United States Patent

Muldoon

[15] **3,703,972**

[45] **Nov. 28, 1972**

[54] **BALE WAGON**

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[21] Appl. No.: **175,627**

[52] **U.S. Cl.** .....**214/519,** 214/507, 214/83.32, 214/6 B

[51] **Int. Cl.** **B60p 1/42**

[58] **Field of Search**.....214/519–522, 507, 214/83.32, 6 B, 83; 56/377

[56] **References Cited**

UNITED STATES PATENTS

2,761,578 9/1956 Brownlee et al.....214/507

2,825,478 3/1958 Hunnicutt et al.....214/507

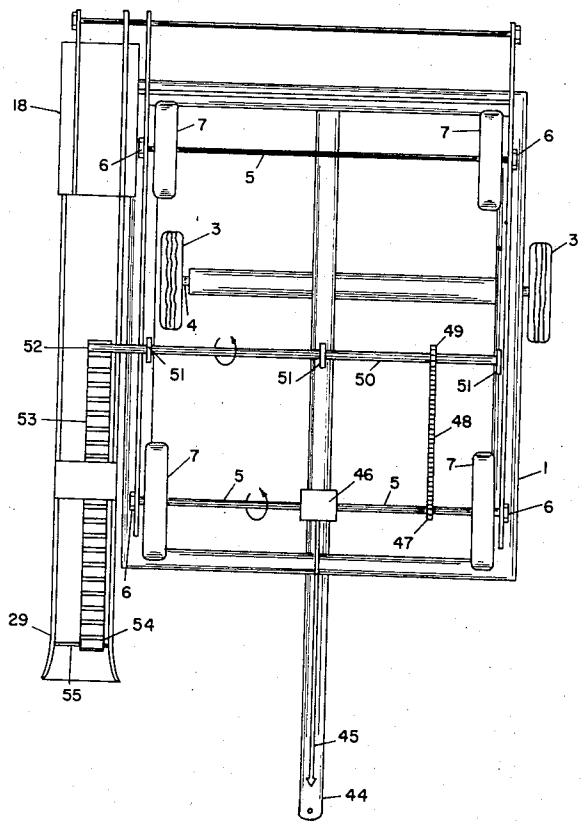
Primary Examiner—Albert J. Makay

Attorney—Howard W. Bremer

[57] **ABSTRACT**

A self-loading and unloading wagon for transporting bales of hay or straw which consists essentially of a rotatably mounted drum having helically arranged internal partitions which define at least one continuous helical bale-receiving channel extending from one end of the drum to the other. The drum can be associated with automatic bale-loading and bale-discharging means and can also be used for handling and mixing dry feed.

