

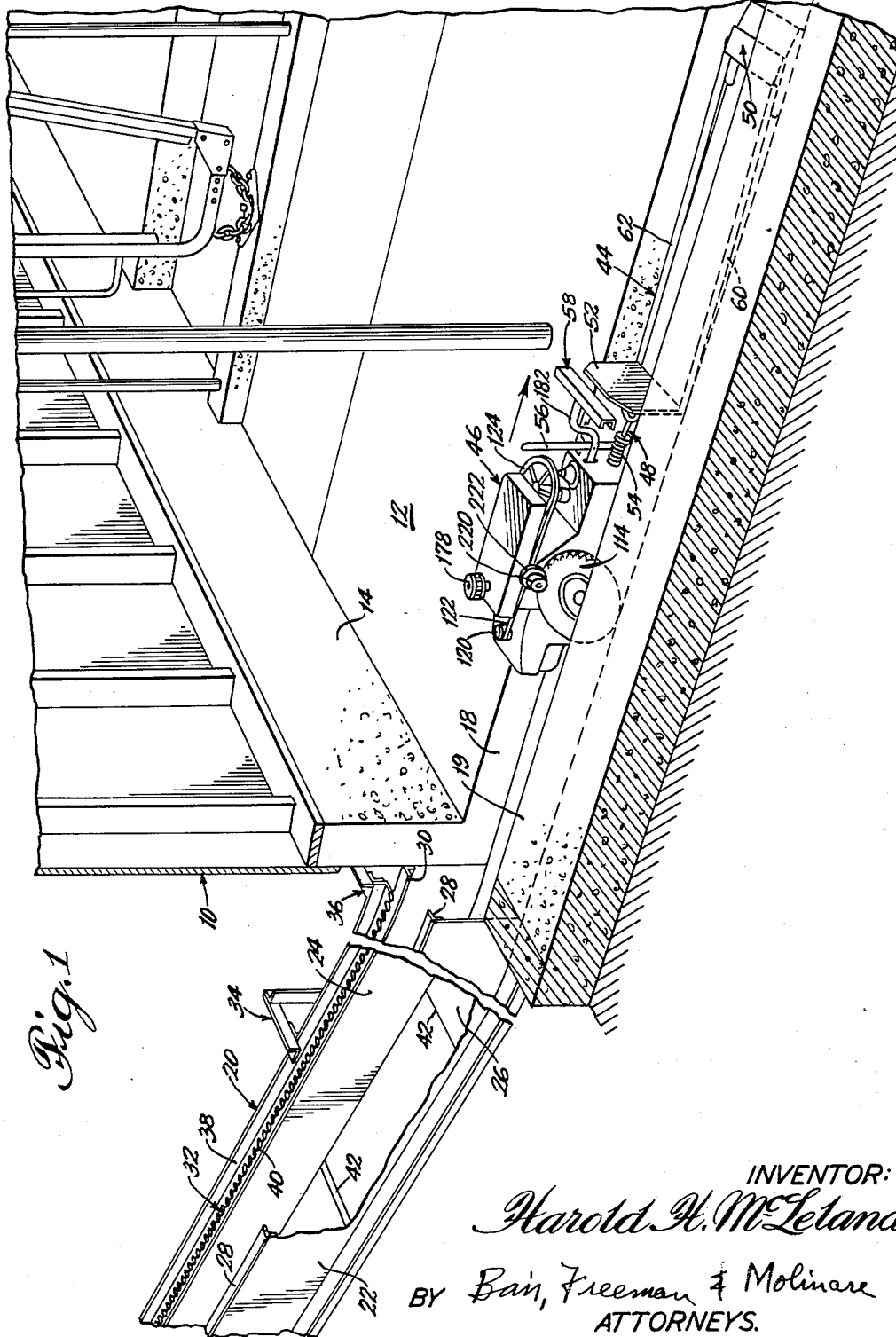
Dec. 27, 1960

H. H. McLELAND
BARN-GUTTER CLEANER

2,966,256

Filed Aug. 19, 1957

4 Sheets-Sheet 1



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Fig. 2

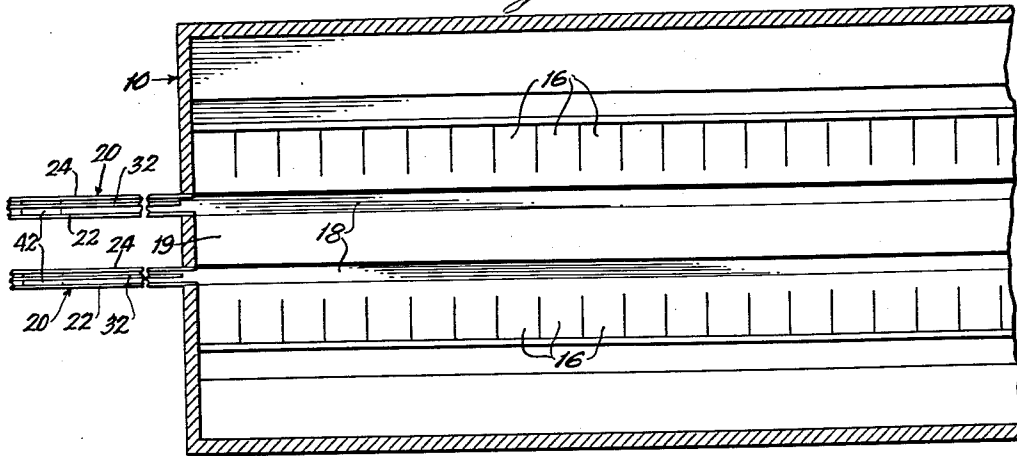


Fig. 3

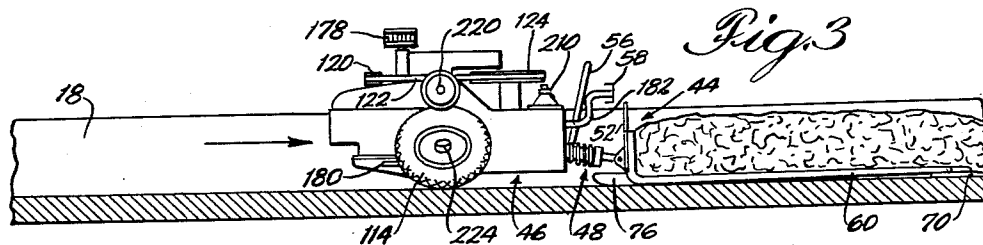


