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(54)

APPARATUS AND METHOD FOR CONTROLLING THE FILLING OF HAZARDOUS WASTE WITHIN A CONTAINER

- (57) The apparatus comprises a container (110) with a cover (120), a scale (130) for measuring a total weight (W_T) of hazardous waste within the container (110), control means (140) for operating the scale (130) only during a determined period of time every time a hazardous waste is disposed within the container (110), disabling the scale (130) while no hazardous waste is being dis-

posed within the container (110) or when the total weight (W_T) of hazardous waste within the container (110) is equal to or greater than a predetermined maximum weight (W_M); and providing an indication that the total weight (W_T) of hazardous waste within the container (110) exceeds a predetermined maximum weight (W_M).

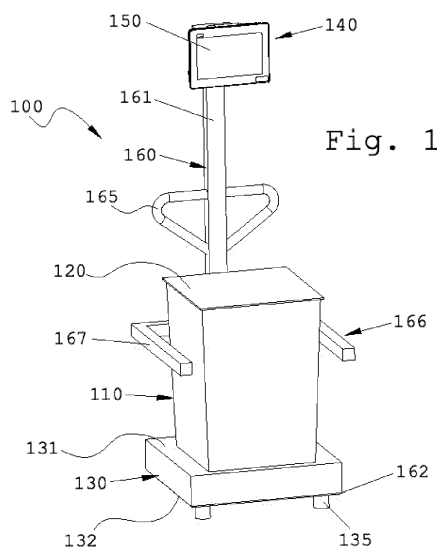


Fig. 1

Description

[0001] The present disclosure refers to management of hazardous waste. In particular, the present disclosure refers to an apparatus for controlling the filling of hazardous waste within a container. A method for controlling the filling of hazardous waste within a container is also disclosed herein.

BACKGROUND

[0002] Dangerous wastes are produced in large amounts in different health environments such as hospitals, clinics, laboratories, etc., which are required to be properly segregated and safely disposed due to toxicity. Recycling or reuse of biological and cytotoxic waste is thus prohibited.

[0003] Dangerous wastes may include biological waste corresponding to materials such as surgical wraps, culture tubes, petri dishes, pipets, blood vials, absorbent materials, tips, plastic ware tissue culture, etc. containing biohazardous agents such as bacteria, allergens, fungi, parasites, viruses, cultured human, and animal cells, etc.

[0004] Dangerous wastes may also include cytotoxic waste corresponding to materials that come into contact with cytotoxic drugs such as vials, syringes, needles, gloves, air filters, respirator masks, personal clothing, and equipment, etc.

[0005] At present, personnel in charge of depositing biological and cytotoxic waste at waste segregation points deposit waste inside suitable containers. Containers are closed when considered full. This is typically determined by simply visualizing the filling of the container and/or under specific circumstances, such as bad odors, after a predetermined period of time, etc.

[0006] This entails the risk of container overfilling, which may lead to health risks for personnel and patients and even financial penalties for the hospital, the clinic, the laboratory, health centre, and so on. Also, collection of not completely filled containers results in a poor or improper management hazardous waste.

[0007] There is thus a need for a safe management of hazardous waste in hospitals, clinics, laboratories, health centres, and the like.

SUMMARY

[0008] An apparatus is disclosed herein for controlling the filling of hazardous waste within a container with which significant advantages are achieved as it will be discussed herein below. The present apparatus has been found to be particularly efficient in control and management of biological and cytotoxic waste disposal in hospitals, clinics, laboratories, health centres, etc.

[0009] The apparatus includes a container comprising a container body made of a rigid resistant material such plastic or metal. Suitable plastic materials from which the container body may be made are, for example, high-den-

sity plastic such as high-density polyethylene (HDPE) or even high-density polypropylene (HDPP). Other suitable materials are also possible, including metal alloys. The container body may be opaque, slightly translucent, or transparent as required. The container is preferably configured to be leakproof and such that it can be easily cleaned and decontaminated.

