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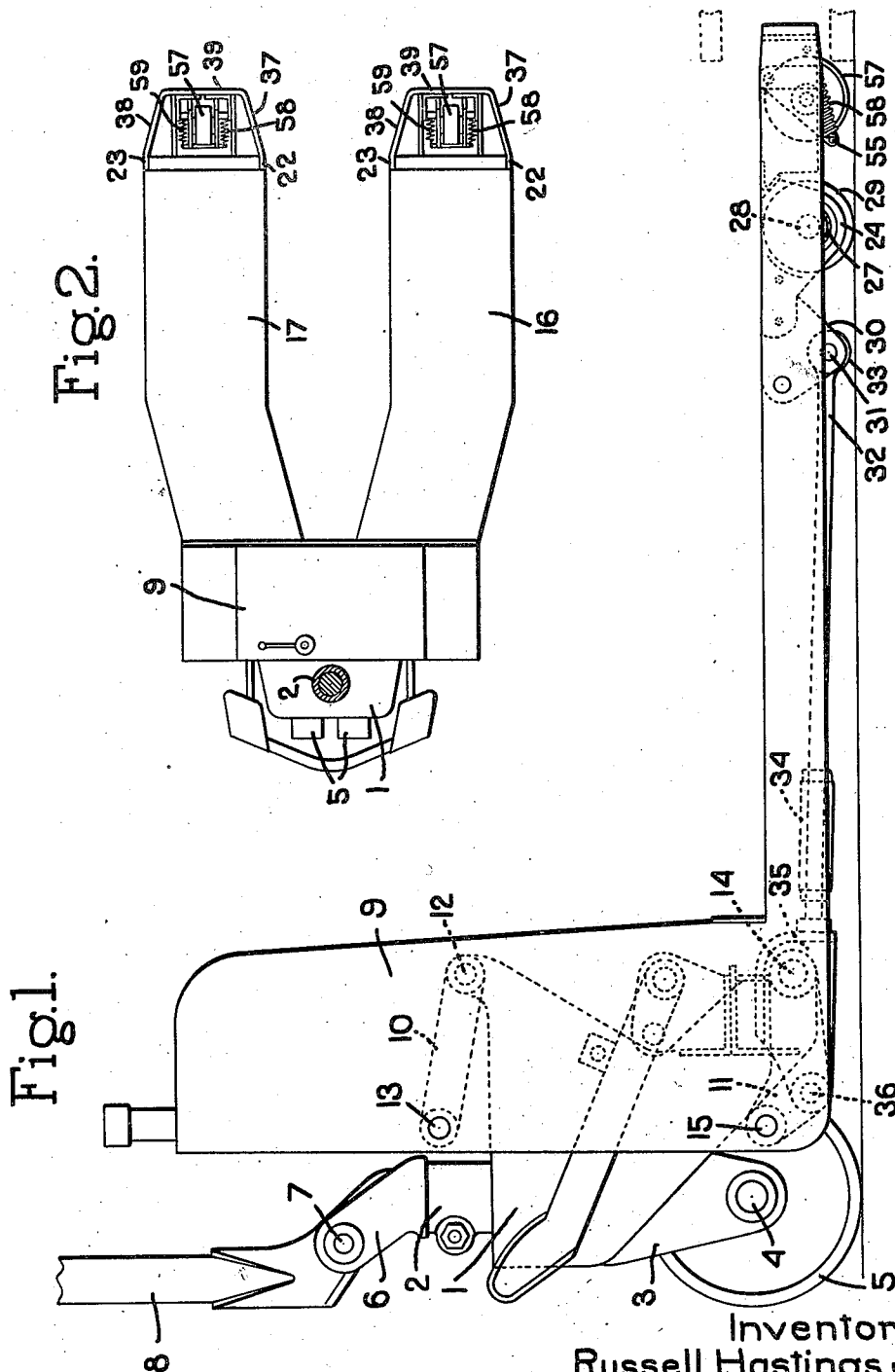
R. HASTINGS, JR

