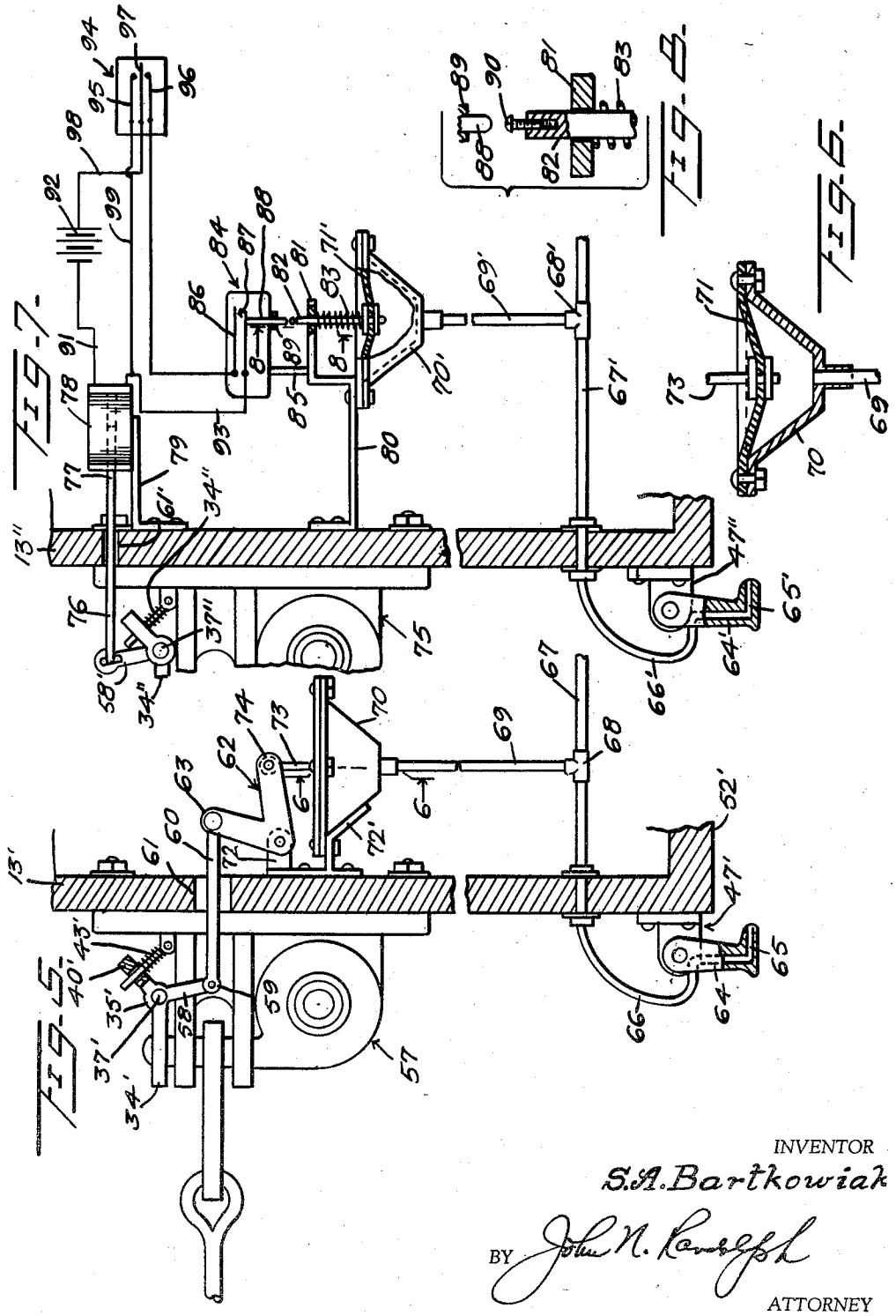
July 12, 1960 S. A. BARTKOWIAK 2,944,506

