Aug. 9, 1938. C. S. SCHROEDER 2,126,289

LIFTING TRUCK

Filed June 7, 1935 7 Sheets-Sheet 1

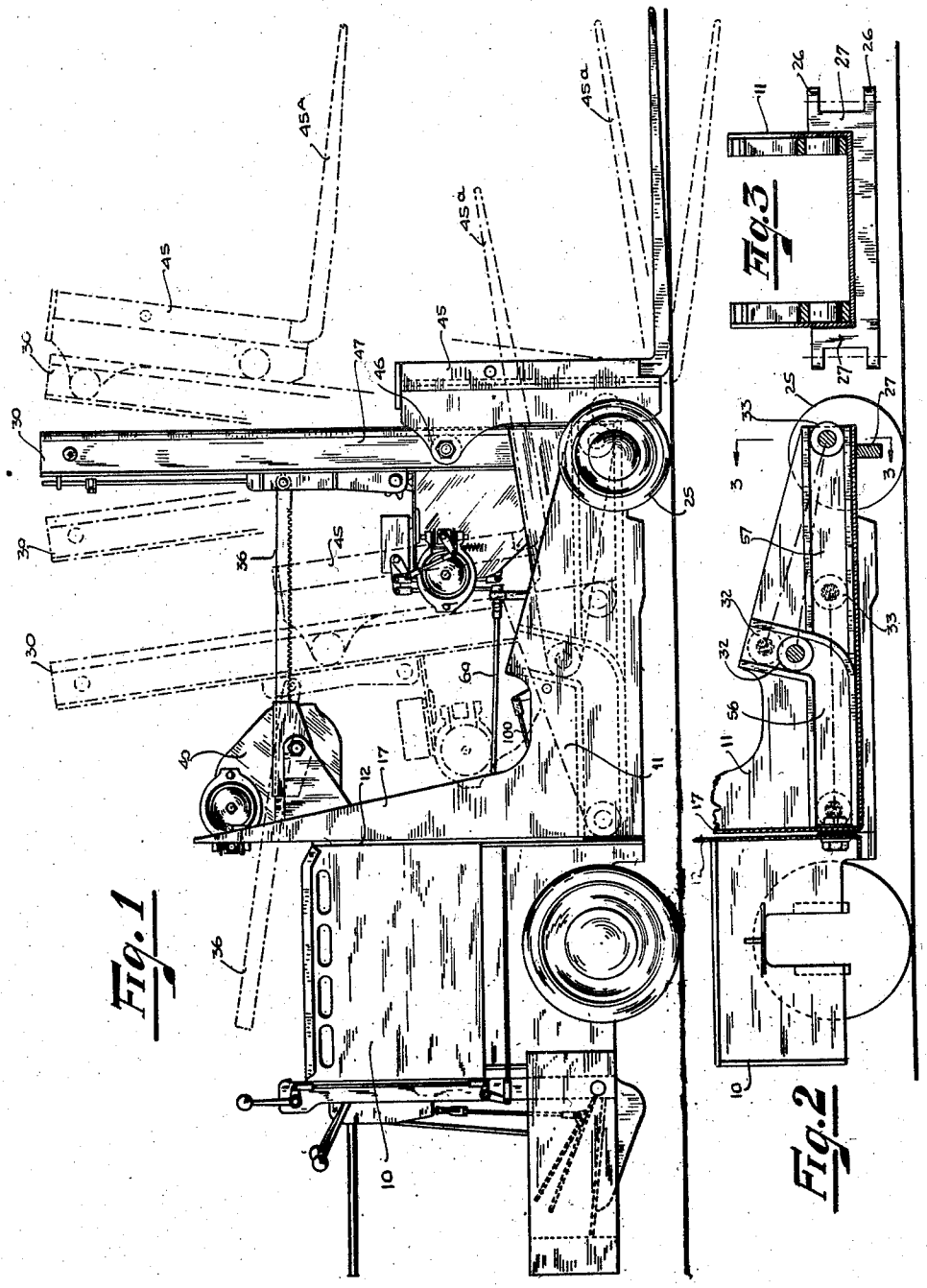

Fig. 1

Fig. 2

Fig. 3

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Aug. 9, 1938. C. S. SCHROEDER 2,126,289

LIFTING TRUCK

Filed June 7, 1935 7 Sheets-Sheet 2

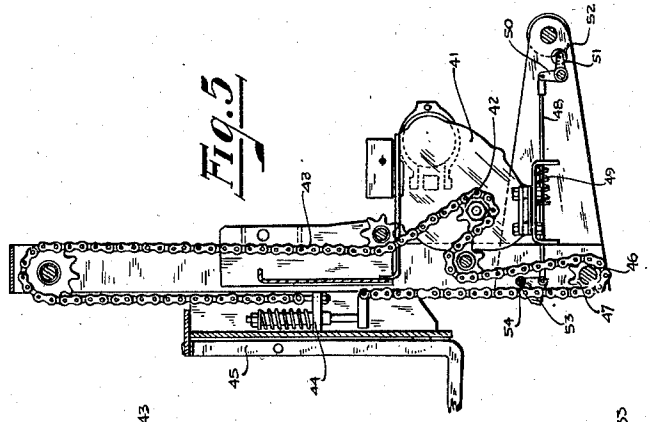

Fig. 5

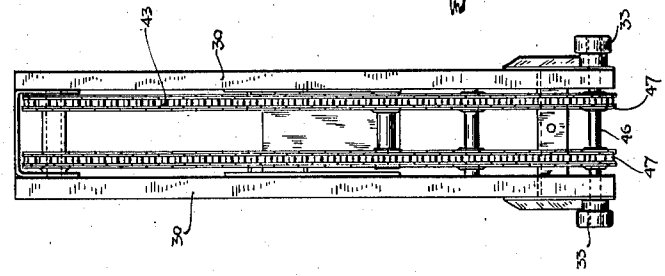

Fig. 6

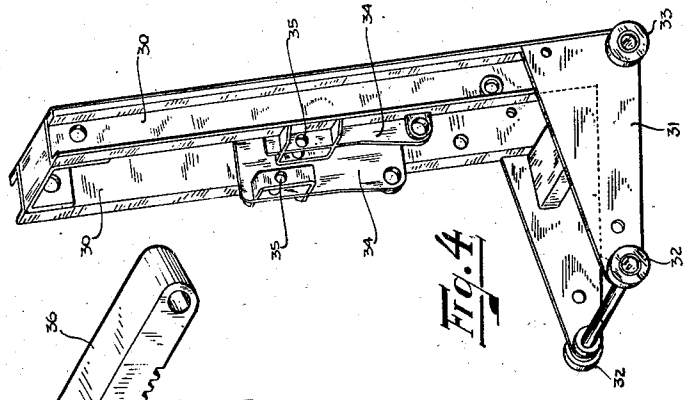

Fig. 4

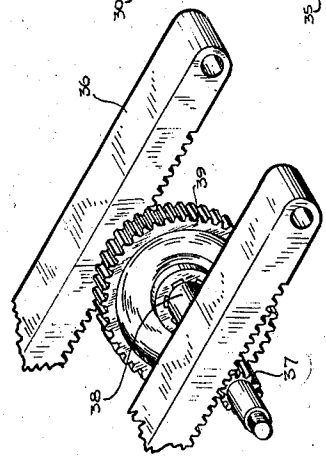

Fig. 7

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Aug. 9, 1938. C. S. SCHROEDER 2,126,289

