Sept. 5, 1950 G. J. ARMSTRONG 2,521,319

STARTER FOR INTERNAL-COMBUSTION ENGINES

Filed Oct. 26, 1948 2 Sheets-Sheet 1

Fig. 1

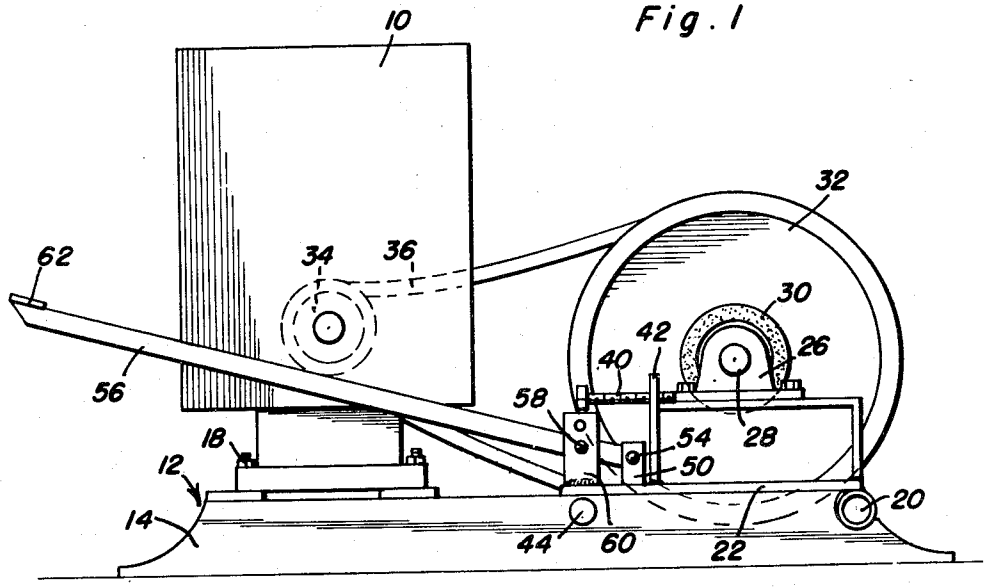
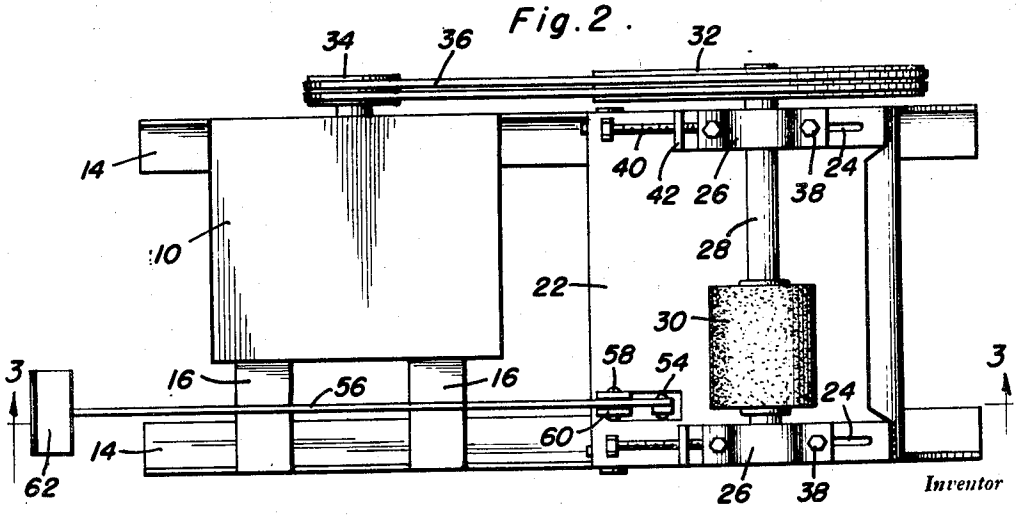


Fig. 2.



