



May 9, 1944.

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2,348,547

STARTING DEVICE

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3 Sheets-Sheet 2

Fig. 6.

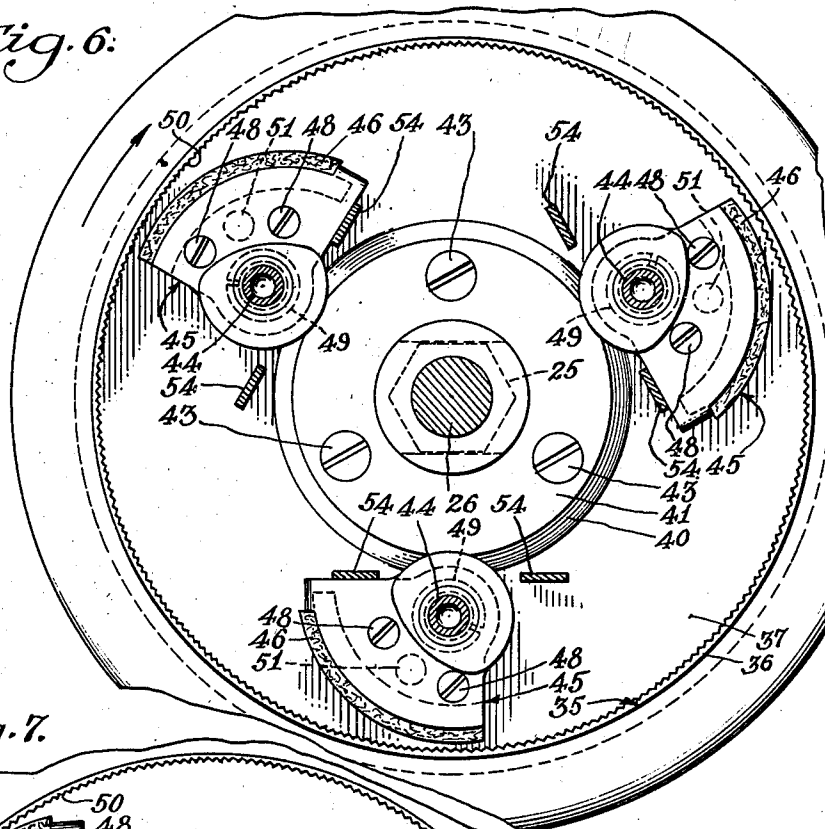
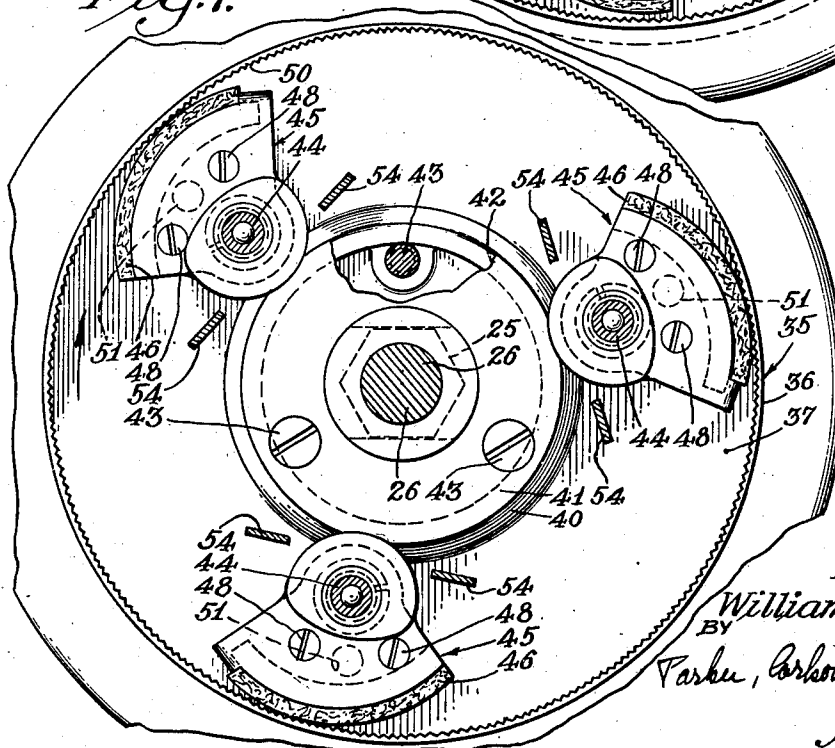


Fig. 7.