LIFTING TRUCK

Filed June 7, 1935 7 Sheets-Sheet 3

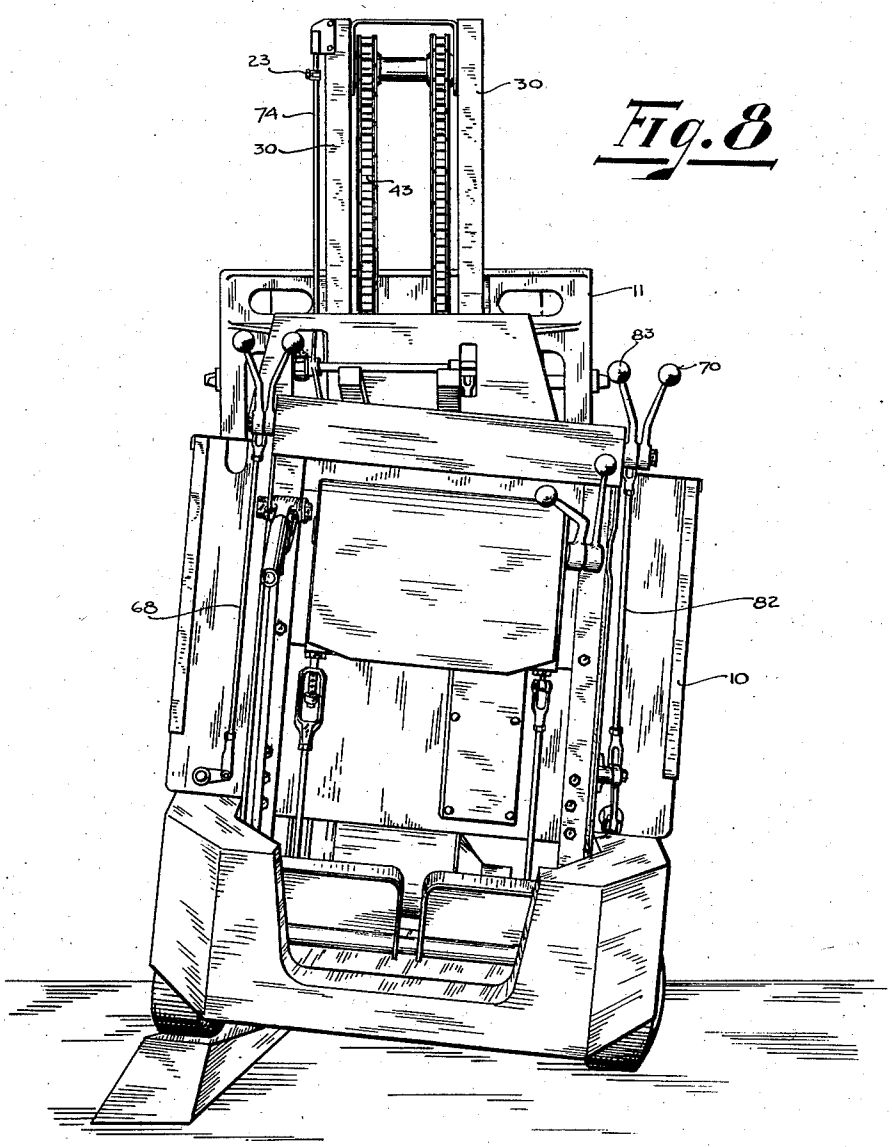

Fig. 8

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Aug. 9, 1938. C. S. SCHROEDER 2,126,289