Fig. 4

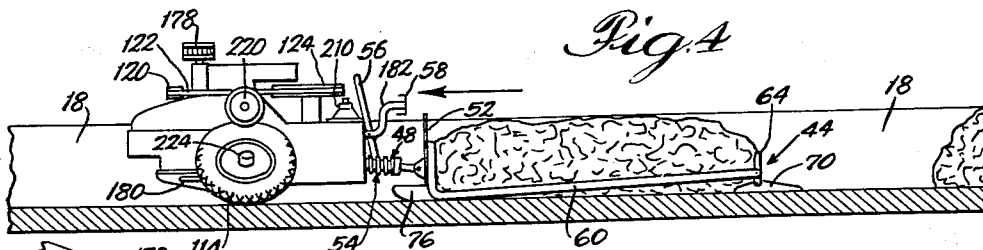
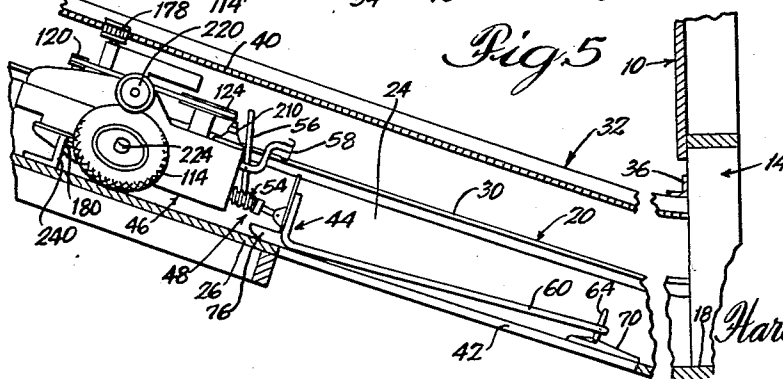


Fig. 5



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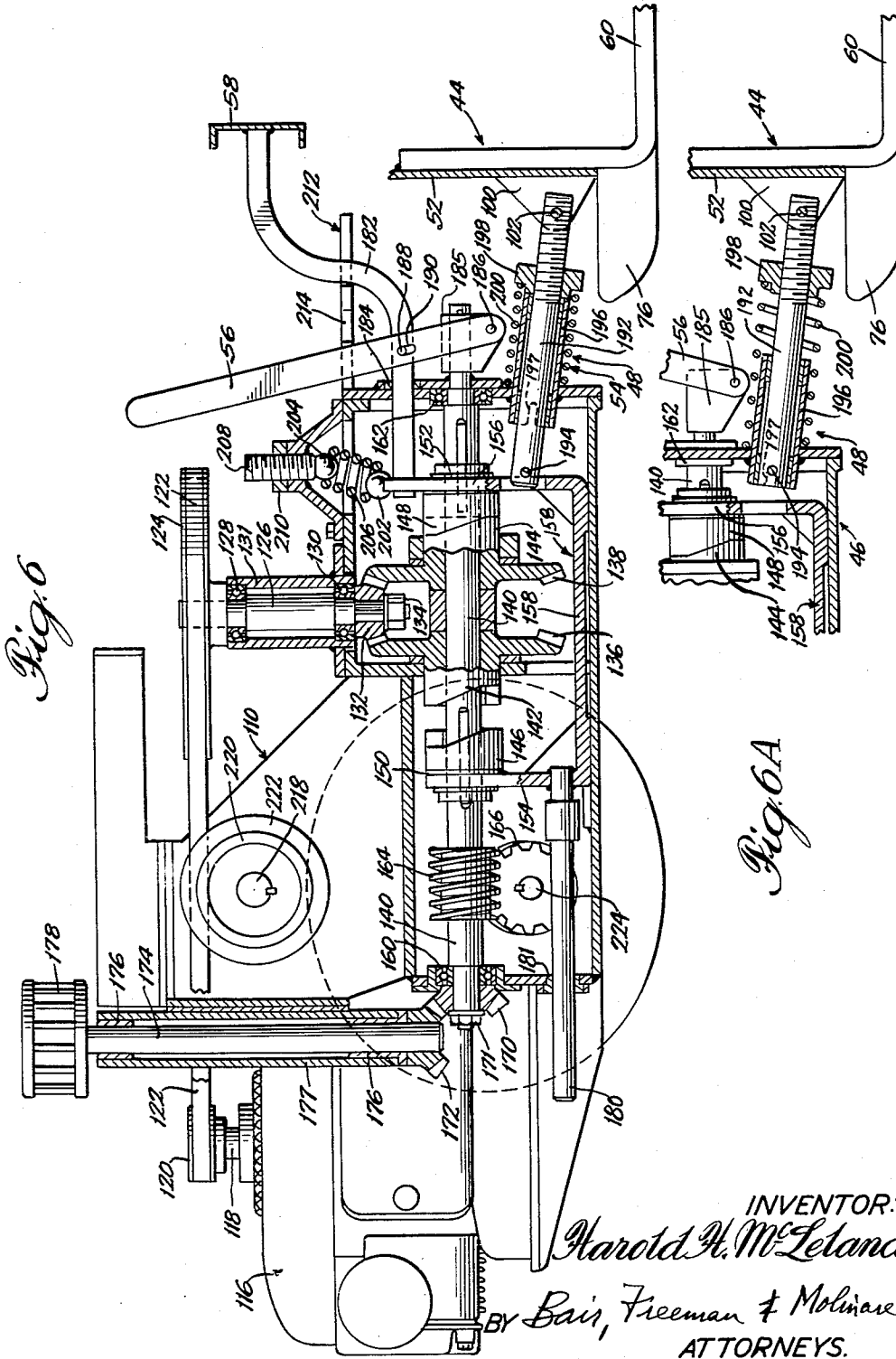
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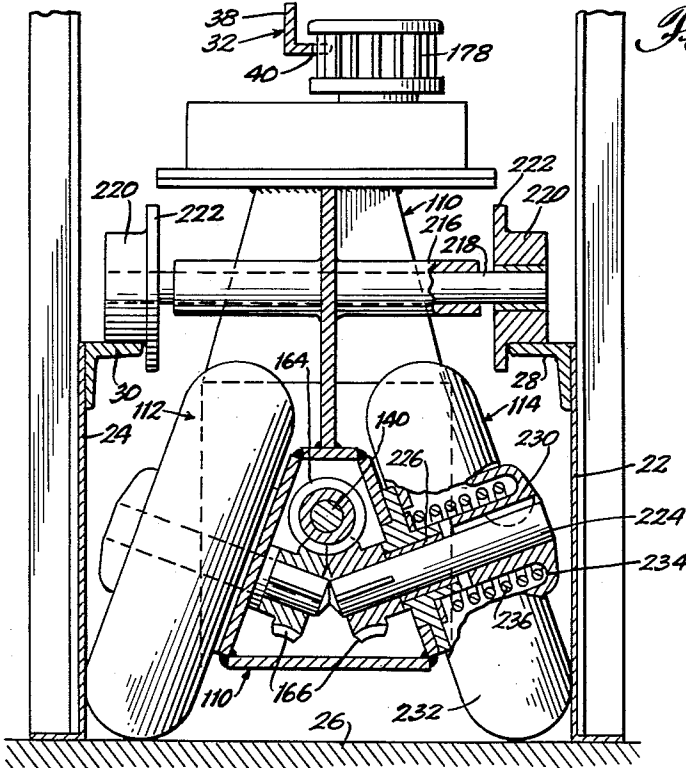


