Aug. 13, 1963 C. L. NICHOLSON 3,100,606

WATER SKI ROPE REEL

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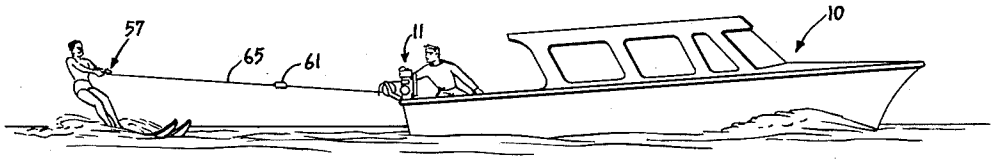


Fig. 1.

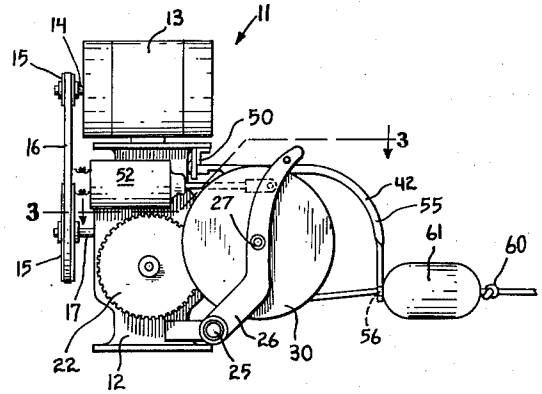


Fig. 2.

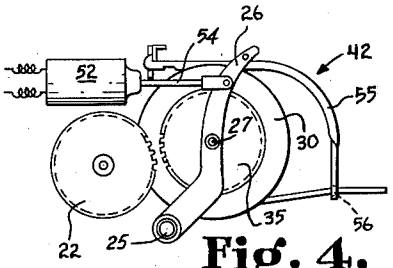


Fig. 4.

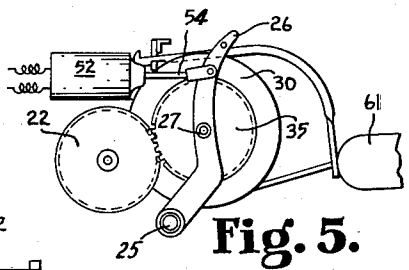


Fig. 5.

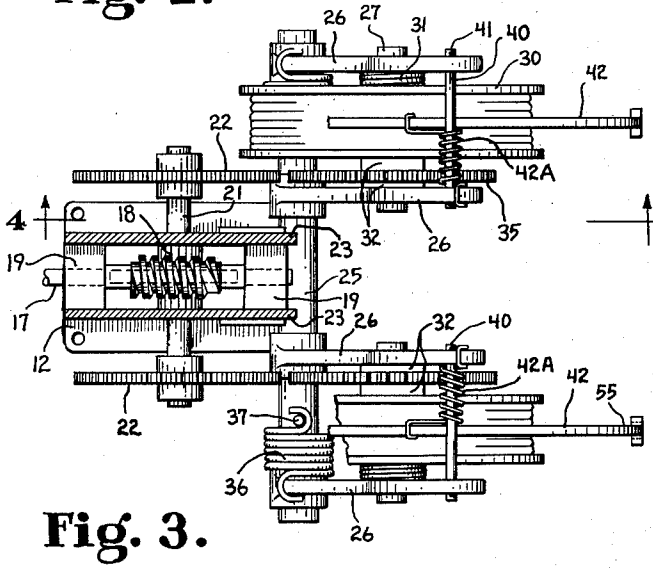


Fig. 3.

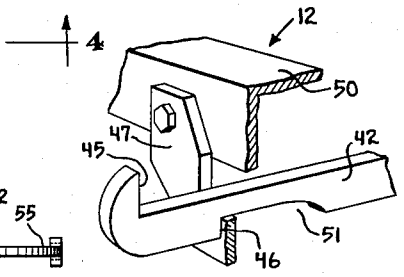


Fig. 6.

