

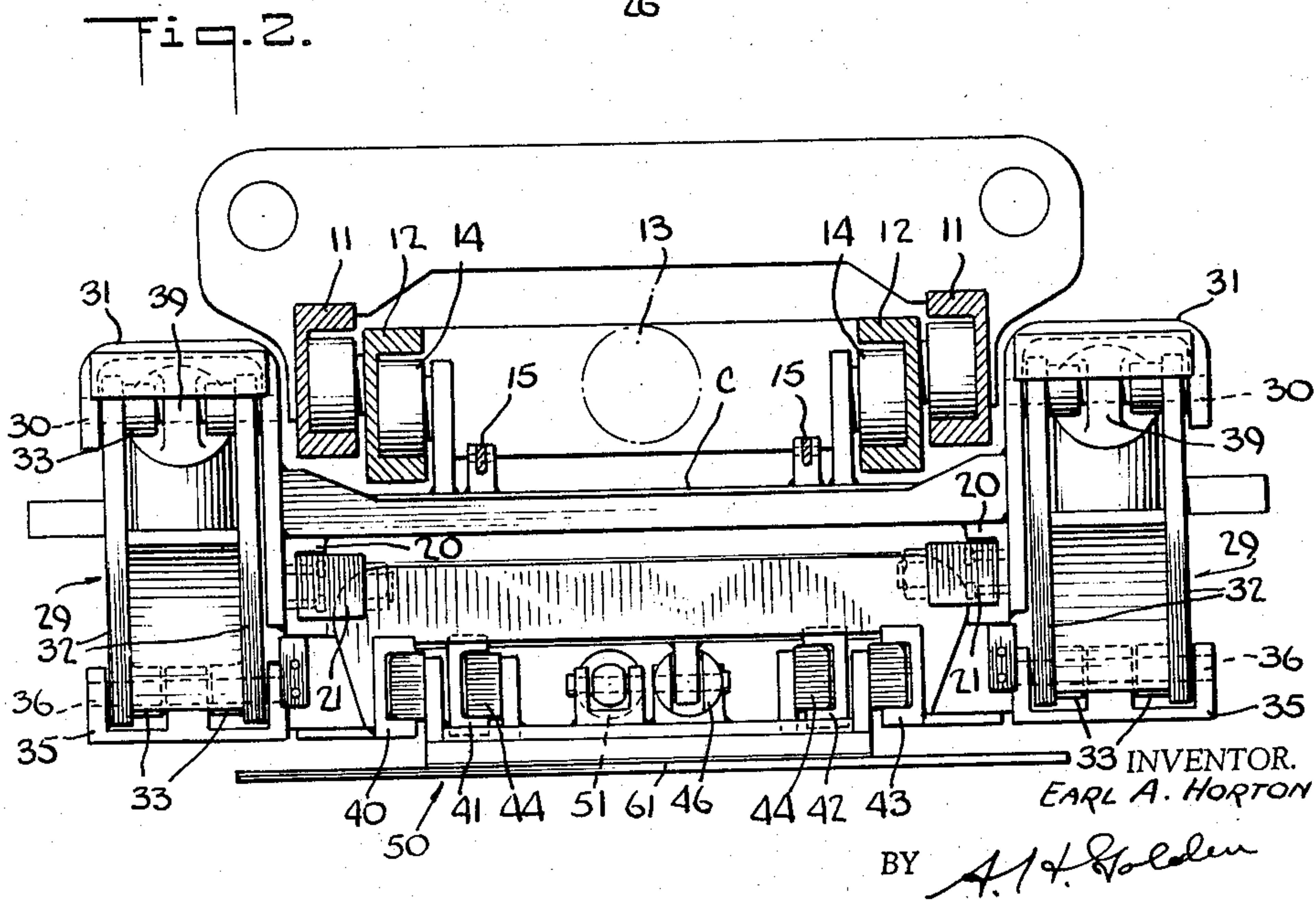
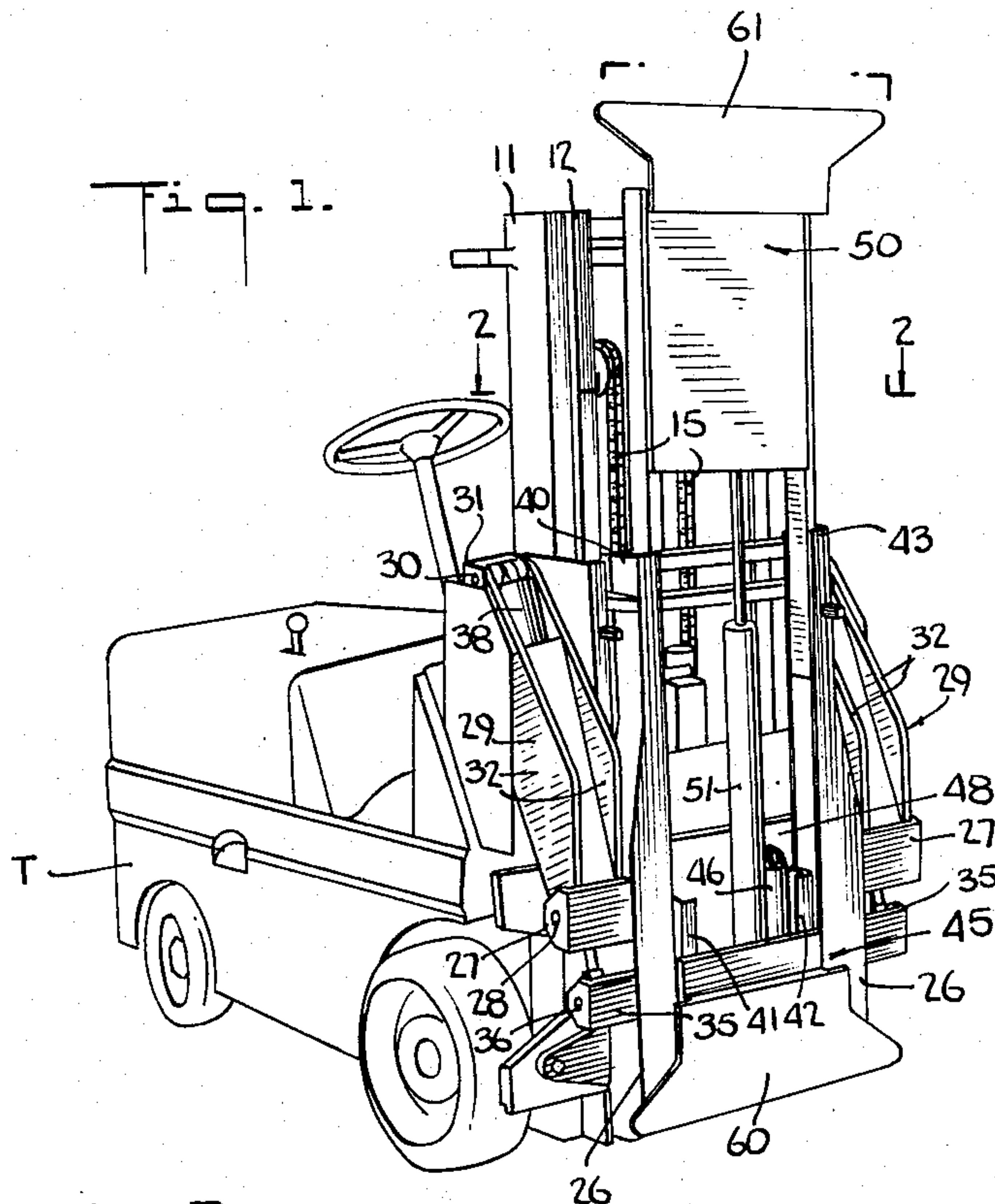
Sept. 20, 1960

