April 20, 1954 R. W. WATERSTREET 2,675,991

LITTER HANDLING APPARATUS

Filed June 21, 1950 4 Sheets-Sheet 1

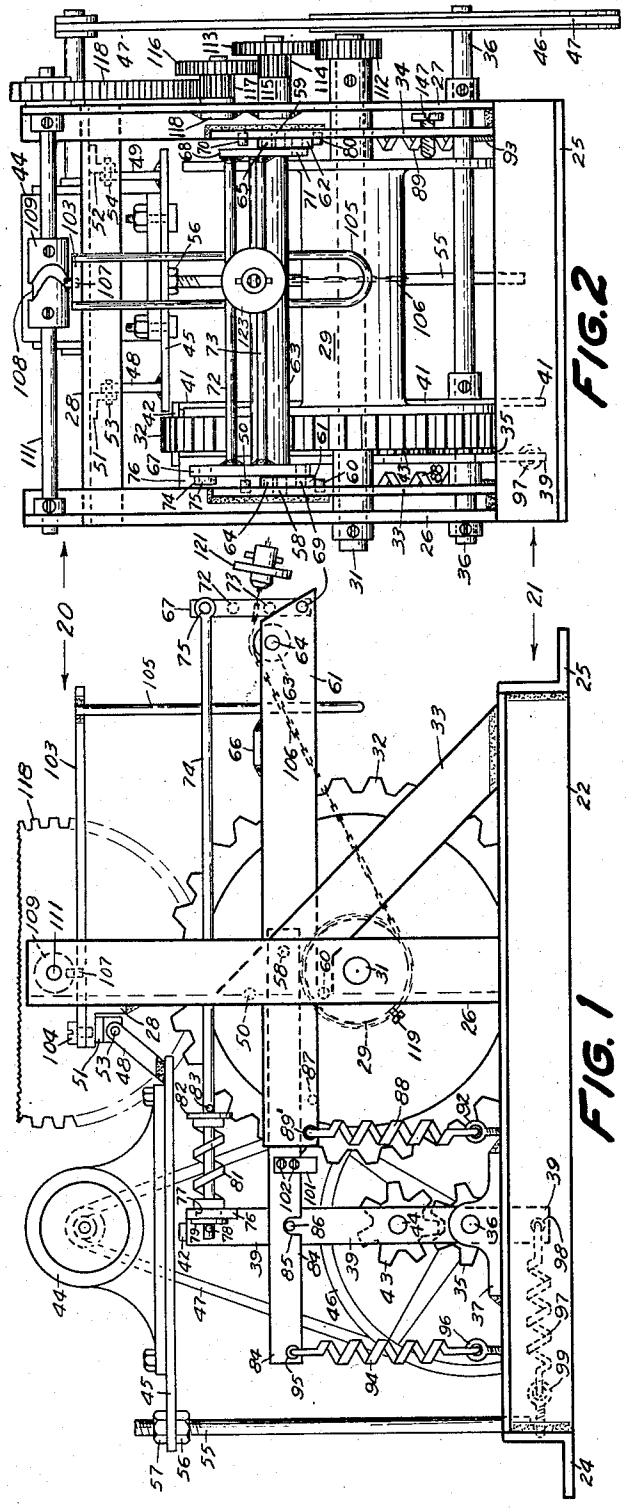


FIG. 2

FIG. 1

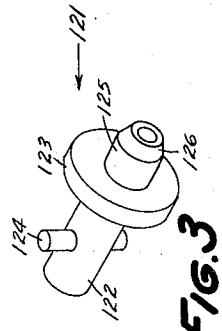


FIG. 3

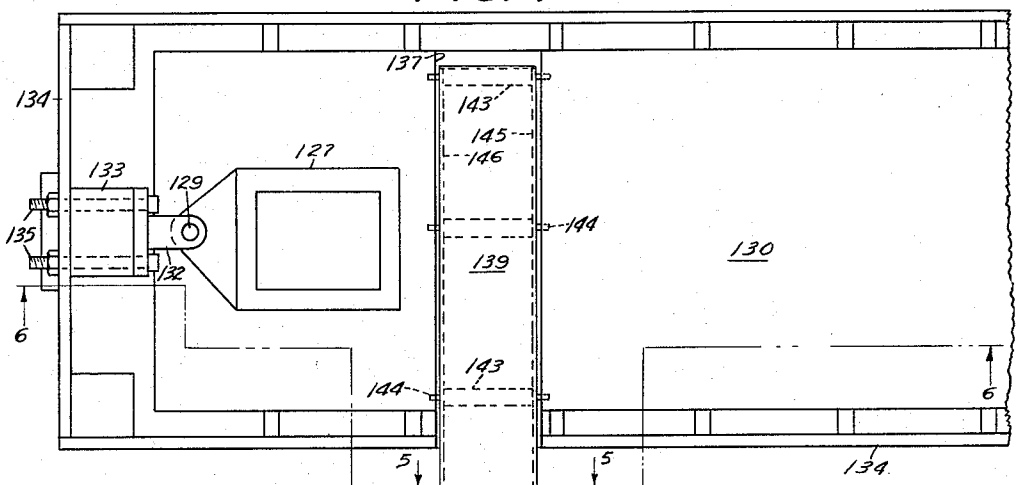
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LITTER HANDLING APPARATUS

