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PALLET LIFT TRUCK

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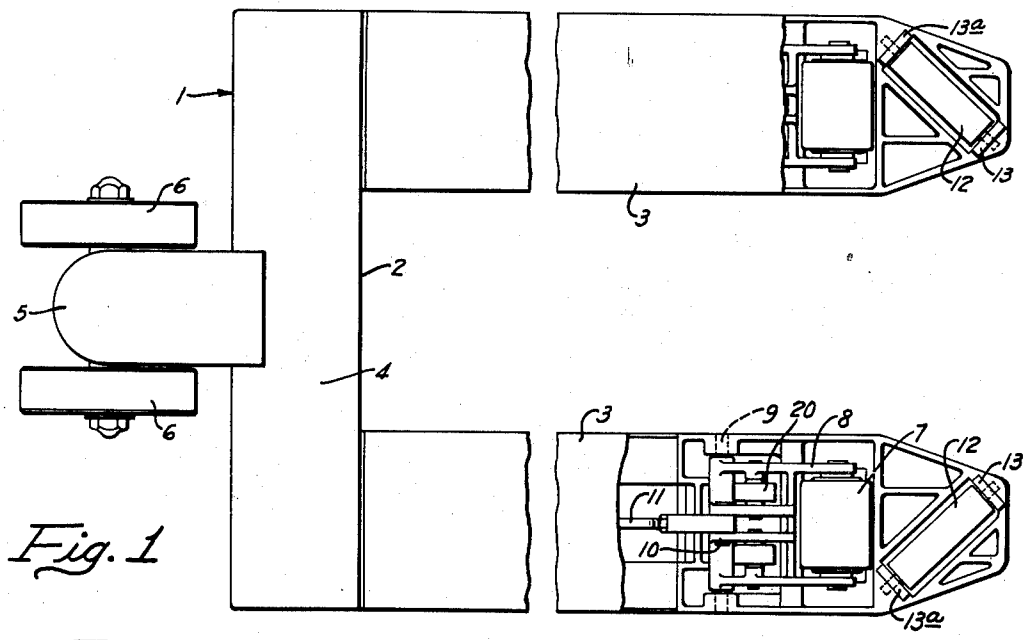


