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(54) Safety pallett-drum assembly system for transport of dangerous materials.

(57) Integrated pallet/drum system as device for safe handling, transportation and storage of water and/or soil contaminating dangerous liquids. The pallet is provided with integrated side-walls (2) extending from the pallet base (4) upwardly and forming a basin for drums (6) positioned on the pallet base (4) wherein the side-walls (2) have such a height that the safety basin is capable of storing the entire content of the drums (6) in case of leakage. To allow stacking of the device corner posts (3) are provided, the upper ends thereof are connected to each other forming an open cage to receive the integrated drums (6) completely. This embodiment allows the stacking of the devices.

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"Apparatus for The Safe Transportation and Storage of Dangerous Materials"

Steel or plastic shipping drums have come into general use for the shipment of dangerous materials. They are mass produced on a large scale and are relatively inexpensive. Moreover, they have a relatively short life expectancy and can be coated with various film coatings so as to be chemically resistant. Several drums can be grouped together on rectangular pallets and transported from one location to another using fork-lift truck handling equipment. In spite of these advantages steel or plastic shipping drums have certain disadvantages. One of the principal disadvantages is that the drums require frequent manual handling. For example, drums are rolled or slid and then lifted to an appropriate pallet. This is particularly difficult if the drums are heavily loaded. Similarly from truck beds the drums are frequently dropped onto cushions and rolled to where they are to be stored. Such treatment can cause drums or drum linings to crack, thereby causing the contents of the drum to leak. If not properly drained, drum storage areas containing leaking drums create hazards that contaminate the environment.

Once the drums have been used they are generally returned for further use, either as such or in conjunction with the pallets upon which they were initially shipped. Generally these drums must be separately cleaned or washed, rinsed and dried prior to being refilled, in order to prevent future contamination of the contents of the drum. Each of these operations is time-consuming and adds to the cost of the product and presents an opportunity for drum contamination, leakage or spillage to occur. Waste has to be carefully recycled due to its water contaminating properties, causing great expenses. Moreover, each handling increases the likelihood of damage occurring to the drum or to its lining which can result in a defective or leaking drum. This is particularly critical in the event that the drums are filled with solvents, acids, bases or other soil and/or water contaminating materials. Chlorinated solvents and other soil and water contaminating materials have to be regarded as dangerous materials.

Safe transporting and storage systems are generally known.

It is the object of the invention to provide an apparatus for the economical safe handling, transport and storage of standard drums containing dangerous materials which can contaminate soil and/or water, avoiding the common decanting steps into intermediate containers.

This object is solved by an integrated pallet drum system which allows refilling without any problems by the original producer avoiding intermediate cleaning.

Subject of the invention is an apparatus for safe handling, transport and storage especially intermediate storage, of water and/or soil contaminating liquids comprising a pallet with drums positioned thereon forming an integrated system which is characterized in that the pallet is provided with integrated side-walls extending upwards from the pallet base and forming a basin for standard drums positioned on the pallet base.

The transportation pallet according to the present invention comprises protecting side-walls that protect the drums from mechanical damage and serve, together with the pallet base, as a leak-proof safety basin in the event of drum leakage or spillage. For this reason the side-walls are preferably high enough that the volume of the basin is similar or larger than the interior volume of the drums positioned on the pallet. In any event, the capacity of the basin is sufficient for safe collection of the entire contents of the drums. That means that the upper edge of the basin is at least several centi meters higher than is required, for the basin volume to correspond to the interior volume of the drums. In most cases it is sufficient that the basin volume corresponds to the interior volume of the largest drum positioned on the pallet because the likelihood of all the drums being damaged is lesser than that of one drum.

To enable a safe and space-saving stacking of the device, reinforcing corner posts are provided preferably at the corners of the pallet within the basin and extending upwardly. The upper ends of the posts can be connected by connecting bars. To increase stability crossing diagonal bars can be provided between two reinforcing posts. The corner posts and the connecting bars form an open cage surrounding the integrated drums and is of sufficient height to extend slightly above the rim of the drums positioned vertically on the pallet base. The strength of the corner posts and the reinforcing construction as well as its shape is sufficient to permit stacking of the devices.

