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STORAGE DRUM WITH DRAIN CHANNEL
VORRATSTONNE MIT EINEM DRAINAGEKANAL
BIDON DE STOCKAGE COMPRENANT UN CANAL DE DRAINAGE

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Description

Field of the Invention

This invention relates generally to storage drums of the type having a cylindrical outer wall section, a bottom panel attached to a first end of the outer wall section, a top panel attached to a second end of the outer wall section, and a bung hole in the top panel communicating between the drum exterior and the drum interior comprising a sump formed in the bottom panel, whereby that said sump being adjacent to the drum outer wall. More specifically this invention relates to 208 liter (55 gallon) drums.

Background of the Invention

Industrial chemicals are often stored in 208 liter (55 gallon) steel drums which are sealed entirely and accessible through a small bung hole in a lid at one end of the drum. The sides of the drum are usually corrugated in part, to strengthen the drum walls and provide rigidity. During use, a hose or pump is inserted into the drum through the bung hole, with the drum in a vertical position. Once the majority of the drum contents have been pumped out, the pump is removed and some of the remaining fluid in the drum can be poured out. Alternately, the drum can be fitted with a valve on the bung hole and then placed horizontally, relying primarily on the force of gravity for drainage.

Due to the configuration of the lip of the drum and the location of the bung hole, approximately 4.45 cm (1.75 inches) from the edge of the drum lid, it is nearly impossible to drain the drum entirely. When the drum is filled with acid or other hazardous liquids, careful draining of the drum contents is often skipped or at best performed hastily.

In fact, it is common to leave two or more liters of fluid inside the drum. The "empty" drum is, in many cases, taken to a land fill and crushed. When one multiplies this seemingly small volume by the huge numbers of drums which are dumped in United States land fills on a daily basis, one begins to realize the magnitude of the problem created by incomplete drainage. Proper draining of drums containing hazardous fluids, such as sulfuric acid, pesticides, and other chemicals before the drum arrives at a land fill would enormously decrease the amount of hazardous wastes that eventually end up loose in the environment.

Currently, people throughout the world are expressing a renewed interest in the issue of environmental safety. Corporations are even advertising how their policies reduce impact on the environment. Possible reasons why the 208 liter (55 gallon) drum has not been redesigned before to allow for more complete draining are that the size of the current drum is an industrial standard and that the current shape of the drum creates a very rigid container. Any redesign which changed the shape of the drum without reducing container strength would have widespread effects on how drums are shipped, stored and handled. An ideal solution would not change the outer drum dimensions, yet would provide for easy and near complete drum drainage.

From US 1,658,251 a self-draining oil receptacle is known which comprises a container, a sloping bottom member disposed above the base of the container, a sump communicating with the member, and a spout, for discharging drainings from the sump, secured interiorly of the container, its receiving end having an appended hood overhanging the sump, and its discharge end terminating adjacent the mouth of the container.

Summary of the Invention

The present invention provides a new drum configuration which does not change the outer dimensions nor the inner volume of the drum, but which allows for more complete draining of the drum contents.

According to the present invention a storage drum according to the preamble of claim 1 is characterized by said sump being aligned with the bung hole, and by further comprising channel means for guiding fluid from said sump to the bung hole as the drum in a vertical position is tipped into a horizontal position, said channel means comprising two raised wall sections positioned adjacent the interior of the drum outer wall, said raised wall sections being spaced apart from one another, each said raised wall section beginning next to said sump at the intersection of said outer wall and said bottom panel and extending up along said outer wall toward said bung hole.

When the drum is used in a vertical position with a pump tube inserted down through the bung hole and into the sump area, almost all of the drum contents can be evacuated with the pump. Any fluid remaining inside the drum after the pump is removed will be accommodated by the volume of the sump. Tilting the drum over onto the side of the drum where the sump, channel and bung hole are located, will cause the majority of fluid remaining within the sump area to flow through the channel to the bung hole and out of the drum.

It is therefore an object of the present invention to provide an improved storage drum drainage apparatus which will not require changing the outer dimensions of the drum.

Another object of the present invention is to provide an improved storage drum drainage apparatus which will allow drainage of the drum contents so that no more than about 100 ml of fluid will remain inside a standard 208 liter (55 gallon) drum after draining.

