

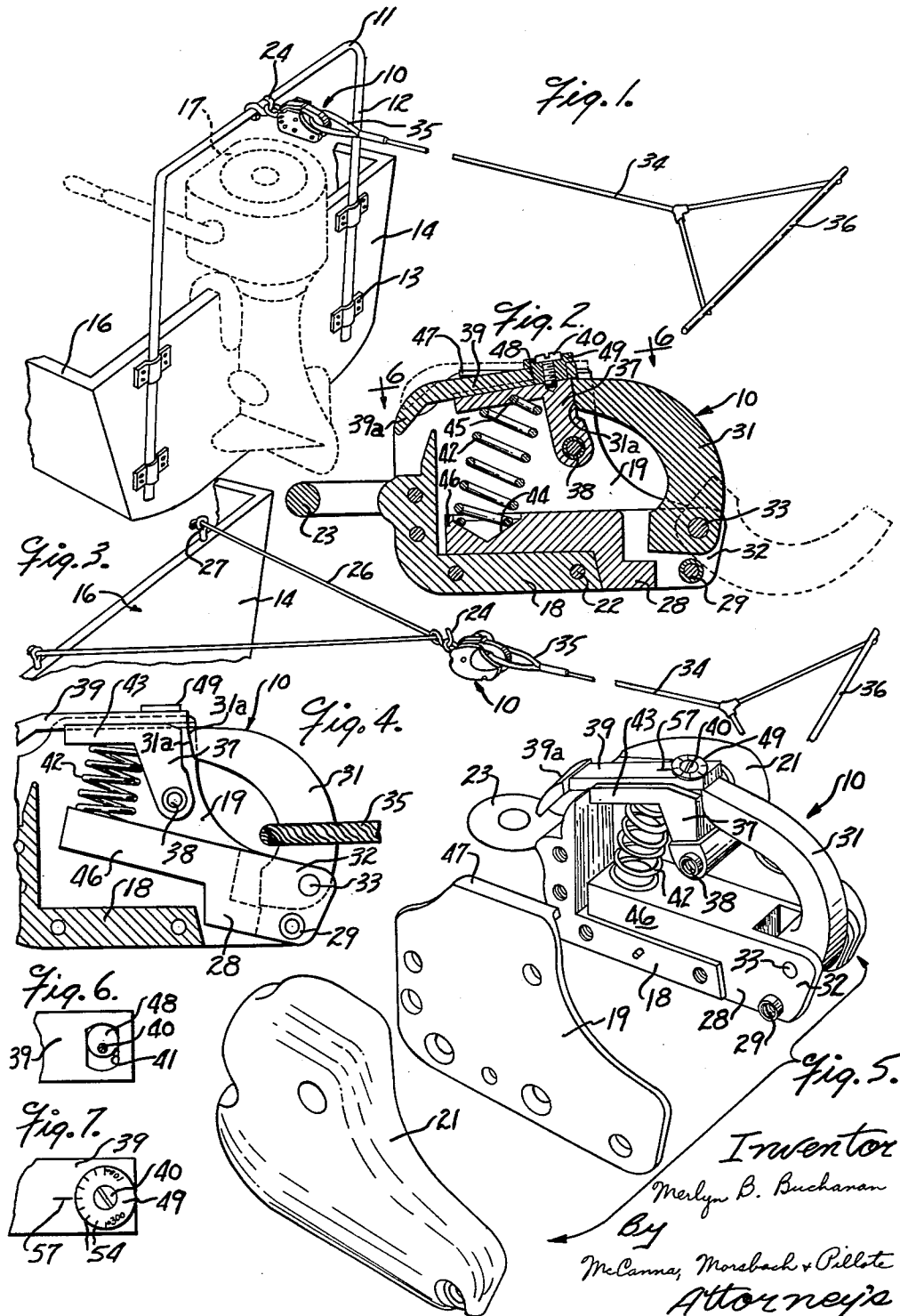
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RELEASABLE HITCH

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RELEASABLE HITCH

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This invention relates generally to release hitches, and more particularly to a release hitch for water skiing.

