

United States Patent

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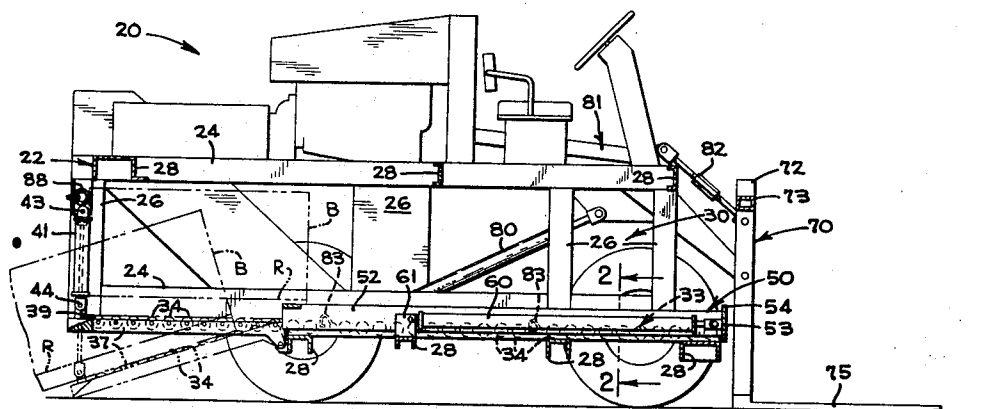
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[54] LOAD CARRYING DEVICE
8 Claims, 7 Drawing Figs.

[52] **U.S. Cl.**..... 214/518,
214/75, 214/83.24
[51] **Int. Cl.**..... B60p 1/46
[50] **Field of Search**..... 214/516,
518, 505, 75, 83.24

ABSTRACT: A vehicle is provided with a fork lift at its front end that is adapted to raise boxes one at a time and transfer them to a conveying mechanism that moves the boxes into a tunnel that extends internally of the vehicle longitudinally thereof. A plurality of boxes may be temporarily stored in the tunnel and then discharged from the rear of the tunnel down an inclined ramp.



