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Broling

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[54] **TURNTABLE TIE-DOWN WINCH**

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[21] Appl. No.: **120,714**

Related U.S. Application Data

[63] Continuation of Ser. No. 815,132, April 10, 1969, abandoned.

[52] **U.S. Cl.** .....**105/369 A,** 248/361 A

[51] **Int. Cl.**.....**B60p 7/08,** B61d 45/00

[58] **Field of Search** ...105/369 A, 368 T; 148/361 A; 280/179 A

[56] **References Cited**

UNITED STATES PATENTS

3,295,464	1/1967	Broling	105/369 A
3,315,617	4/1967	Schwiebert	105/369 A
3,324,807	6/1967	Broling	105/369 A

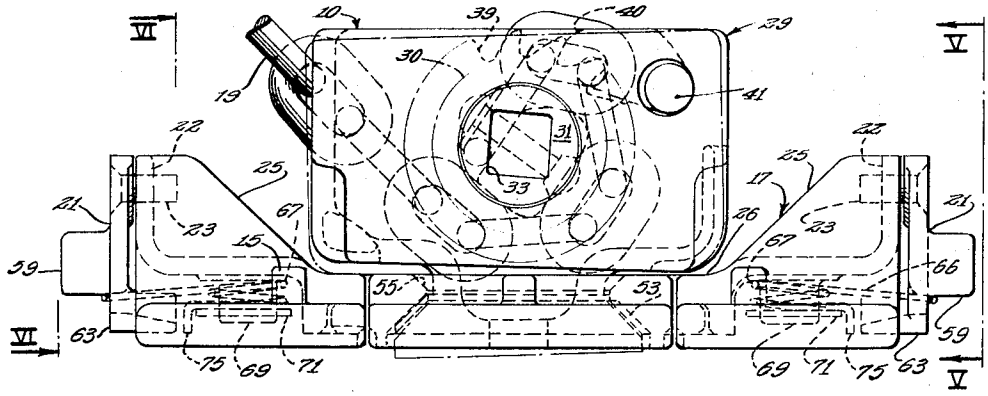
Primary Examiner—Drayton E. Hoffman

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[57] **ABSTRACT**

Turntable tie-down winch for tying lading to freight vehicles. The winch includes a winch block having a flexible tie-down adapted to be wound thereon and is mounted for adjustable movement along a channel extending along the deck of the vehicle. The winch is mounted on a base for adjustable movement about a vertical axis and for limited movement along said axis and is freely adjustable about said vertical axis as tension is relieved from the flexible tie-down and is locked from turning movement by an interengaging connection between the winch and base as tension is taken up on the tie-down, to bring the interengaging connection into locking engagement. Locking devices are mounted on opposite ends of the base for the winch and normally extend over the edge portions of the base and automatically engage the tops of retaining flanges of the channel and hold the winch in position as the winch is elevated in its channel by pulling upwardly on the flexible tie-down.

