This invention relates generally to equipment used in conjunction with water sports, especially water skiing, and deals more particularly with apparatus for promoting safety in the handling and retrieving of water ski lines while still providing a satisfactory tow arrangement for the line.

One of the important objects of the invention is to provide a retrieving unit for water ski lines than can be utilized to retrieve a line, after it has been released by the skier, within a very short time and with little power required, yet which provides a secure and non-fraying towing connection between the water craft and the line at times when the line is in use. It is a particular feature of the invention in this respect that the unit is so constructed that skiers can make wide swinging arcs behind and to the side of the towing craft without causing undue bends in or undesirable lateral forces on the line.

Another important object of the invention is to provide a line retrieving unit of the character described which serves to provide a compact and safe storage for the line and the tow bar connected therewith when the line is not in use.

A further object of the invention is to provide a unit of the character described which can be operated from a remote location in the craft to cause the ski line to be retrieved and in which, once the line is retrieved, there is automatic deactivation of the power means.

Among other objects of the invention are to provide a water ski line carrying and retrieving unit which is so constructed as to require but few parts, which can be made and sold at low cost, which can readily be secured to the craft on which it is desired to be used, which is attractive in appearance and efficient in operation, and which is capable of withstanding many years of rugged use.

Other features and objects of the invention together with the advantages appurtenant thereto will appear in the course of the following description.

In the accompanying drawing, which forms a part of the specification and is to be read in conjunction therewith, and in which like reference numerals indicate like parts in the various views;

FIG. 1 is a fragmentary perspective view of the fantail of an outboard boat equipped with a unit embodying the invention;

FIG. 2 is an enlarged side elevation of said unit, parts being broken away for purposes of illustration;

FIG. 3 is a top plan view of the unit, parts again being broken away and shown in section for purposes of illustration;

FIG. 4 is an enlarged fragmentary sectional view taken generally along line 4--4 of FIG. 3 in the direction of the arrows.

Referring to the drawing, reference numeral 10 indicates generally a hollow housing which can be cast from a suitable material, for example aluminum. This housing is preferably provided on its back wall 11 with spaced bolts 12 extending therefrom. These bolts can be utilized to securely mount the housing 10 to the fantail of the boat B, one suitable and convenient location being where one of the lift handles like handle H has been removed.

The housing is provided with the side walls 13, 14, a top wall 15 and a bottom wall 16. The top wall has an opening 15a which is normally covered by a removable access plate 17 secured to the top wall by screw fasteners 18. Preferably, the margin of the opening 15a is slightly depressed to provide a shoulder 15b around the opening on which the access plate seats and which permits the plate to be flush with the top wall of the housing. While not shown, the bottom wall 16 should be provided at its lowermost point with one or more drain openings capable of permitting any water shipped in the housing to escape freely therefrom by gravity.

It will be observed that the top and bottom walls 15 and 16 are configured to provide a front entrance opening 19 to the housing extending the full width of the unit. This opening is defined on the upper edge by the lip 15c of the top wall and on the lower edge by the lip 16a of the bottom wall. For reasons subsequently to be explained, the upper lip 15c is preferably set back slightly from the lower lip and each lip is rounded so as to avoid any sharp edges in the vicinity of the opening 19.

The front opening 19 merges at each of its ends with generally V-shaped apertures 20, 21 respectively, formed in the sides of the housing. Preferably, the lower edge of each opening 20 or 21 is generally horizontal while the upper edge is inclined upwardly as shown, and these edges are also rounded smoothly.

Rotatably supported within the housing 10 is a shaft 22 having its axis parallel with the front opening 19. One end of the shaft projects through a suitable bearing opening (not shown) in side wall 13 and has a gear 22b keyed thereto. An electric motor 23 is drivingly connected with gear 22b through a pinion 24 on the drive shaft of the motor. The motor and gear mechanism are enclosed in a protective cover 25 which is secured by screws 26 to the housing 10. It will be understood that suitable gasketing (not shown) can be provided around the margin of the cover 25 between it and the side wall, in order to provide a water-tight seal, as can suitable packing around the shaft 22 at its point of emergence from the housing. Alternatively, a sealed motor can be used.

The motor 23 may be of any suitable type, but I have found the usual six-volt or twelve-volt D.C. motor of the type used for windshield wipers on automobiles to be highly satisfactory. Because of its conventional nature, I have not shown the electrical circuitry involved in powering the motor. The usual storage battery would supply the necessary power through leads 27 and switch 28, the latter being in series with the motor. A main control switch (not shown) would also be in series in the circuit, this switch preferably being located within reach of the boat operator. More will be said later of the operation of the electrical system.

The shaft 22 has connected centrally thereof one end of a water ski tow line 29. The connection can most easily be achieved by threading one end of the line through a central diametrically extending aperture 22a in the shaft and knotting the line as at 29a. When the line is in storage in the unit, it is wound about the shaft as shown in FIGS. 2 and 3.

To prevent jamming of the line within the housing, guide flanges 30 are located on the shaft near the opposite side walls of the housing. These are inset sufficiently from the side walls as to occasion no interference therewith and are preferably adjustable, both rotationally and longitudinally on the shaft. Normally they are held
3. 3,162, fixed to the shaft by radial set screws as exemplified at 31 in FIG. 3. The inside face of each flange is preferably frusto-conical, as shown, in order to assist in achieving a relatively level wind on the shaft.

Each flange 30 is provided in its periphery with a generally radially cut notch 30a. This notch has generally the same shape as the inner end of the V-shaped notches in the sides. The notches are so oriented with respect to the shaft that when the line is completely drawn off of the shown notches, when fully extended from the unit, the notches 30a in the flanges will register with the side notches 20, 21, all as shown in FIG. 1.

