United States Patent

[11] 3,583,578

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[54] **BALE WAGON UNLOADING SYSTEM**
7 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **214/6B,** 214/510
[51] **Int. Cl.** **B65g 57/32**
[50] **Field of Search** ..... 214/6 B, 518

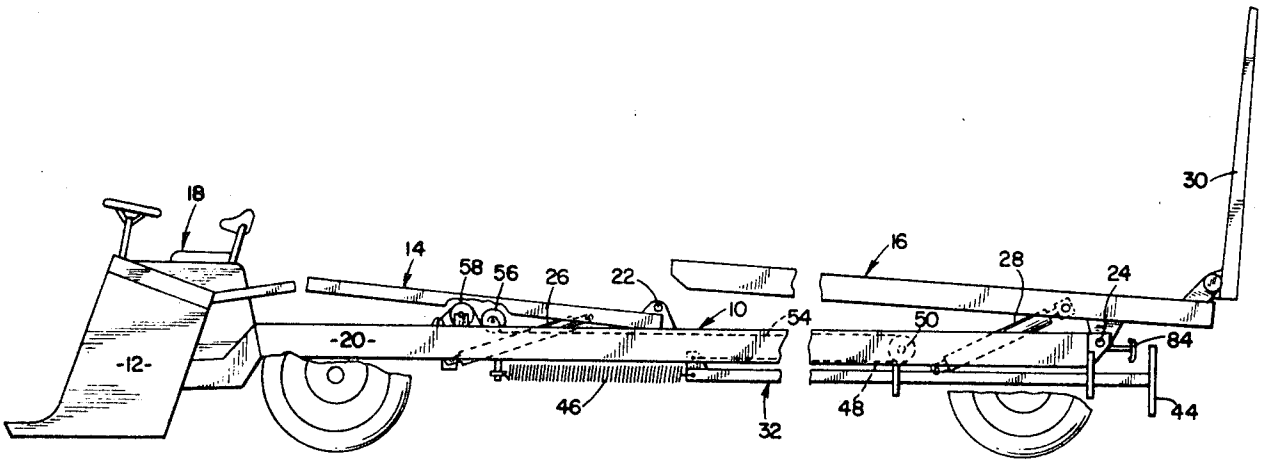
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3,373,882	3/1968	Forest	214/6B

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ABSTRACT: An automatic bale wagon having a bale pickup, an accumulator table, and a load table arranged on a mobile frame. A layer of bales is formed on the accumulator table which is successively pivotable to a generally vertical position to deliver successive layers to the load table. The load table is pivotable to a generally vertical position wherein a pair of pusher members on the frame are actuated to push a stack of bales off the load table onto the ground. Means are provided for selectively actuating the pusher members in response to sequential pivoting of the load table and the accumulator table to their respective vertical positions.



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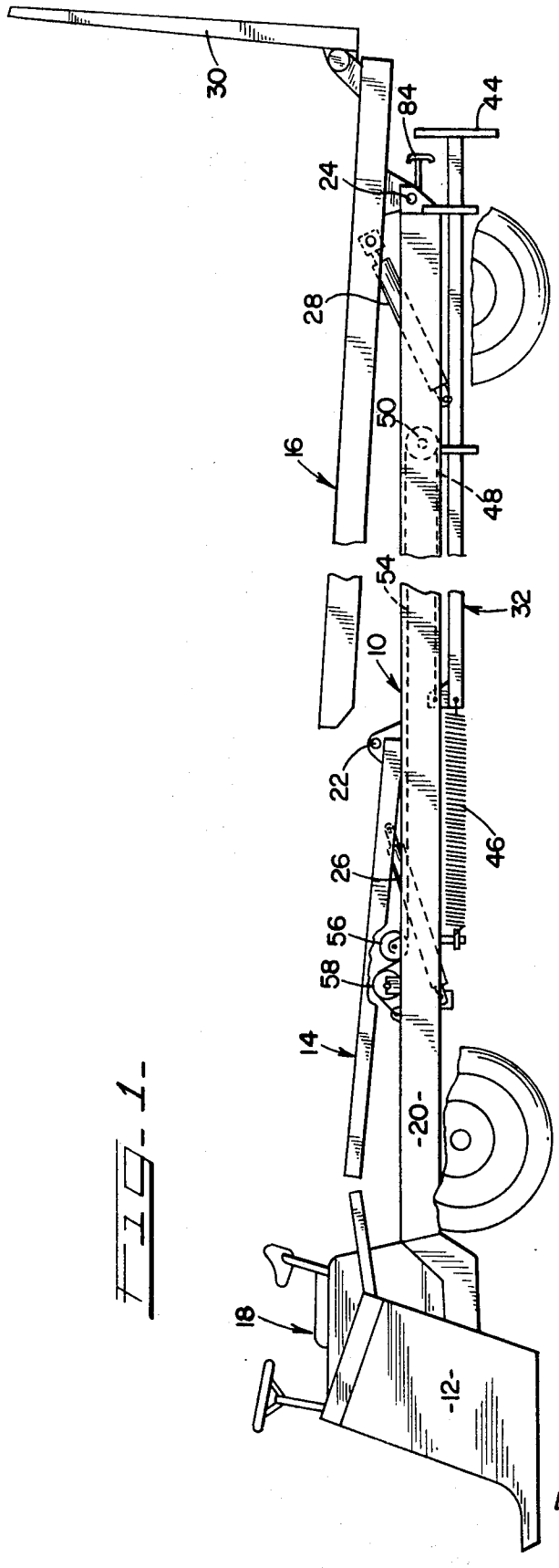