Fig. 7

Fig. 9

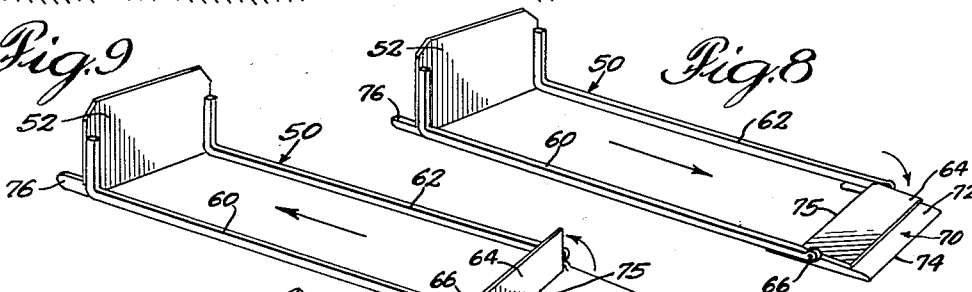


Fig. 8

Fig. 10

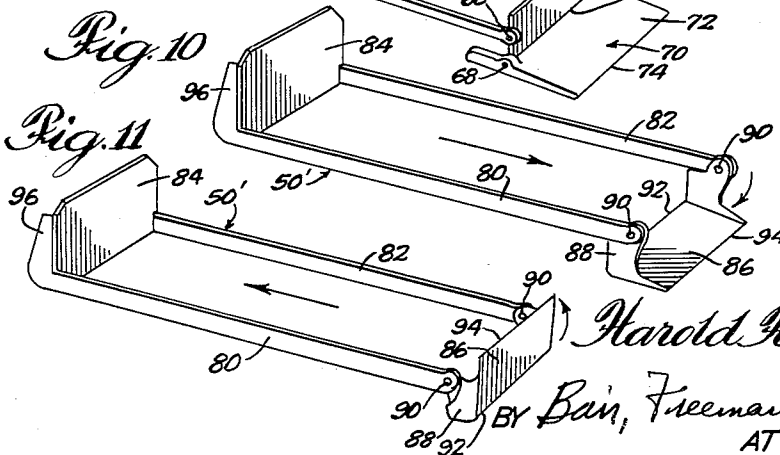


Fig. 11

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BARN-GUTTER CLEANER

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Filed Aug. 19, 1957, Ser. No. 679,026

18 Claims. (Cl. 198—224)

This invention relates to a barn-gutter cleaner, and more particularly to a scoop means which enters a barn-gutter and automatically and repeatedly loads itself and disposes of the load to the end that the gutter is substantially entirely cleaned in a most efficient manner.

One of the most distasteful, tedious and time consuming jobs on a farm, particularly one that produces dairy products, involves the cleaning out of the barn-gutter.

Attempts and suggestions have heretofore been made to mechanize this farm chore, but such prior attempts are either too expensive or not too efficient. One such suggestion has been used particularly with a straight-run gutter and involves use of a reciprocating piston, or plunger-mounted, scoop which enters the gutter at one end, and scoopful-by-scoopful empties the gutter. Unfortunately such device is useful only with a straight-run gutter, and then the length of the plunger or piston must be very great to effect cleaning of the far end of the gutter. Another suggestion involves a continuous chain-type conveyor that may be disposed in the gutter. The continuous conveyor-type device is expensive, and requires a length of conveyor at least equal to the total length of the barn-gutter plus a length of conveyor to bridge the distance between the ends of the gutter. The continuous-conveyor type cleaner also is constantly being exposed to weathering conditions and to fresh waste matter that is deposited in the gutter, all of which causes rapid deterioration of the parts of the conveyor and may result in requiring costly repair. Furthermore, the motor that is provided for operating the conveyor-type cleaner must be of sufficient size to move the entire load that is present in the gutter and hence the cost of such motor is high.

One object of this invention is to provide a novel barn-gutter cleaner which avoids the above noted deficiencies, and which provides a procedure of cleaning the barn gutter which more nearly simulates the stepwise excavation thereof as would be executed by a person, which stepwise excavation is felt to be the most desirable mode of operation in performance of the desired task.

In fact, the mode of operation of the novel gutter cleaner herein disclosed so closely approximates the manner of gutter cleaning as would be manually performed by a person that I refer to my device as a "robot."

Thus, my entire device, including the motive means therefor, is arranged to enter the gutter and pick up, or capture, a scoopful of waste matter therein, and then the motive means moves out of the gutter taking with it the scoopful of waste matter to be deposited in a waste matter receptacle, or the like, and then the device returns and takes out another scoopful of waste matter in the same manner, and this stepwise procedure is repeated until the gutter is cleaned.

An object of this invention is to provide a compact motive means and scoop means, in combination, which enters the gutter of a barn and in stepwise repetitive operations excavates the waste matter from the gutter.

Another object of this invention is to provide an auto-

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matic barn-gutter cleaner which moves along the barn-gutter from one end thereof until it has gathered a pre-selected load of waste matter and then automatically reverses its movement to take the load of waste matter out of the gutter, and then again automatically reverses its movement to go through the same cycle, repeatedly, until the barn-gutter has been fully cleaned.

A further object is to provide a new and improved barn-gutter cleaner which is characterized by its mode and means of operation, by its efficiency, and by its simplicity of construction and operation.

Further objects and advantages of this invention will become apparent as the following description proceeds and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

A preferred embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 is a perspective view of a portion of a barn having gutters therein for receiving waste matter and further shows the device of this invention disposed in the barn's gutter;

Figure 2 is a diagrammatic illustration showing a plan view of a typical barn that may be equipped with a gutter cleaning device as disclosed herein;

Figure 3 is a side view within a gutter showing the gutter cleaning device in elevation, and partly illustrates the operation of the gutter cleaning device when moving in the direction of the arrow to effect loading of the scoop means thereof with waste matter in the gutter;

Figure 4 is similar to Figure 3 and illustrates the movement of the gutter cleaning device, after loading thereof has been effected, in the direction opposite to the direction of movement shown in Figure 3;

Figure 5 illustrates the movement of the gutter cleaning device, at a time subsequent to that shown in Figure 4, upwardly along an elevator means from whence the load of waste matter is discharged from the scoop portion of the device;

Figure 6 is a vertical cross-section view, with some parts in elevation, of the traction means and the adjacent portion of the attached scoop means of the gutter cleaning device, and showing the relation of parts at a time just when movement of the traction means has been reversed;

Figure 6A is a view of a fragment of Figure 6, showing the relationship of parts at a time shortly subsequent to Figure 6, and illustrates the lost motion connection between the traction means and the scoop means;

Figure 7 is an end view, partly in cross-section and partly in elevation, and is taken looking from the left of Figure 6;

Figure 8 is a perspective view of one form of scoop means, showing the relative position of the parts thereof when the scoop means is moving into the waste matter in a gutter in the direction of the arrow shown on the figure;

Figure 9 is another view of the scoop means of Figure 8 showing the relative position of the parts when the scoop means moves in the opposite direction illustrated by the arrow on the figure;

Figures 10 and 11 are, respectively, similar to Figures 8 and 9, but show a modified form of the scoop means.

