

Device for Picking Up and Conveying Heavy Loads

The invention refers to a device for picking up and conveying heavy loads, with a surface for supporting the loads and with a holding device for a body which is variable in volume and has a smooth surface.

Heavy, long goods or cargo with large dimensions often have to be loaded from one vehicle to another, or have to be moved only a few metres for other reasons e.g. out of an overseas container. Forklift trucks often cannot be used, for reasons of space or because the load can only be grasped insufficiently. For instance, the load to be lifted may also be too high, or the pallet with the freight on it may be too voluminous for the forklift truck.

These requirements call for special solutions that make it possible to convey goods or transport pallets over relatively short distances and, during the loading process, to spread the pressure over a bigger surface, e.g. over the floor of the transport chamber. In some cases, the ground pressure of the forklift truck tires would be too great.

For the conveying of heavy loads, air-cushion systems are conventionally used (e.g. pneumatic jack, lifting cushions for raising tipped-over machinery, vehicles etc.), but these do not allow simultaneous movement of the load. Furthermore, roller equipment integrated into the flooring of a storehouse or into a hold (airplane or truck) is known for moving loads. However, these devices are bound to the place and means of transportation.

The journal "Güter Verkehr" (edition 1995, pages 48 and 49) shows a trailer with liftable conveyor in the loading platform for loading and discharge. In container traffic, so-called "slip sheets" are used: these are Teflon sheets placed under a pallet to diminish the friction between pallet skid and ground while discharging.

Loading is usually performed by a forklift truck and discharging by pulling the Teflon sheets out of the container together with the load. The solution's disadvantage is that the pallet must be put onto the Teflon sheets with a forklift truck, which frequently is impossible. Moreover, in many cases a forklift truck cannot be used for reasons of space or because the load is too big.

The invention's function is to provide a device which permits the conveyance of heavy loads in a simple manner over short distances.

This task is solved by the invention with its characteristics as described in claim 1.

Further advantages of the device are characterized by the sub-claims mentioned below.

If the pressure chambers are located in the extended hollow spaces of profiles or in notches below the pallets, the so-called "inlets", a device is formed which is independent of the external situation. The cavities situated below a pressure chamber, filled with lubricant (e.g. soft soap), burst under the pressure between pressure chamber and ground when the device is pressurized. Each pressure chamber extends to the bottom and lifts the transport pallet up off the ground or floor. This method easily conveys the transport pallet with its load a few metres, sliding on the film of lubricant between pressure chamber and ground. Fig. 9 shows another variant of the invention in which the pressure chambers are made so long that they project out of at least one end of the inlets.

The pressure chambers are only placed loosely into the inlets. The contact surfaces between inlet and pressure chamber are prepared for sliding, e.g. by a smooth rubber, Teflon or graphite coating or/and lubricants such as soft soap. In this way, the loaded pallet can slip along the pressure chamber and, for example, can then be moved out of an overseas container.

This variant's advantage becomes especially clear in heavy-lift transports to developing countries where suitable discharging equipment is often not available, and where the pressure chamber as a "discharging rail" does not make excessive demands on the nature of the ground surface at the place of final destination. The device can be carried along with the transported goods without additional space requirements (lying flat without pressurizing) underneath the pallet or between stowage materials for transport safety (e.g. between the pallet skids). There is no need to carry along any pressure-generating units.

The medium of air pressure is available at practically every destination, as trucks usually are equipped with air compressors for own tire-filling purposes.

Further details of the invention are particularized in schematic figures; the following examples are shown:

Fig. 1 Device for picking up and conveying heavy loads

Fig. 2 Set-up for an unpressurized pressure chamber in the inlet of the transporting pallet

Fig. 3 Set-up for a pressurized pressure chamber in the inlet of the transporting pallet.

Fig. 1 shows a device for picking up and conveying heavy loads. Transport pallet (1) consists of longitudinal and cross bracings as well as skids (7) for propping up the tonnage (5). Along the underside of the pallet, two heavy-load sheathings are fixed as U-profiles (6) to form two inlets (2). Two pressure hoses (3) are put into both inlets. Both pressure hoses project out of the end of the transporting pallet when in the pressurized condition. The pallet with load (5) can now slide on the lubricated surface between U-profile and pressure hose, since the pressurized hose lifts the skids (7) up off the ground. The fixture for pressure connection (4) is provided at the end of the pressure hoses.

Fig. 2 shows the arrangement for the unpressurized pressure chamber, here realized by pressure hose (3) in the U-profile (6) of the pallet. Under such conditions, the pressure hose does not fill up the entire inlet (2). In this partial cross-section view of the heavy lift profile, the skid (7) is touching the ground. While in this condition, the lubricant-filled cavities (8) do not touch the ground.

Fig. 3 shows the pressurized condition. The inflated pressure hose (3) lifts the load, so that the skid (7) no longer touches the ground. The cavities (8) are ripped open by the pressure, thereby releasing the lubricant. In this manner, the connecting surface between pressure hose and ground can be made to slide. Now the entire load can be moved with relatively little effort on the sliding cushion provided by the pressure hose.



Patent Claims

1. Device for picking up and conveying heavy loads, with a surface for supporting the loads, characterized by a holding device for a body which is variable in volume and has a smooth surface. The variable-volume body (3) is the fact that it is made to be pressure-tight and that the body's surface is coated with a solid or liquid lubricant arranged in the direction of the holding device and/or towards the ground.
2. Device according to claim 1, thereby characterized that the body is firmly connected with the holding device.
3. Device according to claim 1 or 2, thereby characterized that the lubricant is stored in reservoirs which release the lubricant when pressurized.
4. Device according to one of the above-mentioned claims, with the surface mainly consisting of a pallet, thereby characterized that the holding device is arranged below the pallet.
5. Device according to claim 4, thereby characterized that the holding device is firmly connected with the pallet.
6. Device according to one of the claims 4 or 5, thereby characterized that the holding device is built into the underside of the pallet.
7. Device according to one of the above-mentioned claims, thereby characterized that the body (3) is tight for fluid media and that it can be filled with a fluid to enlarge its volume.
8. Device according to one of the above-mentioned claims, thereby characterized that the body is a hose.
9. Device according to claim 8, thereby characterized that the hose is longer than the holding device.
10. Device according to claim 8 or 9, thereby characterized that the hose is made out of polyurethane.
11. Device according to claim 8 or 9, thereby characterized that the hose is made out of rubber and is coated with a synthetic-fibre fabric.