15 Claims, 6 Drawing Figures



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SHEET 1 OF 2

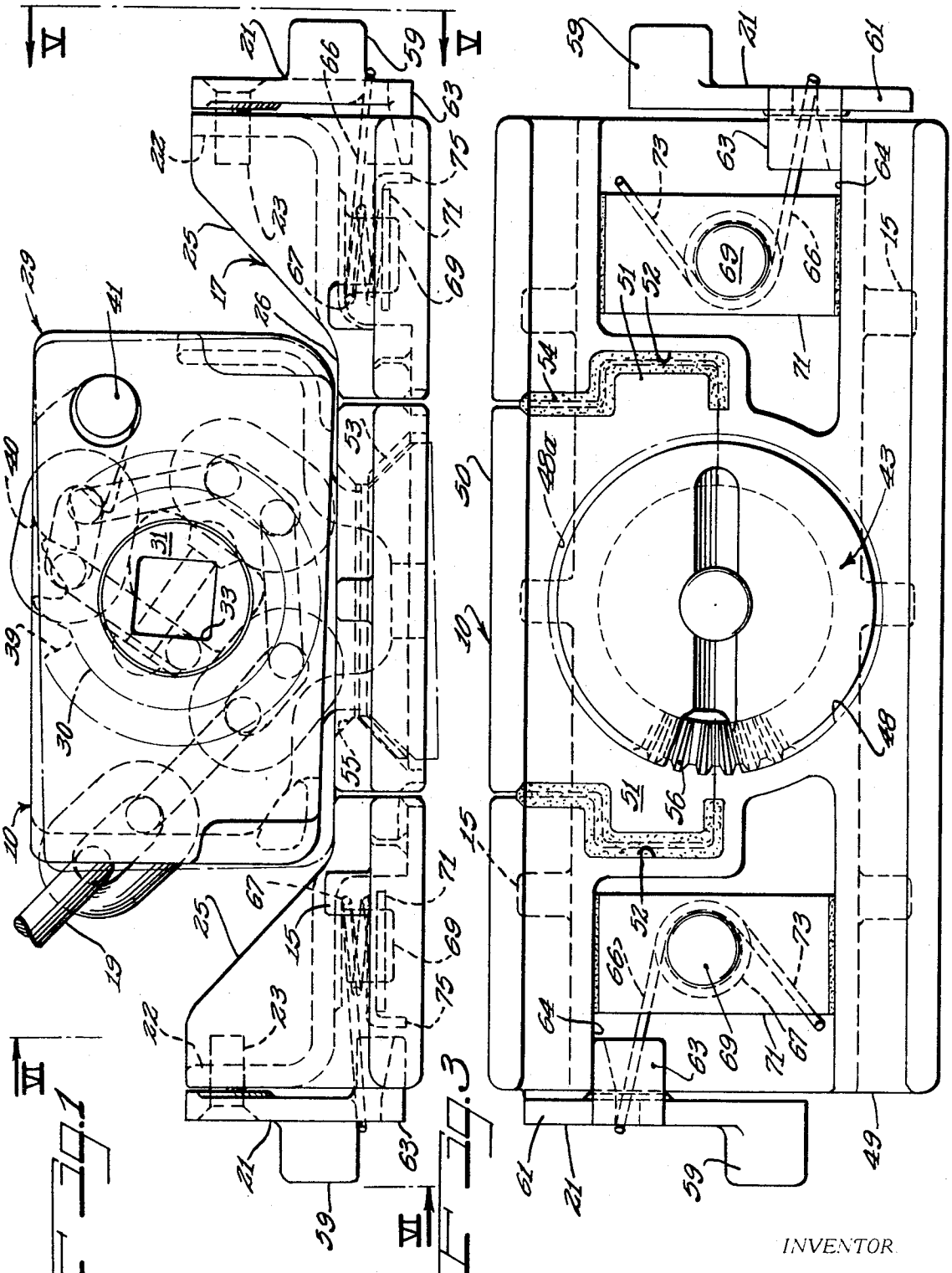


FIG. 1

FIG. 3

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Fig. 5

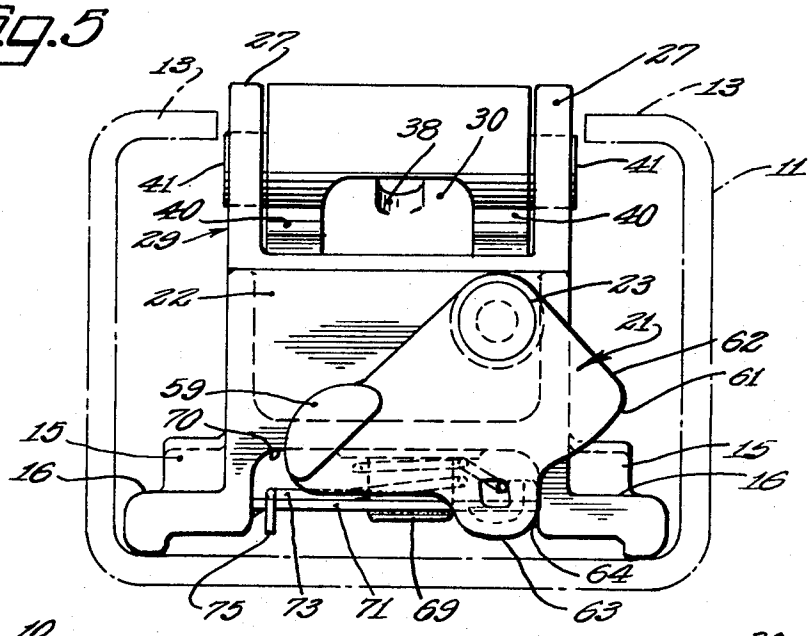
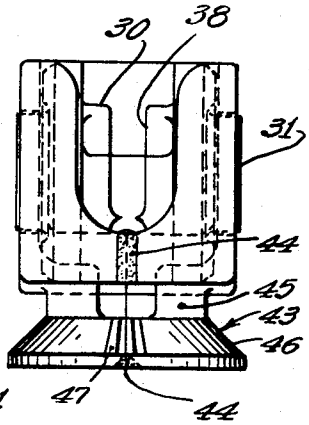