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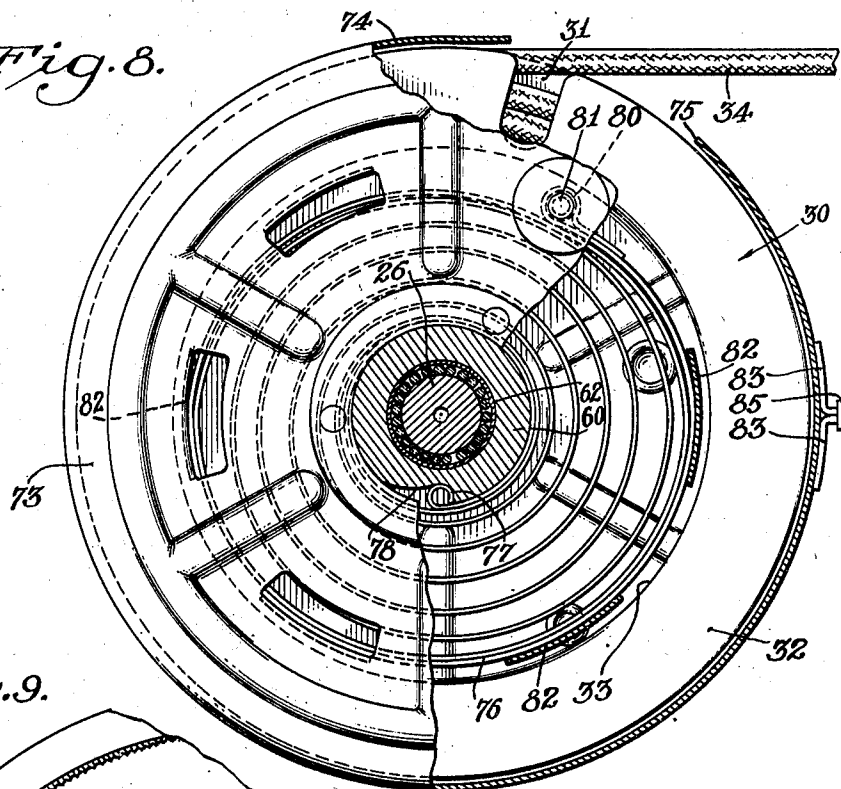
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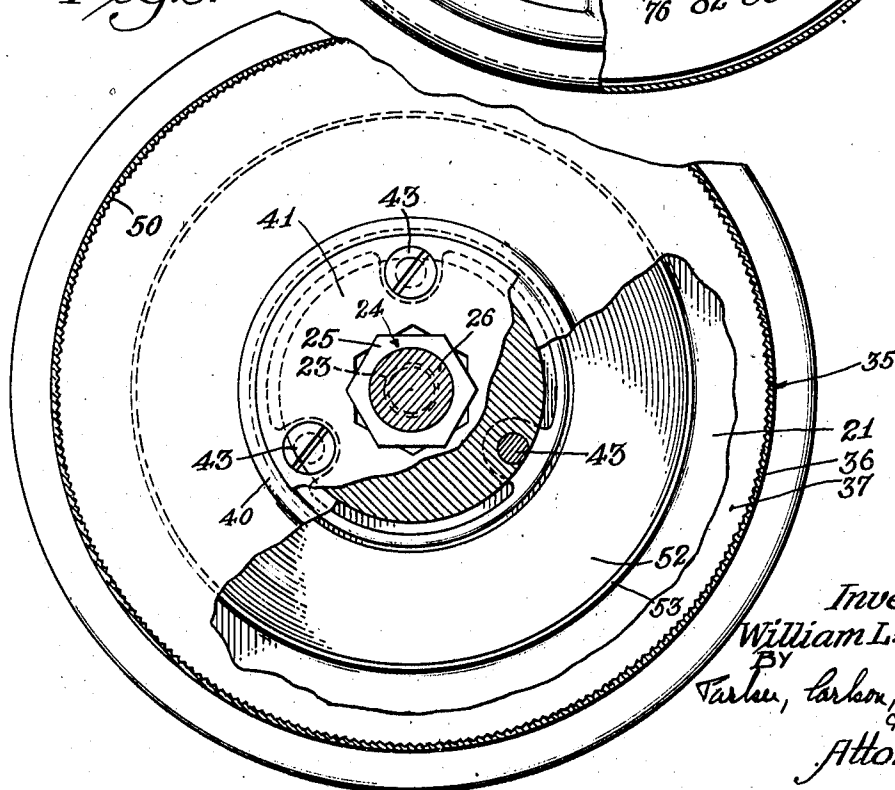
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3 Sheets-Sheet 3

*Fig. 8.*



*Fig. 9.*



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## UNITED STATES PATENT OFFICE

2,348,547

## STARTING DEVICE

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30 Claims. (Cl. 185-41)

The invention relates generally to starting devices for internal combustion motors, and particularly to a starting device for a motor of the outboard type.

The general object of the invention is to provide a novel starting device which is simple to operate, which effectively cranks the motor, and which is inexpensive to manufacture.

It is also an important object to provide a starting device which is so constructed that a backfire of the motor will cause no damage to the parts of the device nor any inconvenience in or disturbance of subsequent operation of the device.

Another object is to provide a starting device having a rotating member, manually operated for starting and spring returned, which has a frictional means for connecting the member with the motor and an auxiliary frictional means for insuring disconnection of the member when the motor is started.