2,361,544

LIFTING BUFFER MECHANISM FOR ELEVATING TRUCKS

Filed March 20, 1943

2 Sheets-Sheet 1



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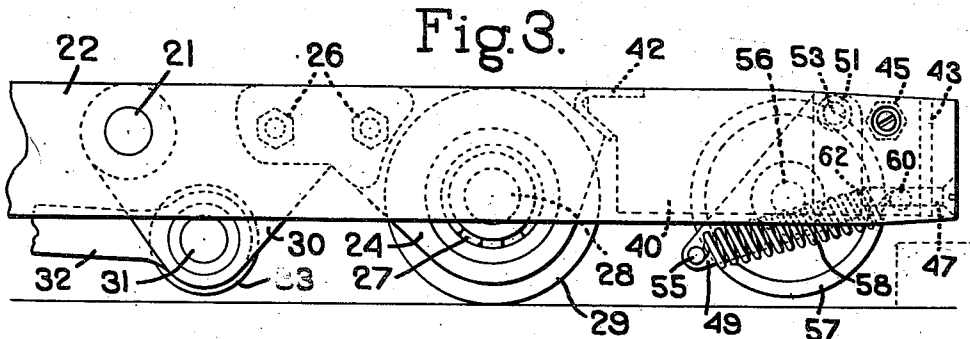
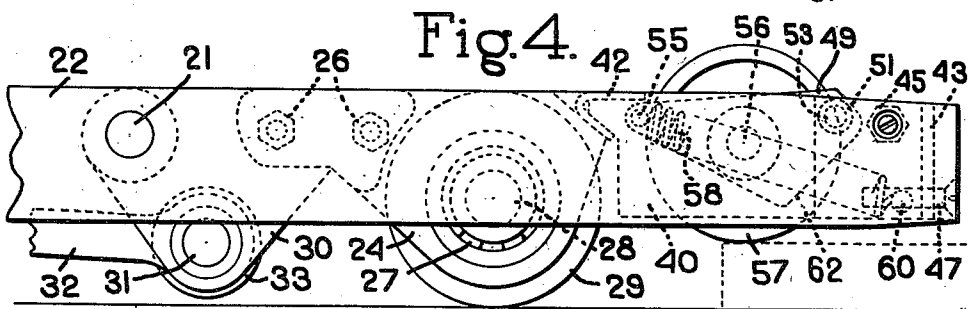
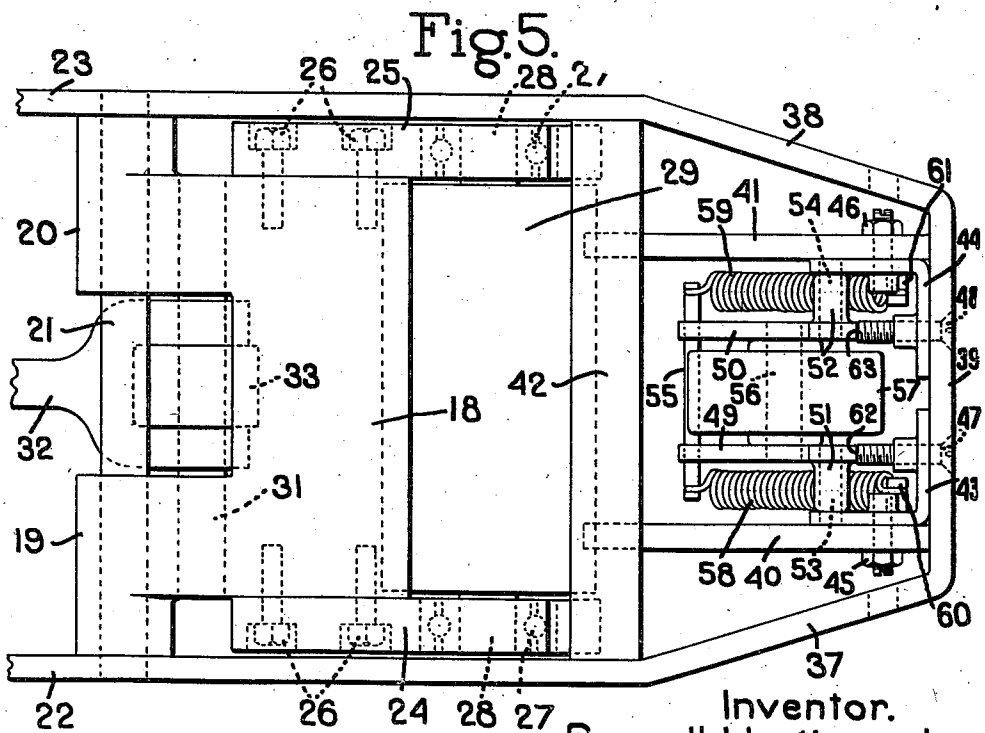
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,361,544

LIFTING BUFFER MECHANISM FOR
ELEVATING TRUCKS

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6 Claims. (Cl. 280—49)

This invention relates to improvements in elevating trucks and more particularly to elevating trucks which are employed to lift double-faced pallets, and the object of the invention is to provide means for facilitating the introduction of the load supporting means into the pallet and to avoid the shock which would be occasioned by abrupt engagement of the wheel supporting mechanism of the load supporting means with the outermost floor board or other floor boards of the base of the pallet.