FIG. 1

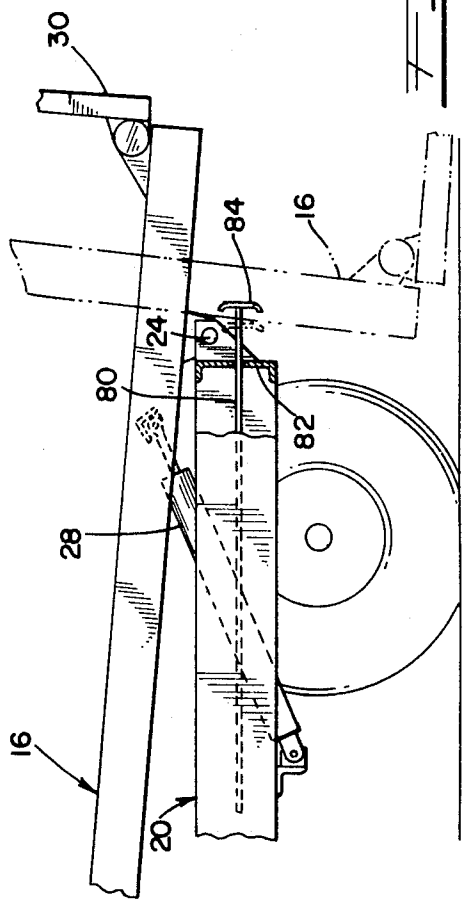


FIG. 4

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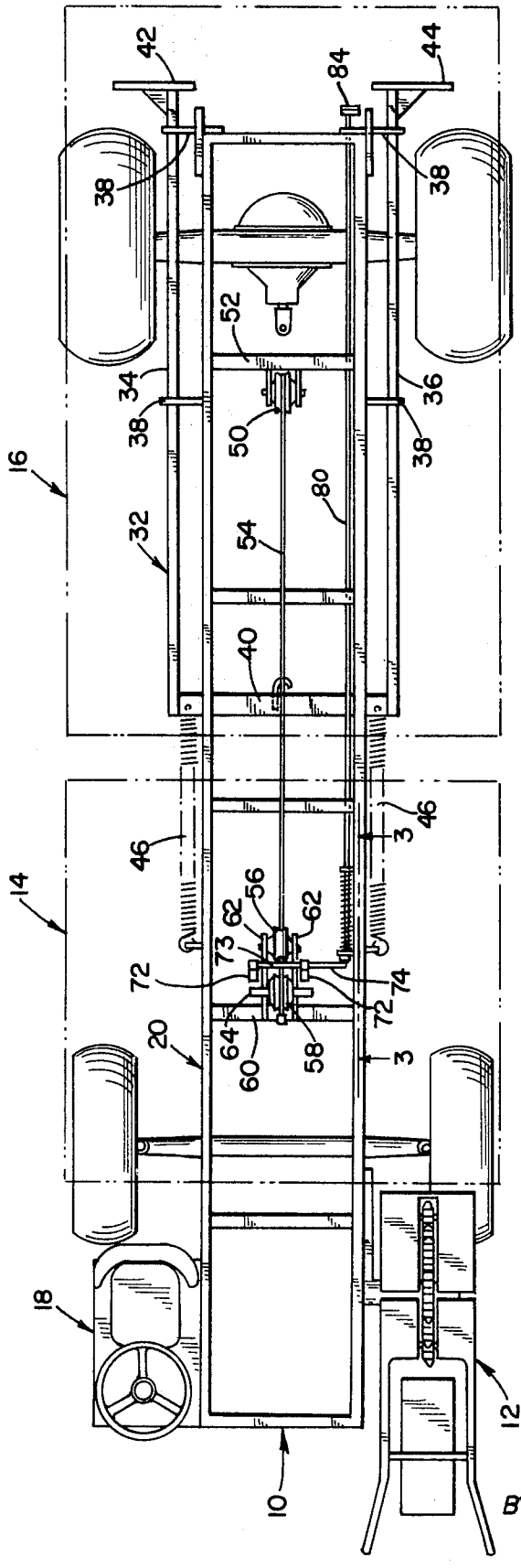


