United States Patent

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[54] RATCHET DEVICE FOR HOSE REEL
5 Claims, 6 Drawing Figs.

[52] U.S. Cl. 74/575, 188/82.7
[51] Int. Cl. G05g 5/12
[50] Field of Search 74/578, 577, 576, 575, 162, 97; 188/82.7

[56] References Cited
UNITED STATES PATENTS

2,943,710	7/1960	Lindmark	74/97 X
2,976,959	3/1961	Husted	188/82.7

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ABSTRACT: A hose reel of the type having an automatic rewinding motor and a ratchet and pawl stop mechanism is improved by a redesigned floating pawl and redesigned ratchet teeth. Both the pawl and the teeth are provided with cammed surfaces providing a means for positively actuating the pawl so that it does not hang up on deadcenter.

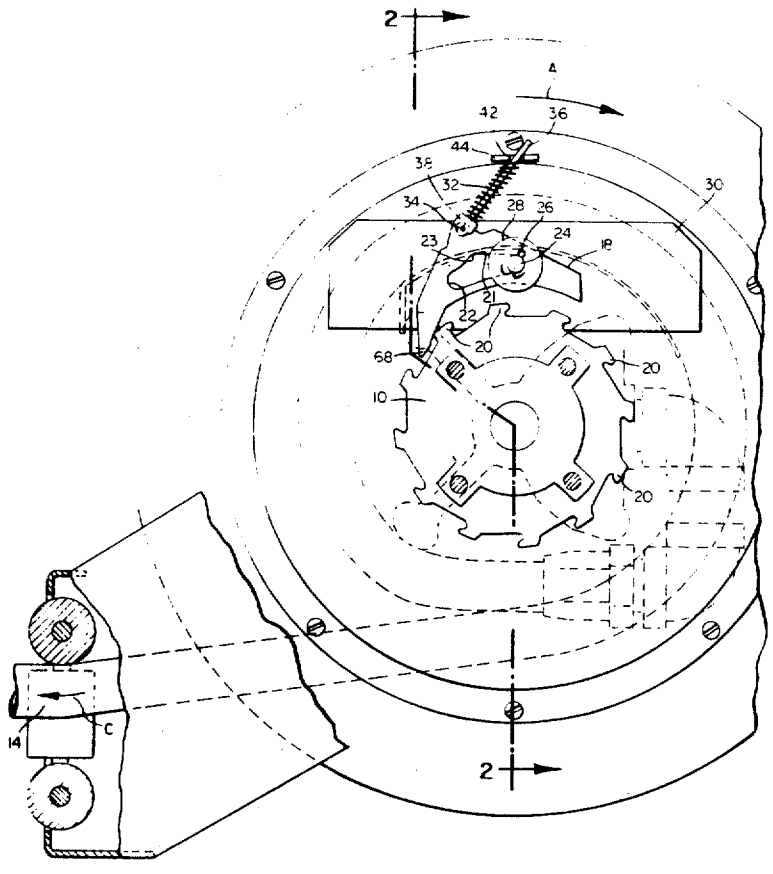
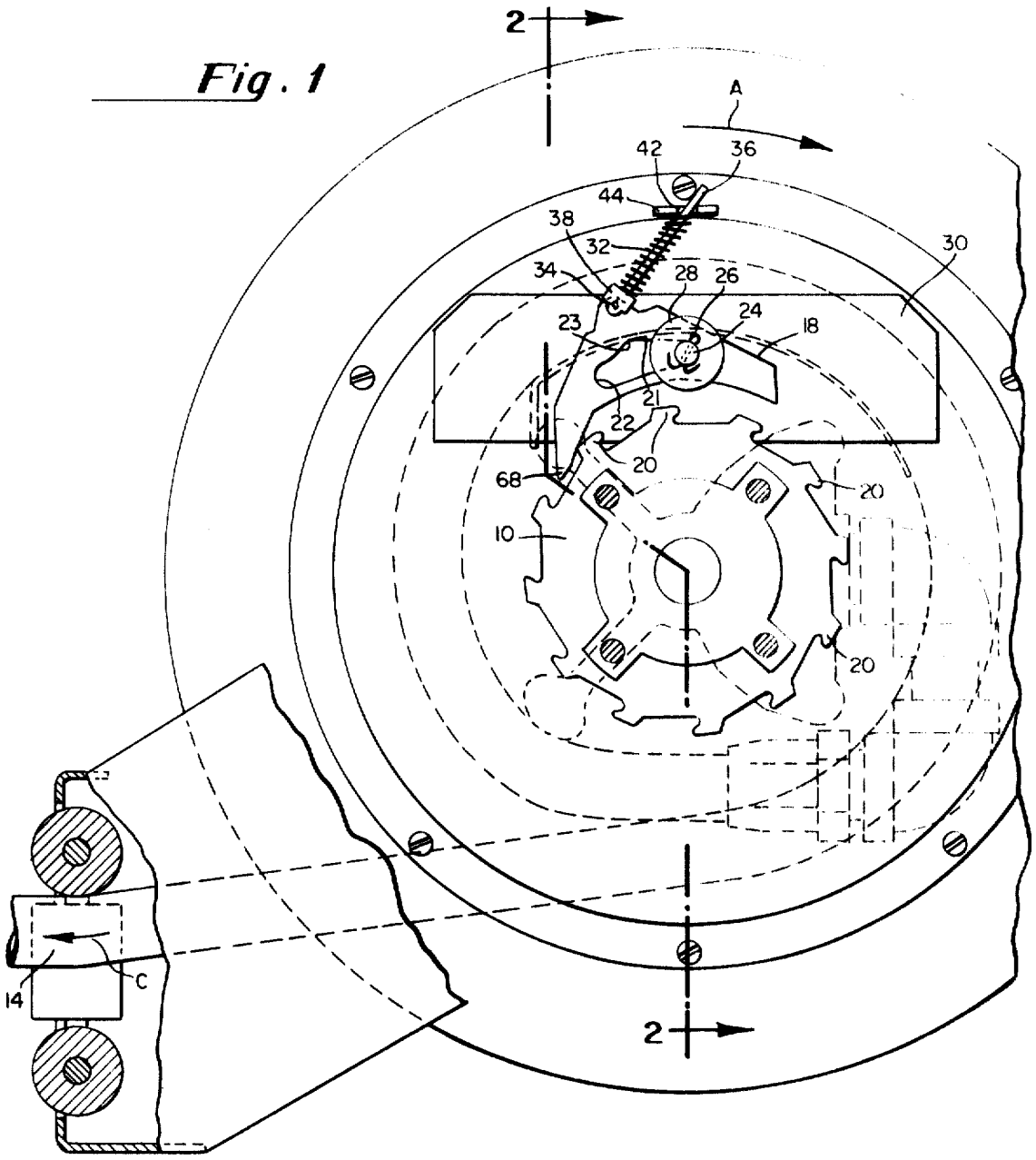
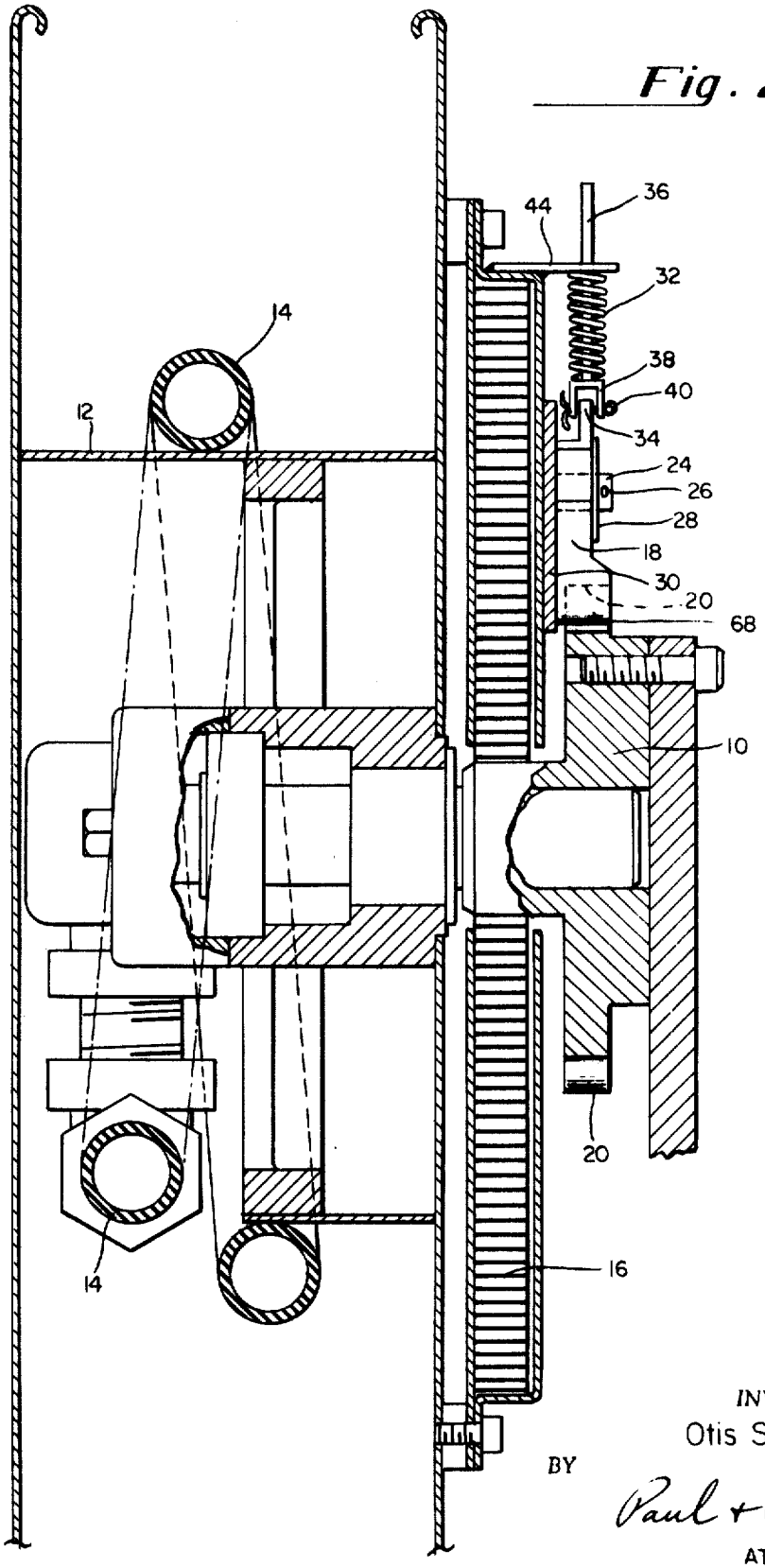