LIFTING TRUCK

Filed June 7, 1935 7 Sheets-Sheet 4

Fig. 9

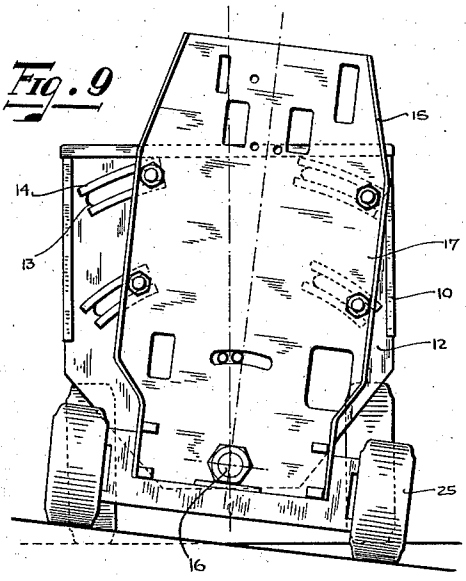


Fig. 10

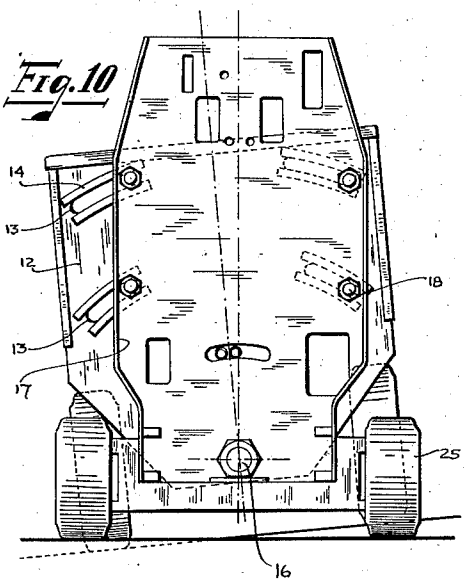


Fig. 11

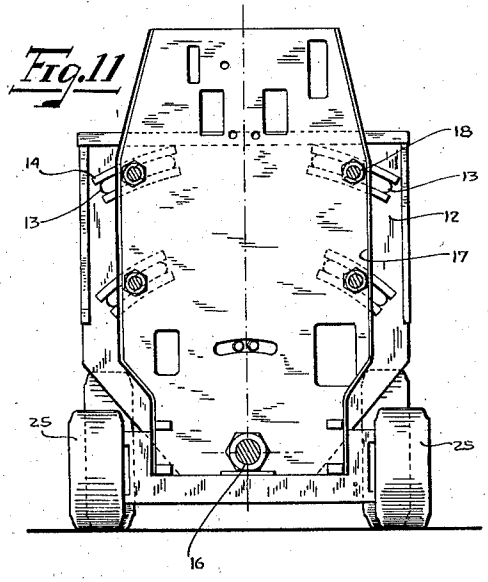
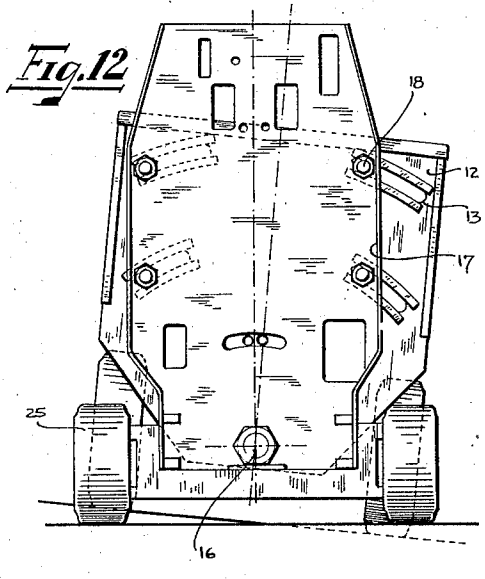


Fig. 12



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Aug. 9, 1938. C. S. SCHROEDER 2,126,289

LIFTING TRUCK

Filed June 7, 1935 7 Sheets-Sheet 5

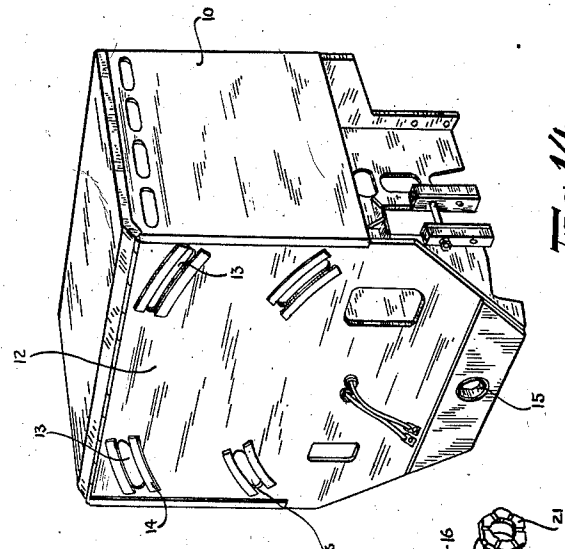

Fig. 14

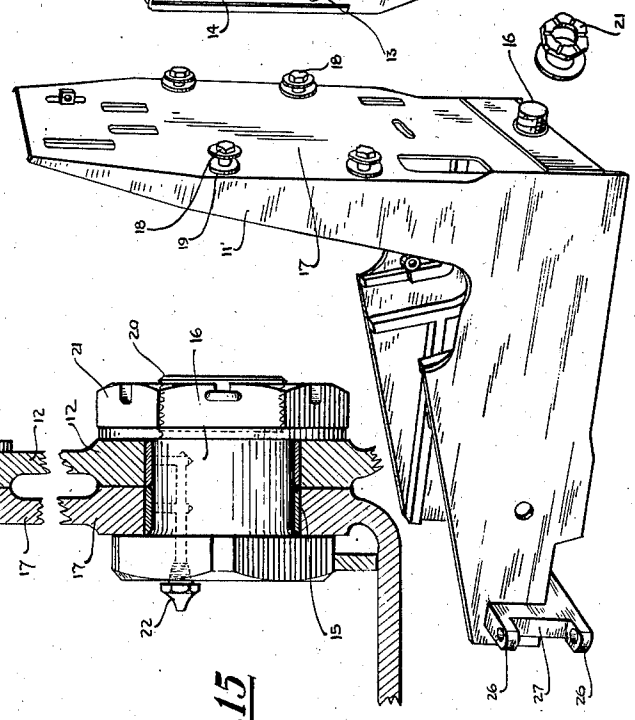

Fig. 13

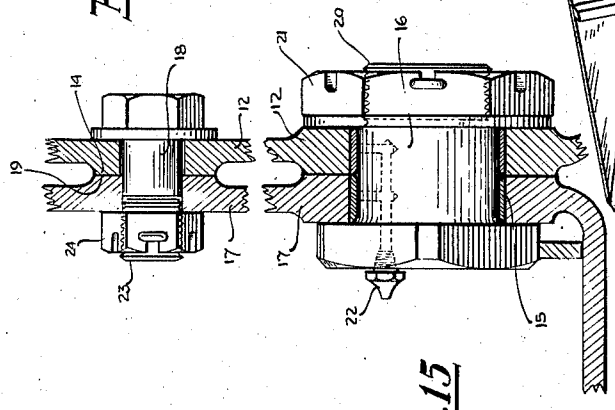

Fig. 15

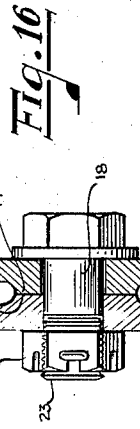

Fig. 16

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Aug. 9, 1938. C. S. SCHROEDER 2,126,289

LIFTING TRUCK

Filed June 7, 1935 7 Sheets-Sheet 6

Fig. 17.