[0010] The container has at least one opening through which waste can be placed inside the container. A cover is provided for temporarily closing said opening. The cover may be hinged on the container body or otherwise removably connected thereto. The container may be duly labeled, for example with biohazard labels, preferably visible from all sides of the container.

[0011] A scale is provided for measuring a total weight of hazardous waste within the container. The scale has a top surface so that, in use, the container constantly sits thereon. Any suitable type of scale may be used depending on the type of waste and the container. For example, for medical applications where small and medium size waste may be involved, a preferred type of scale may be an electronic bench scale. Other types of scales may of course be used. The scale may be capable of providing weight of waste that is present inside a container in a variety of different units, such as kilograms, grams, ounces, pounds, etc., according to specific applications where different sizes and quantities of waste are to be measured. Units may be easily switched for example by pressing a weight mode button in a display which will be described below.

[0012] The present apparatus further comprises control means, such as a Programmable Logic Controller (PLC) control system, or other suitable means for controlling electronics such as for example Arduino, configured for operating the scale only during a determined period of time every time a hazardous waste is disposed within the container. Thus, the control means in the present apparatus are configured for operating the scale exclusively only when waste is being disposed within the container.

[0013] The control means are also configured for disabling the scale while no hazardous waste is being disposed within the container. The control means are also configured for disabling the scale when a total weight of hazardous waste within the container is equal to or greater than a predetermined maximum weight. The control means may be also configured for disabling the scale when the container is empty.

[0014] Within the meaning of the present disclosure, disabling the scale involves, for example, switching off the scale or at least preventing the scale from operating to weight. On the other hand, predetermined maximum weight may be based on one or more of the size of the container and the on number of patients with which the container is associated. Other parameters on which the predetermined maximum weight may be based are no ruled out.

[0015] The control means may be configured for pro-

viding indications, for example that a total weight of hazardous waste within the container exceeds a predetermined maximum weight. Indications may be in a wide variety of different forms, such as light, text, sound, or symbol. Indications may be displayed through the above mentioned display or through another separate device.

[0016] If a display is provided, it may be connected to the scale to display said indications. The display may be configured to show accurate real-time information on total weight of hazardous waste that is deposited within the container. An easy to read display such as an LCD display may be particularly preferred. The control means may be configured for operating the display as with the scale, that is, exclusively only when waste is being disposed within the container. However, it is also envisaged that the display may show information or provide an indication even if the scale is disabled, for example, a red light when that a total weight of hazardous waste within the container is equal to or greater than a predetermined maximum weight informing the personnel that it is not allowed to deposit waste inside the container.

[0017] As an example, an indication may be a green light informing that a total weight of hazardous waste within the container is below a predetermined maximum weight or within a given range, corresponding to a normal operation in which personnel is allowed to deposit waste inside the container. Another example of indication may be a red light, that could be a flashing light if required, informing that a total weight of hazardous waste within the container is equal to or greater than a predetermined maximum weight, corresponding to a condition in which personnel is not allowed to deposit waste inside the container.

[0018] The control means may be also configured to provide an indication every time a hazardous waste is disposed within the container when a total weight of the hazardous waste within the container has exceeded a predetermined maximum weight. Thus, for example, in the event that a total weight of hazardous waste within the container exceeds a predetermined maximum weight and personnel still deposits waste within the container with the red light, text, or symbol being provided, an audible warning or sound indication may be delivered every time a waste is deposited into the container in such situation. For this purpose, the apparatus may include means for providing a sound indication such as for example one or more speakers.

[0019] With said visual and audible indications the personnel who deposit the waste in the containers know exactly the state of the container, in particular, if waste can still be deposited in the container or a predetermined maximum weight has been reached. If said predetermined maximum weight has been reached, indications will be provided to show the personnel that a given container must be closed, locked and removed from the apparatus.

[0020] The apparatus may comprise a support structure for supporting at least the container and the scale.

The support structure may be advantageously configured for preventing the container from turning. For this purpose, for example, the support structure may have a container holding part comprising two parallel arms separated from each other between which a container can be placed preventing it from being turned when the apparatus is moved.

