

Aug. 8, 1961

J. M. McCANN ET AL

2,995,260

UNLOADING APPARATUS

Filed Feb. 20, 1956

3 Sheets-Sheet 1

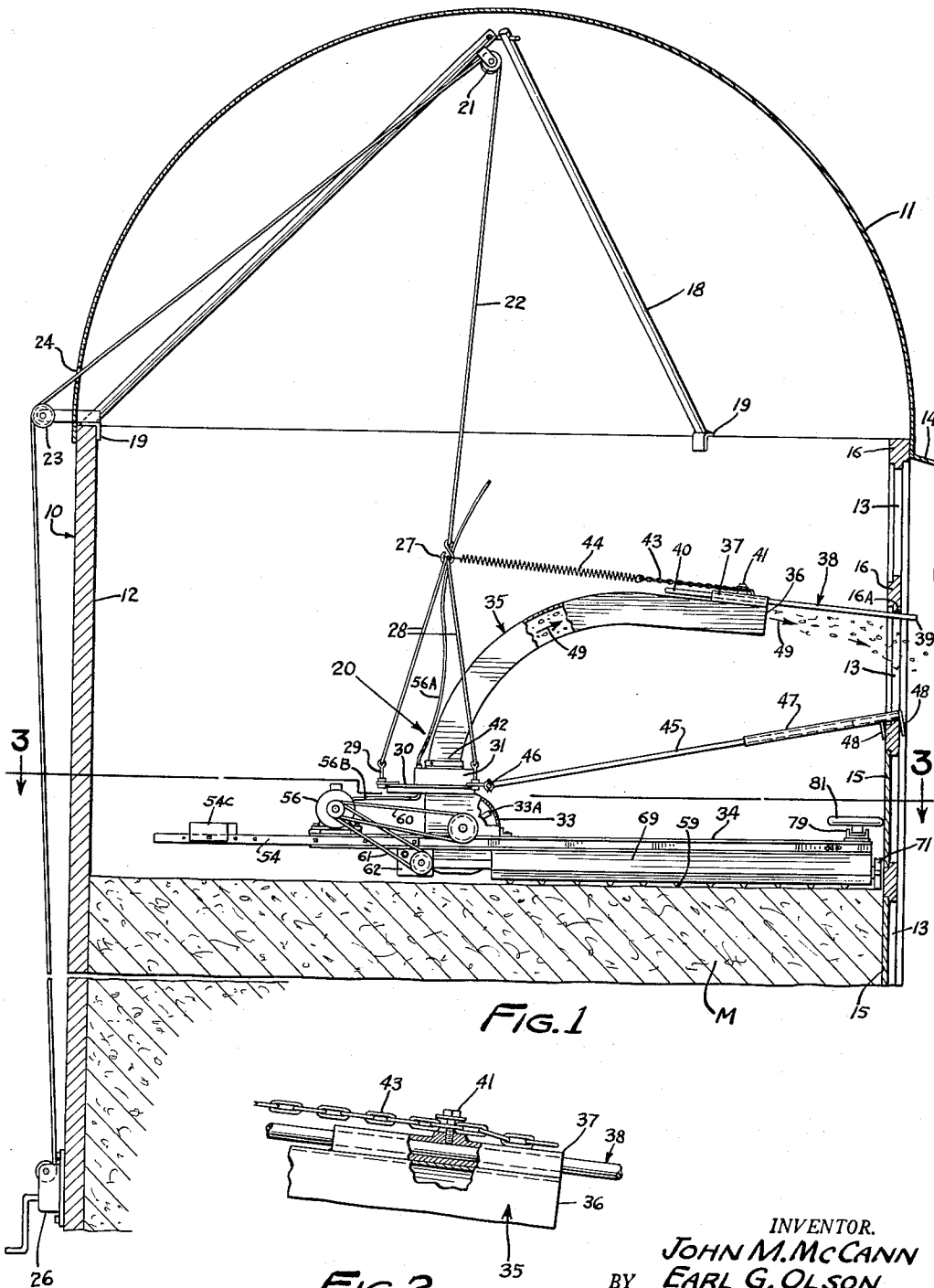


FIG. 1

FIG. 2

INVENTOR.  
JOHN M. McCANN  
BY EARL G. OLSON  
*Paul, Moore & Ruppel*  
ATTORNEYS