Other objects, features and advantages of the present invention will become apparent upon reading and understanding this specification, taken in conjunction with the accompanying drawings.
Brief Description of the Drawings

Fig. 1 is a three quarter cutaway view of the preferred embodiment of the present invention. Fig. 2 is a view of the preferred embodiment of Fig. 1 with the top panel partially removed. Fig. 3 is a sectional view of the drum embodiment of Fig. 1 taken along line 3-3. Fig. 4 is a sectional view of the drum embodiment of Fig. 1 taken along line 4-4. Fig. 5 is an isolated planar view, taken from inside the drum of Fig. 1 and looking at the top panel in the vicinity of the bunghole.

Detailed Description of the Preferred Embodiment

Referring now in greater detail to the drawings, in which like numerals indicate like components throughout the several views, Figures 1-4 show the preferred embodiment of a drum 9, in accordance with the present invention, as including an outer wall section 11, top panel 16 and bottom panel 10. A bunghole 14 provides access to the drum interior through the top panel 16 and is positioned at a distance "a" from the drum outer wall 11. The distance "a" is the shortest distance as measured from the inside diameter of the bunghole 14 to the inside diameter of the outer wall 11 (see Figs 3 and 5). The criticality of this measurement "a" as it relates to certain embodiments is given below.

The bottom panel 10 is formed with a pan section 19 and a sump 12. With the drum 9 in a vertical position (see Fig. 3) the sump 12 is seen as a pocket or depression in the bottom panel 10; and the pan section 19 slopes downward from all edges toward the sump 12, providing a type of spillway for directing fluid to the sump. The sump 12 is vertically aligned (as seen in Fig. 3) with the bunghole 14.

In the preferred embodiment, a channel 21 is formed inside the drum 9 along one segment of the drum outer wall 11 and is made up of a channel side panel 13 and two raised wall sections 17a, 17b. In the preferred embodiment the two raised wall sections 17a, 17b begin on either side of the sump 12 at the intersection of the outer wall 11 and the bottom panel 10 and extend upward along the edges of the channel side panel 13 but do not actually intersect with the top panel 16. In the preferred embodiment, a gap 15 exists at the top end of raised wall sections 17a, 17b; although alternate, less preferred embodiments within the scope of the invention eliminate this gap 15 and include a channel which slopes up to and partially around the bunghole 14. The gap 15 allows any fluids outside the channel to escape around the raised wall sections and exit the drum through the bunghole 14 as the bottom 10 end of the drum is lifted from the horizontal position of Figure 1.

In the preferred embodiment, the channel side panel 13 and the two raised wall sections 17a, 17b are formed from one piece of metal, with the channel side panel being formed from a curved piece of metal which matches the curvature of the outer wall section 11. During construction of the preferred embodiment the channel side panel 13 is inserted inside the outer wall section 11 before the top panel 16 and bottom panel 10 are attached. During attachment of the bottom 10 and top 16 panels the channel side panel 13 is crimped between the top panel and the outer wall section 11 and between the bottom panel and the outer wall section 11. This leaves a small space between the outer wall section 11 and channel side panel 13, but this space is, typically, small enough that no appreciable amount of fluid is caught here. In other embodiments the drum 9, including outer wall 11, top panel 16, bottom panel 10 and channel 21 are formed from molded plastic into one solid piece during manufacture. In still another embodiment, the raised wall sections 17a, 17b are each separately formed and attached to the inside of the outer wall 11, which inside of the outer wall serves as the "side panel" of the channel 21.

Operation. When a 208 liter (55 gallon) drum is used in a vertical position (see Fig. 3) with a pump (not shown), a pump tube (not shown) is inserted through bunghole 14 and extends down into the sump 12. The pump is able to evacuate most of the fluid from the drum with a pump tube in this position. However, for various reasons, some fluid will remain within the sump (directed by the sloping pan section 19) after the pump tube is removed; the pump tube only extends to within a certain distance from the drum bottom, or the contents of the pump tube drains back into the drum after the pump tube is pulled up above the level of the fluid. The first of these reasons will almost be eliminated because a given depth of fluid at the bottom of the sump 12 has a much smaller volume than the same depth spread over the bottom of the entire drum. This has a much greater area. In this case, the drum is tilted over to the right (as oriented in Figure 3) so that fluid in the sump 12 flows out onto the channel side panel 13 between raised wall sections 17a, 17b. Once the drum reaches a horizontal orientation, most of the liquid will be inside the channel, and raising the bottom 10 of the drum will cause the majority of fluid in the channel to flow out of the drum through bunghole 14.