Fig. 1

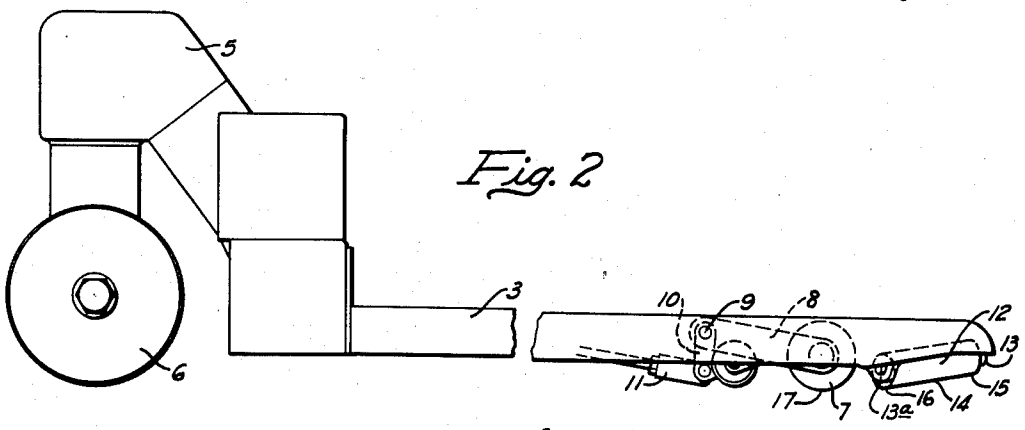


Fig. 2

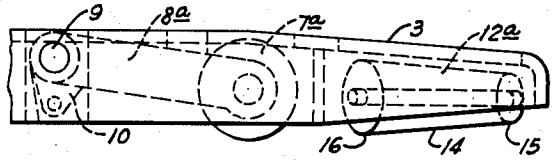


Fig. 4

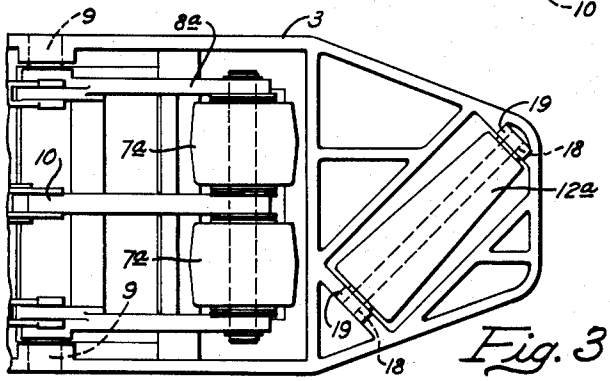


Fig. 3

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PALLET LIFT TRUCK

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This invention relates to hand lift trucks of the type used for lifting and transporting material handling pallets, and, more particularly, is directed to improvements for facilitating movement of the truck frame to an operative lifting position relative to a pallet.

The frames of pallet handling lift trucks have a fork shape providing a pair of spaced forwardly extending arms which are inserted in the space between the upper and lower platforms of material handling pallets preparatory to lifting the same. The frame is supported for rolling movement over a floor area by wheels at the rear thereof and by wheels or rollers at the forward ends of the fork arms which are extensibly mounted with respect to the frame by supporting brackets pivoted to the frame. After movement of the fork arms to an operative position between the upper and lower pallet platforms, pivotal movement of the supporting brackets raises the fork arms of the truck frame into engagement with the underside of the upper pallet platform and elevates the pallet so that it may be transported by the truck.

Since the fork arms of the truck must be inserted in the relatively narrow space between the upper and lower pallet platforms, the extensible rollers at the forward ends of the truck fork arms of necessity have a small diameter which interferes with their being rolled over obstructions in the path of movement of the truck. The lower pallet platform, of course, constitutes an obstruction to the rolling movement of these extensible or elevating rollers which causes difficulty in moving the fork arms to an operative lifting position with respect to the pallet. The difficulty of entering the fork arms between the upper and lower pallet platforms is increased when the platforms are constructed of spaced parallel wood slats since the extensible rollers, without more, drop into the space between adjacent slats whenever they move over one of the slats so that each of the slats becomes an obstruction over which the extensible roller must move.

To facilitate entry of the truck fork arms into the space between the pallet platforms, various proposals have been made for elevating the forward ends of such arms and the extensibly mounted rollers carried thereby with respect to obstructions an amount such that the rollers will more readily move over such obstructions. One proposal for this purpose comprises a series of auxiliary rollers mounted at different levels in advance of the extensible truck rollers.

Another proposal for the same purpose comprises a camming member in advance of the extensible rollers. Undesirable features are presented by both of these proposals since the first effects elevation of the truck frame over obstructions with a series of bumping movements and the second, while eliminating the bumping movement of the first, results in a frictional drag of its camming member over the obstruction which impedes forward movement of

the truck. These features of the patented proposals are eliminated by the elevating provisions of this invention.

One of the principal objects of this invention is to provide an auxiliary mechanism which will elevate the extensible rollers of hand lift trucks over obstructions, such as a lower pallet platform in the path of movement of the truck, without any noticeable bumping movement or frictional drag. To this end, there is provided on the forward end of each truck frame fork arm an elongated roller which extends angularly with respect to the horizontal centerline of the fork arm on which it is mounted and which has a line of contact on its lower surface sloping downwardly from front to rear with respect to such fork-arm. In a manner to be described, the elongated rollers may be either conical or cylindrical and are preferably mounted so that their angularly inclined axes converge toward the front of the truck.

Other objects and advantages of the invention will become apparent from the following description.

In the drawings, there are shown two embodiments of the invention. In this showing:

Fig. 1 is a bottom plan view of a pallet lift truck illustrating the arrangement of auxiliary elevating rollers at the forward ends of the truck lift arms in accordance with the principles of this invention, the actuating mechanism for operating the extensible elevating rollers being broken away;

Fig. 2 is a side elevational view of the truck shown in Fig. 1;

Fig. 3 is a fragmentary view similar to a portion of Fig. 1 showing a modified arrangement of auxiliary lifting rolling; and

Fig. 4 is a side elevational view of the apparatus shown in Fig. 3.