Aug. 8, 1961

J. M. McCANN ET AL  
UNLOADING APPARATUS

2,995,260

Filed Feb. 20, 1956

3 Sheets-Sheet 3

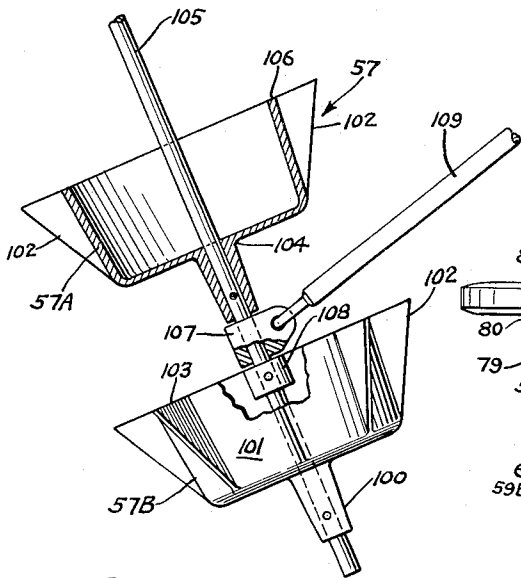


FIG. 6

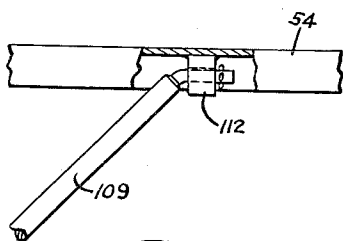


FIG. 7

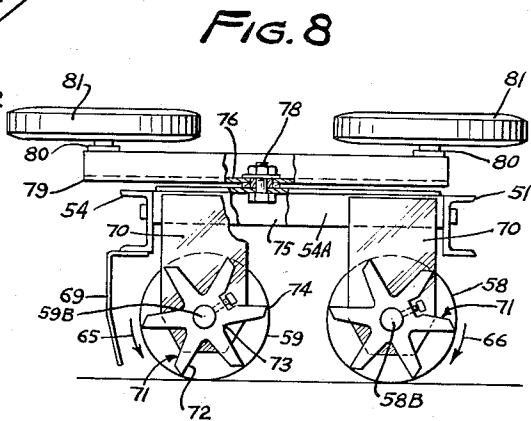


FIG. 8

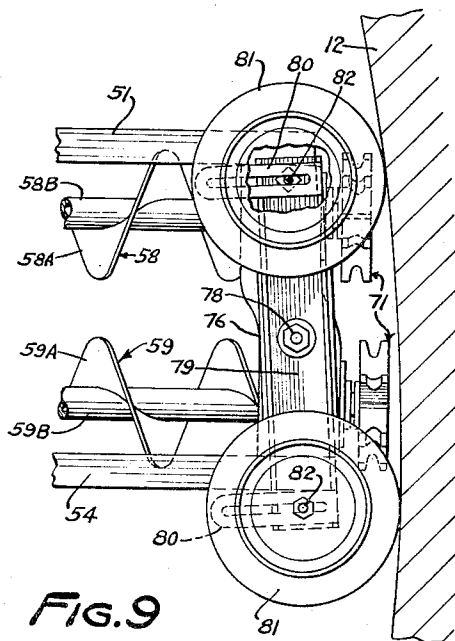


FIG. 9

INVENTOR.  
JOHN M. McCANN  
BY EARL G. OLSON  
*Paul Moore & Suggs*  
ATTORNEYS

1

2,995,260

**UNLOADING APPARATUS**

John M. McCann, Long Lake, and Earl G. Olson, Minneapolis, Minn., assignors to Vandale Corporation, Long Lake, Minn., a corporation of Minnesota  
 Filed Feb. 20, 1956, Ser. No. 566,696  
 25 Claims. (Cl. 214—17)

This invention relates to new and useful improvements in apparatus for unloading silos or the like and more particularly to new and useful improvements in silo unloaders of the type disclosed in Patent No. 2,719,058, issued September 27, 1955.

Broadly speaking, this invention comprises a silo unloader having an extended helical collecting or gathering means positioned upon the surface of material within a silo for collecting or delivering material from the surface of the ensilage to adjacent the center of the silo, said collecting means having one end in communication with the wall of the silo and rotatable about its other end, a central impeller means for receiving said gathered material and continuing the movement thereof and ejector means for directing it from the silo, in which new and useful wall engaging wheel means is provided for maintaining the guided engagement of said wall engaging end with the silo wall while permitting ready travel with respect thereto, in which new and improved drive hub means is provided in cooperation therewith for driving the collecting means over the surface of the ensilage and maintaining said end in communication with said wall for travel thereover, in which new and useful means for suspending and positioning the ejection means is provided whereby it will be retained in discharging position during the operation of the unloader and the travel of said collecting means, and in which new and useful cleaning means is provided in cooperation with said wall engaging means for loosening material immediately adjacent the wall of the silo to permit effective operation of the collecting means with respect thereto.