AUTOMATIC TOWLINE RELEASE

Filed March 5, 1958 2 Sheets-Sheet 1

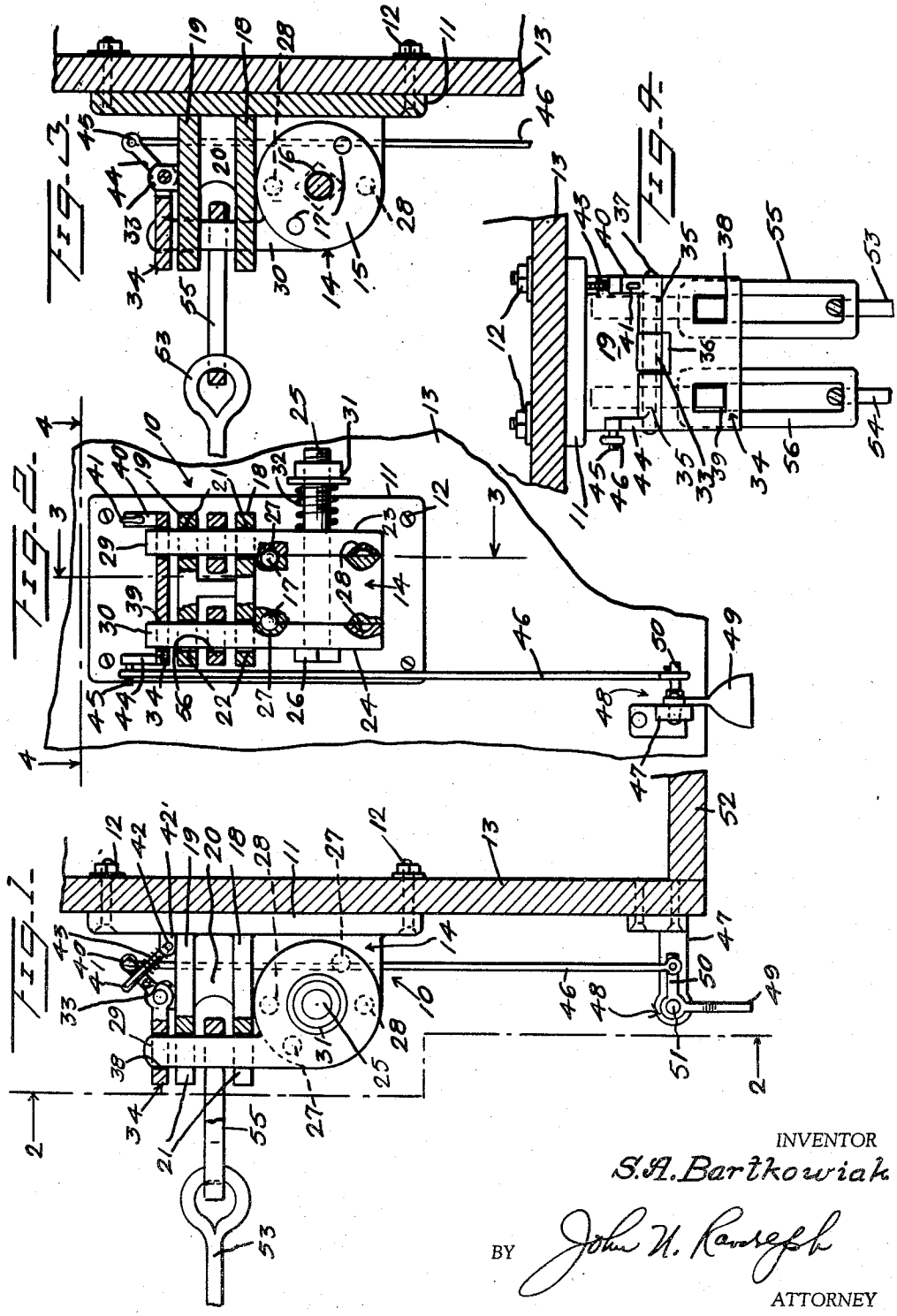


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AUTOMATIC TOWLINE RELEASE

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United States Patent Office

2,944,506
Patented July 12, 1960

2,944,506

AUTOMATIC TOWLINE RELEASE

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Filed Mar. 5, 1958, Ser. No. 719,326

9 Claims. (Cl. 114—235)

This invention relates to a device for automatically releasing a towline and has for its primary object to provide a safety device for coupling the towline of a surfboard or water skis to a towing boat and in such a manner that when the boat is under way and moving at a normal speed for towing a water skier or a surfboard rider, an increase in the pull on the towline will automatically release the towline.

Another object of the invention is to provide an automatic towline release having means to prevent operation of the release mechanism when the boat is moving at a reduced speed, so that the towline will not be released while a skier or surfboard rider is initially being brought to a planing position on the surface of the water and while the boat is accelerating, during which period a considerably greater pull or drag is exerted on the towline than when the skier or surfboard rider is planing on the surface of the water and while the boat is traveling at a normal speed.