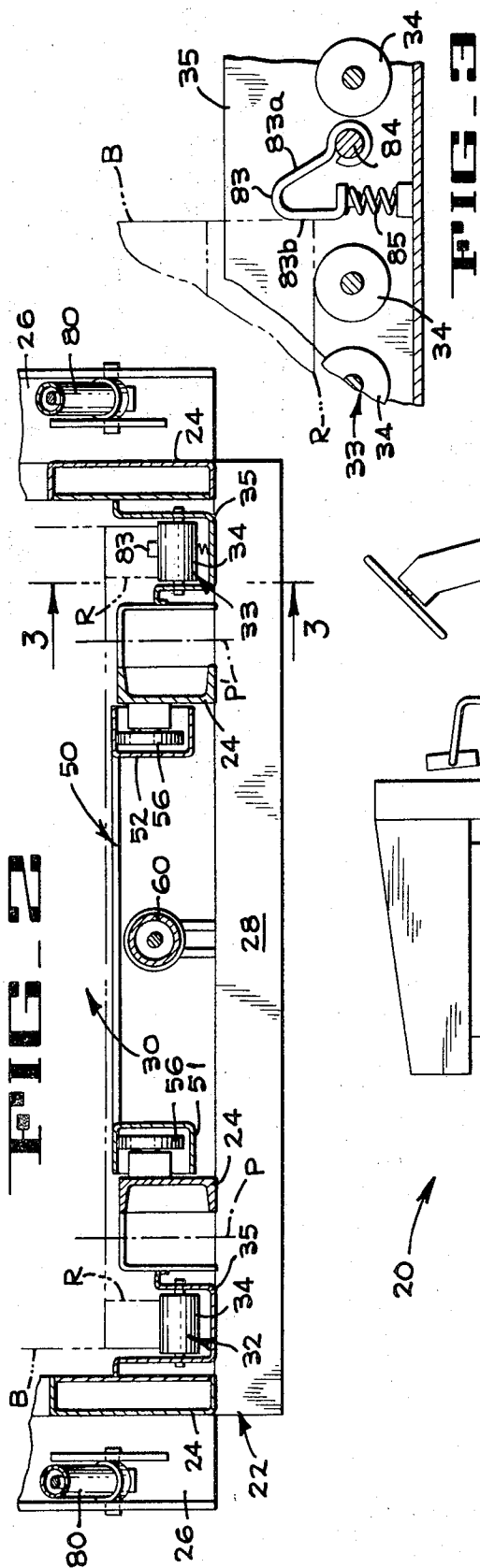
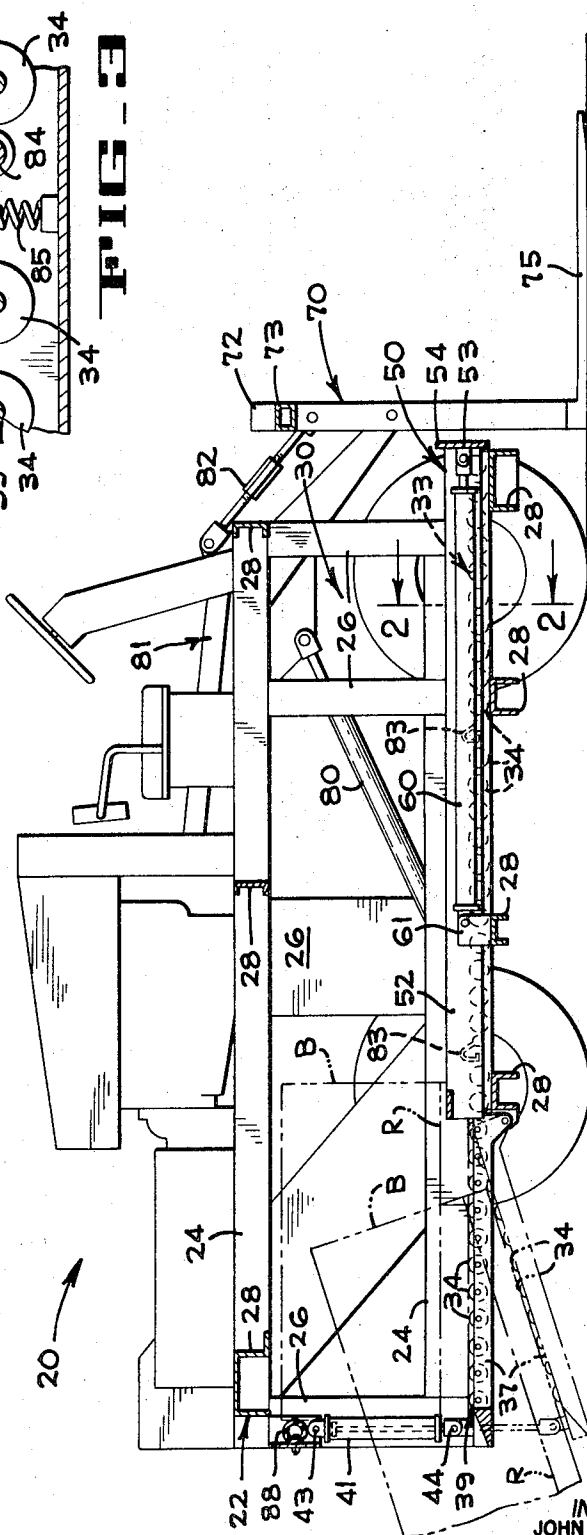