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FIG. 4



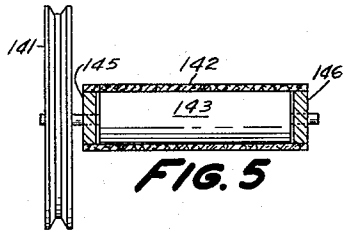


FIG. 5

FIG. 6

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LITTER HANDLING APPARATUS

Filed June 21, 1950 4 Sheets-Sheet 3

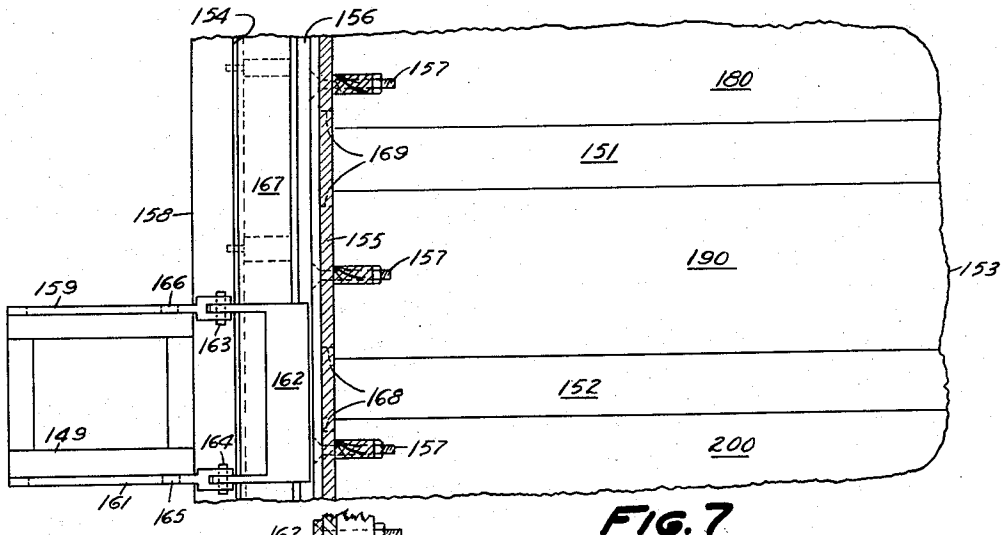


FIG. 7

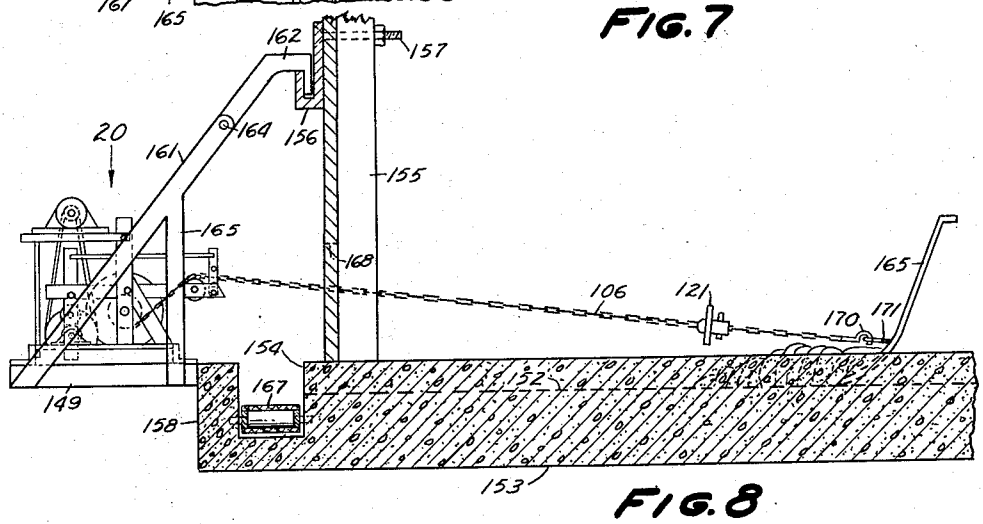


FIG. 8

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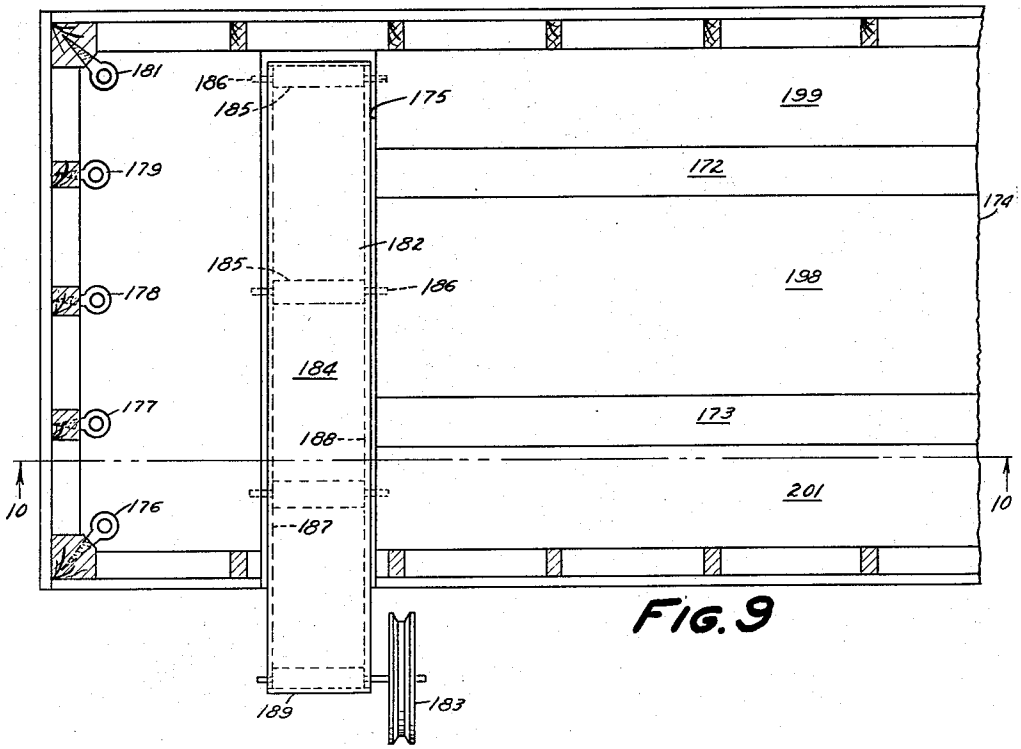