Referring now to the drawings, there is shown a barn 10 having a concrete floor 12 and upright walls 14 enclosing the barn area. According to well known and typical floor plan arrangements, as illustrated in Figure 2, a plurality of stalls 16 are provided in a line, in adjacent relation, with a waste gutter 18 extending along the rear edge of each line of stalls, and a service alley 19 is arranged between a pair of waste gutters. The waste

gutter extends below the surface of floor 12 and may, for example, be 11 inches deep and 18 inches wide.

In the practice of this invention, each gutter 18 is arranged to extend through a wall 14 of the barn, and the end of gutter 18 is aligned with an elongated elevator means 20. The elevator means 20 is a channel defining structure which is shaped similarly to a gutter 18 so as to serve, in effect, as an extension of the gutter 18. The elevator means includes upright, spaced, elongated side walls 22 and 24, and an elongated bottom wall 26. The upright walls 22 and 24 respectively carry thereon elongated supporting rails, or tracks, 28 and 30, each in the form of structural angles having the upright leg secured to the supporting wall and the horizontal leg extending inwardly toward the opposite wall. The rails 28 and 30 extend into the open upper portion of the channel defined between the upright walls 22 and 24 and above the bottom wall 26.

There is also provided a traction means along the elongated elevator means, extending substantially longitudinally coextensive therewith. More specifically, there is an elongated rack 32 spaced above the supporting rails 28 and 30 and supported by appropriate structural members, such as supports 34 and 36 for example, in spaced relation to the elevator means 20. The rack 32 is formed from an elongated structural angle which provides an upright leg 38 which provides rigidity to the rack, and a horizontal leg 40, the free edge of which is formed to define the teeth of the rack.

In the preferred construction, the elevator means slopes upwardly from the wall of the barn, as the elevator extends away from the barn. The length and slope of the elevator means may be appropriately selected so that a discharge station in the elevator means may be selected and disposed at a selected height above ground and at a selected distance from the barn, so that a waste receiving means, such as a dump truck, may be moved into a position to receive discharged waste directly thereinto from the discharge station on the elevator means. Thus, at an appropriate point along the elevator means 20, the bottom wall is apertured at 42 to serve as a discharge station. The size of the discharge station aperture 42 is selected relative to the size of the scoop means as will become apparent hereinafter.

There is positioned in the gutter 18 for movement therealong an apparatus which includes a scoop means generally indicated at 44, and a tractor means generally indicated at 46 and connected to the scoop means. The tractor means is for moving the scoop means in either of opposite directions along and through said gutter. Movement of the scoop means in one direction along the gutter is for the purpose of effecting loading of waste material, which is located in the gutter, onto the scoop means; and, after waste material has been loaded onto the scoop means, the movement of the scoop means in the opposite direction acts to transport the loaded scoop means to the discharge station where the scoop means may be unloaded. Means are also provided for automatically regulating the length of run of the tractor and scoop means in both directions along the gutter. One terminus of the length of run of the tractor means and scoop means is governed by the location of the discharge station at which the scoop means is unloaded of the waste matter that has been gathered therein, while the terminus of the run in the opposite direction varies, as the gutter is being excavated by the scoop means, since as more material is excavated by the scoop means, the length of run into the gutter for the purpose of gathering a load of waste will accordingly increase.

As will be seen in the drawings, the scoop means 44 and the tractor means 46 are interconnected by a connecting means generally indicated at 48, the operation of which will be more fully explained later in the specification. The scoop means 44 has a forward end 50, which is the end that is caused to be driven into the waste matter

in the gutter, during the operation of the device when the scoop means is being loaded with waste matter. The scoop means 44 also has an upright wall 52 at the rearward end of the scoop means.

The connecting means 48, which connects the scoop means 44 to the tractor means 46, is spring-loaded by a spring 54. The bias of the spring means 54 is adjustable by means which will be hereinafter described, and operates to provide a pre-set loading, or force, on connecting means 48, which loading must first be attained by the scoop means 44 encountering resistance to further forward movement, and, after such resistance is attained, then other means operate to effect reversal of movement of the tractor means 46 to start the run of the device toward the discharge station.

There is also provided a manual control 56 for affording selective manual control as to the direction of movement of the device, or for putting the tractor means 46 in a neutral condition, wherein it moves in neither direction. Further, a safety control 58 is provided which is positioned above the gutter and is responsive to engagement thereof with a body disposed above the gutter for effecting reversal of the direction of movement of the tractor means. So much for a general disclosure, from an overall standpoint, as to the principal portions of the gutter cleaning device and the controls therefor.

Referring now particularly to the details disclosed in the drawings, Figures 6 and 7 illustrate the details of the tractor means and the details of the controls therefor, while Figures 8 and 9 illustrate one form of scoop means, and Figures 10 and 11 illustrate an alternate form of scoop means.

Referring to the first form of scoop means, shown in Figures 8 and 9, said scoop means 50 includes a frame which is dimensioned to enter a gutter and to cooperate with the upright walls of the gutter to maintain the scoop means centered therein. The scoop means includes a pair of longitudinally disposed, elongated runners 60 and 62, an upright rear abutment wall 52, and a forward movable wall 64. The movable wall 64 is pivoted to the forwardly extended ends of the runners 60 and 62 by means of pins 66, at points located between the upper and lower edges of the movable wall 64.

The lower edge of movable wall 64 is fulcrumed by means of pins 68 to a base plate 70, which is adapted to lie adjacent the bottom wall of the gutter. The base plate 70 has an inclined upper surface 72 which slopes upwardly and rearwardly from a narrowed leading edge 74. As can be seen in Figure 8, when the scoop means is moving in the direction from left to right, or forwardly along the gutter into a mass of waste disposed therein, then the linkage arrangement operates to pivot the movable wall 64 into its "down" position, which is substantially horizontal, or parallel to the upper surface 72 of the base plate 70, and with the forward edge of wall 64 located rearwardly of the leading edge 74 of base plate 70. This arrangement permits entrance of the base plate 70 and the pivotable wall 64 under the greater portion of the mass of waste in the gutter, in much the same way as the edge of a shovel enters into a mass of waste.