FIG. 1

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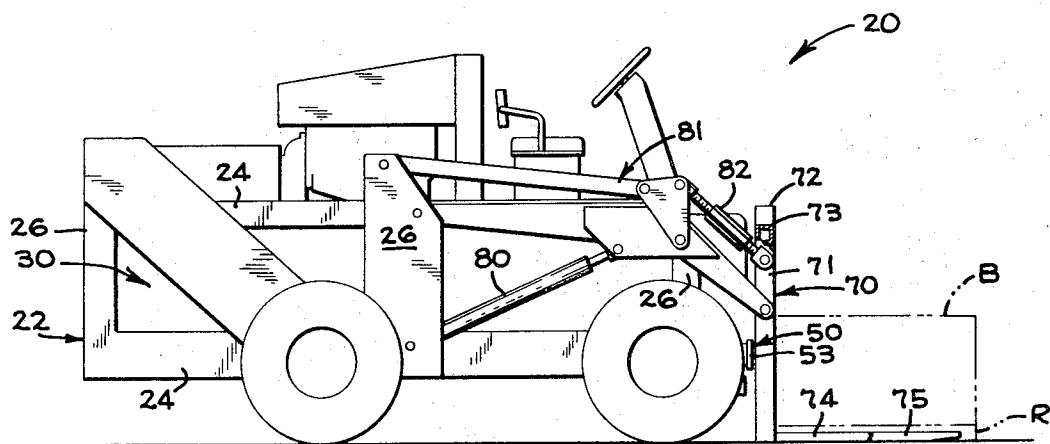


FIG. 4

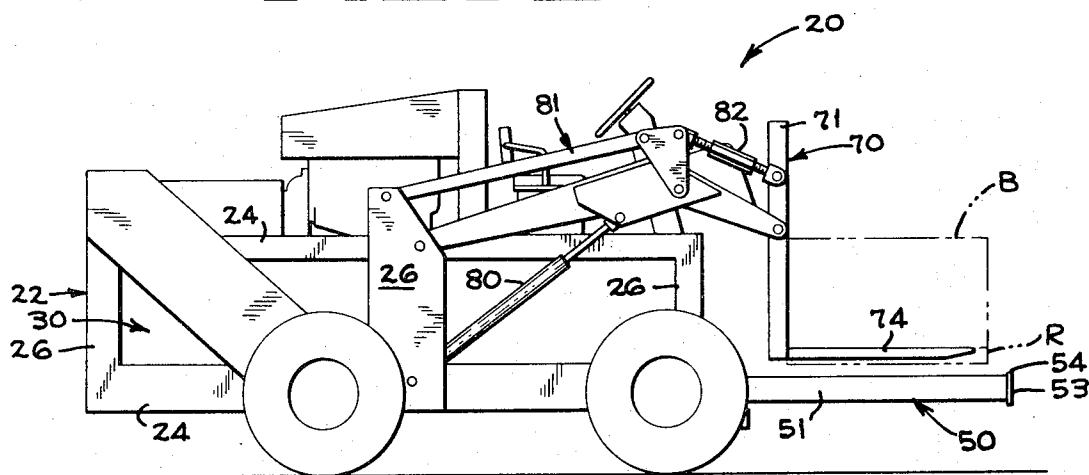
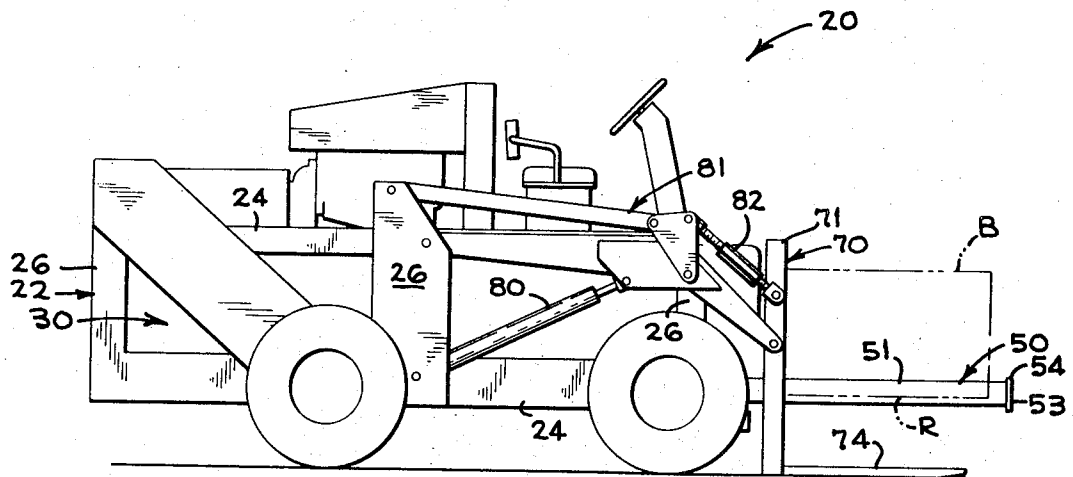
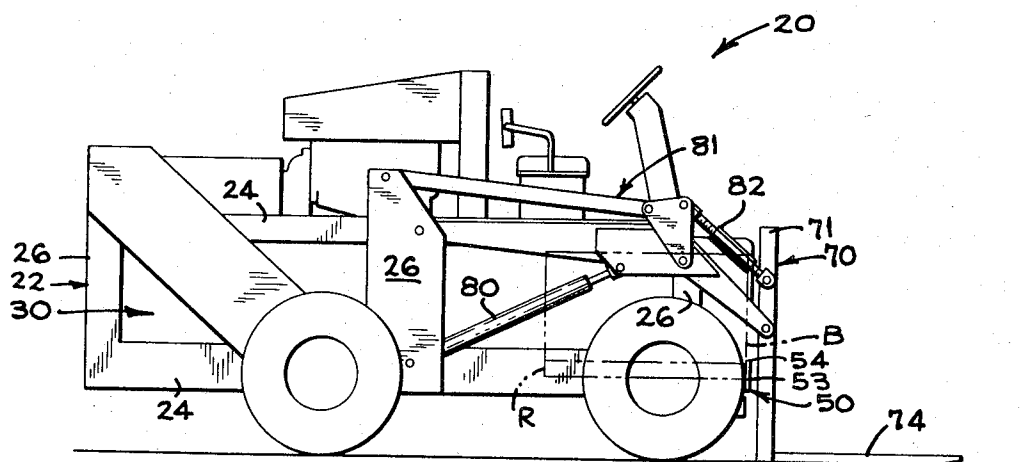