7 Claims, 18 Drawing Figures



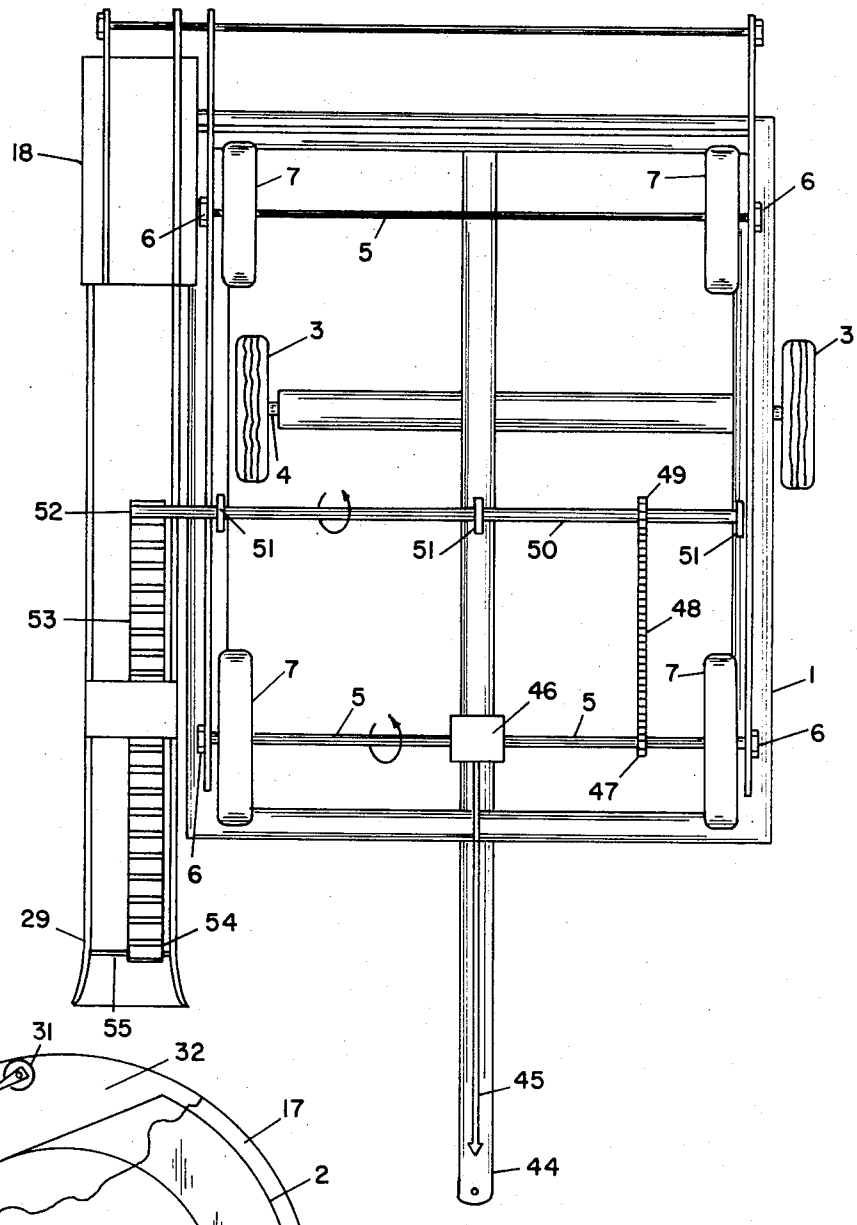


Fig. 1

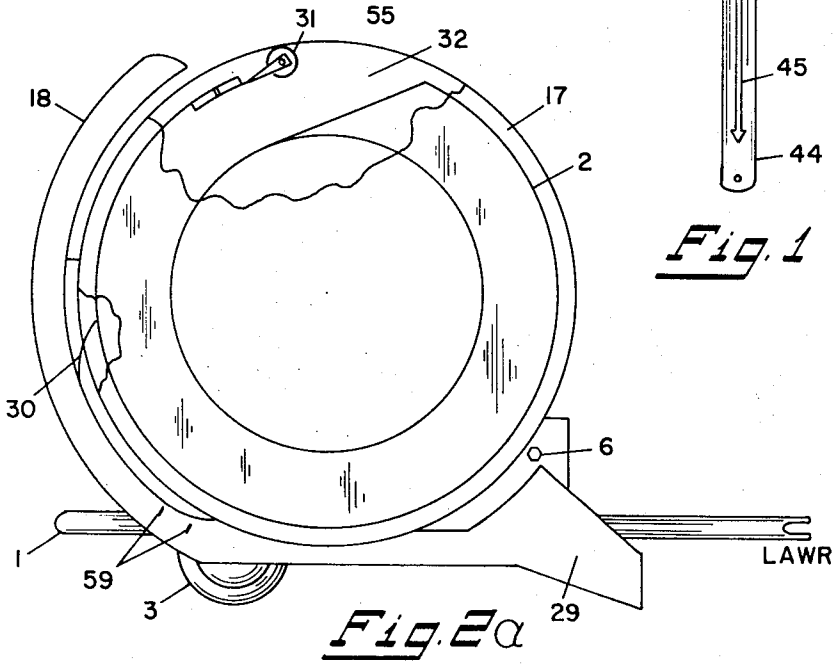


Fig. 2a

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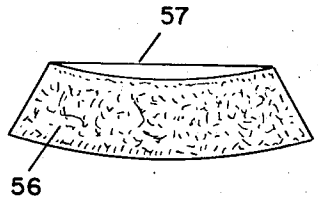


Fig. 2b

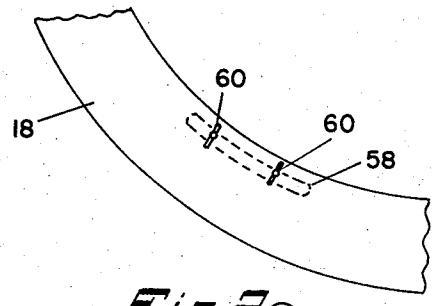


Fig. 2c

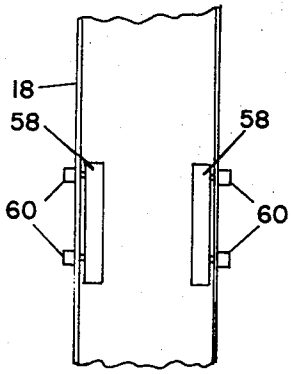


Fig. 2d

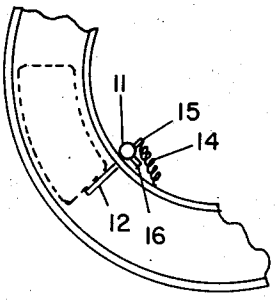


Fig. 5a

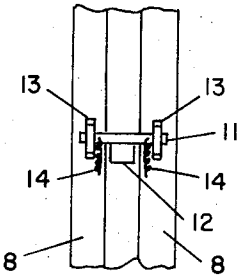


Fig. 5b

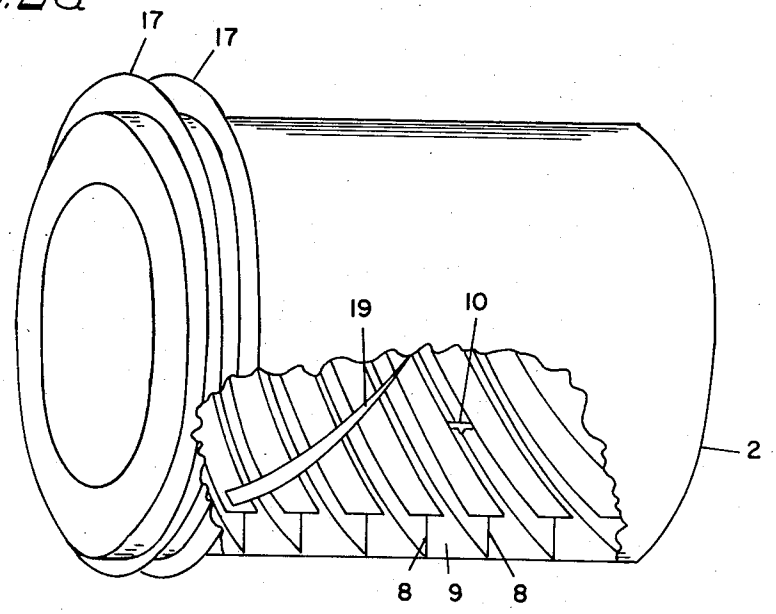


Fig. 4

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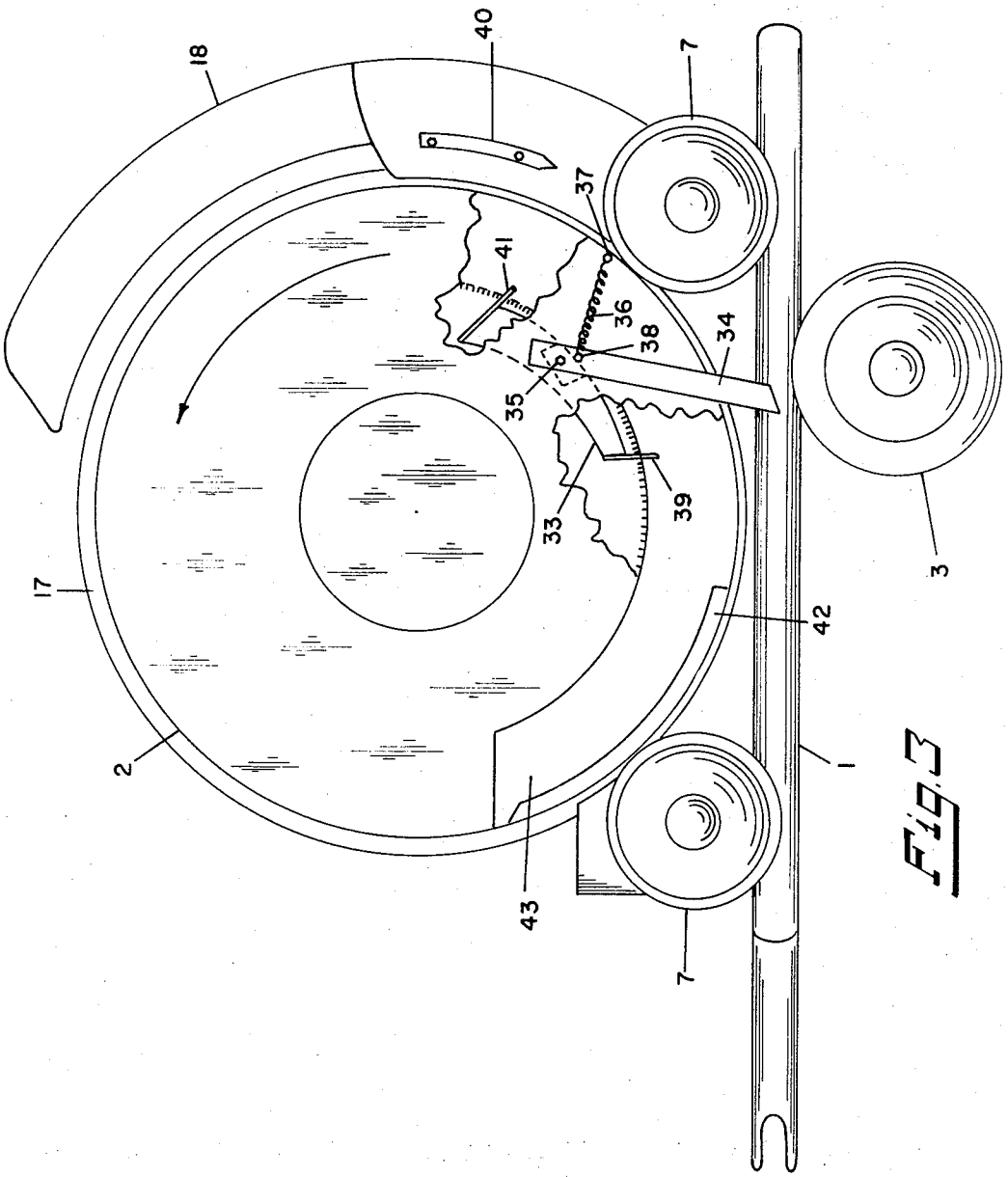


