The present invention relates to a system for carrying refuse and other materials. More particularly, the system relates to a trailer for use in combination with a transport vehicle. The trailer has a frame to which a load-bearing platform is attached. The platform has a plurality of elongated slats, each of which is engaged with a slat bearing bar such that the slats are spaced so as to permit liquid to seep between them. A drive means is attached to the slats for displacing them. A tray is attached to the frame and extends beneath the elongated slats so as to catch liquid waste that seeps between the slats.
ABSTRACT

The present invention relates to a system for carrying refuse and other materials. More particularly, the system relates to a trailer for use in combination with a transport vehicle. The trailer has a frame to which a load-bearing platform is attached. The platform has a plurality of elongated slats, each of which is engaged with a slat bearing bar such that the slats are spaced so as to permit liquid to seep between them. A drive means is attached to the slats for displacing them. A tray is attached to the frame and extends beneath the elongated slats so as to catch liquid waste that seeps between the slats.
TITLE OF THE INVENTION

RECIPIROCATING CONVEYOR WITH LIQUID COLLECTING TRAY

FIELD OF THE INVENTION

The present invention relates to transportation trailers for carrying refuse and other materials.

BACKGROUND OF THE INVENTION

Reciprocating slat-type conveyors are well known in the art. This type of conveyor system provides a convenient method of discharging refuse (or other loads) rearwardly from a trailer without tilting the trailer. The system typically includes a plurality of slats, independently driven with three or more drive means in a forward and rearward direction such that at any given moment either all slats or every third slat is in movement. Thus, a relatively short reciprocating movement will displace over time the entire load out of the trailer in a stepwise movement. Examples of such conveyors are disclosed in U.S. Patent Nos. 4,143,760 (Hallstrom), 4,184,587 (Hallstrom), 4,891,819 (Hallstrom), 4,709,805 (Foster) and 5,934,445 (Foster et al.).

When the loads transported on a trailer or by a vehicle contain a liquid component, liquid may seep onto conveyor slats, between conveyor slats onto the drive means and out of the trailer or vehicle onto the road. This is especially problematic when the load is refuse such that the liquid may be toxic and its escape from the trailer or vehicle contravenes environmental regulations. Various improvements have been disclosed in response to the seepage of toxic liquids from the load. U.S. Patent No. 6,013,585 (Foster et al.) describes a method for manufacturing conveyor slats that are chemical resistant and non-corrosive. Each of U.S. Patent Nos. 5,165,626 (Quaeck), 5,267,641 (Hallstrom, Jr.) and 5,547,087 (Foster) disclose base members to which the conveyor slats are attached. The base members may be attached, configured or sealed in such a manner so as to prevent the leakage of liquid beneath them. U.S. Patent Nos. 6,088,595 and RE35,156 each
disclose a liquid receptacle that collects liquid. The liquid receptacle extends beneath a portion of each base member.

Reciprocating conveyors may be attached to frameless trailers, as described in U.S. Patent No. 5,957,267 (Quaeck et al.). Frameless trailers minimize the total mass of the load by eliminating components of the conventional framework assembly that normally supports the load. One drawback associated with the use of a frameless trailer is the damage sustained by the piston rods, which are components of the drive means, when loads are dropped on the conveyor slats above the piston rods. U.S. Patent No. 5,957,267 adds fixtures to the drive means assembly, which fixtures bear the loads that are dropped upon the conveyor slats.

A further limitation that has been identified in prior art reciprocating conveyors is the position of the drive means. When such reciprocating conveyors are not fitted with base members, liquid waste seeps onto the drive means located beneath the conveyor slats, thus hampering movement of the conveyor slats. In liquid impermeable conveyor systems, it is expensive and labour intensive to mount a drive means below the conveyor slats. This is because an extensive hose and tubing system is necessary to connect the hydraulic fluid supply that is frequently a component of such drive means to drive units such as pistons. Thus U.S. Patent No. 5,222,590 (Quaeck) discloses a configuration in which the drive means is positioned outside of the container in which the load is transported.

There are a number of limitations associated with prior art reciprocating conveyors, including improved reciprocating conveyors adapted to transport loads having a liquid component. Adding seals to each base member increases the costs of manufacture. Using base members to prevent the leakage of liquid beneath them is undesirable because such base members are susceptible to damage from the impact that they sustain when loads are dropped upon them. Replacing such base members is more costly and time-consuming when they are sealed. Furthermore, changing the configuration of the slats when they have a complicated base member structure, whether or not such structure includes seals, is also costly and time-
consuming. Moreover, such seals trap moisture amongst the base member structure, thus making it susceptible to damage from the freezing of such moisture in cold temperatures. Finally, previous means for preventing leakage through the conveyor could not be attached to the conveyors of more than one manufacturer, since the width of the conveyor slats varies depending on who manufactures them.