FIG. 5



LOAD CARRYING DEVICE

BACKGROUND OF THE INVENTION

This invention concerns vehicles for hauling articles from place to place and more particularly concerns a vehicle adapted to load, transport, and unload bins of the type used to collect produce in orchards or the like.

It is often desirable to collect produce in the field in large containers that are too heavy to be handled manually by the operators in the field. In some instances fork lift trucks have been used to transport the loaded bins but such trucks are limited as to the load they can carry and the speed at which they can travel. Accordingly, vehicles have been proposed in which an elongated bed is provided for storing a plurality of bins which are delivered to the bed by a fork lift mechanism that is mounted at the front of the vehicle and has a self-contained powered conveyor for transferring the bins from the fork lift to the vehicle bed. British Pat. No. 1,070,252 discloses such a vehicle. The U.S. Pat. to Shimmon No. 2,823,813 discloses a vehicle having a fork lift truck at its forward end that can rotate about a vertical axis for depositing boxes on the bed of the truck. The U.S. Pat. to Berg No. 2,099,998 discloses a pivotal lift mechanism that swings upwardly and into the truck to deposit a load therein. Also, a vehicle has been designed wherein a fork lift mechanism raises a box to a predetermined height, and roller conveyor sections are then moved to a position under the box, so that the box can be deposited thereon as the fork is lowered and the box can be then propelled into the truck.

All of the above-described mechanisms involve fairly complicated and expensive mechanism. Since simplicity in design and operation is of utmost importance in agricultural vehicles, it is an object of the present invention to provide a simple, rugged vehicle that operates on easily understood principles and is effective to load and carry four full bins at speeds of about 30 mph.