A grating can be provided within the basin positioned on the upper surface of the pallet base to ensure that the integrated drums stand above the level of any remaining liquid in the basin. The remaining liquid may be rain water, if for any reason the device was stored outdoors during pouring. Preferably the pallet base is provided with a draining valve which is positioned on the upper surface of the pallet base to permit complete draining of the safety catch basin. Most preferably the upper surface of the pallet base has a slight gradient towards one corner and the draining valve is

positioned at the lowest point on the upper surface of the pallet base. Preferably the draining valve is a draining bung extending downwardly and comprising an internal thread to which a seal is tightly screwed. The closure is equipped with a slot so that it can be removed with simple tools for draining the contents of the safety catch basin if needed.

The lower surface of the pallet base is formed similarly to the common transportation pallets and is provided with grooves or slots on eech side for engagement of the forks of the forklifts. The rectangular pallets preferably have such a base surface that within the basin two or four drums can be vertically positioned.

The drums are preferably of steel whereby common steel drums can be used. On principle it is possible to integrate plastic drums into the device provided that the drums are of materials resistant to the contents of the drums. Useful plastics are e.g. polyethylene, polypropylene, vinyl ester resins and the like. Plastic drums can be sulfonated or fluorinated to provide tight seals against solvents.

To enable a safe discharging of the device and to prevent undesired refilling of the drums subsequent to discharge of contents each integrated drum is provided preferably with a unidirectional valve and a bung for ventilation with seal. The unidirectional valve can be screwed into a second bung. In general both of the bungs are positioned on the upper surface of the vertically positioned drums. The means for ventilating the drum can be integrated in the discharge valve.

The pallet of the device according to the invention is of corrosion resistant material, especially of material resistant to chlorinated hydrocarbons. These materials include stainless steel, reinforced plastics e.g. polyethylene, polypropylene or vinyl ester resins. In the event that the pallet is of a material which is insufficiently corrosion resistant to corrosion or solvents the required corrosion resistance can be provided by sufficiently thick, resistant, adhering and impact resistant coatings. The selection of the material being preferably adapted to meet the degree of danger from contents. Most preferably the pallet and the side-walls are formed as one unit. The open cage prevents manual removal of drums from the device. The system according to the invention only permits discharging by a suction or pressure pipe and prevents refilling without the secured filling seal being removed so that the filler can refill with a similar product without any problems, thus resulting in a safer and more economic system. The economical situation is increased by the possibility of exchanging damaged drums in general.

The invention will become apparent in the light of the following description and drawings.

Figure 1 is a perspective view of the device comprising a pallet with four integrated drums.

Figure 2 is a perspective view of two corner post embodiments.

Figure 3 is a perspective view of the device with a pallet and two integrated drums.

Figure 4 is a perspective view of a single drum equipped with a bung and a unidirectional discharge valve.

Figure 5 is a sectional drawing of a one way discharge valve.

Figure 6 is a perspective view of the bung closure including ventilating means.

Figure 7 is a section of a useful bung closure.

Figure 1 demonstrates the device according to the invention comprising a pallet with four integrated drums 6 positioned on the pallet base and side-walls 2 tightly joined to the pallet base and at each corner a corner post 3 the upper ends thereof are connected to each other by connecting bars 7. For increasing stability at each side between the corner posts crossing diagonal bars are provided. To show the pallet base at the interior of the basin, a portion of the side-wall 2 is removed in figure 1. A grating 5 is positioned in spaced relation on the pallet base within the basin. A distance of between 2 and 6 centimeters from the grating to the base is in general sufficient to ensure that the drums do not stand directly in any remaining liquid in the basin.

The grating can be a grid or a lattice grating. The pallet is provided on the lower surface of its base 4 with two parallel grooves 9 each extending between the outer edges and spaced apart from each other for engagement of the forks of a fork-lift. The strength of the material and the construction of the pallet base as well as of the side-walls is sufficient to resist stress from handling, transport, stacking and storage without damage.

Figure 2 shows possible embodiments of the corner posts 3. The posts 3 can have a rectangular, triangular or circular cross-section. In the case of a rectangle it is preferred to provide the section with reinforcing triangular plates. Optionally the reinforcing triangular plates are positioned at the upper end of the corner posts to provide a platform for stacking the devices. Most preferably, the triangular plates positioned at the upper ends of the corner posts 3, have rims at the outer edges extending upwardly forming a platform correspond to the size the overall dimension of the pallet base. The rims at each corner post form a rectangle to receive second device and increasing stacking security, by preventing the stacked device from sliding off. It is also possible to increase the security of stacked devices by bending the outer peaks of the

lar plates at the ends of the corner posts so as to prevent sliding off of a stacked second device.