In the sport of water skiing, the tow line pull varies considerably from the time when the skiing operation is first started until the skier gets up to planing position. When the towing boat is accelerating, and the skier is coming up to the planing position, the pull on the tow line can be as high as 125% of the skier's weight. However, when the boat is traveling at normal speed, and the skier is planing properly, the tow line pull drops to a small fraction of the skier's weight, generally about 25%. In addition, the tow line pull can vary considerably between such upper and lower values depending on the action of the towing boat and the skier, as for example, when the skier is swinging hard to either side of the towing boat.

It has been found, however, that the tow line pull rapidly increases to a value substantially above that encountered in normal skiing operations as described above, in the event the skier falls into the water while skiing and is unable for any reason to let go or disengage himself from the tow line.

It is a general object of this invention to provide a release hitch for a water ski tow line which will withstand the variable loads incident to normal water skiing operation and which will reliably release in the event of an abnormal load to prevent injury to the water skier.

Another object is to provide a hitch for a water ski-tow line which can be readily adjusted as desired to accommodate skiers of different weight.

Another object is to provide a water ski releasable tow line hitch which is adapted for use on inboard or outboard motor boats, and which will not interfere with the outboard motor if used on such a boat.

A yet further object is to provide a hitch which can be readily attached to the rear end of a boat as by a flexible line and which will float if the tow line is released to avoid damage to the boat propulsion apparatus.

Other objects and important features of the invention will be apparent from a study of the following specification, taken with the drawings, which together describe and illustrate a preferred embodiment of the invention, and what is now considered to be the best modes of practicing the principles thereof. Other embodiments may be suggested to those having the benefit of the teachings herein and such other embodiments are intended to be reserved especially as they fall within the scope of the subjoined claims.

In the drawings:

FIG. 1 is a fragmentary perspective view of a boat hull showing the hitch according to the present invention attached thereto;

FIG. 2 is a longitudinal sectional view through the hitch seen in FIG. 1;

FIG. 3 is a perspective view showing the hitch in another mode of operation;

FIG. 4 is a view similar to FIG. 2, but showing the arrangement of the parts just at the instant of release;

FIG. 5 is an exploded perspective view showing the parts comprising the hitch according to the present invention;

FIG. 6 is a fragmentary sectional view through the latch adjusting mechanism, taken on the plane 6-6 of FIG. 2; and

FIG. 7 is a fragmentary plan view of the latch adjusting mechanism.

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Referring now particularly to FIG. 1 of the drawings, the improved hitch according to the present invention is referred to generally by the reference numeral 10. As shown in FIG. 1, the hitch is supported from a U-shaped frame 11 having downward extending legs 12 which are held in mounting stirrups 13 secured to the transom 14 of the boat hull 16. The U-shaped frame 11 is designed to straddle an outboard engine indicated generally by the reference numeral 17 and to clear the same during all turning movements thereof. Alternatively, the hitch can be attached to the boat hull 16 as by a flexible sling 26 which is secured to the boat at transversely spaced points by fasteners 27 extending from the transom 14. As is apparent, the sling 26 is also adapted for use on outboard motor boats to straddle the motor. On inboard motor boats, it is not necessary to provide an arrangement for straddling the motor and the hitch can be mounted directly on the boat hull if desired.

The releasable hitch 10 comprises a generally L-shaped body member 18 flanged by side plates 19. The side plates 19 and body member 18 are held in assembled relationship by means of through bolts 22. The body member 18 affords a means of supporting an eye member 23 which in turn is connected as by a shackle 24 to the frame 11 or sling 26. In those applications where the hitch 10 is attached to the boat by a flexible type connector such as the sling 26, a pair of float blocks 21 are preferably provided at each side of the hitch. The float blocks are made of a light weight material such as wood, cork, expanded plastic or the like and are selected so as to make the overall unit sufficiently buoyant to float in the water to prevent the hitch from fouling in the boat propeller when the tow line is slack. The float blocks are conveniently secured to the hitch by the same fasteners or bolts 22 which secure the side plates to the body.