A further object of the invention is to provide an automatic tow release adapted to releasably couple two towlines to a boat for towing two water skiers or surfboard rides and which release is operable for individually releasing either towline in response to an excessive pull thereon and after acceleration of the boat.

It is, accordingly, an object of the invention to provide a safety device for protecting water skiers and surfboard riders as well as occupants of a boat or the boat itself from injury while the boat is employed for towing water skiers or surfboard riders. When a surfboard rider falls from a surfboard, the surfboard usually flips over and is caused to submerge and is pulled toward the bottom. This produces a sudden jerk on the boat which frequently causes the operator and passengers to be thrown from the boat and may in addition cause the transom to be torn loose from the remainder of the hull, and any of which results can cause considerable injury and damage. With the automatic towline release the additional pull would automatically release the towline so that these mishaps could not occur. Similarly, if a water skier falls and becomes entangled in and is unable to release the towline the increased pull in a like manner release the towline to avoid the aforementioned mishaps or injury to the skier. In addition, should the towline be crossed by another boat a sudden increased pull or jerk on the towline will effect release thereof and thus protect the water skier or surfboard rider from injury.

A further object of the invention is to provide a tow release whereby either of two skiers can automatically release himself and his towline from the towing boat by merely jerking suddenly on the towline so that the boat can continue pulling the other skier and without dragging an extra towline.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating presently preferred embodiments thereof, and wherein:

Figure 1 is a side elevational view, partly in vertical section, of a preferred form of the automatic towline release;

Figure 2 is a rear elevational view, partly in vertical section and partly broken away thereof, taken substantially along a plane as indicated by the line 2—2 of Figure 1;

Figure 3 is a fragmentary vertical sectional view, taken substantially along a plane as indicated by the line 3—3 of Figure 2;

Figure 4 is a top plan view in detail and partly in section, taken substantially along a plane as indicated by the line 4—4 of Figure 2;

Figure 5 is a fragmentary side elevational view, partly in vertical section, of a slightly modified form of the automatic tow release;

Figure 6 is an enlarged fragmentary vertical sectional view thereof taken substantially along a plane as indicated by the line 6—6 of Figure 5;

Figure 7 is a fragmentary side elevational view, partly in vertical section, of another modified form of the tow release, and

Figure 8 is an enlarged fragmentary vertical sectional view, taken substantially along a plane as indicated by the line 8—8 of Figure 7.

Referring more specifically to the drawings, and first with reference to Figures 1 to 4, the automatic tow release as disclosed in these views is designated generally 10 and includes a mounting plate 11 which is secured by fastenings 12 to the outer side of the transom 13 of a boat, above the waterline. The exposed or rear side of the mounting plate 11 is provided with a large protuberance including a lower portion forming a boss 14 having corresponding substantially parallel opposite sides 15. The boss 14 has an opening 16 extending centrally therethrough. The opposite sides 15 are flat except for two rounded projections 17 which are equally spaced from and disposed on opposite sides of the central opening 16 in diametrical alignment with one another. The protuberance, of which the boss 14 forms a part, also includes two vertically spaced rearwardly extending plates 18 and 19 which are connected by a bracing web 20 which is interposed therebetween. The vertically spaced plates 18 and 19 have two complementary rearwardly opening slots or notches 21 and 22 which are laterally spaced from one another, as best seen in Figure 2.

Discs 23 and 24 are disposed against the opposite sides 15 of the boss 14 and are provided with central apertures which align with the opening 16 to receive a bolt 25 which extends through said discs and through the opening 16 and which has a head 26 bearing against the outer side of the disc 24. The inner face of each disc 23 and 24 is provided with two pairs of depressions 27 and 28. The depressions of each pair are disposed in diametrical alignment with one another and are equally spaced from the center of the disc and are spaced apart a distance corresponding to the spacing between the protuberances 17 of each side 15. The discs 23 and 24 have rigidly connected or integral arms 29 and 30, respectively, which extend substantially tangentially from peripheral portions of said discs, as seen in Figures 1 and 3.

