WASTE AND/OR RECYCLABLES DISPOSAL SYSTEM, APPARATUS AND METHOD

FIELD OF INVENTION

The present invention relates to a waste and/or recyclables disposal system, apparatus and method of disposing waste and/or recyclables from a multi-storey building.

BACKGROUND OF INVENTION

In multi-storey buildings, refuse is often disposed from each floor of the building. The building is provided with a refuse conveyance system that includes a chute shaft. People throw their refuse into the chute shaft through hoppers or openings provided at each level of the building. The chute shaft usually extends from the top of the building to the bottom. The chute shaft opens into a refuse storage chamber at the base of the building. A refuse bin is positioned below the opening of the chute shaft, so that refuse from the chute shaft falls into the refuse bin.

An example in Figure 1 shows a side view of a known refuse conveyance system for a multi-storey building. Refuse 60 is disposed from various levels of a multi-storey building. (In the drawing, only two of the storeys are shown). The refuse is conveyed down through a chute shaft 200. The refuse falls into an empty-able refuse bin 10. The refuse bin is located in a refuse storage chamber 220. The refuse bin 10 is positioned below the chute shaft 200, so that the refuse can fall into the bin mostly by gravity.

Each level of the multi-storey building is provided with a hopper 210. Each hopper 210 is located adjacent the chute shaft 200. In use, people throw their refuse 60 through the hoppers 210 into the chute shaft 200.

In the known system of Figure 1, the refuse chamber is usually small in land area, or footprint, to minimise the area for non-residential use. Therefore, this small footprint therefore results in a small storage chamber 220, also limits the size of the refuse bin, and the eventual volume of refuse it can hold, before an overflow condition occurs.

This need to limit the floor area of the storage chamber 220 restricts how large the refuse bin 10 can be.

Since the size of the refuse bin determines the amount of refuse 60 that the bin 10 can collect from the chute shaft 200, the prior art system of Figure 1 suffers from a limitation that the refuse bin 10 tends to fill up rather quickly, especially when there is a high volume of refuse 60 disposed from the building. Smaller refuse bins fill up faster than larger bins. Thus, an overflow level may be reached faster than for a larger bin. In an extreme scenario, the volume of refuse may build up to such levels that it may reach the throw-in points or hoppers. This is unhygienic.

Thus, there is a conflict of needs: On one hand, the floor area or footprint area of the refuse chamber 220 must be minimised in order to avoid encroaching on valuable land space needed for other purposes in the building.

But on the other hand, minimising the floor area of the refuse chamber restricts the size of the refuse bin 10 that can be placed in the storage chamber 220.

This also leads to problems in the operation of disposal of the waste. The refuse bin 10 is emptied often by a waste management operator. If the bin fills more rapidly, the waste operator must visit the bin more often to empty the bin 10.

Another problem is that if the operator arrives to empty the bin 10 after it has overflowed, there is the added problem that some of the refuse will have spilled on the floor of the storage chamber 220, which will waste the operator's time in cleaning the area.

The problem is not fully addressed by the operator visiting the bin more frequently, because the opposite problem is that the operator arrives too soon before the bin is full. Since the operator has to handle many bins, the need to visit bins more frequently will decrease efficiency and lower productivity.

An object of the present invention is to overcome or ameliorate one or more of the problems in the prior art, or to provide an improved alternative.

DRAWINGS

In order that the invention might be more fully understood, embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a side view of a prior art refuse disposal system;

Figure 2 shows the side view of an embodiment of a waste and/or recyclables disposal system and device in which a moveable barrier is in an open position, so that refuse from the chute shaft falls into the refuse bin below;

Figure 3 shows the side view of the apparatus and system of Figure 2 when the moveable barrier is a closed position, such that refuse from the chute shaft is stored temporarily in the refuse storage compartment above, rather than falling into the bin below;

Figure 4A shows the flow sequence for an operation mode of the apparatus of Figure 2;

Figure 4B shows the flow sequence for a manual-override mode of the apparatus;

Figure 4C shows the flow sequence for an automatic operation mode of an embodiment of an apparatus that is provided with a discharge auger;

Figure 5 shows a side cross-sectional view of a discharge auger that clears blockages from an opening of the refuse storage compartment;

Figure 6 shows a plan view of the discharge auger of Figure 5; and

Figure 7 shows a side cross-sectional view of an embodiment of the apparatus, where the sides of the refuse storage compartment are telescopically expandable and contractible.