A further object is to provide a starting device having a manually operable starting member provided with primary frictional means for effecting a driving connection with the motor, and having a secondary frictional means releasable upon occurrence of excessive torque between the motor and the starting member to prevent damage to the starter upon backfire of the motor.

Other objects reside in providing the starter with a novel pulley and starting rope arrangement, a novel spring arrangement for returning the parts and winding the rope in readiness for subsequent operation of the device, a novel guide for the rope, and a novel handle for the rope.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a fragmentary vertical sectional view on a reduced scale of the upper portion of an outboard motor provided with a starting device embodying the features of the invention.

Fig. 2 is a fragmentary plan view on a reduced scale of the parts shown in Fig. 1.

Fig. 3 is a sectional view of the handle for the starting rope, taken on the line 3-3 of Fig. 2.

Fig. 4 is a vertical sectional view of the starting device.

Fig. 5 is a view showing the means for attaching the starting rope to the starting device.

Fig. 6 is a horizontal sectional view taken on

the line 6-6 of Fig. 4 and showing the relative position of the parts prior to starting.

Fig. 7 is a view similar to Fig. 6 but showing the parts in starting relation with the motor.

Fig. 8 is a horizontal sectional view taken on the line 8-8 of Fig. 4.

Fig. 9 is a horizontal sectional view taken on the line 9-9 of Fig. 4.

As heretofore constructed, outboard motors have been provided with a pulley, rigid with the upper end of the motor crank shaft, to receive a rope wound around the pulley, which is pulled to start the motor. The end of the rope is adapted to be attached to the pulley by being knotted, with the knot filling in a notch in the pulley. On pulling the rope and thereby unwinding it from the pulley, the knot is adapted to slip out of the notch so that, should the motor start, the rope will not be carried around with the motor.

Starting devices have been provided for some outboard motors which have the rope permanently attached to the pulley and utilize a spring for reversely turning the pulley to wind up the rope after it has been pulled out. Such starting devices use some form of clutch means between the pulley and the crank shaft of the motor. However, unless some provision is made in such a starter for backfire, the rope is jerked inwardly, oftentimes breaking the rope or breaking whatever handle may be mounted on the free end of the rope, and perhaps injuring the operator.

If it is desired to disconnect the motor from the starting device when a backfire occurs, it must be kept in mind that the direction of relative rotation of the parts on backfire is the same as when the crank shaft of the motor is being turned by the starting device in the operation of starting. Thus one is presented with the problem of providing clutch means which may operate at one time and will become inoperable at another with the same relative direction of rotation of the parts at both times. Partial solution of the problem has been made by providing a releasable connection between the starting device as a whole and the fixed parts of the motor, so that on backfire, the entire starting device rotates with the crank shaft in the reverse direction. While this saves damage to the parts of the starting device, it does not prevent the pull rope from being jerked out of the operator's hands with the chance of injury to the operator.

The present invention meets the problem by providing two connecting or driving means inter-

posed between the rope and the crank shaft of the motor and both operable for the same relative direction of rotation of the parts. The first of these means is operable under normal circumstances and is adapted to provide a one-way driving connection with the motor crank shaft when the rope is pulled. It thus operates as the primary means for connecting the pulley about which the rope is wrapped. The other means provides normally a driving connection with the motor crank shaft but is releasable when a sudden, excessive torque occurs. The torque occurring upon the backfire of the motor is of this character so that said other means releases the starting device completely from the motor crank shaft upon occasion of a backfire. Preferably both of these connecting means are of the frictional type.

As shown in the drawings, the outboard motor with which the starter is illustrated comprises a generally annular fuel tank 20 within which is located the combined flywheel and magneto 21 mounted on the motor crank shaft 22. The upper end of the crank shaft is provided with a threaded portion 23 to which is secured a shaft extension, indicated generally at 24, and comprising a hexagonal portion 25, a bearing portion 26, and an upper threaded end 27. The starting device is mounted on the shaft extension 24.

A starting device embodying the features of the invention comprises generally a first member adapted to be manually rotated, and a second member normally connected in driving relation with a rotating part of the motor such as the crank shaft. Interposed between these two members is a one-way driving connection adapted to be actuated when the first member is manually rotated. The driving connection also includes means for insuring disengagement thereof when the motor is started. While the second member is normally connected to the motor in driving relation, the connection is such that upon excessive torque, the connection is released. Thus in case of backfire, the starting device is disconnected from the motor, thereby avoiding any damage to the device as well as avoiding chance of injury to the operator.

In the present instance, the first member is a pulley 30 (see Fig. 4) preferably comprising a flat bottom plate 31 and an upper plate 32 having its peripheral portion spaced from the bottom plate 31 but having its central portion dished as at 33 to lie in face-to-face contacting relation with the bottom plate 31. Preferably the two plates are riveted together. The peripheral portions of the two plates thus form a groove into which is wound a pull rope 34 by which the pulley may be rotated.

