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(54) LOADING AND UNLOADING APPARATUS FOR LOAD CARRYING VEHICLES

(71) I, KASPAR KLAUS, a citizen of the Federal Republic of Germany, of 8940 Memmingen, Buxheimerstrasse 5, Germany, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a loading and unloading apparatus provided on load carrying vehicles and comprising an arrangement for loading and unloading containers or other loads over the rear end of the vehicle.

The practice of loading and unloading container or other large loads over the rear end of the vehicle is common. This method of procedure is predominantly favoured where the size of the load to be moved is limited and also when it is required to take up a load from a railway wagon, from a ramp or the like and the load carrying vehicle needs to be orientated at right angles to the ramp or to the rails. Known arrangements for the purpose mentioned include those which use a rocking frame, the pivotable axis of which extends beneath the loading surface and the load is suspended from this frame. During the loading operation the load swings through the frame. Loading apparatus of a similar construction are also known in which a plurality of arms are interlinked and are used to load or unload the load over the rear end of the vehicle.

These known arrangements are only paritally satisfactory. The arrangement of the pivotal axis beneath the loading surface imposes great difficulty in making use of the loading surface and hence of the full load capacity of the vehicle. In this respect it has to be taken into account that the rear axle of the vehicle is located in the vicinity of the pivotal axis of the loading frame referred to. If this pivot axis is arranged beneath the loading surface the space above the wheel axles and beneath the loading surface is very small and there is difficulty in obtaining a stable loading assembly and installing it and its operating means. If the loading assembly is disposed externally of the wheels this reduces the stability and the carrying capacity of the vehicle, whilst arrangement of the loading means within the wheels reduces the loading area available.

It is an object of the invention to provide an apparatus for the purpose set forth above which combines a high degree of rigidity and stability with an optimal utilisation of the loading surface and of the carrying capacity of the vehicle. A further object of the invention is to devise an arrangement which will enable the loading operation to be carried out quickly and will provide a loading surface which can be used for very large loads.

The invention is based on apparatus used on a load carrying vehicle with an arrangement for the loading and unloading of containers or other loads over the rear end of the vehicle, comprising two operating devices each arranged at one of two opposite side edges of the load surface and each comprising a hydraulic drive mechanism, the two drive mechanisms being hydraulically coupled together, and a hydraulically-operated main arm mounted, by means of arm support means secured to a chassis of the vehicle, for movement with respect to said chassis about a pivot axis extending transversely with respect to the vehicle and at a level above that of the load surface, each device further comprising an auxiliary arm mounted on said main arm for pivotal movement with respect thereto, the movements of each operating device being controlled at a level above the level of the load surface solely from the hydraulic drive mechanisms, so as to partake of identical movement which is mechanically independent of the other operating device at levels above

that of the load surface.

The fact that the invention eliminates any mechanical driving connection between the movable parts of the two power units above the level of the load surface, that is to say there is neither a common pivot for the main arms nor for the auxiliary arms, means that it is possible to arrange the pivot joint of the main arm at a comparatively high level and above the loading surface. For this reason the loading surface can be of the normal height because the load can be swung between the pivot joints of the main arms of the two power units. The common motion of the two power units is governed by the hydraulic coupling, that is to say for example by quantity meters or other like devices in the hydraulic circuitry.

The raised position of the pivotal axis which is afforded by the present invention enables the power units to be arranged directly above the wheels. This enables both the wheels and also the power units to be located towards the remote rear end of the vehicle, which caters for good stability of the vehicle having regard to the large wheel base, and also a maximum amount of space becomes available at the loading surface.

Further the invention has the advantage that even when using main arms of conventional length the area for manoeuvre is increased.

In accordance with an embodiment of the invention to assist the loading of the vehicle each main arm is adapted for pivoting into a horizontal position projecting forwards in the direction of travel of the vehicle and in this position the associated auxiliary arm is adapted to be tilted to either of two positions which are approximately the same degree forwardly and rearwardly, respectively of a vertical median position, so that a load may be deposited either forwardly of or between the two main arms.

By using the construction in accordance with the invention it is possible for example to transport two like containers one behind the other and to load and unload these two containers in like fashion by the loading assembly.

In the horizontal position of the main arm, an associated piston-cylinder unit is located beneath this main arm, an arrangement which can be very readily achieved by an appropriate choice of the heightwise positioning of the pivotal axis of the main arm. This prevents an undesirable twisting movement and protects the piston cylinder assembly.

