

Jan. 22, 1946.

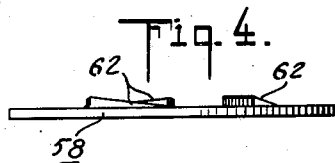
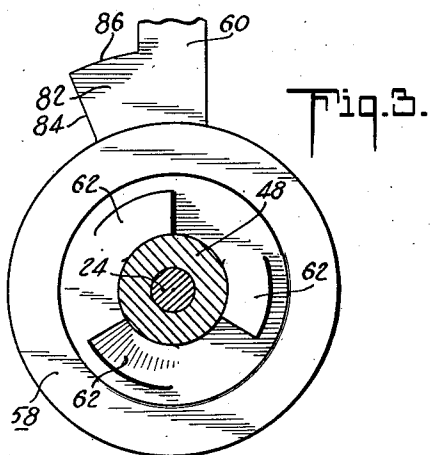
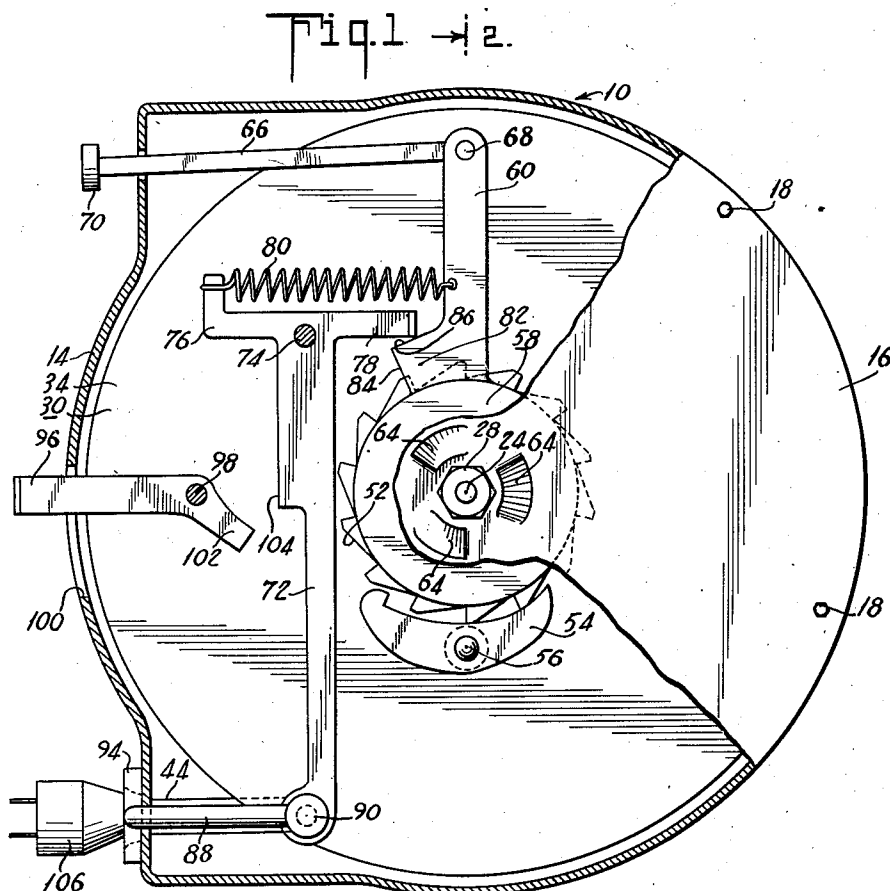
P. RUTTKAY

2,393,417

CORD WINDER

Filed May 16, 1944

2 Sheets-Sheet 1



INVENTOR
Paul Ruttkay
BY
Thomas C. Betts
ATTORNEY

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Fig. 2.