More particularly the invention comprises an improvement in the type of elevating truck disclosed in my prior Patent No. 2,234,925, granted March 11, 1941, in which the means for facilitating the introduction of the rear ends of the supporting members into a double-faced pallet comprised a plurality of rollers mounted upon the rear ends of the load supporting means, the rollers increasing in diameter or height above the floor, from the rear end forwardly.

One of the objects of the invention is to provide yieldable buffer mechanism normally extending below the load supporting means and adapted gradually and resiliently to lift the portion of the load supporting means which projects beyond the wheel base of the truck gradually and yieldably over the foremost floorboard of the pallet or other obstruction which may be encountered as the truck is moved in the direction of the end which is to be introduced into the pallet or beneath the load to be lifted, and thereby cushion the shock which otherwise would be produced by the engagement of the wheel mechanism which supports the load supporting means.

In elevating trucks of the character disclosed in my prior patent the lifting rollers, which are mounted upon the rear end of the load supporting means, are necessarily of small diameter and when the load supporting means is being introduced into the pallet strike the foremost floorboard of the pallet with considerable force by reason of their short radius of curvature and are likely to push an empty pallet along the floor.

Another object of the invention is to provide a construction having a yieldable lifting buffer mechanism in which the lifting roller may be of sufficiently larger diameter to ride more readily over the outside floorboard of the pallet and thereby enable the load supporting means to be introduced into the pallet without pushing the pallet along the floor.

By reason of the yieldable mounting of the lifting roller of the present invention a roller having considerably greater diameter than the thick-

ness of the load supporting means can be employed and when in retracted position may extend above the upper surface of the load supporting means. Furthermore such rollers of greater diameter increase the cushioning effect as they ride over the foremost baseboard of the pallet.

Another object of the invention is to provide pivotally mounted lever mechanism for the lifting buffer mechanism with the spring mounting so arranged that the tension of the spring will lift the end of the load supporting means over the obstruction without substantially increasing the lifting force of the buffer throughout its travel.

These and other objects and features of the invention will appear more fully from the following description and the accompanying drawings and will be particularly pointed out in the claims.

In the drawings:

Fig. 1 is a side elevation of an elevating truck for pallets embodying the invention;

Fig. 2 is a plan view of the same, the steering post and surrounding bearing being shown in section;

Fig. 3 is an enlarged detail view of the rear end of one of the sections of the load supporting means and illustrating in dotted lines an abutment, such as the foremost floorboard of a double-faced pallet, about to be engaged by the lifting buffer mechanism.

Fig. 4 is a similar enlarged detail view showing the lifting buffer mechanism in elevated position preparatory to the lifting of the rear end of the load supporting means; and

Fig. 5 is an enlarged detail plan view of the mechanism illustrated in Figs. 3 and 4.

The present invention is illustrated in the drawings as applied to an elevating truck for pallets and the like of the type shown and described in my prior Patent No. 2,234,925, March 11, 1941, and reference may be made to that patent for a full description of the mechanism for raising and lowering the load supporting means. It will however be understood that the lifting buffer mechanism of the present invention may be applied to other pallet truck constructions in which extensible and retractable means are provided for raising the rear end of the load supporting means, or other portions of the load supporting means which extend beyond the area of the wheel base and are adapted to be introduced over an obstruction beneath the load which is to be transported.

The elevating truck illustrated in the accompanying drawings comprises a head integrally formed of fabricated plates to produce a box-like

construction in which is journaled a steering post having a mounting 2 for the tongue fixedly secured to the upper end and having a forked lower end 3 in which the axle 4 of a steering wheel, or preferably a pair of closely associated steering wheels 5 are mounted. The steering wheel tongue 2 comprises a split sleeve which is firmly clamped upon the steering post by a bolt and is provided with a pair of integral upwardly and forwardly extending parallel arms 6 in which the pivotal shaft 7 of the steering tongue 8 is mounted. A hollow standard 9 fabricated of metal plates integrally welded together is supported upon the head 1 by pairs of upper and lower parallel links 10 and 11, the upper pair of links 10 being journaled at their rear ends upon shafts 12 which are fixedly mounted in journals in the upper rear portions of the head and at their front ends upon shafts 13 which are mounted in suitable bosses in the side plates of the standard 9. The lower parallel links 11 are mounted at their rear ends upon a shaft 14 which is journaled in the lower rear portion of the head 1 and the front ends of the links 11 are offset upwardly and are journaled upon shafts 15 which are mounted in the lower forward portion of the standard.