The release latch 10 has a first lever member 28 which is pivoted on a pin 29 to the body member 18, the side plates 19 having openings therein for the reception of the pin 29. A tow line engaged finger 31 is mounted between spaced limbs 32 of the first lever member 28, and is pivoted with respect to the first lever member 28 by means of a pivot pin 33 which is laterally offset from the pin 29. The tow line engaged finger 31 is adapted to receive an eye splice 35 of a tow line 34 secured to a tow bar 36 which is held by the skier. The finger 31 is swingable from a latched position shown in solid lines in FIG. 2 to a release position shown in dotted lines in that figure and structure is provided for holding the tow line engaged finger 31 in latched position. To this end, a generally L-shaped latch 37 is pivoted between the two side plates 19, and is mounted on a pivot pin 38 supported at its ends in the side plates 19. The L-shaped member 37 has an overlying adjustable latch plate 39 adjustably secured thereto by means of a screw 40. The latch plate 39 has a slot 41 therein, and the position of the latch plate 39 may be suitably adjusted by first releasing the engagement of the screw 40 and adjusting the position of the plate 39. A rotary cam 48 is preferably provided to aid in adjusting the latch plate and, as shown, the rotary cam is eccentrically mounted on the screw 40 and engages the sides of the slot 41 to shift the latch plate as the cam is turned. A knob 49 is provided on the cam to facilitate turning when the screw 40 is loosened. Calibrated graduations 54 are conveniently provided on the knob 49, which graduations cooperate with the index mark 57 on the latch plate to facilitate adjustment of the cam. The graduations are advantageously calibrated in terms of the skier's weight to enable the release pressure to be preset according to the weight of the water skier and, as shown, the graduations go from 100 pounds to 300 pounds in twenty-five pound increments. The graduations and cam are so

related that when the knob is set according to the skier's weight, for example 100 pounds, the latch is adjusted so that it will not release until the actual pull on the tow line reaches a relatively higher value such as 140% to 145% of the skier's weight, to accommodate the abnormal loads of about 125% of the skier's weight encountered when pulling the skier out of the water, with a small additional safety margin of 15 to 20% to assure that the latch will not release prematurely. Alternatively, the knob could be graduated directly in terms of the tow line pull which will cause release.

Latch plate 39 terminates at its other end in an operating handle 39a which can be easily depressed for release of the latch 37. The structure thus far described operates as follows: The tow line engaged finger 31 is moved to the position seen in FIG. 2, and the latching lever 37 is rocked by handle 39a in a counter-clockwise direction against the force of the spring 42 until the latching plate 39 moves into overlying relationship with respect to the tow line engaged finger 31 so as to hold the same in place by the load in spring 42.

A pull on the tow line 34 applies a generally rearwardly directed force on the pin 33 and thus tends to cause the first lever member 28 to turn in a clockwise direction (as viewed in FIG. 2) about the pivot point 29. However, clockwise turning of the first lever member 28 is yieldably opposed by the spring 42 which engages the first lever member at a point spaced relatively farther from the pivot axis 29 than the spacing between the pin 33 and the pivot axis 29. As the force applied through the tow line to the pin 33 increases, the spring 42 compresses and this allows the pivot pin 33 to shift rearwardly in an arc about the pivot pin 29, in proportion to the compression of the spring 42. When the pin 33 has shifted rearwardly a sufficient distance, the nose 31a on the tow line engaged finger 31 moves out from below the latch plate 39 and the finger 31 can then swing to its release position, shown in dotted lines in FIG. 2. As is apparent, by suitably adjusting the position on the latch plate 39, the amount of pull necessary to cause disengagement of the latch 10 may be increased or lessened as desired. In order to reset the hitch, it is only necessary to depress the handle 39 and swing the finger 31 back to position shown in FIG. 2. Since the spacing between the latch pivot 38 and the spring 42 is small as compared to the spacing between the spring and the first lever member pivot 29, the force required to depress the handle is very small as compared to the tow line pull required to release the hitch.