Inventor

George J. Armstrong

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Sept. 5, 1950 G. J. ARMSTRONG 2,521,319

STARTER FOR INTERNAL-COMBUSTION ENGINES

Filed Oct. 26, 1948 2 Sheets-Sheet 2

Fig. 3.

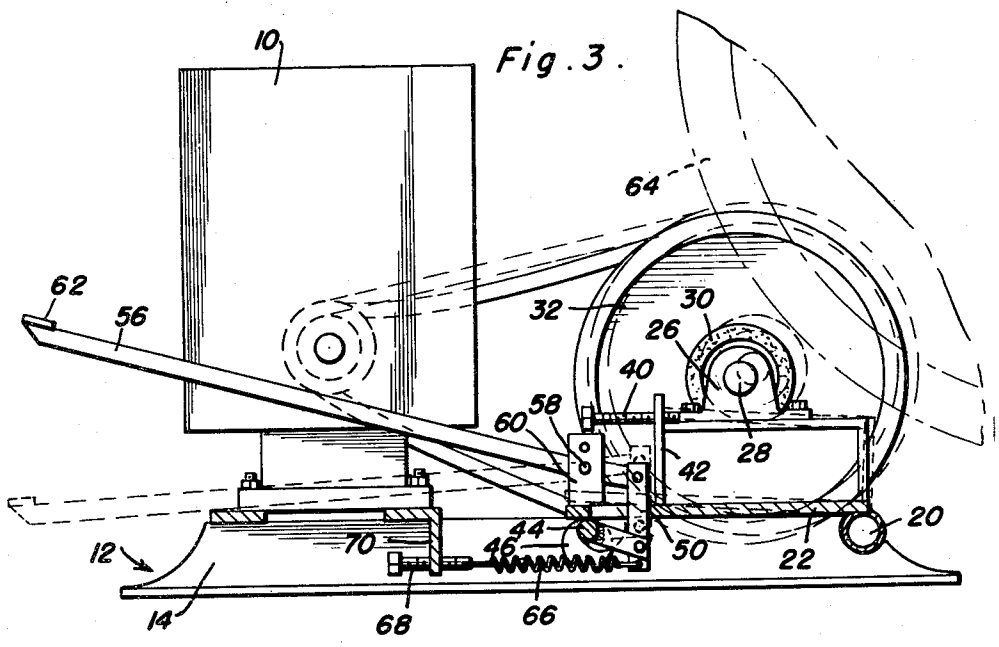
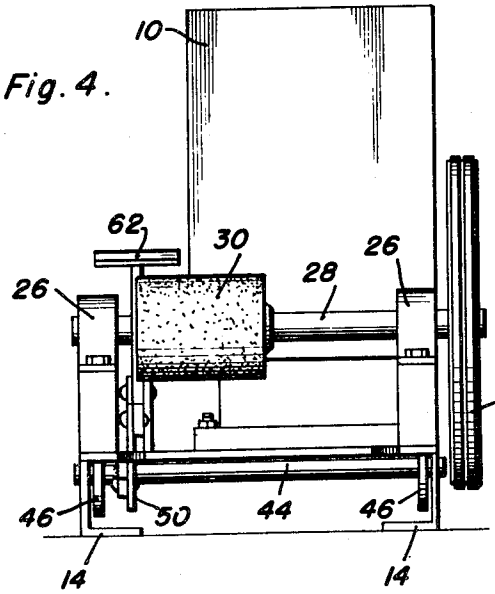


Fig. 4.



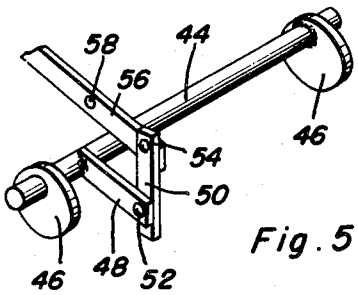


Fig. 5

Inventor

George J. Armstrong

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Patented Sept. 5, 1950 2,521,319

UNITED STATES PATENT OFFICE

2,521,319

STARTER FOR INTERNAL-COMBUSTION ENGINES

George J. Armstrong, Seminole, Okla.