It is therefore an object of this invention to provide a silo unloader having rotary feed means adapted for travel on the surface of the ensilage, and having improved means for retaining an end of the rotary feed means in communication with the wall of the silo and for guiding the same for ready travel thereover.

A further object of this invention resides in the provision of a silo unloader having new and useful ensilage ejection structure including a new and unique guide means for directing the ensilage from the interior to the exterior of the silo.

Still another object of this invention resides in the means for supporting said unique guide means.

Still a further object of the invention resides in the provision of a silo unloader pendently suspended and having an ejection means for ejecting ensilage from the silo, the ejection means including new and unique guide means supported from the suspension means.

Still a further object of the invention resides in the provision of the specific chute and the particular resilient connection supporting said chute from the silo suspension cable in cooperation with the limit means operable in cooperation with the resilient means for determining the position of the chute.

Another object of this invention is to provide in a silo unloader having a rotary gathering means adapted for rotation substantially about the center of the silo and having an end in communication with the silo wall, of new and useful wall wheel means for engaging the silo wall.

Still a further object of this invention is to provide in a silo unloader having means for gathering ensilage from

2

the surface thereof and for conveying it from adjacent the silo wall to substantially the center thereof, the improvement of a new and unique wall cleaning means.

Still a further object of this invention is to provide in a silo unloader having gathering means rotatable over the surface of the ensilage and a drive means for driving the same, of a drive hub means including new and useful structural features.

Other and further objects of the invention reside in the specific structural details of the apparatus as described, pictured and claimed and will become apparent as the description proceeds.

To the accomplishment of the foregoing and related ends, this invention then comprises the features herein-after fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

This invention will be described with reference to the drawings in which corresponding numerals refer to the same parts and in which:

FIGURE 1 is a vertical sectional view of a conventional silo showing partially in elevation and partially in vertical section the silo unloader of the present invention in position therein;

FIGURE 1A is an enlarged fragmentary elevational view, partly broken away showing the manner in which the ejection chute is connected to the central ring assembly;

FIGURE 2 is an enlarged fragmentary elevational view of one end of the ejection chute;

FIGURE 3 is a vertical sectional view taken along the line and in the direction of the arrows 3—3 of FIGURE 1;

FIGURE 4 is an enlarged plan view of the advance guide wheel for the unloader;

FIGURE 5 is a sectional view taken along the line and in the direction of the arrows 5—5 of FIGURE 4;

FIGURE 6 is a fragmentary top plan view, partially in horizontal section, of the drive hub of the instant invention;

FIGURE 7 is a fragmentary plan view of a portion of the conveying means and showing the drive hub tie rod connected thereto;

FIGURE 8 is an end elevational view of the conveying means and showing the dual wall cutters and pivoted wall wheels; and

FIGURE 9 is a fragmentary plan view of the structure of FIGURE 8.

Reference is now made to the drawings and specifically to FIGURES 1-3. The silo or the like in which this invention is adapted to be utilized is of upright cylindrical construction and is generally indicated by the numeral 10.

It is provided with a hollow hemispherical dome 11 and a vertical cylindrical wall 12. Disposed in vertical alignment in the wall 12 is a plurality of apertures 13 usually leading into a chute 14 (shown in fragmentation). The apertures 13 are provided with suitable means for retaining in place a plurality of doors 15 for closing the apertures to the exterior of the silo, as shown. The top and bottom of apertures 13 are defined by cross-braces 16, and the apertures may be provided with facings of any suitable sort adapted to receive and retain doors 15 therein as illustrated best with reference to FIGURE 1. As seen with reference to that figure, when the ensilage or other material M is stored in the silo, the doors, which can be hinged or are removable, are placed in their corresponding apertures and retained therein by suitable means, usually the force of the packed material M alone being sufficient to so retain them.

While the silo has been described as a substantially

upright circular cylinder, hollow, and having a semi-spherical roof, and with a plurality of vertically aligned doors leading to an outside chute, the silo unloader of this invention may be used with other silos or the like. While preferably, the silos or the like are circular in horizontal cross-section, they may be oval, out of round, and even substantially square, octagonal, etc. so long as a substantially continuous and uninterrupted inner wall surface is provided for guiding one end of the collecting means thereover. In such fashion, while it is preferred to provide a roof or cover, such may be dispensed with, and while it is preferred to support the silo unloader from means positioned on the top wall of the silo, it may in some instances be otherwise suspended so long as it is suspended from approximately the center of the silo. The positioning and number of the doors and apertures 13 is likewise not critical so long as the ensilage may be directed from the interior to the exterior of the silo.