Fig. 4



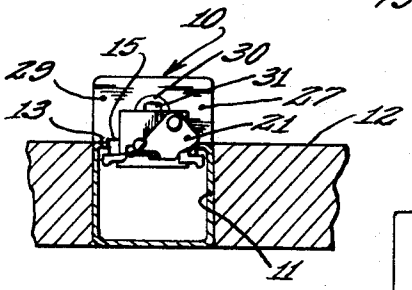


Fig. 2

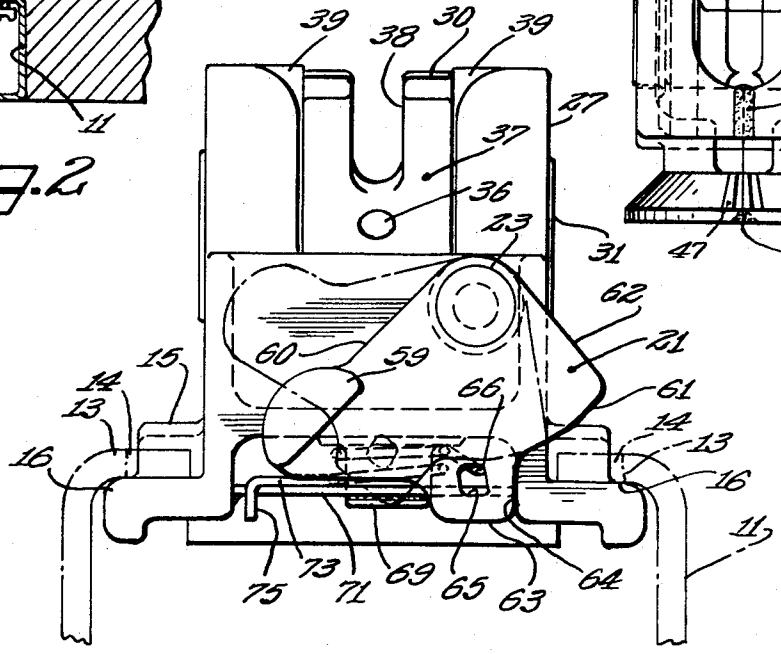


Fig. 6

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TURNTABLE TIE-DOWN WINCH

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation of my earlier filed application Ser. No. 815,132, filed Apr. 10, 1969 and now abandoned.

SUMMARY AND OBJECTS OF THE INVENTION

A principal object of the present invention is to provide a simple and improved form of turntable type of tie-down winch securing lading in place on freight transporting vehicles, which is characterized by a high degree of flexibility, enabling the operator to attach a flexible tie-down to lading at various angular positions and to attain the proper tension on the tie-down to securely hold the lading in place.

Another object of the invention is to provide a novel form of turn-table tie-down winch freely rotatable about a vertical axis upon the release of tension on the flexible tie-down, and retained in fixed relation with respect to its base as tension is taken up on the flexible lading tie-down.

Still another object of the invention is to provide an improved form of tie-down winch of the turntable type guided for movement along a channel recessed in the deck of a freight transporting vehicle and adapted to maintain a flexible tie-down under tension, in which the winch is free to pivot about a vertical axis wen tension is relieved from the flexible tie-down and is locked from such movement as tension is applied to the tie-down, and which is incapable of being adjustably moved along the channel except when the tie-down winch extends parallel to and is recessed within the channel.