Any suitable mechanism may be provided for raising and lowering the standard. Preferably hydraulically operable mechanism is provided such as that described in my prior patent aforesaid.

The load supporting means as illustrated in the drawings comprises two horizontal suitably spaced platforms 16 and 17 which are integrally united at their front ends to the standard 9 so that the front end of the load supporting means will be raised and lowered as the standard 9 is raised and lowered. The rear end of each platform member of the load supporting means is mounted upon extensible and retractable wheel mechanism which may be and preferably is of the character described in my prior patent. The extensible and retractable mechanism comprises lever mechanism consisting of a web 18 having forward extensions 19 and 20 provided with hollow bosses which are journaled upon a shaft 21 the ends of which extend through and are fixedly mounted in the side bars 22 and 23 of the load supporting means. Heavy integral plates 24 and 25 are fixedly secured to the edges of the web 18 by suitable heavy machine screws 26. The plates 24 and 25 are provided with suitable apertures having mounted therein ball bearings 27 for the ends of the shaft 28 of a large wheel 29. The forward extensions 19 and 20 of the web 18 are provided with downwardly extending integral bosses 30 in which is mounted a shaft 31. A connecting rod 32 having a forked end is mounted on the shaft 31 and a booster roll 33 desirably is rotatably mounted on the shaft 31 within the forked end of the connecting rod 32.

The connecting rod 32 extends forwardly and is connected by a turnbuckle 34 rigidly to a link member 35 the forward end of which is pivotally mounted upon a shaft 36 at the elbow of the offset portion of the link 11. When therefore the standard 9 is raised by the front lifting mechanism the link 35 and the connecting rod 32 will be pulled forwardly thereby rocking the web 18 of the extensible wheel mechanism downwardly, thus raising the rear end of the load supporting means and moving the booster roll 33 upwardly simultaneously with the lifting of the standard.

The mechanism is so proportioned that the rear

end of the load supporting means is lifted simultaneously and equally with the front end.

When the standard 9 is lowered the connecting rod will be moved rearwardly thereby lowering the booster roll 33 into proximity to the plane of the wheel base so that it will engage a floorboard of the pallet and lift the rear end of the load supporting means in advance of the engagement of the wheel 29 with the floorboard as the truck is pulled forwardly.

The lifting mechanism thus described is similar to but not necessarily identical with that described in my patent aforesaid.

In the use of pallet trucks of this character for lifting double-faced pallets and/or the pallets and the load supported thereby, the truck is backed up in position to insert the rear end of the load supporting means into the pallet, and if no means were provided for lifting the rear end of the load supporting means or platform members the wheels 29 would abruptly bunt against the foremost floorboard of the pallet and if the pallet were empty will be likely to cause it to skid upon the floor, or if the pallet were loaded or remained stationary considerable force would be required to push the wheels 29 over the floorboard of the pallet and by the abrupt engagement of the wheel with the floorboard would transmit a very considerable and unpleasant shock to the operator of the truck and cause damage to the pallet.

In usual constructions two or more sets of rollers are mounted on the rear end portion of the load supporting means progressively decreasing in clearance from the floor. The diameter of such rollers is necessarily limited by reason of the depth of the load supporting means in which they are mounted as they cannot extend above the upper surface thereof.

In the use of such constructions when the rollers are, as usual, of small diameter the rearward thrust of the truck causes the end rollers to engage the edge of the foremost baseboard of the pallet in a horizontal plane parallel to and in close proximity to the horizontal plane of the axis of the roller thereby requiring such increased thrust to raise the rear end of the truck abruptly upwardly as to transmit a considerable shock to the operator, and such shock is repeated as successive pairs of rollers engage the baseboard of the pallet.

The present invention provides single yieldable lifting buffer means for gradually lifting the rear end portion of the load supporting means over the floorboard of the pallet in such manner that said end may be more easily introduced into the pallet and the shock transmitted to the operator practically eliminated. In the applicant's particular construction as shown and herein described much larger single spring actuated end rollers for the parallel load supporting members may be employed, and because of their pivotal mounting in the skeleton end of the load supporting means their pallet-engaging portions are normally held yieldable below the lower surface of the load supporting means and when the rollers are forced upwardly their upper portions may extend above the upper surface of the load supporting means. By reason of the use of such rollers of larger diameter the horizontal plane of engagement of the rollers with the edge of the baseboard is more remote from the horizontal plane of the axis of the roller and the lifting of the load supporting means is less abrupt and also because of the greater circumference of the roll-

ers the lifting of the rear end of the load supporting means is still more gradual. In addition the yielding of the rollers under the force of impact further cushions the impact and substantially eliminates any shock which otherwise would be transmitted to the operator.