There are other drawbacks to the prior art liquid collection receptacles. The receptacle is small and must be emptied periodically, since failure to empty the receptacle will result in the drive means for the conveyor becoming submerged in liquid waste. Furthermore, the dual trays and centre trough orientation of the liquid receptacle necessitates the welding of the components of the receptacle such that each weld must be covered with sealant to prevent leakage, thus adding to the cost of manufacturing the receptacle. Moreover, the prior art receptacle is fastened to cross members by rivets or bolts. Each fastening means must be individually sealed.

When a reciprocating conveyor is used with the prior art receptacle, debris accumulates between the conveyor slats and pan, which necessitates frequent cleaning and repair.

**SUMMARY OF THE INVENTION**

An object of the invention is to provide an improved reciprocating conveyor for a truck bed that has little or no leakage of liquid waste without the necessity of adding seals to the base members or the conveyor slats.

Accordingly, the invention herein comprises a refuse collection system for use in combination with a transport vehicle, as well as a container and vehicle including such a system. The system includes a frame having at least two cross members and at least two slat-bearing bars. A platform is attached to the frame and has at least two elongated slats, each engaged with one of the at least two slat-bearing bars. The at least two elongated slats are spaced apart from one another so as to permit liquid refuse to seep between the slats. A drive means is attached to the at least two elongated slats and situated distal from the platform out of the path of the liquid...
refuse. The drive means moves the slats between a first and a second position. The system also has an extended tray attached to the frame and situated beneath the platform so as to catch the liquid refuse that seeps between the at least two slats.

Directional references herein such as "vertical" and "horizontal" are for convenience of description only. It will be appreciated by one skilled in the art that (a) the invention may be tilted, and (b) even when placed on the level, a moderate departure from the horizontal, vertical etc. is permissible. Further, terms such as "wall" are intended to have a broad meaning to include a member in any orientation which serves the function of such member.

**BRIEF DESCRIPTION OF THE DRAWINGS**

In drawings which illustrate by way of example only a preferred embodiment of the invention:

Figure 1 is a perspective view of a trailer with a liquid collecting tray in which the housing of the trailer has been cut away so as to show the inside of the trailer;

Figure 2 is a rear plan view of the trailer without a rear door;

Figure 3 is a side plan view of the trailer;

Figure 4 is a perspective view of a portion of the trailer showing the drive means for moving the floor of the trailer and the attachment of the drive means to some of the elongated slats;

Figure 5 is a perspective view of a portion of an alternative embodiment of the trailer with a front tray; and

Figure 6 is a perspective view of an alternative embodiment of a cross member and two slats wherein the cross member and two slats are hollow.
DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A trailer 10 for collecting and transporting refuse is shown in Figure 1. The trailer is in general terms a conventional wheeled trailer for engagement to a tractor. The trailer 10 has side walls 12 and 14, a top wall 16 and a front wall 18. The trailer 10 also has a load-bearing platform 20 comprised of elongated slats 26. Elongated slats 26 extend lengthwise within the trailer for reciprocal movement between a first position and a second position in the fore/aft direction within the trailer. A rear door 28 encloses contents within the trailer 10. Optionally, the trailer is open-topped.

As seen in Figure 2, each slat 26 is engaged to a slat-bearing bar 30. Each slat-bearing bar 30 has a bearing 32 clipped to the slat-bearing bar 30 and the slat 26 engages and slides upon the bearing 32. The elongated slats 26 are set upon the slat-bearing bars 30 such that there is a space between the adjacent slats 26. This space is wide enough for liquid to seep through. Preferably the space is 1/32 of an inch but may have a width of between 1/64 of an inch and three inches. Preferably the space is of a size so as to prevent solid waste from falling between the slats 26.

The slat-bearing bars 28 are attached to at least two cross members 34 such that the slat-bearing bars 30 and the cross members 34 form a frame 40. The slat-bearing bars 30 are attached generally perpendicularly to the cross members 34. Preferably, the cross members 34 and the slat-bearing bars 30 are hollow.