The silo unloader generally designated 20 is suspended in communication with the surface of the material M so that the bottom portions of the helical flight conveyors engage the top surface thereof as subsequently explained. The unloader dangles from a suspending means 18, in this instance a tripod positioned upon the top edge of the wall 12 by foot flanges 19. To one of the tripod legs is secured a first pulley 21 positioned so that the flexible member or cable 22 extends from a point substantially underneath the apex of the tripod downwardly as shown in FIGURE 1. On the foot flange 19 of this leg is supported a second pulley 23 extending toward the exterior of the silo. The dome 11 is apertured at 24 to permit such extension and to permit the cable 22 to emerge from the cover of the silo and continue downwardly to a securing means 26 or winch, secured to the exterior of the silo wall. Thus, the silo unloader 20 will be suspended from a flexible means 22 having one end secured exterior of the silo wall so that the cable may be extended or retracted for the lowering or raising of the unloader within the silo, the other end of the cable 22 supporting the unloader. The interior end of the cable 22 is secured to an S-hook 27 to which is also secured an adjusting cable assembly comprising three cables 28, each secured at one end to hook 27 and at the other end to an eye-bolt 29, eye-bolt 29 in turn supporting a triangular frame member 30.

Supported upon the frame member 30, resting thereon and secured thereto, is a combination suspension and electrical contact ring assembly 31. Assembly 31 serves to support housing 33 and collecting or gathering means 34 so that they may rotate together about a vertical axis substantially at the center of the silo and also serves to support discharge chute 35 so that it may remain rotatively stationary with reference to the silo. Assembly 31 also provides means for connecting electrical lead 56A to electrical lead 56B for supplying power to the motor 56.

The assembly 31, and housing 33 form no part of this invention; consequently will not be described in greater detail. Such structure is shown in co-pending application Serial No. 389,080, filed October 29, 1953, now Patent No. 2,794,560.

Chute 35 is a three-sided chute of U configuration having the open mouth of the U downwardly directed throughout the arcuate and horizontally extending portions of the chute. Chute 35 terminates at one end 36 which end is spaced inwardly a substantial distance from wall 12.

The other end 42 of chute 35 is supported on assembly 31, or may be pivoted about a horizontal axis thereto and may be of somewhat flexible material (in this instance sheet steel) so that end 36 may move in an arcuate direction. Preferably, it is both pivoted to assembly 31 and slightly flexible, as shown in FIGURE 1A. In this instance chute 35 is pivoted at 32 to parallel angle members 32A secured to the top surface of assembly 31.

While pivot 32 may be a single continuous bolt or rod through the width of chute 35 it is preferred to have two individual bolts, rivets, etc., one in each of the side walls of chute 35 and opposed to provide the pivot.

Chute 35 has secured thereto at end 36 and on the top thereof a sleeve 37 within which is positioned a limit means or rod 38. The rod 38 has an end 39 in engagement with the under-surface 16A of one of the members 16 and a second end 40 passed through sleeve 37. The rod 38 is immovably but adjustably positioned in sleeve 37 by a retaining means or set screw 41 which set screw 41 also serves as an anchor for one end of a flexible member or chain 43. Chain 43 is secured to a resilient member or extension spring 44 the other end of which is secured to the S-hook 27. If desired, the chain 43 and spring 44 may extend to the next higher cross brace 16, and spring 44 may be secured thereto.

Thus, it will be seen that the spring 44 in cooperation with chain 43 serves to bias the chute 35 which is of flexible material or pivoted to assembly 31 so that end 36 may move substantially upwardly and downwardly with reference to the material surface M or arcuately about a horizontal axis approximately in the center of the silo, in a direction so that end 39 engages the under-surface of the brace 16 and thus retains the chute in the position of FIGURE 1. The end 39 by engagement with the undersurface of brace 16 determines the limit position to which such biasing occurs. The effect of this is to allow the silo unloader to be moved substantially upwardly and downwardly while retaining rod 38 at a datum position in communication with the brace 16 and effectively positioning the terminal end of the chute 36 to discharge material at a predetermined vertical position through the aperture 13 as shown. As shown, the rod 38, and consequently the discharge position of chute 35 is centered horizontally in the aperture 16 and maintained centered by the engagement of flanges 48 with brace 16, as further explained.

The silo unloader is of the type having a gathering arm or collecting means slightly greater than the average diameter of the silo with which it is to be used as specified in said Patent No. 2,719,058, and rod 38 is in only frictional engagement with the underside of the brace 16 and under only such frictional engagement as is provided by the tension under which spring 44 is positioned (which is usually relatively weak) and is free to slide with reference to brace 16.