Figure 3 shows one embodiment of the device comprising a pallet with side-walls 2 where the base has the common cavities 9 for handling by forklifts. The corner posts 3 together with the upper reinforcing bars 7 and the diagonal bars 8 form an open cage for receiving two drums 6.

Figure 4 shows one of the drums 6 integrated into the device. It is common to discharge such drums horizontally through correspondingly positioned bungs in the drums.

One advantage of the device according to the invention is that the drums 6 can be filled and discharged in a vertical position so that manual handling of single drums for discharging is avoided. Manual handling of single drums for discharging is prevented by the integration of the drums into the device, and thus the risk of spilling dangerous fluids is reduced. The integrated drums, preferably steel drums, are provided with bungs 10,11 in the upper surface. The bung 10, which can be sealed by the closure 12, is used to fill the drum 6. The closure 12 of the filling bung 10 should only be removed for refilling by an authorized filler and can be provided with a seal with ears engaging in the closure and the stud of the bung. For discharge the closure 12 is provided with holes 13 for ventilation of the drum as shown in figures 6 and 7. The holes extend from the upper side-wall of the closure to the interior and the closure is provided with an outside screw-thread 14. The holes are extending therethrough and are angled. In the event that the closure is completely screwed into the bung stud the openings of the holes are positioned within the bung stud, and sealed, if desired, by an intermediate layer of a gasket. For the purpose of ventilating the drum the closure are partially screwed out of the bung so that the openings are free for communication with the environment and the interior of the drum. The closure is provided with one or more grooves for engagement of tools at the upper surface to enable handling of the closure. For sealing the bung 10 there is a common gasket between the closure and the bung stud. The second bung 11 shown in the figure is for discharging the drum and for this reason it is closed by a unidirectional discharging valve 15, for example as shown in figure 5. The valve being screwable into the bung stud is provided with a closure head 16 and an external thread 14 for screwing into the bung stud. A siphon tube 18 extends from the closure head 16 to the drum base and includes a simple ball-check valve 17 to allow unidirectional passage for discharging only. The valve 17 comprises a ball which is movable between a closed position at the valve bore and an opposite bearing. The upper end of the siphon tube 18 above the upper surface of the drum is provided for connecting to discharging pipes, for example by a thread 19 to which a closure cap is attached when not in use.

Preferably the closure of the bung 11 is secured against unauthorized removal by the common and suitable means. The gaskets and the bung closures are of corrosion resistant material. especially of material resistant to chlorinated hydrocarbons. The contents of the drum can be discharged via a vacuum pump attached to the siphon pipe. In principle, it is also possible to apply pressure to the stud of the filling bung 10 to remove the contents of the drum through the siphon pipe 18. The location of and the equipping with two bungs and the means for safe filling and discharging of the drums described above, obstruct the improper use of the device and increase the safety during handling and transportation of dangerous liquids.

List of reference numbers

2 side-walls
3 corner posts
4 pallet base
5 grating
6 drum
7 connecting bars
8 diagonal bars
9 grooves, clearances, spaces
10,11 bung
12 closure
13 bores
14 external thread of the closure
15 unidirectional discharging valve
16 closure head
17 ball-check valve
18 siphon pipe
19 thread

Claims

1. Apparatus for the safe handling, transportation and storage of water and/or soil contaminating liquids in the form of an integrated system of pallets with drums positioned thereon,
characterized in that
the pallet has side-walls (2) extending from the pallet base (4) upwards, forming a basin for the standard drums (6) positioned on the pallet base (4).

2. Apparatus according to claim 1,
characterized in that
two or four drums (6) are positioned on the pallet.

3. Apparatus according to claim 1,
characterized in that
the pallet base (4) is provided with an outlet valve to drain the basin.

4. Apparatus according to claims 1 to 3,
characterized in that
the height of the side-walls (2) is so that the volume of the basin is similar or larger than the interior volume of the drums (6) positioned on the pallet.

5. Apparatus according to claims 1 to 3,
characterized in that
the height of the side-walls (2) is so that the volume of the basin is similar or larger than the interior volume of the largest drum (6) positioned on the pallet.

6. Apparatus according to claims.1 to 5,
characterized in that
the pallet and the side-walls (2) are molded from a chlorinated hydrocarbon resistant material.