DESCRIPTION OF EMBODIMENTS

Referring to the drawings, Figure 2 shows an embodiment of a waste and/or recyclables disposal system and apparatus that is adapted to dispose of waste and/or recyclables from a multi-storey building.

In Figure 2, the waste and/or recyclables disposal system of the present embodiment includes a disposal apparatus 100 that is located in a refuse storage chamber 220.

The disposal apparatus 100 collects refuse 60 that has been disposed from various levels of the multi-storey building. (In the drawing, only two of the storeys are shown). The refuse is conveyed down through a chute shaft 200. The chute 200 runs from the top to the bottom of the building.

Each level of the multi-storey building is provided with a hopper 210. Each hopper 210 is located adjacent the chute shaft 200. In use, people throw their refuse 60 through the hopper 210 into the chute shaft 200.

Empty-able Waste Holder

The disposal system and apparatus 100 of the embodiment is provided with two locations where refuse can collect.

In the embodiment, the first location where refuse 60 can collect is in an empty-able waste holder in the form of bin 10. The refuse bin 10 is located in the refuse storage chamber 220. The refuse bin 10 is positioned below the chute shaft 200, so that the refuse 60 from the shaft 200 falls into the bin 10 by gravity.

Figures 2 and 3 should be studied together to understand the embodiment. In summary, Figure 2 shows the system and apparatus when the refuse bin 10 is not yet full, while Figure 3 shows the system when the refuse in the bin 10 has reached a predetermined level that requires the bin to be emptied before it reaches an overflow level.

In Figure 2, when the refuse in the bin 10 has not yet reached the predetermined level, the refuse 60 falls from the shaft 200 and collects in the bin 10.

When the refuse in the bin reaches the predetermined level, usually close to being completely full, it is necessary for the bin 10 to be emptied.

Temporary-waste-storage-means

If refuse 60 were to continue falling into the bin 10, exceeding the predetermined level, it is likely that the refuse will eventually spill out of the bin 10 onto the floor of the chamber 220. The embodiment of Figures 2 and 3 avoids this problem because the system and apparatus 100 is provided with temporary-waste-storage-means in the form of a refuse storage compartment 20.

The compartment 20 is adapted to temporarily receive refuse from the disposal chute 200 of the multi-storey building.

The compartment 20 can be seen in Figure 2, and also in Figure 3. In Figures 2 and 3, the region of the compartment 20 is seen to have a first end region 21, and generally a second end region 22. The first end region 21 of the compartment extends towards the chute shaft 200. The second end region 22 of the compartment extends towards the refuse bin 10. The second end region 22, at the lower part of the compartment 20, is defined by inclined surfaces 45.

In Figure 2 and 3, the inclined surfaces 45 of the compartment are upheld by strut columns 26. The struts or columns 26 rest on the floor surface of the storage chamber 220.

In other embodiments, the compartment 20 may be maintained in this position between the chute shaft 200 and the refuse bin 10 by any type of supporting mechanisms. For example, in another embodiment, the inclined surfaces 45 of the compartment can be connected to the flanged top end 21 of the ceiling of the chamber 220.

Alternatively, in a further embodiment, the inclined surfaces 45 of the compartment can be connected laterally to sidewalls of the chamber 220. In such an embodiment, arms that extend from both sides of the compartment 20 can be attached to the sidewall of the refuse storage chamber 220.

Thus, the invention is not limited to any particular type of support for the refuse storage compartment 20, provided the position of the compartment 20 is able to be maintained above the bin 10, in other words, between the chute shaft 200 and the refuse bin 10, as in Figures 2 and 3.

In the embodiments so far described, the temporary-waste-storage-means consists of external components that reside in, or are attached to the walls of the chamber 220. However, in further embodiments, the temporary-waste-storage-means can be constructed as an integral part of the building itself. For instance, in a modification, the lower surfaces 45 of the compartment can be built as part of the structure of the chamber 220.

Throughput Control

The compartment 20 is provided with throughput-means in the form of a moveable barrier 40.

The barrier 40 is controllable between an open state and a closed state. Figure 2 shows the barrier 40 in the open state, while Figure 3 shows the barrier in the closed state.

The barrier 40 includes at least one moveable gate 42 located at the lower or second end region 22 of the refuse storage compartment 20.

In the embodiment of Figures 2 and 3, the barrier includes two moveable gates 42. The barrier 40 opens and closes as a result of movement of the gates 42.