FIG. 9

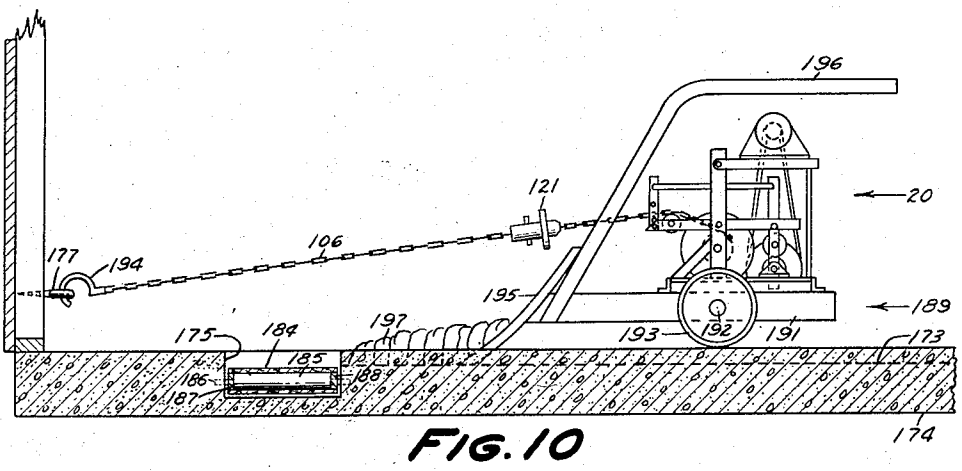


FIG. 10

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UNITED STATES PATENT OFFICE

2,675,991

LITTER HANDLING APPARATUS

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Application June 21, 1950, Serial No. 169,394

7 Claims. (Cl. 254—173)

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This invention relates generally to barn litter removal appliances, and particularly to a winch adapted therefor and to litter removal systems.

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 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 driving pinion gear operative to be engaged with and disengaged from a winding drum and gear assembly.

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

It is another object of my invention to provide a litter removal system for a pen type of enclosure whereby a winch is pivotally mounted at one end of the pen enclosure for freely swinging to the right and left to enable it to draw litter from various portions of the pen.

It is still another object of my invention to provide a litter removal system whereby a winch is carried on a track to enable it to draw litter from a plurality of gutters transverse to said track.

It is yet another object of my invention to provide a litter removal system wherein a winch is mounted on a vehicle which also mounts a scoop, the winch working cable being anchored to any one of a plurality of anchoring means, whereby litter is pushed ahead by the scoop whether it be from a litter gutter or a pen type enclosure.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference

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numerals designate like parts throughout the figures thereof and wherein:

Fig. 1 shows a side elevation of a preferred embodiment of my invention;

Fig. 2 shows a front elevation of the apparatus shown in Fig. 1;

Fig. 3 is an isometric illustration of a control lug carried by the working chain shown in Figs. 1 and 2;

Fig. 4 is a fractional plan view of a pen type enclosure having a pivotal supporting table mounted at one end thereof and a conveyor for the removal of litter therefrom;

Fig. 5 is a sectional view taken along line 5—5 of Fig. 4;

Fig. 6 is a sectional view taken along line 6—6 of Fig. 4 including a winch mounted on the pivotal table and a litter scoop drawn thereby;

Fig. 7 is a fractional plan view of a dairy barn showing a table suspended from a track, and adapted to be disposed in line with a plurality of litter gutters, transverse thereto;

Fig. 8 is a side elevation of the dairy barn arrangement shown in Fig. 7, including a winch mounted on the table and a scoop being drawn thereby;

Fig. 9 is a fractional plan view of a gutter type dairy barn showing eye-screws anchored in the end wall for the anchoring thereto of the working chain of my winch, and a conveyor for the removal of litter; and

Fig. 10 is a sectional view taken along line 10—10 of Fig. 9, including a winch mounted on a vehicle which also mounts a litter scoop, the winch cable being anchored to an anchor eye-screw in line with a barn gutter.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Figs. 1 and 2 a winch generally indicated at 20, mounted on a fabricated base generally indicated at 21.

The base comprises a pair of spaced longitudinal angle irons 22, and 23 (not shown), and a pair of spaced transverse angle irons 24 and 25 secured to said longitudinal members as by welding, to form the rectangular base 21.

Intermediate the ends of said base are provided a pair of companion upstanding angle iron supporting members 26 and 27, each being mounted on a side base angle iron member as by welding. An angle iron brace 28 is welded across the top ends of said upstanding members 26 and 27 to keep them properly spaced and to otherwise provide rigidity to the structure.

Winding means, such as a drum 29, is mounted rotatively-rigid on revolvable shaft 31 which is journalled in the upstanding members 26 and 27.

A spur gear 32 is also mounted rotatively-rigid on shaft 31, adjacent the winding drum.

To buttress the upstanding members 26 and 27 in their vertical position, and to support them against externally applied working forces, bracket braces 33 and 34 are provided and secured as by welding.