7. Apparatus according to claim 1,
characterized in that
reinforcing corner posts (3) are provided at the corners of the pallet within the basin extending upwards above the upper edge of the drums, the upper ends thereof being connected by connecting bars (7).

8. Apparatus according to claim 1,
characterized in that
a grating or a lattice grating (5) is positioned on the upper surface of the pallet base (4).

9. The apparatus according to claim 1,
characterized in that
the drums (6) are of steel or of plastic.

10. The apparatus according to claim 1,
characterized in that
the drums (6) are equipped with a unidirectional discharge valve (15) and a ventilating-filling bung hole (10) equipped with a plug (12) at the upper surface.

11. The apparatus according to claim 10,
characterized in that
means (13) for the ventilation of the drums are integrated into the discharge valve (15).

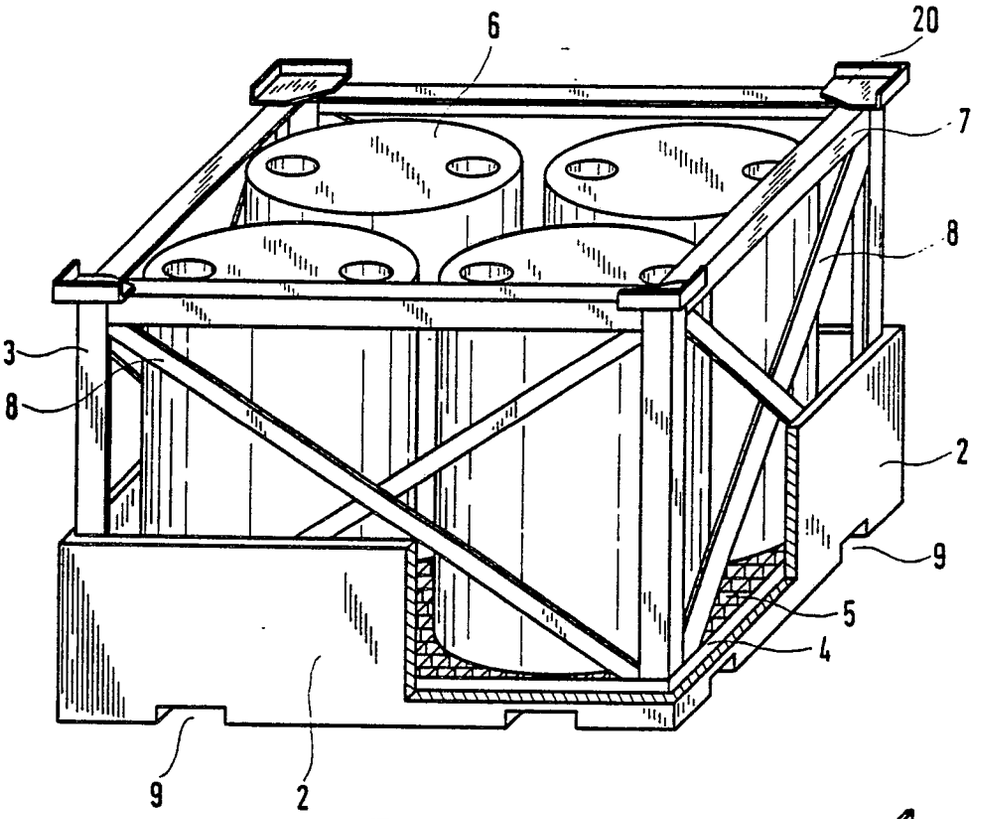

Fig.1

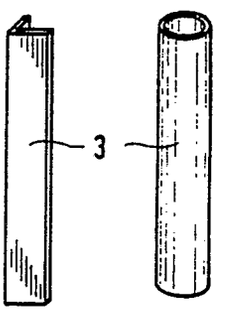

Fig.2

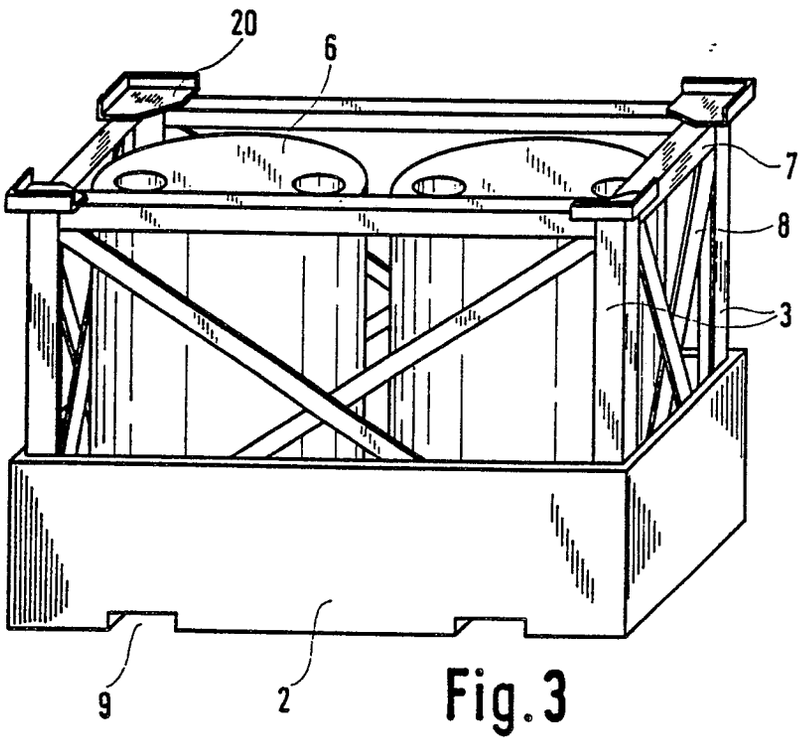

Fig.3

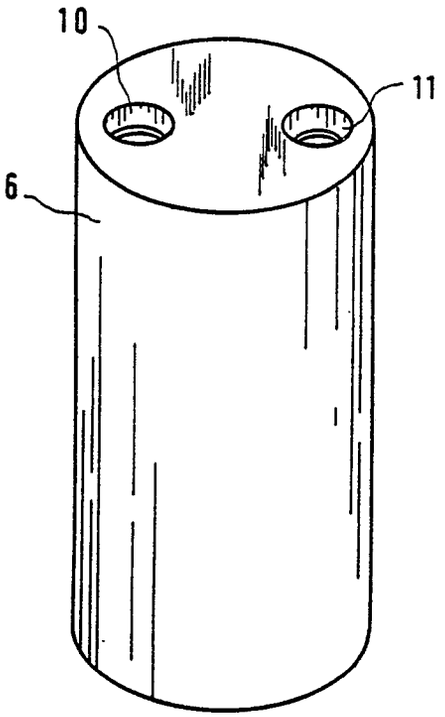

Fig. 4

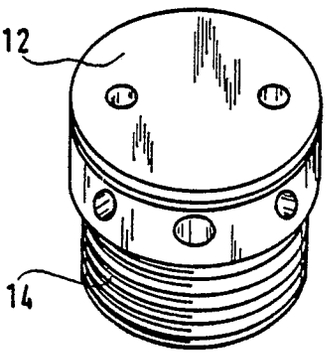

Fig. 6

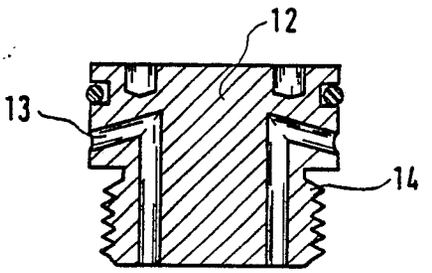

Fig. 7

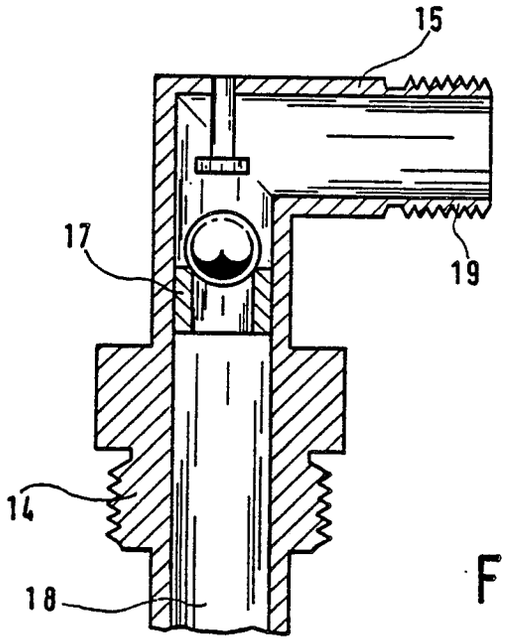

Fig. 5