May 24, 1955 R. W. WATERSTREET 2,709,068

LITTER HANDLING MECHANISM

Filed March 1, 1950 2 Sheets-Sheet 1

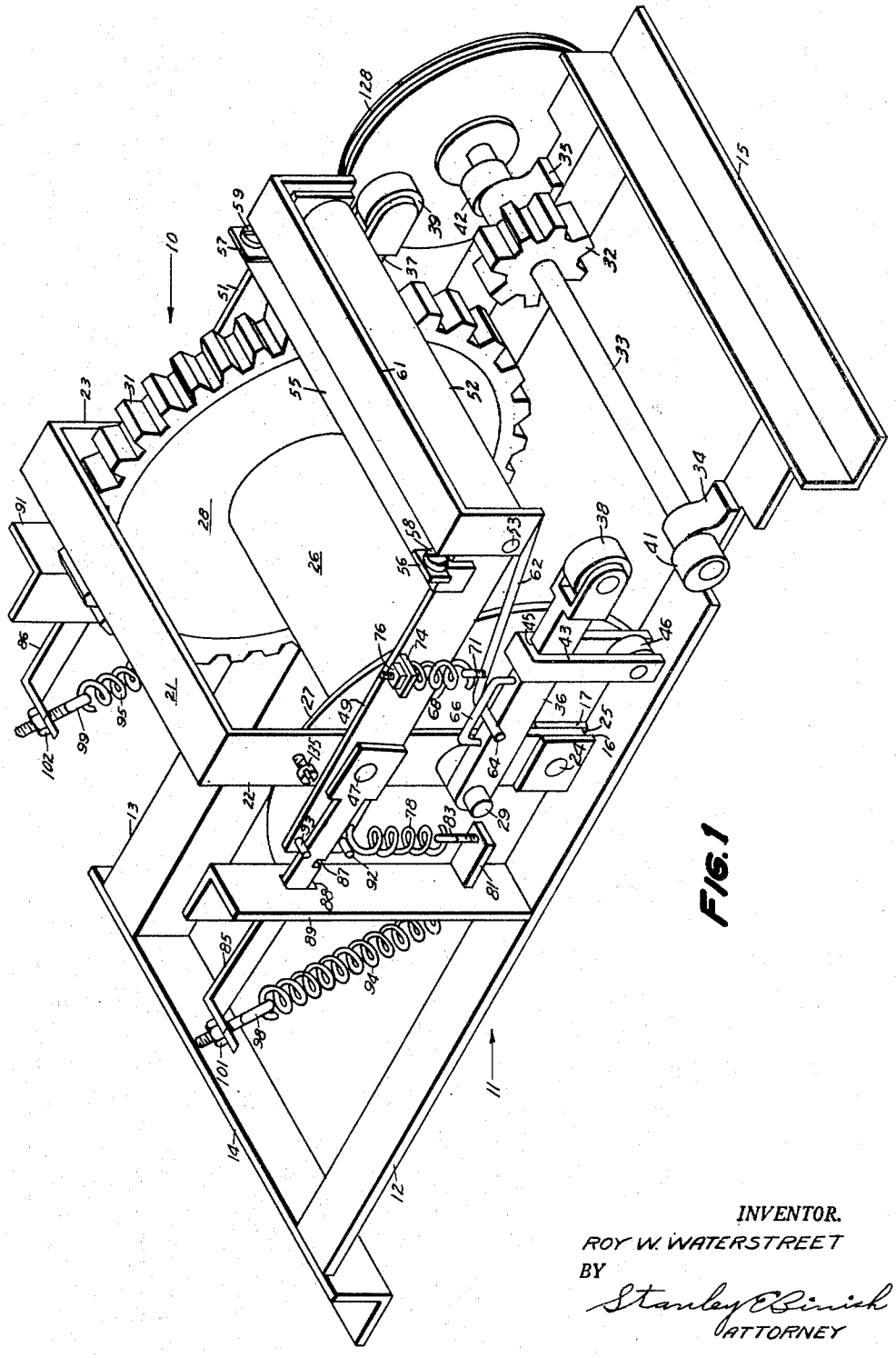


FIG. 1

INVENTOR.
ROY W. WATERSTREET
BY
Stanley C. Birnick
ATTORNEY