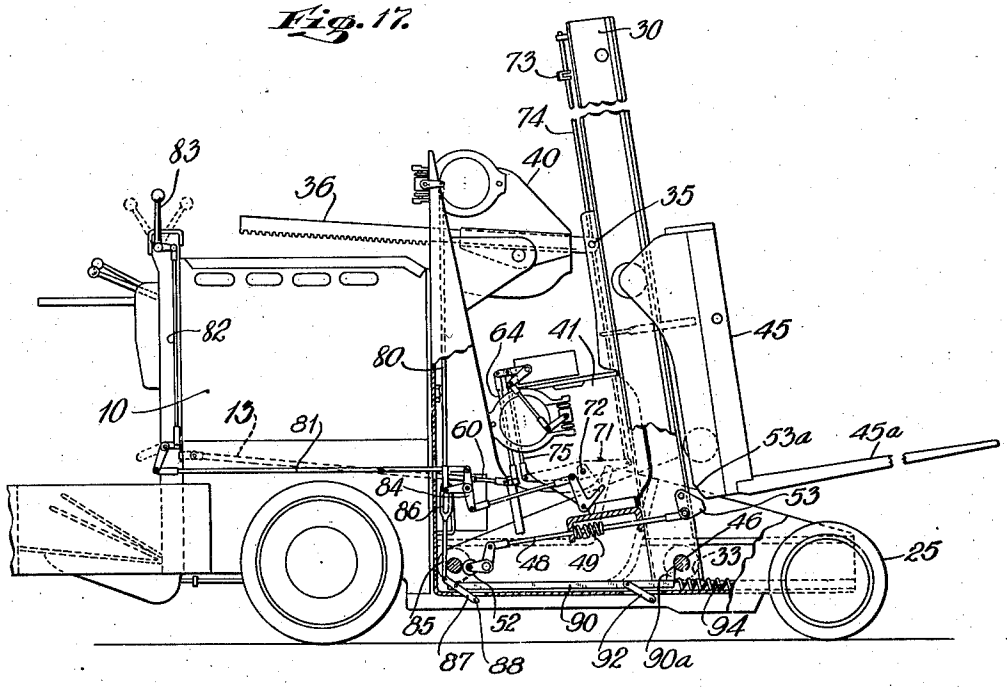


Fig. 19.

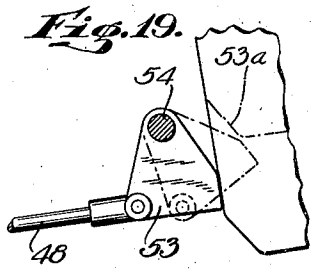
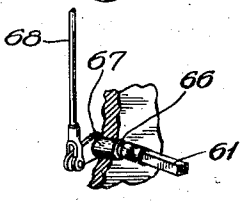


Fig. 20.



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Aug. 9, 1938. C. S. SCHROEDER 2,126,289

LIFTING TRUCK

Filed June 7, 1935 7 Sheets-Sheet 7

Fig. 18.

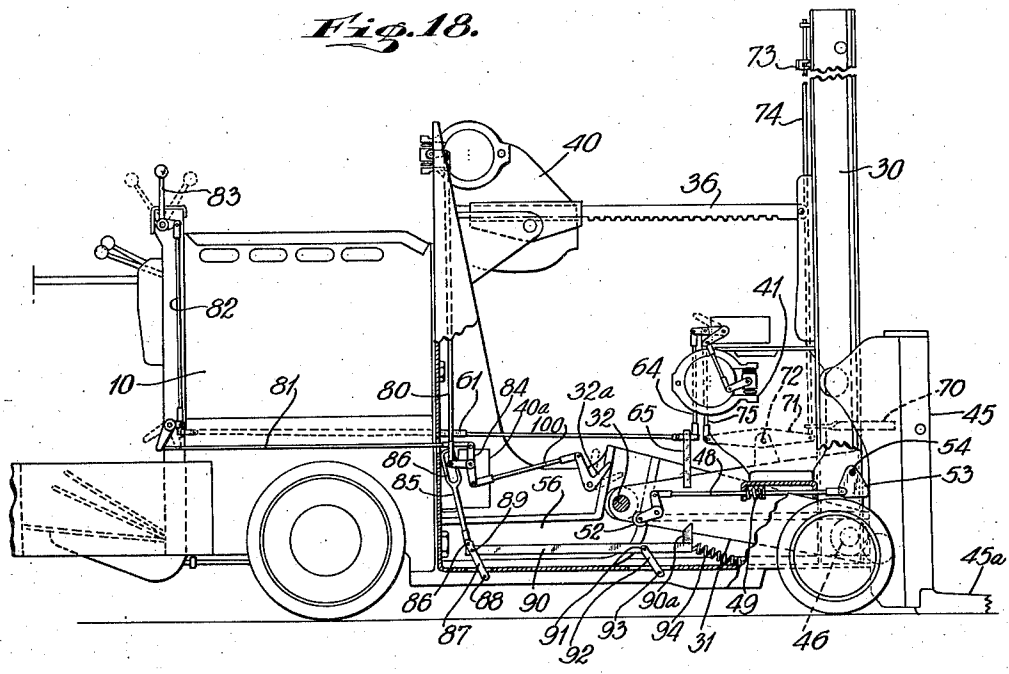


Fig. 21.

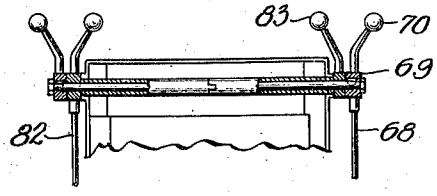


Fig. 22.

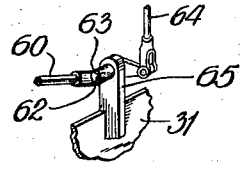
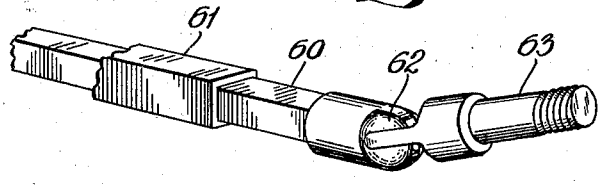


Fig. 23.



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Patented Aug. 9, 1938

2,126,289

UNITED STATES PATENT OFFICE

2,126,289

LIFTING TRUCK

Charles S. Schroeder, Philadelphia, Pa., assignor to The Yale & Towne Manufacturing Company, Stamford, Conn., a corporation of Connecticut

Application June 7, 1935, Serial No. 25,437

24 Claims. (Cl. 187—9)

This invention relates to industrial trucks of the type utilized for the carrying of loads in factories. This invention is particularly directed to a truck having overhanging forks for cooperating with pallets, as distinguished from a truck having an elevating platform cooperable with skid platforms. Of course, it should be understood that the truck of my invention may operate with skid platforms as well as pallets, even though I have designed it especially for operation with pallets.

In a truck of the tilting fork type, it has been generally found necessary to provide a rather long machine, or else to have a counter-weight at the front end of the truck to compensate for the load carrying tilting forks. In the truck of my invention, I am able to substantially shorten the truck overall length when carrying its load and to eliminate most, if not all, the counter-weight normally required at the front end of the truck. I do this by providing uprights which are mounted for tilting action whereby to tilt the load supporting forks, the uprights being also capable of retractive movement.