FIG. 3

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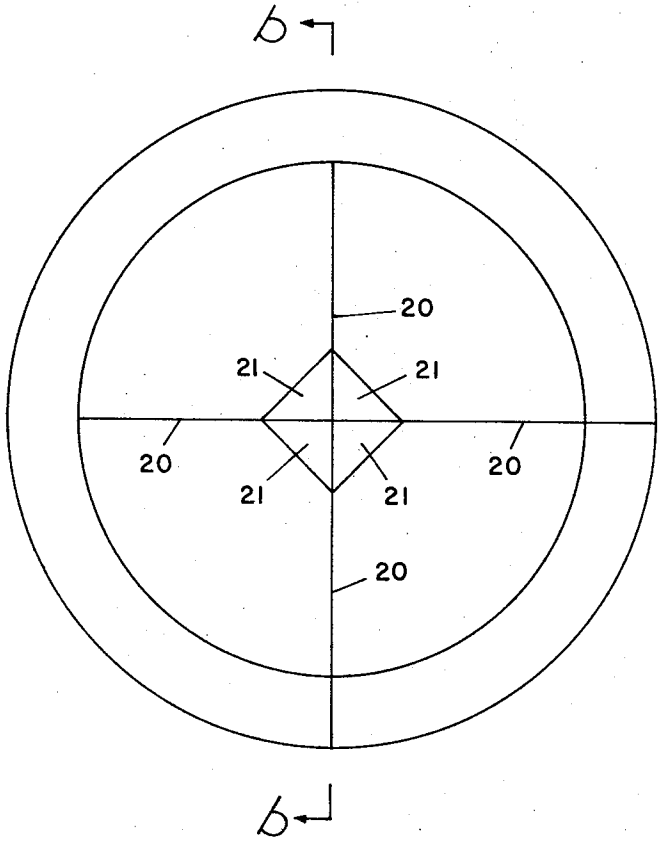


Fig. 9a

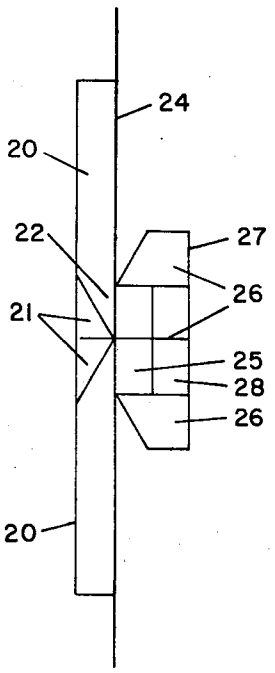


Fig. 9b

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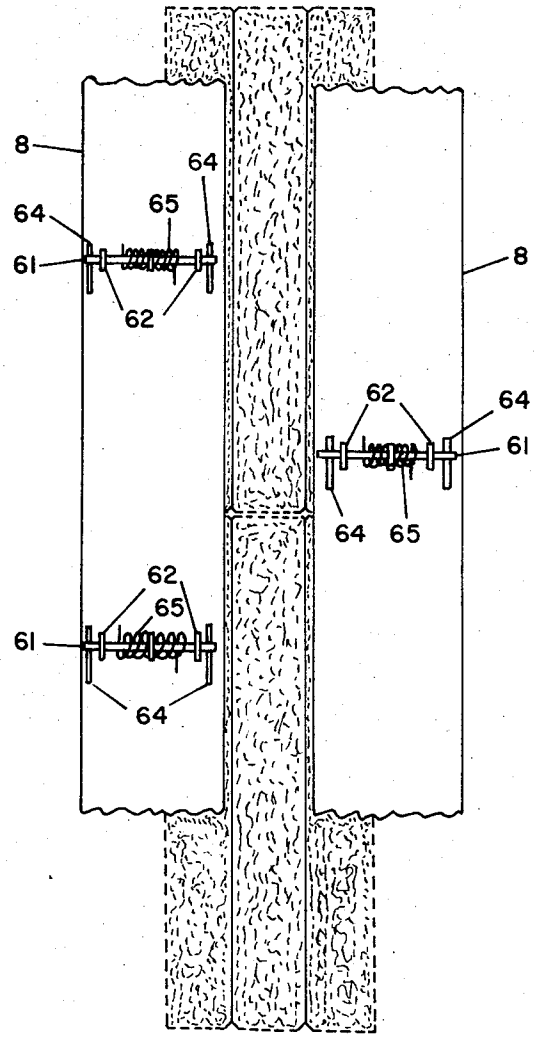


