

REFUSE CONVEYOR SYSTEM

This invention relates to refuse conveyor systems e.g. for medium- or high-rise buildings such as multiple dwellings.

Previously, it has been conventional for residents of a multiple dwelling house or apartment block to put their daily refuse into plastic bags, buckets or the like, these bags or buckets being taken by each resident from their room to an established refuse accumulation area or site on the lowest or ground floor. For example, a resident picks up one or more plastic bags full of refuse and gets in a lift, or goes down the stairs on foot, to dump the bags at the established area on a predetermined refuse collection day.

Alternatively, a "trash chute" system is known. This has a vertically extending hole defined by surrounding side walls, forming a trash chute extending vertically through a building. At respective floors, openings are provided throughout the side walls at which residents can throw in their refuse.

When using a trash chute, residents first put their refuse into a container e.g. plastic bag, plastic or metal bucket or the like, bring this bag or container to the nearest trash chute opening and throw it in. The refuse remains contained in the bag, or is thrown out of

a bucket. It falls to the bottom of the chute at the lowest floor and accumulates there. The accumulated refuse is removed from the bottom of the chute at predetermined intervals e.g. once a day or twice a week. The conventional refuse transport methods as described above have various problems. In the first case, carrying the refuse to the accumulation site on foot is time consuming for residents. Also, unpleasant smell from the refuse escapes into the air on the way from each home to the accumulation site. Furthermore, the residents are compelled to keep their refuse in the room in order to avoid dumping it in a public space such as the accumulation site on any day other than the specified collection day(s). Therefore the comfort and hygiene of the home is spoiled by unpleasant smells from the refuse.

In the trash chute system, the refuse tends to adhere to the inner walls of the chute and give off a bad smell.

We believe it would be desirable to provide a novel refuse conveyor system which would be independent of the passenger lift and which could convey refuse containers between the floors and a refuse accumulation site with a reciprocating conveyance.

It would also be desirable for residents to be able to get rid of refuse from their floor into a closed container, to help hygiene.

In one aspect, the present invention provides a refuse conveyor system for a multi-floor building wherein refuse containers are positioned in respective refuse compartments on respective various floors of the building, and the refuse compartments have openings into a common shaft extending from floor to floor, the refuse containers being selectively collectable by a transporting lift which can run up and down the shaft under the control of a transport control system, whereby a said refuse container collected from its compartment is lowered by the transporting lift to a ground station where a conveyor transfers its contents into a common refuse holder, and the emptied refuse container is returned by the transporting lift.

In another aspect, the invention provides a multi-floor building having a refuse conveyor system comprising a vertical shaft defined by walls and extending from floor to floor of the building;

a transporting lift, and means for moving the transporting lift up and down the vertical shaft;

refuse compartments on respective floors of the building adjacent the shaft, and having access thereto through respective openings in a wall thereof;

refuse containers in said refuse compartments for storing and conveying refuse, the refuse containers having lids whereby they may be open or closed;

a weight sensor for checking how full the refuse containers are;

a transport control system for initiating collection of a refuse container from its refuse compartment, through the opening thereof, by the transporting lift and moving the transporting lift down the shaft to a ground station; and

8 a conveyor which is operable, under the control of the transport control system, to transfer the contents of the refuse container from the ground station to a ground-level refuse storage tank.

In a further aspect, the invention provides a method of conveying and collecting refuse in multi-floor buildings, using a refuse conveyor system as described.

Various preferred and optional features are set out in the sub-claims.

8 By this means, it becomes possible for residents of a building to discharge and transport refuse easily and hygienically, so they can keep their rooms clean because the refuse can be kept in refuse containers separate from the room although on the same floor. They can get rid of the refuse irrespective of whether it is the predetermined date for collection thereof.

An embodiment is described by way of example with reference to the drawings in which:

Figure 1 is an elevational side sectional view of a

portion of a building equipped with a refuse conveyor system;

Figure 2 is an elevational side view of a refuse container to be installed in a refuse conveyor system;

Figure 3 is a perspective view of a base on which the refuse container can stand, and

Figure 4 is a vertical section through the box of a transporting lift for transporting the refuse container.

The embodiments are now described in some detail. Identical reference numbers refer to similar members or elements.