Spaced from said spur gear 32 is a driving pinion 35 mounted rotatively-rigid on shaft 36 which is journalled in bearing blocks 37 and 38 (not shown), secured to the base side members as by welding.

An idler gear assembly associated with said pinion 35 is provided, and is constructed and arranged as follows. Pivotally mounted on said drive shaft 36, and astraddle the driving pinion 35, is a pair of upright leg members 39 and 41 having a spacer brace 42 welded across the top thereof. An idler pinion 43 is rotatably mounted on a shaft 40 which is journalled in said legs 39 and 41, said idler pinion being enmeshed with the driving pinion 35.

Power means are provided comprising a motor 44 mounted on an adjustable plate 45. Said motor drives shaft 36 through means of a sheave 46, mounted rotatively-rigid on the shaft 36, and a connecting belt 47. The adjustable plate 45 is provided with arms 48 and 49 having one end welded thereto, and the other end pivotally connected to lugs 51 and 52 by pins 53 and 54. Said lugs are secured to brace 28 as by welding. A supporting rod 55, having one end welded to the base 21 and the other end passing through an aperture in plate 45, is provided with adjusting nuts 56 and 57, disposed on each side of said plate, for raising or lowering the plate and motor thereon, whereby to tighten the belt 47.

A pair of pins 58 and 59, fixedly secured to bracket braces 33 and 34, pivotally support a pair of rocker arms 61 and 62 which support thereacross a roller 63 journalled therein as by journals 64 and 65.

Pairs of spaced stop pins 50, 60 and 70, 80 are secured in the braces 33 and 34, respectively, to limit the rocking oscillation of said arms.

Brace 66, welded or otherwise secured to and across said arms, retains the arms in spaced relation.

A trip mechanism is provided comprising upright bars 67 and 68 pivotally connected to the rocker arms 61 and 62 by pins 69 and 71, respectively, and having welded thereto and thereacross a pair of spaced rods 72 and 73, spaced as hereafter described.

A push rod, comprising an eye-bar 74, has one end pin connected to upright bar 67 by means of pin 75. The other end is connected to an ear 76 on upright leg member 39 through the following means. Said end is disposed through an over-sized aperture 77 in ear 76 and positively secured against withdrawal therefrom in a forward direction by a cotter-pin 78 and washer 79. The aperture 77 is bored over-size to accommodate the eye-bar 74 when the assembly is oscillated. The eye-bar 74 is also yieldably secured against displacement in a rearward direction relative to ear 76 by means of an initially tensioned compression spring 81 abutting against a washer 82 backed by a cotter-pin 83 and shouldering against ear 76.

A latch member 84, pivotally mounted on pin 58, is provided with a notch 85 that engages with a projecting pin 86 fixed in leg 39.

An inpact pin 87, fixed in the end of arm 61 and spaced from latch 84, operates to transmit an impact unlatching force from said arm 61 to said latch member 84 when the arm is violently thrust clockwise, as hereinafter described.

Tension springs 88 and 89, having one end hook-connected to the rearward ends of rocker arms 61 and 62, through apertures 69', and 91 (not shown), and the other ends hook-connected to eye-screws 92 and 93 threadedly engaged in the base members 22 and 23 (not shown), respectively, serve to bias and overbalance the roller carrying ends of the rocker arms, upwardly, limited by stop-pins 60 and 80, respectively.

Tension spring 94, having one end hook-connected to the end of latch 84 through aperture 95 and the other end hook-connected to eye-screw 96 threadedly engaged in the frame member 22, serves to bias the latch downwardly on the pin 86 thereby urging the notch 85 into engegement with the pin 86 when they are in registry.

Tension spring 97, having one end hook-connected to the lower end of leg 39 through aperture 98 and the other end hook-connected to the eye-screw 99 threadedly engaged in the base member 24, serves to urge the idler pinion assembly toward the spur gear 32 and into engagement therewith, pivoting about shaft 36.

A stop lug 101 is secured to the latch member 84 by means of screws 102. Its function is to engage with pin 86 and prevent the idler pinion 43 from enmeshing too deeply and too tightly with the spur gear 32.

A chain leveling mechanism is provided to direct the chain on the winding drum in neat layers. Said leveling mechanism comprises an oscillatable arm 103 pivotally mounted on brace 28 through means of screw 104. A pendant yoke 105 is provided on the end thereof as by welding to guide the chain 106 in layers on the winding drum 29.

A cam follower pin 107 is fixed in the oscillatable arm 103 and engages in the cam groove 108 provided in cam block 109 which is mounted rotatively-rigid on cam shaft 111. Said cam shaft 111 is driven by the rotatable shaft 31 through means of a train of gears.

Said train of gears comprises a pinion 112 mounted rotatively-rigid on drum shaft 31 and meshing with spur gear 113 formed integral with pinion 114. Said spur gear 113 and integral pinion 114 are rotatably mounted on trunnion 115 supported by upstanding member 27 and secured thereto as by welding. Spur gear 116, disposed to mesh with pinion 114, has integrally formed therewith a pinion 117. Said spur gear 116 and integrally formed pinion 117 are rotatably mounted on trunnion 118 supported by upstanding member 27 and secured thereto as by welding. Cam shaft gear 120 is mounted rotatively-rigid on cam shaft 111 and is disposed to enmesh with pinion 117.

A hauline-line, such as a cable, rope, belt, or the like, a chain 106 being preferred, is wound around the drum 29 and has one end secured thereto by screw 119. Said chain is threaded through the yoke 105, trained over roller 63, and is threaded between rods 72 and 73. Thence it is projected outwardly and remotely to be connected to any desired device. It carries a control lug 121 secured thereto.