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WATER SKI ROPE REEL

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The present invention relates to water skiing and to a reel arrangement finding important utility in reeling and unreeling water ski tow ropes.

There is no device presently in common use for reeling in the tow rope of a water skier. The usual method of handling such tow ropes is to attach them to the transom of the boat and to manually haul in the ropes either in "hand over hand" or "hand over arm" fashion. This conventional method is slow and almost impossible to perform without tangling and knotting of the ski line. The problem of tangling and knotting lines is especially acute when more than one tow rope is used on a single boat.

It is, therefore, an object of the invention to provide a reel arrangement particularly adapted for use in reeling water ski tow ropes.

A further object of the present invention is to provide an improved reel arrangement for water ski tow ropes including means for quickly and easily adjusting the length of one or more of the tow ropes with respect to the other or others thereof in order to permit crisscrossing of the water skiers.

Another object of the present invention is to provide a completely power operated reel arrangement for use with water ski tow ropes.

Related objects and advantages will become apparent as the description proceeds.

One embodiment of the present invention comprises a reel arrangement including a plurality of rotatably mounted reels. There is also provided reversible power means for rotating the reels and means for selectively connecting any number of the reels to the power means. The reel arrangement further includes means for automatically disconnecting the power means and any respective reel upon completion of winding of the respective reel.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

FIG. 1 is a side elevation of a boat equipped with the reel arrangement of the present invention and showing it in operation pulling a water skier.

FIG. 2 is an enlarged side elevation of the reel arrangement of FIG. 1.

FIG. 3 is a further enlarged horizontal section taken along the line 3—3 of FIG. 2 in the direction of the arrows.

FIG. 4 is a sectional view taken on line 4—4 of FIG. 3.

FIG. 5 is a view similar to FIG. 4 showing the reel in another operating position wherein the reel is connected to the power means.

FIG. 6 is a fragmentary detail perspective view of a latching arrangement for locating the reel in either the position of FIG. 4 or the position of FIG. 5.

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawing and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring now more particularly to the drawings, there is illustrated a boat **10** having the reel arrangement **11** of the present invention mounted on the rear or transom thereof. It should be mentioned that the reel arrangement **11** may be mounted in any desired position in or on the boat if certain modifications described below are made. One very appropriate location, however, especially of the particular device hereinafter described, is at the rear of the boat as illustrated.

The arrangement **11** includes a base **12** made up of suitable plates and bars. Mounted upon the upper surface of the base **12** is a reversible electric motor **13** which is connected in conventional manner to an electric power source (not shown) through a suitable reversible switch (not shown). The drive shaft **14** of the motor **13** is connected through suitable pulleys **15** and belt **16** to a worm gear **17** rotatably mounted upon the base **12** and retained against axial movement with respect thereto by blocks **19** fixed to and forming a part of the base **12**. The worm gear **17** is positioned to drive a worm wheel **18** keyed to a shaft **21** which is rotatably mounted upon the base **12**. At the ends of the shaft **21**, there are fixed spur gears **22**. It can be appreciated from the above that the reversible motor **13** is arranged to positively drive the spur gears **22** in one direction or in the reverse direction. It should be mentioned that the parallel plates **23** of the base limit the axial movement of the shaft **21** through the worm wheel **18** whereby the gears **22** are maintained in the same axial position.

Fixed to and forming a part of the base **12** is a horizontal, cylindrical element or shaft **25** which provides a pivotal mounting for four gear-supporting elements **26**. Cotter pins or the like (not shown) are inserted at suitable locations along the length of the shaft **25** to prevent undesired traveling of the elements **26** axially along the shaft **25**. Each pair of elements **26** fixedly receives an axle **27** which may be fixed in place, for example, by cotter pins extending through the elements **26** and the axles **27**. Rotatably mounted upon each of the axles **27** is a reel **30**, the reel being maintained in a desired central location between the elements **26** by means of spacers **31** and **32**. Between the spacers **32**, there is provided, for each reel, a spur gear **35** which is fixed against rotation with relation to its reel and is positioned to mesh with a respective one of the spur gears **22** upon pivoting of the gear-supporting elements **26** toward the gears **22**. As shown, the spacer **31** may comprise a compression spring which will function as a mild brake for each of the reels preventing undesired free spinning thereof.