[0021] Locking means may be provided for locking the cover of the container. The Locking means serve the purpose of preventing the cover from being opened such that hazardous waste can not be placed into the container when a total weight of hazardous waste therein is equal to or greater than a predetermined maximum weight. The locking means may be configured such that once the cover of the container has been closed, it can not be reopened.

[0022] The apparatus may comprise detecting means for at least identifying the presence of a container such that, once a container has been detected to be placed on the scale, the scale can be operated. Said detecting means may be of the optical nature, such as for example an optical sensor, or of the mechanical nature, such as a lever adapted to rotate when container is placed thereon resulting in operation of the scale being allowed.

[0023] Means for transmitting data may be further provided. Such data transmitting means may be associated with the control means. Data to be transmitted may relate to at least a total weight of hazardous waste within the container, as well as date and time of measuring the weight. Data may be recorded and transmitted to a computer or a mobile device, for example. Data transmission may be performed by cable via USB (Universal Serial Bus) ports, Ethernet ports, or wirelessly. Data analysis, historical data and custom reports may be performed and also printed as required. A suitable software application may take the data obtained from the scale and automatically insert said data into a readable database. Password protection may be enabled on data for privacy and security reasons. Data can be forwarded from the computer or mobile device to a monitoring site or any suitable remote location to create data backups, for example.

[0024] In some cases, a bag could be fitted inside the container of the apparatus if required. Said bag may be adapted for receiving therein hazardous waste. When a total weight of hazardous waste within the bag is equal to or more than a predetermined maximum weight of hazardous waste, a suitable indication may be provided to the personnel informing that the bag should be removed. Also in this case, the cover of the container could be locked to prevent hazardous waste from being placed into the bag inside the container when a total weight of hazardous waste is equal to or greater than the predetermined maximum weight.

[0025] A sensor may be included for detecting a volume of hazardous waste within the container. In particular, a light sensor may be included for detecting a volume of waste within the container. This may be useful for containers where waste to be deposited is not very

heavy but takes up a great deal of space therein. Weight and volume of waste that is present inside a container could be thus efficiently controlled. The operation of the apparatus is described in detail below. One or a number of the above described apparatuses are placed in different areas in a hospital, a clinic, a laboratory, etc. where generated hazardous waste is required to be collected for disposal.

[0026] Then, a number of different predetermined indications may be set in each apparatus according to a given value of weight of hazardous waste which is expected to be present within each container. For example, a first indication such as a green light may be set when a weight of a hazardous waste within the container is less than 15 Kg corresponding to a normal operation of the present apparatus. A second indication such as a yellow light may be set when a weight of a hazardous waste within the container ranges from 15 to 18 Kg, corresponding to a condition of the present apparatus that the container is almost full. A third indication such as a red (flashing) light may be set when a weight of a hazardous waste within the container is equal to 18 Kg corresponding to a condition of the present apparatus that the container is full. A fourth indication such as a sound warning or audible signal may be set when a weight of a hazardous waste within the container exceeds 18 Kg, corresponding to a condition that the container must be removed for disposal. Other types of indications and weight values are possible according to requirements.

[0027] Additional parameters may be entered before operation such as, for example, the name of the center where the apparatus is to be installed, the place, for example, in which floor the apparatus is to be installed, date and time of installation of the apparatus, personal information of the installer, etc.

[0028] Once the above mentioned settings have been set in the apparatus, a container is then placed on the scale. The presence of the container on the scale may be automatically detected after which the scale can be operated. Automatic detection of the presence of the container may be carried out through the above mentioned detecting means such as an optical sensor or a mechanical lever. Alternatively, or in addition, the presence of the container may be determined by the personnel who enters a menu command on the apparatus, for example through the display, that a container has been already placed on the scale. Detection of the presence of the container in the apparatus may be displayed in the display. Furthermore, a total number of containers that have been detected in the apparatus for a given period of time may be also manually or automatically entered and be displayed in the display. Areas where the apparatus is installed may be also manually or automatically entered and be also displayed in the display if required. Other data such as the interior volume of the container and type of waste to be deposited therein, for example biological or cytostatic waste, the date and time when the container has been placed, etc. may be also entered by the per-

sonnel. Data entered by the personnel may be recorded in the control means.

