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A TOWING WINCH HAVING A PIVOTED DOG
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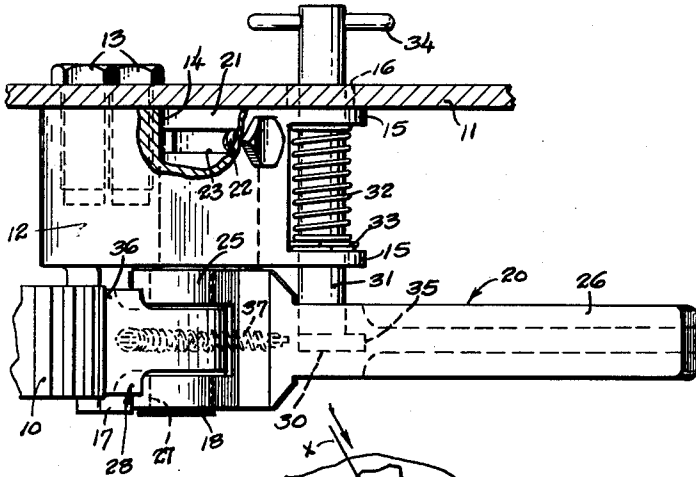


Fig. 1

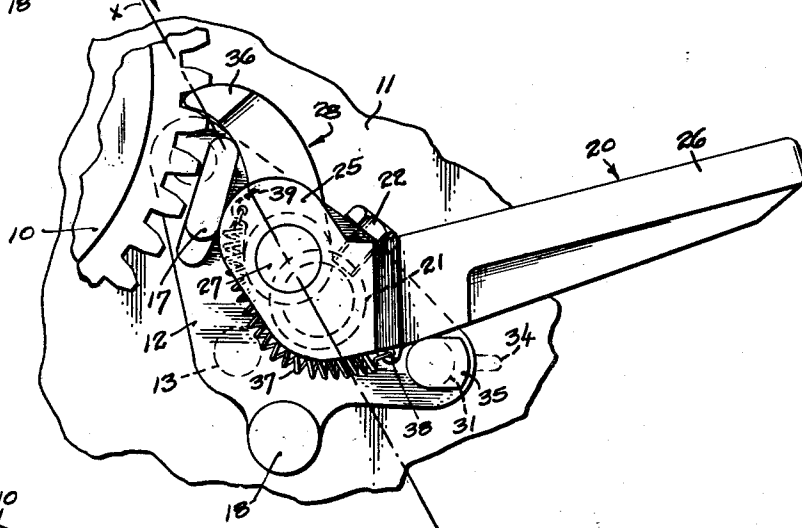


Fig. 2

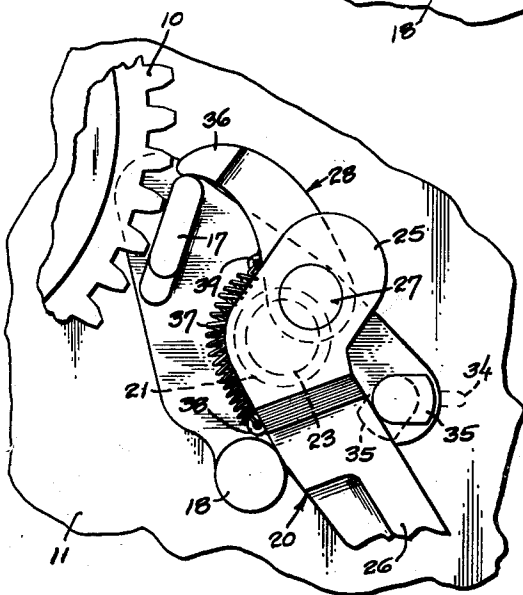


Fig. 3

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QUICK-RELEASE POSITIVE HOLD FOR USE WITH A TOWING WINCH HAVING A PIVOTED DOG

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This invention relates to a quick-release dog and one more especially which is intended to be used with a towing winch. In a towing winch the turning moment imposed by the tow upon a gear wheel associated with the tow-cable's winding drum causes binding between the teeth of said wheel and a pawl employed as a holding complement thereof, making it difficult to disengage the pawl from the gear wheel in situations calling for the tug to drop its tow.

For its general object the present invention aims to provide a perfected dog mechanism which may be released with ease and expedition while providing utmost dependability in the performance of its intended holding function.

Particular objects and advantages will, with the foregoing, appear and be understood in the course of the following description and claims.