Application October 26, 1948, Serial No. 56,552

1 Claim. (Cl. 74—8)

1

This invention comprises novel and useful improvements in a starter for internal combustion engines and more specifically pertains to a friction drive engageable with the flywheel of internal combustion engines for starting the same from a source of power such as a small internal combustion engine or the like.

The principal object of this invention is to provide a friction starter having means for simultaneously placing the friction drum of the starter into contact with a flywheel or analogous part of an internal combustion engine for starting the same and for operatively tensioning a belt drive connecting the friction wheel with a source of power such as a small engine or motor.

An important feature of the invention resides in the provision of an internal combustion engine starter having a prime mover such as an electric motor or an internal combustion engine constituting a source of power and a countershaft connected with this prime mover, which countershaft is provided with a friction drum which is engageable with the flywheel or some other rotatable part of an internal combustion engine for rotating and starting the latter.

A further feature of the invention resides in the provision of a starting device in accordance with the preceding feature wherein an improved mechanism is provided for simultaneously tensioning the driving connection between the prime mover and the countershaft and placing the friction drum of the countershaft in driving engagement with an internal combustion engine.

Yet another feature of the invention resides in an improved mounting of the countershaft, having a friction drum and a driven pulley thereon, upon a tilting plate which is pivotally mounted upon a support upon which the prime mover is mounted and wherein means is provided for pivoting the tilting plate while simultaneously rotating the friction drum and placing the friction drum in driving engagement with a part of an internal combustion engine.

These, together with various ancillary features and objects of the invention which will later become apparent as the following description proceeds, are attained by this device, a preferred embodiment of which has been illustrated by way of example only in the accompanying drawings, wherein:

Figure 1 is a side elevational view of a preferred embodiment of the invention, the countershaft and tilting plate being shown in their disengaged or inoperative position, and the driving belt of the countershaft being shown in its untensioned and inoperative condition;

2

Figure 2 is a top plan view of the embodiment of Figure 1;

Figure 3 is a vertical longitudinal sectional view taken substantially upon the plane of the section line 3—3 of Figure 2, and illustrating in dotted lines the position of the parts when the device is actuated to tension the driving belt, to pivot the tilting plate and to engage the friction drum with the periphery of a flywheel of an internal combustion engine;

Figure 4 is an end elevational view of the device shown in Figures 1–3; and

Figure 5 is a perspective detail view of a portion of the actuating means for tilting or pivoting the tilting plate.

Referring now more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, the numeral 10 designates generally any form of prime mover such as an electric motor, a small internal combustion engine or the like which is shown bolted upon the framework 12 of a suitable supporting frame.

This framework may conveniently comprise a pair of angle irons 14 which are rigidly connected together as by transverse beams 16 upon which the prime mover 10 is removably secured as by bolts or other fastening means 18.

Adjacent one end of the frame members 14 of the supporting frame, is a transversely extending hinge or pivot pin 20 by means of which a tilting plate 22 is pivotally connected to the angle iron members 14. The sides of this tilting plate 22, as shown in Figure 2, are preferably provided with parallel longitudinally extending slots 24 for slidably securing journal bearings 26 thereon, these journal bearings rotatably mounting an axle or countershaft 28 having rigidly secured thereto a drum 30 of any suitable material and forming a friction drum for transmitting power from the countershaft 28 to a driven member as set forth hereinafter.

Likewise rigidly attached to the countershaft 28 and preferably at the end thereof which extends beyond the tilting plate 22, is a driven pulley 32 by means of which the countershaft may be rotated. As will be readily seen from Figure 2, the prime mover 10 is provided with a driving pulley 34, and a driving belt 36 is entrained over the pulleys 32 and 34. If desired, these pulleys may have a plurality of grooves, and a plurality of belt members may be connected therewith for transmitting power between the driving and driven pulleys. Preferably, as shown in Figures 1, 2 and 3, the journal bearings 26 are slidably mounted upon the tilting plate 22 as by

fastening bolts 38 which extend through the slots 24 and serve to retain the bearings upon the tilting plate where it permits sliding movement thereon towards and from the prime mover.