A nut and washer 31 are mounted on the opposite threaded end of the bolt 25, spaced from the disc 23, and a compression spring 32 is mounted on the bolt 25 between the disc 23 and the nut and washer 31 and under compression for urging the discs 23 and 24 against the two sides 15 of the boss 14. The discs 23 and 24 can be rotated to position the arms 29 and 30, respectively, thereof in substantially upright positions so that said arms project upwardly through the vertically aligned slots or notches 21 and 22, respectively, and when the discs are

thus disposed as illustrated in Figures 1 to 4, the depressions 27 of each disc will be disposed to receive the two rounded projections or latch elements 17 which project from the side 15 against which said disc is disposed, and the spring 32 will hold said discs 23 and 24 with their inner sides flush against the boss sides 15, for thus releasably latching the discs in their positions as illustrated with the arms 29 and 30 in upright positions and extending through the slots 21 and 22, respectively. The amount of force required for swinging either the arm 29 or the arm 30 downwardly and outwardly by rotation of the disc 23 or 24, respectively, can be varied by tightening or loosening the nut and washer 31 to vary the compression of the spring 32.

A short post 33 extends upwardly from the top plate 19 and is disposed between the inner ends of the notches 21 and 22 and the mounting plate 11. A latch plate 34 has a rear edge provided with aligned spaced barrel portions 35. The plate 34 has a notch 36 in its rear edge, as seen in Figure 4, to accommodate the post 33 and so that the barrels 35 can be disposed with their bores in alignment with the aperture of said post 33 to receive a pivot pin 37 by means of which the plate 34 is swingably mounted on the post 33. The plate 34, adjacent its forward edge, is provided with transversely spaced openings 38 and 39 in which the upper ends of the arms 29 and 30, respectively, are disposed, when said arms are in upright positions and when the latch plate 34 is swung downwardly to a position above and substantially parallel to the upper plate 19, as illustrated.

An aperture lever arm 40 extends upwardly and forwardly from one barrel 35 at an obtuse angle to the plate 34. One end of a pin 41 is pivotally mounted at 42 on an upstanding ear 42' of the upper plate 19 and the other free end portion of said pin 41 extends loosely through the aperture of the lever arm 40. A spring 43 is mounted on the pin 41 between the ear 42' and lever arm 40 for urging said lever arm 40 to swing upwardly and rearwardly so that the plate 34 is urged to swing downwardly toward the plate 19.

A crank arm 44 extends upwardly and forwardly at an obtuse angle from the outer end of the other barrel 35 and has an outwardly extending crank pin 45 at its outer end to which one end of a connecting rod 46 is pivotally connected. A bracket arm 47 is secured to and extends rearwardly from a lower portion of the transom 13. A lever 48 having arms 49 and 50 is pivotally mounted by a pivot pin 51 at its apex on the outer end of the bracket arm 47. The arm 50 of said lever extends inwardly from the pivot 51 and is pivotally connected at its free end to the other end of the connecting rod 46, and the other lever arm 49 extends downwardly from the pivot 51 and is laterally enlarged to form a plate, as seen in Figure 2, which is disposed crosswise of the axis of the boat and below the level of the bottom 52 of the stern portion of the boat hull, as seen in Figures 1 and 2.

Complementary forward ends of two towlines 53 and 54 are provided with coupling rings or links 55 and 56, respectively, which links fit between the plates 18 and 19 and are engaged by the disc arms 29 and 30, respectively, which extend upwardly therethrough when the discs 23 and 24 are releasably latched in their positions as shown.

Assuming that the opposite ends of tow lines 53 and 54 are connected to surfboards or are engaged by water skiers, in a conventional manner, when the boat is initially under way or moving from left to right of Figure 1, the latch plate 34 will engage over the upper ends of the arms 29 and 30 to prevent said arms from being swung downwardly and rearwardly in counterclockwise directions for releasing the towline rings 55 and 56, due to the heavy pull on the towlines while the surfboards or water skis are being brought into planing positions. After the boat has accelerated to a sufficient extent to effect planing of the water skis or surfboards, the pressure of the water against the forward side of the plate 49 will cause the lever 48 to turn clockwise as seen in Figure 1 to exert a downward pull on the connecting rod 46 and crank 44 for swinging the plate 34 upwardly and out of engagement with the upper ends of the arms 29 and 30, to thus release the latch plate 34. The pressure of the spring 43 will determine the cruising speed of the boat which is necessary to effect release of the latch plate 34 so that the release 10 may thereafter function automatically to release the towlines 53 and 54. The adjustment of the spring 32 determines the amount of pull required to cause either arm 29 or 30 to swing downwardly and rearwardly with its disc 23 or 24, respectively, to effect release of the towline coupled thereto. Thus, should the pull on either towline be materially increased the arm 29 or 30 to which said towline is connected will be swung downwardly and rearwardly to allow the ring of said towline to disengage said arms to thus automatically effect release of the towline if the surfboard connected thereto should overturn and submerge or if the skier pulled thereby should fall and become entangled in the towline. Likewise, a skier by exerting a sudden jerk on his towline can effect release thereof in the same manner and while the other skier, pulled by the other towline will remain connected to the boat by the automatic towline release 10.