A further object of the invention is to provide a simplified form of turntable tie-down winch, retained in a channel for longitudinal movement therealong and movable into an elevated position relative to the channel and locked in position therein, in which the tie-down winch must be parallel to the channel to accommodate the recessing of the winch beneath the retaining flanges of the channel, and adjustable movement of the winch along the channel.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in side elevation of a turntable tie-down winch constructed in accordance with the principles of the present invention.

FIG. 2 is a fragmentary transverse sectional view taken through the deck of a railway flat car with certain parts removed, drawn to a reduced scale, and showing the tie-down winch positioned transversely of its retaining channel, and illustrating the interlock between the tie-down winch and channel, preventing adjustable movement of the winch along the channel except when the winch is positioned to extend parallel to the channel and is recessed in the bottom of the channel.

FIG. 3 is a bottom plan view of the tie-down winch shown in FIG. 1.

FIG. 4 is a fragmentary end view of the winch frame and winch block, separated from the winch base.

FIG. 5 is an end view of the tie-down winch looking at the tie-down along line V—V of FIG. 1 and showing the tie-down winch recessed within its retaining channel; and

FIG. 6 is an end view of the tie-down winch looking at the winch along line VI—VI of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT OF INVENTION

In the drawings, I have shown in FIGS. 1, 2 and 3 a tie-down winch **10**, adapted to be mounted in a retainer and guide channel **11**, shown in FIG. 2 as recessed in a flat deck **12** of a vehicle, such as a flat car, and adapted to extend longitudinally therealong for substantially the length thereof.

Retainer channels **11** may extend along opposite sides of the deck of the railroad car, and other inboard channels (not shown) may be spaced inwardly of the sides of the railroad car a substantial distance, to facilitate the tying down of lading, such as trucks, tractors and the like to the car.

The retainer channel **11** has inwardly extending retainer flanges **13** extending inwardly of the side walls thereof and shown in FIG. 2 as being level with the top of the deck **12**. The retainer flanges **13** have a series of aligned inwardly opening locking notches **14** formed therein. The notches **14** are engageable with interlocking lugs **15** extending upwardly of abutment flanges **16**, extending outwardly of opposite sides of a base **17** for the winch, and locked to abuttingly engage the undersurfaces of the retainer flanges **13**, upon the taking up of tension on a flexible tie-down member, such as a chain **19** in a conventional manner.

Locking members **21,21** are longitudinally pivoted on opposite sides of the longitudinal center line of the base **17**, and are biased to extend over the abutment flanges **16** and engage the top surfaces of the retainer flanges **13,13**, as the tie-down winch is in an elevated position in the channel **11**, as will hereinafter be more clearly described as this specification proceeds.

As shown in FIGS. 1 and 5, the base **17** has opposite end walls **22,22** forming mountings for pivot pins **23,23** for the locking members **21,21**. The end walls **22** are reinforced by gussets **25,25** inclined downwardly from the tops of said end walls to form a relatively flat central recessed portion **26** of the base **17**, to receive parallel side frame members **27** of a winch block **29**. The winch block **29** may be in the form of a two-piece casting in which the parts of the casting are welded or otherwise secured together at their lower ends, along the center line of the casting, to retain the side walls **27,27** in parallel spaced relation with respect to each other.

A take-up drum **30** is mounted between the side walls **27,27** on a transverse shaft **31** rotatably mounted at its ends in said side frame members. The shaft **31** may be formed integrally with said take-up drum and extends to opposite sides thereof and has a squared socket **33** in at least one end thereof to receive a wrench (not shown) to turn said winch block to take-up on the flexible tie-down chain **19**.

A link of the chain **19** fits in a socket **37** formed in the drum **30** and conforming to the form of said link. Said link may be secured to said socket as by a bolt or the like (not shown) fitting through a hole **36** in said

take-up drum. A groove 38 for a link of the chain leads from the socket 37 and extends partially about the drum to accommodate uniform winding of the chain 19 onto said drum.