Adjusting screws 40 are threaded through support brackets 42 mounted upon the tilting plate for abutment against the ends of the journal bearings 26, to thereby urge the same in any direction away from the prime mover 10. By this means, the movement of the countershaft towards the prime mover is limited or adjusted, whereby the tension applied to the driving belt 36 may be regulated as set forth hereinafter.

Rotatably journaled between the angle iron frame members 14 of the support 12, intermediate the ends of these members and at the other end of the tilting plate, is a tilting shaft 44, which adjacent its ends is provided with rigidly attached cams or eccentrics 46 adapted to engage the under surface of the tilting plate for raising the same upon rocking movement of the shaft 44. To effect this rocking movement, the shaft 44 is provided with an arm 48, and a link 50 is terminally pivotally connected as at 52 and 54 to the end of the arm 48 and to the end of the tilting lever 56 which is fulcrumed as at 58 to a standard 60 mounted upon the support. The outer end of this lever is provided with a plate 62 constituting a foot plate whereby the lever may be depressed from its full line and inoperative position shown in Figure 3 to its depressed and dotted line position whereby the starter is actuated. It will be now understood that depressing this lever from the full line to the dotted line positions of Figure 3, serves by means of the link 50 and arm 48 to rotate the tilting shaft 44 in a counterclockwise direction as viewed in Figures 1, 3 and 5, whereby the cams 46 will raise the end of the tilting plate from the full line to the dotted line position shown in Figure 3, thus causing a rocking or pivoting action in a clockwise direction of the tilting plate about its hinge pin 20.

This tilting action of the tilting plate serves two functions. First, it serves to tension the belts 36 from their inoperative positions shown in full lines in Figures 3 and 1, to their operative positions shown in dotted lines in Figure 3, whereby the countershaft will be operatively connected to the constantly rotating prime mover 10. Second, this tilting movement will cause the friction drum 30 to move in an arc in a clockwise direction about the hinge pin 20 of the tilting plate, and thus move from its full line to its dotted line position in Figure 3, in which latter position it is frictionally engageable with the surface of a flywheel indicated in dotted lines at 64, for rotating the same.

This flywheel 64 may be a part of an internal combustion engine, whereby the rotation of the flywheel will serve to start the internal combustion engine. Alternatively, any other rotatable shaft of the engine may be frictionally engaged by the friction drum 30 for a similar purpose, and likewise the friction drum may be employed for starting or operating other machines than internal combustion engines.

As shown more clearly in Figure 3, the end of the link 50 is extended below the arm 48 and its pivotal connection 52, for engagement by a tension spring 66 whose other end is secured to an adjusting screw 68 screw threaded through a depending lug 70 carried by the support. This tension spring serves to bias the link, and consequently the arm 48 in a clockwise direction, as viewed in Figure 3, thereby urging the lever, link and arm to their inoperative position, and retracting the lift cams 46 from the tilting plate, whereby the latter under its own weight will tend to return to its inoperative position. If desired, additional means such as a spring or the like may be employed to assist in returning the tilting plate to its lowered or inoperative position.

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, after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claim.

Having thus disclosed and described the invention, what is claimed as new is as follows:

A starter for internal combustion engines comprising a support having a tilting plate hinged thereto, a countershaft journaled on said tilting plate and having a friction drum and a driven pulley thereon, a source of power on said support having a driving pulley, a driving belt connecting said driving and driven pulleys and means for tilting said plate in a direction to simultaneously and progressively and increasingly tension said driving belt and continuously pivot said friction drum into contact with the fly wheel of an internal combustion engine, said support having an axle, means connecting said axle with said tilting plate for tilting the latter upon rocking movement of said axle and means for rocking said axle, said connecting means including cams engaging said tilting plate, said rocking means including a lever journaled on said support, means for adjusting said lever and its journaled engagement, an arm on said axle and a link terminally pivoted to said lever and arm.

GEORGE J. ARMSTRONG.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,708,903	Schroder	Apr. 9, 1929
1,799,261	Stoody	Apr. 7, 1931
2,463,178	Hoover	Mar. 1, 1949