In the drawings, the numeral 1 designates as a whole a pallet lift truck comprising a frame 2 of fork shape having a pair of forwardly projecting lift arms 3 which are connected together at the rear ends thereof by a transversely extending supporting member 4. The transverse supporting member 4 is secured to a housing 5 which is supported at its lower end by a pair of floor engaging wheels 6. The housing 5 includes mechanisms (not shown) for elevating the housing 5 and frame 2 with respect to the wheels 6 and for actuating the supporting rollers at the front of the fork arms 3 to an extended position in a manner to be described.

The supporting rollers at the front ends of the fork lift arms 3 are designated by the numeral 7. Each of the rollers 7 is rotatably connected to the outer end of a bracket 8 which has its inner end pivotally connected to the frame by a pivot 9 extending transversely of one of the fork arms 3. The bracket support 8 includes an eccentrically projecting bracket part 10 to which an actuating rod 11 is connected.

The drawings show the position of the supporting brackets 8 and rollers 7 in their unextended or withdrawn position in which the frame 3 is supported at its minimum position above the floor level. When the rods 11 are pulled rearwardly by the actuating mechanism (not shown) in the housing 5, the eccentric bracket part 10 and the bracket support 8 are rotated in a clockwise direction as viewed in Fig. 2 to move the supporting rollers 7 downwardly with respect to the frame 2 and thereby elevate the fork arms 3 with respect to the floor level on which the truck is supported and lift a pallet which may have its upper supporting platform positioned above the fork arms 3.

The pallet lift truck structure thus far described is conventional and forms no part per se of this invention.

As indicated above, the fork arms 3 are moved to an operative lifting position with respect to a pallet by wheeling the truck over the floor area on which the pallet is supported to insert the fork arms 3 in the space between the upper and lower platforms of the pallet. The lower platform pallet of course constitutes an obstruction to the forward movement of the extensible roller 7 through the space between it and the upper pallet platform. Since the space between the upper and lower pallet platforms is relatively small in depth, the supporting roller 7 must have a relatively small diameter of the nature illustrated in the drawings. By reason of the small diameter of the rollers 7, the lower pallet platform constitutes an obstruction in the path of rolling movement of the roller 7 which renders the operation of inserting the fork arms 3 in the space between the upper and lower pallet platforms difficult. The difficulty of this operation is of course increased when the pallet is constructed of spaced parallel wooden slats.

In accordance with the principles of this invention and for the purpose of elevating the forward ends of the fork arms 3 over an obstruction such as a lower pallet platform in the path of movement of the rollers 7, each forward end of the fork arms 3 is provided with an elongated roller 12 in advance of the rollers 7 which is journaled in front and rear brackets 13 and 13*a* depending from the under surface of the fork arms 3 at the forward ends thereof. As best shown in Fig. 1, the axes of the rollers 12 extend angularly and transversely with respect to the horizontal center line of the arms 3, and, preferably, the axes of the rollers 12 converge toward the front of the truck. In the showing of Figs. 1 and 2, the rollers 12 are cylindrical, and the rear brackets 13*a* are positioned at a lower level than the front brackets 13. In this manner, as best shown in Fig. 2, each roller 12 has a line of contact 14 along its lower edge which slopes upwardly toward the front of the truck. The line of contact at the point 15 at the front of the roller 12 is preferably positioned at a level which is slightly above the upper surface of a lower platform pallet, and its rear point 16 is positioned just slightly above the lower level of the roller 7. The point 16 is positioned sufficiently close to the point 17 of rolling contact of the roller 7 such that the roller 7 will be in engagement with a lower slat of a slatted pallet before the point 16 moves out of engagement with such slat. In other words, the minimum linear distance between the points 16 and 17 is determined by the width of one of the slats in a slatted pallet. The linear distance between the points 16 and 15 in a direction extending longitudinally of the fork arms 3 must also be somewhat greater than the spacing between adjacent slats of the slatted pallet to be handled so that the point 15 will be positioned over a succeeding slat when the point 16 moves beyond the preceding pallet slat. The rollers 12 have a length such that the distance between the points 15 and 16 in a direction transverse of the fork arms 3 approximates the length of the rollers 7.