The second member in the present instance is in the form of a drum, indicated generally at 35, and comprising a vertically extending peripheral flange 36 and a bottom 37. The drum 35 is located adjacent the flywheel 21 of the motor and has its bottom 37 located in spaced relation to the end face of the flywheel. The drum is mounted so that it may rotate relative to the flywheel and to this end is provided with an upwardly and inwardly turned flange 40 fitting around the body of a washer 41. The washer 41 is provided with a peripheral flange 42 overlying the inner flange 40 on the drum to limit the movement of the drum away from the flywheel 21. The washer 41 lies against a hub por-

tion of the flywheel 21 and is secured thereto as by a plurality of screws 43. The washer 41 is preferably held against rotation relative to the crank shaft and to this end has a central aperture fitting around the hexagonal portion 25 of the shaft extension 24.

As mentioned above, the invention includes means for connecting the first and second members when the first member is rotated manually. To this end the pulley 30 is provided with a plurality of downwardly extending pivot pins 44, three in number in the present instance (see Figs. 4, 6 and 7), located eccentric to the axis of the pulley. Mounted on each of the pivot pins 44 is a shoe, indicated generally at 45. Each shoe is generally sector shaped with a hub mounted on the pivot pin 44, but the peripheral edge of the shoe is eccentric to its pivotal axis. Thus, as the shoe is swung about its peripheral axis, the periphery thereof will move into contact with the inner periphery of the flange 36 of the drum 35. In order to provide a driving engagement between the shoe and the drum, the peripheral edge of the shoe is provided with a groove into which fits a strip of leather 46, the leather being clamped in place by an arcuate clamping plate 47 secured to the shoe as by screws 48. Each shoe is preferably held on its pivot pin 44 by means of a split ring 49 (see Fig. 4) fitting within a groove in the pin.

The shoes are so arranged that when the pulley 30 is rotated by pulling on the rope 34, centrifugal force or the inertia of the shoes cause the shoes to swing outwardly from the position shown in Fig. 6 to the position shown in Fig. 7. Thus the leather strips 46 engage and provide a frictional driving relation between the pulley and the drum 35. To increase the friction, the inner peripheral surface of the flange 36 of the drum is preferably knurled with vertically extending grooves, as indicated at 50.

Another feature of the invention contemplates the provision of auxiliary friction means for facilitating engagement of the shoes with the drum when the pulley is manually rotated, and also serving to facilitate disengagement of the shoes from the drum when the motor is started so that the shoes will not drag on the drum. In the preferred form, such auxiliary means comprises a fiber pin 51 mounted in each shoe intermediate the pivotal axis and the periphery thereof and extending downwardly into engagement with the bottom 37 of the drum. Thus when the pulley is manually rotated and before the shoes have moved into contact with the drum, there is relative movement between the shoes and the drum. However, the pins 51 drag on the bottom 37 of the drum and cause the shoes to swing into engagement with the drum. When the motor has been started, the drag of the fiber pins 51 on the drum causes the shoes to swing away from and out of engagement with the drum so that the leather strips 46 are completely out of contact with the periphery of the drum. Thus the shoes will not drag on the drum when the motor is operating. In order to limit the swinging movement of the shoes in both directions, lugs 54 are punched from the bottom plate 37 of the pulley and are bent downwardly into the path of the shoes.

The structure thus far described is utilized during normal starting operations. However, as mentioned above, the invention includes a provision to avoid damage when the motor backfires. Generally such provision comprises a sec-

ondary friction means or driving connection between the drum and the motor flywheel 21 which in normal operation of the starter provides such driving connection but is releasable under a sudden excessive torque such as occurs upon backfire. In the present instance the connection between the drum and the flywheel is frictional. As shown herein, the connection comprises a resilient dished ring 52 located in the space between the bottom 37 of the drum and the flywheel 21, and holding the inner flange 40 of the drum in contact with the peripheral flange 42 of the washer 41. In the preferred arrangement, the inner marginal portion of the disk 52 bears against the bottom 37 of the drum, while the outer marginal portion bears against the flywheel 21. In order to provide a suitable bearing surface on the flywheel 21, a low rib 53 may be formed thereon.

The resilient ring 52 is shaped so that when it is free it has a greater height than is shown in Fig. 4, but when assembled and the screws 43 which hold the washer 41 in place are tightened, the height of the ring 52 is decreased to place it under tension. The ring thus on its marginal portions frictionally engages the drum and the flywheel sufficiently to provide a driving connection therebetween. However, should there be a sudden excessive torque such as occurs when the engine backfires, the drum and flywheel will slip relative to each other, thus in effect disconnecting the starting device from the flywheel.

As mentioned above, the pulley is rotatably mounted on the bearing portion 26 of the shaft extension 24. To this end the pulley is provided with a hub 60 seated on a washer 61 on the shaft extension, and roller bearings 62 are provided between the hub 60 and the bearing portion 26. In order to provide for lubrication of the roller bearing 62, a central bore 63 is made in the shaft extension 24 and a transverse bore 64 extends therefrom to the bearing.