The invention consists in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawing:

FIGURE 1 is a fragmentary top plan view illustrating a quick-release mechanism constructed to embody the preferred teachings of the present invention. Shown fragmentarily in the view, in horizontal section, is a gear case on which the dog mechanism is mounted.

FIG. 2 is a fragmentary front elevational view of said dog mechanism with the dog shown as occupying an engaged position; and

FIG. 3 is a fragmentary front elevational view thereof with the dog shown disengaged.

With reference being had to said drawing, the numeral 10 denotes a unidirectionally loaded exposed gear wheel, and 11 designates a rigid member laterally spaced therefrom and serving as a mounting for the quick-release dog of the present invention. The gear wheel is or may be rigid with the winding drum of a towing winch, and the mounting member is or may constitute one wall of a case in which reduction gearing for the winch is housed.

A bracket 12 having a thickness somewhat less than the width of said space which occurs between the mounting member and the gear wheel is secured to the mounting member, as by bolts 13, and occupies a position upon the outside of said mounting member, more or less radial to the gear wheel with only a nose portion projecting inwardly beyond the perimeter of the latter. The bracket has a through-bore 14 located more or less central to its length with the axis paralleling the rotary axis of the gear wheel and has its outer end made furcate to provide separated arms 15. These fork arms are drilled on a coinciding axis, and there is provided in the mounting wall 11 a hole 16 registering with said drill hole. Two lugs, as 17 and 18, project laterally from the bracket beyond the exposed face thereof. The lug 17 lies between the bore 14 and the gear wheel in a position giving little more than clearance for the gear wheel. The lug 18 is spaced below the bore.

A lever 20 of the first order is fulcrumed by a gudgeon pin 21 journaled in said bore 14 and is held against endwise displacement by the engagement of a cap screw 22 in a peripheral groove 23 of the pin. The inner force arm 25 of the lever has a length considerably shorter than the outer power arm 26, is made furcate,

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and has the two forks of such force arm drilled on a coinciding axis to receive the pivot pin 27 for a dog 28.

The lever admits to reciprocal rocker motion between active and inactive limits of travel which place the power arm 26 in an elevated and a lowered position, respectively. Lug 17 prescribes the upper said limit of travel, serving as a stop against which the force arm 25 bears, and lug 18 prescribes the lower said limit of travel, being engaged by the power arm 26. Normally occupying a position in the path travelled by the power arm, the head end 30 of a plunger pin 31 serves as a lock for releasably holding the power arm in either its raised or its lowered position. Said pin is received for rotary and slide motion in the drill holes of the bracket's outer arms 15 and is yieldingly urged in an outward direction by the force exerted from a compression spring 32 upon a snap ring 33 carried by the pin. A cross-bar 34 extending diametrically through the pin at the rear end thereof permits the plunger pin to be turned or retracted at will. The purpose in turning the plunger pin is to enable an operator to set the pin in a retracted inactive position by the expedient of lodging a lateral tab prolongation 35 of the pin's head end against the inner face of the lever's power arm 26, as shown by broken lines in FIG. 3.

When the lever occupies its active raised position, bearing by its arm 25 against the stop lug 17, the free end 36 of the dog 28 enters between adjacent teeth of the gear wheel. When so located a force line x passing through the axis of the dog's pivot pin 27 to reflect a force moment tending to turn the gear wheel in a clockwise direction as viewed in FIG. 2, lies to the left side of the level fulcrum. Translated into the force moment of the lever, this is counterclockwise so that thrust is from the lever to the stop lug 17 rather than to the locking pin.

To disengage the dog, the operator retracts the plunger pin, gives the same a counterclockwise twist to bring the tab 35 against the inner face of the lever, and the power arm 26 of the lever is struck a sharp downward blow with a mallet or hammer. Only very slight motion of the lever arm is required to shift the force line x from the position in which it is shown in FIG. 2 to the opposite side of the fulcrum, whereupon the release action becomes instantaneous, the load imposed upon the gear wheel coming into play as the responsible force. The dog, sliding over the top of the stop lug 17, is held against downward motion and is thus forcefully retracted from between the teeth of the gear wheel by the force moment of the gear wheel, making the retraction movement a self-energizing action. The lever moves to the stop position shown in FIG. 3. As the lever reaches this travel limit the plunger pin springs automatically into locking position above the lever. An extension spring 37 stretched over the shoulder of the lever, extending from an ear 38 formed upon the lever to an ear 39 formed upon the dog, yieldingly urges the dog toward the gear wheel.