Another object is to provide an improved and simplified bin-lifting and transferring mechanism.

Another object is to provide an improved chassis for a bin carrier that accommodates loading, unloading, and storage mechanisms in an efficient manner.

SUMMARY OF THE INVENTION

The vehicle of the present invention comprises a self-powered, wheeled frame structure that provides a bin storage tunnel extending longitudinally therethrough. A pair of free rollers are disposed at each side of the tunnel to support the bins in the tunnel. Bins are moved into the tunnel by means of a fork lift mechanism that raises each bin directly vertically to a position in front of the open end of the tunnel at a level such that the bottom of the bin is somewhat above the level of the conveyor rollers in the tunnel. While the bin is thus held in raised position, a loading frame, which has an upwardly projecting plate at its forward end to provide a hook, is moved outward to a position between and below the arms of the fork lift. The fork lift is then lowered to deposit the bin on the loading frame so that, when the rail is retracted into the vehicle, the hook on the front end of the frame will pull the bin rearwardly into the tunnel and onto the two free roller conveyor sections.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic vertical section taken substantially on the longitudinal centerline of the vehicle.

FIG. 2 is an enlarged vertical section taken along line 2-2 of FIG. 1.

FIG. 3 is an enlarged vertical section taken along line 3-3 of FIG. 2.

FIGS. 4-7 are schematic side elevations of the vehicle of the present invention showing consecutive operations in a bin loading sequence.

In FIG. 1 the reference numeral 20 indicates generally the bin carrier of the present invention. As illustrated, the carrier

comprises a frame structure 22 that includes a plurality of rigid longitudinal members 24, vertical members 26 and transverse members 28 that are secured together by welding or bolting to provide a rigid structure and to define a tunnel 30, the lower portion of which is shown in FIG. 2, that is open at the front and rear and extends longitudinally of the vehicle.

Internally of the tunnel and extending longitudinally thereof are two fixed rows 32 and 33 of free conveyor rollers 34. Each row of rollers is mounted in a bracket 35 that is supported from adjacent longitudinal frame members 24. At the rear of the vehicle, the bottom of the tunnel is formed by a panel 37 that is pivoted on the frame 22 for swinging about a horizontal axis from a raised position in which it acts to support the rear-most bin in the tunnel to a downwardly inclined position in which it is effective to discharge bins from the tunnel.

The discharge panel 37 is provided with two fixed rows 39 of free rollers 34 (one row only being shown in FIG. 1), each of which forms a continuation of one of the rows 32 or 33. As shown in phantom lines in FIG. 2, each bin B has two spaced side rails R that ride along the rollers 34. The discharge panel 37 is raised and lowered by means of two double-acting hydraulic cylinders 41, one of which is shown in FIG. 1. Each cylinder 41 is disposed in a vertical frame channel 26 at one of the rear corners of the vehicle, the housing of the cylinder being pivoted at 43 to the frame and the piston rod being pivoted at 44 to the corner of the panel 37.

A loading frame 50, which is mounted inside the forward end of the vehicle, is made up of two laterally spaced channels 51 and 52 (FIG. 2) that are connected at their forward ends by a plate 53 (FIG. 1) which has a lip 54 extending above the level of the upper surfaces of the channels 51 and 52. Along its length, each of the channels 51 and 53 is supported on a line of rollers 56, one roller of each line being shown in FIG. 2. A double-acting hydraulic cylinder 60 (FIG. 1) is disposed centrally of the channels 51 and 53 and is anchored at one end in a fixed bracket 61 that is mounted on the frame. At the other end of the cylinder, the piston rod of the cylinder is pivotally connected to the cross plate 53 of the loading frame. It will be evident that when the cylinder 60 is energized, the loading frame will move longitudinally of the frame, with the channels of the loading frame riding over the lines of rollers 56.