Whereas the present invention finds broad invention in the embodiments described above, there is certain, more specific invention attributed to the criticality of the bunghole 14 positioning, at least with respect to some embodiments of the present invention. A standard 208 liter (55 gallon) drum, made to American Standard Association, Inc. specifications, is made from 2.57 mm (18 gage) steel and has the standard dimensions of approximately: outer wall 11 having an inside diameter of approximately 57.15 cm (22.5 inches); outer wall 11 having a height between 87.30 cm (34.37 inches) and 91.44 cm (36 inches) (measured at its outside, not within the inside storage cavity); and a bunghole inside diameter of approximately 5.08 cm (2 inches). It is extremely
difficult to drain much more than about 1500 ml of fluid out of a prior art drum by tilting the drum as described above, because the bunghole of a standard drum is located approximately 4.45 cm (1.75 inches) (distance *a*) from the inside of the outer wall 11, and some fluid is trapped between the bunghole and the edge of the drum. The specific, preferred embodiment of the present invention, to be utilized in connection with the standard dimensioned, rolled steel, 208 liter (55 gallon) drum, orients the bunghole 14 at a distance *a* of 1.09 cm (3/4 inch). It is understood that location of the bunghole 14 might be considered in most cases to be a matter of design choice. However, the position of the bunghole 14 in this stated, preferred embodiment for the 208 liter (55 gallon) rolled steel drum of the present invention, is deemed inventive as it constitutes a certain criticality achieved by inventive thought and development, whereby the structural integrity of the 208 liter (55 gallon) drum is maintained while allowing for evacuation of a maximum amount of fluid from the drum cavity.

Claims

1. A storage drum (9) of the type having a cylindrical outer wall section (11), a bottom panel (10) attached to a first end of the outer wall section (11), a top panel (16) attached to a second end of the outer wall section (11), and a bunghole (14) in the top panel (16) communicating between the drum exterior and the drum interior, comprising:

   said sump (12) being adjacent to the drum outer wall (11);

   characterized by

   said sump (12) being aligned with the bunghole (14), and by further comprising:

   channel means for guiding fluid from said sump (12) to the bunghole (14) as the drum (9) in a vertical position is tipped into a horizontal position, said channel means comprising two raised wall sections (17a, 17b) positioned adjacent the interior of the drum outer wall (11), said raised wall sections (17a, 17b) being spaced apart from one another, each said raised wall section (17a; 17b) beginning next to said sump (12) at the intersection of said outer wall (11) and said bottom panel (10) and extending up along said outer wall (11) toward said bunghole (14).

2. The storage drum of claim 1, wherein said raised wall sections (17a, 17b) begins on one side of said sump (12) and the other of said raised wall sections (17b; 17a) begins on the opposite side of said sump (12).

3. The storage drum of claim 1 or claim 2, wherein said raised wall sections (17a, 17b) are each separately formed and attached to the inside of the outer wall (11) of the drum (9).

4. The storage drum according to one or several of the preceding claims, wherein said channel means further comprises a flat side panel (13) mounted between said raised wall sections (17a, 17b) and between the top (16) and bottom panels (10).

5. The storage drum of claim 4, wherein said raised wall sections (17a, 17b) and said flat side panel (13) of said channel means are formed as a single unit, separate from the outer wall (11), top panel (16) and bottom panel (10) of the drum (9) and whereby said single unit channel means is attached to the inside of the drum (9) during manufacture.

6. The storage drum according to one or several of the preceding claims, wherein said outer wall section (11), said top panel (16), said bottom panel (10), said sump (12) and said raised wall sections (17a, 17b) are formed as one solid, molded piece during manufacture.

7. The storage drum according to one or several of the preceding claims, wherein said bottom panel (10) slopes gradually from the outer edge of said bottom panel, which intersects with said outer wall section (11), down to said sump (12).

8. The storage drum according to one or several of the preceding claims, wherein the content of the drum (9) is approximately 208 liters (55 gallons), said cylindrical outer wall section (11) having an inside diameter in the range of 55.88 cm (22 inches) to 60.96 cm (24 inches) and having an outside height in the range of 86.36 cm (34 inches) to 91.44 cm (36 inches), and said bunghole (14) being positioned between 1.27 cm (0.5 inch) and 2.54 cm (1 inch) from the inside surface of said outer wall section (11).