May 24, 1955 R. W. WATERSTREET 2,709,068

LITTER HANDLING MECHANISM

Filed March 1, 1950 2 Sheets-Sheet 2

FIG. 3

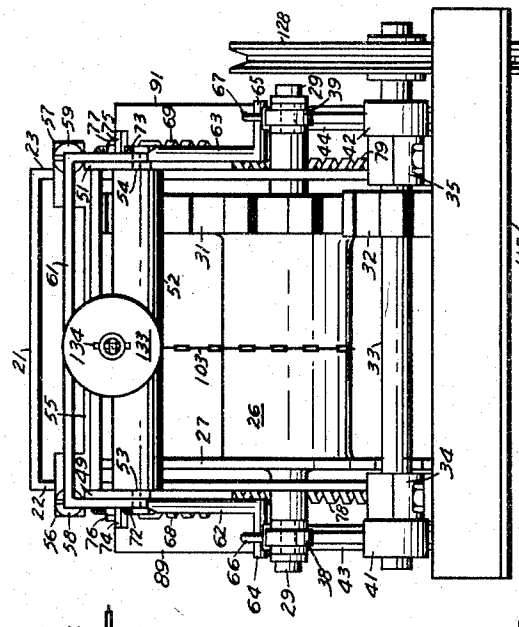


FIG. 2

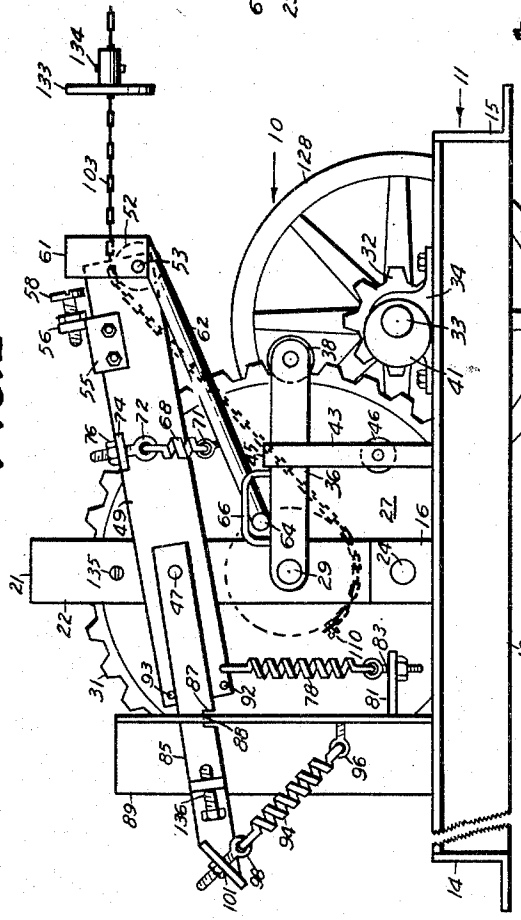
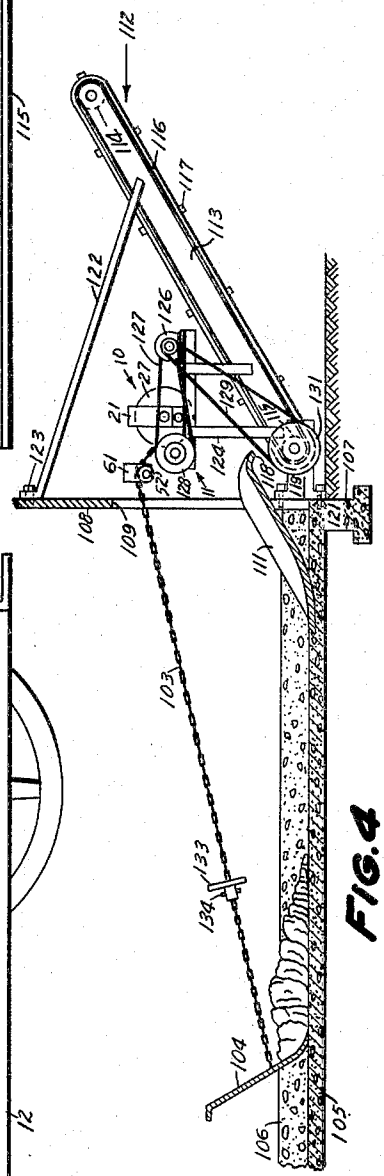