Fig. 6a

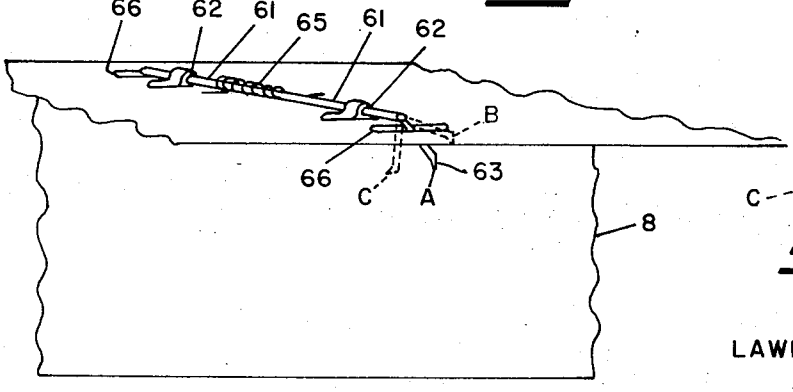


Fig. 6b

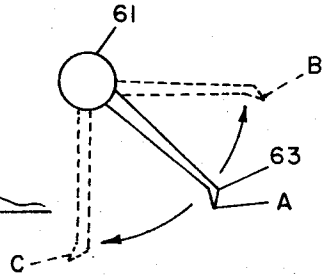


Fig. 6c

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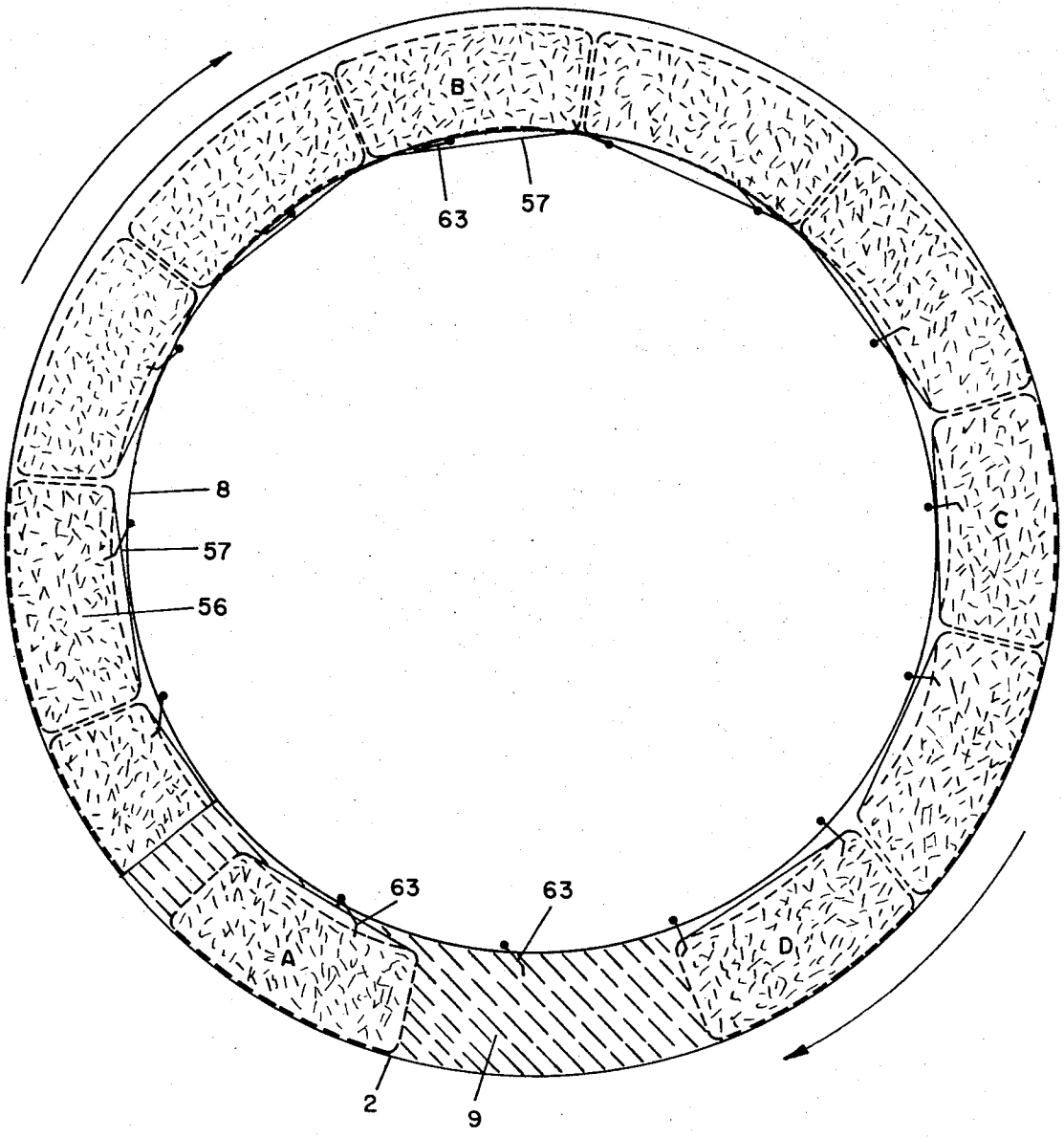


Fig. 6d

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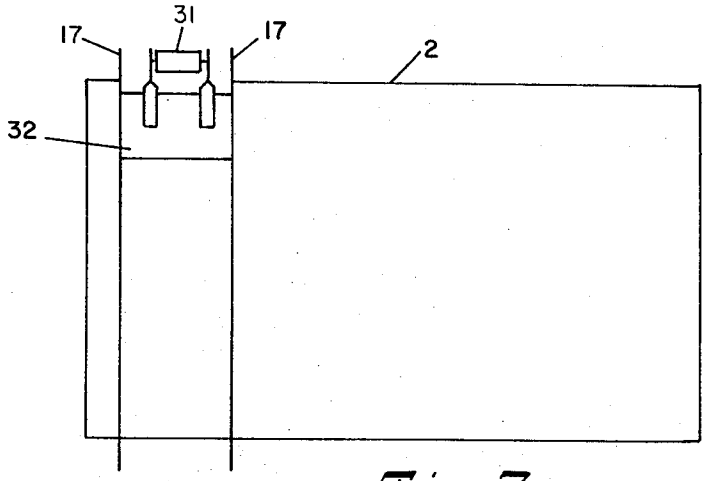