Any suitable mechanism of this character may be provided within the spirit and scope of the invention. In the particular mechanism illustrated herein the rear end portions 37 and 38 of the side bars 22 and 23 of the load supporting means converge and are integrally connected by a bar 39. Parallel bars 40 and 41 are welded at one end to the bar 39 and at their opposite ends to a suitable girder 42 which in turn is welded at its ends to the side bars 22 and 23. Suitable L-shaped brackets 43 and 44 are detachably secured by bolts 45 and 46 to the parallel bars 40 and 41 and are also secured by screws 47 and 48 to the end bar 39 of the frame of the load supporting means. Parallel lever arms 49 and 50, which are provided with laterally extending bosses 51 and 52, are mounted upon stud shafts 53 and 54, the ends of which are fixedly secured preferably by welding in the respective brackets 43 and 44. The lever arms 49 and 50 are rigidly connected, preferably by welding, to a transverse bar 55 the ends of which respectively extend beyond the lever arms 49 and 50. The roller 57 is journaled on the shaft 56 which is mounted on the lever arms 49 and 50.

Preferably the lever arms are of general triangular shape, as shown in Figs. 3 and 4, and coiled springs 58 and 59 are connected at their front ends to the cross bar 55 and at their rear ends to suitable anchorages 60 and 61 which are welded to the angle bars 43 and 44 respectively.

By reason of this construction the springs 58 and 59 swing the levers 49 and 50 downwardly thereby normally holding the roller 57 below the load supporting means and in proximity to the floor.

When the truck is moved rearwardly the rollers 57 will engage the foremost floorboard of the pallet, or other obstruction, and yield upwardly, thus imposing a tension upon the springs which are of sufficient strength to lift the end of the load supporting means gradually so that when the wheels 29 of the extensible mechanism for lifting the rear end of the truck engages the foremost bottom floorboard of the pallet it will ride easily over the floorboard and without transmitting any substantial shock to the operator. Preferably the mounting for the lifting buffer mechanism is such that no substantial increased tension is imposed upon the springs 58 and 59 as the wheel 57 is raised upwardly.

In view of the fact that the rear end of the load supporting members are of skeleton construction, the upper portion of the rollers 57 may be raised above the plane of the upper surface of the load supporting means, while the rollers 57 when in lowered position are entirely below the level of the upper face of the load supporting means.

Desirably the rear end portions of the triangular levers 49 and 50 are provided with shoulders 62 and 63 adapted to abut against the ends of the screws 47 and 48 which connect the brackets 43 and 44 to the rear bar 39. These screws therefore have a double function of securing the brackets 43 and 44 to the rear bar 39 and also acting as stops to limit the downward movement of the rollers 57.

In view of the fact that the L-shaped brackets 43 and 44 are respectively secured to the longi-

tudinally extending bars 40 and 41 and to the transverse bar 39 of the frame of the load supporting means by the bolts 45 and 46 and the screws 47 and 48, the lifting buffer mechanism can be readily assembled upon the truck or removed therefrom for repair or replacement of the roller or springs.

By reason of the construction above described the yielding buffer mechanism not only will avoid the abrupt lifting of the rear end of the load supporting means when the truck is inserted into the pallet, which is inherent in previous constructions, and eliminate the shock transmitted to the operator, but will also require less force to introduce the truck into the pallet so that the truck may be more easily operated and will also avoid substantial injury to the baseboards of the pallet and displacement of the pallets along the floor particularly when empty or lightly loaded.

It will be understood that the particular embodiment of the invention shown and described herein is of an illustrative character and not restrictive and that various changes in form, construction and arrangement of parts may be made within the spirit and scope of the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. Lifting buffer mechanism, for pallet lifting and transporting trucks, having front steering mechanism and, rearwardly extending therefrom, load supporting means and rear wheels adapted to enter the space between the top and bottom floorboards of a double-faced pallet and means for raising the rear end of said load supporting means, comprising spring actuated means, having springs of sufficient strength to lift the rear end of the truck, mounted on said truck rearwardly of said rear wheels and extending forwardly in proximity thereto and downwardly in proximity to the plane of the wheel base of the truck, operable when the rear end of the truck is inserted into the pallet gradually and yieldably to lift said rear end upon engagement with the bottom floorboard of the pallet and thereby cushion the shock which would otherwise be produced by abrupt contact of the rear wheels with said floorboard.