Figure 2 shows the gates 42 of the barrier 40 in the open state. Figure 3 shows the gates 42 in the closed state.

In Figure 2, when the barrier 40 is in the open state, refuse from the chute shaft 200 is initially deposited into the compartment 20, and then the refuse passes through the open barrier 40 into the bin 10 below.

However, in Figure 3, when the barrier 40 is in the closed state, refuse from the chute shaft 200 is temporarily held in the compartment 20, until the barrier reverts to its open

state of Figure 2. At that time, the refuse can then pass through the open barrier 40 into the bin 10 below.

In the embodiment of Figure 2, the opening 23 is approximately 700mm in diameter. This also happens to be the size of cross-section of the chute 200. The cross-sectional area of the compartment 20 is larger. These dimensions are given by example, and do not limit the invention.

Sensor

The waste and/or recyclables disposal system and apparatus includes sensor-means that monitors one or more conditions relating to the bin 10 and the refuse storage compartment 20.

In the embodiment, the sensor-means includes a level-sensor that monitors the level of refuse in the bin 10.

In the embodiment, the level-sensing means is in the form of a level sensor 30 which senses and determines the level of refuse 60 in the refuse bin 10.

The level sensor 30 is designed to sense whether the refuse in the bin 10 has reached a predetermined level. This predetermined level preferably is close to overflow level, but of course does not exceed the bin-overflow level.

When the sensor 30 identifies that refuse in the bin has reached the predetermined level, the sensor 30 sends a signal to activate or trigger the gate 42 so that it closes.

The gate 42 is controlled to open or close in response to an activation or a triggering mechanism. The gate 42 is activated or triggered in response to a signal from the level-sensor 30.

In another embodiment, the gate 42 is activated by a signal independent of the response of the level sensor 30. In this mode, the gate 42 is controlled to open or close by a manual button (not shown in the figures), such that an operator may choose to open or close the gate 42 according to his/her needs at the point in time. In this mode, the level-sensor 30 is bypassed. It is preferred that the manual button is located at a position

convenient for an operator to have easy access to, for example, by the side of the entrance to the refuse storage chamber 220.

The measurement of the pre-determined level can be altered, for instance by programming and re-programming in the case of a digital or electronic system. For instance, the predetermined level of refuse may be set at a level where the bin 10 is 90% full.

When the pre-determined level of refuse 60 is reached, the gate 42 is activated into its closed state, as in Figure 3.

After the gate 42 is closed, further refuse 60 that falls down the chute shaft 200 will be temporarily collected in the refuse storage compartment 20, and will not go through to the refuse bin 10, because of the closed gate 42. Therefore, the bin 10 never reaches an overflow condition because the gate 42 closes before the bin 10 can ever reach the full overflow level.

In operation, the fact that the refuse bin 10 of Figure 2 will never overflow, means that the operator avoids the problem of arriving too late to find that the bin has overflowed. It also means that the operator is better able to schedule visits to many bins, since the operator is not required to visit each bin in time before it overflows.

Since the compartment 20 can continue to collect refuse when the gate 42 is closed, even when the bin 10 is close to overflow, it also means that the amount of refuse 60 that may be collected within the refuse storage chamber 220 is effectively increased. In other words, the volume of the bin 10 is no longer the upper limit of how much refuse can be collected by the waste and/or recyclables disposal system.

Following a period of time when gate 42 has been closed, such that a large volume of refuse has accumulated in the compartment 20, that refuse accumulation can be discharged into the bin 10 after the bin has been emptied. When the gate 42 is opened to release the accumulation in the compartment 20, the level sensor 30 monitors the amount of refuse coming into the bin, and will cause the gate 42 to close again if the amount of refuse in the bin reaches the predetermined level again. This can be monitored automatically by a control system, or can be monitored manually by an operator.

The sensor 30 is able to be located at a number of physical locations in the system, since the sensors will be able to function when located at any of a number of locations. In some embodiments, the sensor-means can be located on the bin, or even on the walls of the chamber 220. The sensor-means may also be located proximate or on the under-surface of the gate 42.

In the embodiment shown in Figures 2 and 3, the sensor 30 is in the form of a removable sensor, and removably situated on the interior wall of the refuse bin, so that when an operator removes the bin for disposal of the refuse therein, the removable sensor 30 may be removed and attached to the replacement bin positioned below the chute shaft 200. The sensor may also be irremovably situated on the interior wall of the refuse bin 10. In a further embodiment, the sensor 30 is located independent of the refuse bin 10. In this embodiment, not all bins have to be retrofit with the sensor 30.