It will also be apparent that before the boat can slow down sufficiently so that the drag on the towline is materially increased, the spring 43 will overcome the pressure on the lever plate 49 and return the latch plate 34 to its latched position as illustrated, so that the towlines will not be automatically released should the boat be required to slow down momentarily or while the boat is preparing to stop. It will also be apparent that any other cause producing an increased pull on either towline or a sudden jerk will automatically effect release of said towline if the boat is traveling at a normal cruising speed sufficient to maintain the latch plate 34 in a released position.

Figures 5 and 6 illustrate a slightly different embodiment of the automatic towline release, designated generally 57, and wherein the lever 48 and connecting rod 46 are omitted. In lieu of the upwardly and rearwardly extending crank 44, one of the latch plate barrels 35 is provided with a downwardly and forwardly extending crank arm 58 having an outwardly extending crank pin 59 which is pivotally conencted to one end of a connecting rod 60 which extends forwardly therefrom loosely through an opening 61 of the boat transom 13'. A bracket arm 72 is secured to and projects from the inner side of the transom 13'. A bell crank 62 is pivotally mounted at its apex on the bracket arm 72 and has an upwardly extending arm 63 to which the other forward end of the connecting rod 60 is pivotally connected.

A bracket arm 47' is secured to and extends rearwardly from a lower portion of the outer side of the transom 13' and has an arm 64 pivotally connected thereto and extending downwardly therefrom and which is provided with a bore or passage 65 which is provided with a forwardly opening lower end disposed below the level of the stern portion of the bottom of the boat hull 52' and a rearwardly opening opposite end to which is connected one end of a flexible conduit or tubing 66. The opposite end of the tube 66 is connected to the rear end of a pipe 67 which extends rearwardly through the transom 13'. The other end of the pipe 67 is adapted to be connected to a boat speedometer, not shown. The parts 64 through 67 constitute conventional parts of a boat speedometer operated by variations in pressure created in the pipe 67 by forward motion of the boat and whereby water is forced through the passage 65 and tube 66 into pipe 67 to create the pressure in said pipe. The member 64 is mounted on a sufficiently tight pivot to

normally maintain its position of Figure 5 and is swung upwardly and rearwardly only by striking an obstruction.

A T-coupling 68 is interposed in the conduit 67 and a pipe or tube 69 connects with and extends upwardly from said T-coupling and has its opposite end connected with an opening into a cup shaped member 70 having an open upper end which is closed and sealed by a diaphragm 71, as best seen in Figure 6. The cup member 70 is supported by a bracket arm 72' which is secured to the inner side of the transom 13'. One end of a rod 73 is secured to the central portion of the diaphragm 71 and the other end of said rod is pivotally connected to the free end of the other arm 74 of the bell crank 62, which is disposed above the diaphragm.

The automatic towline release 57 is otherwise identical with the towline release 10 and the latch plate 34' thereof is urged downwardly into a latching position by the spring 43' bearing against the lever 40'. The lever 58 is thus urged forwardly or toward the transom 13' and the bell crank 62 is held in its position of Figure 5 so that the diaphragm 71 is flexed inwardly of the cup member 70, to prevent release of the automatic tow release 57 while the boat is not under way or moving at a slow speed. As the boat reaches a normal cruising speed for pulling surfboards or water skiers, pressure is built up sufficiently in the pipes 67 and 69 and the cup member 70 to distend the diaphragm 71 upwardly and outwardly of the cup member 70. This movement exerts an upward thrust on the rod 73 which swings the bell crank 62 counterclockwise about its pivot to exert a rearward thrust on the connecting rod 60 and lever 58 for swinging said lever, the latch plate 34' and lever 40' clockwise about the pivot 37' of said parts for moving the latch plate 34' upwardly to an unlatched position and so that the spring 43' will be compressed by a downward swinging movement of the lever 40'. The tow release 57 can then operate automatically as previously described in reference to the tow release 10. As the speed of movement of the boat diminishes to below its normal cruising speed the pressure in the pipes 67 and 69 and in the cup 70 will be diminished so that the spring 43' will return the latch plate 34' to its latched position of Figure 5 and will return the diaphragm 71' to its position of Figure 6.