FIG. 4



INVENTOR.
ROY W. WATERSTREET
BY
Stanley C. Binish
ATTORNEY

United States Patent Office 2,709,068 Patented May 24, 1955



2,709,068

# LITTER HANDLING MECHANISM

Roy W. Waterstreet, Kewaunee, Wis.

Application March 1, 1950, Serial No. 147,077

11 Claims. (Cl. 254—173)

This invention relates generally to winches and particularly to a winch for use in dairy barns where litter gutters are provided. It also relates to a novel barn cleaning system.

It is an object of my invention to provide a winch which may at all times be under the control of the operator, that is, in which the stroke or range of the movement of a litter scoop, drawn by said winch, may be varied at the will of the operator.

It is another object of my invention to provide a winch that is controlled by means including the working chain or cable.

It is still another object of my invention to provide a winch that is operatively responsive to a pull or jerk on the working chain or cable.

It is yet another object of my invention to provide a winch including a displaceable winding drum and gear assembly operative to be engaged with and disengaged from a driving pinion gear.

It is a further object of my invention to provide a winch comprising a winding drum and driving pinion that are relatively displaceable and engageable.

It is still a further object of my invention to provide a winch comprising a displaceable winding drum, operative to engage with driving means, including a control lug on the working cable and linkage means associated with the drum operative to disengage the drum from the driving means and reset the winch preparatory for another cycle of operations.

It is yet a further object of my invention to provide a barn cleaning apparatus embodying an ascending ramp disposed between the gutter and the conveyor, thereby eliminating a pit to receive the lower receiving end of the conveyor.

It is another object of my invention to provide a barn cleaning apparatus wherein a winch is mounted on the conveyor; and wherein the driving means, which are also mounted on the conveyor, drive both the winch and the conveyor.

It is a final object of my invention to provide a simple, durable, inexpensive, and economical power operated winch, and a barn cleaning system, which have no fine intricate parts, and in which replacements or repairs can be cheaply and readily made.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

Fig. 1 shows an isometric view of a preferred embodiment;

Fig. 2 shows a side elevational view of the apparatus shown in Fig. 1;

Fig. 3 shows a front elevational view of the apparatus shown in Fig. 1; and

Fig. 4 is a fragmentary part sectional view of a dairy barn showing my improved litter handling system, the section being taken through a gutter.



Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown a winch generally indicated at **10**, and a fabricated base frame generally indicated at **11**, comprising a pair of spaced longitudinal angle irons **12** and **13**, and a pair of spaced transverse angle irons **14** and **15** secured to said longitudinal members as by welding, to form the square base frame **11**.

Intermediate the ends of said frame are provided companion pairs of short upstanding spaced brackets **16—17**, and **18—19** (not shown), mounted on each of the side angle iron members. Said spaced bracket elements are centrally apertured, oppositely aligned, and fixed to the side frame members as by welding.

A U-shaped drum frame member **21**, having downwardly projecting legs **22** and **23** received between said spaced brackets **16—17** and **18—19**, is pivotally connected thereto by means of pins **24**. The ends of the legs **22** and **23** are spaced from the tops of the side angle irons **12** and **13** as at **25** to allow the U-shaped member to oscillate fore and aft through a small predetermined angle to be hereinafter described.

Displaceable winding means, such as a spool-like winding drum **26** having side flanges **27** and **28**, is rotatably mounted on a shaft **29** journalled in the legs of the drum frame member **21**.