E. A. HORTON  
CARTON UPENDING DEVICE

2,953,268

Filed Feb. 18, 1959

5 Sheets-Sheet 1



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ATTORNEY

**Sept. 20, 1960**

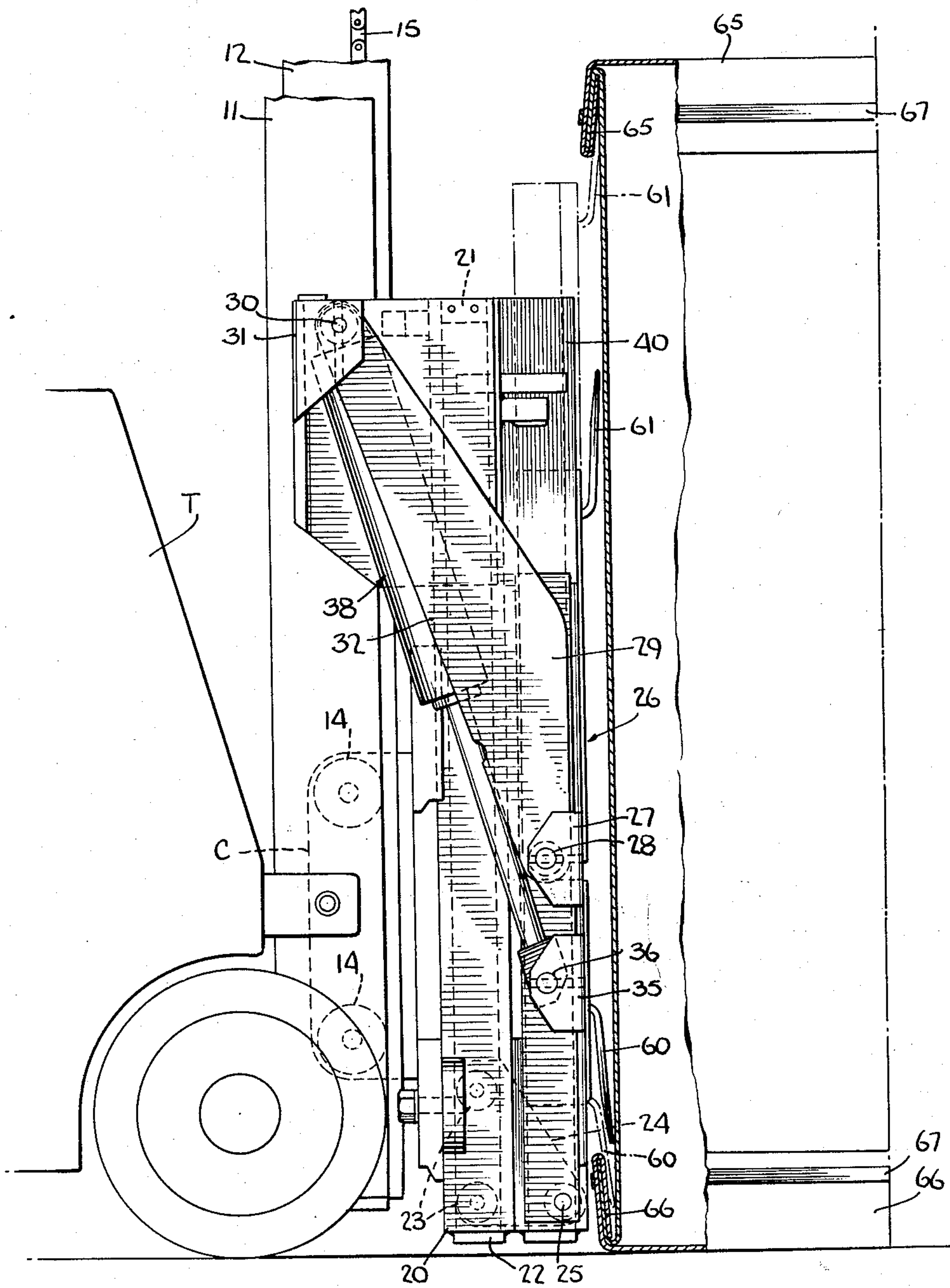
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Fig. 4.