Patentansprüche

1. Vorratsonne (1) der Gattung mit einem zylinderförmigen äußeren Wandabschnitt (11), einer Bodenplatte (10), die an einem ersten Ende des äußeren Wandabschnitts (11) befestigt ist, einer Deckelplatte (16), die an einem zweiten Ende des äußeren Wandabschnittes (11) befestigt ist, und einem in der Deckelplatte (16) vorgesehenen Spundloch (14), das eine Verbindung zwischen dem Äußeren und dem Inneren der Tonne herstellt, folgendes umfassend: eine in der Bodenplatte (10) ausgebildete Sammelgrube (12), wobei sich die Sammelgrube
(12) in der Nähe der Außenwand (11) der Tonne befindet; dadurch gekennzeichnet
daß die Sammelgrube (12) mit dem Spundloch (14) ausgerichtet ist, und dadurch, daß sie des weiteren folgendes umfaßt:
eine kanalartige Einrichtung zum Leiten von Flüssigkeit von der Sammelgrube (12) zum Spundloch (14), wenn die Tonne (9) aus einer vertikalen Position in eine horizontale Position gekippt wird, wobei die kanalartige Einrichtung zwei erhöhte Wandabschnitte (17a, 17b) umfaßt, die in der Nähe des Inneren der äußeren Tonneneinwand (11) angeordnet sind, wobei die erhöhten Wandabschnitte (17a, 17b) voneinander beabsichtigt sind, wobei jeder erhöhte Wandabschnitt (17a, 17b) in der Nähe der Sammelgrube (12) an der Schnittstelle der äußeren Wand (11) mit der Bodenplatte (10) beginnt und entlang der äußeren Wand (11) auf das Spundloch (14) zu verläuft.

2. Vorratsstange nach Anspruch 1, dadurch gekennzeichnet, daß einer der erhöhten Wandabschnitte (17a, 17b) auf einer Seite der Sammelgrube (12) beginnt und der andere der erhöhten Wandabschnitte (17b; 17a) auf der gegenüberliegenden Seite der Sammelgrube (12) beginnt.

3. Vorratsstange nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die erhöhten Wandabschnitte (17a, 17b) jeweils separat ausgebildet und am Inneren der äußeren Wand (11) der Tonne (9) befestigt sind.

4. Vorratsstange nach einem oder mehreren der voranstehenden Ansprüche, dadurch gekennzeichnet, daß die kanalartige Einrichtung des weiteren einen flachen Seitenplatte (13) umfaßt, die zwischen den erhöhten Wandabschnitten (17a, 17b) und zwischen der Deckelplatte (16) und der Bodenplatte (10) befestigt ist.

5. Vorratsstange nach Anspruch 4, dadurch gekennzeichnet, daß die erhöhten Wandabschnitte (17a, 17b) und die flache Seitenwand (13) der kanalartigen Einrichtung als einzelne Einheit ausgebildet sind, getrennt von der äußeren Wand (11), der Deckelplatte (16) und der Bodenplatte (10) der Tonne (9), und wodurch die als einzelne Einheit vorgesehene kanalartige Einrichtung während der Herstellung am Inneren der Tonne (9) angebracht wird.

6. Vorratsstange nach einem oder mehreren der voranstehenden Ansprüche, dadurch gekennzeichnet, daß die äußere Wandabschnitt (11), die Deckelplatte (16), die Bodenplatte (10), die Sammelgrube (12) und die erhöhten Wandabschnitte (17a, 17b) während der Herstellung als ein massives Formstück gebildet werden.

7. Vorratsstange nach einem oder mehreren der voranstehenden Ansprüche, dadurch gekennzeichnet, daß die Bodenplatte (10) vom äußeren Rand der Bodenplatte, der sich mit dem äußeren Wandabschnitt (11) schneidet, eine allmähliche Neigung bis hinunter zur Sammelgrube (12) aufweist.