Fig. 1



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Fig. 2



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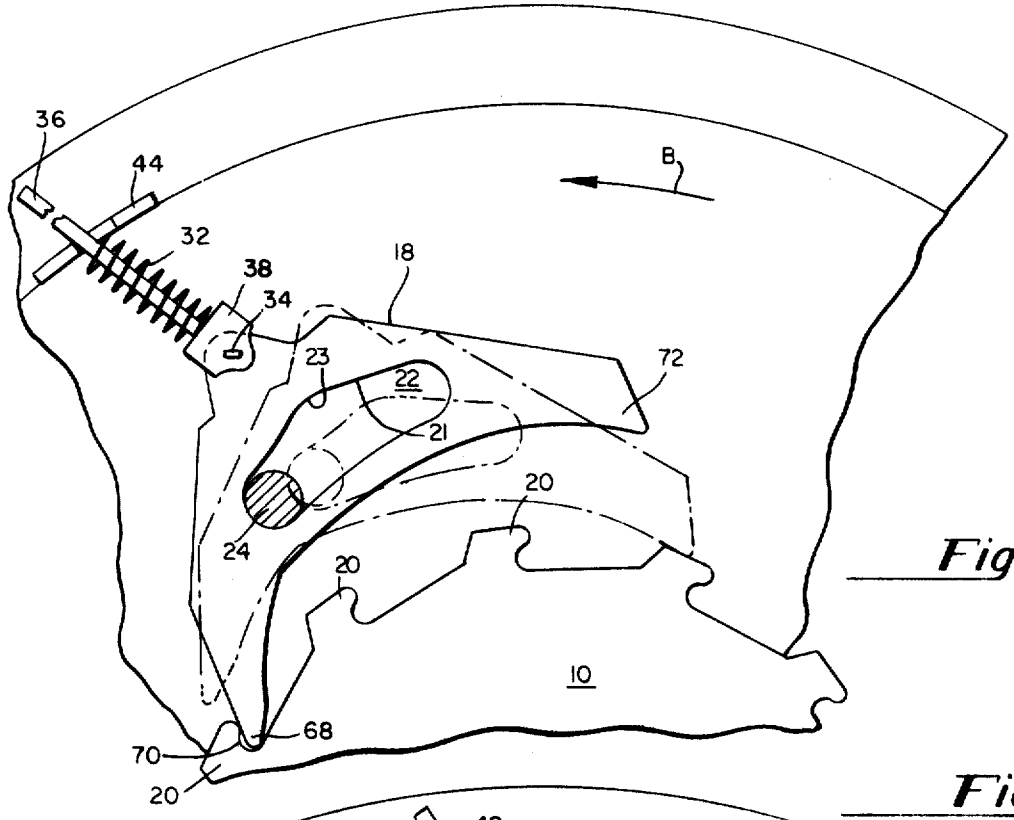
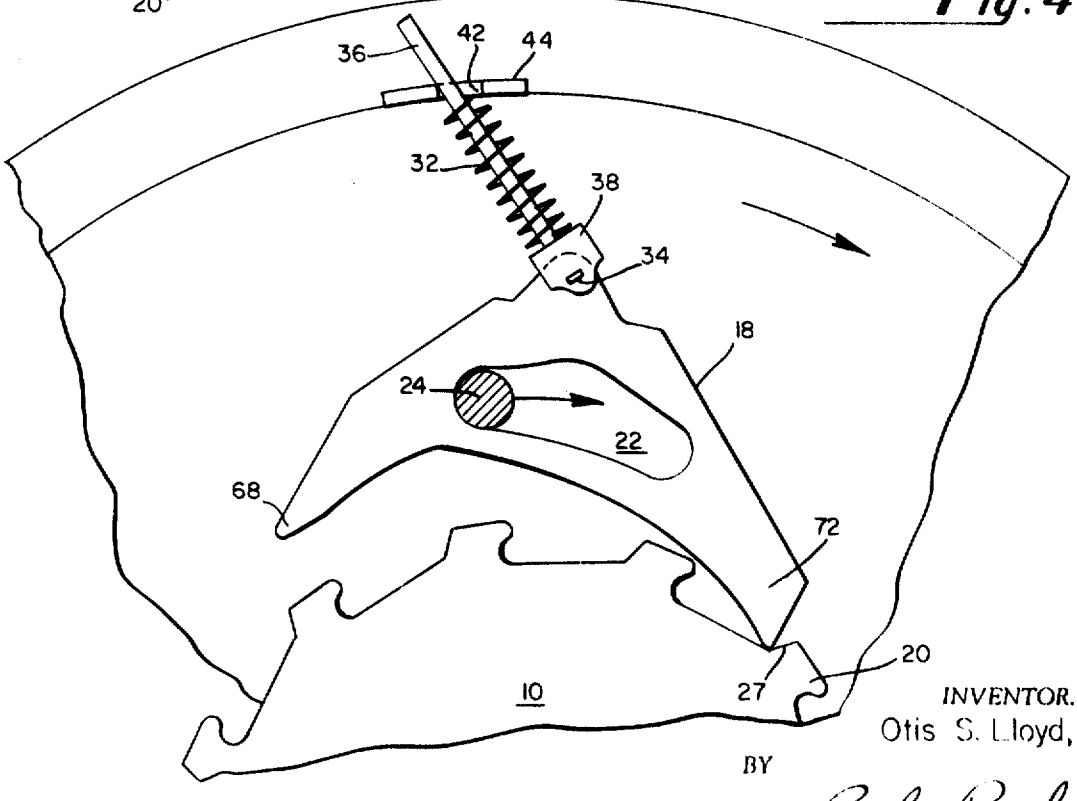