To secure the inner end of the rope permanently to the pulley, an aperture 65 is punched in the lower plate 31 of the pulley and a downwardly dished lip 66 is formed in the bottom plate so that the rope may extend through the bottom plate without having to pass over a sharp edge of metal. The end of the rope is bent into a generally square loop 67, as shown in Fig. 5, lying against the bottom face of the lower plate 31 and is clamped in place by a clamp comprising a flat central portion 70 secured to the bottom plate by a screw 71. At each end of the flat bottom portion 70 are U-shaped portions 72 fitting over and clamping the rope in place.

The rope is wrapped around the pulley sufficiently so that each time the rope is pulled, the motor crank shaft is turned over approximately two and one-half times, which is found to be sufficient for starting.

The invention also includes means for automatically rewinding the rope on the pulley. Said means in the present instance comprises a cover plate 73 (see Figs. 4 and 8) having a downwardly extending peripheral flange 74 enclosing the pulley 30. At one side, the flange 74 is provided with an aperture 75 through which the rope 34 extends tangentially. Under the cover plate 73 is a torsion spring 76 comprising a flat strip of resilient metal wound in a loose spiral. The torsion spring 76 is connected at one of its ends to the cover plate 73 and at its other end to the pulley so as to rotate the pulley in a direction to wind the rope thereon. To this end,

the inner end of the torsion spring 76 is formed into a curl 77 adapted to fit into and be retained by a notch 78 formed in the periphery of the hub 60 of the pulley. The outer end of the spring is bent into a loop 80 and secured over a downwardly extending pin 81 rigid with the cover plate 73. The spring 76 extends partially into the dished portion 33 of the pulley 31 and is confined by a plurality of annularly arranged lugs 82 punched from the cover plate and extending downwardly outside of the spring.

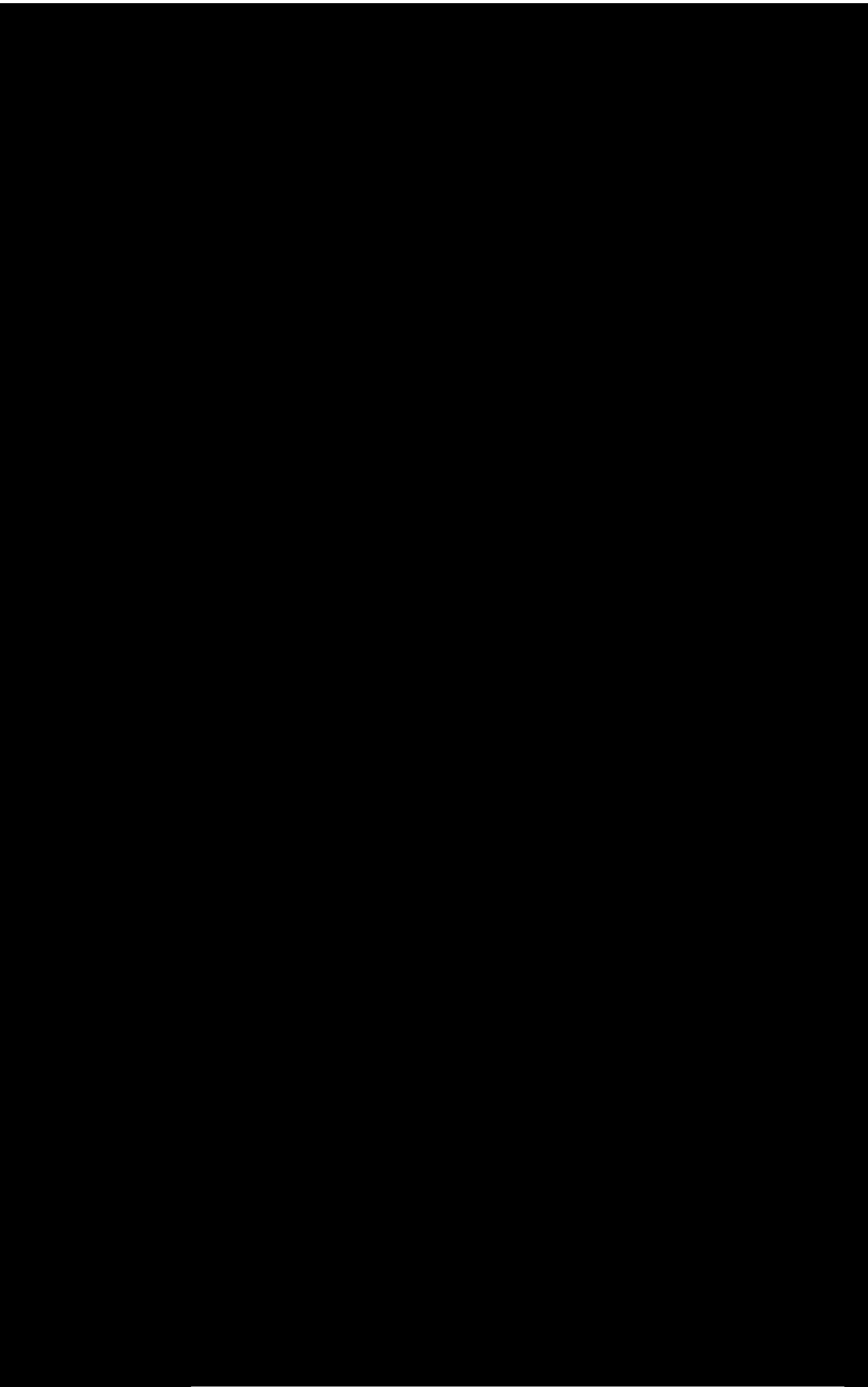
Since the spring 76 is adapted for rewinding the rope on the pulley by causing the pulley to rotate, the cover plate 73 is held against rotation so that the outer end of the spring is thereby anchored. For holding the cover plate against rotation, a pair of L-shaped lugs 83 are provided. Each lug has one leg secured to the outer periphery of the flange 74 of the cover plate and the other leg projecting radially therefrom in abutment with the adjacent lug. Secured to the inner peripheral face of the tank 20 (see Figs. 1 and 2) is a pair of generally similar L-shaped lugs 84. The lugs 84 are mounted in spaced relation to each other so that the lugs 83 may extend therebetween. To cushion the starter and to prevent rattle between the lugs, a tubular rubber bushing 85 may be slipped over the lugs 83.