8. Vorratsstange nach einem oder mehreren der voranstehenden Ansprüche, dadurch gekennzeichnet, daß das Fassungsvermögen der Tonne (9) ungefähr 208 Liter (55 Gallonen) beträgt, wobei der zylindrische äußere Wandabschnitt (11) einen Innendurchmesser im Bereich von 55,88 cm (22 Inch) bis 60,96 cm (24 Inch) und einen Außenhöhe im Bereich von 86,36 cm (34 Inch) bis 91,44 cm (36 Inch) hat und das Spundloch (14) mit einem Abstand von zwischen 1,27 cm (0,5 Inch) und 2,54 cm (1 Inch) von der inneren Oberfläche des äußeren Wandabschnittes (11) angeordnet ist.

**Revendications**

1. Bidon de stockage (9) du type ayant une section de paroi externe cylindrique (11), un panneau inférieur (10) fixé sur une première extrémité de la section de paroi externe (11), un panneau supérieur (16) fixé sur une seconde extrémité de la section de paroi externe (11), et un trou de bonde (14) dans le panneau supérieur (16) communiquant entre l'extérieur du bidon et l'intérieur du bidon, comprenant: un collecteur (12) formé dans le panneau inférieur (10), ledit collecteur (12) étant adjacent à la paroi externe du bidon (11); caractérisé par ledit collecteur (12) étant aligné avec le trou de bonde (14), et par le fait en outre qu'il comprend: des moyens formant canal destinés à guider le fluide depuis ledit collecteur (12) jusqu'au trou de bonde (14) lorsque le bidon (9) dans une position verticale est incliné dans une position horizontale, lesdits moyens formant canal comprenant deux sections de paroi relevées (17a, 17b) étant espacées l'une de l'autre, chaque dite section de paroi relevée (17a, 17b) partant à proximité dudit collecteur (12) à l'intersection de ladite paroi externe (11) et dudit panneau inférieur (10) et s'étendant le long de ladite paroi externe (11) vers ledit trou de bonde (14).

2. Bidon de stockage selon la revendication 1, dans lequel une desdites sections de paroi relevées (17a, 17b) débute d'un côté dudit collecteur (12) et l'autre desdites sections de paroi relevées (17b,
17a) débute sur le côté opposé dudit collecteur (12).

3. Bidon de stockage selon la revendication 1 ou de la revendication 2, dans lequel lesdites sections de paroi relevées (17a, 17b) sont chacune formées séparément et fixées à l'intérieur de ladite paroi externe (11) du bidon (9).

4. Bidon de stockage selon l'une ou plusieurs des revendications précédentes, dans lequel lesdits moyens formant canal comprennent en outre un panneau latéral plat (13) monté entre lesdites sections de paroi relevées (17a, 17b) et entre les panneaux supérieur (16) et inférieur (10).

5. Bidon de stockage selon la revendication 4, dans lequel lesdites sections de paroi relevées (17a, 17b) et ledit panneau latéral plat (13) desdits moyens formant canal sont formés en tant que pièce unique, séparée de la paroi externe (11), du panneau supérieur (16) et du panneau inférieur (10) du bidon (9), lesdits moyens formant canal de la pièce unique étant fixés à l'intérieur du bidon (9) au cours de la fabrication.

6. Bidon de stockage selon l'une ou plusieurs des revendications précédentes, dans lequel ladite section de paroi externe (11), ledit panneau supérieur (16), ledit panneau inférieur (10), ledit collecteur (12) et lesdites sections de paroi relevées (17a, 17b) sont formés en tant que pièce solide, moulée pendant la fabrication.

7. Bidon de stockage selon l'une ou plusieurs des revendications précédentes, dans lequel ledit panneau inférieur (10) descend progressivement depuis le bord externe dudit panneau inférieur, qui s'entrecroise avec ladite section de paroi externe (11) jusqu'auudit collecteur (12).

8. Bidon de stockage selon l'une ou plusieurs des revendications précédentes, dans lequel le contenu du bidon (9) est de 208 litres environ (55 gallons), ladite section de paroi externe cylindrique (11) ayant un diamètre intérieur compris entre 55,88 cm (22 pouces) et 60,96 cm (24 pouces) et ayant une hauteur extérieure comprise entre 86,36 cm (34 pouces) et 91,44 cm (36 pouces) ; et ledit trou de bonde (14) étant positionné entre 1,27 cm (0,5 pouce) et 2,54 cm (1 pouce) depuis la surface intérieure de ladite section de paroi externe (11).