According to an example of the invention, a pivotal mounting of the main arm at the rear end of the loading surface is preferred. In this event it is of advantage if the length of the main arm is so chosen as to correspond substantially to half the length of the loading surface. In a horizontal position of the main arm the auxiliary arm is then approximately at the mean point in the length of the loading surface and the whole of this surface is equally readily accessible.

It is of advantage if an intermediate frame is mounted at each side of the vehicle chassis and carries the pivotal mounting of the corresponding main arm, the linkage coupling to the associated piston cylinder unit and also a support foot. This facilitates the erection and dismantaling of the arrangement of this invention, and the use of the vehicle for other purposes.

Although the invention dispenses with a mechanical connection between the movable parts of the two power units, it may nevertheless be useful to connect together their two intermediate frames beneath the loading surfaces. The space required for a mechanical connection of the intermediate frames in this way is comparatively small. The mechanical strength of the arrangement is increased without the advantages of the present invention being lost.

Two embidoments illustrating the use of the invention are diagrammatically depicted in the accompanying drawings, in which:

Figure 1 is a side view of an apparatus according to the invention,

Figure 2 is a side view of a modified apparatus, and

Figure 3 is a rear view of the arrangement illustrated in Figure 2.

Referring to the drawings, two power units 4 and 5 (see Figure 3) are arranged at the two sides 1 and 2 of the load surface 3 of the vehicle 6, and these are independent mechanically of one another at a level above the load surface.

The two power units 4 and 5 are in each case supported by an intermediate frame 12, 13 secured at each side to the vehicle chassis 16. Each intermediate frame has an upstanding main arm 7 pivotally connected thereto at 9 and an auxiliary arm 8 pivotally connected to the main arm at 18. A piston cylinder unit 10 operates the main arm 7 and is pivotally connected thereto at 17 in the vicinity of the pivot 18.

The auxilary arm 8 is operated by a piston cylinder unit 19 and the load 21 is supported from the free end 20 thereof. The load can be suspended directly, that is to say a suspension cable 22 can be directly connected to the load 21, or use may be made of an intermediate frame 23.

Figure 1 shows the way in which two loads 21, for example containers, can be arranged in succession on the load-carrying vehicle 6. During the loading operation a support foot 15 arranged on each intermediate frame 12 will advantageously be

lowered to ground level. The comparaparatively elevated level of the intermediate frame 12, facilitates the use and arrangement of the suport feet 15 and the operation thereof.

In the embodiment of the invention illustrated in the drawings the intermediate frames and thus the pivots 9 for the main arm 7 are in each case arranged at the rearward end 11 of the load surface 3. In special cases it may be of advantage to arrange them at a spacing from the rear end, although the construction illustrated in the drawing is generally to be preferred.

The embodiment illustrated in Figures 2 and 3 differs from that of Figure 1 basically in the fact that the load surface 3 of the vehicle there illustrated is shorter, that is to say in this example only a single container can be set down on it and transported. Figure 2 illustrates however that in this case power means of similar construction can still be used and the load can be deposited at any required part of the load surface.

In each of Figures 1 and 2 it is assumed that the load is to be transfered from a railway wagon 24. It will be apparent that the load 21 can be taken from a ramp. Lowering on to the ground or taking up from the ground is readily accomplished in view of the manoeuvrability of the power means.

WHAT I CLAIM IS:—

1. Apparatus on a load carrying vehicle for the loading and unloading of containers or other loads over the rear end of a load surface of the vehicle, comprising two operating devices each arranged at one of two opposite side edges of the load surface and each comprising a hydraulic drive mechanism, the two drive mechanisms being hydraulically coupled together, and a hydraulically-operated main arm mounted, by means of arm support means secured to a chassis of the vehicle, for movement with respect to said chassis about a pivot axis extending transversely with respect to the vehicle and at a level above that of the load surface, each device further comprising an auxiliary arm mounted on said main arm for pivotal movement with respect thereto, the movements of each operating device being controlled at a level above the level of the load surface solely from the hydraulic drive mechanisms, so as to partake of identical movement which is mechanically independent of the other operating device at levels above that of the load surface.

2. Apparatus according to claim 1, in which, to assist the loading of the vehicle in use, each main arm pivots into a horizontal position projecting forwards in the direction of travel of the vehicle and in this position the auxiliary arm is adapted to be tilted to either of two positions which are aproximately the same degree forwardly or rearwardly of a vertical position.

3. Apparatus according to claim 1 or 2, in which each hydraulic mechanism comprises a piston-cylinder unit for operating the corresponding main arm, and in the horizontal position of the main arm this piston cylinder unit is located beneath the main arm.

4. Apparatus according to any of claims 1 to 3, in which the main arm is pivotally mounted at the rearward end of the loading surface.