Fig. 3

Fig. 4



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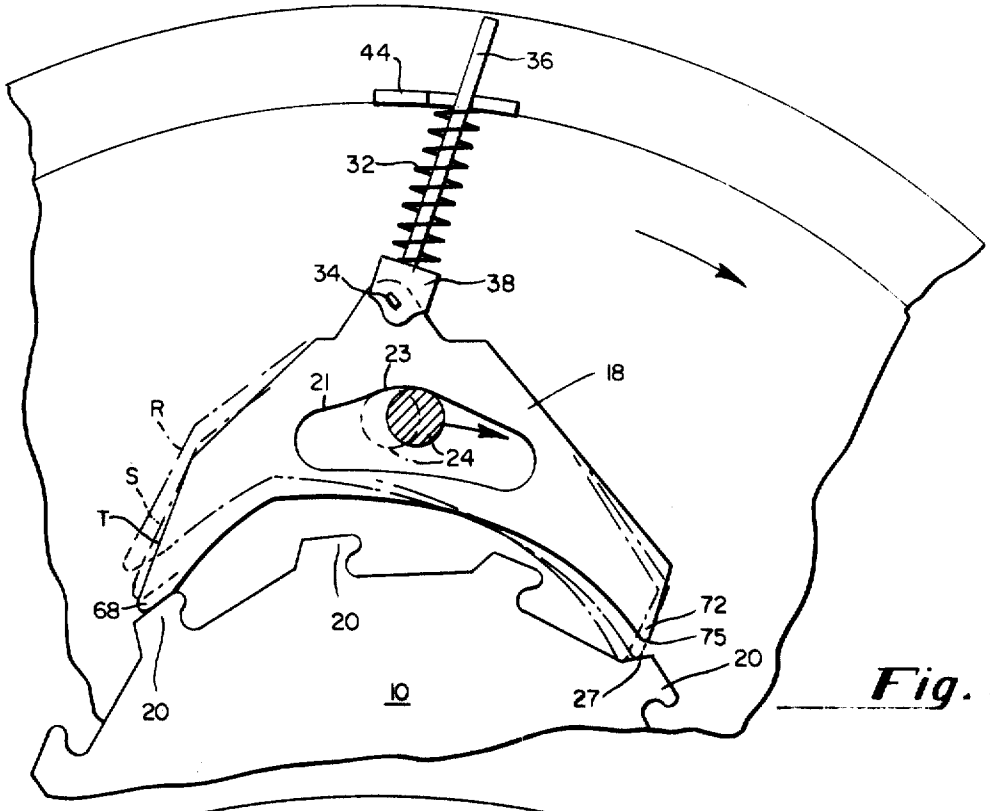
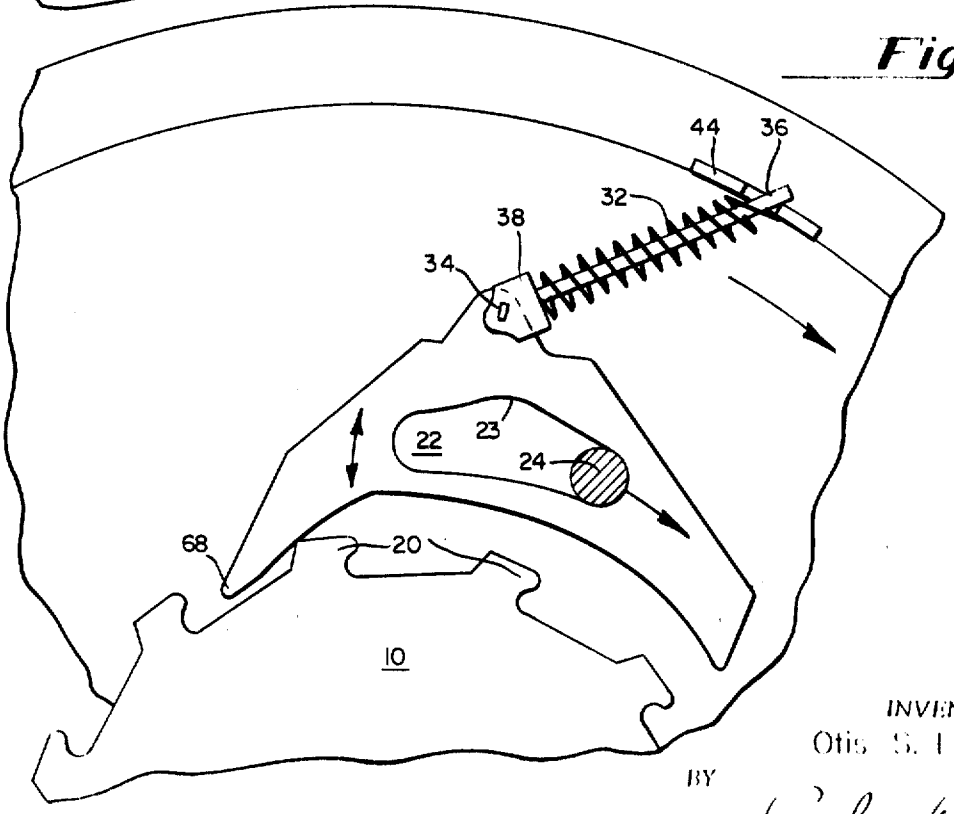