Preferably, I mount the load supporting forks on the uprights, and then I mount the uprights for movement of translation. Special guide means are then utilized whereby the uprights are held against movement of translation during a part of their movement, and are compelled to move in a tilting manner. Thereafter, the guide means permit movement of translation of the tilting uprights whereby the uprights are moved substantially into the center of the load portion of the truck so as to place the load supporting forks substantially over the load supporting wheels. Incidentally, the normal position of my uprights when they are not retracted and when driving with a load is such that the overhang of the load is reduced to a minimum.

While possibly many types of guide means could be utilized for the uprights, I prefer to mount the uprights on two pairs of rollers located one pair on each side of the truck and cooperating with guide grooves on the two side plates of the load supporting portion. These guide grooves are so formed that the uprights are first held for tilting movement about a fixed axis and are then moved forwardly of the truck. For contributing this forward as well as tilting movement of the uprights, I provide a rack and pinion construction which is well known in the art, and which will not, therefore, be described in much detail here.

In order to perfect an operative and commercially usable truck, I have devised an especially ingenious and novel form of control for the tilting and retracting drive mechanism. I have so constructed my truck that the drive means for the tilting and retracting movement will be stopped immediately upon the tilting of the uprights to a predetermined position if, during this tilting, the elevating forks remain in their lowered position. By this construction, I prevent the destruction of the truck by a careless operator who might conceivably fail to elevate the lifting forks before proceeding to retract the uprights. I provide additional control means whereby the power means are then shut off when the uprights are fully retracted to bring the load over the load supporting wheels. Preferably, I utilize a considerable portion of the control mechanism previously described for so stopping the tilting and retracting drive at the end of the retracting movement.

In describing my invention, I show it applied to a special type of articulating truck, the structure of which I shall cover in a separate application. Briefly, this special truck embodies a driving portion and a load supporting portion in articulated relation to one another. In a truck of the articulating type, in order to properly control the motor drives on the load supporting portion, from the operator's platform located on the driving portion, I have found it desirable to utilize a telescoping control means which will be capable of shortening during movement, for instance, of the retracting uprights. Also, because of the pivoting articulating movement of the two portions of the truck, I have found it desirable to utilize universal joints in the control means. All of these features, I find, contribute to the success of my particular construction.

Having thus generally described the purposes for which my invention is especially adapted, and having now also described the general features of the invention, I shall proceed with a detailed description of the mechanism I prefer to utilize. I believe, however, that I have made a substantial contribution to the industrial truck art, which contribution should not be limited except as may be required by the state of the art.

Referring now to the drawings, Fig. 1 illustrates a truck embodying my invention and showing the tilting uprights in several tilted positions. Fig. 2 is a vertical partial section through portions of the truck of Fig. 1, showing the construction of several of the parts thereof. Fig. 3 is a view taken along lines 3—3 of Fig. 2. Fig. 4 is a perspective view of the tilting and retracting uprights. Fig. 5 is a side view of the

tilting and retracting uprights shown in assembled and driving relation to the lifting forks. Fig. 6 is a rear view of the tilting and retracting uprights showing the chain drive. Fig. 7 illustrates the drive for the racks which tilt and retract the uprights. Fig. 8 shows the truck viewed from its front end and with its front or driving portion tilted relatively to the load supporting portion. Figs. 9–12, inclusive, show the construction of the means whereby it is possible to articulate the load supporting portion relatively to the front or driving portion. Fig. 13 is a perspective view of the frame of the load supporting portion. Fig. 14 is a perspective view of the frame, showing the forward or driving portion. Fig. 15 is a view of the assembly of the pivot shaft about which the articulating portions of the truck pivot. Fig. 16 is a view showing a bolt connecting the vertical plates of the load supporting and driving portions. Figs. 17 and 18 show the control means for the drive mechanism of the truck, the truck itself being shown in phantom. Fig. 19 shows a part of the control mechanism and its method of operation. Figs. 20–23 show other parts of the control mechanism.

Referring now more particularly to the drawings and especially to Figs. 1, 2, 13 and 14, reference numeral 10 indicates the rear portion of the truck while reference numeral 11 indicates the forward or load supporting portion of the truck. The portion 10 carries the usual battery and mechanism for driving the wheels, all this being quite unnecessary to indicate in detail. It should be noted, however, that the rear portion 10 terminates in a vertical plate 12 having a series of slots 13 outlined by abutments 14 and a hole 15 forming a bearing for the pivot shaft 16 relatively to which the portions 10 and 11 articulate or pivot.

The load supporting portion 11 terminates in a vertical plate member 17 which supports a series of bolts 18 protruding from abutments 19, and adapted to operate in the slots 13 of the vertical plate 12. The vertical plate 17 also supports pivot shaft 16, which functions to hold the plates 12 and 17 for pivoting movement relatively to one another, as is best illustrated in Fig. 15, the shaft 16 being threaded at 20 to support the nut member 21 for maintaining the parts properly positioned. A lubricating nipple 22 is utilized for lubricating this bolt in the usual manner well known in the art.

In Fig. 16 the coaction of one of the bolts 18 with the parts 17 and 12 is also illustrated more in detail. It will be noted that the bolt 18 is threaded as at 23 for coaction with a nut 24. The abutments 14 and 19 of the plates 12 and 17 preferably prevent frictional contact between the plates 12 and 17, the abutments acting as the rubbing and guiding surfaces.

In Figs. 2 and 13, the location of the pivot shaft 16 relatively to the truck is best indicated. It will be seen that this pivot shaft is placed at the lowermost possible position relatively to the plate members 12 and 17 and substantially in the same axis as the axis on which the load supporting wheels 25 rotate. While the shaft may be placed elsewhere, I have found this to be the best location.

The load supporting wheels 25 are carried on axles, in turn supported by pivot shafts mounted on ears 26 of the abutments 27, shown best in Figs. 3 and 13. By this construction, the load wheels are fixedly carried by the load supporting portion, in so far as relative vertical movement is concerned, the wheels being, of course, pivotal in the usual manner well known in the art, should it be desirable to steer through these wheels.

The articulating or rotating movement between the vertical plates 12 and 17 is probably best illustrated in Figs. 8–12, inclusive. It will be noted that the pivoting or articulating movement is limited by the length of the slots 13, this movement being calibrated to the proper amount generally required in commercial trucks. The stability of a truck utilizing this construction is easily appreciated. The load portion is supported by two load supporting wheels which accommodate themselves to any terrain. The load platform pivots easily and as a whole relatively to the shaft 16, thus allowing the accommodation of the wheels to the terrain while exerting no strain whatsoever on the frame of the truck. Similarly, the movement of the load supporting portion does not affect the position of the drive wheels, nor does it affect the tractive effort of the said wheels.