In Fig. 1, the symbol M indicates a medium- or high-rise building such as a multiple dwelling house or the like. The building M has a vertical shaft 1 or cavity extending up through the first floor to the top floor and in which an elevator box 2 is movable up and down by a lift which is described later. The shaft 1 is surrounded by side walls 3 at each of the floors. One of the walls (indicated 3') has a generally square opening 3a at each floor. Except for the ground floor, each floor has a compartment 4. The compartments 4 are connected to the shaft 1, in that one side of the compartment 4 is open to the opening 3a into the shaft. Usually, refuse containers 5 occupy the inside of the compartments 4. The compartments 4 have top openings 6 through which refuse can be thrown into the refuse containers 5.

At the ground floor, the vertical shaft 1 has an exit 7 where a refuse container 5 full of refuse can be unloaded from the elevator box 2.

As seen in Fig. 2, each refuse container is a cylindrical box 5a opening upwardly (like a bucket), and a lid 5b movably hinged at a hinge 5c. The refuse container 5 sits on a base 8 so that the hinge 5c is towards the vertical shaft 1. The hinged lid 5b serves to close the opening of the cylindrical box 5a. It has sufficient weight to hold the opening tightly closed.

As seen in Fig. 3, the base 8 of the compartment is in the form of a hollow box. One side thereof is open, and the base 8 is placed in the compartment 4 so that the open side or end faces the opening 3a of the shaft wall 3'. The base 8 has cut out portions or slots 8a in its upper side. These slots 8a make it possible for the prongs of a fork 9, comprised in the elevator box 2 and actuated by appropriate drive means, to pass from within the cavity of the base 8 through to above the top of the base 8. This enables a refuse container 5 on the base 8 to be lifted by the fork 9 and transported thereby between the elevator box 2 and the compartment 4, in either direction by appropriate movement of the fork 9. Appropriate drive means e.g. hydraulic means, are provided for moving the fork 9 to and fro and/or up and down. The container 5 moves with the fork 9.

The base 8 also has a weight sensor 10 attached to its inside, to detect whether or not the container 5 is full of refuse. That is, when the refuse container 5 is sufficiently full of refuse to reach a predetermined weight, the weight sensor 10 sends a signal to a transport control system 11, located generally at the top of the shaft 1. This operates a winding mechanism 12 which can move the elevator box 2 up and down the vertical shaft 1 in order to operate the conveyor system.

The elevator box 2, having an opening, transports the refuse container 5 by moving up or down the vertical shaft 1 in which it is installed. The shaft opening 3a serves as a loading or unloading port for the refuse container 5 on the base 8 in the compartment 4.

At the ground floor, a conveyor 13 is installed in front of the exit 7 of the vertical shaft 1. The conveyor 13 has a conveyor belt 13a which conveys the refuse container 5 from the exit 7 to a refuse tank T.

The operation of these installations is controlled by the transport control system 11.

Operation of the transport control system 11 is started by the signal from the weight sensor 10 belonging

to a compartment 4 at a certain floor. The transport control system 11 operates the winding mechanism 12 to move the elevator box 2 up or down.

The winding mechanism 12 comprises a drive means, such as a winch 12a installed at the top of the building M, and a wire rope 12b on which hangs the elevator box 2. Reciprocating movement of the elevator box 2 corresponds to winding or unwinding of the wire rope 12b by the winch 12a, and this is controlled by the transport control system 11. The elevator box moves up or down to the location where the signal was generated by the weight sensor 10.

The refuse container 5 full of refuse is then loaded into the elevator box 2 by the fork 9, which is usually housed in the bottom of the elevator box 2 with its longitudinal axis directed towards the opening 3a. Specifically, the fork 9 moves forward into the compartment 4 along that longitudinal direction, and is inserted into the cavity of the base 8 in the compartment 4. The fork 9 then moves up slightly, through the cutaway portion 8a, to lift the refuse container 5. After lifting, the fork 9 moves back into the elevator box 2 and down slightly to deposit the refuse container 5 in the elevator box 2. The elevator box 2, loaded with the refuse container 5, then moves down along the vertical shaft 1 to the ground floor of the building.

To return the refuse container 5, to the compartment 4, the steps described above are performed in reverse order.

After the elevator box 2 loaded with the refuse container 5 is brought to the ground floor location by the lift mechanism 12, the refuse container 5 is unloaded by the fork 9. That is, the fork 9 lifts the refuse container 5 and moves it from the exit 7 of the vertical shaft 1 to a conveyer 13 having a conveyor belt 13a having means (not shown) for securing the refuse container 5. Last, the refuse container 5 is set on the conveyer 13 by the fork 9 and is fixed on the belt 13a. After fixing, the conveyor belt 13a moves the refuse container 5 fixed thereto up and over the refuse tank T, until the opening of the refuse container 5 opposes the opening of a trash shoot T'. Movement of the conveyor belt 13a is interrupted to throw refuse into the trash shoot T' and thence into the refuse tank T.