Mounted around flange **28**, and welded thereto, is a spur gear **31** engageable with a driving pinion gear **32** mounted rotatively-rigid on drive shaft **33** journalled in bearing blocks **34** and **35** which are secured to the base or by bolts or any other means. In the normal and inoperative position, the spur gear **31** and the pinion gear **32** are not engaged. They become operatively related when the frame **21** and its associated drum gear **31** are angularly displaced forwardly, pivoting about pin **24**, sufficiently to engage drum gear **31** with pinion **32**. The angle of a displacement is determined by the movement necessary to have gear **31** enmesh with pinion gear **32**.

Reset means comprising a pair of push rods **36** and **37** have one end rotatably mounted on the ends of drum shaft **29**, the other ends being provided with cam followers **38** and **39** which are engageable with eccentric disc cams **41** and **42** mounted rotatively-rigid on drive shaft **33** which also functions as a cam shaft. Said push rods oscillate between and are guided by the legs of elongated U-shaped elements **43** and **44**. The upper limit of movement of the push rods known as the normal inoperative position is determined by the closed ends **45** of said elongated U-shaped elements, and the lower limit of travel known as the operative position is determined by stop rollers **46** mounted across the legs of said U-shaped elements. The stop rollers **46** are disposed so that when the push rods **36** and **37** rest on the rollers **46**, the cam followers **38** and **39** are engageable with cams **41** and **42**, respectively. Securement of the elongated U-shaped elements is acomplished by welding the ends of the legs to the tops of the base side members, or by any conventional detachable means such as screws or bolts.

A pair of pins **47**, and **48** (not shown), fixedly attached to legs **22** and **23** of the drum frame **21**, pivotally support a pair of rocker arms **49** and **51** which support thereacross a roller **52** journalled therein as by journals **53** and **54**. Brace **55**, welded or bolted across the arms **49** and **51**, holds said arms in spaced relation. Said brace is provided with ears **56** and **57** having adjustable stop screws **58** and **59** that limit the backward travel of a shallow U-shaped trip bar **61** pivotally mounted on journals **53** and **54** and disposed in a spaced relation above said roller. In its normal and inoperative position the

trip bar is spaced forwardly from said stop screws. The trip bar and the following associated mechanism function as control means for disposing the push rod into engagement with said cam. A pair of extension arms **62** and **63**, welded to the legs of said trip bar **61**, have outwardly projecting end portions **64** and **65** that slidingly engage with push rods **36** and **37**, respectively. Lift bars **66** and **67** are secured to said push rods and are disposed over the end portions of said extension arms to be liftably engaged therewith. The push rods and their associated cam followers are normally held in an inoperative position away from the cooperating eccentric disc cams **41** and **42** through means of the tension springs **68** and **69** acting through the extension arms and the lift bars. One end of the tension springs is connected to corresponding eye-bolts **71** threadedly engaged with each of the extension arms **62** and **63**, and the other end is connected to eye-bolts **72** and **73** passing through an aperture in lugs **74** and **75** and threadedly engaging with adjustable nuts **76** and **77**, respectively. The lugs **74** and **75** are welded to the rocker arms, respectively.

Tension springs **78** and **79** connected to the rearward ends of rocker arms **49** and **51**, and to corresponding fixed lugs **81**, and **82** (not shown), through means of adjustable eye-bolts **83**, and **84** (not shown), respectively, bias and counterbalance the forward ends of said rocker arms, upwardly, stopped by the abutment of the associated push rods against closed ends **45** of elements **43** and **44**.

Latch members **85** and **86**, pivotally mounted on pins **47** and **48**, are each provided with a notch **87** that engages with a slot edge **88** provided on each of the upright members **89** and **91**. A pair of spaced pins **92** and **93** are fixed in the ends of the rocker arms, operative to transmit a latching and unlatching force from said rocker arms to said latch members **85** and **86**. Springs **94** and **95**, disposed at an acute angle to the longitudinal axes of latches **85** and **86**, have one end connected to eye-bolts **96**, and **97** (not shown), that are threadedly engaged to upright members **89** and **91**, and the other end connected to eye-bolts **98** and **99** secured to the ends of said latches through means of adjusting nuts **101** and **102**, respectively. The spring is disposed at an acute angle to the latches to provide horizontal and vertical components of force to act on said latch. The horizontal component actuates the latches forwardly when they are unlatched; and the vertical component biases the latches downwardly, operative to engage the notches with the slot edges when they are in registry.