That end of the tow line not connected with the shaft has secured thereto the tow bar 32. As can be seen in FIG. 3, the conventional method of joining the line with the tow bar is employed, this comprising providing a two-strand bridle 29b, 29c, the ends of which are threaded through suitable apertures in the cross bar and knotted to complete the connection. The tow bar is of greater length than the length of the housing 10 and the width of the notches 20, 21, that is, in such a way that in relation to the tow bar, the tow bar can enter the notches and will be stopped approximately midway thereof.

When the tow bar is positioned at its full depth in the side notches 20, 21, it engages the operating arm 28a of the switch 28. In the depressed condition of arm 28a, which condition corresponds to the position of the tow bar illustrated in FIGS. 2 and 3, switch 28 is open thereby interrupting the connection between the source of power and the motor 23.

It will also be observed from FIG. 4 that inset in the housing 10 in the side notches is a magnetic element 33, which may be a permanent magnet of the Alnico type. Preferably, there are two such elements, one in each side notch.

The tow bar is provided with correspondingly located bands 32a of magnetic material, these bands being so positioned that when the tow bar enters opening 19 and seats in the notches, the bands will contact the magnetic element 33.

It is important to note that the bridle strands 29b, 29c are so connected with the tow bar that when the tow bar is drawn toward the housing from some distance away, it will, as it reaches the housing, be twisted to a horizontal position by the strands of the bridle. In other words, the engagement of the lip 16a with the bridle as it enters the housing tends to cause the strands to shift from a horizontal position other than a horizontal position to the horizontal position thus slipping the tow bar into proper position for entry into the notches.

In operation, at times when the line is not being utilized for skiing, it is carried in the unit in the fashion illustrated in FIGS. 2 and 3. At these times, the main operating switch will be off, as will the automatic control switch 28, and no power is supplied to the motor 23. When it is desired to unwind the line for towing a skier, all that need be done is to grasp the tow bar and pull against the magnetic elements 33 and resistance of the motor sufficiently to start the line unwinding. The tow bar can be handed to the skier and the boat then moved forward while permitting the line to unreel. Once the line has been completely extended, the notches 30a in the flanges are in registry with the notches 20, 21 in the sides of the housing, as shown in FIG. 1. Thereupon, the boat can proceed to draw the skier and maneuver as desired. Despite wide swinging arcs by the skier behind the boat, or sharp turns by the boat, the line 29 does not come into contact with sharp edges on the housing or frame because of the arrangement of the registering notches in the flanges and housing.

When it is desired to retrieve the line, which is usually any time after a skier has fallen off or has released the line for any other reason, the main control switch can be pressed by the operator. The switch 28 is and has been closed since removal of the tow bar. Thereupon, power is applied to the motor and winding starts.

While FIG. 1 shows the line in the notch 30a of the flange, immediately upon release, the line will trail more directly behind the boat and there is no problem with a crossbar becoming caught in the path of the line as during the reeling in of the line.

As the tow bar approaches the housing, it will be straightened as earlier indicated, and placed in such orientation as to enter the notches 20, 21. As it enters the notches, it momentarily interrupts the power to the motor, thus preventing any undue stress on the motor or line or any other component of the unit. As earlier noted, the magnetic elements serve to attract and releasably hold the tow bar with such force that there is little danger of it being vibrated loose and separating from the housing during operation of the boat while the line is in the stored or retracted condition.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A water ski line retrieving and carrying unit comprising a housing having a front entrance opening elongated in the horizontal direction, said entrance opening merging at the sides of said housing with openings in said sides defining generally V-shaped notches in the sides, a shaft rotatably supported in said housing with its axis parallel with the long axis of said entrance opening, said shaft having thereon longitudinally spaced circumferential flanges near the respective sides of the housing, said flanges each being provided with generally radially directed notches adapted to simultaneously register with the notches in said sides at one selected rotational position of said shaft, a ski line connected at one end with said shaft, said selected rotational position corresponding with the position of the shaft when said line is completely unwound from said shaft and drawn taut through said entrance opening, and drive means drivingly connected with said shaft for winding said ski line thereon between said flanges.

2. A unit as in claim 1 wherein said flanges are mounted on said shaft for selective rotational and longitudinal adjustment thereof.

3. A unit as in claim 1 wherein said ski line includes a cross bar secured to the other end thereof, said housing having magnet means in at least one of said notches and said bar having a magnetic portion adapted to register with said magnet means and be held thereby releasably maintained in said notches when said bar is drawn therein.

4. A unit as in claim 1 wherein said drive means comprises an electrically powered motor, and including a cross bar connected with said ski line and adapted, as said line is wound on said shaft, to approach and enter said notches in said sides, and switch means controlling said motor and position of said bar and said enters said notches, said switch means operating to de-energize said motor in response to the entrance of said bar into said notches.

5. A water ski line retrieving and carrying unit comprising a housing having a horizontally elongated entrance opening in the front thereof, said entrance opening merging at the sides of said housing with apertures in said
sides defining generally V-shaped notches in the sides, a shaft rotatably supported in said housing, a line secured at one end to said shaft and having a cross bar at the other end, electric drive means connected with said shaft for winding said line on said shaft, and switch means supported from said housing with an operating member in one of said notches, said switch means operated responsive to contact between said cross bar and operating member to de-energize said drive means.

6. A unit as in claim 5 including cooperating magnetic elements on said housing and cross bar operable to releasably hold said bar with spaced portions thereof in said notches.

7. A unit as in claim 5 including spaced flanges on said shaft, said flanges each having a generally radially cut out portion adapted to register with its adjacent notch at a selected rotary position of said shaft.

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