The refuse accumulated in the refuse tank T is moved on to a refuse cart C by screw conveyors S.

After emptying the refuse container 5, the conveyor belt 13a moves in the reverse direction and back onto the fork 9. The fork 9, carrying the empty refuse container 5, moves back into the elevator box 2 to load the empty container. The elevator box 2 then moves up to the compartment 4 in which the empty refuse container 5

belongs, and the empty container 5 is installed on the base 8 thereof by the fork 9.

It should be noted that, in the system described, it is not necessary for residents to go from their homes to the refuse accumulation site. Because the refuse conveyor system transports refuse from each floor to the accumulation site automatically it is only necessary for each resident to put their refuse in the refuse container on their floor. Hygienic transportation of the refuse is also possible. Because the refuse conveyor system uses refuse containers having hinged lids, and these close the openings of the containers tightly, it is possible to avoid bad smells which might otherwise be generated by dropped or adhering refuse.

It is also possible to keep the refuse separate from the rooms, whether or not it is the refuse collection day, because each resident need only put the refuse into the refuse container and close it using the hinged lid.

CLAIMS:

1. A refuse conveyor system for a multi-floor building wherein refuse containers are positioned in respective refuse compartments on respective various floors of the building, and the refuse compartments have openings into a common shaft extending from floor to floor, the refuse containers being selectively collectable by a transporting lift which can run up and down the shaft under the control of a transport control system, whereby a said refuse container collected from its compartment is lowered by the transporting lift to a ground station where a conveyor transfers its contents into a common refuse holder, and the emptied refuse container is returned by the transporting lift.

2. A refuse conveyor system according to claim 1 in which the transport control system is adapted to initiate collection of a refuse container in response to a signal from a sensor associated with that refuse container in its refuse compartment, indicating fullness of the container.

3. A refuse conveyor system according to claim 2 in which the sensor is a weight sensor which weighs the refuse container.



4. A refuse conveyor system according to any one of the preceding claims in which the transporting lift comprises a box adapted to receive a said refuse container through a side opening thereof.

5. A refuse conveyor system according to claim 4 in which the box is separated into an upper compartment for a refuse container and a lower compartment housing a movable loading fork for loading a refuse container.

6. A refuse conveyor system according to claim 5, in which a drive for the movable loading fork is operable under the control of the transport control system.

7. A refuse conveyor system according to any one of the preceding claims in which the transporting lift is hung on a rope and is raised and lowered by a winding mechanism.

8. A refuse conveyor system according to any one of claims 1 to 4 in which the transporting lift comprises a movable fork for loading a refuse container, and the base of each refuse compartment has a cavity to admit the fork underneath a refuse container supported thereon.



9. A refuse conveyor system according to claim 8 in which said base comprises a box with a cutout portion in its top side to allow the fork to engage the refuse container.

10. A refuse conveyor system according to claim 8 or 9, and claim 3, in which the weight sensor is incorporated in the base of the refuse compartment and sends a signal to the transport control system when the weight of the refuse container exceeds a predetermined amount.

11. A refuse conveyor system according to any one of the preceding claims in which the refuse containers comprise lids by which they are closable.

12. A multi-floor building having a refuse conveyor system comprising

a vertical shaft defined by walls and extending from floor to floor of the building;

a transporting lift, and means for moving the transporting lift up and down the vertical shaft;

refuse compartments on respective floors of the building adjacent the shaft, and having access thereto through respective openings in a wall thereof;

refuse containers in said refuse compartments for storing and conveying refuse, the refuse containers



having lids whereby they may be open or closed;

a weight sensor for checking how full the refuse containers are;

a transport control system for initiating collection of a refuse container from its refuse compartment, through the opening thereof, by the transporting lift and moving the transporting lift down the shaft to a ground station; and

a conveyor which is operable, under the control of the transport control system, to transfer the contents of the refuse container from the ground station to a ground-level refuse storage tank.

13. A method of conveying and collecting refuse in a multi-floor building, using a system as claimed in any one of the preceding claims.

14. A refuse conveyor system for a multi-floor building, substantially as described and shown herein with reference to the accompanying drawings.

15. A method of conveying refuse for a multi-floor building, substantially as described and shown herein with reference to the accompanying drawings.