A fork lift mechanism 70 is mounted on the front end of the vehicle and includes a pair of spaced vertical posts 71 and 72 (FIG. 4) which are rigidly connected together by a box beam 73 (FIG. 1) that extends between the upper ends of the posts 71 and 72 and cooperates with the vertical posts to define an inverted U-shaped lifting frame that is open at the bottom, thereby permitting unlimited vertically upward movement of the lifting frame relative to the loading frame. At their lower ends the posts 71 and 72 carry forwardly projecting tines 74 and 75, respectively. The tines are located approximately in the vertical planes indicated by the lines P and P' of FIG. 2, and thus it will be seen that they are disposed outwardly of the channels 51 and 52 of the loading frame but inwardly of the side rails R of the bin B.

The inverted U-shaped lifting frame and the tines thereon are moved vertically by means of two double-acting power cylinders 80 each of which is connected to the vehicle frame at one side of the vehicle and to one member of a double parallelogram link 81 that is connected between the vehicle frame and the lifting frame at that side of the vehicle. The two cylinders 80 are synchronized so that the lifting frame receives equally lifting actuations at each side of the frame. The front upper lever 82 of the lift linkage on each side of the vehicle is adjustable in length.

As seen in FIGS. 2 and 3 a bin stop 83 is located between certain rollers 34 of the conveyor row 33 within the tunnel. These stops are pivoted on fixed pins 84 and are urged upwardly by a spring 85. Each stop has a slanted forward surface 83a, adapted to be engaged and cammed downwardly by an advancing bin, and a generally vertical surface 83b which prevents rearward movement of a bin after the stop has been raised behind the bin by the spring. There are two bin stops 83

on the vehicle and they are located as indicated in dotted lines in FIG. 1.

The vehicle is provided with a conventional power steering mechanism and an automatic transmission that is powered by an industrial gasoline engine. The wheel suspension and other parts of the vehicle are conventional.

In operation, the driver lowers the tines 74 and 75 to the position of FIG. 4 and then drives the vehicle forwardly to project the tines under a bin. After the tines are in place, the two cylinders 80 are actuated to raise the tines and the bin on the tines to substantially the position shown in FIG. 5 wherein the tines are above the horizontal plane movement of the loading frame 50, which is then projected outwardly to the position of FIG. 5 underlying the bin by actuation of cylinder 60.

The fork lift is then lowered to move the tines to a position below the loading frame, thus automatically depositing the bin on the loading frame, rearwardly of the lip or hook 54 on the outer end of the frame. The cylinder 60 is then actuated again to move the loading frame and the bin thereon into the tunnel. As the bin enters the tunnel, the rails R ride up onto the rollers 34 so that, as seen in FIG. 2, the bin is progressively lifted out of engagement with the top surfaces of the channels of the loading frame. The rearward movement of the bin continues of course since the hook at the front end of the loading frame will engage the bin and urge it rearwardly.

A second and a third bin may be moved into the tunnel following the same procedure. Since none of the bins rest on the loading frame after it enters the tunnel, the outward movement of the frame is not restrained. As each new bin is moved into the tunnel, it moves the bins in the tunnel rearwardly, and the rearmost bin comes to rest over the panel 37 against a rubber bumper 88 that is mounted across the rear of the frame.

The tunnel is adapted to hold three bins. For maximum utilization of the vehicle carrier, three bins can be positioned in the tunnel and a fourth can be carried on the extended loading frame. If desired, when the fourth bin is on the loading frame, the loading frame can be moved rearwardly until the lip 54 on the frame has moved all the four bins into abutting contact and has locked them against the rear bumper 88.

It should be recognized that the lift mechanism of this vehicle is not only effective to raise bins from the ground but also it can remove bins from a stack of bins, or from a truck bed, or from a dock and load them into the tunnel.