Upon the scoop means 50 encountering sufficient resistance to further forward movement into the mass of waste, the tractor will be caused to move in the opposite direction and the linkage operates to swing the movable wall 64, from the position shown in Figure 8 to the position shown in Figure 9, wherein the movable wall 64 is in an upright position and operates to capture, between it and the upright rear wall 52, a mass of waste that will be dragged along the gutter by the scoop means until the waste is discharged from a discharge station. When the movable wall 64 is swung to the upright position shown in Figure 9, the lower edge portion of movable wall 64 engages the rear edge 75 of base plate 70, thereby rigidly maintaining the wall 64 in upright posi-

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tion, as the scoop means moves from right to left as seen in Figure 9. The scoop means 50 is also provided with a pair of rearwardly extending tongues or rails 76 extending rearwardly of the upright wall 52. These rails 76 prevent pivoting of the scoop means 50 about the rearward edge thereof.

In the form of the scoop means 50' shown in Figures 10 and 11, there is provided a pair of elongated rails 80 and 82, an upright rearward wall 84, and a pivotable forward member 86. The forward member 86 has flanges 88 extending therefrom and pivoted on pins 90 to the forwardly extending ends of the rails 80 and 82. The edge 92 of wall 86 serves as the fulcrum point about which the wall 86 is pivoted. The opposite edge 94 of wall 86 is tapered toward a sharp edge, so that when the scoop means is moving in the direction from left to right, as seen in Figure 10, the edge 94 acts much the same way as the edge of a shovel in permitting entrance of the forward edge of the scoop means into a mass of waste. Upon movement of the scoop means in the opposite direction, as seen in Figure 11, member 86 is caused to pivot about fulcrum edge 92 so that member 86 moves into an upright position and becomes an upright wall, and thus captures a mass of waste between itself and upright rear wall 84 for movement along the gutter toward the discharge station. The engagement of edges 93 of member 86 with the bottom of the gutter maintains member 86 in its upright position, when scoop means 50' is moving as shown in Figure 11. The upright rear wall 84 of the scoop means 50' is provided with rearwardly extending flanges 96 for much the same purpose as the rearwardly extending rails 76 shown in Figures 8 and 9.

As best seen in Figure 6, the scoop means 50, or 50', is provided with a rearwardly extending flange 100 located centrally of the lateral edges of the scoop means and carrying a pivot pin 102 to which the tractor means may be connected.

The details of the tractor means and the controls therefore are best seen in Figures 6 and 7, to which reference is now had.

The tractor means includes a frame, generally indicated at 110, which is mounted on a pair of wheels 112 and 114. The frame 110 carries thereon any form of motive means 116, which may either, preferably, be a gasoline driven engine or an electrically driven motor. In any event, there is extending from the motive means 116 an upright drive shaft 118 carrying a drive pulley 120 for driving belt 122. The drive belt 122 is trained about a driven pulley 124 which is carried on an upright driven shaft 126, which is journaled in bearings 123 and 130 carried by the frame 110. The bearings 123 and 130 are maintained in spaced relation by means of the tubular collar 131 through which the shaft 126 extends. The lower end of shaft 126 carries thereon a drive pinion 132 which is retained in position by means of nut 134.

The drive pinion 132 continuously drives a pair of rotatably mounted, free wheeling, bevel gears 136 and 138 which rotate simultaneously in opposite directions and which are rotatably journaled on a longitudinally extending shaft 140. The bevel gear 136 has attached thereto a clutch jaw element 142, and the bevel gear 138 has attached thereto a clutch jaw element 144. There is keyed, or splined, to shaft 140, for longitudinal movement therealong, a pair of clutch jaw elements 146 and 148 which are adapted, respectively, for cooperation with the clutch jaw elements 142 and 144 connected to the bevel gears 136 and 138. The spacing of the clutch jaw elements 146 and 148 is greater than the spacing of the clutch jaw elements 142 and 144 so that only one pair of clutch elements at a time may be interconnected. The clutch jaw elements 146 and 148 are, respectively, provided with grooved collar portions 150 and 152 for receiving, respectively, forked yoke portions 154 and 156 which

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are carried by a rigid yoke frame 158. The forked yoke portions 156 and 154, being carried by the rigid yoke frame 158, cooperate with the clutch jaw elements 146 and 148 to maintain the spacing thereof greater than the spacing of the clutch elements 142 and 144.

The elongated shaft 140 is mounted intermediate its ends in bearings 160 and 162 carried on frame 110. The shaft 140 carries a worm 164 thereon which simultaneously drives a pair of worm gears 166, as can be best seen in Figure 7. The shaft 140 also extends rearwardly of bearing 160 and carries thereon a bevel gear 170 retained in position by nut 171, and the bevel gear 170 operates to drive a second bevel gear 172 carried at the lower end of an upright shaft 174 which is journaled in spaced sleeve bearings 176 carried by collar 177 supported on frame 110. The upper end of shaft 174 carries a pinion 178 which is positioned, and adapted, to engage with the rack 32 heretofore described, and in the manner as shown in Figure 7.

The yoke 158 has a control plunger 180 therefor rigidly connected thereto and extending rearwardly through a sleeve bearing 181. There is also a first forward control plunger 182 which extends forwardly through a sleeve bearing 184. The forward control plunger 182 is shaped so that the extended end thereof extends above and forwardly of the rear upright wall 52 of the scoop means, and carries thereon the safety control member 58.

The forward end of shaft 140 extends forwardly of the front bearing 162 and is rotatable in a sleeve member 185 carried thereon. The sleeve member carries pin 186 to which the control handle 56 is pivotally connected. The control handle 56 extends upwardly from pin 186 and is connected to forwardly extending control plunger 182 by means of a pin and slot connection, wherein pin 188 carried by plunger 182 extends through elongated hole 190 formed in the control arm 56, thereby providing a lost motion connection therebetween.

The yoke 158 is also provided with a second, elongated, forward control plunger 192. The control plunger 192 is part of the connecting means 48 that connects the scoop means 44 to the tractor means 46. The plunger 192 is pivoted at one end on pin 102 carried on flange 100, and carries at its other end a pin 194 extending transversely in opposite directions therefrom.