Ratchet wheels 39,39 are mounted on the shaft 31 on each side of the take-up drum 30 and may be welded or otherwise secured to said shaft. The ratchet wheels 39,39 are releasably engaged by pawls 40,40 extending along the insides of the side frame members 27,27 and mounted on trunnion pins 41,41 extending outwardly of said pawls, and mounted in the side frame members 27,27. As herein shown, the pawls 40,40 are formed from an integral casting and the trunnion pins 41,41 may be formed integrally therewith and have loose pivotal mounting in said side frame members, as shown in FIG. 1.

The side frame members 27,27 each have a half of a boss 43 depending therefrom and retained in abutment with each other to form a single depending boss, by the operation of welding said side frame members and boss together, as indicated by reference character 44 in FIG. 4. The boss 43 has a neck portion 45 extending downwardly of the side frame members 27 a short distance and has an outwardly flared or diverging wall portion 46 in the general form of the frustum of a cone, depending from said neck portion. The frusto-conical wall portion 46 of the boss 43 is shown in FIGS. 1,2 and 4 as having one or more bevel gear teeth 47 formed integrally therewith, spaced from the bottoms of the side frame members 27,27 and facing said side frame members. The boss 43, neck portion 45 and diverging wall portion extend downwardly within a central open portion 48 of the base 17. Two bevel gear teeth are herein shown as projecting from the frusto-conical wall portion 46 to maintain the winch block in a selected position of angular adjustment as tension is taken up on the chain 19, as will hereinafter more clearly appear.

The recessed portion 26 of the base 17 is shown in FIG. 3 as having one half of the central open portion 48 formed therein, the other half of which is formed by an insert 50. The insert 50 has opposite inner projecting end portions 51,51 fitting into recesses 52,52, formed in the central recessed portion 26 of the base 17, to enable the diverging portion of the boss 43 and frusto-conical wall portion 46 thereof to be inserted in said recess from the side and to then close said central open portion, to form a generally circular opening having a converging wall portion 53 converging from the bottom toward the top of said base. The converging wall portion 53 terminates into a diverging wall portion 55 opening to the top of said base and accommodating limited vertical and rocking movement of the winch block 29 relative to the base 17. The converging wall portion of the central opening 48 has gear teeth 56 spaced therealong, meshing with the gear teeth 47 of the diverging wall portion of the depending boss 43 of the winch block, as tension is taken up on the tie-down chain 19 and the winch block is elevated above a position where the side frame members 27 rest on the central recessed portion 26 of the base 17.

As the winch block 29 is elevated to the solid line position shown in FIG. 1 as tension is taken up on the tie-down chain 19, the bevel gear teeth 47 will mesh with the bevel teeth 56 and retain the winch block from pivotal movement about the axis of the boss 43 until tension is relieved from said tie-down chain, at which time the teeth 47 will drop out of mesh with the teeth 56.

The plane face of the frusto-conical wall portion 46 on opposite sides of the two bevel gear teeth 47 gives the clearance to enable the teeth 47 to drop out of engagement with the teeth 56, as tension as relieved from the chain 19.

The winch block 29 and the take-up drum 30, rotatably mounted therein, may thus be pivoted relative to the base 17 to conform to the position of the lading tied down by the chain 19, and when once in position, and tension is taken up on said chain the winch block is locked in position to conform to the tie-down chain, until tension on the chain is again released, either when repositioning the chain or releasing the chain to unload the lading tied down thereby.

Referring now to the locking members 21 pivoted to the end walls 22 of the base 17 on the longitudinally extending pivot pins 23. As shown in FIG. 3, the locking members 21 at opposite ends of the base 17, are off-set on opposite sides of the longitudinal center line of said base, so that one locking member 21 extends over one abutment flange 16 and is engageable with the top of the flange 13 on one side of the guide channel 11, while the opposite locking member 21 extends over the opposite abutment flange 16 and is engageable with the top of the flange 13 on the opposite side of the guide channel 11.