2. Lifting buffer mechanism, for pallet lifting and transporting trucks, having front steering mechanism and, extending rearwardly therefrom, load supporting means and rear wheel mechanism adapted to enter the space between the top and bottom floorboards of a double-faced pallet, and means for raising and lowering the rear end of said load supporting means, comprising lever mechanisms fulcrumed on said truck rearwardly of said rear wheels and extending forwardly therefrom and provided with rollers located adjacent said wheels and normally positioned in proximity to the plane of the wheel base of the truck, and resilient means acting upon said lever mechanisms with sufficient force gradually and yieldably to lift said rear end upon engagement of the rollers with the bottom floorboard of the pallet and thereby cushion the shock which would otherwise be produced by abrupt contact of the rear wheels with said floorboard.

3. Lifting buffer mechanism, for pallet lifting and transporting trucks, having front steering mechanism and, extending rearwardly therefrom, load supporting means having a skeletonized rear end portion and extensible and retractable rear

wheels adapted to enter the space between the top and bottom floorboards of a double-faced pallet and means for raising and lowering the rear end of said load supporting means, comprising yieldable buffer rollers located rearwardly of and in proximity to said rear wheels and of such greater diameter than the depth of the load supporting means as to extend from approximately the upper plane of the load supporting means into proximity to the plane of the wheel base and upon yielding to extend above the upper plane of the load supporting means, and resilient means acting upon said rollers with sufficient force to lift the rear end of the truck upon engagement by said rollers with a bottom floorboard of the pallet, whereby upon introduction of the rear end of the truck into the pallet said rear end will be gradually and yieldably raised thereby substantially eliminating the shock which would otherwise be produced by abrupt contact of said rear wheels with the floorboard of the pallet.

4. Lifting buffer mechanism, for pallet lifting and transporting trucks, having front steering mechanism and, extending rearwardly therefrom, load supporting means having spaced skeletonized rear end portions and extensible and retractable rear wheels adapted to enter the space between the top and bottom floorboards of a double-faced pallet and means for raising and lowering the rear end of said load supporting means, comprising triangular lever mechanisms fulcrumed upon the skeletonized rear end portions and extending downwardly and forwardly and provided with rollers adjacent to said rear wheels, tension springs acting upon said lever mechanisms normally forcing said rollers downwardly, and means for limiting the downward position of said rollers in predetermined proximity to the plane of the wheel base.

5. Lifting buffer mechanism, for pallet lifting and transporting trucks, having front steering mechanism and, extending rearwardly therefrom, load supporting means having spaced skeletonized rear end portions and extensible and re-

tractable rear wheels adapted to enter the space between the top and bottom floorboards of a double-faced pallet and means for raising and lowering the rear end of said load supporting means, comprising triangular lever mechanisms fulcrumed upon the skeletonized rear end portions and extending downwardly and forwardly and provided with rollers adjacent to said rear wheels, tension springs acting upon said lever mechanisms normally forcing said rollers downwardly, in such manner that the lifting force of the springs will not be substantially increased as the rollers are forced upwardly by the floorboard of the pallet, and means engaging the rear shoulders of the triangular lever mechanisms limiting the downward position of said rollers in predetermined proximity to the plane of the wheel base.

6. Lifting buffer mechanism, for pallet lifting and transporting trucks, having front steering mechanism and, extending rearwardly therefrom, load supporting means having extensible and retractable rear wheels and at its rear end an integral skeletonized frame having a transverse end bar and spaced parallel longitudinally extending bars, L-shaped brackets having arms detachably connected to the respective longitudinally extending bars by bolts, triangular lever mechanism pivotally mounted on said brackets having a roller located normally in proximity to the wheel base of the truck to engage the bottom floorboard of the pallet and provided at the lower rear end thereof with shoulders, springs of sufficient strength to raise the rear end of the load supporting means connected at their respective ends to said bracket and to said lever mechanism acting normally to extend said roller below the load supporting means, and screws detachably mounted in said transverse rear bar engaging the transverse arms of said bracket and extending a sufficient distance therethrough to engage the shoulders of the lever mechanism and limit the downward swinging movement of said lever mechanism.

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