A torque arm 45 or stabilizing means for preventing the rotation of the chute 35 is pivoted about a horizontal axis 46 to the silo unloader and usually to the framework 30. The torque arm 45 has an end received in sleeve 47 provided with downwardly depending tongs or members 48 for securing the sleeve 47 to a brace 16 and preventing radial or arcuate movement thereof. Tongs 48 of sleeve 47 are preferably positioned at one corner of an aperture 16 so that arm 45 is parallel to but off-set with reference to chute 35 so as not to be positioned thereunder. The torque arm 43 in cooperation with sleeve 47 serves to secure assembly 31 and chute 35 effectively against other than very limited rotary motion within the silo while permitting complete rotary motion of gathering means 34.

The impeller housing 33 is supported from the assembly 31 and carries an impeller 33A for receiving material gathered by the collecting arm and for engaging it and impelling it in a direction upwardly and outwardly as determined by the confinement of chute 35 as shown by the arrows 49.

The frame 51 for supporting the gathering means generally designated 52 has parallel major horizontal or side members 53 and 54 extending at the left end of the unloader with reference to FIGURE 3 to support the counterweights 54C and a platform 55 for motor 56 which drives the central impeller 33A, the drive hubs 57 and the helical augers 58 and 59, the impeller being driv-

5

en through belt 60, and the conveyors 58 and 59 and drive hub 57 being driven through belt 61 through a gear train enclosed in housing or gear box 62.

The frame 51 is of elongated rectangular shape with major extensions 53 and 54 and minor extensions or ends 53A and 54A.

The collecting means or gathering means 52 comprises the conveyors or helical augers 58 and 59 rotating in opposite directions as indicated by the arrows 65 and 66 in FIGURE 8. Conveyors 58 and 59 are journaled for rotation in and supported by bearing supports 70 depending from member 54A at the right end thereof with reference to FIGURES 1 and 9, the other ends of the conveyor being journaled for rotation in and supported by housing 62 as shown in FIGURE 3.

Conveyors 58 and 59 in cooperation with shield 69 serve to engage the material M within the silo and move it inwardly into communication with the impeller 33A of housing 33 from whence it is ejected from the silo as shown by arrow 49.

As shown best in FIGURE 9 the member 54A of frame 51 comprises an angle member and is off-set inwardly at its juxtaposition to conveyor 58. Conveyor 58 comprising flighting 58A and shaft 58B is thus of shorter radial extension in the direction of the silo wall than conveyor 59. Shaft 58B has secured to the exterior and thereof a wall cleaning means 71. Conveyor 59 likewise has flighting 59A and shaft 59B, the shaft 59B also having secured to the extension thereof a wall cleaning means 71. Because of the shorter extension of conveyor 58, means 71 for conveyor 58 will be radially off-set with respect to means 71 for conveyor 59 as shown in FIGURE 9. Consequently, the two means in cooperation will cut a path or swath wider than if they were positioned in prolongation.

The means 71 as shown best in FIGURE 8 comprises a plurality of extending arms 72 positioned about a center hub 73, in this instance six in number, and having ensilage engaging ends 74 shaped to form a surface declined from their direction of rotation (shown by arrows 65 and 66 for conveyors 59 and 58 respectively) and shaped to provide a center circumferentially extending recess in each of arms 71 as shown in FIGURE 9.

Angle member 54A as shown in FIGURE 9 includes a horizontal flange 75 on which is secured a wear plate 76 of like configuration but somewhat wider extension as shown in FIGURE 9 to which is secured a pivot bolt assembly 78 on which is pivoted a channel member 79 having the channel flanges turned upwardly with reference to FIGURE 8.

Secured to the top edges of the flanges of channel 79 are members 80 each having an elongated central aperture and having an inwardly overhanging end. Members 80 serve as ways in which the wheels 81 are positioned by pivot bolt assemblies 82. Ways 80 allow the utilization of different size wheels 81 with the unloader and allow the different size wheels to be positioned so that the portion in communication with the wall of the silo will be substantially at the point shown in FIGURE 9 to space the wall cleaners 71 from the wall yet position them closely adjacent thereto for effective cleaning thereof.

It is noted with reference to FIGURES 8 and 9 that the pivot 78 is substantially centered between the axis 82 of wheels 81, but not at the center between the shafts 58B and 59B for conveyors 58 and 59. Instead, axis 78 is spaced asymmetrically with reference thereto and rearwardly of a center line between shafts 58B and 59B so that left wheel 81 with reference to FIGURE 8 is behind shaft 59B a greater distance than the right wheel 81 is ahead of shaft 58B.