The cross members 34 are attached to an extended tray 44. The extended tray 44 is situated beneath the platform 20. In a preferred embodiment of the trailer, the extended tray 44 extends beneath the platform 20 along most of the length of the platform, as shown in Figure 3. The extended tray 44 attaches to the cross members 34 near the side wall 12 and the side wall 14. Though the extended tray 44 may have any shape, it is preferred that it be arcuate in cross-section. In relation to the platform 20 above the extended tray 44, the extended tray 44 is convex-shaped in cross-section. The extended tray 44 is also preferably progressively sloped, either
downward or upward, from the end of the extended tray 44 proximate to the front wall 18 to the end of the extended tray 44 proximate to the rear door 28. The extended tray 44 is preferably sealed.

5 The extended tray 44 forms a structural component of the trailer 10 since the tray 44 supports the frame 40. It is preferred that the tray 44 be a single integral component. However, the tray 44 may comprise multiple sections fastened together and sealed.

10 The extended tray 44 has a bottom surface 50 which attaches to chassis 52. The chassis 52 is attached to axles 54. Each axle 54 is attached to wheels 56 in a conventional manner.

Referring to Figure 4, the trailer 10 also has a drive means 60 for displacing the elongated slats 26 in the fore/aft direction. One component of the drive means 60 is a hydraulic press portion 62. The hydraulic press portion 62 is situated outside of the trailer 10 and out of the path of the liquid refuse falling between the elongated slats 26 to the extended tray 44. The hydraulic press portion 62 has three hydraulic cylinders 64, 66 and 68, each of which extend through an opening (not shown) in the front wall 18 into the trailer 10. Each of the hydraulic cylinders 64, 66 and 68 are attached to one of three cross drives 70, 72 and 74. Each of the cross drives 70, 72 and 74 have fingers 76. The fingers 76 of each cross drive are attached to every third elongated slat 26 in the series of elongated slats such that each elongated slat is attached to a single cross drive. Preferably, fingers 76 are bolted to the elongated slats 26.

25 It will be understood by a person skilled in the art that the drive means 60 may have any number of hydraulic cylinders greater than one and that the number of cross drives is equal to the number of hydraulic cylinders.

30 An alternative embodiment of the trailer 10, shown in Figure 5, has a transverse tray 80 which is in communication with the extended tray 44. Preferably,
the transverse tray 80 also spans the width of the trailer 10 but is deeper than the extended tray 44. Preferably, the transverse tray 80 is positioned near the drive means 60 but may be positioned anywhere along the length of the extended tray 44. The transverse tray 80 is equipped with a plug 82 to drain the transverse tray 80.

In a further embodiment of the trailer 10, shown in Figure 6, the cross member 34 has a first aperture 84 and a series of second apertures 88 by which the cross member 34 is in communication with the slat-bearing bars 30. Both the cross member 34 and the slat-bearing bars 30 have slits 90.

In operation, wet refuse is deposited upon the platform 20. Liquid from the refuse seeps between the elongated slats 26 and collects in the extended tray 44. In the alternative embodiment with the transverse tray 80, extra liquid from within the extended tray 44 or from the platform 20 collects in the transverse tray 44.

Once the refuse has been collected and transported to its destination, the drive means 60 is engaged. The hydraulic cylinders 64, 66 and 68 extend and retract so as to move the cross drives 70, 72 and 74 and thus displace the elongated slats 26 upon the bearings 32 on the slat-bearing bars 30. The hydraulic cylinders may extend in tandem so as to move all of the elongated slats 26 at once between a first and a second position and thus displace refuse. Alternatively, the hydraulic cylinders may extend and retract sequentially so as to return the elongated slats to the first or the second position at different times and thereby not displace the refuse.

Finally, in the alternative embodiment in which the cross member 34 and the slat-bearing bars 30 have first aperture 84 and second apertures 88, respectively, water or a suitable cleaning fluid is sprayed through the first aperture 84 into the cross member 34 to clean it of any deposits left by the refuse. The water or cleaning fluid then flows into the slat-bearing bars 30 through the second apertures 88. The water or cleaning fluid flows through the slits 90 in the cross member 34 and in the slat-bearing bars 30 and collects in the extended tray 44.
Numerous modifications may be made to the embodiments described above without departing from the scope of the invention, which is defined by the claims.
I claim:

1. A refuse collection system for use in combination with a transport vehicle, said system comprising:

   a frame having at least two cross members and at least two slat-bearing bars;

   a platform attached to the frame and having at least two elongated slats each engaged with one of the at least two slat-bearing bars such that the at least two elongated slats are spaced apart from one another so as to permit liquid refuse to seep between the at least two elongated slats;

   a drive means attached to the at least two elongated slats so as to move them between a first position a second position, the drive means situated distal from the platform out of the path of the liquid refuse; and

   an extended tray attached to the frame and situated beneath the platform so as to catch the liquid refuse that seeps between the at least two elongated slats.