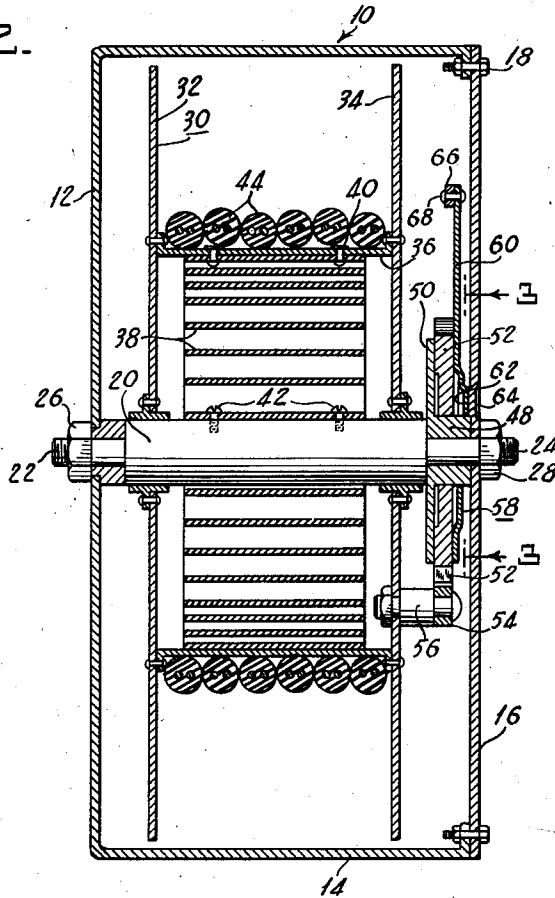
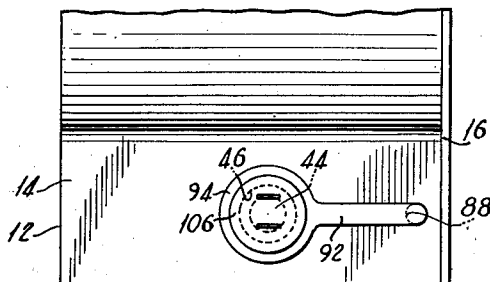


Fig. 5.



INVENTOR
Paul Ruttkay
 BY
Thomas C. Betts
 ATTORNEY

UNITED STATES PATENT OFFICE

2,393,417

CORD WINDER

Paul Ruttkay, Stamford, Conn., assignor to Electrolux Corporation, Old Greenwich, Conn., a corporation of Delaware

Application May 16, 1944, Serial No. 535,807

8 Claims. (Cl. 242—107)

My invention relates to a cord winder for winding up any flexible cord, such as the electric cord on a vacuum cleaner.

One of the objects of my invention is to provide an improved mechanism for controlling the rotation of the reel for rewinding the cord thereon. In accordance with my invention, a pawl and ratchet mechanism and a friction brake are arranged in series between the reel and a stationary part of the device. When the brake is applied, the pawl and ratchet mechanism permits rotation of the reel in a direction to unwind the cord, but prevents rotation of the reel under the influence of the rewind spring. However, when the brake is released, the pawl and ratchet may rotate as a unit, thus permitting rotation of the reel to wind up the cord. Thus, it is not necessary to release the brake during unwinding of the cord and it is never necessary to disengage the pawl from the ratchet. This results in a much simpler mechanism than is required where the brake must be released during both winding and unwinding of the cord, or where the pawl must be removed from engagement with the ratchet during winding of the cord. It also makes possible the use of a double ended pawl, which is much quieter in operation than a single ended spring pressed pawl, but which cannot be pivoted out of engagement with the ratchet wheel.

Further objects and advantages will be apparent from the following description considered in connection with the accompanying drawings which form a part of this specification and of which:

Fig. 1 is a top view of a preferred embodiment of my invention with a portion of the casing broken away to reveal the mechanism;

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an end view of the elements shown in Fig. 3; and

Fig. 5 is an exterior view of the lower portion of the device as seen from the left of Fig. 1.