Another feature of the invention resides in the manner in which the outer or free end of the rope is held in a convenient location so that the operator may readily grasp it to start the motor. To this end, a tube 90 extends through the gasoline tank to provide a guide for the rope, and in the outer end of the tube is mounted a bushing 91 having a hole therethrough of sufficient size to permit the passage of the rope. The outer end of the bushing 91 is provided with a collar 92, and a rubber grommet 93 extends from the collar rearwardly against the tank to provide a neat appearance.

The outer end of the rope is provided with a handle preferably made of rubber. The handle in its preferred form comprises a shank portion 94 having a pair of laterally projecting portions 95 shaped to be readily grasped in the hand. The shank is hollow and internally is provided with a steel cup or thimble 96. The bottom of the cup 96 is provided with an aperture through which the rope extends and the end of the rope is knotted with the knot seated in the cup. Thus the handle is rigidly secured to the rope. The outer end of the hollow shank is adapted to be closed by a rubber plug 97 having inwardly tapered sides fitting a correspondingly shaped portion on the interior of the shank and thereby removably retained within the shank. In order to hold the handle in the same position each time the rope is wound up by the spring, the inner end of the shank of the handle is provided with a pair of diametrically spaced V-shaped lugs 98 adapted to be received by correspondingly shaped notches in the collar 92.

The starting device may also be provided with an auxiliary pulley 100 secured to the shaft extension 24 and adapted to be used with a rope having a knot fitting into a notch 101 in the flange of the pulley. For securing the pulley to the shaft extension, a washer 102 is mounted on the threaded end portion 27 of the shaft extension and a nut on the threaded portion clamps the pulley 100 against the washer 102.

In operation of the device, the operator grasps



be manually turned, each of said shoes also having an auxiliary frictional means in engagement with the member connected to the motor and positioned relative to the pivotal axis of the shoe to cause the shoe to swing out of engagement with said member when the motor rotates faster than the manually rotatable member.

6. A starting device comprising, in combination, a rotatable member, manual means for rotating said member in one direction, automatic means for rotating said member in the opposite direction when the manual means is released; a member connected to the motor; frictional means movable into driving engagement with the member connected to the motor when the first-mentioned member is rotated by the manual means, and auxiliary frictional means in engagement with the member connected to the motor and adapted to release said first-mentioned frictional means from driving engagement with the member connected to the motor when said member is rotated by the motor and also to release said first-mentioned frictional means when the first-mentioned member is rotated by said automatic means.

7. A starting device comprising, in combination, a pulley, a rope wrapped around said pulley and adapted to be pulled to rotate the pulley in one direction, a torsion spring for rewinding the rope, a member connected to the motor, frictional means adapted to move into engagement with said member when the pulley is rotated by the rope for starting the motor, and auxiliary frictional means engaging said member and adapted to move said first-mentioned frictional means out of engagement with said member when the motor is started and also when the torsion spring rotates the pulley.

8. A starting device comprising, in combination, a manually rotatable member, a drum connected to the motor, a plurality of shoes pivotally carried by said member each having a frictional surface eccentric to its pivotal axis and adapted to swing into engagement with the inner peripheral surface of the drum when said member is rotated, whereby the drum and the motor rotate with said member, each shoe also having a pin frictionally engaging the radial face of the drum and adapted to swing the frictional surface out of engagement with the drum when the motor is started.