In order to minimize wear on the finger 31 and latch plate 39 due to the variable loads on the tow line, the end nose 31a on the finger 31 is advantageously arranged to engage the L-shaped latch 37, when the finger is in its latched position, and to hold the latch 37 spaced somewhat away from the keepers 47. Thus, when the tow line initially starts to swing the pivot pin 33 rearwardly, due to the moderate tow line loads encountered in normal skiing operations, the latch 37 tends to swing in a clockwise direction and follow the movement of the nose 31a. However, when abnormal tow line loads are encountered, the clockwise movement of the latch is arrested by the keepers 47 so that further rearward movement of the finger 31 releases the nose end of the finger from the latch. This arrangement minimizes sliding movement between the finger and the overhanging latch portion of the latch plate to minimize wear on these surfaces. Moreover, the varying tow line loads encountered during normal skiing operations and which are below the load at which the hitch is set to release, will yet cause some relative movement of the members 28, 31 and 37 about the pins 29, 33 and 38 to prevent corrosion from building up on these surfaces and freezing the pins and members together. Thus, the hitch will remain operative to reliably release at the calibrated setting, even after prolonged use.

From the foregoing, it will be seen that the ski tow hitch can be selectively adjusted in accordance with the

weight of the skier, so as to withstand the tow line pulls encountered during pulling the skier out of the water and also during normal skiing. As previously described, these loads generally do not exceed about 125% of the skier's weight. The hitch, however, will reliably release when the tow line pull exceeds these normal values, as would occur if the skier falls in the water and is unable to let go or disengage himself from the tow line. In this manner, dragging of a fallen skier through the water is avoided.

I claim:

1. A releasable hitch for a tow line comprising, a body having means at one end for attaching the body to a boat, a tow line engaged finger disposed adjacent the other end of said body, mounting means pivotally supporting said finger at one end thereof for movement about an axis disposed transverse to said body between a first position in which the finger extends generally crosswise of the body and a second position in which the finger extends generally lengthwise of the body, a latch mounted on said body and having a latch portion extending generally longitudinally of the hitch and overlying the other end of the finger when the latter is in said first position to retain the finger in said first position, said mounting means supporting said one end of said finger for limited shifting movement in a direction generally lengthwise of the hitch, means yieldably opposing rearward shifting of said one end of the finger to yieldably oppose withdrawal of the other end of said finger from said latch portion, and means for adjusting said latch portion in a direction longitudinally of the hitch to control the tow line pressure at which said finger is released.

2. A releasable hitch for a tow line comprising, a body having means at one end for attaching the body to a boat, a tow line engaged finger disposed adjacent the other end of said body, a first lever pivotally mounted adjacent the rear end of said body for swinging movement about a first axis disposed transverse to said body, means pivotally mounting one end of said finger on said lever for movement about a second axis paralleling said first axis and laterally offset from said first axis in a direction transverse to the longitudinal axis of the hitch, said lever extending forwardly from said first pivot axis, spring means engaging said lever and yieldably opposing rearward swinging movement thereof about said first axis, a latch mounted on said body and having a latch portion extending generally lengthwise of said hitch and overlying the other end of said finger, said first lever being swingable rearwardly to shift said second axis rearwardly in response to a preselected rearward pull on said finger to permit said other end of said finger to disengage said latch whereby to release a tow line on said finger.

3. The combination of claim 2 wherein said latch is pivotally mounted on said body for movement about an axis extending transverse to the longitudinal axis of the hitch to enable manual release of said finger.

4. The combination of claim 3 wherein said yieldable means also engages said latch to yieldably urge said latch into its finger engaging position.

5. A releasable hitch for a tow element comprising, a body having means at one end for attaching the body to a towing vehicle, a tow element engaging finger disposed adjacent the other end of said body, mounting means pivotally supporting said finger at one end thereof for movement about an axis disposed transverse to said body between a first position in which the finger extends generally crosswise of the body and a second position in which the finger extends generally lengthwise of the body, a latch mounted on said body and having a latch portion extending generally longitudinally of the hitch and overlying the other end of the finger when the latter is in said first position to retain the finger in said first position, said mounting means supporting said one end of said finger for limited shifting movement in a direction generally lengthwise of the hitch, means yieldably opposing rearward shifting of said one end of the finger to yield-

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ably oppose withdrawal of the other end of said finger from said latch portion, and means for adjusting said latch portion in a direction longitudinally of the hitch to control the tow element pressure at which said finger is released, said latch portion adjusting means including an eccentric cam connecting said latch and latch portion, said cam being rotatable to shift the latch portion relative to the latch.