A pair of springs **36** is received upon the shaft **25**, each of the springs **36** functioning to maintain a respective one of the gears **35** out of meshing engagement with its associated gear **22**. Each spring **36** is anchored at one end by a pin **37** extending through the shaft **25** and is in engagement at its other end with one of the reel-supporting members **26**. It can be appreciated that the springs **36** act to urge the outermost reel-supporting elements rightwardly as viewed in FIG. 3.

Extending through each pair of reel-supporting members **26** is a latch mounting shaft **40** which is pinned at its opposite ends in position by suitable cotter pins **41**. Each of the shafts **40** has welded thereto a latching element **42** which is urged in a counterclockwise direction as viewed in FIGS. 4 and 5 by means of a coil spring **42A** and which is formed adjacent one end thereof with a pair of limiting surfaces **45** and **46**. A further portion of the latching arrangement includes a generally J-shaped element **47** which is fixed to an angle **50** fixed to and making up a part of the base **12**.

Referring particularly to FIG. 4, a respective one of the reels **30** is shown in its counterclockwise pivoted position

wherein its associated gear 35 is out of mesh with the respective gear 22. In this position, the limiting surface 45 of the latching element 42 will be in engagement with the angle 50 as shown.

Referring to FIG. 5, the reel 30 may be pivoted to a position wherein the gears 35 and 22 are in meshing relation and the surface 46 will engage the surface of the J-shaped element 47 to retain the gears in such meshing relation. Obviously, the slot 51 in the lower surface of the latching element 42 and including the surface 46 functions to receive the J-shaped element to permit such locking of the gears in meshing relation to occur.

There is also provided a pair of solenoids 52 of any conventional form which are fixed to the base 12 and have their armature shafts 54 pivotally secured to the reel-supporting elements 26. These solenoids 52 are separately connected to the electrical power source and are separately controlled by suitable switches (not shown) whereby neither, either or both of the reels may be positioned as in FIG. 5 for driving by the motor 13.

Each of the latching elements 42 is provided with a downwardly curved portion 55 which has an aperture 56 at its distal end. Threaded through the aperture 56 of each latching element is the water ski tow rope associated with the power reel. It should be mentioned that each latching element 42 is secured to the shaft 40 centrally thereof and of the reel 30 associated therewith in order that the aperture 56 will always be arranged in a central location with respect to the reel.

Secured to the distal end of each tow rope is a suitable handle 57 for the water skier. Just adjacent to the handle 57, there is tied, in the tow rope, a knot 60 which can bear against a float 61 to cause the float to bear, in turn, against the downwardly curved portion 55 of the latching element 42 to pivot the latching element about the shaft 40 and to raise the surface 46 away from the J-shaped element 47. This action causes the respective reel to be pivoted by the spring 36 in a clockwise direction as viewed in FIGS. 2, 4 and 5 causing the respective gears 22 and 35 to move out of meshing relation. Thus, it can be seen that the latching element 42 provides an automatic device for stopping rotation of the reel when the winding thereof has been completed. It should be noted that clockwise pivoting of the respective reel about the axis 25 is limited by engagement of the surface 45 with angle 50.

Presumably, the present device will be operated in such a manner that the water skier will grasp the handle 57 and will swim out with the tow rope 65 with the respective reel associated with that tow rope in a disconnected clockwise position as in FIG. 4 so that relatively free rotation of the reel is permitted. When the skier has reached the proper distance at which it is desired to commence skiing, the respective solenoid 52 associated with the respective reel is energized causing the parts to move to the position of FIG. 5. The inertia of the drive system including the motor locks the reel in position or, by running the motor 13 in one direction or in a reverse direction, the length of the payed out portion of the tow rope may be varied. If it is desired to pull two water skiers at one time and for the water skiers to crisscross their paths, one of the ski ropes is made longer than the other by disconnecting the respective reel associated therewith from the power source and by reconnecting that particular reel at such time as the proper distances of the water skiers is achieved. It can be appreciated that either of the reels may be disconnected from the power source at any desired time by merely striking the downwardly curved portion 55 of the latching element 42 to disengage surface 46 from the J-shaped element 47 and position the reel in a clockwise direction as viewed in FIGS. 2, 4 and 5.