In the embodiment, the sensor consists of known electronic components, such as those used in security applications to detect the presence of people in a building.

Position Sensor

In another embodiment, the sensor-means of the system and apparatus 100 further includes a position-sensing-means in the form of a position sensor 400.

The position sensor 400 detects whether or not the bin 10 is present and in position below the chute shaft 200 and refuse storage compartment 20. This is to verify and ensure that refuse coming through the gate 42 will fall into the bin, rather than on the floor of the refuse storage chamber 220.

The position sensor 400 communicates with the gate 42, so that when the bin 10 is not detected, the gate 42 will close, or remain in the closed position. In this way, refuse will not fall onto the floor of the storage chamber 220 when the bin 10 is not there, or not in position to receive refuse. Instead, the refuse will be collected in the compartment 20 while the bin 10 is not in the chamber 220 or not in position to receive refuse 60. This could happen when the bin is taken away temporarily to be emptied or moved out of position or alignment with the opening of the compartment 20.

In another embodiment, the position sensor 400 and the level sensor 30 are able to communicate with the gate 42. The flow sequence of an example of this communication is in Figure 4A. The position sensor 400 detects if the refuse bin 10 is under the compartment 20. The level sensor 30 determines if the pre-determined level of refuse 60 in bin 10 has been reached.

The location sensor 400 may be located at any location of convenience, for example, on the inclined surfaces 45 of the refuse storage compartment 20. In the embodiment of figures 2 and 3, the position sensor 400 is located on the sidewalls of the refuse storage chamber 220.

Compartment sensor

In a further embodiment, the sensor-means of the system and apparatus 100 further includes a second sensor in the form of a second level-sensor, that monitors the level of refuse in the refuse storage compartment 20.

In this embodiment, the second level-sensing means is in the form of a compartment level sensor 31, which senses and determines the level of refuse 60 in the refuse storage compartment 20.

The compartment level sensor 31 is designed to sense whether the refuse in the storage compartment 20 has reached a pre-determined level. This pre-determined level is preferably close to the first end region 21 of the compartment 20. When this pre-determined level is reached, the compartment level sensor 31 will indicate a "compartment full" situation.

The compartment level sensor 31 includes a communication means adapted to transmit a signal containing information of the compartment and sounds an alert to the waste management operator when the "compartment full" situation is reached.

This alert may be any kind of a visual or audio or a combination of both a visual and an audio signal, just so long as it is able to alert the waste management operator of the condition of the compartment 20. Since the compartment 20 will only indicate a "compartment full" situation when the gate 42 is closed, the scenarios when the compartment indicates the full condition occurs either when the level sensor 30 senses

and continues to sense that the bin is full, or when the position sensor 400 does not detect or continues to not detect the presence of a bin in position below the chute shaft 200.

Therefore, the compartment level sensor 31 serves as an alert when the bin is full and not removed, or when the bin has been removed or not placed in position below the storage compartment 20.

Function

In a first scenario in Figure 4A, when the position sensor 400 detects that the refuse bin 10 is present, and when the level detector 30 determines that the pre-determined level has been reached, these two factors cause the gate 42 to close, or remain closed.

The sensor-means of the system includes communication means adapted to transmit a signal containing information of the condition of the bin. Hence, concurrently, an external indicator may be activated that alerts a waste management operator that the refuse bin 10 is ready to be emptied. Similarly, an external indicator may be activated to alert the waste management operator that the compartment 20 is full. For instance, there may be an electronic connection to an instrument panel at the office of the waste management operator that indicates which bins are ready to be emptied or which compartments 20 are full. The state of the bin would indicate "bin full", and the state of the compartment 20 would indicate "compartment full".

The communication means may consist of known control software and hardware used for transmitting information about the system to external control panels in an operations centre located a distance away from the system.

In a second scenario in Figure 4A, when the position sensor 400 detects that the refuse bin 10 is present under the gate 42, and when the level sensor 30 determines that the pre-determined level in the bin 10 has not been reached, these two conditions cause the gate 42 to open, or remain open.