5. Apparatus according to any of claims 1 to 4, in which the main arm is substantially half the length of the loading surface.

6. Apparatus according to any of claims 1 to 5, in which an intermediate frame is fastened to each side of the vehicle chassis and carries a pivotal mounting for the main arm, a linkage of the piston cylinder unit, and a support foot.

7. Apparatus according to claim 6, in which the intermediate frames of the two hydraulic mechanisms are connected together beneath the loading surface.

8. Apparatus for loading and unloading a vehicle substantially as herein described and as shown in the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

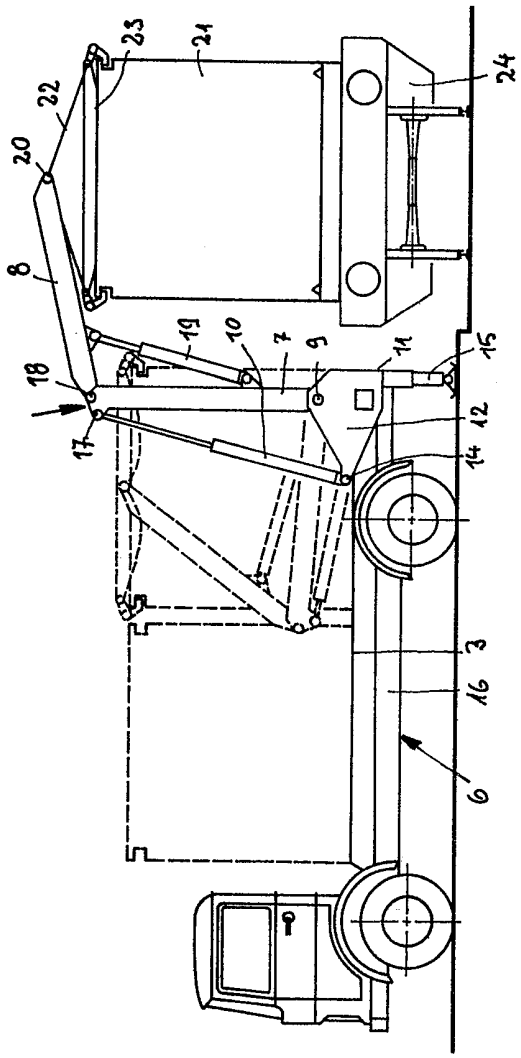

Fig. 1

1563339 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 2

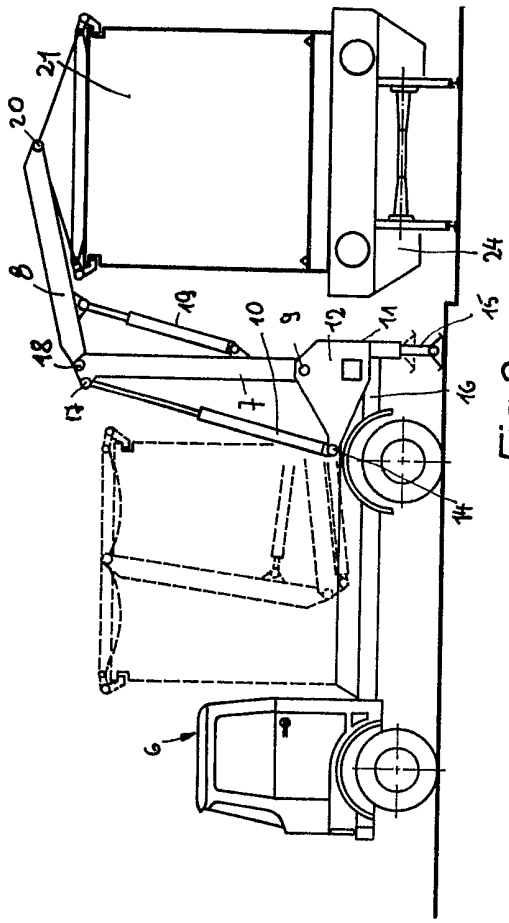

Fig.2

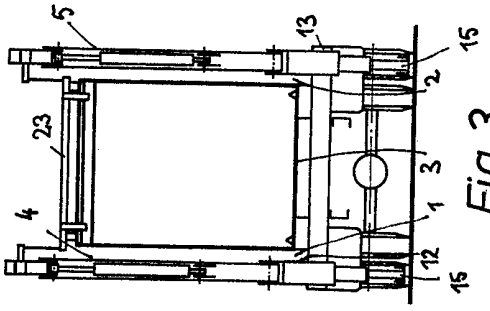

Fig.3