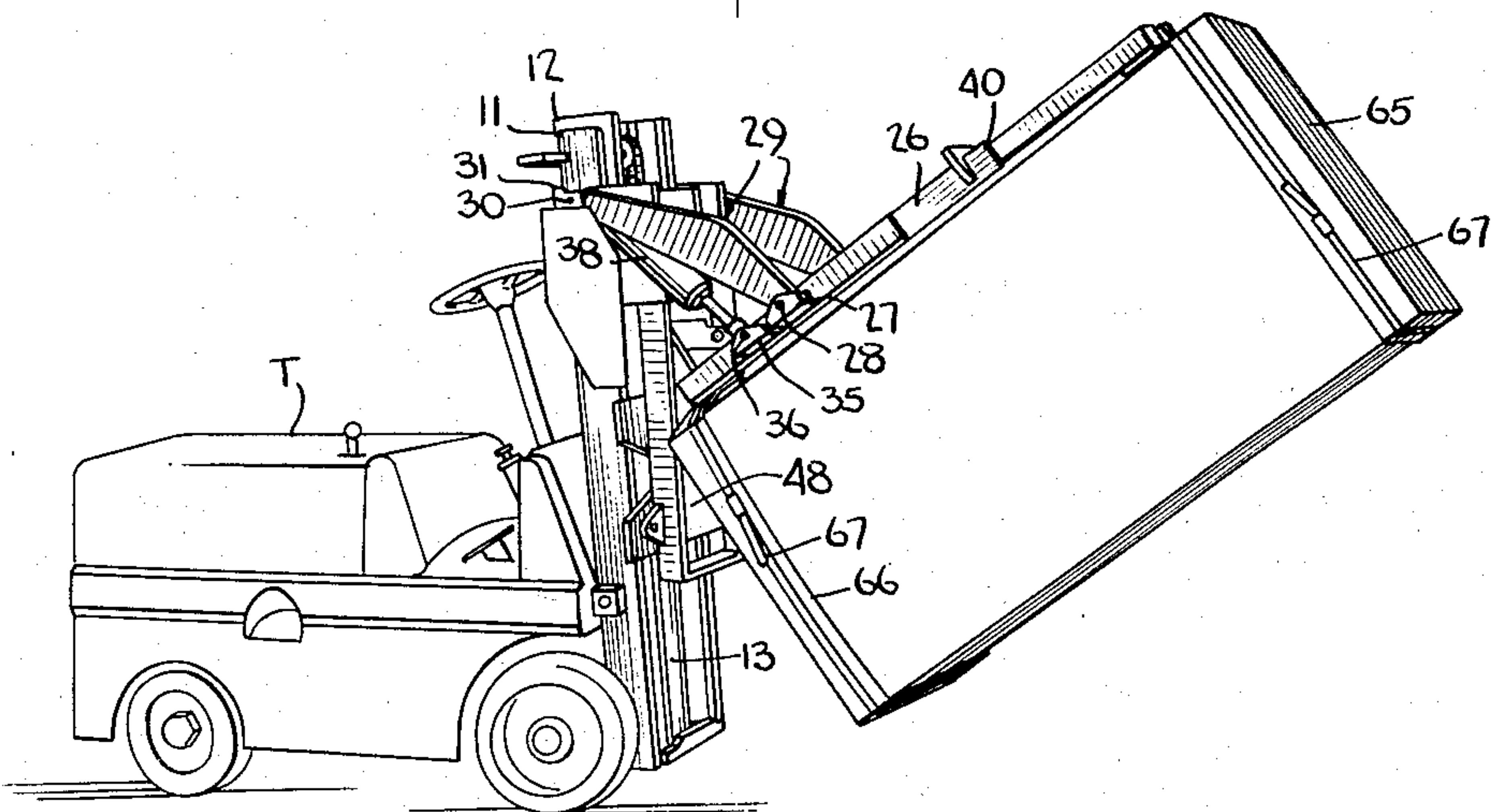
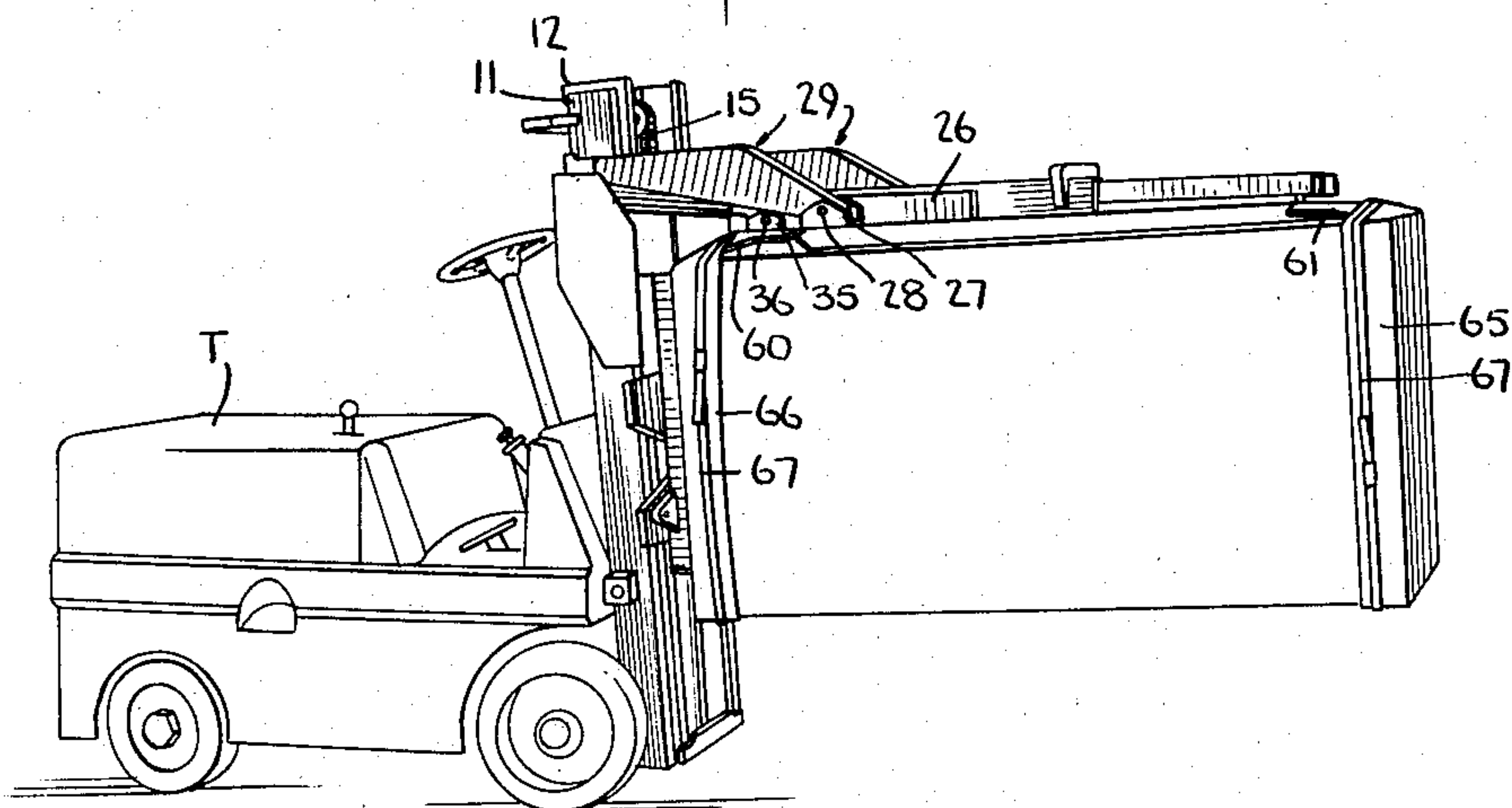