Fig. 7

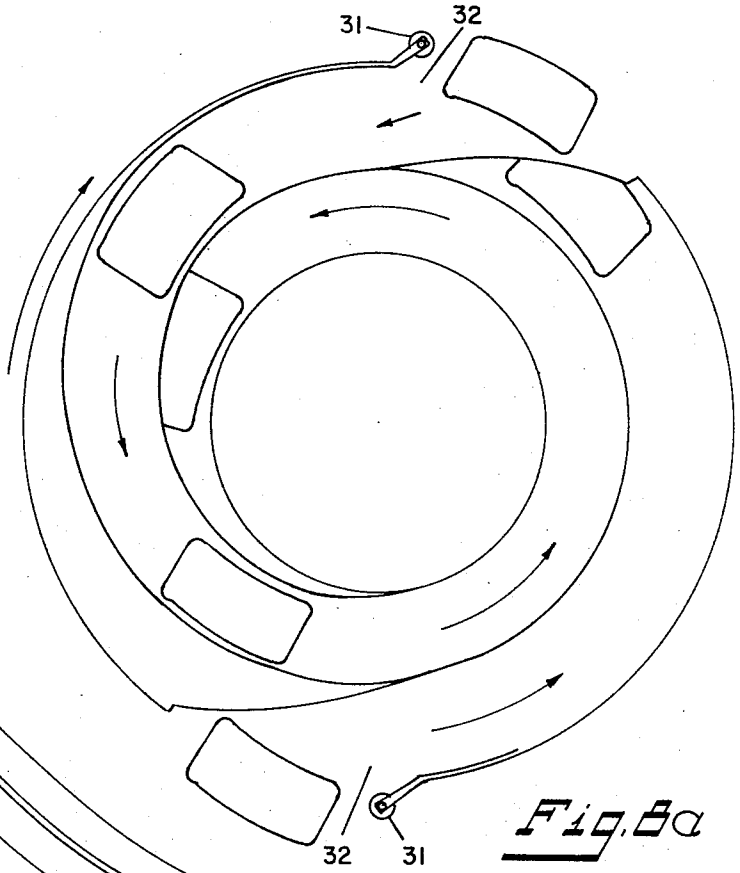


Fig. 8a

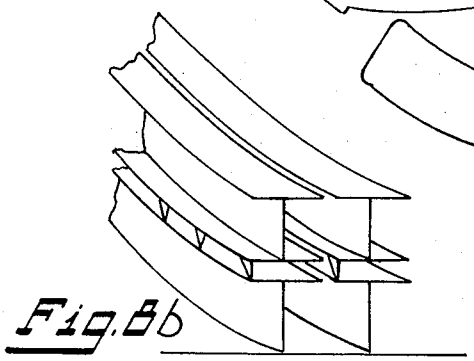


Fig. 8b

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BALE WAGON

Traditionally, hay, straw and the like, which was often baled to facilitate its handling and storage, was handled in two ways. Either a flat bed wagon accompanied the agricultural baler and the bales discharged by the baler were manually stacked on the wagon, or the bales were merely discharged from the baler to the ground and were later picked up and placed on a wagon for transportation to appropriate storage facilities.

Subsequently semi-automatic bale handling means were developed but such means still relied upon the stacking of bales, singly or in multiples, on a flat bed type utility wagon. As an alternative to utilizing a flat-bed wagon or utility trailer upon which bales were stacked manually or automatically by machine, a rotatable drum was mounted horizontally on a wheeled chassis and longitudinal partitions in the drum circumferentially divided it into bale-receiving longitudinal compartments. Bale wagons of this type are shown in U.S. Pat. Nos. 2,761,578 and 2,867,340 both to Brownlee et al.

The most popular method used today is direct loading from a kicker baler into a wagon with high racks for sides. The baler pulls the wagon and simply "shoots" the bales into this basket-type wagon. This method requires hand unloading and considerable man power to keep pace with the baler.

Bale wagons of the type shown in the aforementioned patents have certain inherent disadvantages. Since the bale-receiving channels are arranged longitudinally and circumferentially there is much wasted space within the drum, as can readily be ascertained from the drawings in the said patents, which, of course, adversely affects the capacity of the wagon. In addition, as each bale-receiving channel becomes filled with bales, the drum must be rotated so that the next circumferential bale-receiving channel is exposed to the bale loading-mechanism. This requires considerable power since as the channels are filled and the drum is intermittently rotated, the full weight of the accumulation of bales in the successive channels must be essentially lifted by the drum rotating mechanism. It is of course also evident that as successive channels are filled and the drum is rotated the weight distribution of the wagon becomes very drastically changed. This is especially disadvantageous if the wagon is being used on uneven ground or on hilly terrain. It is also apparent that the Brownlee et al bale wagons require considerable manual attention if they are to operate properly. For example, bales are not all of a uniform length and therefore the same number of bales may not be accepted by each of the longitudinal channels. Consequently, if the bales are automatically fed into the channels it is quite probable that the channel will be over-filled and a part of a bale will be left protruding from the channel unless an operator is present to prevent such event. If the channel is over-filled the last bale must be extracted manually before the drum can be rotated to present the next bale-receiving channel to the bale-loading mechanism with a consequent loss in time.

The present invention overcomes the disadvantages of prior bale wagons and provides a self-loading and unloading bale wagon capable of operating at relatively high speed with a minimum of manual attention while loading and without requiring manual control while unloading.

The bale wagon of this invention comprises an elongated drum transversely and rotatably mounted on a wheeled chassis which is adapted to be drawn by a powered vehicle or which, alternatively, can be self-propelled. The drum has an internal T-shaped partition projecting inwardly from the inside of the said drum and extending helically from one end of the drum to the other. The inside surface of the drum and adjacent flights of the helical T-shaped partition define a continuous box-like bale-receiving channel within the drum extending from one end to the other. The said channel is connected with a bale inlet means at one end and bale outlet means at its opposite end. Means are provided to rotate the said drum, to deliver baled material to the bale inlet means and to prevent bales in the said channel from reversing the direction of their movement within the said channel as the drum is rotated. The bale outlet is provided with means to retain the bales within the drum and control their release through the outlet in any desired manner.

The various features and advantages of the bale wagon of this invention will be apparent from the following detailed description and the accompanying drawings wherein like numerals refer to like parts and wherein:

FIG. **1** is a plan view of the wagon with the drum omitted to show bale pickup and delivery means to the drum inlet and some of the running gear;

FIG. **2***a* is an elevational view of the bale inlet side of the wagon partly in section to show the bale inlet means;

FIG. **2***b* is a side view of an agricultural bale which has been pre-shaped into a bowed configuration,

FIG. **2***c* is a side view of a section of the bale guide chute showing the positioning of bale pre-shaping means within the chute,

FIG. **2***d* is a plan view of the section of the guide chute of FIG. **2***c* showing the bale pre-shaping rails or shoes,

FIG. **3** is an elevational view of the bale outlet side of the wagon partly in section to show the releasable bale-retention mechanism at the bale outlet;

FIG. **4** is an oblique view of the drum in broken section showing the successive flights of the continuous helically arranged T-shaped partition within the drum and the auger-like member for causing back flow of particulate material when the drum is to be employed as a dry feed or grain mixer;

FIG. **5***a* and **5***b* are respectively a side elevational view and a plan view of a means for preventing bales in the bale-receiving channel from moving in a reverse direction;

FIG. **6***a* and **6***b* are respectively a plan view and a perspective view of alternative means for preventing bales in the bale-receiving channel from moving in a reverse direction,

FIG. **6***c* is a side view of a shaft-mounted spike used in the means shown in FIG. **6***a* and *b* as the bale reverse movement-preventing means,

FIG. **6***d* is a schematic side view of the drum showing the positions of the spikes of the bale reverse movement-preventing means of FIGS. **6***a* and **6***b* relative to the bales in a bale-filled portion of the bale-receiving channel,

FIG. 7 is a front elevational view of the drum showing the bale inlet opening, the external channel-defining ribs on the drum and the bale guide roller associated with the bale inlet;

FIG. 8*a* is a cross sectional view of a drum showing a "double decked" arrangement for bale-receiving channels and the bale inlet arrangement for each of said channels;

FIG. 8*b* shows one form of deck spacing which may be used in the double deck arrangement of FIG. 8*a*;

FIG. 9*a* shows an internal view of the outlet end of the drum adapted for the discharge of particulate material from the drum; and

FIG. 9*b* shows a side sectional view of the drum end along line b—b of FIG. 9*a* adapted for the discharge of particulate material from the drum.