FIG-2-

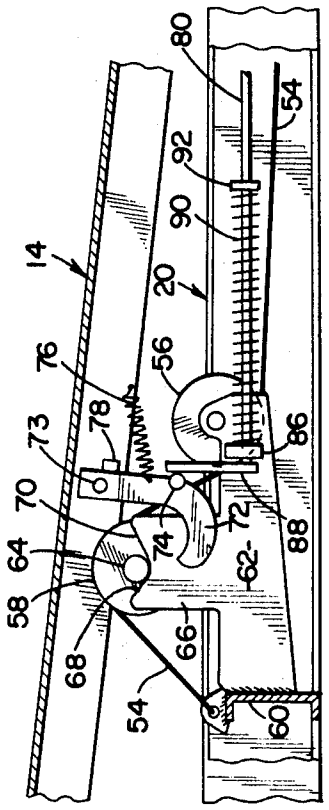


FIG-3-

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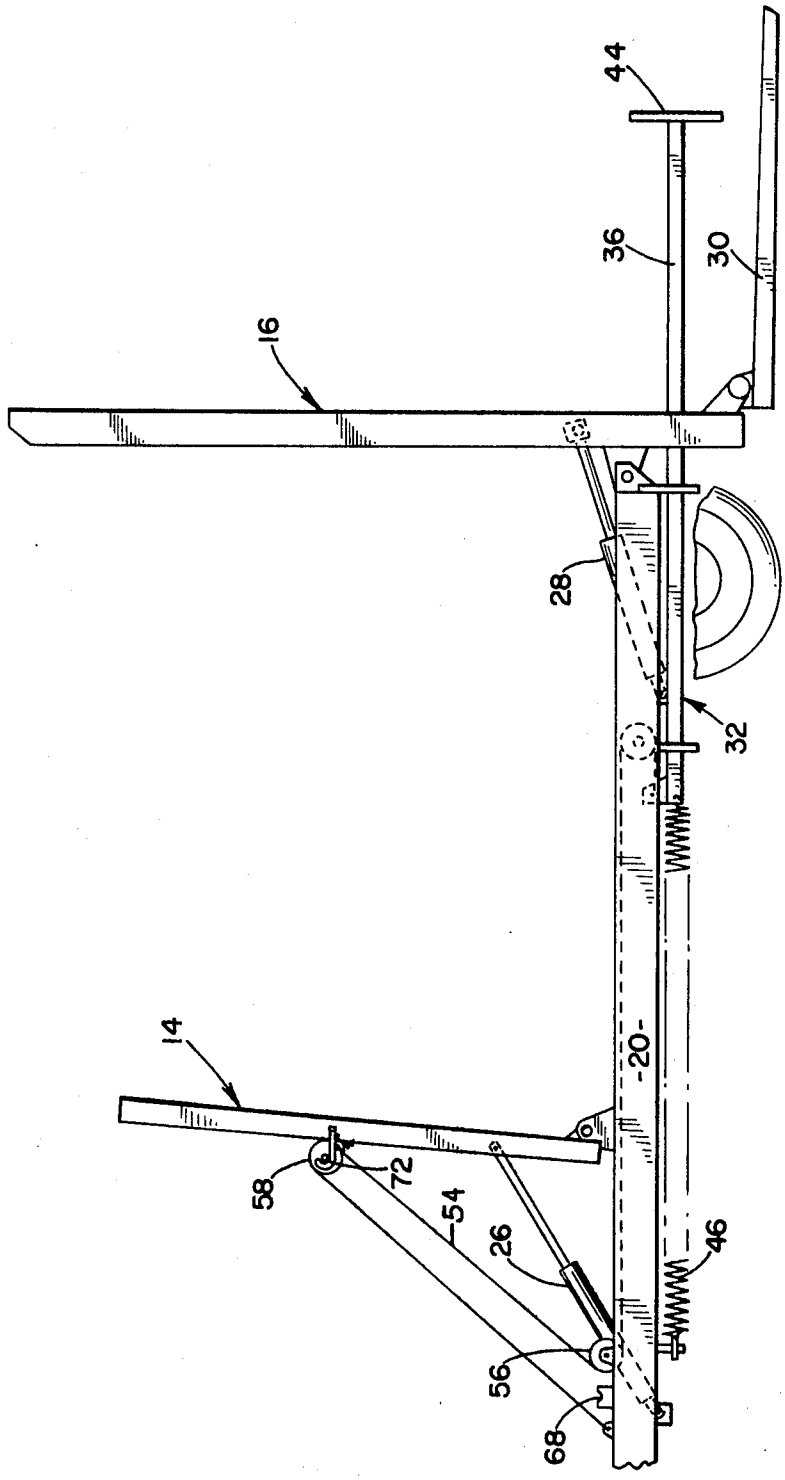