Referring to the drawings, reference character 10 designates generally a casing including a rear wall 12, a curved side wall 14 and a front wall 16. As shown more particularly in Fig. 2, the rear wall 12 may be integral with the side wall 14, while the front wall 16 may be removably secured to the side wall, as by means of bolts 18. A central shaft 20 is formed with threaded end portions 22 and 24 of reduced diameter which

extend through suitable openings in the front and rear walls, respectively. Nuts 26 and 28 serve to rigidly secure the shaft 20 to these walls.

Rotatably mounted on the shaft is a reel 30 comprising circular discs 32 and 34 joined together by means of a cylindrical hub member 36. A spiral spring 38 has its outer end secured to the hub, as by means of rivets 40, while its inner end is anchored to the shaft 20, as by means of screws 42. An electric cord 44 is adapted to be wound on the hub 36 and between the discs 32 and 34. The side wall 14 is formed with an opening 46, shown in Fig. 5, through which the cord 44 may pass during winding or unwinding thereof.

A bushing 48 is fixed on the reduced portion 24 of the shaft 20 by being clamped between the top plate 16 and the shoulder on the shaft. This bushing has a radially extending flange 50. Rotatably mounted on the bushing 48 is a ratchet wheel 52. A double ended pawl 54 is pivotally mounted on a pin 56 secured to the disc 34 of the reel 30 in such a position that the pawl cooperates with the ratchet in a manner permitting the reel, on which the pawl is mounted, to rotate in a clockwise direction relative to the ratchet, while preventing counter-clockwise rotation of the reel relative to the ratchet. As the pawl moves clockwise around the ratchet, first one end and then the other of the pawl is moved radially outwardly by the inclined faces of the ratchet teeth, thus causing the pawl to oscillate on the pin 56. Whenever the pawl tends to move in counter-clockwise direction around the ratchet, one or the other of the ends of the pawl is bound to be in a position to engage the radial surface of a tooth, thus arresting further movement of the pawl. Inasmuch as no spring or the like is required for causing engagement of the pawl with the ratchet teeth, the device is very quiet in operation, but, it is obvious that the pawl could not be maintained out of engagement with the teeth, so as to permit it to move around the ratchet counter-clockwise, by merely pivoting the pawl about the pin 56, as is possible with a single end pawl. However, a pawl of the latter type requires a spring or the like for normally holding the pawl in engagement with the ratchet, which results in objectionable noise and wear as the pawl slips over the teeth. In accordance with the present invention, the foregoing objections are overcome by using a silent double ended pawl and providing brake means for selectively holding the ratchet stationary when it is desired to prevent counter-clockwise rotation of the reel 30, and freeing the

ratchet when such rotation of the reel is desired, as will appear more fully hereinafter.

Pivotally mounted on the bushing 48 between the ratchet 52 and the front wall 16 is a generally circular brake member 58 having an actuating arm 60. The face of the brake member 58 which is adjacent to the wall 16 is formed with a plurality of inclined surfaces 62, shown more particularly in Figs. 3 and 4. The inner surface of the wall 16 is formed with similar inclined surfaces 64 which are inclined in an opposite direction from the surfaces on the brake member. These surfaces may be formed by striking out arcuate tabs from the wall 16 and brake member 58 and are arranged to cooperate in such a way that, when the brake member is pivoted about the bushing 48 the surfaces 62 on the brake member slide up on the surfaces 64 on the wall 16, thus displacing the brake member axially along the bushing and forcing it into frictional engagement with the adjacent radial face of the ratchet wheel 52. Consequently, the ratchet wheel is clamped between the brake member and the flange 50 on the bushing and is thus held stationary.

A link 66 is pivotally secured at 68 to the arm 60, and extends through a suitable opening formed in the side wall 14, the outer end of the link being provided with a button or the like 70. A lever 72 is pivotally mounted on a pin 74 carried by the front wall 16. This lever includes arms 76 and 78 extending at right angles to the rest of the lever in the neighborhood of the pin 74. A tension spring 80 is connected between the arm 76 and the brake arm 60, and tends to draw these two arms towards each other. The brake arm is provided with an extension 82 having a radial surface 84 and an arcuate surface 86. With the parts in the position shown in Fig. 1, the end of arm 78 contacts the arcuate surface 86, thus preventing pivoting of the lever 72 in a clockwise direction under the influence of the spring 80. However, if the brake arm 60 is pivoted in a clockwise direction, the end of arm 78 will ride on the arcuate surface 86, until this surface passes beyond the end of the arm, whereupon the spring 80 pivots the lever 72 in a clockwise direction, bringing the end of the arm 78 into engagement with the radial surface 84. This locks the brake arm in the position to which it has been pivoted.