The frame 110 carries an elongated sleeve bearing 196 through which the plunger 192 is adapted to slide. The sleeve bearing 196 is welded in position, as can be seen, and projects at a slight angle forwardly and downwardly. The sleeve 196 is slotted diametrically at 197, at its rearward end, for receiving pin 194 therein. The control members 192 is threaded along its length and carries thereon an adjustable headed nut 198. A coil spring 200 is positioned between the forward wall of the tractor frame and the head of nut 198. By adjusting nut 198 along the length of rod 192, the bias of the spring 200 may be increased or decreased, as desired. Thus, the bias of the spring 200 establishes a predetermined force which must be imposed upon the scoop means 44 before the bias of the spring means 200 may be overcome so as to effect sufficient movement of the control plunger 192 rearwardly so as to effect shifting of the yoke frame 158 to the position, shown in Figure 6, wherein the tractor means is caused to effect movement thereof rearwardly, or to the left, as seen in Figure 6.

When tractor 46 and scoop 44 are moving forwardly, the push-force from tractor 46 is transmitted through spring 200 to the scoop 44. When resistance on scoop 44 exceeds the bias of spring 200, the tractor 46 advances relative to plunger 192, and pin 194 engages yoke 158 and throws yoke 158 to the position of Figure 6 as tractor 46 advances further. The position of parts in Figure 6 stops further forward movement and rearward movement begins, the tractor 46 moving rearwardly relative to plunger 192 and scoop 44 until the position of Figure 6A

is attained. Then, tractor 46 exerts a pull-force on scoop 44 through engagement of sleeve 196 and pin 194 on plunger 192.

The frame 110 carries an over-center toggle arrangement which is provided for insuring the throwing of the yoke 156 and of the clutch-jaw elements 146 and 148 to one or the other of the two clutching positions. This toggle arrangement includes a pair of spaced members 202 and 204 which are normally biased apart by a relatively stiff compression spring 206. One of said members, 202, engages an upwardly extending terminus of yoke portion 156, so as to transmit the bias of the spring 206 to the yoke frame 158. The other member 204 engages an adjustable abutment 208 which is threaded in boss 210 on frame 110; and the adjustment of abutment 208 selectively varies the bias of spring 206.

The frame 110 carries a forwardly extending latch plate 212 having an indented latch recess 214 formed therein for receiving the control arm 56. The control arm 56 is adapted to pivot about the axis of shaft 140 to permit movement of said arm into and out of the latch recess 214.

The frame 110 also carries a horizontal sleeve bearing 216 which is positioned transverse to the directions in which the tractor 46 is adapted to move. The axis of the sleeve bearing 216 is disposed substantially vertically above the axis of the wheels 112 and 114. The sleeve bearing carries therein an elongated shaft 218 which carries on its ends a pair of flanged wheels 220. The flanged wheels 220 are adapted for riding on rails 28 and 30, so as to support the tractor 46 on said rails as the tractor means moves upwardly along the elevator means 20. The flanges 222 on the wheels 220 are arranged to cooperate with the inner longitudinal edges of the rails 28 and 30 so as to maintain the tractor centered with respect to said rails as the tractor moves along the elevator means 20.

The drive wheels of the tractor are of special construction, which will now be described. As was noted heretofore, the worm 164 on shaft 140 drives a pair of worm gears 166. Each worm gear 166 is positioned so that its axis of rotation is located in a plane perpendicular to the direction of movement of the tractor, and at an upwardly inclined angle with respect to the horizontal. Each bevel gear 166 has a stub shaft 224 extending laterally outwardly therefrom, and being journaled in a sleeve bearing 226 which is carried by an axle-support member 228 mounted on the frame 110. A portion of stub shaft 224 located outwardly of bearing 226 is splined, or keyed to provide means for effecting a driving connection between the shaft 224 and a wheel hub 230 which is axially slidable thereon. The wheel hub 230 carries thereon a resilient tire 232, and the wheel hub 230 is so shaped and formed as to define an annular recess 234. There is provided a compression spring 236 disposed longitudinally between the axle-support 228 and the recess portion 234 of the wheel hub 230. The arrangement of wheel and axle is such that the hub 230 and tire 232 thereon is arranged for axial movement with respect to the stub shaft 234. The wheel hub 230 is normally biased toward an outermost position by spring 236.

Because of the arrangement of parts, whereby the shafts 224 are arranged inclined with respect to the horizontal, the wheels 112 and 114 may be referred to as being inversely-cambered, or toed out. Thus, the tire 232 on wheel 114 engages both the bottom wall and one side wall of the gutter 18 and, likewise, the tire on the other wheel 112 engages both the bottom wall and the opposite side wall of gutter 18. The engagement of the tires on each of wheels 112 and 114 with both a side wall and bottom wall of the gutter provides for additional traction between the wheels and the walls of the gutter. In the preferred form, both of the wheels 112 and 114 are individually biased outwardly, although the biasing of only a single wheel outwardly will also provide improved re-

sults. The foregoing arrangement also provides that the tractor means will be centered with respect to the gutter 18, and the resilient mounting of the wheels accommodates for any irregularities that may exist in the walls of the gutter.

In operation, consider that the tractor and attached scoop means are moving forwardly so as to move the scoop means along the gutter in the direction towards the mass of waste therein. The tractor may be moving at a rate of about 150 feet per minute, and the inertia of the device effects movement of the scoop means into the waste matter until sufficient resistance is obtained against the scoop means to effect overcoming of the bias of spring 200, whereupon the control rod 192, through engagement of pin 194 with yoke 158, effects movement of the yoke means 158 to the position shown in Figure 6 at which point clutching together of jaw elements 144 and 148 effects reversal of the direction of movement of the tractor means. The tractor means will then move rearwardly from the position shown in Figure 6 to the position shown in Figure 6A, during which movement the control rod 192 slides through sleeve 196 and pin 194 moves into slot 197 in sleeve 196 and effects a pull-type connection between tractor means 46 and scoop means 44. The tractor means 46 then pulls the scoop means 44 rearwardly with a load of waste trapped between the upright walls of the scoop means. The tractor means continues movement along the gutter 18 and onto the elevator means 20. During the movement of the tractor means up the elevator, the tractor is supported from the wheels 220 which are riding on tracks 28 and 30, and traction is obtained by means of pinion 178 cooperating with rack 40.

The tractor and scoop means continue up the elevator until the scoop means are aligned with the bottom opening 42 in the elevator means, through which the captured waste matter drops for discharge from the elevator means. There is provided a fixed abutment member, or stop, 240 carried by elevator means 20 and positioned across the path of movement of tractor 46, against which the rearwardly projecting control plunger 180 strikes at the end of the run up the elevator means, and this effects the shifting of the yoke member 158 in a direction to effect clutching of the clutch jaw member 142 and 146, and this causes reversal of movement of the tractor means and scoop means to cause the same to move down the elevator and forwardly into the gutter 18. This back and forth movement of the tractor and scoop continues until the gutter 18 has been cleared of waste matter. In the event that there is any obstruction lying above the gutter, the striking of the safety member 58 against the obstruction will effect reversal of movement of the tractor means.