9. A starting device comprising, in combination, a pulley adapted to be manually rotated and loosely mounted on a motor shaft, a drum normally rigid with the motor shaft and mounted under the pulley, a plurality of shoes pivotally mounted on the lower face of the pulley and having eccentric frictional surfaces swingable into engagement with the inner periphery of the drum, each shoe also having a pin extending downwardly into engagement with the radial face of the drum and adapted to cause the shoe to swing out of engagement with the drum when the motor is started.

10. A starting device comprising, in combination, a manually rotatable member rotatably mounted on the motor shaft, a drum mounted under said member and rigid with the motor shaft, and a plurality of shoes located within the drum and pivotally supported by said member on axes eccentric to the motor shaft, each of said shoes comprising a sector having a grooved peripheral surface eccentric to the pivotal axis of the shoe, a strip of leather mounted in the peripheral groove of the shoe and adapted to

swing into engagement with the inner peripheral surface of the drum when the member is manually rotated, a fiber pin mounted in the shoe and extending downwardly into engagement with the radial face of the drum and adapted to drag on the drum when the member is rotated to cause the leather to engage the drum and also adapted to swing the shoe out of engagement with the drum when the motor is started.

11. A starting device for a motor having an upwardly extending motor shaft, said device comprising, in combination, a drum secured to the motor shaft for rotation therewith and comprising an upwardly opening dished member, a pulley rotatably mounted on the motor shaft above said drum and carrying a plurality of pivotally mounted shoes, each of said shoes being swingable into engagement with the inner periphery of the drum to cause the drum and motor shaft to rotate with the pulley, each of said shoes also having frictional means adapted to engage the bottom of the drum to cause the shoe to swing out of engagement with the drum when the motor is started, a rope wound around said pulley and manually operable for rotating it in one direction, a downwardly opening dished cover overlying and surrounding the pulley and held against rotation, and a torsion spring having one end connected to the pulley and the other end to the fixed cover for causing the pulley to rotate and thereby wind up the rope.

12. A starting device comprising, in combination, a first member adapted to be manually rotated, a second rotatable member, primary frictional means adapted to provide a driving connection between the two members when the first member is manually rotated, and secondary frictional means normally connecting the second member with the motor but adapted to release upon excessive torque therebetween.

13. A starting device comprising, in combination, a first member adapted to be manually rotated, a second rotatable member, means provided with a frictional surface adapted to connect said members when the first member is manually rotated and also provided with an auxiliary frictional surface for disengaging the first-mentioned frictional surface when the second member rotates faster than the first member, and frictional means normally providing a driving connection between the second member and the motor but releasable upon excessive torque therebetween.

14. A starting device comprising, in combination, a first member adapted to be manually rotated, a second rotatable member, frictional means for connecting said members when the first member is manually rotated, auxiliary frictional means adapted to disengage the first-mentioned frictional means when the second member rotates faster than the first member, and means normally connecting the second member with the motor but releasable upon excessive torque therebetween.

15. A starting device comprising, in combination, a pulley adapted to be manually rotated in one direction, a rotatable drum, a plurality of shoes carried by said pulley each having a frictional surface adapted to engage and drive the drum upon manual rotation of the pulley, each shoe also having an auxiliary frictional surface in engagement with the drum and adapted to disengage the first-mentioned frictional surface from the drum when the latter rotates faster than the pulley, and frictional means normally

connecting said drum with the motor but releasable upon excessive torque therebetween.

16. A starting device comprising, in combination, a pulley, a manually operable rope wound around said pulley for rotating it in one direction, a torsion spring for rotating the pulley in the opposite direction to wind up the rope, a rotatable drum, a plurality of shoes carried by said pulley, each adapted when the pulley is rotated by the rope to provide a driving connection between the pulley and the drum, each shoe having a frictional engagement with the drum adapted to release the shoe from the drum when the drum rotates faster than the pulley or when the pulley is rotated by the torsion spring, and frictional means connecting the drum with the motor but adapted to release when the torque therebetween becomes excessive.

17. A starting device comprising, in combination, a first member adapted to be manually rotated, a second rotatable member, frictional means providing a driving connection between said members when the first member is manually rotated, and means for frictionally connecting the second member with a rotating part of the motor comprising a dished resilient ring having its inner marginal portion engaging said second member and its outer marginal portion engaging said rotatable part of the motor.

18. A starting device for a motor having a rotatable part with a relatively flat face comprising, in combination, a first member adapted to be manually rotated, a second rotatable member having a relatively flat face adjacent to the flat face of the motor part, frictional means providing a driving connection between said members when the first member is manually rotated, and means for frictionally connecting the second member with the rotating part of the motor comprising a dished resilient ring having its inner and outer marginal portions engaging said flat faces, said ring and said faces slipping relative to each other when the torque between the second member and the motor part becomes excessive.

19. A starting device for a motor having a rotatable part provided with an end face comprising, in combination, a first member adapted to be manually rotated, a second rotatable member having an end face spaced a short distance from the end face of the motor part, frictional means providing a driving connection between said members when the first member is manually rotated, a conically dished resilient ring located and clamped between said faces and having its inner marginal portion bearing against one of said faces and its outer marginal portion bearing against the other face to provide a frictional driving connection between said member and the motor part, said driving connection being adapted to slip upon excessive torque between said second member and said motor part.