Fig. 5.



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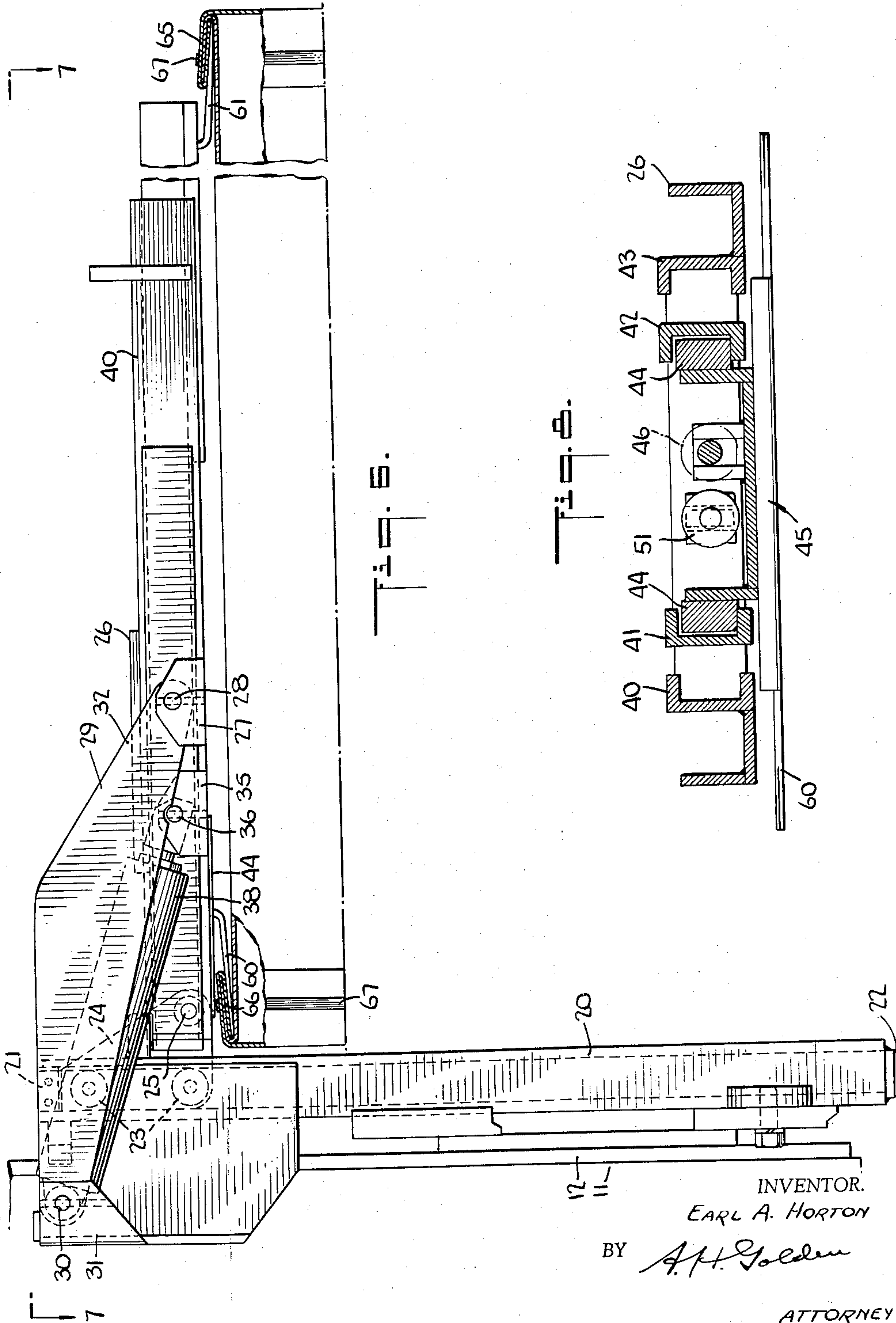
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5 Sheets-Sheet 4