In a third scenario in Figure 4A, when the position sensor 400 determines that the refuse bin 10 is not present, the gate 42 will close, or remain closed. Concurrently, an external indicator can be activated to alert the waste management operator that the refuse bin 10 is not present. This may be in the form of a "no bin" condition that appears on their

instrument panel. Similarly, a different visual indicator will signify the "compartment full" condition.

When the gate 42 is closed, the compartment level sensor determines the level of refuse in the compartment. In the present embodiment, the compartment level sensor 31 is triggered to operate only when the gate 42 is closed, or remains closed.

When the compartment level sensor 31 determines the level of refuse within the compartment to be full, an external indicator can be activated to alert the waste management operator to clear the refuse from the compartment 20.

When the compartment level sensor 31 determines the level of refuse within the compartment to be below the pre-determined level, the compartment level sensor 31 will continue to detect the level as long as the gate 42 is closed or remain closed.

The external indicator may be in the form of a visual indicator, for instance, on an instrument panel. To differentiate between the "bin full", the "no bin" condition and the "compartment full" conditions, these different conditions may be visually distinguished by different using different coloured lights for each condition.

In another embodiment, the external indicator given to the waste operator may be in the form of an audio alarm. To differentiate between the "bin full", the "no bin" condition and the "compartment full" conditions, these conditions may be audibly distinguished by different audio signals for each condition.

In a further embodiment, the external indicator may be transmitted by wireless transmission. In this embodiment, when any of the three conditions are indicated, a paged-message with pre-determined words may be sent to a pre-registered pager number used by the waste management operator.

Modes of Operation

In another embodiment, the waste and/or recyclables disposal system and apparatus has two modes of operation: firstly, an operations mode, and secondly, a manual override mode.

In use, the apparatus 100 is provided with a control panel that has an option to activate either the operation mode or the manual override mode.

In the operation mode, the flow sequence is as described above in relation to Figure 4A.

Figure 4B shows a manual override mode where the operator has the choice of how the system should operate. An option is given to choose between an open-gate and a close-gate mode. When the gate-open option of the manual override mode is chosen, the gate 42 will open, regardless of the information from the level sensor 30 and the position sensor 400. When the gate-close option of the manual override mode is chosen, the gate 42 will close, regardless of the information from the level sensor 30 and the position sensor 400. Therefore, in the manual override mode, the level sensor 30 and the position sensor 400 , together with the activation means, is overridden or by-passed.

In another embodiment, when the manual override mode is chosen, the level sensor and the position sensor are deactivated. Once the operation mode is chosen, the level sensor and the position sensor are re-activated.

The operation mode and the maintenance mode may be activated by way of push buttons. Preferably, the control panel is not easily accessible, so that only authorized personnel with the relevant access, with keys or electronic pin codes, can access the controls.

Compartment Details

In the embodiment of Figures 2 and 3, internal surfaces of the compartment 21 are tapered towards the second end region 22. This enables refuse, which is conveyed through the chute shaft 200, to slide down the inclined surface of the compartment and to be directed by gravity through the opening 23 of the second end region.
In other embodiments, rather than tapered or inclined surfaces, there can be curved or rounded surfaces, provided that the shape and configuration of the surface facilitates the movement of refuse towards the opening 23.

In a further embodiment in Figure 7, the compartment 20 is provided with extendible sidewall surfaces that increase or decrease the internal volume of the compartment. In Figure 6, extendible sidewall surfaces are telescopic, such that the walls may be

extended or contracted to modify the height of the compartment 20. This is useful when the same apparatus has to be adapted for use in different buildings that have storage chamber 220 of different internal ceiling heights.

In Figure 7, the compartment 20 is sectioned. There is a top section 24 that extends upwards towards the chute shaft 200. There is also a bottom section 25 that is dimensioned to receive the top section 24 within the bottom section like a sleeve.

Preferably, the top section 24 is received inside the bottom section 25, rather than vice versa, so that when liquid refuse is thrown into the chute shaft 200, the liquid will not leak out of the refuse storage compartment 20 through the sections.

In Figure 7, the top section 24 of the extendible sidewall surfaces is moveable relative to the bottom section 25, in a telescopically expandable and contractible manner.

To maintain a particular adjusted height of the compartment 20, the sides of either the top section 24 or the bottom section 25 are provided with fastening means. These fasteners can be bolts and screws 27, or any other type of fastening means that maintain the relative position of the top section 24 and the bottom section 25.

Materials

The compartment 20 is preferably made of a non-corrosive, fireproof material that is preferably resilient, for example mild steel. This material is easy to fabricate, and hence advantageous for manufacturing purposes.