A link 88 is pivoted at 90 to the lower end of lever 72. The link extends through a suitable opening in the wall 14 of the casing and has an arm 92 extending at right angles therefrom which carries a bushing 94 in substantial axial alignment with the opening 46, the cord 44 extending through the bushing, as is shown more particularly in Fig. 5.

If desired, a lever 96 may be pivotally mounted on a pin 98 carried by the front wall 16. One end of this lever extends through a slot 100 formed in the side wall 14, while the other end of the lever is formed as a nose 102 which may be pivoted into engagement with a surface 104 formed on the lever 72. With the parts in the position shown in Fig. 1, the lever 96 has no effect on the lever 72, but if the lever 96 is pivoted in a counter-clockwise direction so that the nose 102 contacts the surface 104, the lever 72 is thus prevented from pivoting in a clockwise direction when the arcuate surface 86 on the brake arm 60 passes beyond the end of the arm 78, and hence the arm 78 cannot move down to engage the radial surface 84 on the brake arm.

Consequently, the brake arm will not be locked, but will be free to pivot in a counter-clockwise direction under the influence of spring 80.

The above described device operates as follows:

It will be assumed that the cord 44 is completely wound on the reel, with the exception of the length of cord necessary to extend out through the opening 46. The usual enlarged electric plug 106 connected to the end of the cord prevents the latter from being drawn completely into the casing. With the cord thus wound on the reel 30, the spring 38 will be unwound. When it is desired to unwind the cord from the reel, the plug 106 is grasped and pulled outwardly. This causes the reel to rotate in a clockwise direction, as viewed in Fig. 1. As the reel rotates, the pawl 54, which is pivotally secured to the reel by means of pin 56, travels around the stationary ratchet, the pawl oscillating as the ends thereof pass over the teeth of the ratchet. As above described, this operation of the ratchet mechanism is substantially silent and results in practically no wear of the parts. When the desired amount of cord has thus been unwound from the reel, the pull on the cord is relieved, and the spring 38 immediately tends to rotate the reel 30 in a counter-clockwise direction. However, one or the other of the ends of the pawl 54 engages a tooth on the stationary ratchet 52, thus preventing rewinding of the cord.

When it is desired to rewind the cord, the operator depresses the button 70, thus pivoting the brake arm 60 in a clockwise direction, as viewed in Fig. 1. This pivoting of the brake arm 60 and the brake member 58 permits the inclined surfaces 62 on the latter to slide down on the inclined surfaces 64 on the front wall 16, thus permitting the brake member to be displaced axially to the right, as viewed in Fig. 2, which relieves the clamping or braking pressure applied to the ratchet 52. The ratchet is hence free to rotate and the ratchet and pawl rotate as a unit with the reel under the influence of the spring 38.

Pivoting of the brake arm 60 in a clockwise direction permits the arm 78 of lever 72 to be pulled down by the spring 80 into engagement with the radial surface 84 on the brake arm (provided the lever 96 is in the position shown in Fig. 1) to thus lock the brake arm, hence preventing pivoting of the arm in a counter-clockwise direction under the influence of the spring 80. Consequently, pressure on the button 70 may be relieved without the brake being applied.