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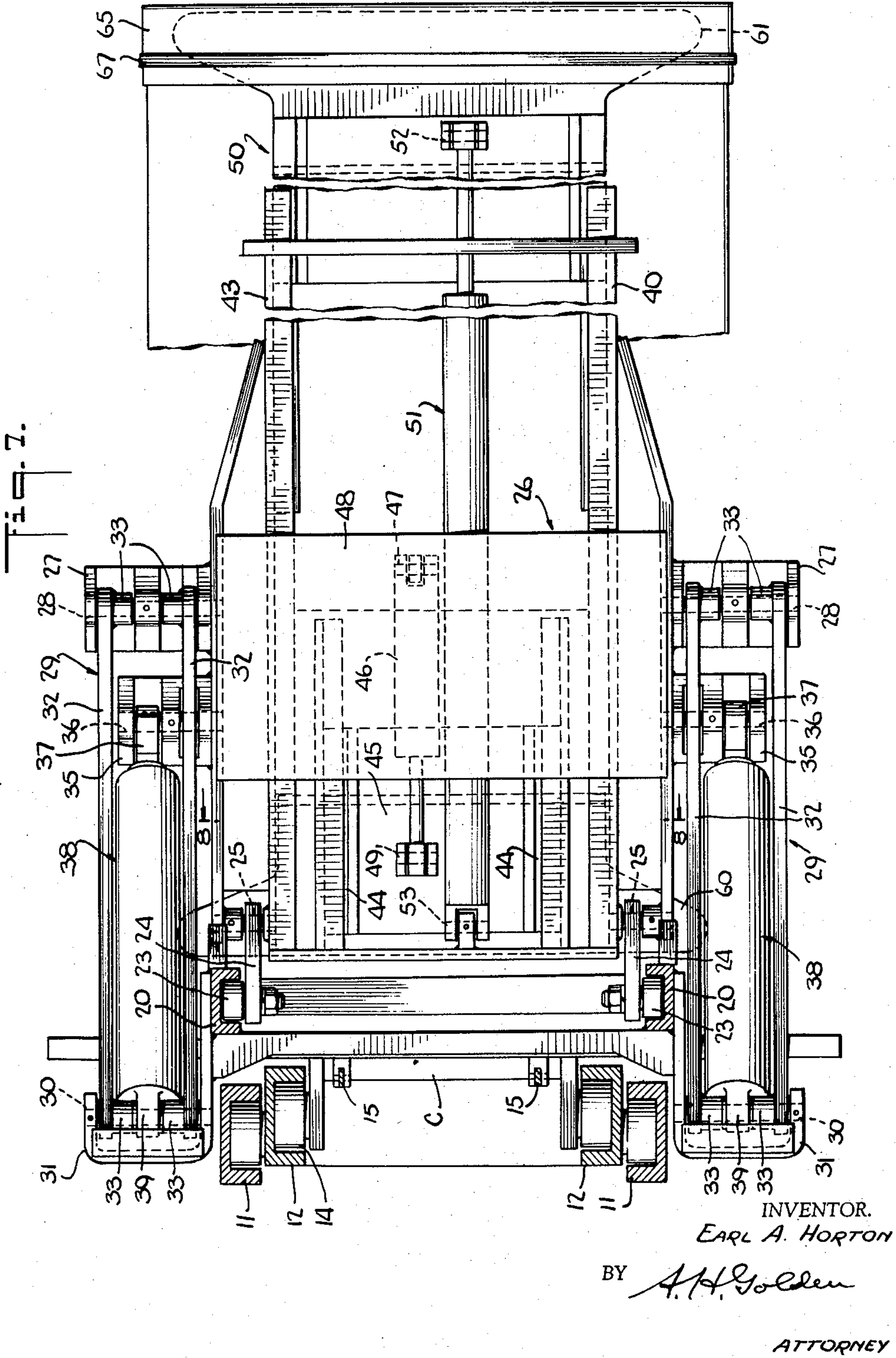
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2,953,268