[0029] According to the method for controlling the filling of hazardous waste within the container disclosed herein, once the apparatus has been installed and ready for operation, every time a hazardous waste is disposed within the container of the apparatus, a total weight of hazardous waste within the container is determined.

[0030] It should be emphasized that, as stated above, the scale is only in operation exclusively when hazardous waste is being disposed within the container. The weight of waste present in the container may be displayed on the screen only when hazardous waste is being disposed within the container. It may be preferred that no indications are provided when the scale is not in operation. In particular, it may be preferred that no weight indications are provided when the scale is not in operation.

[0031] A condition for disabling the scale is when the container is empty. Another condition for disabling the scale is when the container is full. A further condition for disabling the scale is when the container is closed or locked to prevent further placement of waste into the container and when no waste is being placed into the container. As stated above, when one of said conditions occur, at least the scale is disabled. In some cases, the display could be also disabled under said condition, together with the scale, or simply the display may be enabled only provide an indication, preferably not relating to weight values.

[0032] Then, in operation, every time hazardous waste is deposited within the container, a total weight of hazardous waste therein is compared with a predetermined maximum weight. An indication is then provided when a total weight of hazardous waste within the container is less, equal to, or more than said predetermined maximum weight of hazardous waste.

[0033] When a container is considered full of waste, that is, when a total weight of hazardous waste within the container is at least equal to a predetermined maximum weight of hazardous waste, the cover of the container is closed and locked properly. At that moment or afterwards, information may be sent regarding a total weight of hazardous waste within the container. Such information may be sent to a computer or a mobile device through a suitable software or mobile application, for example. A company responsible for waste removal may be thus precisely informed that containers must be collected for disposal. The mobile application may be configured not only to warn the personnel in charge of waste removal but also to send reminders from time to time, for example, as required, for example once a container is considered to be full for collection. Once the container is removed from the apparatus, such warnings and reminders would be canceled. This is advantageously interesting because the less time a full container is in a sanitary area the better for safety reasons.

[0034] Once the container has been removed from the apparatus, waste management continues until final treat-

ment. Full containers, which have been closed, and locked if required, may be placed in an intermediate warehouse waiting for a waste manager, usually a company responsible for the management of hazardous waste, to take them for further treatment.

[0035] A number of significant advantages are achieved by the above described apparatus and method. The advantages of the present disclosure are crucial in sanitary areas such as hospitals, clinics, laboratories, health centres, and the like.

[0036] Real-time information of the filling of the container is precisely provided to personnel who is precisely informed when a container is full of waste. Controlling weight of hazardous waste exclusively every time a hazardous waste is disposed within the container allows for accurate and efficient management and control of the filling of the containers before they are closed, locked, and transferred to an intermediate storage or to a treatment plant by a waste manager. A more efficient waste management is thus achieved preventing container overfilling. Also, conditions when empty or half-full containers could be considered to be ready for being removed from the apparatus for disposal are avoided with the present apparatus. In addition to a more efficient waste management, optimal filling of the container also results in less containers being required for waste disposal and thus less material used for the manufacturing of said containers and therefore a lower environmental impact.

[0037] Having control over the weight of waste within a container exclusively only during filling is efficient and safe. When personnel are not being informed about weight, that is, when the display is not showing information about weight of waste within a container, personnel is implicitly informed that depositing waste within the container is allowed. As a result, only a binary decision can be taken, that is, depositing waste within the container is allowed or not. Advantageously, the personnel do not have other options which could result in overfilling of the container, for example if the personnel knew about a given weight value close to a predetermined maximum weight and despite this waste is still being deposited within the container. The risk of considering a container ready for being removed when in fact it was not, is also reduced. Personnel involved in health care environment, such as for example, cleaning, nursing, engineering personnel, etc. as well as patients themselves who may come into contact with waste containers might not be familiar with functions and protocols associated with waste containers. Even so, they may still safely use the present apparatus without any risk of error which is extremely advantageous in sanitary environments such as for example in operating rooms, and also in many other applications.