A cable such as a rope, chain, belt, or any other flexible hauling or hoisting means, or the like, a chain **103** being preferred in the present embodiment, has one end trained around and secured to the winding drum **26** as by a screw **110**, and passes over roller **52** and thence outwardly and remotely to a scoop metallic **104**, see Fig. 4, connected to the end thereof as by welding.

Fig. 4 is a fragmentary part sectional view of a dairy barn showing my improvd litter handling system, the section being taken through one of the gutters. A gutter, having a bottom **105** and sides **106**, is provided in the dairy barn constructed with a foundation **107** and an end wall **108**. In the wall, at the end of the trough, a discharge opening **109**, is provided. A small ramp member **111** communicates with the end portion of the gutter and discharges the litter through the opening **109** and onto the receiving end of an elevating conveyor generally indicated at **112**. The ramp, having side portions, also serves as an extension of the gutter.

Conveyor **112** comprises spaced side frame members **113** supporting rollers **114** and **115** journalled in the ends thereof. An endless belt **116** is provided around the rollers, said belt having fixed cleats **117** on the face thereof. The lower or receiving end of the conveyor is disposed under the discharge lip **118** of the ramp **111**, and is carried by a pair of spaced brackets **119** having bearings for receiving the roller shaft ends therein. The brackets are mounted to the dairy barn foundation **107**, and the end wall **108**, as by bolts **121**. The upper or discharge end of the conveyor is supported by a pair of braces **122** welded to the conveyor frame sides and secured to the barn and wall **108** by bolts **123**.

The winch base **11** is mounted on the conveyor by means of legs **124** welded to said base and said conveyor, and it supports the winch, diagrammatically shown, and generally indicated at **10**, Fig. 4.

A motor **126**, also mounted on said base **11**, drives the winch through means of a belt **127** and a sheave **128** mounted rotatively-rigid on said drive shaft **33**; said motor also drives the conveyor belt **116** through means of a belt **129** and a sheave **131** mounted rotatively-rigid on the shaft of roller **115**.

A control lug **133** comprising a flanged sleeve receives the chain therethrough and the chain is secured therein by means of a pin **134**. The control lug is of a dimensional size so as not to pass between the roller **52** and the trip bar **61**, but will contact the trip bar and pivot it counterclockwise around journals **53** and **54** as the chain is being drawn around the winding drum. The control lug is disposed along the length of the chain so that it will contact the trip bar at the time the scoop has reached a preselected point, usually when the scoop has discharged the litter onto the conveyor.

*Operation.*—The normal non-operating position of the winch is as shown in Fig. 2, the winch gear **31** being latched in a non-engaging position away from the driving pinion gear **32** by means of latch member **85** having its notch **87** in interlocked engagement with slot edge **88**. Also, springs **78** and **79** overbalance the forward portions of rocker arms **49** and **51** and thereby dispose the associated trip bar **61** and push rods **36** and **37** into their normally inoperative position, ready for actuation.

When the motor switch is closed the drive shaft **33** and its pinion will be rotatively driven by motor **126** through means of belt **127** and sheave **128**.

At this time the conveyor **112** will also be set in motion by said motor through means of belt **129** and sheave **131**.

Thus the motor furnishes the operating power for both the winch and the conveyor, both of which are set in motion at the outset of a cycle of operation.

Assume now that the drum is wound with a considerable number of turns of the working chain or cable, resulting from the scoop having been hauled or drawn in from a previous cycle of operation.

Since approximately a ten foot section of gutter litter constitutes a load, the operator pulls back on the cable and places the scoop **104** in the gutter in the rear of the first ten foot section of the litter.