FIG. 5.

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BALE WAGON UNLOADING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to automatic bale-handling machines and more particularly to a mobile bale-pickup and -stacking wagon.

2. Prior Art

U.S. PAT. No. 2,848,127 shows an automatic bale wagon having a load-carrying bed 39 pivotable to a vertical position wherein hydraulic rams 59 are actuated by a control valve 67 to off-load a stack of bales from the bed.

A practical problem with machines having hydraulic components is the relatively high cost of the components and the degree of maintenance required to insure proper operation. In modern machines of the type involved herein, the hydraulic fluid system is normally operable at very high pressures in order to move heavy loads quickly. Consequently, the hydraulic components are subject to rapid wear and the hydraulic system is subject to leakage. Moreover, proper operation can be maintained only when the hydraulic fluid is kept free from contamination. It is therefore desireable to reduce the number of hydraulic components to a minimum commensurate with effective operation.

SUMMARY

The invention relates to a mechanical system for off-loading a stack of bales from a load-carrying table or bed of a bale wagon. The system includes a mechanical linkage operable in response to the sequential hydraulic lifting of a load table and an accumulator table forming part of the basic structure of the bale wagon, for off-loading a stack of bales. The mechanical linkage reduces the number of expensive and difficult-to-maintain hydraulic components, heretofore thought to be required in an automatic bale wagon.

Briefly, the objects of the invention are to provide an automatic bale wagon with a mechanical system for off-loading a stack of bales, wherein the number of hydraulic components in the bale wagon are reduced; costs are reduced; maintenance requirements are reduced; and wherein the off-loading operation may be conducted with no significant sacrifice in effective speed or load capacity of the system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of a conventional automatic bale wagon including the off-loading system of the invention;

FIG. 2 is a plan view of the bale wagon wherein the accumulator table and the load table are shown in phantom lines to better illustrate the structure disposed therebeneath;

FIG. 3 is an enlarged fragmentary sectional view taken generally in the direction of arrows 3–3 of FIG. 2;

FIG. 4 is an enlarged fragmentary side elevation view of the rearmost portion of the bale wagon; and,

FIG. 5 is a fragmentary side elevation view of the bale wagon wherein the accumulator table and the load table are vertically disposed during an unloading operation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention is embodied in a conventional automatic bale wagon including a wheel-supported chassis 10 upon which is mounted a bale pickup 12, an accumulator table 14, and a load table 16. The bale wagon is of the self-propelled type controlled from an operator's station shown generally at 18. The illustrated bale wagon is adapted to be driven along rows of bales lying on the ground wherein the bales are picked up by the pickup 12, transferred onto the table 14 into a layer of predetermined configuration, and then deposited in vertical layers on the load table 16, all in a manner will known in the art.