In the modification shown in Figs. 3 and 4, a modified roller 12*a* of conical shape is employed in place of the cylindrical roller 12 of Figs. 1 and 2. The axes of the rollers 12*a* are positioned in a horizontal plane, and the journal supports 18 provided by the brackets 19 are positioned at the same vertical level, the sloping line of contact 14 of the rollers 12*a* being provided by the conical shape thereof and being otherwise the same as described in connection with the showings of Fig. 2. In the modification shown in Figs. 3 and 4, there is further illustrated a modified form of supporting rollers 7*a* and pivoted mounting bracket 8*a*; this further modification having no bearing on the present invention.

The operation of the rollers 12 and 12*a* will be best understood by considering their action as the fork arms are moved into the space between the upper and lower platforms of a pallet to be lifted and transported by the truck. As initial entry of the forward ends of the arms 3 into this space is effected, the line of contact 14 will strike the upper surface of the lower platform at a point slightly inwardly of the point 15. As further forward movement is continued, the line of contact 14 of the rollers 12 or 12*a* will lift the forward end of the arms 3 upwardly with a combined rolling and sliding action over the upper surface of the lower pallet platform. This elevating movement raises the supporting rollers 7 so that the point 17 is positioned at substantially the same level as the upper surface of the pallet platform when it moves into supporting engagement therewith. In this manner, the supporting rollers 7 move into supporting engagement with the upper surface of the lower pallet platform smoothly and without any noticeable jarring action against the rollers 7 or the actuating mechanism including the bracket 8 by which they are moved to an extended position.

Auxiliary rollers 20 are mounted on the brackets 8 and a level slightly above the level of the rollers 7 to protect the rollers 7 during rearward movement in accordance with conventional practice.

While I have illustrated and described several specific embodiments of my invention, it will be understood that this is merely by way of illustration, and that various changes and modifications may be made therein within the contemplation of the invention and under the scope of the following claims.

I claim:

1. In a pallet lift truck having a pair of spaced forwardly projecting fork arms and a pair of supporting rollers respectively mounted adjacent the forward ends of said arms for vertical movement from a retracted to an extended position, an auxiliary mechanism for lifting said arms and rollers over obstructions in the path of rolling movement of said rollers comprising an elongated roll mounted of each arm and positioned in advance of said supporting roller, each of said elongated rolls having an axis of rotation inclined angularly with respect to the longitudinal center line of said arms and having an obstruction engaging line of rolling and sliding contact at its periphery which slopes in an upward direction toward the outer end of said arms.

2. The invention described in claim 1 characterized by said lines of rolling and sliding contact of each said rolls having a length in a direction transversely of the truck fork arms such that its ends are in positions of alignment with the ends of the supporting roller on the fork arm mounting the elongated roller providing said line of rolling and sliding contact.

3. The invention described in claim 1 characterized by said elongated rolls being cylindrical in shape and respectively having supporting brackets at their ends positioned at different vertical levels, the bracket at the front end being at a level above that of the bracket at the rear end of the roll.

4. The invention described in claim 1 characterized by said elongated rolls respectively having a frustoconical shape and having journal supports at the same vertical levels on said arm, the smaller ends of said elongated rolls being positioned forwardly of their larger ends relative to the arms on which they are mounted.

5. The invention described in claim 1 characterized by the angularly inclined axes of said elongated rolls converging toward the forward ends of said arms.

6. In a pallet lift truck having a frame in the shape of a fork providing laterally spaced forwardly projecting lift arms, supporting wheels at the rear of said frame, and a pair of supporting rollers respectively mounted at the forward ends of different ones of said arms for vertical movement from a retracted to an extended position, the invention which comprises an auxiliary mechanism for lifting said arms and rollers over an obstruction in the path of rolling movement of said rollers comprising a pair of elongated rolls respectively mounted on

said arms in positions in advance of said supporting rollers, each of said elongated rolls having an axis inclined angularly with respect to the longitudinal center line of said arms and having a line of rolling and sliding contact at its bottom which slopes in an upward direction toward the outer end of said arms, the ends of said line of contact at the rear of said elongated rolls being positioned slightly above the line of rolling contact of said supporting rollers with a floor area when in their retracted position and the opposite ends of said line of contact being at a sufficiently higher level to clear the

upper surface of an obstruction over which said supporting rollers are to be moved.

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