During the manual pulling back of the scoop, the winding drum rotates freely, responsive to said pull, and pays out the chain. A small friction brake, consisting of a screw **135** threadedly engaged with frame **21** and having its end bearing against drum flange **27**, provides means for preventing over-run and back-lash that would result in the fouling of the chain or cable if not provided for.

The placement of the scoop behind a ten foot section of the litter is accompanied with a hard pull, or a jerk or a snap of the cable, that reacts against supporting roller **52**, thrusting downwardly said roller. As a result of said thrust and resulting movement, the supporting rocker arms **49** and **51** are pivoted clockwise about pins **47** and **48**, against the tension of springs **78** and **79**, respectively.

Henceforth, the operation of the winch will be described in relation to the component members on one side only, it being obvious that the corresponding members on the opposite side of the winch act similarly and in unison therewith.

The lost motion travel between pin **92** and the lower edge of latch **85**, allows the rocker arm **49** to accelerate pivotally, whereafter it violently strikes and raises the latch **85**, thereby releasing it from its interlocked engage-

ment with upright member **89**, and allowing the winding drum assembly to pivot forwardly about pivot **24**, urged by the horizontal component of the tension of spring **94**, and resulting in the engagement and enmeshment of drum gear **31** with pinion gear **32**.

Fig. 2 shows the initial latched status of the winch; and the isometric Fig. 1 shows the status of the winch after the unlatching step but just before the forwardly pivoting drum assembly and drum gear **31** has become enmeshed with the driving pinion gear **32**. When the enmeshment of the gears is complete, the rocker arm will be disposed substantially horizontally, and further pivotal movement of the drum assembly is arrested by the abutment of the mesh adjusting screw **136** against upright member **89**.

At the first indication of gear engagement, the drum gear **31** immediately commences to rotate because the driving pinion gear is continually rotating, its movement having been started with the starting of motor **126**.

As the drum gear rotates, its attached winding drum likewise rotates, resulting in the chain being wound around the drum and the consequential pulling forward of the scoop and its load of litter.

This forward action continues until the litter is pulled up the ramp **111** and is discharged therefrom onto the moving elevator belt **116** which carries said litter to the upper end of the elevator and discharges it overboard into a litter hauling vehicle therebelow.

At the instant the last of the litter approaches the top of the ramp **111**, the stop control element **133** engages the trip bar **61** and pivots it backwardly about pin **53**, resulting in a downward pivotal displacement of push rod **36**, through means of extension arm **62**. Consequently, the cam follower **38**, on the end of push rod **36**, engages with eccentric disc cam **41** and is thrust backwardly thereby, resulting in the drum assembly being pivoted backwardly about pivot **24** and the ensuing disengagement of drum gear **31** from the driving pinion gear **32**. The rotation of the winding drum immediately stops; and the forward movement of scoop **104** thereby terminates.

Said backward displacement of the drum assembly causes the latch to slide on the slot edge **88** until the latch notch **87** engages and interlocks therewith, being urged into engagement by the tension of spring **94**, and also by spring **78** acting through pin **93**, thus restoring and resetting the winch to its initial inoperative status.

This cycle of operations is repeated for any litter loads remaining in the gutter.

The purpose of this invention is to provide a winch that is operatively responsive to a jerk on the working chain or cable; to provide a winch having a pivotally displaceable winding drum assembly that is engageable with a driving pinion; to provide a winch having a pivotally displaceable winding drum assembly that is unlatchably responsive to a jerk on the working cable; to provide a winch that can be disengaged from its driving means and reset to its initial status through means of a control lug on the working cable and linkage actuated by said driving means; to provide a bar cleaning apparatus having a winch mounted on an elevating conveyor; to provide a short ramp communicating from the litter gutter to the conveyor; and to provide a barn cleaning apparatus wherein a winch is mounted on a conveyor, and wherein a driving motor is also mounted on said conveyor for driving both the conveyor and the winch.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed and desired to be protected by Letters Patent of the United States is:

1. A winch, comprising: a base; a drive shaft rotatably mounted on said base; a pair of spaced cams mounted rotatively-rigid on said shaft; a pinion mounted rotatively-rigid on said shaft; a frame having a pair of spaced legs pivotally mounted on said base; a winding drum rotatably mounted on said spaced legs; a gear mounted rotatively-rigid with said drum, said gear being engageable with said pinion, and normally spaced therefrom; a pair of rocker arms pivotally mounted on said legs, respectively, said rocker arms extending rearwardly and forwardly of its pivot point; a roller rotatably supported by said rocker arms, said roller being disposed upwardly of said drum; a trip bar pivotally supported by said rocker arms and disposed in spaced relation to said roller; a pair of push rods pivotally mounted on said legs, respectively, the free ends of said push rods being engageable with said cams, and normally spaced therefrom; a pair of members having one end fixed to said trip bar and the other end slideably engaged with said push rods, respectively, operative to communicate a pivotal movement from said trip bar to said push rods; lift bars on said push rods, respectively, disposed to be liftably engaged by said members; a pair of tension springs connecting said rocker arms and said members, respectively, operative to yieldably hold said associated trip bar and push rods in an inoperative position; containing means on said base for limiting the pivotal movements of said push rods; a second pair of tension springs connecting said base and the rearward portions of said rocker arms, respectively, operative to counterbalance the forward portions of said rocker arms and their associated assemblages; a pair of latch means on said frame controlled by a pivotal movement of said rocker arms, respectively, for detachably holding the winding drum and its associated gear in an inoperative position relative to the driving pinion; spring means acting on said detachable latch for urging said associated drum gear forwardly and into engagement with the driving pinion; a chain trained around and having one end attached to said drum and the other end trained over said roller; and a control lug on said chain for engaging with and actuating said trip bar.

2. A winch, comprising: a drive shaft having a pinion and cam means mounted rotatively-rigid thereon; a pivotally displaceable winding drum; a gear mounted rotatively-rigid with said drum, said gear being disposed to be engageable with said pinion, and being normally inoperatively spaced therefrom; cable means connected to said drum, its free end being adapted to be connected to a mass; latch means for releasably holding said gear in said normally inoperative position, said latch means supportingly engaging said cable means intermediate its free end and the drum, and being releasably operative by a pull on said cable means; push rod means coactable with said cam for thrusting said gear into its normally inoperative position, and into engagement with said latch means, the push rod being normally inoperatively spaced from said cam; means for controlling the engagement of the push rod and the cam, said means having a normally inoperative position; a stop lug secured to said cable means for actuating said controlling means; and spring urged means for returning the push rod and the controlling means to their normally inoperative position.

3. A winch, comprising: a drive shaft having a pinion thereon; a pivotally displaceable winding drum; a gear mounted rotatively-rigid with said drum, said gear being engageable with said pinion, and being normally inoperatively spaced thereform; cable means connected to said drum, said cable means having a free end adapted to be connected to a litter scoop; a latch means for releasably holding said gear in said normally inoperative position, said cable means being trained over said latch means, and said latch means being releasably responsive to a jerk on said cable means; a cam mounted rotatively-rigid on said shaft; a push rod pivotally associated with said gear and being engageable with said cam, operative to thrust said gear into its normally inoperative position and into engagement with said latch means, the free push

rod end being normally inoperatively spaced from said cam; a stop lug fixed to said cable means; controlling means engaging with said push rod for impelling said push rod into engagement with said cam, actuated by said stop lug, said impelling means having a normally inoperative position; and means for resetting the push rod and said controlling means into their normally inoperative position.

4. A winch, comprising: driving means; an angularly displaceable winding drum driveable by said driving means, said drum being normally inoperatively spaced from said driving means; cable means connected to said drum; releasable means for releasably holding said drum in said normally inoperative spaced position, said releasable means supportingly engaging said cable means, and said releasable means being releasably responsive to a pull on said cable means; a cam driven by said driving means; a push rod associated with said drum and being engageable with said cam, operable to thrust said drum into its normally inoperative position and into engagement with said releasable means; a stop lug fixed to said cable means; control means for disposing said push rod into engagement with said cam, actuated by said stop lug; and means for resetting the push rod and said control means into their normally inoperative position.