Referring to the accompanying drawings in detail, the reference numeral 1 designates the wheeled chassis which in combination with the drum 2 and other features hereinafter described comprises the bale wagon of this invention. The chassis and drum are supported by wheels 3 mounted on a suitable axle 4. A pair of shafts 5 extend transversely of chassis 1 and are rotatably journalled in bearing means 6. Wheels 7 are fastened to shafts 5 and support rotatable drum 2.

Referring to FIG. 4, the drum 2 has secured to its interior surface a continuous T-shaped partition 8 which extends helically from one end of the drum to the other end. The T-shaped partition advances spirally within the drum with each drum circumference so that adjacent flights of the helical partition define a bale-receiving channel 9 which extends from one end of the drum to the other. The helical advance of the T-shaped partition should be sufficient to define a channel width which will allow the bales to travel freely within the channel and not "bind" against the sides thereof. Also, the channel depth defined by the cross-arm of the T-shaped partition should be deep enough to readily accept agricultural bales and permit their free movement but should be sufficiently shallow to prevent them from "folding up" when subjected to the weight of abutting bales as the channel is filled.

In FIG. 2*a*, which is an elevational view of the bale inlet side of the bale wagon of this invention partly in section, 29 represents bale pick up means, 30 bale injection means, 31 the bale guide roller and 32 the bale inlet to the bale-receiving channel in the drum 2.

Upstanding ribs 17, secured to the drum 2, cooperate with bale guide chute 18 to function as guide means to guide the bales to the bale inlet in drum 2. Since passage of a bale through bale guide chute 18 and subsequent movement of the bales through bale-receiving channel 9 in drum 2 will tend to impart a bowed silhouette to the bale such as is shown in FIG. 2*b*, where reference numeral 56 indicates the bale and 57 indicates the twine with which the bale is bound together and which gives the bale its integrity, it may be desirable to pre-shape the bales into a bowed configuration prior to their injection into bale inlet 32. This can readily be accomplished by providing curved rails or shoes mounted to the sides of guide chute 18 and under which the bales pass after they have been engaged by guide roller 31. Such rails or shoes, in cooperation with the floor of the bale guide chute will function to pre-shape the bales into a bowed configuration. It is to be understood, of course, that bale guide chute 18 must have sufficient depth to accommodate a bowed bale after it has passed under the shaping rails or shoes.

The shaping rails or shoes, which are preferably mounted in adjustable relation to the floor of bale guide chute 18 to enable bales of different heights to be accommodated and pre-shaped, are shown in FIGS. 2*c* and 2*d*. FIG. 2*c* is a side view of the section of the guide chute 18 in which the bale pre-shaping curved rails or shoes are mounted and FIG. 2*d* is a plan view showing such rails or shoes. In FIG. 2*c* and 2*d*, 58 designates the curved bale pre-shaping rails or shoes (shown in dotted line outline in FIG. 2*c*), 59 indicates slots through which studs fastened to rails or shoes 58 protrude and to which nuts or other suitable fastening means 60 can be applied to hold rails 58 in a predetermined but adjustable position above the floor of bale guide chute 18. The rails or shoes must in all cases be mounted so that guide roller 31 can readily pass between them.

Bale injection means 30 is conveniently made of spring steel and is secured to the inner surface of bale guide chute 18 so that it bears against the drum surface between upstanding ribs 17. Guide roller 31 is spring mounted to permit a certain resiliency when it contacts an agricultural bale in the bale guide chute 18 to move it toward the bale injection means 30. The spring mounting of the guide roller allows the roller to pass over any bale that is not yet in position in the guide chute to be advanced by the engagement of the guide roller.

The guide roller 31 and bale inlet 32 are also shown in FIG. 7 in a front elevational view of the drum.

Within the openings between adjacent flights of the said partition means are provided as indicated by reference numeral 10 to prevent bales from reversing their direction within the bale-receiving channel as rotation of the drum is continued after bales have traversed the unfilled portion of bale-receiving channel 9. An example of one such means is shown in FIGS. 5*a* and 5*b* where shaft 11 to which is secured plate 12 is rotatably journalled in bearing means 13. The plate is spring loaded in a position perpendicular in the bale-receiving channel by springs 14 which are secured to the partition 8 by suitable means and to pin 15 which is secured to shaft 11. Pin 16 acts as a detent to prevent springs 14 from rotating shaft 11 beyond the point where plate 12 is substantially perpendicular in the bale-receiving channel. FIG. 5*a* additionally shows an agricultural bale, defined by the dotted lines, beginning to impinge upon plate 12. The weight of the bale will "open" the bale-receiving channel as the drum is rotated clockwise and after the bale has passed spring 14 will snap plate 12 into position shown to prevent the bale from moving in a reverse direction after it has negotiated the unfilled portion of channel 9 and has been stopped by abutting the next preceding bale or detent 39 if it is the first bale picked up, as the drum continues to rotate. Such "check plates" may be conveniently spaced along the total helically extending opening between the adjacent flights of partition 8 to minimize any reverse movement of bales in the bale-receiving channel as the drum is rotated.

With pre-bowed bales, as are elsewhere described in this specification, an alternative means for preventing bales from reversing direction may be desirable. With the check plate means described above interference

may be encountered with pre-bowed bales since the bale twine on such bales will protrude into the open space between adjacent flights of the T-shaped partition **8** as is shown in FIG. **6***d*. A suitable alternative means is shown in FIGS. **6***a* through **6***d*. In FIG. **6***a*, which shows a multiplicity of such means in plan view, **61** is a shaft which is rotatably journalled in bearing means **62** and near to each end of which are secured spikes **63** (shown in FIGS. **6***b* and **6***c*) which protrude through slots **64** into bale-receiving channel **9**. Spring **65** is affixed to shaft **61** to hold spike **63** in position as shown in FIGS. **6***b* and **6***c*. The spring loading of the shaft permits spike **63** to be depressed to position B or to be moved into position C by the action of the agricultural bale upon it as can be seen in FIG. **6** *d*. The ends **66** of slots **64** prevent spike **63** from rotating beyond position C as shown in FIG. **6***b*. When not in contact with a bale spike **63** is returned to position A by the action of spring **65**.