To engage the dog, the operator retracts the plunger pin, gives the same a clockwise twist to bring the tab 35 against the inner face of the lever, and raises the power arm of the lever until the force arm is brought to bear against the upper stop lug 17, whereupon the freed plunger pin springs automatically into the locking position in which it is shown in FIG. 2. In course of this upward travel the dog rides over the crown of the lug into engagement with the gear wheel. So engaged, the dog ratchets freely over the teeth of the gear wheel as the latter turns in a counterclockwise direction incident to taking in the tow-line.

It will be noted (see FIG. 2) that the force imposed by the gear wheel upon the dog and passed by the dog into the lever presses said lever against the upper stop, the plunger pin, which functions as a safety lock, being free of any load.

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It should perhaps be here noted that the quick-release dog of the present invention may be used to advantage with substantially any winch applied to an operation in which a quick release of a tensioned cable is desirable. "Barge connector" winches place their cables under extreme tension and peculiarly lend themselves to use of the present invention. "Anchor" winches are a further example. The term "towing" as used herein to describe a winch to which the dog is applied is used in a generic sense and is intended to include within its meaning any winch to which the invention may be advantageously applied.

The invention is believed to be clearly understood from the foregoing detailed description of my now-preferred illustrated embodiment. Changes in the details of construction may be resorted to without departing from the spirit of the invention and it is accordingly my intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. In a winch having a winding drum for a tow-cable and imposing a turning moment from said drum to a gear wheel in response to load-tensioning of the tow-cable, in combination with the gear wheel, and a rigid mounting member, a lever of the first order fulcrumed from said mounting member for rocker movement about an axis spaced beyond the perimeter of the gear wheel and paralleling the axis of rotation of the latter, the force arm and the power arm of said lever extending the former inwardly toward and the latter outwardly from the gear wheel, a holding pawl for the gear wheel pivoted directly to said force arm for pivotal motion about an axis offset from and paralleling the rocker axis of the lever, a stationary shoulder occupying an intervening position between the lever and the gear wheel, and stationary means engaged by the lever limiting the rocker motion of the lever to an approximate 90° turn in one direction of which the force arm swings toward the gear wheel and slides the pawl over said shoulder into ratcheting engagement with the teeth of the gear wheel and in the other direction of which the force arm moves from the gear wheel and slides the pawl over said shoulder out of engagement with the teeth of the gear wheel, said pivot axis of the pawl being so located that a force line reflecting a tow-loaded turning moment of the gear wheel and projected from the dogging end of the pawl through said pivot axis is caused, in course of moving the lever so as to engage the pawl, to traverse the rocker axis of the lever moving from a position to the outside to a position spaced only a moderate distance to the inside of said rocker axis, said lever being movable in its opposite direction of rocker travel, so as to free the gear wheel from the pawl, by sharply striking the power arm of the lever with a mallet.

2. Structure according to claim 1 having means releasable at will and acting automatically upon movement of the lever to either end limit of travel to positively lock the lever against return movement.

3. In a winch having a winding drum for a tow-cable and imposing a turning moment from said drum to a gear wheel in response to load-tensioning of the tow-cable, in combination with the gear wheel, and a rigid mounting member, a lever of the first order fulcrumed from said mounting member for rocker movement about an axis spaced beyond the perimeter of the gear wheel and paralleling the axis of rotation of the latter, the force arm and the power arm of said lever extending the former inwardly toward and the latter outwardly from the gear wheel, a holding pawl for the gear wheel pivoted directly to said force arm for pivotal motion about an axis offset from and paralleling the rocker axis of the lever, a stationary shoulder occupying an intervening position between the lever and the gear wheel, the dogging end of the pawl sliding on said shoulder both into engagement with the gear wheel responsive to movement of the lever in one

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direction of swing travel and out of engagement with the gear wheel responsive to movement of the lever in the other direction of swing travel, and a stationary stop engaged by the lever in said wheel-engaging movement of the pawl, said pivot axis of the pawl being so located that a force line reflecting a tow-loaded turning moment of the gear wheel and projected from the dogging end of the pawl through said pivot axis is caused, in course of moving the lever so as to engage the pawl, to traverse the rocker axis of the lever moving from a position to the outside to a position spaced only a moderate distance to the inside of said rocker axis, said lever being movable in its opposite direction of rocker travel, so as to free the gear wheel from the pawl, by sharply striking the power arm of the lever with a mallet.