Mounted on the load supporting portion 11 of my truck are a pair of upright members 30 securely joined together, as is best shown in Fig. 4, to form a double L-shaped assembly having a horizontal portion 31 carrying rollers 32 at the forward end and rollers 33 at the rear end. Abutments 34 are secured to each of the uprights 30 and carry ears 35, to which are attached a pair of rack members 36, best illustrated in Fig. 7. These rack members are operated by pinions 37 carried on a shaft 38 driven by a gear 39. This gear is part of a drive assembly denoted generally by reference numeral 40 in Fig. 1.

This drive assembly is well known in the art and per se forms no part of my invention. It drives the rack members 36 in a conventional way, maintaining the uprights 30 in any particular position, through the rack members 36, in which it may be desired to maintain those uprights.

The L-shaped assembly of Fig. 4 carries a motor drive assembly denoted generally by reference numeral 41 in Fig. 5, this motor drive being adapted to operate through a pinion 42, a chain 43 which is interconnected at 44 to forks 45 for moving those forks up and down on the upright members 30, the forks being equipped with rollers 46 operating in the channels 47 of the uprights, as is best illustrated in Fig. 1. The particular chain drive per se is not a part of this invention, although I believe that the manner in which the motor drive of the upright tilting members is mounted is entirely novel.

In connection with the construction of Fig. 5, it will be interesting to note that the rollers 33 are mounted on a shaft 46, which in turn supports pinions 47 cooperating with the drive of chain 43.

Mounted on the L-shaped upright assembly is a control device whose function I will describe later, but whose construction should probably be indicated at this point. A rod 48 is normally spring pressed through means of a spring 49 toward the left in Fig. 5 and acts through leverage mechanism 51 to maintain a control roller 52 in the upper position illustrated in Fig. 5. At the same time, the control rod 48 acts to maintain in the upper position illustrated in Fig. 5, a lug member 53 pivoted at 54. This lug member 53 is again illustrated in Fig. 19 and is also shown, of course, in Figs. 17 and 18, which particularly illustrate the control means of which this entire assembly just described is an important part.

Referring now more particularly to Fig. 2, each

of the side plates of my load supporting frame 11 has formed thereon outlined grooves 56 and 57. The rollers 33 of the L-shaped upright assembly are adapted to move in the grooves 57 of the side plates of the frame 11, while the rollers 32 move in the grooves 56, as is also best illustrated in Fig. 2. When the upright members 30 occupy a position, shown in dotted lines at the extreme right of Fig. 1, the rollers 32 will be in their upper dotted line position illustrated in Fig. 2 and the uprights will be tilted rearwardly as much as possible. If the elevating platform is at its upper dotted line position shown in Fig. 1, while the uprights are in the indicated position, a load carried on the forks may be easily moved off for stacking. When the forks 45a of the lifting fork assembly 45 are in their lowered position relatively to the uprights 30 and are inclined, they will be easily inserted under a low pallet and thus contribute a very fine action where such operation is desirable.

It will be appreciated that if the racks 36 are moved from their full line position of Fig. 1 to their dotted line position of Fig. 1, the retracting uprights 30 will be moved from their full line position of Fig. 1 to their dotted line position of that figure. During the first part of this movement, the uprights will be held by the grooves 56 and 57 cooperating with rollers 32 and 33, against movement of translation and the uprights will pivot until the rollers 32 reach the horizontal portions of the grooves 56. When this has been accomplished, it will thereafter be possible to move the upright assembly 30 to the extreme left dotted line position illustrated in Fig. 1 until the rollers 32 and 33 assume their horizontal dotted line positions of Fig. 2, at which point the uprights will have been fully retracted.

As was previously indicated, the lifting of the forks 45 is accomplished through chain 43 by the drive mechanism 41. For controlling this drive mechanism, I utilize a square rod 60 mounted in telescopic relation to a sleeve 61, as is best illustrated in Fig. 23, and terminating at one end in a universal joint 62. This universal joint serves to connect the rod 60 to a shaft 63, as is possibly best illustrated in Fig. 22, whereby to rotate that shaft and contribute an upward movement to a further shaft 64. Preferably, the shaft 63 is mounted for rotation on a standard 65 supported on the horizontal member 31 of the L-shaped upright assembly. The square sleeve 61 is connected by means of a universal joint 66 (Fig. 20) to a shaft 67 similar to the shaft 63 whereby it may be actuated by the rod 68 so as to control the rods 62 and 64, which in turn control the drive for the elevating mechanism. The rod or shaft 68 is in turn operated by the rotation of sleeve 69 through the handle 70 on the driving platform, as seen in Figs. 21 and 8. It will be readily appreciated that due to the telescopic relation between members 60 and 61 and due to the operation of the universal joints 62 and 66, it will be possible to control the drive 41 at all times from the driving portion 10 of the truck, regardless of the angular relation between the portions 10 and 11 and regardless of the position of the upright assembly relatively to the load supporting portion 11.

As a limit member for shutting off the power when the forks 45 are moved to their extreme upper or extreme lower positions, I utilize a rod member 70 carried by the forks 45 and adapted to operate the walking beam 71 pivoted at 72, through means of a lug 73 carried on a rod 74 pivoted to the walking beam, or through direct contact with the walking beam, as will be appreciated by those skilled in the art. The walking beam will, of course, operate through the shaft 75 to control the drive reversely to the control exercised over that drive by the shaft 64.

The drive member 40 for the racks 36 and its control box 40a are controlled through means of a rod 80 and a lever 84, in turn controlled by the rod 81 secured for operation as is illustrated in Fig. 18, to a further rod 82 connected to the handle 83. This connection between the handle 83 and the rod 80 is through means of the lever 84, and will be well understood by those skilled in this art.

For automatically shutting off the power of the drive 40, I utilize a rod member 85 which is adapted to operate the lever 84 reversely to its operation by rod 81. This rod 85 is pivoted at 86 to link 87, pivoted at 88 to the frame 11. At 89 there is pivoted to the link 87 a bar member 90 which in turn is pivoted at 91 to a link 92 pivoted at 93 to the frame of the truck similarly to the manner of the pivoting of the link 87. A spring 94 is connected to the bar 90 and is adapted to maintain the assembly in the position of Fig. 18, as will be readily understood. When the uprights 30 are fully retracted to the position illustrated in Fig. 17, the shaft 46 which supports the rollers 33 will be positioned against an extension 90a of bar 90 so as to move that bar to the left against the pressure of spring 94. This naturally actuates the control rod 85 and acts through the loop 86 to move the lever 84 and rod 80 into drive stopping position, whereupon the racks 36 will be halted in their movement and the retracting movement of the upright assembly will be stopped.