Fig. 5

Fig. 6



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RATCHET DEVICE FOR HOSE REEL

BACKGROUND OF THE INVENTION

This invention relates to ratchet and pawl mechanism for hose reels and more particularly to such mechanism wherein the pawl is free floating and spring biased and travels with the moving part of the hose reel mechanism.

The prior art devices as illustrated in U.S. Pat. No. 2,976,959, issued to L. E. Husted, Mar. 28, 1961. include a free-floating spring-biased pawl which revolves in both directions about a fixed ratchet. The pawl of such a mechanism may have a tendency to function improperly, as particularly pointed out in this patent in connection with FIGS. 15, 16 and 17. In particular, the pawl can either hang up on dead center and fail to function at all or, under certain conditions, can jam.

SUMMARY OF THE INVENTION

I have invented an improvement in such a mechanism comprising a redesigned pawl which cooperates with redesigned ratchet. In particular, the pawl has a cammed surface which rides along a follower, the cammed surface having an off center dip therein which causes the pawl to move by sliding and rocking to its desired positions during operation of the device. The end of the pawl and the teeth of the ratchet are designed to cooperate to prevent jamming.

Accordingly, it is an object of this invention to improve a ratchet device for a hose reel by providing a means whereby the pawl of the ratchet device will not hang up on dead center nor jam in operation.

This and other objects of my invention will become apparent from the following description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation partially broken away of a portion of self-retracting hose reel showing the preferred embodiment of this invention in an operative position in the apparatus;

FIG. 2 is a view taken as indicated by the lines and arrows 2–2 in FIG. 1;

FIG. 3 is an enlarged view of a portion of the mechanism shown in FIG. 1 shown in an alternate position with a further alternate position shown in phantom;

FIG. 4 is an enlarged view of a portion of the mechanism shown in FIG. 1 showing the parts in an alternate position;

FIG. 5 is an enlarged view of a portion of the mechanism shown in FIG. 1 shown in an alternate position with further alternate positions shown in phantom; and

FIG. 6 is an enlarged view of a portion of the apparatus shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although specific forms of the invention have been selected for illustration in the drawings, and the following description is drawn in specific terms for the purpose of describing these forms of the inventions, this description is not intended to limit the scope of the invention which is defined in the appended claims.

Referring to FIGS. 1 and 2 a hose reel of the common self-retracting type is shown in front elevation and transverse section respectively. This type is more fully described in U.S. Pat. No. 2,976,959 previously referred to. Briefly the device includes a fixedly mounted frame including a ratchet 10 and a rotatable reel 12 mounted on a shaft for coiling a hose 14. The hose is automatically rewound in a direction opposite to the arrow A in FIG. 1 by means of a spring motor 16. Such a device is well known in the art and accordingly needs no further explanation.