4. Structure according to claim 3 having a plunger pin spring-urged into a position whereat the same catches automatically behind the power arm of the lever both when the latter moves to the active and the inactive extreme of its swing movement so as to lock the lever against a return swing from said extreme, and means for retracting said plunger pin against the imposed force of the spring to disengage the same from the lever.

5. Structure according to claim 4 in which the pin is revolvably mounted and presents a tab projecting laterally from the extremity of its catch portion arranged by the act of turning the pin coincident with said retraction to be lodged against a side face of the power arm and thus held retracted until the pin clears the opposite edge of the lever's power arm in the course of moving the lever to its other extreme of swing travel.

6. In a winch having a winding drum for a tow-cable and imposing a turning moment from said drum to a gear wheel in response to load-tensioning of the tow-cable, in combination with the gear wheel, and a rigid mounting member, a lever of the first order fulcrumed from said mounting member for rocker movement about an axis spaced beyond the perimeter of the gear wheel and paralleling the axis of rotation of the latter, the force arm and the power arm of the lever extending the former inwardly toward and the latter outwardly from the gear wheel, a holding pawl for the gear wheel directly pivotally attached to said force arm for pivotal motion about an axis offset from and paralleling the rocker axis of the lever, the dogging end of the pawl moving into engagement with the gear wheel responsive to movement of the lever in one direction of swing travel and out of engagement with the gear wheel responsive to movement of the lever in the other direction of swing travel, a positive stop engaged by the lever in said wheel-engaging movement of the pawl, said pivot axis of the pawl being so located that a force line reflecting a tow-loaded turning moment of the gear wheel and projected from the dogging end of the pawl through said pivot axis is caused, in course of moving the lever so as to engage the pawl, to traverse the rocker axis of the lever moving from a position to the outside to a position spaced only a moderate distance to the inside of said rocker axis, said lever being movable in its opposite direction of rocker travel, so as to free the gear wheel from the pawl, by sharply striking the power arm of the lever with a mallet, and means releasable at will and acting automatically when the lever reaches a predetermined position in course of withdrawing the pawl from the wheel for positively locking the lever against return travel.

7. Structure according to claim 3, the mounting member providing a cross-bore for one end of a rocker shaft having its other end projecting from the front side of the member and producing the fulcrum for the lever, said member being arranged to bear by its back face against the inner face of a frame plate for the winch and being drilled and tapped from said back side to accommodate cap screws for securing the mounting member to the plate.

8. Structure according to claim 3 characterized in that the distance between the pivot axis of the pawl and the

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rocker axis of the lever is only a small fraction of the length of the lever's power arm.

9. Structure according to claim 3 characterized in that the surface of the pawl which slides on said shoulder is so arched that the referred-to force line lies to the inside of the shoulder when the pawl is engaged with the gear wheel.

10. In a winch having a winding drum for a tow-cable and imposing a turning moment from said drum to a gear wheel in response to load-tensioning of the tow-cable, in combination with the gear wheel, and a rigid mounting member, a lever of the first order fulcrumed from said mounting member for rocker movement about an axis spaced beyond the perimeter of the gear wheel and paralleling the axis of rotation of the latter, the force arm and the power arm of said lever extending the former inwardly toward and the latter outwardly from the gear wheel, a holding pawl for the gear wheel pivoted directly to said force arm for pivotal motion about an axis offset from and paralleling the rocker axis of the lever, a stationary shoulder occupying an intervening position between the lever and the gear wheel, the dogging end of the pawl sliding on said shoulder both into engagement with the gear wheel responsive to movement of the lever in one direction of swing travel and out of engagement with the gear wheel responsive to movement of the lever

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in the other direction of swing travel, and a stop engaged by the lever in said wheel-engaging movement of the pawl prescribing the limit of arcuate travel to which the pivot axis of the pawl can move in its swing about the rocker axis of the lever, said stop and the pivot axis of the pawl being so located that a force line reflecting a tow-loaded turning moment of the gear wheel and projected from the dogging end of the pawl through said pivot axis is caused, in course of moving the lever so as to engage the pawl, to traverse the rocker axis of the lever moving from a position to the outside to a position spaced only a moderate distance to the inside of said rocker axis, said lever being movable in its opposite direction of rocker travel, so as to free the gear wheel from the pawl, by sharply striking the power arm of the lever with a mallet.

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