## CARTON UPENDING DEVICE

Earl A. Horton, Philadelphia, Pa., assignor to The Yale and Towne Manufacturing Company, Stamford, Conn., a corporation of Connecticut

Filed Feb. 18, 1959, Ser. No. 794,003

5 Claims. (Cl. 214—652)

This invention relates to an industrial truck, and more particularly to an industrial truck adapted to stack loads in a novel manner in order to make possible a fuller utilization of available space.

It frequently happens that it is impossible to stack a series of cartons or boxes on a lower series of cartons and boxes due to the fact that the ceiling may not be sufficiently high to accommodate two, three or more courses of cartons. However, there is frequently room to deposit the lower course or courses of cartons in one position, and to apply the uppermost course of cartons in another position. As an example, in the stacking of refrigerators that may be seven feet high and three feet square, the lower course of refrigerators may be stacked vertically. In an 11 foot ceiling warehouse, this will not leave sufficient room for the stacking of two courses of refrigerators in a vertical position, but there is sufficient room to stack the lower refrigerators vertically, with the upper refrigerators laid to their sides. To do this requires special handling, and while this problem has existed for some time and a number of solutions have been proposed, so far as I know, no solution has ever been proposed whereby loads may be manipulated accurately and safely and stacked in all positions.

This same stacking problems arises frequently, also even if there is room for vertical stacking, should the cartons when so stacked in a vertical stacking become unstable. As a feature of my invention, I utilize a standard type of truck carriage adapted to be elevated on primary and secondary uprights so that the carriage may attain an extremely high stacking position. Carried by the carriage is a load handling frame that is adapted for compound movement so that it may readily be shifted to position a load in a horizontal position or in a vertical position.

As a particular feature of the invention, the load is so handled that a part thereof remains in close proximity to the truck, thereby decreasing the amount of counterbalance that is required on the truck to balance the load. As a more particular feature of my invention I utilize a load handling frame adapted to move with a portion thereof in a substantially vertical path while the remainder of the frame swings forwardly to carry the load therewith into a horizontal position when the vertical moving portion has completed its motion. Naturally, a reverse movement will carry the load from a horizontal position to a vertical position.

As even a more particular feature of the invention, the load handling frame is particularly adapted for coaction with a commercial type of carton having upper and lower caps. Thus, a pair of prong-like members are carried by the load handling frame and are adapted to extend into position between the caps and the body of the carton for gripping the carton. Of course, those skilled in the art will appreciate that my invention is adapted for utilization with varying types of loads and may carry load grippers of different constructions.

I have thus outlined rather broadly the more important features of my invention in order that the detailed de-

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scription thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings, Fig. 1 is a perspective view of an industrial truck equipped with my invention, taken from the forward end thereof.

Fig. 2 is a partial section and plan view taken along lines 2—2 of Fig. 1.

Fig. 3 is an enlarged side view showing the forward end of the truck equipped with my attachment just prior to engaging a carton.

Fig. 4 shows the truck with the carton in a position intermediate a vertical position and a horizontal position.

Fig. 5 shows the carton lifted to a horizontal position.

Fig. 6 is an enlarged view, partially in section, of the parts of the attachment when in the position of Fig. 5.

Fig. 7 is a view taken along lines 7—7 of Fig. 6.

Fig. 8 is a section taken along lines 8—8 of Fig. 7.