As shown in FIGS. 5 and 6, the locking members 21 are each of generally triangular form with the locking member pivotally mounted on the pivot pin 23 adjacent the apex of the triangle. The base of the triangle is biased to extend over the abutment flange 16 and over the retainer flange 13 of the channel 11 when the tie-down is in its elevated position in its channel (FIG. 6). A grip lug 59 extends outwardly of the locking member 21 on the inner side thereof at the juncture between a long leg 60 of the triangle and the base thereof. The base of the locking member has a convex downwardly facing generally arcuate surface 61 leading from a short leg 62 of the triangle and diverging from said short leg, to form an arcuate locking portion normally extending over the flange 16 and enabling ready release of said locking member from the top of the associated retainer flange 13 when it is desired to lower the tie-down in the channel 11 for storage or repositioning along the channel. The short leg 62 serves as a camming face camming the locking member 21 inwardly by engagement with the retainer flange 13 upon elevation of the winch block relative to the channel 11.

The base of the locking member 21 also has a stop lug 63 depending and extending inwardly therefrom for engagement with an inner wall 64 of the downwardly facing recessed portion of the base 17 (FIGS. 3, 4 and 5). An opening 65 extends through the lug 63. A leg 66 of a torsion spring 67 extends into said opening 65. The torsion spring 67 is shown as being coiled about a lug 69 depending from the recessed portion of the base 17, and as being retained to said lug as by a retainer plate 71 extending across said recessed portion and fitting along the lower end portion of the lug 69, and welded or otherwise secured to said lug and opposite side walls 64 of said recessed portion. An opposite leg 73 of the torsion spring 67 extends along the top of the plate 71

and has a depending end portion 75 engaging an outer side of the plate 71.

While the weight of the hand grip lug 59, base portion and stop of the locking member 21, is sufficient to bias the lug 63 against an inner wall 64 of the recessed portion 70, to normally extend the arcuate leading portion 61 over the abutment flange 16, the torsion spring 67 is provided to assure that the locking member 21 will always be in the extended position shown in FIGS. 5 and 6 except when it is desired to manually retract the locking members 21 to accommodate the lowering of the tie-down device to the base of the channel 11.

When the base 17 is resting on the bottom of the channel 11 and the chain 19 is pulled upwardly to place the winch block 29 in the elevated position shown in FIG. 6, the retainer flanges 13 of the channel 11 engaging the faces 62 of the locking members 21, will cam said locking members inwardly to accommodate vertical movement of the winch block to its operative position. As the faces 62 move above the retainer flanges 13, the torsion spring 67 will move the arcuate surfaces 61 in position to engage the tops of the retainer flanges 13 and hold the winch block in its elevated operative position as tension is relieved from the chain 19. The winch block will be held in this position until the locking members 21 are positively released by the hand.

It will be noted from FIG. 4 that the neck of the lug 43 spaces the upwardly facing bevel gear teeth 47 beneath the bottoms of the side frame members 27 and that the converging wall portion 53 of the central open portion 48, terminating into the diverging wall portion 55 in cooperation with the plane face 46 of the lug 43, provides clearance and freedom of vertical movement of the winch block 29 relative to the base 17, to bring the bevel gear teeth 47 into mesh with the bevel gear teeth 56 as the winch block is elevated relative to the base and tension is taken up on the tie-down chain 19, and to accommodate the teeth 47 to drop out of mesh with the teeth 56 as tension is released from the chain.

Thus, when it is desired to turn the winch block about the pivotal axis of the boss 43, it is merely necessary to release tension on the chain 19 and position the winch block in the desired position. As tension is again taken up on the chain 19, the winch block will be elevated relative to the base 17 and the teeth 47 meshing with the teeth 56 will hold the winch block in position from turning movement about the axis of the boss 43. It will further be noted from FIG. 2 that when the winch block 29 is positioned to extend across the retainer flanges 13 of the channel 11, the locking members 21 at opposite ends of the base 17 will lock the winch block in its elevated position in the channel 11, and prevent adjustable movement of the winch block longitudinally of the channel even when the winch block rests on the retainer flanges 13.