Figures 7 and 8 illustrate another modified form of the automatic towline release, designated generally 75 and which constitutes a variation of the towline release 57. The lever arm 58' of the latch plate 34'' extends upwardly rather than downwardly from the pivot 37'' and one end of a connecting rod 76 has a pivoted and limited sliding connection with the upper end of the lever 58' and extends forwardly therefrom loosely through an opening 61' of a boat transom 13''. The other end of the connecting rod 76 forms an armature 77 which is disposed in a solenoid 78. The solenoid 78 is supported by a bracket 79 which is secured to and projects from the inner side of the boat transom 13''. The tow release 75 includes parts 47'', 64', 65', 66', 67', 68', 69', 70' and 71', corresponding with the parts 47', 64, 65, 66, 67, 68, 69, 70, and 71, respectively. The cup member 70' is supported by a bracket arm 80 which is secured to the inner side of the transom 13'' and which has an upwardly offset free end portion 81 which is disposed over the diaphragm 71' and which provides a guide for a plunger 82 which extends slidably therethrough. The lower end of the plunger 82 is secured to the central portion of the diaphragm 71' and a compression spring 83 is mounted on the plunger 82 between the guide 81 and the diaphragm 71' for urging the plunger rod and diaphragm downwardly relatively to the cup member 70'.

An electric switch 84 is supported above the guide 81 by a standard or bracket 85, which extends upwardly from the guide 81. The switch 84 has a fixed contact 86 and a resilient contact 87 which is disposed beneath the contact 86 and is normally spring biased downwardly to an open position of the switch. A push rod 88 is supported by and extends downwardly from the contact 87 through a guide 89 which forms a part of the switch 84, and the lower end of the push rod 88 is normally disposed above and spaced from the head of a screw 90, which is threaded in the upper end of the plunger 82, as seen in Figure 8, when the diaphragm 71' is flexed inwardly of the cup member 70'.

A conductor wire 91 leads from one contact of the solenoid 78 to one side of a self-contained current source such as a storage battery 92, and a conductor wire 93 extends from the other connection of the solenoid 78 to the switch contact 87. A conventional double throw type electric switch 94 may be mounted at any suitable remote point, as for example, adjacent the controls of the boat and includes two stationary contacts 95 and 96 and a movable contact 97 which is interposed therebetween. The movable contact 97 is connected to the other side of the battery 92 by a conductor wire 98, and a conductor wire 99 connects the switch contact 95 to the conductor wire 93. A conductor wire 100 forms a connection between the switch contacts 86 and 96.

From the foregoing it will be readily apparent that with the movable contact 97 in a neutral position as illustrated in Figure 7, the solenoid 78 will remain de-energized and the latch plate 34'' will be retained in a latched position to prevent release of the towlines. If the contact 97 is moved into engagement with the contact 95 a circuit will be completed between the battery and solenoid so that the pull rod 76 will be drawn forwardly to rock the latch plate 34'' upwardly for relasing the towline ring engaging arms so that said arms may swing to positions to release the towline rings, even though the boat is not traveling at a cruising speed. By positioning the contacts 97 in engagement with the contact 96 a circuit will be completed to the solenoid 78 only when the switch 84 assumes a closed position. This is accomplished by a sufficient hydraulic pressure building up in the cup member 70' to distend the diaphragm 71' outwardly thereof and so that the plunger 82 is displaced upwardly to effect an upward displacement of the push rod 88 for moving the switch contact 87 into engagement with the switch contact 86. Adjustment of the screw 90 varies the amount of pressure required in the cup member 70' to thus effect release of the latch plate 34'', and thus varies the speed at which the boat must be moving to move the latch plate 34'' to a released position. It will be obvious that the spring 43'' will return the latch plate 34'' to a latching position whenever the solenoid 78 is de-energized.