The advance guide wheel 85 shown in FIGURES 3 and 5 is pivoted at 86 to a bifurcated member 87 supported upon an extending guide arm 88 provided at its inner end 89 with a clamp 89A. Guide arm 88 is in turn

6

supported upon a guide arm extension 90 secured at one end to frame member 53A and extending as shown in FIGURE 3. It is provided at its outward end with a lug 91 to which is hooked the reduced end of a guide arm brace 92, the other end of which is likewise secured to member 53 as shown in FIGURE 3. A guard rod 94 has an end clamped to brace 92 and a second end secured to member 53 adjacent the front wheel 81 as shown in FIGURE 3.

Extension 90 is provided with two clamps 89A, turned in the opposite direction with reference to clamp 89A for arm 88.

Clamps 89A as shown in FIGURE 5 are U-members with spaced arms 89B of such extension as to engage opposite portions of the circumference of the rod forming arm 88 or extension 90 as the case may be and are provided with bolt assemblies 89C for immobilizing the respective rod with reference thereto. Thus bolt assemblies 89C may be loosened whereupon the arm 88 may be extended or retracted with reference to extension 90 and assemblies 89C may be tightened for securely immobilizing the extension at that position.

As shown in FIGURE 6, the drive hub means generally designated 57 comprises a pair of identical roughly bell-shaped members 57A and 57B spaced as shown. Each of the hubs 57A and 57B is identical and their configuration will be explained with reference to hub 57B. The hub comprises an apertured center boss 100 and enlarged circular body portion 101 provided with a plurality of fins or lugs 102 of triangular or gusset shape with the base of the triangle at edge 103 of the hub. The body portion 101 is hollow to its juncture with boss 100 at 104 as shown.

There is thus provided a pair of spaced bell members each having a central apertured boss and means (pins here) whereby it may be retained upon a hub shaft (hub shaft 105) the central apertured boss joining a body portion of the hub, the body portion of drum-like configuration, hollow and having a circular terminal edge 106 spaced with reference to the shaft 105. The fins or gores 102 extend in a direction substantially parallel to the extension of the hub shaft 125 on the outer surface of the body 101 providing inclined members from surface 104 to edge 103.

Member 57B is placed adjacent the end of the shaft 105 and member 57A spaced inwardly therefrom. A bearing 107 engages the end of boss 100 of hub 57A and is positioned by spacer 108 secured to shaft 105, and is provided with an apertured lug portion to receive the reduced hook end of tie bar 109.

Shaft 105 has a bent end 110 which is driven by a shaft through a universal generally designated 111 in FIGURE 3 from gear box 62.

Tie bar 109 has a second reduced end which is passed through apertured lug 112 secured to member 54 as shown in FIGURE 7, being pivoted therein. The pivoting of tie bar 109 to the member 54 and the provision of universal 111 for hub shaft 105 allow the dual hubs 57A and 57B to float upon the surface of the ensilage to thus provide substantially continuous uniform traction without variances because elevation of the ensilage surface.

It will be apparent from inspection of FIGURE 3 that the center of rotation of the silo unloader 20 is substantially at the center of the silo and describes a small orbit thereabout by virtue of the over-center extension of the gathering means 52. However, the center of rotation of the drive hub 57 is displaced downwardly and leftwardly with reference thereto so that as the unloader rotates within the silo and is confined by engagement of the silo wall 12 with wheels 81 and 85, there will be a constant sliding of the drive hub 57 in the direction of the arrow 115.

As stated previously, the pivot assembly 58 is centered between the axis 82 of wheels 81 but displaced in a trailing direction of movement with reference to conveyors 58 and 59, or on the outward end of the S-member 76.

It has been found through experimentation that the front wheel 81 should be placed as far forward (rightward with reference to FIGURE 8) as possible, yet as a practical matter cannot be placed so that its axis is further forward than the periphery inscribed by the ends 74 of wall cleaners 71. Further, it has been found that the drive hub 57 and the front wheel 81 should be positioned in the same 90° quadrant.

The particular configuration of the gores 102 permits such sliding with a minimum of impedance since they provide a decline in the direction in the outward end of shaft 105.

The member 57B may in some instances, if desired, be reversed from the position of FIGURE 6 so that boss 100 will be positioned adjacent and in abutment with member 107 occupying the position normally occupied by spacer 108 and pinned to shaft 105 by a pin passed through the hole normally occupied by the pin for spacer 108.

There is thus provided a drive hub member positioned on either side of the tie bar 109.

It is apparent that many modifications and variations of this invention as hereinbefore set forth may be made without departing from the spirit and scope thereof. The specific embodiments described are given by way of example only and the invention is limited only by the terms of the appended claims.