From the above description, it will be obvious that the present invention provides a reel arrangement particularly adapted for use in reeling water ski tow ropes. It can also be appreciated that the present invention provides highly efficient means for quickly and easily adjusting the length of one or more of the tow ropes with respect to the other or others thereof to permit, for example, crisscrossing of the water skiers.

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention and the scope of the claims are also desired to be protected.

For example, the present device might be modified in such a manner as to mount the reel arrangement in the front of the boat. The ropes in such a case possibly would be payed out and reeled in through tubing extending through the boat. In such a case, it should be noted that the knot 60 should be sufficiently small to pass through the tubing or conceivably, the rope could be damaged by the catching of the knot on the tubing. Alternatively, a limit switch might be provided at the exit and of the tubing to actuate a further solenoid to trip the latch element 42.

The invention claimed is:

1. A base, a plurality of reel mounting elements pivoted on said base, a plurality of reels rotatably mounted on said reel mounting elements, drive means mounted on said base, a shaft rotatably mounted on said base and driven by said drive means, gears carried by said shaft and by said reels and capable of meshing by the pivoting of said reel mounting elements, means for pivoting said reel mounting elements to mesh said gears, resilient means acting between said reel mounting elements and said base and urging said gears out of engagement, a latching element secured to each of said reels and adapted to latch to said base to hold said gears in meshing relation, a rope connected to each reel and each having an elargement adjacent its distal end, said rope being threaded through said latching element, each latching element being proportioned and arranged to be disengaged by the striking of said latching element by said enlargement upon completion of winding of said reels

2. A base, a plurality of reel mounting elements pivoted on said base, a plurality of reels rotatably mounted on said reel mounting elements, drive means mounted on said base, a shaft rotatably mounted on said base and driven by said drive means, spur gears carried by said shaft and by said reels and capable of meshing by the pivoting of said reel mounting elements, solenoids mounted on said base and having their armature shafts secured to said reel mounting elements for pivoting said reel mounting elements to mesh said gears, resilient means acting between said reel mounting elements and said base and urging said gears out of engagement, a latching element secured to each of said reels and adapted to latch to said base to hold said gears in meshing relation, a rope connected to each reel and each having an enlargement adjacent its distal end, each rope being threaded through a respective latching element, each latching element being proportioned and arranged to be disengaged by the striking of said latching element by said enlargement upon completion of winding of said reels.

3. A water skiing arrangement comprising a base, a plurality of reel mounting elements mounted on said base, a plurality of reels rotatably mounted on said reel mounting elements, drive means mounted on said base for rotating said reels, means for selectively connecting any number of said reels to said drive means, a rope connected to each of said reels, said selective connecting means providing rotation of particular reels so said ropes may be unwound to unequal lengths thereby providing means for accomplishing criss-cross water skiing, an enlarged member secured to each rope adjacent its distal end, and means for automatically disconnecting said selec-

tive connecting means, said disconnecting means being operated when engaged by said enlarged member upon winding a particular rope.

4. A water skiing arrangement comprising a base, a plurality of reel mounting elements mounted on said base, a plurality of reels rotatably mounted on said reel mounting elements, drive means mounted on said base for rotating said reels, means for selectively connecting any number of said reels to said drive means, rope connected to each of said reels, said selective connecting means providing rotation of particular reels so said ropes may be unwound to unequal lengths whereby criss-cross water skiing may be accomplished, an enlarged member secured to each rope adjacent its distal end, and a latching element secured to each of said reels and adapted to

latch said selective connecting means to said drive means while winding and unwinding said reels, said rope being disposed in close proximity to said latching element such that said enlarged member strikes said latching element and disengages it from said drive means upon completion of winding of said reels.

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