20. A starting device for a motor having a rotatable part comprising, in combination, a first member adapted to be manually rotated, a second rotatable member, a one-way driving connection between said members effective upon manual rotation of the first member, and means to provide a connection between said second member and said motor part which is releasable upon backfiring of the motor to prevent reverse operation of the manually operable member, said means comprising a dished resilient ring clamped between said member and said part and having frictional engagement therewith.

21. A starting device comprising, in combination, a first member adapted to be manually rotated, a second rotatable member, means providing a driving connection between said members when the first member is manually rotated, a dished resilient ring having its inner and outer marginal portions frictionally engaging said second member and the part of the motor to be rotated to provide a frictional driving connection therebetween, and means for drawing said second member toward said motor part and partially flattening the resilient ring to put it under tension and thereby increase the frictional engagement between the second member and the motor part.

22. A starting device comprising, in combination, a first member adapted to be manually rotated, a second rotatable member, means providing a driving connection between said members when the first member is manually rotated, a dished resilient ring having its inner and outer marginal portions engaging said second member and a rotatable part of the motor to provide a driving connection between said second member and said motor part, a clamping washer secured to said motor part for rotation therewith and clamping the second member against the resilient ring to partially flatten said ring and thereby provide a frictional driving connection between the ring and motor part.

23. In an outboard motor of the character described, the combination of a pulley adapted to be rotated for starting the motor and providing a driving connection therewith, said pulley being downwardly dished on its upper face, tension means wrapped around said pulley and adapted to be pulled for rotating the pulley in one direction, a spiral spring for rotating the pulley in the opposite direction and thereby winding up the tension means, said spiral spring being located partially within the dished portion of the pulley, and a fixed cover plate overlying the spring and having a downwardly extending flange encasing the pulley, said flange being provided with an aperture through which the tension means extends, and said cover plate having a plurality of lugs punched therefrom and bent downwardly in annular arrangement to confine the spiral spring.

24. In a starting device of the character described, the combination of a pulley having means providing a driving connection with the motor, tension means wrapped around said pulley and adapted to be pulled to rotate the pulley in one direction, spring means for rotating the pulley in the opposite direction and thereby wind up the tension means, said spring means being secured at one end to said pulley, a cover plate to which the other end of the spring means is attached, and means for holding the cover plate against rotation comprising a lug extending radially outward from the cover plate, a pair of brackets secured to a fixed part of the motor on opposite sides of said lug, and cushioning means interposed between said lug and said brackets.

25. In an outboard motor, the combination of a generally annular tank structure, a starting device mounted within the inner periphery of said tank structure and including a cover plate adapted to be held against rotation, a lug extending radially from said cover plate, a pair of L-shaped brackets secured to the inner periphery of said tank in spaced relation to each other to

receive said lug therebetween, and a rubber bushing on said lug to cushion it against said brackets.

26. In an outboard motor, a starting device including a rope adapted to be pulled to crank the motor and extending generally tangentially from the starting device, a fixed rope guide comprising a tube and a bushing located in the outer end of the tube, and a handle on the outer end of the rope provided with a pair of oppositely positioned lugs on its inner end face, said bushing having a pair of oppositely located notches to receive the lugs on the handle when the rope is drawn inwardly.

27. In a starting device of the character described, the combination of a pulley comprising a flat bottom plate made of sheet metal and a sheet metal upper plate having its central portion dished downwardly and secured to the bottom plate, a rope wrapped around said pulley, and means for securing the inner end of the rope to the pulley comprising an aperture in the bottom plate for the end of the rope to extend therethrough, and a clamping plate having a flat central portion adapted to be secured to the bottom face of the lower plate, and a pair of channel shaped ends through which the end of the rope extends and is clamped against the lower plate.

28. A starting device comprising, in combination, a manually rotatable member, a drum having a driving connection with the motor, and a

plurality of shoes pivotally mounted on said member and swingable into engagement with said drum when said member is manually rotated, said member being provided with a pair of lugs for each shoe positioned on opposite sides of the shoe for limiting the swinging movement of the shoe in both directions.

29. A rubber handle for a pull rope for starting an outboard motor comprising a tubular shank having portions projecting laterally adapted to be grasped, a metal cup fixed within one end of the tubular shank and having an aperture in its bottom through which the rope extends, the rope being adapted to be knotted with the knot seated within the cup, the interior of the other end of the shank being tapered inwardly, and a tapered plug fitting in and removably retained within the tapered end of the shank to close said end.

30. A starting device comprising, in combination, a rotatable driven member, a first clutch member adapted to be rotated, a second rotatable clutch member in driving connection with said rotatable driven member, means adapted to provide a driving connection between said clutch members when the first clutch member is rotated, and a clutch means between said second clutch member and said driven member connecting said members but releasable by excessive torque therebetween.

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