FIG. **6***d* is illustrative of how above described alternative means functions to prevent bales from moving in a reverse direction in bale-receiving channel **9** after they have traversed the unfilled portion of the channel and have been stopped by abutting against preceding bales filling the channel to that point. Thus, and referring to FIG. **6***d*, the bale designated by A is sliding toward bale D in bale-receiving channel **9** as the drum **2** is rotated in the direction of the arrows and will when it abouts bale D have traversed the unfilled portion of channel **9**. As bale A slides toward bale D spikes **63** drag along its surface but do not impede its movement. After bale A has abutted bale D and the drum continues to rotate the bales filling the channel are carried around by the drum reaching the position designated by bale B. The position of the succession of bales relative to the peripheral walls defining channel **9** can be readily seen in FIG. **6***d*. At the position of bale B the bales will rest upon the depress spike **63** to the position shown (position B in FIG. **6***c*). At this point the bale twine **57** can be seen protruding from channel **9** as previously mentioned. As the bales are carried by the rotating drum beyond the position of bale B they will, through the action of gravity tend to slide downward in the channel toward the bale designated C. As they slide forward they engage the curved tips of spikes **63** since the spring tension on the spikes has kept them pressed tightly against the bale and move them into the equivalent of position C in FIG. **6***c* and as shown in relation to bale C where they abut the ends **66** of slots **64** and are prevented from moving farther. This action tends to force the bales against the floor of the channel and they are prevented from sliding in the same direction as the drum rotation.

The tips of the spikes **63** are slightly curved to permit them to penetrate into the bales as shown and to permit the bales to more readily fall free of the spikes with a minimum amount of damage to the bale integrity.

The spacing of the spikes is not critical but it is preferred that it be such that at least one be in contact with each bale in the channel to prevent reverse movement.

Other methods of preventing reversal of bale movement will readily be apparent to those skilled in the art and the present invention shall not be considered to be limited by the means specifically shown herein.

FIG. **3** which is an elevational view of the bale outlet side of the bale wagon partly in section, shows the releasable bale-retention mechanism at the bale outlet. Rocker arm **33** and trip arm **34** are both secured to shaft **35** which is rotatably journalled in bearing means (not shown). Spring **36** which is secured between pin **37** affixed to the drum and pin **38** which is affixed to trip arm **34** holds the trip arm in a position so that detent **39** on rocker arm **33** is positioned in the bale-receiving channel to retain bales in the said channel. As the drum turns in the direction of the arrow trip arm **34** strikes trip rail **40** which causes trip arm **34** and rocker arm **33** to pivot on shaft **35** whereby detent **39** is raised from its position in the bale-receiving channel and releases a bale from the channel. At the same time detent **39** is raised detent **41** secured to the opposite end of rocker arm **33** from detent **39** is lowered into the bale-receiving channel to prevent the next following bale from also being released from the drum. As a bale passes raised detent **39** it engages flange **42** which is angled across the bale-receiving channel to direct the bale through bale outlet **43**.

If it is desired to use the bale wagon of this invention as a dry feed mixer spirally arranged flange **19** may be secured along the top of the continuous T-shaped partition **8**. As the drum **2** is rotated the dry feed or other particulate material moves within the drum from one end to the other advanced by the spirally arranged partition **8** in the fashion of a screw conveyor. Flange **19** functions to induce a reverse flow of the particulate material in the drum so that the drum rotation will not cause the material to pile up at one end of the drum and will improve the mixing ability of the device.

When the bale wagon is used to mix dry feed or to transport particulate material cover plates must be fastened to the ends of drum **2** and the bale outlet and inlet must be closed off. Inlet means for the particulate material is preferably provided by an opening at the central axis of the cover plate at the bale inlet end of the drum. A convenient method of discharging dry feed or other particulate material in a regulated fashion from drum **8** is shown in FIGS. **9***a* and **9***b* where **20** designates ribs secured to the inside surface of the end of drum **2**. Triangular fillets **21** are fastened between adjacent ribs sloping from the inner edge of the ribs to an apex where the ribs intersect across opening **22** in the drum end cover plate **24**. A frusto-conical section **25** is secured to the cover plate around the periphery of hole **22**. Flanges **26**, are secured on edge to the inside of frusto-conical section **25** and supports plate **27**, the section **25** and plate **27** defining peripheral opening **28** which is intersected by flanges **26**. As the drum is rotated, particulate material is picked up from the bulk of particulate material lying in the drum by ribs **20**, slides down the ribs and is diverted through hole **22** by fillets **21** and is discharged from the drum through peripheral opening **28**. While the drum is being used as a mixer, opening **22** is closed off and then the particulate material picked up by ribs **20** is merely dumped back into the bulk of the material in the drum until thorough mixing of the constituents is achieved. Then, when it is desired to empty the drum, opening **22** is uncovered and the particulate material is discharged from the drum as described above.

FIG. 8a is a schematic diagram of a bale wagon drum having two bale-receiving channels in decked relationship and illustrating agricultural bales in various positions within said drum to better illustrate the relationship of the bale inlets **32** with the two bale-receiving channels. Bale outlet means are arranged in like fashion to enable the discharge of bales from each of the decked bale-receiving channels. It is apparent that the inner bale-receiving channel must have a shorter radius than the outer channel but it is obvious that such radius must always be great enough to accommodate standard length agricultural bales within the channel without binding. The same bale pick-up and bale-guide chute in cooperation with guide rollers **31** and a bale injection means **30** as shown in FIG. **2** will readily function for loading both of the bale-receiving channels in the decked arrangement.

FIG. **8***b* is illustrative of a deck spacing construction of adjacent flights of the helically arranged partitions which can be used in the drum arrangement shown schematically in FIG. **8***a*. In FIG. **8***b* a bale is shown positioned in each bale-receiving channel by means of a dotted line outline. It is of course apparent that additional decks may be used in relationship similar to that illustrated, the drum diameter being, of course, a practical limitation on the number of decked bale-receiving channels arranged within its interior.

In operation the bale wagon shown is drawn by a powered vehicle (e.g. a tractor) by means of the draw bar **44** which comprises an integral part of wheeled chassis **1**. Power shaft **45** is connected to a power take-off (not shown) which comprises an ancillary part of the powered drawing vehicle as is well known. **46** denotes a gear box through which shaft **5** and wheels **7** on the forward part of the wheeled chassis are driven. The wheels **7**, which are preferably rubber covered, are in frictional engagement with the outer surface of drum **2** and, as viewed from the bale inlet side of the drum, rotate the drum in a clockwise direction, the speed of rotation being adjustable through the power take-off and/or the gear box in accordance with well known practice.