The invention herein described and claimed is concerned with the configuration of the pawl 18 and the teeth of the ratchet 10. The pawl 18 lies in substantially the same plane as the ratchet teeth 20 and is provided with a slot 22 through which passes a follower pin 24. The pawl is maintained on the pin by a cotter pin 26 and a washer 28. The pin 24 is fixedly attached to a bracket 30 which is welded or otherwise suitably affixed to the rotating drum or reel 12. Such an arrangement is described in the 1961 patent. It is noted here however that the slot 50 in the pawl 48 in the 1961 patent is substantially straight on the longitudinal sides and rounded at the ends, whereas the slot 22 in accordance with the present invention is arcuate along one side and has an irregularly curved cam surface 21 along the other longitudinal side and terminates at both ends in rounded portions which are complimentary to the cylindrical pin 24. Further, whereas the center of the pawl 48 in the 1961 patent is biased downwardly by a torsion spring, in my device the biasing of the torsion spring 32 is applied at a point 34 which is off center on the pawl 18 and preferably lies behind the centerline in the unwind direction (indicated by the arrow A in FIG. 1).

The spring 32 is disposed about a rod 36 which terminates in a yoke 38, said yoke being attached to the pawl by means of a cotter pin 40. The rod passes through a clearance hole 42 in a bracket 44 attached to the reel 12, as by welding, as shown more clearly in FIG. 2. The spring is under compression at all times so that it tends to drive the pawl away from the bracket 44. It will be evident from the figures that when the pawl 18 moves to one side or the other of a line passing through the center line of the hole 42, the pivot point 34 and the pin 24, the spring will act to move the pawl so that one end or the other of the pawl will be moved downwardly toward the ratchet 10. Further, the cam surface 21 will always bear against the pin 24.

I will now describe the operation of the device as it normally occurs in accordance with prior art devices. This description parallels the more detailed description in the 1961 patent set forth under the heading "Operation " in column 3 of the patent with reference to FIGS. 3 through 17 thereof. At the outset, referring to the figures of my application, note that the pawl in accordance with my invention has a trailing end with a nose 68 which is adapted to fit under the under cut portion 70 of the tooth 20 of the ratchet so that it is prevented from disengaging from the tooth 20 by action of the spring 32 when the pawl and ratchet are in the position shown in FIG. 3. In this position the ratchet and pawl mechanism acts to prevent the reel from winding in the direction of the arrow B.

Assume that it is desired to unwind the hose from the reel. The hose 14 is pulled outwardly in the direction of the arrow C in FIG. 1 which causes the drum or reel 12 to rotate in the direction of the arrow A in FIG. 1. This causes the pin 24 FIG. 3 and bracket 44 FIG. 3 to move clockwise. The immediate reaction will be to flip the rod 36 over in clockwise direction like a toggle switch and to push the lead end 72 of the pawl 18 down towards the ratchet as the pin 24 travels to the outer end of the slot 22. The trailing end 68, which was retained below the portion 70 of the tooth 20, will remain in this position and therefore the spring 32 will cause the lead end 72 to rise again as the pin 24 passes the point 34 at which the spring force is applied to the pawl 18. When the pin 24 reaches the other end of the slot it will begin to carry the pawl along with it thereby disengaging the trailing end 68 from the overhung portion 70. Since the spring force is now on the other side of the pin 24 the trailing end 68 will merely bounce along the backs of the teeth 20.

If however (as shown in phantom in FIG. 3) the pawl begins to move initially with the pin 24 then its trailing end will be disengaged before the pin 24 crosses over the center of the slot. In such a case the lead end of the pawl will be forced downwardly into contact with the back end of the teeth on the ratchet and the pin 24 will be driven ultimately to the forward end of the slot as the pawl is restrained from moving (see the description in connection with FIGS. 2 through 7 in the 1961 patent). In either case the same result obtains, that is, the pin takes up a position at the lead end of the slot 22 and the trail-

ing end of the pawl drags along the teeth 20 during continued unwinding. The position shown during unwinding is that illustrated in FIG. 6.