Referring now more particularly to the drawings, reference letter T indicates a typical standard industrial truck equipped with primary uprights 11, best shown in Fig. 2, and secondary uprights 12. Uprights 11 and 12 are channel-shaped, it being understood that the uprights 12 will move vertically in the uprights 11 when actuated by a suitable ram 13 in a manner standard in the art. Within the channels of the secondary uprights 12 there are mounted for movement upper and lower rollers 14 of a load carriage C. This load carriage C is lifted relatively to the secondary uprights, and naturally the primary uprights, through the medium of chains 15 in a standard manner illustrated in many prior patents. This part of the truck construction has been referred to merely for the purpose of indicating that applicant utilizes a standard load carriage mounted in a standard manner for movement by a ram or other means relatively to primary and secondary uprights.

The carton manipulator that I have conceived is carried by the carriage and is manipulated relatively to the carriage. I shall now proceed to describe in detail the construction of the carton manipulator.

The carriage C is equipped with opposed uprights 20 probably best shown in Fig. 7, but also quite well illustrated in Figs. 2, 3, and 6. The upper ends of the channels formed in the uprights 20 are closed by lugs 21 at the top and stops 22 at the bottom. Sliding within each of the channels of the uprights 20 are upper and lower rollers 23 secured as part of a carrier 24. The lower position of this carrier 24 in the uprights 20 is best illustrated in Fig. 3, while the upper position is probably best illustrated in Fig. 6. Each of the opposed carriers has pivoted thereto at 25 a frame member indicated generally by reference numeral 26. The particular manner of fabrication of this frame member 26 is not important, it being merely necessary that it be so constructed as to pivot at 25 relatively to the carrier 24 and to support a carton through the means to be described presently.

At each side of the frame member 26 there is formed a large ear 27 having a support for a short shaft 28 on which is pivoted a compound arm 29 formed of two separate plates 32 spaced relatively to one another as probably best seen in Fig. 7. The opposed end of the



compound arm 29 is pivoted at shaft 30 to a bracket 31 forming an integral part of the carriage C. To hold the plates 32 of compound arm 29 in spaced relation, each of the plates is formed with an integral sleeve 33 at each end thereof, as is clearly indicated in Fig. 7. It will be well to emphasize that this construction of the levers 29 is merely to contribute that strength that is necessary for the purpose of manipulating the load. It is also desirable to use the plates 32 for forming levers 29 in order to leave room for the operation of the two opposed rams referred to presently.

As is well shown also in Fig. 3, the frame member 26 is equipped with additional ears 35 at its opposed sides, these ears being rather similar to ears 27. Pivoted to the ears 35 at shaft 36 at each side of the truck, is the piston 37 of a hydraulic ram 38, the cylinder end of the ram being designated by reference numeral 39 and being pivoted at 30 to the carriage C. It will be recognized that this is the same pivot shaft on which the plates 32 of the lever 29 are pivoted to the carriage. Of course, the construction at each side of the truck is exactly the same, as is obvious from the drawings.

It has now been made clearly apparent that the carriage C of my truck is movable upwardly on the secondary and primary uprights 11 and 12. It is also apparent that the carriage is itself formed with uprights within which move the rollers 23 of a carrier 24. It is further apparent that pivoted to this carrier on shafts 25 is a frame 26. It will still further be seen that the frame 26 is not only pivoted to the carrier 24, but is also linked at each side thereof to the carriage C through the medium of levers 29 formed of opposed plates 32. It will still further be seen that the frame 26 is adapted for movement on shafts 25 relatively to carrier 24 through the piston 37 of the ram 38, the piston 37 being secured to the ears 35 of the frame 26 while the ram cylinder is secured at pivot shaft 30 to the carriage C.

Frame 26, as best illustrated probably in Fig. 2 has four additional uprights designated by reference numerals 40, 41, 42, and 43. Mounted for sliding movement on the uprights 41, 42 are opposed bars 44 forming an integral part of a lower gripper 45 best illustrated in Fig. 1, but shown well in several of the other figures. The lower gripper 45 is adapted for actuation by a hydraulic ram 46, one end of the hydraulic ram 46 being secured as best seen in Fig. 7, by a pivot 47 to a plate 48 forming an integral part of the frame 26. The opposed end of the ram 46 is pivoted at 49 to the lower gripper 45. Therefore, it is obvious that actuation of the ram 46 will move the gripper 45 vertically. This vertical movement will be under the guidance of the bars 44 moving in the opposed channels of uprights 41, 42.

Through a similar arrangement, the channel uprights 40 and 43 carry an upper gripper 50, also best illustrated in Fig. 1. As best seen in Fig. 7, the gripper 50 is adapted for actuation by a ram 51, the piston of which is pivoted at 52 to the gripper, while the cylinder is pivoted at 53 to a part of the frame 26. Obviously, therefore, actuation of the ram 51 will move the gripper 50 vertically, the gripper being guided by the channeled uprights 40 and 43.

The grippers are in the form of plates from which extend prong-shaped portions, the prong-shaped portion extending from the lower gripper 45 being designated by reference numeral 60, while the prong-shaped portion extending from the upper gripper 50 is designated by reference numeral 61. The carton to be lifted is of a type well known in the art, being formed of paper and having a cap 65 at its upper end and a cap 66 at its lower end. These caps are bound to the main body of the carton by straps 67 formed of metal and well known in this art. The prongs 60 and 61 are adapted to enter between each of the carton caps 65, 66 and the respective parts of the carton, as is probably best shown in Figs. 3 and 6.

