pulley 13. The other arm 10 of the bell crank has an aperture 9 through which is attached wire 17 whose opposite end is attached to the left end, as viewed in Figure 3, of a contractable spring 18. The right end of this spring has attached to it the wire 20.

The bell crank arm 12 is biased to rotate in a clockwise direction on pivot 71 by spring 15 mounted on a stationary part 16 of the engine. The part 14 is a guide for belt 45 which latter is also provided with a belt guard 67 as seen in Figure 3. A stop 68 limits clockwise movement of the bell crank arm 10, arm 12 and its pulley 13.

An arm 22 is mounted on a vertical pivot 23 on framework B. The free end of the arm has a flange 89 provided with an aperture with which is threaded wire 32 forming part of Bowden wire 33 and having an end 31 secured by an adjustable screw stop member 39.

Mounted in flange 89 on the right side thereof as viewed from Figure 4 is an adjustable stud member 25 which is adapted to engage a spring pressed button switch 28 mounted on the end of cross member 88 of frame B. The button of the switch 28 is reciprocally mounted in the casing 29. A spring (not shown but of conventional type) urges the button to the left as seen in the figures. When the button is pushed to the right an electrical circuit through switch 28 is completed as follows: the two leads 30 as seen in Figure 2 are connected so as to complete the circuit when button 28 is pushed to the right. One of these leads connects to ground and the other is connected to solenoid 35. There are connections from this solenoid to motor 8, cutout 36 and battery 341 which latter is grounded at 40. From cutout 36 there are wired connections to signal light 37, ground 38 and generator 7.

As seen in Figures 2, 3, 4 and 5, the pivoted arm 22 is provided with an adjustable stop 24 which engages a vertical flange 84 as seen in Figure 5 of the cross member 88 when arm 22 is pulled counter-clockwise as viewed in Figure 4, as hereinafter described.

Movement of arm 22 in either direction is controlled by Bowden wire 33, that is provided with an operating handle 34 mounted adjacent the steering mechanism of the vehicle as seen in Figure 1.

As shown in Figure 3, this swinging pivoted arm 22 also has attached to it the wire 20 that is connected through spring 18 and wire 17 to arm 10, which latter forms part of the bell crank lever that constitutes the belt tightener.

The plate 90 is attached to the fixed transverse frame member 88 and this serves as a guide for arm 22. The recess or slot 91 of this arm, as shown in Figure 3, prevents up or down movement of the end of arm 22 as it moves about pivot 23.

Operation

Prior to starting the engine, the parts are in the full line position as shown in Figure 3. In order to start the engine, the handle 34 is grasped and pulled upwardly. This causes the handle 34 and the arms 10 and 12 of the bell crank and pulley 13 to assume the dotted line positions shown in the figure. Movement of the pulley 13 to its upper position immediately tensions belt 45. During this time, the arm 22 has moved to the right to the position where stud 25 has depressed

4

the push button of switch 28, completing the circuit to the electric starter motor 8. As this motor rotates, it drives through belt 45, pulley 1 turning over engine C. The engine starts immediately, whereupon the handle 34 is released and automatically assumes the full line position shown in Figure 3. Springs 15 and 18 then restore the parts to the full line position shown in this figure. In this position and during the running of the engine, although pulley 1 continues to rotate, belt 45 is not driven to drive electric motor pulley 3 due to the amount of slack in the belt. Pulley 2 on the engine shaft drives generator 7 through pulley 4 to recharge the battery 341.

A conventional ignition switch is turned off to stop the engine, and is again turned on when the handle 34 is pulled up to start motor 8 and operate the belt tightener.

Various changes may be made without departing from the spirit of the invention. For instance, other types of switch means may be employed; a foot pedal could be used instead of the handle 34; the shape and style of the handle 34 could be changed; a cable could be used instead of the Bowden wire shown and described; or chains could be employed in place of the belts shown. Belts are preferred, however. It is to be understood that the specification and drawings are furnished for purposes of illustration only, and that I desire to be limited only to the extent set forth by the appended claims.

I claim:

1. A combined starter and belt tightener control for internal combustion engines in combination, a belt, a belt tightener therefor comprising a pivot, a driving and a driven pulley at the opposite ends of said belt, said belt tightener comprising a bell crank having arms swingable on said pivot and having a pulley on the end of one of said arms engageable with said belt, a normally open switch, a starter motor for operating said driving pulley, a source of energy and circuit means connecting said source and starter motor when said switch is closed, a pivoted lever having an actuator for closing said switch, flexible means connecting said other bell crank arm to said lever, and an operating means for moving said lever to close said switch whereby said motor is started and said belt is tightened.