[0038] Efficient container management in hazardous waste disposal is achieved as personnel is helped to make the best decision concerning removal of the container from the apparatus such that efficiency and optimization in waste management is achieved.

[0039] A further advantage of the present apparatus

and method is related to operation safety. Disabling the scale in specific situations even the apparatus is in use results in risks being reduced such as for example those due to mechanical or electrostatic sparking or heating that could result in an ignition source leading to fire or explosion if the apparatus is placed in flammable environments such as those where gases, vapors, dusts, or fibers which are combustible, or flammable may be present. Radiation time, and also surface temperature are also reduced. In hospital and clinical laboratory environments, for example, different equipment is involved as well as highly flammable products and materials. For example, solvents and reagents such as xylene, formaldehyde, ethyl ether, sulfuric acid, ammonia and auramine are widely used in such environments, for example in anatomic pathology, high-resolution microscopy, endoscopy units, etc. The operation of the present apparatus in which the scale is disabled in specific situations reduces the risk of interfering with other surrounding equipment. This is extremely important, for example, in hospitals, clinics and laboratories where devices may be present such as vital signs monitors, electrocardiogram machines, defibrillators, electrosurgical units, artificial respirators, anesthesia machines, sterilizers, stretchers, and surgical tables requiring continuous power supply.

[0040] On the other hand, electrical consumption in the present apparatus is highly minimized thus reducing overall power consumption in that environment.

[0041] Furthermore, disabling the scale in specific situations also results in the operating life of the scale being increased. Waste is generated in different amounts in areas of hospitals, for example. Areas where less waste is generated results in the filling of a container requiring a longer period of time, in which case, the present apparatus will work less and will use less energy resulting in its useful life being advantageously extended.

BRIEF DESCRIPTION OF THE DRAWING

[0042] The present disclosure will be described in the following with reference to the appended drawing, in which figure 1 is a perspective view of the present apparatus for controlling hazardous waste.

DETAILED DESCRIPTION OF EXAMPLES

[0043] Referring to figure 1 the drawing, a non-limiting example of the present apparatus 100 for controlling the filling of hazardous waste within a container 110 is provided. The apparatus 100 in the example shown is for control and management of hazardous waste in a hospital. Many other applications are however possible.

[0044] In the example shown, the apparatus 100 includes a container 110 made of a rigid resistant material such as plastic. The container 110 has an opening through which waste can be placed therein. A top cover 120 is provided for temporarily closing the opening of the container 110. The top cover 120 in the example shown

is hinged on the container although other arrangements are possible.

[0045] A scale 130 is provided at the bottom of the apparatus 100. The scale 130 is configured as a weighing platform as shown in the drawing. The scale 130 is adapted for measuring the weight of the container 110 so that a total weight W_T of hazardous waste that is present within the container 110 can be obtained. The scale 130 is configured such to provide weight values in a variety of units, such as kilograms, grams, ounces, or pounds according to specific applications. The personnel may select a desired weight unit by pressing a weight mode button in a touch display 150 which will be described below. The scale 130 has a top surface 131 onto which the container 110 constantly sits thereon when in use, and a bottom surface 132. Caster wheels and/or legs 135 may be provided either in the bottom surface 132 of the scale 130 or under a base 162 of the apparatus 100 which will be described below. Transport is thus facilitated.

[0046] The present apparatus 100 further comprises control means 140, such as a Programmable Logic Controller (PLC) control system, configured for operating the scale 130 only during a determined period of time every time a hazardous waste is disposed within the container 110. The scale 130 thus exclusively operates only when waste is being disposed within the container 110. Thus, the scale 130 is disabled while no hazardous waste is being disposed within the container 110 and also when the total weight W_T of hazardous waste within the container 110 is equal to or greater than a predetermined maximum weight W_M . The predetermined maximum weight W_M may depend, for example, on the size of the container 110, the number of patients with which the apparatus 100 is associated, etc.