The compartment, however, can also be made of strong polymer materials, or other suitable construction materials.

Sweeper

To ensure that refuse 60 will leave the compartment 20 through the opening 23 when the gate 42 is open, the compartment includes a discharging means.

In the embodiment, the discharging means is designed to have a sweeping motion, and is in the form of a discharge auger 50, as in Figures 1, 2, 5 and 6. The discharge auger has an edge that sweeps refuse off the opening of the compartment 20.

In Figure 5, the discharge auger 50 is a curved strip of material 51. The auger is attached to a motorized turntable ring 52. The motorized turntable ring 52 allows the curved strip of material 51 to rotate, at one end, along the circumference of the opening 23, and the other end, at the interior of the compartment 20. Figure 6 shows a plan view of the discharge auger 50 of Figure 5.

This movement of the auger sweeps the sides of the compartment 20 to prevent blockage of the opening 23. It also ensures that refuse 60, will not be stuck around edges of the compartment 20, which could otherwise lead to blockage of the narrow opening. This may occur when multiple refuse is discharged through the chute 200 at the same time.

The motorized turntable ring 52 is preferably positioned around the circumference of the opening 23. The shape of the ring 52 means that the opening of the gate 42 is unobstructed, so that refuse 60 may still pass through when the gate 42 is in the open state.

The combination of the tapering of the surfaces of the compartment 20, together with the action of the discharge auger 50, both minimise the likelihood of refuse 60 being left on the internal surfaces of the compartment 20, which could otherwise lead to blockage of the opening 23.

In the embodiment, the sweeping motion is a continuous rotational motion, however, in other embodiments, the sweeping motion can be intermittent, and can change directions, either smoothly or intermittently. The movement of the discharge auger can be regular or irregular. In other words, the sweeper means is not limited to a particular type or mode of motion, so long as it achieves the result of discharging or removing refuse that may be stuck at the opening 23.

The discharge auger 50 may be activated by the operator on demand, for example, only when there is blockage of the opening 23.

Alternatively, it may be activated automatically as part of a flow sequence during the operation mode to pro-actively prevent blockage, as in Figure 4C.

In a further modification, the discharge auger 50 may be activated by a timing mechanism, so that the discharge auger 50 rotates after a pre-determined time interval. Preferably, the discharge auger will rotate in a timed interval only when the gate 42 is open, since the intention is to discharge refuse out of the gate.

In the operation mode, the position sensor 400 tests whether the bin 10 is below the compartment 20, and the level sensor 30 tests if the pre-determined level of refuse has been reached in the bin 10. If these two tests are positive, then the discharge auger 50 is activated for at least one revolution of the turntable 52, to remove refuse 60 that may be stuck on the interior sides of the compartment 20.

Preferably the pre-determined level of the bin is not 100% of its volume, so that there is at least some headroom for receiving small amounts of refuse that comes when the discharge auger 50 sweeps the sides of the compartment.

In other embodiments, the gate 42 and the discharge auger 50 can be operated independently of each other, at the discretion of the operator.

In other embodiments, the discharging means can be, for instance, a spade-like component that moves up and down the inclined surface of the compartment 20, without a rotational motion of the earlier embodiment.

Moveable Barrier Details

The moveable barrier 40 includes at least one gate 42. In the embodiment of Figures 2 and 3, the barrier 40 has two gates. Other modifications can have three or more gates components.

Movement of the gates 42 is powered by at least one driving means in the form of a motor, not shown in the figures. The motor may be of any kind of power driven means, for example, electric, pneumatic or hydraulic. The gate may also be operated manually by hand.

In Figure 2, when the gates 42 are open, the two sides of the gate 42 move away from each other on the same plane. The gates are guided on a railing or support structure.

In Figure 3, when the gates close, the two sides of the gates 42 move towards each other to meet in the centre.

However, in other embodiments, the barrier 40 may consist of a single gate 42 that slides open and close.

Alternatively, the gate may be pivotally connected to a side of the compartment 20 such that the gate swings open and close.

The moveable barrier 40 may be activated by one or more mechanisms, such as electronic, digital, or mechanical activation.

In the embodiments, the apparatus and system is provided with one temporary-waste-storage-means, in the form of the single compartment 20, however, other modifications include embodiments where the temporary-waste-storage-means comprises a plurality of compartments, each having its own gate that closes when the region beneath it becomes full.