Said control lug 121, Fig. 3, comprises a sleeve

122 having a flange 123 intermediate the ends thereof. The chain is threaded through said sleeve and is secured thereto by means of pin 124. The leading end 125 of the sleeve is of a dimensional size to pass between the rods 72 and 73. The flange 123 is of a dimensional size to shoulder against the rods 72 and 73. Said leading end is chamfered as at 126 to be more easily guided between said rods 72 and 73.

Fig. 6 shows the assembled winch 20 and base 21 applied to the purpose of moving litter. Said Fig. 6, including Figs. 4 and 5, illustrate my first novel litter removal system for a pen type of enclosure 130 whereby the winch 20 is mounted on a pivotally supported table 127 and is connected to a scoop 128 by means of the chain 106.

The table, of substantial construction, is secured, as by welding, to a vertically disposed shaft 129 journalled in supporting brackets 131 and 132 which are secured to a timber 133 embodied in the pen barn structure 134 by means of bolts 135.

The pivotally supported table swings freely to the right and to the left thereby orienting and lending itself to draw litter from any portion of the pen, unlike the conventionally fixed and immobile winches which can function and draw litter from an area straight ahead, only.

The concrete floor 136 of the pen is provided with a gutter 137 across the pulling range of the pivotally mounted winch. Said gutter continues through the pen barn foundation 138 and communicates to the outside.

Disposed in said gutter is an endless belt conveyor 139 embodying a driving pulley 141 which is adapted to be driven by a motor, engine, or the like (not shown). The conveyor is of the conventional type having a belt 142 trained over rollers 143 which are rotatably mounted on shafts 144 that are secured in the sides of the gutter. Side frame members 145 and 146 are provided to maintain the rollers in spaced assembled position and to support the belt between the rollers.

Operation.—Assume the arrangement of Fig. 6 wherein the winch 20, diagrammatically shown, is mounted on the pivotal table 127 at one end of the pen 130, and the remote end of the chain 106 being attached to the scoop 128 as shown in Fig. 6.

The normal non-operating position of the winch is as shown in Fig. 1, the idler pinion 43 assembly being latched in a non-engaging position away from the drum gear 32 by means of latch member 84 having its pin 86 in interlocked engagement with notch 85. Also, it is to be noted that spring 94 spring-loads said latch, and biases said interlocked engagement; while springs 88 and 89 overbalance the forward portions of rocker arms 61 and 62 and thereby urge the rocker arms assembly into their normally inoperative position, ready for actuation. Spring 97 is initially tensioned to urge the idler gear 43 assembly pivotally toward drum gear 32.

When the motor 44 is energized, the drive shaft 36 and its pinion 35 will be rotatively driven by said motor through means of belt 47 and sheave 46. Consequently, the associated idler gear 43 will be freely driven by driving pinion 35, at the outset of a cycle of operation.

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

As the scoop 128, attached to the remote end of the chain 106, is pulled back preparatory to placing it behind litter or other material to be moved, the winding drum rotates, responsive to said back pull, and pays-out the chain accordingly. The chain leveling mechanism, being permanently associated with the drum shaft, will be driven in reverse by the rotating drum, and accommodate the paying-out of the chain.

Since approximately a ten foot long swath of the scoop constitutes a load, the operator pulls back on the chain and places the scoop in the rear of the first ten foot section of the litter.

A small friction brake, consisting of a screw 147 threadedly engaged in and through the brace member 34, and having its end bearing against the drum flange, provides adjustable 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 vigorous pull, jerk, or a snap of the cable, which reacts against the supporting roller 63, thrusting it downwardly. As a result of said thrust and resulting downward movement, the supporting rocker arms 61 and 62 are pivoted clockwise about pins 58 and 59, against the tension of springs 88 and 89, respectively.

The lost motion travel between impact pin 87 and the lower edge of latch 84, allows the rocker arm 61 to accelerate pivotally, whereafter it forcibly strikes and raises the latch 84, thereby releasing it from its interlocked engagement with pin 86, and allowing the idler gear 43 assembly to pivot forwardly about shaft 36, urged by tension spring 97, resulting in the engagement and enmeshment of the idler gear 43 with drum gear 32.

Stop lug 101 engages with latch pin 86 and prevents the idler gear 43 from enmeshing too deeply and too tightly with drum gear 32.

At the first indication of gear engagement, the winding drum immediately commences to rotate because the driving pinion 35 and the associated idler gear are continuously rotating, their rotation having been initiated with the starting of the motor 44.

As the winding drum rotates the chain is being wound around the drum, pulling forward the scoop and its load of litter 148.

The leveling mechanism, driven by the drum shaft and gear train, directs the chain in neat layers on the drum.

The forward action of the scoop continues until the litter is pushed onto the movable conveyor 139 in the gutter 137. It is dischargeable therefrom to the outside of the pin barn, as desired.

At the instant the last of the litter is discharged by the scoop onto the conveyor, the stop control lug 121, predeterminately positioned on the chain 106, engages with the trip mechanism bars 72 and 73, resulting in a backward pivotal displacement of said mechanism and associated push rod 74. Consequently the spring 81 is compressed until the compressive force is sufficient to thrust backwardly the idler gear assembly, generally, and the idler gear 43, particularly, from engagement with the drum gear 32. The rotation of the winding drum immediately stops; and the forward movement of the scoop thereby terminates.

When the forward movement of the scoop is arrested the load on the chain and the roller 63 is relieved, thereby allowing the rocker arms 61 and 62 to assume their initial nonoperating position urged thereup by spring 88.