6. A releasable hitch for a tow element comprising, a body having means at the forward end for attaching the body to a towing vehicle, a first lever pivotally mounted adjacent the rear end of the body for swinging movement about a first axis disposed transverse to said body, a finger pivotally mounted at one end on said lever for movement about a second axis paralleling said first axis and laterally offset from the first axis in a direction transverse to the longitudinal axis of the hitch, said lever extending forwardly from said first pivot axis, a latch pivotally mounted on said body for movement about a third axis extending transverse to the longitudinal axis of the hitch, said latch having a latch portion thereon extending generally lengthwise of the hitch and overlying the other end of the finger, and spring means interposed between said first lever and said latch for yieldably urging said latch portion into engagement with said finger and for yieldably opposing rearward swinging movement of said first lever about said first axis, said first lever being swingable rearwardly about said first axis to shift said second axis rearwardly in response to a preselected rearward pull on said finger to permit said other end of said finger to disengage said latch portion and thereby release the tow element connected to the finger.

7. The combination of claim 6 wherein the body has stops engageable with the latch to limit rearward swinging movement of the latch, said finger being arranged to engage said latch and normally maintain the latch out of engagement with said stops and until the rearward pull on the finger exceeds a preselected value.

8. The combination of claim 6 including means for adjusting said latch portion relative to said latch in a direction generally longitudinally of the hitch to control the pull on the finger required to release the finger from the latch portion.

9. The combination of claim 8 wherein said adjusting means includes an eccentric cam connected to said latch and latch portion.

10. A releasable hitch for a tow element comprising, a body having spaced side plates and means adjacent the forward end for attaching the body to a towing vehicle, a tow element engaging finger disposed adjacent the other end of said body, a first lever disposed between said side plates and pivotally mounted adjacent the rear ends of the plates for swinging movement about a first axis disposed transverse to said plates, means pivotally mounting one end of said finger on said lever for movement about

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a second axis paralleling said first axis and laterally offset from the first axis in a direction transverse to the longitudinal axis of the hitch, said lever extending forwardly from said first axis, spring means disposed between said side plates and engaging said lever forwardly of said first axis to yieldably oppose rearward swinging movement of said lever about said first axis, a latch mounted on said side plates and having a portion extending generally lengthwise of said hitch and overlying the other end of said finger, said first lever being swingable rearwardly to shift said second axis rearwardly in response to a preselected rearward pull on said finger to permit said other end of said finger to disengage said latch whereby to release a tow element on said finger.

11. The combination of claim 10 including a pair of buoyant bodies each detachably mounted on the outer side of a respective one of said side plates for floatingly supporting the hitch in water.

12. A releasable hitch for a tow element comprising, a body having spaced side plates and means adjacent the forward end for attaching the body to a towing vehicle, a generally L-shaped tow element engaging finger disposed adjacent the other end of the body, a first lever disposed between said side plates and pivotally mounted adjacent the rear end thereof for swinging movement about a first axis disposed transverse to said plates, means pivotally mounting one end of said finger on said lever for movement about a second axis paralleling said first axis and laterally offset from the first axis in a direction transverse to the longitudinal axis of the hitch, said lever extending forwardly from said first pivot axis, spring means disposed between said side plates and engaging said lever forwardly of said first axis to yieldably oppose rearward swinging movement of said lever about said first axis, a generally L-shaped latch disposed between said plates and pivotally mounted thereon for movement about a third axis transverse to said side plates, said latch having a latch portion overlying the other end of said L-shaped finger, said first lever being swingable rearwardly to shift said second axis rearwardly in response to a preselected rearward pull on said finger to permit the other end of said finger to disengage said latch portion whereby to release a tow element on said finger, said L-shaped latch having an operating handle at the end remote from said third pivot axis to enable manual shifting of said latch to set or release said finger.

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