The term 'waste' is not intended to be limited to merely refuse, or domestic refuse, and may include other material including recyclables.

The embodiments have been advanced by way of example only, and modifications are possible within the scope of the invention as defined by the appended claims.

CLAIMS:

1. A waste and/or recyclables disposal system adapted to dispose of waste and/or recyclables from a multi-storey building, the system including:

temporary-waste-storage-means adapted to receive waste and/or recyclables from a disposal chute of a multi-storey building, the temporary-waste-storage-means provided with throughput-means operable between an open state and a closed state,

an empty-able waste holder adapted to receive waste and/or recyclables from the temporary-waste-storage-means,

wherein the waste and/or recyclables from the multi-storey building that is received in the temporary-waste-storage-means is able to pass through the throughput-means into the waste holder when the throughput-means is in the open state, and

wherein the throughput-means is adapted to be in the closed state when the waste and/or recyclables in the waste holder reaches a predetermined level below overflow level of the waste holder.

2. A system of claim 1 wherein the throughput-means is adapted to be in the closed state when the waste and/or recyclables in the waste holder reaches the predetermined level,

such that the waste holder avoids reaching the overflow level and is able to be emptied without reaching the overflow level,

and such that the waste and/or recyclables from multi-storey building is able to continue to collect in the temporary-waste-storage-means while the throughput-means is in the closed state.

3. A system of claim 1 or 2 wherein the system includes sensor-means that monitors one or more conditions relating to the waste holder.

4. A system of claim 3 wherein the sensor-means includes a level sensing means adapted to sense when the waste and/or recyclables in the waste holder reaches the predetermined level.

5. A system of claim 3 wherein the sensor-means includes a position sensing means adapted to sense whether the waste holder is present under the throughput-means.

6. A system of claim 1 wherein the system further includes a second sensor-means to monitor a condition of the temporary waste storage means.

7. A system of any one of claims 1 and 6 wherein the second sensor means includes a level sensing means adapted to sense when the waste and/or recyclables in the temporary waste storage means reaches a pre-determined level.

8. A system of any one of claims 3 to 7 wherein the sensor-means includes communication means adapted to transmit a signal containing information of the condition being monitored by the sensor-means.

9. A system of any one of the preceding claims wherein the temporary-waste-storage-means has internal surfaces that are inclined and tapered towards the throughput means.

10. A system of any one of the preceding claims wherein the temporary-waste-storage-means is provided with discharging means that dischargees waste and or recyclables off the opening of the temporary-waste-storage-means.

11. A system of claim 10 wherein the discharging means is in the form of a rotatable discharge auger that sweeps the opening of the temporary-waste-storage-means.

12. A system of any one of the preceding claims wherein the temporary-waste-storage-means is provided with extendible sidewall surfaces that are operable to increase or decrease the internal volume of the temporary-waste-storage-means.

13. A system of claim 12 wherein the extendible side wall surfaces are telescopically expandable and contractible.

14. A system of any one of the preceding claims wherein the throughput-means includes an opening through which the waste and/or recyclables passes from the temporary-waste-storage-means into the waste holder.

15. A method of disposing of waste and/or recyclables from a multi-storey building, including:

depositing waste and/or recyclables from the multi-storey building down a disposal chute into a temporary-waste-storage-means that is provided with throughput-means operable between an open state and a closed state such that the waste and/or recyclables passes from the temporary-waste-storage-means through the throughput-means into an empty-able waste holder therebelow when the throughput-means is in the open state, and

closing the throughput-means when the waste and/or recyclables in the waste holder reaches a predetermined level below overflow level of the waste holder.

16. A method of claim 15 including the step of opening the throughput-means when the waste and/or recyclables in the waste holder is below the predetermined level.

17. A method of claim 15 or 16 including the step of closing the throughput-means when the waste holder is not positioned beneath the below the throughput-means.

18. A waste and/or recyclables disposal apparatus adapted to dispose of waste and/or recyclables from a multi-storey building, including:

temporary-waste-storage-means adapted to receive waste and/or recyclables from a disposal chute of a multi-storey building, the temporary-waste-storage-means provided with throughput-means operable between an open state and a closed state,

such that the waste and/or recyclables from the multi-storey building that is received in the temporary-waste-storage-means is able to pass through the throughput-means into an empty-able waste holder when the throughput-means is in the open state, and

wherein the throughput-means is adapted to be in the closed state when the waste and/or recyclables in the waste holder reaches a predetermined level below overflow level of the waste holder.