Thus, when it is desired to reposition the base and winch block longitudinally along the channel 11, the locking members 21 must be manually released by hand and held in their released positions until said locking members clear the bottoms of the retainer flanges 13. The entire tie-down device may then be lowered to the web of the channel and be slidably moved therealong, or may rest on the base of the channel for storage of the tie-down device and the chain 19 in said channel.

As the winch block is in selected position along its channel and then elevated, the locking members 21 will be automatically retracted by camming engagement with the flanges of the channel, and will then be extended outwardly to be supportingly engaged by said retainer flanges as the lugs 15 mesh with the notches 14.

While I have herein shown and described one form in which the invention may be embodied, it may readily be understood that various variations and modifications in the invention may be attained without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a tie-down apparatus for tying lading to freight vehicles and in combination with a channel recessed in the deck of the vehicle and having retainer flanges extending inwardly from the tops of the sides of said channel having inwardly opening inwardly opening notches spaced therealong,

a tie-down winch including a pair of parallel vertical side frame members,

means connecting said side frame members together at the lower ends thereof and having a depending portion forming a vertical pivot for said side frame members,

a winch block rotatably mounted between said side frame members and having a flexible tie-down connected thereto,

an elongated base for said side frame members having retainer portions extending beneath said flanges and having lugs spaced therealong for engagement with said notches, to retain said tie-down winch from movement along said channel,

locking means mounted at opposite ends of said base to extend over said retainer portions to engage the tops of said flanges,

said base having a central open portion having a wall portion converging from the bottom of said base toward the top thereof,

said depending portion of said means connecting said side frame members together extending within and rotatably mounted in said central open portion of said base and having a diverging portion generally conforming to said converging open portion of said base and retaining said tie-down winch to said base, and

means on said converging wall portion of said central open portion of said base and on said diverging wall portion of said depending portion of said means connecting said side frame members together, having interengagement with each other to lock said tie-down winch from turning movement about a vertical axis upon the taking up of tension on said flexible tie-down, and movable out of interengagement to accommodate free adjustable movement of said winch about said vertical axis, upon the release of tension on said flexible tie-down.

2. A tie-down apparatus in accordance with claim 1, wherein the portion depending from said side frame members has a neck portion between said side frame members and said diverging portion, accommodating relative vertical movement between said side frame members and said base, and accommodating rotation of said side frame members

relative to said base upon the release of tension on said flexible tie-down.

3. A tie-down apparatus in accordance to claim 2,
wherein the converging portion of said open portion of said base is frusto-conical,
wherein the diverging portion of said depending portion is frusto-conical at the same general angle of said converging portion, and
wherein said converging and diverging frusto-conical portions have interengaging portions have interengagement with each other to retain said side frame members and winch block from rotation relative to said base as tension is taken up on said flexible tie-down.

4. The tie-down apparatus of claim 2,
wherein the converging and diverging wall portions of said base and said depending portion are frusto-conical,
wherein the means on said converging and diverging wall portions for locking said tie-down winch from turning movement about a vertical axis comprises a plurality of teeth extending about said wall portions for at least a portion of the circumference thereof,
wherein said diverging wall portion is spaced beneath the bottoms of said side frame members a distance sufficient to bring said teeth out of mesh and accommodate rotation of said boss and side frame members relative to said base about the axis of said boss, and
wherein said flexible tie-down brings said teeth into locking engagement with each other upon the taking up of tension on said flexible tie-down.

5. The tie-down apparatus of claim 4,
wherein said teeth are generally in the form of internal and external bevel gear teeth and are moved into meshing engagement with each other upon upward movement of said winch block relative to said base.

6. The tie-down apparatus of claim 4,
wherein said teeth are generally in the form of internal and external gear teeth, and
wherein one of said frusto-conical wall portions has teeth extending for a portion of the frusto-conical surface thereof to provide a plane frusto-conical surface extending from said teeth and to thereby provide the clearance to enable said teeth to drop out of mesh upon the release of said flexible tie-down.

7. The flexible tie-down of claim 1,
wherein the locking means at opposite ends of said base includes a locking member pivotally mounted at each end of said base having camming surfaces camming said locking means to retracted positions, by engagement of said camming surfaces with said retainer flanges upon vertical movement of said tie-down apparatus relative to said channel into an elevated operative position, and
wherein the locking members are biased to extend over said retainer flanges and lock said tie-down apparatus in its elevated operative position in said channel upon engagement of said lugs with said notches.