Pivoting of the lever 72 in a clockwise direction causes the link 88 and arm 92 to move the bushing 94 outwardly away from the wall 14. As the cord is rewound it passes through this bushing until the plug 106 strikes the bushing. The resulting impact is sufficient to pivot the lever 72 in a counter-clockwise direction, thus moving the arm 78 outwardly along the radial surface 84 of the brake arm and onto the arcuate surface 86 thereof. Consequently, the spring 80 is now able to pivot the brake arm in a counter-clockwise direction so as to turn the brake member 58 in this same direction to thereby cause the inclined surfaces 62 thereon to ride up on the inclined surfaces 64, thus displacing the brake member axially to the left, as viewed in Fig. 2. This applies braking force to the ratchet 52 so that the latter is now fixed.

If it is desired to have the electric cord under tension at all times, so that the reel will take up slack, as the vacuum cleaner or the like is moved closer to the outlet to which the plug 106 is at-

tached, the button 70 is depressed as soon as the plug has been inserted in the outlet. In the manner above described, this releases the brake on the ratchet, thus permitting the reel to be rotated under the influence of the spring 38. Consequently, the reel tends to wind up the cord and is prevented from doing so only by virtue of the fact that the plug 106 is attached to an outlet. Hence, if the reel is moved closer to the outlet, it will take up any slack in the cord.

If for any reason it is desired to have the brake under the control of the button 70 during the entire rewinding, the lever 96 may be pivoted in a counterclockwise direction so as to bring the nose 102 into engagement with the surface 104 on the lever 72. As above described, this prevents pivoting of the lever 72 in a clockwise direction and hence prevents the end of the arm 78 from moving into engagement with the radial surface 84. Thus, the brake arm will not be locked in brake releasing position, but will be pivoted in a counterclockwise direction so as to apply the brake as soon as pressure on the button 70 is relieved. Thus, the operator may stop the rewinding at any time and may control the speed at which the cord is rewound by regulating the pressure applied to the button 70.

Even with the lever 96 in the position shown in Fig. 1, the same result may be obtained if the button 70 is not depressed sufficiently so that the arm 78 can move down into contact with the radial surface 84. Obviously, as long as the arm 78 is on the arcuate surface 86, the brake arm 60 will not be locked and can be pivoted in a counterclockwise direction by the spring 80 whenever pressure on the button 70 is reduced.

While I have shown and described one more or less specific embodiment of my invention, it is to be understood that this has been done for purposes of illustration only and that the scope of my invention is not to be limited thereby, but is to be determined from the appended claims. Certain structure disclosed but not claimed herein constitutes an invention of Arnold H. Beede, and is disclosed and claimed in application Serial No. 542,858, filed by him on June 30, 1944.

What I claim is:

1. In a cord winder, a reel, a cord, means for rotating said reel in a direction to wind the cord thereon, a pawl pivotally mounted on said reel, a rotatably mounted ratchet cooperating with said pawl, said ratchet having a radial face providing a braking surface, an axially displaceable brake member adjacent to said face, and means for displacing said brake member into and out of frictional engagement with said braking surface for selectively arresting and permitting rotation of said ratchet.

2. In a cord winder, a reel, a cord, means for rotating said reel in a direction to wind the cord thereon, a pawl pivotally mounted on said reel, a rotatably mounted ratchet cooperating with said pawl, said ratchet having a radial face providing a braking surface, an axially displaceable brake member adjacent to said face, resilient means for displacing said brake member into frictional engagement with said braking surface to arrest rotation of said ratchet, and manually operable means for displacing said brake member out of frictional engagement with said braking surface to free said ratchet for rotation with said pawl and reel.

3. In a cord winder, a fixed shaft, a reel rotatably mounted on said shaft, a cord, means for rotating said reel in a direction to wind the cord

thereon, a ratchet wheel rotatably mounted on said shaft, a pawl pivotally mounted on said reel and cooperating with said ratchet wheel for preventing rotation in said direction of said reel relative to said ratchet wheel while permitting rotation of said reel in the opposite direction, a brake member axially displaceable on said shaft, and means for axially displacing said brake member into and out of frictional engagement with said ratchet wheel for selectively arresting and permitting rotation of said ratchet wheel.