19. An apparatus of claim 18 wherein the throughput-means is adapted to be in the closed state when the waste holder is not present to receive waste and/or recyclables from the throughput-means.

20. An apparatus of either claims 18 or 19 wherein the throughput-means is adapted to be in the closed state when the waste and/or recyclables in the waste holder reaches the predetermined level,

such that the waste holder avoids reaching the overflow level and is able to be emptied without reaching the overflow level,

and such that the waste and/or recyclables from multi-storey building is able to continue to collect in the temporary-waste-storage-means while the throughput-means is in the closed state.

21. An apparatus of any one of claims 18 to 20 wherein the apparatus includes sensor-means that monitors one or more conditions relating to the waste holder.

22. An apparatus of claim 21 wherein the sensor-means includes a level sensing means adapted to sense when the waste and/or recyclables in the waste holder reaches the predetermined level.

23. An apparatus of claim 21 wherein the sensor-means includes a position sensing means adapted to sense whether the waste holder is present under the throughput-means.

24. An apparatus of claim 21 wherein the system further includes a second sensor-means to monitor a condition of the temporary waste storage means.

25. An apparatus of any one of claims 21 and 24 wherein the second sensor means includes a level sensing means adapted to sense when the waste and/or recyclables in the temporary waste storage means reaches a pre-determined level.

26. An apparatus of any one of claims 21 to 25 wherein the sensor-means includes communication means adapted to transmit a signal containing information of the condition being monitored by the sensor-means.

27. An apparatus of any one of claims 18 to 27 wherein the temporary-waste-storage-means has internal surfaces that are inclined and tapered towards the throughput means.

28. An apparatus of any one of claims 18 to 27 wherein the temporary-waste-storage-means is provided with discharging means that dischargees waste and/or recyclables off the opening of the temporary-waste-storage-means.

29. An apparatus of claim 28 wherein the discharging means is in the form of a rotatable discharge auger that sweeps the opening of the temporary-waste-storage-means.

30. An apparatus of any one of claims 18 to 29 wherein the temporary-waste-storage-means is provided with extendible sidewall surfaces that are operable to increase or decrease the internal volume of the temporary-waste-storage-means.

31. An apparatus of any one of claims 18 to 30 wherein the extendible sidewall surfaces are telescopically expandable and contractible.

32. An apparatus of any one of claims 18 to 31 wherein the throughput-means includes an opening through which the waste and/or recyclables passes from the temporary-waste-storage-means into the waste holder.

33. A waste and/or recyclables disposal system adapted to dispose of waste and/or recyclables from a multi-storey building, the system including:

temporary-waste-storage-means adapted to receive waste and/or recyclables from a disposal chute of a multi-storey building, the temporary-waste-storage-means provided with throughput-means operable between an open state and a closed state,

an empty-able waste holder adapted to receive waste and/or recyclables from the temporary-waste-storage-means,

wherein the waste and/or recyclables from the multi-storey building that is received in the temporary-waste-storage-means is able to pass through the throughput-means into the waste holder when the throughput-means is in the open state, and

wherein the throughput-means is adapted to be in the closed state when the waste holder is not in position or in location to receive waste and/or recyclables from the throughput-means.

34. A method of disposing of waste and/or recyclables from a multi-storey building, including:

depositing waste and/or recyclables from the multi-storey building down a disposal chute into a temporary-waste-storage-means that is provided with throughput-means operable between an open state and a closed state such that the waste and/or recyclables passes from the temporary-waste-storage-means through the throughput-

means into an empty-able waste holder therebelow when the throughput-means is in the open state, and

closing the throughput-means when the waste holder is not in position or in location to receive waste and/or recyclables from the throughput-means.

35. A waste and/or recyclables disposal apparatus adapted to dispose of waste and/or recyclables from a multi-storey building, including:

temporary-waste-storage-means adapted to receive waste and/or recyclables from a disposal chute of a multi-storey building, the temporary-waste-storage-means provided with throughput-means operable between an open state and a closed state,

such that the waste and/or recyclables from the multi-storey building that is received in the temporary-waste-storage-means is able to pass through the throughput-means into an empty-able waste holder when the throughput-means is in the open state, and

wherein the throughput-means is adapted to be in the closed state when the waste holder is not in position or in location to receive waste and/or recyclables from the throughput-means.