When it is desired to unload the bins from the vehicle, the panel 37 is lowered, permitting the rearmost bin to move out immediately. The loading frame with the fourth bin is retracted to urge the three remaining bins rearwardly along the rollers and their momentum and inertia will cause them to be discharged as the vehicle is accelerated forwardly.

It will be noted that when the vehicle is carrying four loaded bins, the weight is distributed substantially uniformly to the front and rear wheels.

From the foregoing description it will be recognized that the present invention provides a simple effective means for transferring a bin from the ground to the tunnel of a bin carrier. Further the organization of the vehicle frame, the conveyor members, and the lift mechanism is such that a maximum load can be effectively and quickly moved into position in the vehicle, and clamped in place so that it can be carried at relatively high speeds over rough terrain such as is found in typical orchards and farms. The loading frame with its upwardly projecting forward lip provides a novel means for moving a loaded bin into a carrier without bruising the contents of the bin or damaging the bin itself.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention.

I claim:

1. In an article carrying vehicle, the combination of a support structure defining a tunnel open at its forward end to

receive articles, a lift mechanism mounted on said support structure at the forward end of the tunnel, said lift mechanism having spaced apart side members to pass an article therebetween and having forwardly extending tines inboard of said side members to lift the articles to the entrance of the tunnel, an extendable power operated loading frame mounted on said support structure, said frame having means to engage when extended an article on said tines and to draw said article between said lift member side members into said tunnel.

2. The combination of claim 1 wherein said loading frame is mounted for movement from a retracted position wherein the forward portion of said frame is substantially entirely within said tunnel to an extended position wherein said forward portion is outwardly of the tunnel and in the path of movement of said lift mechanism to receive an article from said lift mechanism, said means to engage an article comprising an upstanding ledge on the outermost end of said forward portion to engage the side of the article and move the article into said tunnel as said frame is retracted.

3. In a vehicle the combination of a support structure defining a tunnel open at its forward end, a loading frame mounted on said structure for movement from a retracted position substantially within said tunnel to an extended position wherein a forward portion of said frame is disposed outwardly of the open end of said tunnel, means for moving said frame between extended and retracted positions, and a lift mechanism mounted on the support structure at the forward end of the vehicle, said lift mechanism having an opening to receive an article and having tines outboard of said frame and inboard of the sides of said tunnel to support said article, said lift mechanism operable to deposit said article on said frame portion when said frame is in said extended position, movement of said frame toward said retracted position being effective to project the article into said tunnel, said loading frame and said lift mechanism movable in intermeshing relationship for transfer of said article from the lift mechanism to the loading frame.

4. A vehicle according to claim 3 including a lowerable ramp at the rear of said tunnel for discharging articles from the vehicle and including means for selectively raising and lowering said ramp.

5. A vehicle according to claim 4 including roller means within said tunnel for receiving an article projected into the tunnel and supporting it for movement toward said lowerable ramp.

6. A vehicle according to claim 3 including abutment means at the rear of said tunnel, and wherein said loading frame is provided with hook means on its outermost end that is adapted to engage an article on said frame during movement of said frame toward retracted position and urge the article against other articles in said tunnel to lock all articles in abutting relation with the rearmost article abutting said abutment means in the rear of said tunnel.

7. A vehicle according to claim 3 wherein said forward portion of said loading frame includes an upwardly facing support surface; and said lift mechanism includes two lift tines, and means for raising said tines with an article thereon to an elevated position above the level of said loading frame when said frame is in retracted position and for lowering said tines when said frame is in extended position to deposit the article on said support surface without interference with the loading frame as said tines move downwardly outside of said loading frame.

8. A vehicle according to claim 7 wherein said lift mechanism includes a power actuated linkage and an inverted U-shaped member connecting said linkage to said tines, the configuration of said member permitting said tines to be lowered under positive control of said linkage outside the loading frame to a level below said loading frame without interference from said frame, said frame pulling said article through said inverted U-shaped member into said tunnel on movement of the frame toward said retracted position.