What is claimed:

1. In a silo unloader or the like having a rotary gathering means, wheel means for engaging the wall of the silo and for spacing said gathering means with respect thereto and for travel thereover, said wheel means including at least two spaced wheels, means supporting said wheels in fixed spaced relation, and said last means being pivotally secured to said gathering means.

2. The structure of claim 1 in which said last means is pivotally secured to said gathering means at a point substantially equidistant from the axis of rotation of said wheels.

3. The structure of claim 1 in which said means supporting said wheels comprises an elongated member, means providing an elongated aperture at each end thereof, and at substantially right angles thereto, and one of said wheels being adjustably positioned in each of said elongated apertures.

4. The structure of claim 1 in which said gathering means has a leading edge and a trailing edge and a frame member providing an outwardly off-set portion in the direction of said trailing edge and said means supporting said wheels is pivoted to said off-set portion.

5. The structure of claim 1 in which said gathering means includes a rotary ensilage engaging means having a leading edge and a trailing edge, a wall cleaning means axially aligned therewith positioned exterior of said rotary ensilage engaging means and likewise providing a leading edge and a trailing edge, said wall cleaning means comprising a member rotatable about a horizontal axis, said spaced wheels providing a leading wheel and a trailing wheel, and the axis of rotation of said leading wheel being positioned not substantially outside a zone defined by the axis of rotation of said wall cleaning means and the leading edge of said wall cleaning means.

6. The structure of claim 1 in which said gathering means includes a pair of elongated ensilage engaging means each having an interior end and an exterior end adapted to be positioned adjacent the wall of the silo, said wheel means includes a leading wheel and a trailing wheel with reference to the normal direction of travel of said gathering means with reference to the wall of the silo, one of said pair of elongated ensilage engaging means providing a leading means journalled for rotation about a horizontal axis, and the axis of rotation of said leading wheel being positioned substantially not further in said normal direction of travel than the peripheral extension of leading means and substantially not further in a direction opposite thereto than the axis of rotation of said leading means.

7. The structure of claim 1 in which said gathering means is provided with an exterior end adapted to be positioned adjacent the wall of the silo and an interior end substantially at the center thereof about which it is adapted to be rotated, drive means positioned behind said gathering means for the rotation thereof, said wheel means providing a leading wheel and a trailing wheel, and said drive means and said leading wheel being positioned substantially in the same ninety degree quadrant.

8. In a silo unloader adapted to be used in a silo having a lateral aperture with a top horizontal edge, and pendently suspended in the silo by flexible means, the improvement comprising a chute means secured at one end to said unloader and having means at the other end for engaging said edge, and resilient means secured to said flexible means for biasing said means into communication with said top edge.

9. The structure of claim 8 in which said chute terminates short of the wall of the silo and extending rod means secured thereto is provided for engaging said top edge.

10. In a silo unloader having a drive hub means for engaging the surface of the ensilage for the driving thereof, the improvement comprising said drive hub means being of outwardly and gradually diminishing periphery from the interior to the exterior edge thereof and said drive hub means including a plurality of cleats for engaging the ensilage, said cleats being gradually declined in the direction of the silo wall.

11. The structure of claim 10 in which said drive hub means includes two spaced hubs, each having a plurality of said cleats.

12. In a silo unloader having a drive hub means for engaging the surface of the ensilage for the driving thereof, the improvement comprising two spaced drive hubs axially aligned upon a common shaft to provide an inside and an outside hub, said inside hub having a plurality of cleats for engaging the ensilage, said cleats being gradually declined from the interior to the exterior edge of said hub, and said outside hub having a plurality of cleats for engaging the ensilage, said cleats being gradually declined from the interior to the exterior edge of said hub.

13. In a silo unloader having a drive hub means for engaging the surface of the ensilage for the driving thereof, the improvement of two spaced drive hubs positioned upon a common substantially radially extending shaft, a tie bar positioned to said unloader and to said shaft between said drive hubs, said shaft being journalled for rotation with reference thereto, said spaced drive hubs each including a plurality of cleats for engaging the surface of the ensilage and said cleats each gradually declined from the interior to the exterior edge thereof.

14. In a silo unloader having a drive hub means for engaging the surface of the ensilage for the driving thereof, the improvement of a substantially radially extending shaft on which said drive hub means is positioned, said shaft being connected to said unloader by a universal joint means for the rotation thereof, a tie bar means having an end connected adjacent the extending end of said shaft and in which said shaft is journalled for rotation, said tie bar being connected to said unloader at a position spaced with reference to said universal a distance substantially equal to the radius of the silo with which the unloader is to be used and pivotally connected thereto whereby said drive hub means may float with reference to the unloader.