Chain sprocket **47** is secured to shaft **5** and connected by drive chain **48** to chain sprocket **49** which in turn is secured to shaft **50** which is rotatably journalled in bearing means **51**. A sprocket **52** fixed to the end of shaft **51** drives endless lugged chain or belt **53** which is supported at the end opposite sprocket **52** by an idler sprocket **54** which is rotatably mounted on shaft **55**. Thus, as forward shaft **5** is rotated sprocket **47** also rotates driving chain **48** which in turn rotates sprocket **49** and therefore shaft **50**. As shaft **50** turns sprocket **52** rotates and drives lugged chain or belt **53**. If desired, the base of the bale pick-up **29** and the chute connecting it with the bale-guide chute **18** may be slotted to receive the lugged chain or belt **53**.

As the bale wagon of this invention is drawn across a field agricultural bales deposited in the field by a baler are picked-up by bale pick-up means **29** and are transported to and positioned in bale-guide chute **18** by lugged chain or belt **53**. (Alternative to the bale pick-up means shown, the bale pick-up means depicted in U.S. Pat. No. 2,867,340 to Brownlee et al can be used in conjunction with the bale wagon of this invention.) Drum **2** and belt **53** are normally operated continuously while bale loading is progressing there being no need to coordinate the movements of these elements with the spacing of bales being picked up from the ground. As drum **2** rotates clockwise guide roller **31** engages a bale and moves it along in the bale-guide chute **18** until it engages bale injection means **30** which forces the trailing end of the bale into bale inlet **32**. As the bale is lifted by the rotating drum the action of gravity on the bale causes it to fall into bale-receiving channel **9** within drum **2**. As the drum continues to rotate the bale will slide freely in the channel through the action of gravity progressing from the bale inlet **32** to the bale outlet **43** where, if it is the first bale picked up, it will abut against detent **39** and thereby be prevented from leaving the spiral channel. Succeeding bales will likewise pass through channel **9** until they abut against the next preceding bale which has already negotiated the unfilled portion of channel **9** until the entire channel is filled with bales. After each of the bales has reached the end of the unfilled portion of the channel it is prevented from sliding in a reverse direction as the drum continues to rotate by check means such as are shown in FIGS. **5** and **6**. During the filling procedure trip rail **40** must, of course, not be functional i.e. it must be removed or retracted or the bales will not be retained within the drum.

When it is desired to empty the drum of bales trip rail **40** is placed so that as the drum is rotated it will engage trip arm **34**. With each drum revolution trip arm **34** rides up on trip rail **40** which causes trip arm **34** and rocker arm **33** to turn about shaft **35** lifting detent **39** and freeing a bale held by detent **39** to allow it to be discharged from the drum through the action of gravity. As detent **39** is raised detent **41** is secured to the other end of rocker arm **33** is depressed and engages the next succeeding bale in the bale-receiving channel to hold it within said channel. Detent **41** can be a single sharp spike or tooth or a multiplicity of them. With such configuration the detent can pierce a bale and hold it and therefore accurate registration and spacing from bale end to bale end is not necessary. For example, it is anticipated that if detent **41** is placed about **50** inches from detent **39**, detent **41** will always pierce the next succeeding bale at some point. Thus, with the arrangement shown in FIG. **3** one bale is released at a time from the bale channel and from the drum for every revolution of the drum.

Bales which are pre-bowed as pointed out hereinbefore or which have achieved a bowed profile as the result of passage through the channel in the drum are preferably unbowed prior to movement to permanent storage. This can readily be accomplished by discharging the bales into a chute having an overhead straight rail under which the bales are passed by suitable conveying means prior to moving them to storage.

It is anticipated that the drum **2** will have a diameter of from about ten to about twelve feet which can, of course, vary depending upon the size of the bales it is to accommodate and whether or not it is a single bale-channel or decked bale-channel arrangement. The drum can be constructed of fairly light weight sheet metal because of the rigidity which is imparted to it by the T-shaped partition secured to its inside surface. Also, if desired, additional reinforcing bands may be placed around the outer circumference of the drum,

particularly where the drum is frictionally engaged by supporting and driving wheels 7. Such bands may be surfaced in a manner, e.g. roughened, or coated with a material such as rubber, which will increase the friction between them and driving wheels 7. Although in the accompanying drawings only two of the drum supporting wheels 7 are shown as driving wheels, all four wheels can be linked so they are powered to frictionally drive drum 2. Other and alternative arrangement of component parts and modifications in the apparatus shown in the drawings can be made, as will be apparent to those skilled in the art, without departing from the scope of the invention. For example, the chassis 1 may be supported by tandem wheels or other arrangement; other bale inlet means than that shown may be provided where the inlet does not pierce the drum surface; the bale outlet may be connected to conveying means to convey discharged bales directly to storage facilities; the drum may be driven through a gear arrangement rather than through frictional engagement as shown.

It is apparent that the bale wagon of this invention may be advantageously used in units of two or more so that one wagon can be picking-up and loading bales in the field and another can be discharging its contents to more permanent storage facilities. Also the bale wagon itself can be used for storing bales or dry feeds on a temporary basis and be operated to discharge only specific amounts needed in applicable circumstances.

Having thus described the invention what is claimed is:

1. A self-loading and unloading bale wagon comprising a wheeled chassis, an elongated drum transversely and rotatably mounted on said chassis, a T-shaped partition projecting inwardly from the inside of said drum and extending helically from one end of said drum to the other end thereof, the cross arm of the T-shaped partition along with the inside surface of the said drum and adjacent flights of the helically arranged partition defining a continuous helical box-like bale-receiving channel within said drum extending from one end thereof to the other, said channel having a bale inlet at one end thereof and a bale outlet at the other end thereof, means for rotating said drum, and means within said channels to prevent bales from reversing their direction of movement within said channel as said drum is rotated.

2. The bale wagon of claim 1 wherein the bale inlet means communicates with said helical channel through the circumference of the drum near one end thereof.

3. The bale wagon of claim 1 wherein releasable means are provided at the bale outlet to retain the bales within the drum and to control movement of bales from the drum.

4. The bale wagon of claim 1 wherein the drum ends and bale inlet and outlet are covered, the said end covers having axial openings and wherein an inwardly projecting spiral flange is secured to the T-shaped partition, whereby the said wagon is adapted to dry feed mixing and handling.

5. The bale wagon of claim 1 wherein a bale pick-up means is provided to move bales deposited on the ground to the bale inlet in the drum.

6. The bale wagon of claim 1 wherein at least two continuous helical box-like bale-receiving channels are disposed concentrically within said drum.

7. The bale wagon of claim 6 wherein each of the said helical channels is associated with a separate bale inlet communicating through the circumference of the drum with a single bale pick-up means.

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