I believe that I have now described rather fully the construction of my truck and that all there remains to be set forth here is a particular cycle of operation of my invention.

Let us now assume that a particular carton is to be lifted from a vertically stacked position and then deposited horizontally at a high point on some platform, or on a lower course of cartons. The truck T will approach the carton as best seen in Fig. 3, with the two prongs 60, 61 of the grippers 45, 50 spaced vertically from the respective caps 66, 65. Now, by operating in opposed directions, the two rams 46, 51 best illustrated in Fig. 7, will move the prongs 60 and 61 from their full line positions of Fig. 3 to their dotted line positions of Fig. 3. As a matter of interest, the dotted line position of Fig. 3 of the prongs 60, 61 is the same as their full line position of Fig. 6. Naturally, in Fig. 6 the carton is now in the horizontal position illustrated in Fig. 5.

With the carton securely held because of the entry of the prongs 60, 61 between the caps 65, 66 of the carton, my attachment is now ready for further operation. First the carriage C will be lifted somewhat, depending on the final position of the carton. This is accomplished through ram 13 in a conventional manner. Next, the operator directs fluid to the ram cylinder 38, pulling the piston 37 into the cylinder from the position of Fig. 3 to the intermediate position illustrated in Fig. 4 and then further to the final position of Figs. 5 and 6. It will be obvious that this movement of the piston rod 37 will act through frame 26 to move the carriers 24 vertically in the uprights 20 of the carriage C. At the same time, the levers 29 extending between the carriage C and frame 26 will contribute swinging movement to the frame 26 about its pivots 25 on carriers 24 moving the frame first to the position of Fig. 4. Continued upward movement of the carriers 24 is effective through levers 29 to swing the frame 26 into its final horizontal position of Fig. 5.

In its final horizontal position, the carton is securely held by the prongs 60, 61. Further, the carriage C may now be moved vertically to any position through operation of the carriage C in the usual manner well known in the art relatively to the primary and secondary uprights, so that it may be moved by the truck over the surface onto which it is then deposited. Now, the two rams 46, 51 may be operated in a reverse direction withdrawing the prongs 60, 61 from between the carton caps and the carton, and releasing the carton from the frame 26.

It is now possible by reverse operation of the ram cylinder 38 and its piston 37 to restore the frame to its position of Figs. 1 and 3 relatively to the carriage C and to move the carriage C to its initial downward position. Of course, those skilled in the art will appreciate that it is always possible to reverse the operation by gripping a carton while the carton is horizontal, and then moving the carton to a vertical position and there depositing the carton.

I now claim:

1. In a truck of the class described, support means, a load handling frame having load engaging means, mounting means for said frame, means mounting said frame on said mounting means for swinging movement about a lower end portion of said frame, means mounting said mounting means on said support means for vertical translational movement relatively to said support means, means operatively interconnecting said support means and said mounting means for effecting said vertical translational movement of said mounting means, and means interconnecting said frame and said support means for swinging the upper end of said frame away from said support means in response to upward vertical translational movement of said mounting means relatively to said support means.
2. In a truck of the class described, support means, a



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load handling frame having load engaging means, mounting means for said frame, pivot means mounting said frame on said mounting means for pivotal movement about a lower end portion of said frame, means mounting said mounting means on said support means for vertical translational movement relatively to said support means, means operatively interconnecting said support means and said mounting means for effecting said vertical translational movement of said mounting means, and means interconnecting said frame and said support means for pivoting the upper end of said frame away from said support means in response to upward vertical translational movement of said mounting means relatively to said support means.

3. In a truck of the class described, support means, a load handling frame having load engaging means, mounting means for said frame, pivot means mounting said frame on said mounting means for pivotal movement about a lower end portion of said frame, means mounting said mounting means on said support means for vertical translational movement relatively to said support means, means operatively interconnecting said support means and said mounting means for effecting said vertical translational movement of said mounting means, and guide means interconnecting said frame and said support means for pivoting the upper end of said frame away from said support means in response to upward vertical translational movement of said mounting means relatively to said support means.

4. In a truck of the class described, support means, a load handling frame having load engaging means, mounting means for said frame, pivot means mounting said frame on said mounting means for pivotal movement about a lower end portion of said frame, means mounting said mounting means on said support means for vertical

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cal translational movement relatively to said support means, means operatively interconnecting said support means and said mounting means for effecting said vertical translational movement of said mounting means, and a lever pivotally connected at one end to said support means and pivotally connected at its other end to said frame for pivoting the upper end of said frame away from said support means in response to upward vertical translational movement of said mounting means relatively to said support means.

5. In a truck of the class described, a pair of uprights, a carriage mounted for vertical movement on said uprights, a load handling frame having load engaging means, mounting means for said frame, means mounting said frame on said mounting means for swinging movement about a lower end portion of said frame, means mounting said mounting means on said carriage for vertical translational movement relatively to said carriage, means operatively interconnecting said carriage and said mounting means for effecting said vertical translational movement of said mounting means, and means interconnecting said frame and said carriage for swinging the upper end of said frame away from said carriage in response to upward vertical translational movement of said mounting means relatively to said carriage.

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