The backward displacement of the idler gear assembly causes the latch 84 to slide along the latch pin 86 until the latch notch 85 interlocks therewith, being urged into engagement by the tension of spring 94, thus restoring and resetting the winch to its initial inoperative status, ready for another cycle of operation.

This cycle of operation is repeated for any loads of litter remaining in the pen.

The operative disposition and size of the idler and drum gears is such that they exert a resulting force that urges enmeshment rather than disengagement.

The yieldable engagement of the push rod 74 and the idler gear assembly, through compression spring 81, provides an arrangement whereby disengaging energy is stored up in the spring 81 sufficient to break the operating enmeshment of the idler gear from the drum gear, and then thrust the idler gear assembly free and clear of the drum gear teeth, thereby preventing damage to the teeth otherwise resulting from the gears riding on their teeth tips, as when in close contact proximity to each other.

Figs. 7 and 8 disclose my second novel litter removal system, particularly one adapted to serve a dairy barn having a plurality of gutters. However, it will be obvious that this system can also serve a pen type barn.

In the conventional barn having a plurality of litter gutters, each gutter has installed at the end thereof a winch to serve that particular gutter. In other words, a plurality of gutters would necessitate an equal number of winches. This invention enables one winch to serve a plurality of gutters, thereby eliminating and making unnecessary all but one winch. In serving a pen type barn this system is adapted to reach every portion thereof, as it is shiftable laterally of the pen.

Fig. 7 illustrates a fractional plan view of a dairy barn showing a table 149 suspended from a sliding track, disposed exteriorly of the barn, and adapted to be aligned with any one of a plurality of gutters.

Fig. 8 is a side elevation of the arrangement shown in Fig. 7, including my winch, diagrammatically shown, mounted on said table.

Reference numerals 151 and 152 indicate a pair of parallel litter gutters in the floor 153 of a dairy barn having a communicating transverse discharge gutter 154 exteriorly of the barn end wall 155 thereof. On the exterior of barn wall 155 is horizontally disposed a U-shaped track 156, the inboard leg being longer than the outboard leg and secured to the end wall by means of bolts 157.

The supporting table 149, horizontally disposed and having one side slidably bearing against the lip 158 of the transverse gutter 154, is suspended from the track 156 through means of supporting arms 159 and 161 pivotally connected to a track engaging member 162 by pins 163 and 164, respectively. The supporting arms 159 and 161 have secondary arms 165 and 166, respectively, formed integrally therewith, to aid in sustaining said table. Said arms are secured to the table as by welding. The track engaging member 162 is a hook-shaped element that interlocks with the track and is slidably associated therewith. My winch, diagrammatically shown at 20, is mounted on the table 149 and has the remote end of its chain 106 attached to a scoop 165 which is disposed in a litter gutter 152. The control lug 121 is secured to the chain at a predetermined operative distance from the scoop that will be hereinafter described.

Openings 168 and 169 are provided in the end wall, at the discharge ends of the gutters 152 and 151, respectively, to allow for the passage therethrough of litter from said gutters.

Disposed in the external gutter 154 is an endless belt conveyor 167 which is adapted to be driven by any means. The conveyor is of the conventional type having a belt trained over rollers as shown in Figs. 4, 5 and 6. The conveyor discharges at one end of the gutter, or into a vehicle (not shown) as desired.

Operation.—When gutter 152 is desired to be cleaned of litter the supporting table 149 with the winch 20 mounted thereon is disposed and aligned with said gutter by manually sliding it along the track 156 and adjusting its position accordingly.

When said gutter 152 is cleaned of litter the supporting table and the winch 20 thereon is disposed and aligned with gutter 151 by manually sliding it further along track 156 and adjusting its position accordingly.

To facilitate sliding, the supporting table can be manually pulled slightly outwardly of the lip 158, pivoting about pins 163 and 164, and manually moved to the right or left as desired.

When the apparatus is to be moved from one gutter to the other, the scoop can be passed through the openings 168 or 169 and moved externally of the barn along with the winch, or the scoop can be detached from the chain and moved interiorly of the barn from one gutter to the other while the winch is being moved exteriorly thereof. The detachment can be accomplished by unhooking hook 170 from the eye of eye-screw 171 which is threadedly engaged with the scoop.

To clean the flat floor areas 180, 190 and 200, the scoop is disposed thereon, and the accumulated litter is drawn through the openings 168 or 169 by the winch disposed accordingly, or through additional accommodating openings. This simulates pen barn cleaning.

It is obvious that an excellent pen type enclosure can be provided by merely filling in the gutters 151 and 152 level with the floor surface with any solid material such as concrete. This type of arrangement can be likewise cleaned by merely shifting the winch along the track and drawing the litter through the openings 168 and 169 in the end wall. Additional openings can be provided as needed. By laterally shifting the winch along the track every portion of the enclosure can be reached and cleaned with ease.

It is not absolutely necessary to a pen barn that the floor be plane and unbroken. Cattle can roam about in the enclosure shown in Fig. 7, including the gutters, and the pen will still lend itself to cleaning by this my second system of cleaning as indicated above.

The mechanical operations of the winch in paying-out the chain, engagement of the gears, hauling in a load of litter, and resetting the winch preparatory for another cycle of operations is the same as described hereinbefore in the operation of the winch disclosed for Figs. 1–6, inclusive.

Figs. 9 and 10 disclose a third novel barn litter removal system, adapted to serve a dairy barn having a plurality of gutters. However, it will be obvious that this system is also well adapted to serve a pen type barn, hereinafter provided for.

In the conventional barn having a plurality of litter gutters, a plurality of winches are needed, one for each gutter. This invention eliminates

all but one winch and thereby results in a substantial saving.