4. In a cord winder, a fixed shaft, a reel rotatably mounted on said shaft, a cord, means for rotating said reel in a direction to wind the cord thereon, a ratchet wheel rotatably mounted on said shaft, a pawl pivotally mounted on said reel and cooperating with said ratchet wheel for preventing rotation in said direction of said reel relative to said ratchet wheel while permitting rotation of said reel in the opposite direction, a brake member axially displaceable on said shaft, resilient means for axially displacing said brake member into frictional engagement with said ratchet wheel to arrest rotation thereof, and manually operable means for displacing said brake member out of frictional engagement with said ratchet wheel to free the latter for rotation with said pawl and reel.

5. In a cord winder, a stationary wall, a shaft fixed to said wall, a reel rotatably mounted on said shaft, a cord, means for rotating said reel in a direction to wind the cord thereon, a ratchet wheel rotatably mounted on said shaft, a pawl pivotally mounted on said reel and cooperating with said ratchet wheel for preventing rotation in said direction of said reel relative to said ratchet wheel while permitting rotation of said reel in the opposite direction, a brake member mounted for rotation and axial displacement on said shaft between said stationary wall and said ratchet wheel, cooperating cam surfaces on said wall and said brake member whereby rotation of the latter displaces it axially into frictional engagement with said ratchet wheel, and means for rotating said brake member.

6. In a cord winder, a stationary wall, a shaft fixed to said wall, a reel rotatably mounted on said shaft, a cord, means for rotating said reel in a direction to wind the cord thereon, a ratchet wheel rotatably mounted on said shaft, a pawl pivotally mounted on said reel and cooperating with said ratchet wheel for preventing rotation in said direction of said reel relative to said ratchet wheel while permitting rotation of said reel in the opposite direction, a brake member mounted for rotation and axial displacement on said shaft between said stationary wall and said ratchet wheel, cooperating cam surfaces on said wall and said brake member whereby rotation of the latter in one direction displaces it axially into frictional engagement with said ratchet wheel, resilient means for rotating said brake member in said one direction to frictionally engage said ratchet wheel for restraining the latter against rotation, and manually operable means for rotating said brake member against the force of said resilient means to release the brake member from frictional engagement with said ratchet wheel, whereby the wheel is free to rotate with said pawl and said reel.

7. In a cord winder, a stationary wall, a shaft fixed to said wall, a reel rotatably mounted on said shaft, a cord, means for rotating said reel in a direction to wind the cord thereon, a radial

flange fixed to said shaft, a ratchet wheel rotatably mounted on said shaft between said wall and said flange, a pawl pivotally mounted on said reel and cooperating with said ratchet wheel for preventing rotation in said direction of said reel 5 relative to said ratchet wheel while permitting rotation of the reel in the opposite direction, a brake member mounted for rotation and axial displacement on said shaft between said stationary wall and said ratchet wheel, cooperating 10 cam surfaces on said wall and said brake member whereby rotation of the latter displaces it axially against said ratchet wheel to clamp the wheel between said flange and the brake member to thereby arrest rotation of the wheel, and means 15 for rotating said brake member.

8. In a cord winder, a stationary wall, a shaft fixed to said wall, a reel rotatably mounted on said shaft, a cord, means for rotating said reel in a direction to wind the cord thereon, a radial 20 flange fixed to said shaft, a ratchet wheel ro-

tatably mounted on said shaft between said wall and said flange, a pawl pivotally mounted on said reel and cooperating with said ratchet wheel for preventing rotation in said direction of said reel relative to said ratchet wheel while permitting rotation of the reel in the opposite direction, a brake member mounted for rotation and axial displacement on said shaft between said stationary wall and said ratchet wheel, cooperating cam surfaces on said wall and said brake member whereby rotation of the latter in one direction displaces it axially against said ratchet wheel to clamp the wheel between said flange and the brake member, resilient means 5 for rotating said brake member in said one direction to clamp said ratchet wheel against rotation, and manually operable means for rotating said brake member against the force of said resilient means to unclamp said ratchet wheel, whereby 10 the latter is free to rotate with said pawl and reel.

PAUL RUTTKAY.