[0047] The control means 140 are configured to provide a number of indications through the above mentioned display 150 that is connected to the scale 130. Indications may be in a wide variety of different forms, such as light, text, sound, or symbol. Examples of indications are:

- a green light informing that the total weight W_T of hazardous waste within the container 110 is below a predetermined maximum weight W_M , for example, less than 15 Kg, which would correspond to a normal operation in which personnel is allowed to deposit waste inside the container 110;
- a yellow light informing that the total weight W_T of hazardous waste within the container 110 is 15-18 Kg, which would correspond to a condition of the present apparatus that the container is almost full;
- a red light, which may be a flashing light, informing that the total weight W_T of hazardous waste within the container 110 is equal to a predetermined maximum weight W_M , for example 18 Kg, which would correspond to a condition of the present apparatus that the container is full; and
- an audible warning or sound indication to be emitted

every time a hazardous waste is disposed within the container 110 when the total weight W_T of the hazardous waste within the container 110 has exceeded a predetermined maximum weight W_M , for example 18 Kg, which would correspond to a condition that the container must be removed from the apparatus for disposal.

[0048] Other types of indications and weight values are possible according to requirements.

[0049] In the situation when the total weight W_T of hazardous waste within the container 110 is equal to a predetermined maximum weight W_M , personnel could be prevented from depositing waste inside the container 110. For this purpose, locking means, not shown are provided for locking the cover 120 of the container 110 such that hazardous waste can not be placed into the container 110. With said locking means, once the cover 120 of the container 110 has been closed, it can not be reopened.

[0050] A support structure 160 is provided for supporting a container 110 and the scale 30. The support structure 160 comprises a vertical post 161 whose lower portion is attached to the above mentioned base 162. The base 162 has a top surface for receiving the scale 130 thereon and a bottom surface where the above mentioned caster wheels and/or legs 135 are provided for facilitating transport. The support structure 160 is configured for preventing the container 110 from turning. For this purpose, the support structure 160 includes a container holding part 166 comprising two parallel arms 167 joined together to the post 161. The two parallel arms 167 are separated from each other so that a container 110 can be placed between them. A carrying handle 165 is attached to the post 161 for facilitating transport in conjunction with said caster wheels and/or legs 135.

[0051] As stated above, a touch display 150 is provided. The touch display 150 is attached to an upper portion of the post 161 in the support structure 160. The touch display 150 is configured to display the total weight W_T of hazardous waste that is present within the container 110 when waste is being deposited and also for providing indications as described above as well as to provide indications.

[0052] The operation of the apparatus 100 is described in detail below. One or a number of apparatuses 100 are placed in different areas in a hospital, a clinic, a laboratory, etc. where generated hazardous waste is required to be collected for disposal. Initial settings are entered in each apparatus 100 corresponding to a number of predetermined indications according to a given value of weight of hazardous waste which is expected to be present within each container, the name of the center where the apparatus is to be installed, the place, such as for example, the floor where the apparatus is to be installed, the volume of the container 110 and type of waste to be deposited therein, for example biological or cytostatic waste, the date and time when the container 110 has been placed, etc. Data entered by the personnel

may be recorded in the control means.

[0053] Once the above mentioned settings have been entered, containers 110 are then placed onto the scale 130 of the respective apparatus 100. The presence of the container 110 may be automatically detected after which the scale 130 can be operated. Automatic detection of the presence of the container 110 may be carried out through detecting means, not shown in the drawings, which may be of the optical nature, such as for example an optical sensor, or the mechanical nature, such as a lever adapted to rotate when container 110 is placed thereon. The presence of the container 110 may be also determined by the personnel who enters a menu command through the display 150 of the apparatus 100 that a container has been already placed on the scale 130.

[0054] Once apparatuses 100 have been installed and ready, operation starts every time a hazardous waste is disposed within each container 110. When this occurs, that is, every time a hazardous waste is disposed within a container 110, a total weight W_T of hazardous waste within the container 110 is determined.

[0055] It is to be noted that the scale 130 is exclusively only in operation when hazardous waste is being disposed within the container 110. The scale 130 and, in some cases, also the display 150, is not in operation in any other case. Thus, a total weight W_T of hazardous waste within the container 110 may be displayed on the display 150 only when hazardous waste is being disposed within the container 110.