In serving a pen type barn this system is designed to reach every portion thereof with ease.

Fig. 9 illustrates a fractional plan view of a gutter type dairy barn showing eye-screws anchored in the end wall for the securement thereto of the working line of a winch.

Fig. 10 is a sectional view taken along line 10—10 of Fig. 9, including my winch diagrammatically shown mounted on a vehicle which also mounts a litter scoop. The working line of the winch is anchored to one of the eye-screws shown in Fig. 9.

Reference numerals 172 and 173 indicate a pair of parallel litter gutters in the floor 174 of a dairy barn having a communicating transverse discharge gutter 175 also in the floor thereof.

To the lower portion of the end wall studs are secured eye-screws 176, 177, 178, 179 and 181. Eye-screws 177 and 179 are aligned with the gutters 173 and 172, respectively; eye-screws 176, 178 and 181 are aligned with the remaining floor surfaces.

Mounted in the transverse gutter is an endless belt conveyor 182 embodying a driving pulley 183 which is adapted to be driven by a motor, engine, or the like (not shown). The conveyor is of the conventional type having a leather belt 184 trained over rollers 185 which are rotatably mounted on shafts 186 that are secured in the sides of the gutter. Side members 187 and 188 are provided to maintain the rollers in spaced assembled position and to support the belt between the rollers. The conveyor end 189 discharges exteriorly of the barn into a vehicle, or other means (not shown).

A vehicle, generally indicated at 189, comprising a square frame 191 mounted on shaft 192 journalled in a pair of wheels 193, mounts my winch diagrammatically shown at 20. The wheels are spaced to straddle either of the gutters 172, 173.

The remote end of the working chain 196 is provided with a hook 194 which engages with the eye of the aligned eye-screw 177.

The control lug 121 is secured to the chain at a predetermined operative distance from a scoop 195. Said scoop is mounted on the front end of the vehicle 189, and is disposable in either of the gutters 172 or 173.

Handle means 196 are secured to the vehicle for maneuvering purposes.

Operation.—When litter gutter 173 is desired to be cleaned, the vehicle 189, with my winch 20 mounted thereon and secured thereto, is disposed astraddle gutter 173, and the working chain 196 with the hook 194 is anchored to the eye-screw 177 by engaging the hook 194 therewith.

The placement of the scoop 195 behind a ten foot section of litter is accompanied with a vigorous backward pull or jerk on the handle means 196. This results in starting the operation of the winch. Bearing down on the handles 196 and tipping the vehicle backward on its wheels is also sufficient to start the winch operating.

The mechanical operation of the winch, and the resetting of the winch preparatory for another cycle of operations is the same as described hereinbefore in the operation of the winch disclosed for Figs. 1–6, inclusive.

As the winch drum rotates it winds up the chain, thereby pulling itself and the vehicle forward, including the litter 197 ahead of the scoop 195.

The forward action of the scoop continues until the litter is pushed onto the movable conveyor 182. It is dischargeable thereby, to the outside, to a manure spreader, or other means, as desired.

At the instant the last of the litter is discharged by the scoop onto the conveyor, the stop control lug 121, predeterminately positioned on the chain 196, engages with the trip mechanism on the winch, stopping the winch. Consequently, the forward movement of the scoop terminates. The scoop is now drawn back and placed behind another ten foot section of litter and the forward movement repeated.

To clean gutter 172, the vehicle and the winch mounted thereon are disposed astraddle said gutter 172, the hook 194 engaged with the eye of aligned eye-screw 179, and the cycle of operations repeated.

To clean the floor area 198 between the gutters 172 and 173, the winch and vehicle are disposed thereon, the hook 194 engaged with the eye of the aligned eye-screw 178, and the cycle of operations repeated.

Similarly the floor areas 199 and 201 can be cleaned of litter by disposing the winch and vehicle thereon, engaging the hook 194 with eye-screws 181 and 176, respectively, and repeating the cycle of operations. This simulates pen type barn cleaning.

It is obvious that an excellent pen type enclosure can be provided by merely filling in the gutters 172 and 173 level with the floor surface with any solid material. By securing the hook 194 to any or all of the eye-screws, individually, every portion of the pen can be reached and cleaned with ease.

However, it is not absolutely necessary to a pen barn that the floor be plane and unbroken. Cattle can roam about in the enclosure shown in Fig. 9, including the gutters, and the pen will still lend itself to cleaning by this my third system of barn cleaning.

The characteristic features of this invention are: a winch that is operatively responsive to a pull or jerk on the working cable; a winch comprising a displaceable driving pinion operative to be engaged with and disengaged from a winding drum and gear assembly; a first litter removal system whereby a winch is pivotally mounted at one end of a pen enclosure, adapted to swing to the right and to the left, for drawing litter from various portions of said pen; a second litter removal system whereby a winch is carried on a track, adapted to be shifted along the track, and draw litter from a pen or gutters; and a third litter removal system whereby a winch and scoop are mounted on a vehicle, the working cable being anchored to any one of a plurality of anchoring means, whereby the vehicle pulls itself and pushes the litter ahead thereof.