The bar 90 has a further function in that it cooperates with the roller 52 described in connection with Fig. 5 earlier in this specification, to prevent the retractive movement of the uprights when the forks 45 are in their lowered position of Fig. 18. In the position of the forks 45 in Fig. 18, it will be observed that the member 53 will have been forced to the left against the pressure of spring 49, moving rod 48 in a direction to maintain the roller 52 in a lowered position. If the uprights are now fully tilted, the roller 52 will contact the bar 90 upon the completion of the tilting and move that bar 90 to the position of Fig. 17 in the same manner as though that bar were actuated by shaft 46. Incidentally, in Fig. 19, the actuation of the member 53 by the uprights 45 to force the rod 49 to the left is clearly illustrated. Should the forks 45 be elevated to the position of Fig. 17 relatively to the uprights 30, it will be readily appreciated that the surface 53a of the uprights will have been moved above the member 53 as shown in dotted lines in Fig. 19 so as to permit the spring 49 to move the rod 48, so that the roller 52 may occupy an upper position and not in contact with the bar 90 at the time that the uprights are fully tilted.

Because of this construction, it will be seen that the same mechanism which shuts off the power upon the full retraction of the upright assembly also is actuated to shut off the power when the forks are in a lowered position, immediately upon the completion of the tilting movement. It will be quite apparent that this construction is absolutely essential in order to prevent pulling apart of the truck by the forceful movement of the forks against the rear axle assembly.

In order to shut off the power at 40 when the uprights 30 are moved to their extreme rear-

ward position illustrated in dotted lines at the extreme right of Fig. 1, I utilize a rod member 100 connected to the lever 84 and to a bell crank 32a operable by the roller 32 when that roller reaches a position at the head of the groove 56 for shutting off the drive similarly to the manner in which it was shut off by the bar 90. This is well shown in Fig. 18.

It will probably be helpful if the operation of the truck mechanism is now described as a whole. Elevation of the forks 45 is accomplished by means of the drive mechanism 41 through the assembly illustrated best in Fig. 5. A lug 73 on the rod 74 is actuated by the limit device 70 for shutting off the power 40 at the upper end of the lift, while the same rod 70 acts to shut off the power by cooperating with the walking beam 71 when the forks have been fully lowered. The positive operation or control of the drive 41 is through telescoping sleeve 61 and rod 60 and under the control of rod 68 actuated by handle 70.

The tilting and retracting mechanism is actuated by the drive unit 40 operating through rack members 36. This mechanism is positively controlled through rods 81 and 82 and handle 83. The power is shut off by the operation of the roller 52 when the uprights have been fully tilted with the elevating forks in their lower position. This is accomplished by the forks moving the device 53 against the force of the spring 49, placing roller 52 in its lowered position where it contacts bar 90. The retracting drive is shut off also by the coaction of the shaft 46 with the extension 90a of the bar 90 upon the full retraction of the uprights.

In Fig. 8, I have illustrated some of the details of the front end construction, but I believe it is unnecessary to describe those details, since per se they form no part of the present invention.

I now claim:

1. In a truck of the class described, a main frame, a pair of uprights mounted on said main frame for longitudinal movement, an operating member for said uprights adapted to move said uprights and to maintain them in any position to which they are moved, and guide means on said main frame for maintaining said uprights against longitudinal movement while guiding said uprights for tilting movement about a fixed axis relatively to said main frame when said uprights are actuated by said operating member.

2. In a truck of the class described, a main frame, a pair of uprights, rollers mounting said uprights on said main frame for longitudinal movement, an operating member for said uprights adapted to move said uprights and to maintain them in any position to which they are moved, guide means on said main frame cooperable with said rollers for guiding said uprights for sequential longitudinal movement relatively to said main frame when said uprights are actuated by said operating member, and offset guide means cooperable with certain of said rollers when said uprights are at the rear end of the truck for tilting the said uprights when they are further actuated by said operating member.

3. In a lift truck of the class described, a frame, a pair of uprights, an elevating platform mounted for movement on said uprights, a pair of spaced rollers on each upright whereby said uprights are movably supported on said truck frame, means for moving said uprights on said rollers, and stationary guide tracks cooperable with each of said pairs of rollers for tilting said uprights about certain of said rollers as pivots and for guiding said uprights bodily on all of said rollers as said uprights are moved by said moving means.

4. In a lift truck of the class described, a frame, a pair of uprights, an elevating platform mounted for movement on said uprights, a pair of spaced rollers on each upright whereby said uprights are movably supported on said truck frame, means for moving said uprights on said rollers, and fixed guide means cooperable with certain of said rollers for tilting said uprights on the others of said rollers as pivots as said uprights are moved by said moving means.

5. In a lift truck of the class described, a frame, a pair of uprights, an elevating platform mounted for movement on said uprights, a pair of spaced rollers on each upright whereby said uprights are movably supported on said truck frame, means for moving said uprights on said rollers, fixed horizontal guide tracks on each side of said truck frame cooperable with each of said pairs of rollers for shifting said uprights longitudinally on said truck when said uprights are moved by said moving means, and guide tracks offset from said horizontal tracks and cooperable with certain of said rollers for tilting said uprights about the others of said rollers as pivots when said uprights are moved by said moving means.

6. In a lift truck of the class described, a frame, a pair of uprights, an elevating platform mounted for movement on said uprights, a pair of spaced rollers on each upright whereby said uprights are movably supported on said truck frame, means for moving said uprights on said rollers, fixed horizontal guide tracks on each side of said truck frame cooperable with each of said pairs of rollers for shifting the said uprights longitudinally on said truck when said uprights are moved by said moving means, means for limiting the movement of said uprights longitudinally, said guide tracks allowing a tilting of said uprights by said moving means about certain of the rollers when said uprights are held by said means against further longitudinal movement.

7. In a lift truck of the class described, a frame, a pair of L shaped uprights, an elevating platform on said uprights, rollers on each end of the horizontal portions of said L shaped uprights movably supporting said uprights on said frame, means carried by said frame for moving said uprights on said rollers, and fixed guide tracks on said frame cooperable with said rollers.

8. In a lift truck of the class described, a frame, a pair of L shaped uprights, an elevating platform on said uprights, rollers on each end of the horizontal portions of said L shaped uprights movably supporting said uprights on said frame, means carried by said frame for moving said uprights on said rollers, and fixed guide tracks cooperable with said rollers for tilting said uprights about certain of said rollers as pivots when said uprights are moved by said moving means.