8. The tie-down apparatus of claim 7,
wherein spring means are provided to bias said locking members to extend over said retaining portions, and
wherein each locking member has a stop thereon limiting outward movement of said locking member relative to said base.

9. The tie-down of claim 7,
wherein said side frame members are spaced above said base when said flexible tie-down members is under tension, and
wherein the spacing between said side frame members and said base is such as to prevent the release of said lugs from said notches when said side frame members are pivoted in angular relation with respect to said base, to rest on said retainer flanges, whereby said side frame members must extend parallel to said base and said locking members must be held in released positions to lower said base to the bottom of said channel, to adjustably move said tie-down apparatus along said channel.

10. A turntable tie-down apparatus in accordance with claim 8,
wherein the spring means biasing each of said locking members outwardly of said side frame members comprises an individual torsion spring,
wherein pins depend from said base adjacent opposite ends thereof, and
wherein said torsion springs are each mounted on one of said pins and each have one fixed leg and an opposite leg having operative connection with an associated locking member.

11. The tie-down winch of claim 7,
wherein the locking means at opposite ends of the base are spring biased to extend outwardly of said side frame members, to rest on the tops of said retainer flanges of said channel and provide self-locking members locking said winch in elevated positions in said channel, to accommodate said lugs to hold said winch from movement longitudinally of said channel in all positions of said winch block relative to said base.

12. In a tie-down apparatus for tying lading to freight vehicles and in combination with a channel recessed in the deck of the vehicle and having retainer flanges extending inwardly from opposite top sides of said channel having inwardly opening notches spaced therealong,
a tie-down winch including a pair of parallel vertical side frame members,
means connecting said side frame members together at the lower ends thereof and having a depending portion forming a vertical pivot for said side frame members,
a winch block rotatably mounted between said side frame members for movement about a vertical axis, having a flexible tie-down connected thereto,
an elongated base for said side frame members having retainer portions extending beneath said flanges and having lugs spaced therealong for engagement with said notches, to retain said tie-down winch from movement along said channel,
said base having a central open portion, and
said depending portion of said means connecting said side frame members together extending within and

rotatably mounted in said central open portion of said base and forming a vertical pivot for said side frame members,

said central open portion of said base having a converging wall portion at the lower end thereof,

said depending portion of said means connecting said side frame members together having a diverging wall portion disposed beneath and generally conforming to said converging wall portion of said central open portion, and engaged therewith upon the taking up of tension on said flexible tie-down,

locking means mounted at opposite ends of said base including a locking member mounted at each end of said base for movement to extend over said retainer flanges of said channel, to support said base and winch block on opposite retainer flanges, and

said lugs being spaced along said retainer portions forwardly and rearwardly of said side frame members and extending upwardly of said retainer portions distances greater than the spacing between the top surfaces of said retainer portions and the bottom surfaces of said side frame members, to hold said lugs in locking engagement with said notches when said tie-down winch is turned about its vertical axis relative to said base, and to prevent movement of said base and tie-down winch along said channel except when said side frame members extend parallel to said base and said locking members are released to accommodate lowering of said base to the bottom of said channel, to enable said tie-down winch to be adjustably moved along said channel.

13. The tie-down winch of claim **12**,

wherein said converging and diverging wall portions are frusto-conical and are spaced from each other when said winch block is turned relative to said base and said side frame members rest on said channel, and

wherein said frusto-conical wall portions are brought into engagement with each other when said flexible tie-down is connected with a load and is under tension.

14. The tie-down winch of claim **13**,

wherein said locking members are pivotally mounted on said base at each end thereof, for movement about axes extending longitudinally of said base to position said locking members to support said base and tie-down winch on opposite retainer flanges of said channel, and

wherein each locking member has a camming face camming the locking member inwardly by engagement with the retainer flanges of the channel upon lifting movement of the winch block relative to the base of the channel.

15. The tie-down winch of claim **14**,

wherein spring means bias said locking members to extend over said retainer flanges of said channel.

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