[0056] Every time a hazardous waste is disposed within a container 110, a total weight W_T of hazardous waste within said container 110 is compared with a predetermined maximum weight W_{nn} . An indication is provided when the total weight W_T of hazardous waste within the container 110 is equal to or more than said predetermined maximum weight W_M of hazardous waste.

[0057] When a container 110 is considered full of waste, the cover 120 is closed and locked and an indication is provided that said container 110 is ready for removal. In that situation when a container 110 is considered full of waste, the scale 130 is disabled by the control means and the display 150 is no longer allowed to show weight values. In that case, the display 150 could be only allowed to show another indication such as for example a red light when a total weight of hazardous waste within the container is equal to or greater than a predetermined maximum weight informing the personnel that it is not allowed to deposit waste inside the container.

[0058] Then, information regarding the total weight W_T of hazardous waste within the container 110 is sent, for example, to a computer or a mobile device through a suitable software or mobile application informing a company responsible for waste removal which container 110 is ready to be collected for disposal.

[0059] Once a container 110 is removed from the apparatus 100, it is then collected, and waste management continues until final treatment. Closed full containers 110 are placed in an intermediate warehouse waiting for a

company responsible for the management of hazardous waste, to take them for further treatment.

[0060] Although one example has been disclosed herein, other alternatives, modifications, uses and/or equivalents thereof are possible. For example, the control means 140 may be configured to identify each container 110 that is present in a given location. Furthermore, the apparatus 100 may also include GPS and/or tracking systems to provide information about an exact location and subsequent movements of the apparatus 100, enabling real-time tracking. Means for cooling the interior of the container could be also provided if required depending on the waste to be disposed within the container.

[0061] The scope of the present disclosure should not be limited by the particular example but should be determined only by a fair reading of the claims that follow. Reference signs related to drawings placed in parentheses in a claim are solely for attempting to increase the intelligibility of the claim and shall not be construed as limiting the scope of the claim.

Claims

1. Apparatus (100) for controlling the filling of hazardous waste within a container (110), the apparatus (100) comprising:

- a container (110) having at least one opening through which waste can be placed into the container (110) and a cover (120) for temporarily closing said opening;
- a scale (130) for measuring a total weight (W_T) of hazardous waste within the container (110); and
- control means (140) configured for:

- operating the scale (130) only during a determined period of time every time a hazardous waste is disposed within the container (110);
- disabling the scale (130) while no hazardous waste is being disposed within the container (110) or when the total weight (W_T) of hazardous waste within the container (110) is equal to or greater than a predetermined maximum weight (W_M); and
- providing an indication that the total weight (W_T) of hazardous waste within the container (110) exceeds a predetermined maximum weight (W_M).

2. The apparatus (100) of claim 1, wherein it further includes a display (150) to show real-time information of total weight (W_T) of hazardous waste within the container (110).

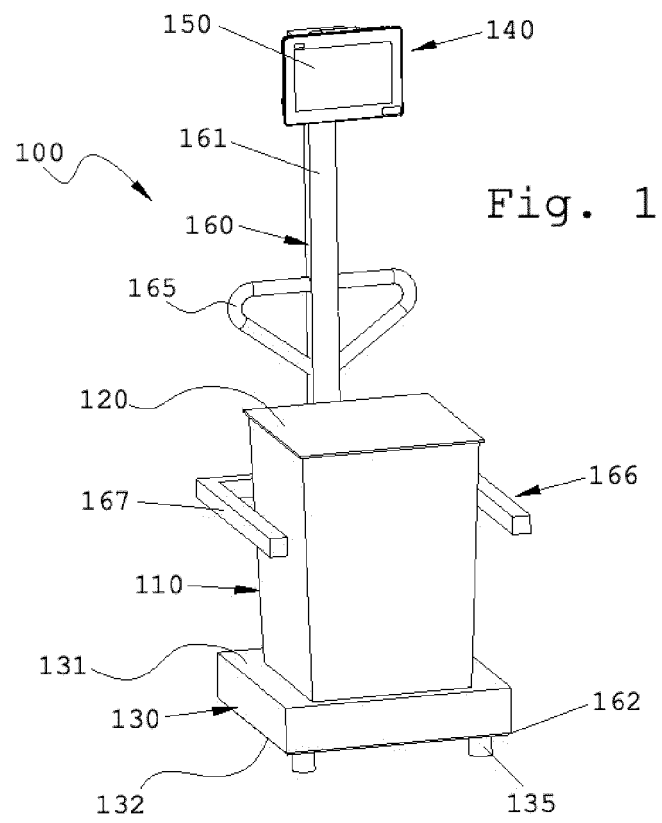
3. The apparatus (100) of claim 1, wherein it comprises