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 pinion mounted rotatively-rigid on said shaft; a pair of spaced legs mounted on said base; a winding drum ro-

tatably mounted across said spaced legs; a drum gear mounted rotatively-rigid with said drum; upstanding supporting means pivotally mounted on said drive shaft adjacent said pinion; a latch engaging pin on said supporting means; an idler gear rotatably mounted on said supporting means, disposed to enmesh with said pinion and being engageable with said drum gear and normally spaced from said drum gear; rocker arm members pivotally mounted on said legs, respectively, said arms having portions extending rearwardly and forwardly of their pivots; stop means on said legs for limiting the pivotal movement of said rocker arms; a roller rotatably supported across the forward portions of said rocker arms, said roller being disposed in a normal position upwardly of said drum; trip bar means pivotally supported across said rocker arms and disposed forwardly of said rollers; push rod means connecting said trip bar means and the upstanding supporting means, including yieldable linkage means operative to receive and store disengaging energy sufficient to overcome the operating enmeshment forces between the idler and drum gears and violently thrust apart said gears into a spaced relation; a latch bar pivotally mounted on at least one of said rocker arms, having a notch engageable with said latch pin to releasably hold said upstanding supporting means and associated idler gear in a normal inoperative spaced position relative to the drum gear, said latch bar being controlled by a pivotal movement of a rocker arm; an impact pin on at least one of said rocker arms operable to transmit a disengaging impact force to said latch bar; spring means acting on said latch bar for urging said latch bar into engagement with said latch pin; spring means acting on the upstanding supporting means for urging the associated idler gear forwardly and into enmeshment with the drum gear; spring means acting on at least one of said rocker arms for counterbalancing the forward portions of said arms and their associated assemblages and disposing the roller upwardly of drum in a normal position; a chain having one end attached to said drum and the other end portion trained over said roller, said chain being operable as the working chain, and also operable to transmit an unlatching force to said roller resulting in a pivotal movement of said rocker arm; a control lug on said chain for engaging with and actuating said trip bar; and chain leveling means drivable by said rotatable drum operative to direct the chain in rows on the drum.

2. A winch, comprising: a supporting structure; a drive shaft rotatably mounted on said supporting structure; a pinion mounted rotatively-rigid on said shaft; a winding drum rotatably mounted on said structure; a drum gear mounted rotatively-rigid with said drum; a supporting member pivotally mounted on said shaft; an idler gear rotatably mounted on said member, disposed to enmesh with said pinion and being engageable with said drum gear and normally spaced therefrom; a hauling line connected to said drum, the free end of said line being adapted to be connected to a scoop; latch means for releasably holding said member and associated idler gear in said normally inoperative spaced position, said latch means supportingly engaging said hauling line intermediate its free end and the drum, and being releasably operative by a pull on said hauling line; thrust transmitting means connected to said member operative to disengage the idler gear from the drum gear and impel said member and its associated idler gear into its normally inoperative position and into engagement with said latch means; a control lug fixed to said hauling lines operative to engage with and actuate said thrust transmitting means; and means acting on said member for urging the associated idler gear into enmeshment with the drum gear.

3. A winch, comprising: angularly displaceable driving means; winding means driveable by said driving means, said driving means being normally inoperatively spaced from said winding means; means for urging said driving means into driving engagement with said winding means; releasable means for releasably holding said driving means in said normally inoperative position; a hauling line having one end connected to said winding means and the other free end portion trained over said releasable means for controlling said releasable means, said releasable means being releasably responsive to a pull applied to the free end of said hauling line; a control lug on said hauling line; and reset means for resetting the driving means to its normal inoperative position and into engagement with said releasable means, said reset means being controlled by said control lug, and said reset means including a resilient link operative to receive and store disengaging energy sufficient to overcome the operating engaging forces between the driving and winding means, for suddenly disengaging said driving means from engagement with said winding means.

4. A winch, comprising: displaceable driving means; winding means driveable by said driving means, said driving means being normally inoperatively spaced from said winding means; latch means having a pivotal engaging arm for releasably holding said driving means in said normally inoperative position; supporting means transversely connected to said engaging arm and a hauling line having one end connected to said winding means and the other free end portion trained over said supporting means and directed downwardly therefrom so as to form a bend in the hauling line on said supporting means, said free end being adapted to be connected to a movable object, and said supporting means being releasably responsive, at said bend in the hauling line, to a pull on the free end of said hauling line.

5. A winch, comprising: angularly displaceable driving means; winding means driveable by said driving means, said driving means being normally inoperatively spaced from said winding means; means for urging said driving means into engagement with said winding means; latch means having a pivotal engaging rocker arm for releasably holding said driving means in said normally inoperative position; supporting means transversely connected to said engaging arm and a hauling line having one end connected to said winding means and the other free end portion trained over said supporting means and directed downwardly therefrom so as to form a bend in the hauling line on said supporting means, said free end being adapted to be connected to a movable object, and said supporting means being releasably responsive, at said bend in the hauling line, to a pull on the free end of said hauling line.

6. A winch, comprising: driving means and associated winding means, relatively displaceable and normally inoperatively spaced from each other; latch means having a pivotal engaging arm for releasably holding said winding means

and said driving means in said inoperatively spaced relation; supporting means transversely connected to said engaging means and a hauling line having one end connected to said winding means and the other free end portion trained over said supporting means and directed downwardly therefrom so as to form a bend in the hauling line on said supporting means, said free end being adapted to be connected to a movable object, and said supporting means being releasably responsive, at said bend in the hauling line, to a pull on the free end of said hauling line.

7. A winch, comprising: engageable driving and winding means mounted for relative angular displacement, and normally inoperatively spaced from each other; latch means having a pivotal engaging rocker arm for releasably holding said winding means and said driving means in said normally inoperatively spaced relation; supporting means transversely connected to said engaging means and a hauling line having one end connected to said winding means and the other free end portion trained over said supporting means and directed downwardly therefrom so as to form a bend in the hauling line on said supporting means, said free end being adapted to be connected to a movable object, and said supporting means being releasably responsive, at said bend in the hauling line, to a pull on the free end of said hauling line.

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