Various modifications and changes in the embodiments of the invention as disclosed are contemplated and may be resorted to, without departing from the function or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. An automatic towline release comprising a base plate having a rearwardly projecting boss, a journal member extending through and supported by said boss, a disc journaled on said journal member, said disc and boss having normally abutting faces, spring means carried by the journal member and urging said disc face against the boss face, cam latch means interposed between said faces and coacting with said spring means for yieldably resisting rotational movement of the disc relative to the boss, an arm fixed to and extending from a part of said disc, a plate supported by said base plate above said boss and having a rearwardly opening notch through which a free end portion of said arm extends in an operative position of the arm, said arm being swingable rearwardly and downwardly to a released position in response to an excessive pull thereon in a direction away from the base

plate for turning said disc against the resistance of said latch means.

2. An automatic towline release comprising a mounting plate, a towline engaging arm, means turnably supporting said arm on one side of said mounting plate for swinging movement toward and away from the mounting plate, a boss fixed to the mounting plate and disposed adjacent a part of said arm, spring latch means including a portion interposed between the boss and said part of the arm for releasably latching said arm against swinging movement and responsive to an excessive torsional force or a sudden jerk exerted on said arm in a direction away from the plate to release the arm for swinging movement outwardly and away from the mounting plate to a released position.

3. An automatic towline release as in claim 2, spaced plates supported by said mounting plate and having notches opening away from the mounting plate in which portions of said arm are disposed in an operative position of the arm.

4. In combination with a boat including a transom and hull bottom, and a towline having an attaching loop at one end thereof; an automatic towline release comprising a mounting plate secured to the outer or rear side of said transom and having an outer rear side facing away from the transom, a boss fixed to and extending from the outer side of said plate, a towline engaging arm, means turnably supporting said arm on said boss for swinging movement toward and away from the mounting plate, said arm extending through the towline loop and being disposed nearly parallel to the plane of the mounting plate, in an operative position of the arm, for connecting the towline to the towline release, spring latch means including a portion interposed between said boss and a part of the arm for releasably latching said arm against swinging movement and responsive to an excessive torsional force exerted on said arm, in a direction away from the plate, to release the arm for swinging movement from the operative position thereof outwardly and away from the plate to a released position for release of the towline loop from the arm.

5. An automatic towline release as in claim 4, a latch plate pivotally supported by the mounting plate and having an opening engaging over a free end of said arm, when the arm is in an operative position and when the latch plate is in an operative position extending outwardly from the mounting plate, spring means bearing against a portion of said latch plate and urging the latch plate to swing outwardly to an operative position, and means connected to said latch plate and including a first part extending below the hull bottom and which is responsive to the pressure of the water through which the boat hull is moving for transmitting a force developed by the water pressure through said means for displacing the latch plate upwardly to a released position when a predetermined pressure is exerted against said pressure responsive means.

6. An automatic towline release as in claim 4, a latch plate swingably supported by the mounting plate and having an opening for engaging over a free end of said arm when the latch plate is swung outwardly relative to the mounting plate to a latching position to prevent swinging movement of said arm to a released position, and means including a first part extending downwardly below the hull bottom and responsive to pressure of the water in which the boat is moving and a second part connected to said latch plate and first part and transmitting the force exerted by the pressure of the water on said first part to the latch plate for swinging the latch plate to a released position out of engagement with said arm in response to a predetermined pressure against said first part of the pressure responsive means.

7. An automatic towline release as in claim 6, said pressure responsive means including a conduit having a submerged forwardly opening end constituting said first part thereof, a cup shaped member connected to said conduit and having an open end closed by a diaphragm, said diaphragm being responsive to the pressure in the chamber formed by said cup shaped member and diaphragm whereby the diaphragm is distended outwardly of the cup shaped member in response to a predetermined pressure in said chamber, and link and lever means connecting said diaphragm to the latch plate for swinging the latch plate upwardly to a released position when the diaphragm is distended, a part of the conduit, said cup shaped member, diaphragm and link and lever means forming portions of said second part of the pressure responsive means.

8. An automatic towline release as in claim 7, and spring means acting against said latch plate and against said pressure responsive means and urging the latch plate outwardly to a latching position.

9. An automatic tow release as in claim 8, and an electrically energized solenoid interposed in said link and lever means and operable when energized to move the latch plate to a released position, a first normally open electric switch movable to a closed position by movement of the diaphragm to a distended position, a second manually actuated electric switch movable to one position for completing a circuit to the solenoid through the closed first electric switch and movable to a second position for completing an electric circuit to the solenoid around the first switch.

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