It is with respect to this operation, that is, the disengagement of the pawl initially, that the present invention is particularly effective. As pointed out in the 1961 patent with respect to the description of FIGS. 15 through 17, it is possible for a pawl in accordance with the prior art to malfunction. This may be caused for example by a weak spring 32. Thus in going from the position shown in FIG. 3 of the present application to the position shown in FIG. 6 the pawl may hang up on dead center or in fact may be cocked in the wrong direction and jammed by the back end of a tooth on the ratchet. In order to avoid this, I have designed a cammed surface 21 which follows a generally arcuate path and has a dip 23 therein which is preferably to the left of the center of the arc in the direction of unwinding, but not as far to the left as the point 34 at which the spring force is applied to the pawl 18. The dip is a smooth curve having a greater radius than the external configuration of the cylindrical pin 24, so that the pin will always follow the curve along a single line of contact.

The effect of this dip can best be illustrated by following the progression of movement of the parts through FIGS. 3 through 6. Assuming that as the hose is being unwound the pawl is initially disengaged from the teeth and moves from the position shown in FIG. 3 to that shown in FIG. 4. The lead end 72 abuts against the rear of one of the teeth 20 on the ratchet and this to some extent retards or restrains the pawl from further movement in a clockwise direction while the pin 24 continues to move in a clockwise direction until it reaches the position shown in phantom in FIG. 5. At this point the spring 32 (which has constantly maintained the cam surface 21 in contact with the pin 24) forces the entire pawl downwardly from the upper position R shown in phantom toward the lower position T shown in full lines. This movement is shown by the progression views R to S to T.

At the same time, the pin 24 is continuing to move in a clockwise direction so that the pawl 18 rather than being pivoted about a fixed point is really pivoted and slid at one and the same time along the arcuate portion of the dip 23 until it reaches the position shown in full lines in FIG. 5. Note that this all occurs prior to and just at the point at which the pin reaches the middle of the slot; the slot being centrally disposed in the pawl 18. Since the point of application of the spring force 34 is even further to the left than the offcenter dip 23, the pawl will never become hung up on dead center

The pin then continues in its path with the reel while the spring 32 forces the pawl downwardly and backwardly so that the pin travels along the substantially straight portion of the cam surface 21 and eventually engages the lead end of the slot as shown in FIG. 6.

To prevent a jamming condition from occuring, I have redesigned the teeth 20. The back edge 27 FIG. 5 of each tooth is inclined forwardly in the unwind direction. At the same time the lead end 72 of the pawl is cut back and the tip 75 is rounded. The tip, therefore, acts as a follower on the slope 27 and if a condition similar to the jamming condition described above and shown in FIG. 16 of the 1961 patent were to occur, the slope 27 and the follower 75 will drive the pawl 18 out of engagement with the rear of the tooth 20 (again as shown by the progression of views in FIG. 5).

To latch the device it is only necessary to release the hose and as the reel 12 starts backward under the influence of the spring motor, the end 68 of the pawl which has been resting on the back of the teeth 20 is caught beneath the overhang 70 of one of the teeth and then as the reel continues to move in a counterclockwise direction, the pin 24 moves in the same direction toward the left-hand end of the slot until it again assumes the position shown in FIG. 3.

It will be understood that various changes in the details, materials and arrangement of parts which have been herein described and illustrated in order to explain the nature of this invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the following claims.

It will further be understood that the "Abstract of the Disclosure " set forth above is intended to provide a nonlegal technical statement of the contents of the disclosure in compliance with the Rules of Practice of the U.S. Patent Office, and is not intended to limit the scope of the invention described and claimed herein.

What I claim is:

1. An improvement in a ratchet and pawl mechanism of the type having a multitoothed ratchet and a floating spring biased pawl orbiting said ratchet, comprising: an elongated arcuate slot in said pawl, said slot having a radially outwardly extending dip in the arcuate side thereof which is radially more remote from said ratchet than the other arcuate side.

2. The invention of claim 1 wherein the dip is disposed intermediate the ends of said slot and closer to one end than the other.

3. The invention of claim 2 wherein the spring biasing occurs through a spring means attached to said pawl on the side of said slot remote from said ratchet at a point intermediate the ends of said slot closer to one end than the other.

4. The invention of claim 3 wherein said point is closer to one end than said dip, both said point and said dip being on the same side of the center of said slot.

5. The invention of claim 1 wherein one end of said pawl presents a rounded nose portion for engagement with the rear of said teeth on said ratchet, and the rear of each of said teeth is inclined in the direction of orbit of said pawl toward the rear of said teeth.