15. In a silo unloader having an advance guide wheel supporting frame positioned ahead of a gathering means and in the path of rotation thereof, the improvement of said advance guide wheel means comprising a first extending arm having turned bifurcated means, a second extending arm supporting said advance wheel and having turned bifurcated means turned in a direction opposite to said turned bifurcated means of said first extending arm, said first and second extending arms each being re-

spectively adjustably positioned in the turned bifurcated means of the other and means whereby said first and second extending means may be clamped in adjusted position.

16. In a silo unloader having a gathering means with an end adapted to engage the wall of a silo and for conveying material toward the center of the silo, the improvement comprising a wall cleaning wheel means positioned adjacent said silo wall and comprising a plurality of spaced finger means rotatable about a horizontal axis, each of said finger means having a central recess extending inwardly from the exterior end thereof and in the direction of rotation.

17. The structure of claim 16 in which each of said finger means has an ensilage engaging surface inclined in the direction of rotation.

18. In a silo unloader having a gathering means with an end adapted to engage the wall of a silo and for conveying material toward the center of the silo, the improvement comprising two wall cleaning wheel means positioned in non-tracking relation.

19. In a silo unloader having a drive hub means for engaging the surface of ensilage for driving thereof, the improvement comprising said drive hub means comprising a drumlike member, axially extending gores secured to the exterior of said drumlike member in parallel relationship, said gores each having a slanting outer edge that declines regularly from one end to the other end of said member and said edges all declining in the same direction.

20. In a silo unloader having means positioned at the center of the silo for receiving and ejecting material from the silo, the improvement comprising means for guiding the material from said receiving and ejecting means to the exterior of the silo including a chute, said chute being configured to receive said material in a substantially vertical direction and for guiding it from the silo in a substantially horizontal direction, said chute being so constructed as substantially to retain said configuration, and said chute being pivoted at its inner end to said receiving and ejecting means.

21. The structure of claim 20 in which said chute comprises bottom and side walls forming a U-shaped channel opening in the direction of the material and pivoted to said receiving and ejecting means adjacent the bottom wall.

22. In a silo unloader or the like having a rotary gathering means, wheel means for engaging the wall of the silo for travel thereover and for spacing said gathering means with respect thereto, said wheel means including at least two spaced wheels, said gathering means including a rotary ensilage engaging means, a wall cleaning means axially aligned therewith and positioned exterior of said rotary ensilage engaging means and pro-

viding a leading edge and a trailing edge, said wall cleaning means comprising a member rotatable about a horizontal axis, said spaced wheels providing a leading wheel and a trailing wheel and the axis of rotation of said leading wheel being positioned not substantially outside a zone defined by the axis of rotation of said wall cleaning means and the leading edge of said wall cleaning means.

23. The structure of claim 22 further characterized in that said gathering means includes a leading and trailing rotary ensilage engaging means, a leading and trailing wall cleaning means axially aligned therewith and the axis of said leading wheel is so positioned with reference to the axis of said leading wall cleaning means.

24. In a silo unloader having a gathering means with an end adapted to engage the wall of a silo and for conveying material toward the center of the silo, the improvement comprising a leading wall cleaning means and a trailing wall cleaning means and said leading wall cleaning means having an exterior edge surface positioned inwardly of the exterior edge surface of said trailing wall cleaning means.

25. In a silo unloader or the like having a rotary gathering means adapted to engage the wall of a silo and for conveying material radially of the silo, including a leading and trailing rotary ensilage engaging means, wheel means for engaging the wall of a silo for travel thereover and for spacing said gathering means with respect thereto, a wall cleaning means axially aligned with each of said ensilage engaging means and positioned at one end thereof, and adjacent said silo wall, said wall cleaning means comprising members rotatable about substantially parallel, substantially horizontal axes, one of said wall cleaning means providing a leading wall cleaning means and the other of said wall cleaning means providing a trailing wall cleaning means, the improvement comprising at least a portion of one of said wall cleaning means being substantially axially off-set with reference to the other of said wall cleaning means.

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

##### UNITED STATES PATENTS

2,580,306	Leach	Dec. 25, 1951
2,595,333	Clapp	May 6, 1952
2,615,594	Clapp	Oct. 28, 1952
2,671,696	McLean	Mar. 9, 1954
2,674,210	Hohub	Apr. 6, 1954
2,678,241	Miller	May 1, 1954
2,719,058	VanDusen	Sept. 27, 1955
2,756,112	Knutson	July 24, 1956
2,761,742	Hintz	Sept. 4, 1956
2,788,247	Chapman	Apr. 9, 1957
2,794,560	Buschbom	June 4, 1957
2,801,885	Harris	Aug. 6, 1957
2,858,033	Hofer	Oct. 28, 1958