2. A combined starter and belt tightener control for internal combustion engines in combination, a belt, a belt tightener therefor comprising a pivot, a belt tightener pulley on said pivot engaged with said belt, a driving and a driven pulley at the opposite ends of said belt, said belt tightener comprising a bell crank having arms swingable on said pivot and having a pulley on the end of said arms, engageable with said belt, a normally open switch, a starter motor for operating said drive pulley, a source of energy and circuit means connecting said source and starter motor when said switch is closed, a pivoted lever having an actuator for closing said switch, flexible means connecting said other bell crank arm to said lever, and an operating means for moving said lever to close said switch whereby said motor is started and said belt is tightened.

3. A combined starter and belt tightener control for internal combustion engines in combination, a belt, a belt tightener therefor comprising a horizontal pivot, a driving and a driven pulley at the opposite ends of said belt, said belt tightener comprising a bell crank having arms swingable on said horizontal pivot and having a pulley on

5

the end of one of said arms engageable with said belt, a normally open switch, a starter motor for operating said driving pulley, a source of energy and circuit means connecting said source and starter motor when said switch is closed, a pivoted lever having an actuator for closing said switch, flexible means connecting said other belt crank arm to said lever, and an operating means for moving said lever to close said switch whereby said motor is started and said belt is tightened, and a vertical pivot for said lever.

4. In a vehicle of the character described wherein the vehicle is provided with a frame, an engine and a self starter including a starter electric motor, a source of electrical potential, a circuit and a flexible drive means for driving said engine by said motor: a belt tightener having a pair of pulleys adapted to engage said flexible drive means, said frame having a transverse member and an electrical switch on said transverse member, a pivoted member mounted on said frame adjacent to said transverse member and having a part adapted upon actuation of said pivoted member to operate said switch, and flexible means connecting said pivoted member to said belt tightener.

5. In a vehicle of the character described wherein the vehicle is provided with a frame, an engine and a self starter including a starter electric motor, a source of electrical potential, a circuit and a flexible drive means for driving said engine by said motor: a belt tightener having a pair of pulleys adapted to engage said flexible drive means, said frame having a transverse member and an electrical switch on said transverse member, a pivoted member mounted on said frame adjacent to said transverse member and having a part adapted upon actuation of said pivoted member to operate said switch, and flexible means connecting said pivoted member to said belt tightener, said last named means including a coiled spring.

6. In a vehicle of the character described wherein the vehicle is provided with a frame, an engine and a self starter including a starter electric motor, a source of electrical potential, a circuit and a flexible drive means for driving said engine by said motor: a belt tightener having a pair of pulleys adapted to engage said flexible drive means, said frame having a transverse member and an electrical switch on said transverse member, a pivoted member mounted on said frame adjacent to said transverse member and having a part adapted upon actuation of said pivoted member to operate said switch, and flexible means connecting said pivoted member to said belt tightener, said last named means including a coiled spring, and Bowden wire mechanism for causing, when actuated, said pivoted member to operate said belt tightener to tighten

6

said flexible drive, and to operate said electrical switch whereby to complete said circuit and start said electric motor.

7. A combined starter and belt tightener control for internal combustion engines, in combination, a belt, a driving pulley and a driven pulley engageable by said belt, a belt tightener including a first pivoted member engageable with said belt, a normally open switch, a starter motor for operating said driving pulley, a source of energy and circuit means connecting said source and said starter motor when said switch is closed, a second pivoted member for closing said switch, means connecting said members together, and means for moving said members to operate said belt tightener and to close said switch, and a guide for said second member, said second member having a slot therein through which said guide passes and means provided for guiding said belt.

8. In a vehicle having a frame, an engine, a starter motor and a source of energy: a belt normally unoperatively connecting said engine with said starter motor, a belt tightener comprising a first pivoted member having one end engageable with said belt to tighten the belt and thereby operatively connect said engine and starter motor, said frame having normally open switch means mounted thereon, circuit means adapted to connect said source with said motor when said switch is closed, a second member pivotally mounted on said frame adjacent said switch means and having a part engageable with said switch means to close said switch when said second member is pivoted, means operatively connecting the other end of said first member to said second member and means for moving said second member to close said switch whereby said motor is started and said belt is tightened, and means to limit the pivoting movement of said first member and to adjust the amount of throw of said second member.

ROBERT J. JACKSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
127,380	Snelbaker	May 28, 1872
804,980	Reiss	Nov. 21, 1905
1,879,878	Leyvastre	Sept. 27, 1932
1,882,022	Leyvastre	Oct. 11, 1932
1,925,755	Hemmingsen	Sept. 5, 1933
2,576,582	Elliott	Nov. 27, 1951

FOREIGN PATENTS

Number	Country	Date
264,934	Great Britain	Jan. 31, 1937