5. A winch, comprising: driving means; a displaceable winding drum driveable by said driving means, said drum being normally inoperatively spaced from said driving means; cable means connected to said drum; releasable means for releasably holding said drum in said normally inoperative position, said releasable means supportingly engaging said cable means and being releasably responsive to a pull on said cable means; cam means driven by said driving means; movable means associated with said drum and being engageable with said cam means, operative to reset the drum into its normally inoperative position and into engagement with said releasable means; and a stop lug fixed to said cable means operative to actuate said movable means into engagement with said cam means.

6. A winch, comprising: driving means; displaceable winding means driveable by said driving means, said winding means being normally inoperatively spaced from said driving means; cable means connected to said winding means; control means on said cable means; releasable means for securing said winding means in said normally inoperatively spaced position, said releasable means being associated with said cable means, and being responsive to a pull on said cable means; cam means actuable by said driving means; and movable means associated with said winding means and being engageable with said cam means, operative to engage said winding means with said releasable means, said movable means being actuated by said control means on said cable.

7. A winch, comprising: driving means; a pivotally displaceable winding drum driveable by said driving means, said drum being normally inoperatively spaced from said driving means; cable means connected to said drum, and having its free end adapted to be connected to a movable object; releasable means for releasably holding said drum in said normally inoperatively spaced position, said releasable means supportingly engaging said free end and being releasably operative by a component of a force applied to said cable means; control means mounted on said cable means, and reset means for resetting the drum to its inoperative spaced position and into engagement with said releasable means, said reset means being controlled by said control means.

8. A winch, comprising: driving means; an angularly displaceable winding drum driveable by said driving means, said drum being normally inoperatively spaced from said driving means; cable means connected to said drum, and having its free end adapted to be connected to a mass; releasable means for releasably holding said drum in said normally inoperative position, said releasable means supportingly engaging said cable intermediate its ends and being operably responsive to a pull on said cable means; control means carried by said cable means; and reset means for resetting the drum to its normally inoperative position and into engagement with said releasable means, said reset means being controlled by said control means.

9. A winch, comprising: driving means; a displaceable winding drum driveable by said driving means, said drum being normally inoperatively spaced from said driving means; cable means connected to said drum; releasable means for holding said drum in said spaced inoperative position, said releasable means supportingly engaging said cable means and being releasably responsive to a pull on said cable means; control means carried by said cable means; and reset means for resetting the drum to its inoperative spaced position and into engagement with said releasable means, said reset means being controlled by said control means.

10. A winch, comprising: driving means displaceable winding means driveable by said driving means, said winding means being normally inoperatively spaced from said driving means; cable means connected to said winding means; releasable means for securing said winding means in said inoperative position, said releasable means being associated with said cable means, and being responsive to a pull on said cable means; control means on said cable means; and reset means for resetting the winding means to its normal inoperative position and into engagement with said releasable means, said reset means being controlled by said control means.

11. A winch, comprising: winding means and driving means for said winding means, relatively displaceable and normally inoperatively spaced one from the other; cable means connected to said winding means; releasable means for releasably engaging said winding means and said driving means in said inoperatively spaced relation, said releasable means supportingly engaging said cable means and being releasably responsive to a pull on said cable means; control means carried by said cable means; and reset means for re-establishing said inoperative spaced relation and said releasable engagement, said reset means being controlled by said control means.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 272,422 | Flanigan | Feb. 20, 1883 |
| 435,239 | McLane | Aug. 26, 1890 |
| 945,794 | McCamey et al. | Jan. 11, 1910 |
| 1,019,269 | Miller | Mar. 5, 1912 |
| 1,419,181 | Waern | June 13, 1922 |
| 1,441,216 | Corner | Jan. 9, 1923 |
| 1,482,469 | Jespersen | Feb. 5, 1924 |
| 2,395,238 | Thwaites | Feb. 19, 1946 |
| 2,468,652 | Brassell | Apr. 26, 1949 |