The chassis 10 includes a rectangular longitudinally extending frame 20 upon which the accumulator table 14 and load table 16 are pivotally mounted at 22 and 24 respectively. The tables 14 and 16 are adapted to be pivoted upwardly by hydraulic cylinder units 26 and 28 respectively, each being connected between the frame 20 and the respective tables. The load table 16 includes structure 30 extending upwardly from the rear end thereof for retaining a load of stacked bales thereon.

It will be understood that the foregoing constitutes a general description of conventional structure wherein the load of stacked bales on the table 16 is adapted to be off-loaded as a unit when the table 16 is pivoted to a generally vertical position shown in FIG. 5.

The invention relates to a system for off-loading the stack of bales. As best shown in FIG. 2 there is provided a pusher assembly 32 slidably mounted beneath the frame 20. The assembly 32 includes a pair of rails 34 and 36 slidably supported on guide members 38 fixed to the frame 20. The rails 34 and 36 are interconnected at their forward ends by a cross brace 40. Plates 42 and 44 are secured to the rearward ends of rails 36 and 38 respectively as shown. The pusher assembly 32 is normally disposed in a retracted position beneath the table 16 as shown in FIG. 1 and 2 by means of a pair of coil springs 46 connected between the frame 20 and the cross brace 40.

The pusher assembly 32 is adapted to be moved rearwardly to off-load a stack of bales from the load table 16 (in response to raising the accumulator table 14) when the table 16 is disposed in a vertical position shown in FIG. 5. A cable having a lower run 48 is connected to the cross brace 40 and extends rearwardly around a pulley 50 secured to a cross brace 52 of the frame 20. The cable extends forwardly from the upper portion of the pulley 50 in an upper run 54 beneath a pulley 56 and upwardly over pulley 58. The end of the cable is secured to a cross brace 60 of the frame 20.

As best shown in FIGS. 2 and 3 the pulley 56 is mounted on a pair of supports 62, 62 extending rearwardly from the cross brace 60. The pulley 58 includes a central shaft 64 which normally rests on a pair of yokes 66, 66 formed integrally with and extending upwardly from the supports 62, 62 forwardly of the pulley 56. The upper end of each of the yokes 66, 66 is formed to define a concave seat 68 for receiving the shaft 64 to thus support the pulley 58. The seat 68 includes a guide surface 70 inclined upwardly and rearwardly from the lowest point thereof for purposes to be described.

A pair of hooks 72, 72 are rigidly connected to a pivot shaft 73 mounted on the underside of the accumulator table 14. The hooks 72, 72 are disposed proximate to the opposite ends of the shaft 64. A rod 74 extends transversely from one of the hooks 72, 72 toward one side of the frame 20 as best shown in FIG. 2. A spring 76 is connected between one of the hooks 72 and the accumulator table 14 for normally returning the hooks in a rearward position against a stop member 78 on the table 14. It will be noted that the hooks 72, 72 are thus normally disposed rearwardly of the ends of the shaft 64. Accordingly, the accumulator table 14 is free to be pivoted upwardly during the loading procedure without interference with the structure therebeneath.

The hooks 72, 72 are arranged to be pivoted forwardly to a position wherein they will engage the shaft 64 when the accumulator table 14 is raised. Toward that result a push rod 80 is slidably mounted on the frame 20. The rearmost end of the rod 80 extends through a cross brace 82 of the frame and has a plate 84 mounted thereon. The frontmost end of the rod 80 is slidably mounted through a bracket 86 and has a plate 88 thereon as best shown in FIG. 3. It will be seen that forward movement of the rod 80 causes the plate 88 to engage the rod 74 and thus pivot the hooks 72, 72 forwardly beneath the shaft 64. A spring 90 is disposed along the push rod 80 between the bracket 86 and a collar 92 secured on the rod 80. Accordingly, the spring 90 serves to normally retain the push rod 80 in the position shown in FIG. 3.

In operation, the cylinder unit 28 is extended to pivot the load table 16 from the position of FIG. 1 to the generally vertical position of FIG. 5 (and as shown in dotted lines in FIG. 4). It will be understood that the table 16 includes suitable

openings defined therethrough (not shown) for receiving the plates 42 and 44 of the pusher assembly 32. The underside of the load table 16 engages the plate 84 (FIG. 4) and moves the push rod 80 forwardly. As will be seen with reference to FIG. 3 the plate 88 engages the rod 74 to pivot the hooks 72, 72 forwardly to a position beneath the shaft 64.