In the starting up of the tractor means, it is desirable to have the drive means and clutches in neutral, and the handle 56 affords means for putting the yoke 158 in a neutral position at which the motive means 116 may be started up. While the instant disclosure contemplates use of an internal combustion engine as the motive means 116, it will be evident that an electric motor may also be used with the drive means here disclosed; and if a reversible electric motor were to be used, it will be evident that certain of the clutching elements disclosed could be eliminated, and motor switches and actuators therefor could be substituted to effect the necessary reversals of direction of the tractor means.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. A barn-gutter cleaner comprising scoop means arranged to be disposed in the gutter for movement there-

along, tractor means connected to said scoop means for moving said scoop means in either of opposite directions through said gutter, so as to effect loading of said scoop means when said scoop is moved in one direction and so as to move in the opposite direction to transport said loaded scoop means to a discharge station where said scoop means may be unloaded, means for automatically regulating the length of the path of movement of said tractor means and scoop means along said gutter, and means responsive to the resistance encountered by the scoop means, when moving in the direction for effecting loading thereof, to effect reversal of the direction of movement of said tractor means.

2. A barn-gutter cleaner comprising scoop means arranged to be disposed in the gutter for movement therealong, tractor means connected to said scoop means for moving said scoop means in either of opposite directions through said gutter, so as to effect loading of said scoop means when said scoop is moved in one direction and so as to move in the opposite direction to transport said loaded scoop means to a discharge station where said scoop means may be unloaded, means for automatically regulating the length of the path of movement of said tractor means and scoop means along said gutter, and safety means extending above the gutter and responsive to engagement with a body spaced above the gutter for effecting reversal of the direction of movement of said tractor means.

3. A barn-gutter cleaner comprising, in combination: scoop means arranged to be disposed in the gutter for movement therealong, said scoop means comprising frame means dimensioned to enter a gutter and adapted to cooperate with said gutter to center the frame means therein, a fixed upright abutment wall on said frame means, a movable wall member spaced from said fixed abutment wall and being pivoted on said frame, said movable wall being arranged to pivot to a first, loading, position, where said wall is disposed in substantially the direction of movement of said scoop means, and to a second, loaded, position where said wall is disposed upright and transverse to the direction of movement of said scoop means; tractor means connected to said scoop means for moving said scoop means in either of opposite directions through said gutter, so as to effect loading of said scoop means when said scoop is moved in one direction and so as to move in the opposite direction to transport said loaded scoop means to a discharge station where said scoop means may be unloaded; means for automatically regulating the length of the path of movement of said tractor means and scoop means along said gutter; and safety means extending above the fixed abutment wall of said scoop means, and being responsive to engagement with a body spaced above the gutter, for effecting reversal of the direction of movement of said tractor means.

4. A barn-gutter cleaner comprising scoop means arranged to be disposed in the gutter for movement therealong, tractor means connected to said scoop means for moving said scoop means in either of opposite directions through said gutter, so as to effect loading of said scoop means when said scoop is moved in one direction and so as to move in the opposite direction to transport said loaded scoop means to a discharge station where said scoop means may be unloaded, drive means for said tractor means, clutching means arranged to be disposed in a first position, wherein said drive means causes said tractor means to move in one direction, and in a second position, wherein said drive means causes said tractor to move in the opposite direction, and in a third position, wherein the drive means are in neutral, and toggle means for normally disposing said clutching means either in said first or second positions.

5. A barn-gutter cleaner comprising scoop means arranged to be disposed in the gutter for movement therealong, tractor means connected to said scoop means for

moving said scoop means in either of opposite directions through said gutter, so as to effect loading of said scoop means when said scoop is moved in one direction and so as to move in the opposite direction to transport said loaded scoop means to a discharge station where said scoop means may be unloaded, drive means for said tractor means, clutching means arranged to be disposed in a first position, wherein said drive means causes said tractor means to move in one direction, and in a second position, wherein said drive means causes said tractor to move in the opposite direction, and in a third position wherein the drive means are in neutral, toggle means for normally disposing said clutching means either in said first or second positions, and a manual control for selectively effecting movement of said clutching means to said neutral position.

6. A barn cleaning system comprising means defining a continuous gutter adapted to receive waste matter, scoop means movable in opposite directions in said gutter, tractor means for moving said scoop means in said gutter in one direction to load same with waste matter and then to move said loaded scoop means in the opposite direction, gutter-shaped elongated elevator means aligned with said gutter and arranged so that the loaded scoop means will move therein after said loaded scoop means leaves the gutter, said elevator means having a bottom opening along its length through which the waste matter being moved by said scoop means falls, to effect unloading of said scoop means, track means for supporting said tractor thereon as said tractor moves the scoop means up the elevator means, and stop means for effecting reversal of movement of said tractor means upon said scoop means being unloaded.

7. A barn cleaning system comprising means defining a continuous gutter adapted to receive waste matter, scoop means movable in opposite directions in said gutter, tractor means for moving said scoop means in said gutter in one direction to load same with waste matter and then to move said loaded scoop means in the opposite direction, gutter-shaped elongated elevator means aligned with said gutter and arranged so that the loaded scoop means will move therein after said loaded scoop means leaves the gutter, said elevator means having a bottom opening along its length through which the waste matter being moved by said scoop means falls to effect unloading of said scoop means, track means for supporting said tractor thereon as said tractor moves the scoop means up the elevator means, stop means for effecting reversal of movement of said tractor means upon said scoop means being unloaded, and means responsive to the load imposed upon said scoop means for effecting reversal of movement of said tractor means upon said scoop means being loaded.

8. A barn-gutter cleaner comprising scoop means arranged to be disposed in the gutter for movement therealong, tractor means connected to said scoop means for moving said scoop means in either of opposite directions through said gutter, so as to effect loading of said scoop means when said scoop is moved in one direction and so as to move in the opposite direction to transport said loaded scoop means to a discharge station where said scoop means may be unloaded, means for automatically regulating the length of the path of movement of said tractor means and scoop means along said gutter, means responsive to the resistance encountered by the scoop means, when moving in the direction for effecting loading thereof, to effect reversal of the direction of movement of said tractor means, and selectively adjustable means for determining the critical loading of said scoop means which will effect reversal of movement of said tractor means.

9. A barn cleaning system comprising means defining a continuous gutter adapted to receive waste matter, scoop means movable in opposite directions in said gutter, tractor means arranged to enter into said gutter and to move

along said gutter for moving said scoop means in one direction to load same with waste matter and then to move said loaded scoop means in the opposite direction, gutter-shaped elongated elevator means aligned with said gutter so that the tractor means and loaded scoop means will move therein after said loaded scoop means leaves the gutter, said elevator means having a bottom opening along its length through which the waste matter being moved by said scoop means falls to effect unloading of said scoop means, track means for supporting said tractor thereon as said tractor moves the scoop means up the elevator means, and stop means for effecting reversal of movement of said tractor means upon said scoop means being unloaded.