9. In a lift truck, a load supporting portion having rearward supporting wheels, uprights normally positioned substantially over said wheels, a load supporting platform mounted for elevating movement on said uprights and normally positioned rearwardly or outwardly of said wheels, means for moving said uprights relatively to said truck, means for guiding said uprights on the truck when so moved whereby the said uprights will first be tilted to bring said load supporting platform into a tilted position with the load placed more nearly over said supporting wheels, and additional means for thereafter guiding the

uprights forwardly in the truck to place the load medially of the truck.

10. In a lift truck, a pair of uprights, a main frame, rollers carried by said uprights, guide grooves formed on said main frame longitudinal of said truck and in which said rollers ride, said grooves supporting said rollers and uprights and adapted to control the movement of said uprights longitudinally relatively to said truck, means for moving said uprights through the path determined by the said grooves, and additional grooves offset relatively to the longitudinal grooves for tilting the said uprights when the said uprights are moved by said moving means.

11. In a lift truck, a main frame, a pair of uprights, rollers carried by said uprights, guide grooves formed on said main frame longitudinal of said truck and in which said rollers ride, said grooves supporting said rollers and uprights and adapted to control the movement of said uprights, means for moving said uprights backward and forward in the longitudinal path determined by said grooves and for holding said uprights in any particular position in the path determined by said grooves, and additional grooves offset relatively to the longitudinal grooves for tilting the said uprights when the said uprights are moved by said moving means.

12. In a truck of the class described, a pair of movable uprights, a load platform mounted for lifting and lowering movement on said uprights, a guide path for directing the movement of said uprights and having portions for permitting tilting movement of said uprights and portions for permitting retracting movement of said uprights, a motor drive for first tilting said uprights and then retracting them as required by said guide path, means for halting said motor drive, and means for actuating said halting means prior to the retracting movement of said uprights when said load platform is in a lowered position during the tilting of the uprights.

13. In a truck of the class described, a pair of movable uprights, a load platform mounted for lifting and lowering movement on said uprights, a guide path for directing the movement of said uprights and having portions for permitting tilting movement of said uprights and portions for permitting retracting movement of said uprights, a motor drive for first tilting said uprights and then retracting them as required by said guide path, means for halting said motor drive, and means for actuating said halting means prior to the retracting movement of said uprights when said load platform is in a lowered position during the tilting of the uprights, and additional means for actuating said halting means operable upon full retraction of said uprights.

14. In a truck of the class described, a pair of movable uprights, a load platform mounted for lifting and lowering movement on said uprights, a guide path for directing the movement of said uprights and having portions for permitting tilting movement of said uprights and portions for permitting retracting movement of said uprights, a motor drive for first tilting said uprights and then retracting them as required by said guide path, means for halting said motor drive, means for actuating said halting means operable by said uprights when they are moved to a fully extended rearward position, means for actuating said halting means operable by said uprights when they reach a fully forward retracted position, and means for actuating said halting means operable by said platform when it is tilted to a predetermined position with said uprights while in a lowered position relatively to said uprights.

15. In a truck of the class described, a control platform, a load moving unit movable relatively to said platform and having a motor thereon, a control rod for said motor extending from said platform to said unit, means accessible to an operator on said platform for operating said control rod, said rod comprising telescopic portions whereby to permit adjustment in length of said rod during the movement of said load moving unit relatively to said control platform.

16. In a truck of the class described, a control platform, a load moving unit movable relatively to said platform and having a motor thereon, a rotating control rod extending from said platform to said unit, means accessible to an operator on said platform for operating said control rod, said rod comprising a square sleeve and a square bar in telescopic relation whereby to permit extension or contraction of said rod while allowing for combined rotation of said bar and sleeve to control said load moving unit.

17. In a truck of the class described, a control platform, a load moving unit movable relatively to said platform and having a motor thereon, a control rod extending from said platform to said unit, means accessible to an operator on said platform for operating said control rod, said rod comprising telescopic portions whereby to permit adjustment in length of said rod during the movement of said load moving unit, and a universal joint connecting at least one of the said telescoping portions to the platform or the load moving unit to permit angular adjustment of said unit relatively to said platform without interference in the operation of said rod.

18. In a truck of the class described, a separate forward control portion, a separate rearward load supporting and lifting portion, means maintaining said portions assembled but in sliding articulating relation, a control rod extending from said forward control portion to load lifting means on said load supporting portion, said rod having a universal joint therein to permit its functioning despite the articulating movement of said portions.

19. In a lift truck of the class described, uprights on said truck, a load lifting means slidable vertically on said uprights from a lowered to a raised position, means for retracting said uprights and therefore said load lifting means, and a limit means for stopping said retracting means at a predetermined point when said load lifting means are not above a certain elevated position when said uprights reach said predetermined point.

20. In a lift truck of the class described, uprights on said truck, a load lifting means slidable vertically on said uprights from a lowered to a raised position, means for retracting said uprights and therefore said load lifting means, a limit means for stopping the retraction of said uprights, means for operating said limit means when said uprights are retracted to a predetermined point and said load lifting means are not above a certain elevated position, and means for operating said limit means when said uprights are fully retracted with said load lifting means above said certain elevated position.

21. In a lift truck of the class described, uprights on said truck, a load lifting means slidable vertically on said uprights from a lowered to a raised position, means for retracting said uprights and therefore said load lifting means, a

limit switch for stopping the retraction of said uprights, means for operating said limit switch when said uprights are retracted to a predetermined point and said load lifting means are not above a certain elevated position, and means for operating said limit switch when said uprights are fully retracted with said load lifting means abose said certain elevated position.

22. In a truck of the class described, a main frame, a pair of uprights, means supporting said pair of uprights for pivotal movement and movement of translation relatively to said main frame, power means for imparting movement to said pair of uprights, and means for locking said uprights against movement of translation by said power means until said uprights are first tilted to a predetermined angle by said power means.

23. In a truck of the class described, a main frame, a pair of uprights, means supporting said pair of uprights for pivotal movement and movement of translation relatively to said main frame, a single power means for first tilting said uprights and thereafter imparting movement of translation thereto, and means for locking said uprights against movement of translation by said power means until said uprights are first tilted to a predetermined angle by said power means.

24. In a truck of the class described, a main frame, a pair of uprights, means supporting said pair of uprights for pivotal movement and movement of translation relatively to said main frame, power means for imparting movement to said pair of uprights, guide means for said means supporting said uprights adapted to guide said uprights for tilting movement to a predetermined position while locking said uprights against movement of translation, and said guide means being formed to guide said uprights through movement of translation once said uprights are tilted to said predetermined position.

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