The cylinder unit 26 is then extended to raise the accumulator table 14 to its vertical position of FIG. 5. The hooks 72, 72 engage the shaft 64 and the pulley 58 is thus raised in conjunction with the table 14. The cable is pulled upwardly on the pulley 58 resulting in rearward movement of the pusher assembly 32 against the force of the springs 46. The plates 42 and 44 engage the stack of bales supported on the load table 16 and move the same off the load retainer 30 and onto the ground.

After the unloading procedure is completed the cylinder unit 26 is retracted to lower the table 14. The springs 46 are effective to pull the pusher assembly 32 forwardly to the retracted position shown in FIG. 2 while simultaneously keeping the cable taut as the pulley 58 is being lowered. As best shown in FIG. 3 the shaft 64 of the pulley 58 will be brought downwardly into contact with the guide surface 70 which permits the shaft 64 to move forwardly into the lowest point of the seat 68. The load table 16 is then lowered permitting the spring 90 to move the push rod 80 to its rearmost position. It will be seen that as the accumulator table 14 is brought down to its lowest position, the springs 76 are effective to pull the hooks 72, 72 rearwardly out of engagement with the shaft 64 and against the stop member 78. Accordingly, the rod 74 is disposed in position to be engaged by the plate 88 in a subsequent unloading operation.

By the foregoing, it will be seen that the invention provides a simple and effective means for unloading a stack of bales from a bale wagon.

What we claim is:

1. In a bale wagon having a mobile frame, an accumulator table pivotally mounted on said frame for accumulating a layer of bales when in a first generally horizontal position and being pivotable upwardly to a second generally vertical position for delivering said layer of bales, a load table pivotally mounted on said frame for receiving layers of bales delivered by said accumulator table to form a stack of bales thereon and being pivotable to a generally vertical position for depositing a stack of bales onto the ground, wherein the improvement comprises:

pusher means mounted on said frame for removing a stack of bales from said load table when in its generally vertical position; and

means for actuating said pusher means in response to sequentially pivoting said load table to its vertical position and said accumulator table to its second position.

2. The subject matter of claim 1, wherein said pusher means includes at least one pusher member slidably mounted on said frame for rearward movement to remove the stack of bales from said load table.

3. The subject matter of claim 2, including spring means for moving said pusher member forwardly to a retracted position in response to pivoting said accumulator table to its first position.

4. The subject matter of claim 1, wherein said means for actuating said pusher means includes latch means operative in response to movement of said load table from its generally vertical position to release said accumulator table for independent movement, whereby said accumulator table may be successively actuated to deliver layers of bales to said load table without actuating said pusher means.

5. In a bale wagon having a mobile frame, an accumulator table pivotally mounted on said frame for accumulating a layer of bales when in a first generally horizontal position and being pivotable upwardly to a second generally vertical position for delivering said layer of bales, a load table pivotally mounted on said frame for receiving layers of bales delivered by said accumulator table to form a stack of bales thereon and being pivotable to a generally vertical position for depositing a stack of bales onto the ground, wherein the improvement comprises:

a pusher member slidably mounted on said frame for movement between a retracted position and an extended position for removing a stack of bales from said load table;

linkage means interconnecting said accumulator table and said pusher member for moving said pusher member to its extended position in response to movement of said accumulator table to its second position; and

spring means for returning said pusher member to its retracted position in response to movement of said accumulator table to its first position.

6. The subject matter of claim 5, wherein said linkage means includes latch means operative in response to movement of said load table from its generally vertical position to release said accumulator table for independent movement, whereby said accumulator table may be successively actuated to deliver layers of bales to said load table without actuating said pusher means.

7. The subject matter of claim 5, wherein said linkage means includes a flexible cable having one end connected to said pusher member and the other end connected to said frame, a first pulley mounted on said frame, a second pulley mounted on said frame, and a third pulley releasably mounted on said accumulator table, said cable being disposed successively over said first pulley, under said second pulley, and over said third pulley, whereby said cable is pulled upwardly by said third pulley to move said pusher member to its extended position in response to raising said accumulator table.