10. A tractor including a pair of inversely-cambered traction wheels splined to a pair of axles, which axles are axially immovable with respect to each other, said wheels being arranged to be disposed in a track having a bottom and spaced upright side walls, said wheels adapted to provide for tractive engagement thereof with both the bottom and side walls of the track, means maintaining said pair of axles in axially fixed attitude with respect to each other, and resilient coil spring means biasing at least one of said traction wheels axially outward on its axle and apart from the other traction wheel, and each coil spring means being positioned radially between the traction wheel which it biases and the wheel's axle.

11. A tractor including a pair of inversely-cambered traction wheels splined to a pair of axles, which axles are axially immovable with respect to each other, said wheels being arranged to be disposed in a track having a bottom and spaced upright side walls, said wheels adapted to provide for tractive engagement thereof with both the bottom and side walls of the track, means maintaining said pair of axles in axially fixed attitude with respect to each other, and resilient coil spring means biasing each traction wheel axially outward on its axle and apart from the other traction wheel, and each coil spring means being positioned radially between the traction wheel which it biases and the wheel's axle.

12. A tractor including a pair of inversely-cambered traction wheels splined to a pair of axles, which axles are axially immovable with respect to each other, said wheels being arranged to be disposed in a track having a bottom and spaced upright side walls, said wheels adapted to provide for tractive engagement thereof with both the bottom and side walls of the track, means maintaining said pair of axles in axially fixed attitude with respect to each other, and a coil spring coaxial of the axle of each traction wheel biasing each traction wheel apart from the other traction wheel and toward the wheel's associate upright track wall, and each coil spring means being positioned radially between the traction wheel which it biases and the wheel's axle.

13. A scoop for use in cleaning barn gutters, said scoop comprising frame means dimensioned to enter a gutter and adapted to cooperate with said gutter to center the frame means therein, a fixed upright abutment wall on said frame means, a movable wall member spaced from said fixed abutment wall and being pivoted on said frame, said movable wall being arranged to pivot to a first, loading, position where said wall is disposed substantially in the direction of movement of said scoop within a gutter, and to a second, loaded, position where said wall is disposed upright and transverse to the direction of movement of said scoop, and said movable wall member being so pivoted and arranged as to be in said first position when the scoop is being moved in a direction to effect loading of said scoop means and being in said second position when the scoop is being moved in the opposite direction.

14. A scoop for use in cleaning barn gutters, said scoop comprising frame means dimensioned to enter a gutter and adapted to cooperate with said gutter to center the frame means therein, a fixed upright abutment

wall on said frame means, a movable wall member spaced from said fixed abutment wall and being pivoted on said frame, said movable wall being arranged to pivot to a first, loading, position where said wall is disposed substantially in the direction of movement of said scoop within a gutter, and to a second, loaded, position where said wall is disposed upright and transverse to the direction of movement of said scoop, said movable wall member being so pivoted and arranged so as to be in said first position when the scoop is being moved in a direction to effect loading of said scoop and being in said second position when the scoop is being moved in the opposite direction, and a base plate fixedly carried by said frame and spaced from said fixed abutment wall arranged to engage the bottom of a barn gutter for movement thereover.

15. A scoop for use in cleaning barn gutters, said scoop comprising frame means dimensioned to enter a gutter and adapted to cooperate with said gutter to center the frame means therein, a fixed upright abutment wall on said frame means, a movable wall member spaced from said fixed abutment wall and being pivoted on said frame, said movable wall being arranged to pivot to a first, loading, position where said wall is disposed substantially in the direction of movement of said scoop within a gutter, and to a second, loaded position where said wall is disposed upright and transverse to the direction of movement of said scoop, said movable wall member being so pivoted and arranged so as to be in said first position when the scoop is being moved in a direction to effect loading of said scoop and being in said second position when the scoop is being moved in the opposite direction, and a base plate fixedly carried by said frame and spaced from said fixed abutment wall arranged to engage the bottom of a barn gutter for movement thereover, said base plate having an inclined upper surface and a tapered leading edge for effecting efficient scooping-up of matter within the barn gutter.

16. A scoop for use in cleaning barn gutters, said scoop comprising frame means dimensioned to enter a gutter and adapted to cooperate with said gutter to center the frame means therein, a fixed upright abutment wall on said frame means, a movable wall member spaced from said fixed abutment wall and being pivoted on said frame, said movable wall being arranged to pivot to a first, loading, position where said wall is disposed substantially in the direction of movement of said scoop within a gutter, and to a second, loaded, position where said wall is disposed upright and transverse to the direction of movement of said scoop, said movable wall member being so pivoted and arranged so as to be in said first position when the scoop is being moved in a direction to effect loading of said scoop means and being in said second position when the scoop is being moved in the opposite direction, a base plate fixedly carried by said frame and spaced from said fixed abutment wall arranged to engage the bottom of a barn gutter for movement thereover, said base plate having an inclined upper surface and a tapered leading edge for effecting efficient scooping-up of matter within the barn gutter, and said movable wall member adapted to overlie closely adjacent the inclined upper surface of said base plate when said scoop is being moved in a direction to effect loading of said scoop.

17. A scoop for use in cleaning barn gutters, said scoop comprising frame means dimensioned to enter a gutter and adapted to cooperate with said gutter to center the frame means therein, a fixed upright abutment wall on said frame means, a movable wall member spaced from said fixed abutment wall and being pivoted on said frame, said movable wall being arranged to pivot to a first, loading, position where said wall is disposed substantially in the direction of movement of said scoop within a gutter, and to a second, loaded, position where

said wall is disposed upright and transverse to the direction of movement of said scoop, and an off-center pivot connection between the movable wall and said frame means for effecting movement of said movable wall to said first position when said scoop is being moved in a direction to effect loading of said scoop, and to effect movement to said second position when said scoop is being moved in the opposite direction.

18. A barn-gutter cleaner comprising scoop means arranged to be disposed in a gutter having a bottom and upright side walls for movement therealong, tractor means connected to said scoop means for moving said scoop means in either of opposite directions through said gutter, so as to effect loading of said scoop means when said scoop is moved in one direction and so as to move in the opposite direction to transport said loaded scoop means to a discharge station where said scoop means may be unloaded, said tractor means comprising a wheel supported frame wherein opposite wheels thereof are each disposed and arranged to simultaneously contact both the bottom and one side wall of the track to effect tractive engagement both between the wheel and the track bottom and between the wheel and track side, and re-

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silient means operative for biasing at least one of said wheels toward its associate upright track side wall, and means for automatically regulating the length of the path of movement of said tractor means and scoop means along said gutter.

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