means for providing a sound indication.

4. The apparatus (100) of any preceding claims, wherein the control means (140) are configured for providing an indication that the total weight (W_T) of hazardous waste within the container (110) is below a predetermined maximum weight (W_M). 5
5. The apparatus (100) of any preceding claims, wherein the control means (140) is configured to provide an indication every time a hazardous waste is disposed within the container (110) when the total weight (W_T) of the hazardous waste within the container (110) has exceeded a predetermined maximum weight (W_M). 10
6. The apparatus (100) of any preceding claims, wherein it comprises a support structure (160) for supporting at least the container (110) and the scale (130). 20
7. The apparatus (100) of any preceding claims, wherein it comprises locking means for locking the cover (120) preventing hazardous waste from being placed into the container (110) when the total weight (W_T) of hazardous waste within the container (110) is equal to or greater than a predetermined maximum weight (W_M). 25
8. The apparatus (100) of any preceding claims, wherein it comprises detecting means for at least identifying the presence of a container (110) after which the scale (130) can be operated. 30
9. The apparatus (100) of claim 8, wherein the detecting means are of the optical or the mechanical nature. 35
10. The apparatus (100) of any preceding claims, wherein it further comprises means for transmitting data relating to at least a total weight (W_T) of hazardous waste within the container (110). 40
11. The apparatus (100) of any preceding claims, wherein it further comprises a bag to be fitted inside the container (110), the bag being adapted for receiving therein hazardous waste. 45
12. The apparatus (100) of any preceding claims, wherein it further comprises a sensor for detecting a volume of hazardous waste within the container (110). 50
13. The apparatus (100) of any preceding claims, wherein it further includes means for cooling the interior of the container (110). 55
14. A method for controlling the filling of hazardous waste within a container (110), the method comprising:

- determining, every time a hazardous waste is disposed within said container (110) of a apparatus (100) according to any of the preceding claims, a total weight (W_T) of hazardous waste within the container (110);
- comparing the total weight (W_T) of hazardous waste within the container (110) with a predetermined maximum weight (W_M); and
- providing an indication when the total weight (W_T) of hazardous waste within the container (110) is equal to or more than a predetermined maximum weight (W_M) of hazardous waste.

15. The method of claim 14, wherein it further comprises detecting the presence of the container (110) for enabling the scale (130) to be operated.





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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 101 088 691 B1 (LEE JU HYUNG [KR]; SUK JU HAN [KR]) 5 December 2011 (2011-12-05) * paragraphs [0033], [0045], [0046], [0048], [0049], [0064], [0068]; figures 3, 4, 7 *	1-15	INV. B65F1/06 B65F1/16
X	US 5 641 947 A (RIDDLE JR MICHAEL C [US]) 24 June 1997 (1997-06-24) * column 2, line 66 - column 3, line 44; figures 1-4 *	1-15	
X	CN 108 861 238 A (GOLDWAY CONSTRUCTION GROUP CO LTD; ELION RESOURCE GROUP) 23 November 2018 (2018-11-23) * paragraphs [0008], [0009], [0028], [0031]; figure 1 *	1-15	
X	DE 20 2016 100651 U1 (WÜRMSEHER PETER [DE]) 8 March 2016 (2016-03-08) * paragraph [0023] - paragraph [0028]; figures 1-3 *	1-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65F

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Place of search

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Date of completion of the search

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Examiner

Luepke, Erik

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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19-07-2023

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