(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 093 825**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **82850104.9**

(51) Int. Cl.³: **B 65 F 5/00**

(22) Date of filing: **07.05.82**

(43) Date of publication of application: **16.11.83**
Bulletin 83/46

(84) Designated Contracting States: **AT BE CH DE FR GB IT LI LU NL SE**

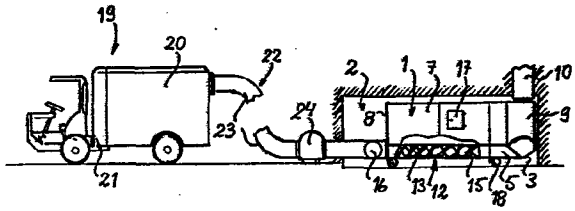
(71) Applicant: **A-Betong AB, Box 24, S-351 03 Växjö (SE)**

(72) Inventor: **Mäkk, Olev, Lövskogsäsen 4, S-427 00 Billdal (SE)**
Inventor: **Svensson, Sven-Olof, Olas väg 6, S-430 50 Källered (SE)**
Inventor: **Bärtzner, Kjell, Flintakroken 4, S-440 01 Stenkullen (SE)**
Inventor: **Bengtsson, Harry, Näckrosvägen 3, S-437 00 Lindome (SE)**

(74) Representative: **Franzén, Lars Hjalmar et al, AWAPATENT AB Box 5117, S-200 71 Malmö (SE)**

(54) Method and system for waste management.

(57) In a method and a system for waste management, in particular of domestic refuse, by removal of the refuse from a receiving container (1) disposed in a refuse storage chamber (2) to a final deposit or the like, the removal is conducted in a closed mobile system comprising a transport vehicle (19) carrying a collecting tank (20). The transfer of the refuse from the receiving container (1) to the collecting tank (20) is brought about by means of a tube equipment (22) in which suction is produced by means of a vacuum (pump (21) mounted on the transport vehicle (19).



EP 0 093 825 A1

A METHOD AND A SYSTEM FOR WASTE MANAGEMENT

The present invention relates to a method and a system for mechanized waste management, in particular of domestic refuse, from the deposition of the refuse, for instance in a refuse storage chamber, until its conveyance to a waste deposit, incineration plant or the like.

Wholly or partly mechanized systems for waste management are previously known. Mechanization is justified by improvements in the working environment and reduction of costs. The partly mechanized systems normally relate to mechanization of the removal of the refuse from the area where it is produced. This mechanization consists in specially designed vehicles to which the refuse is transported manually, whereupon it is mechanically lifted into and packed in the vehicle in order thereafter to be dumped at a plant for storage or degradation. A fully mechanized system that has been in use for some years consists of a pipe system which is integrated in the refuse assembling area and in which the refuse is transported by suction from a refuse storage chamber close to the users, to a collecting place which may be an intermediate storage space, a waste incineration plant or the like. These fully mechanized systems are very costly and have been constructed practically only in connection with new installations for large housing areas. These installations have also proved to be very sensitive to disturbances and demand extensive maintenance. One explanation to this is the far too sensitive automatic systems in valves and pump installations as well as the wear of the pipe system. Furthermore, the waste management system is very difficult of access for repairs and requires alternative storage facilities in the event of a standstill.

Since refuse storage chambers are normally designed for minimum requirements, which particularly in the case of older buildings erected before 1960 has entailed a very poor working environment, mechanization has also been directed to the way the refuse is stored within the building.

One example of such mechanization are refuse sack changers with automatic packing. Depending on the location of the refuse storage chamber, particularly in older buildings, it has been necessary, in order to meet new demands in respect of the working environment, to introduce mechanized transport systems in the form of screw conveyors, conveyor belts, lifts and the like. This transportation has taken place within the building itself, from where the refuse has then been manually transported to the refuse-collecting vehicle.

Other mechanized devices that have been developed are for instance waste mills for grinding the refuse in order to obtain an enhanced degree of compaction so as to reduce transport costs.

The object of the present invention is to meet current demands on the working environment in connection with waste management and to do so in a way to keep costs on an acceptable level and at the same time satisfy the demands of the users on convenience.

The invention may be described as a method and a system for waste management by removal of refuse from a refuse storage chamber located in a building to a final deposit, the novel feature of the invention being that the removal is carried out in a closed mobile system.

The system is thus completely closed. This means that no human hand should need to touch the refuse once it has been deposited in the refuse chute or the like. By the closed system, optimum hygiene is obtained in the waste management process and current injuries to dustmen and caretakers, such as backache and cuts, are

avoided. Backache may result from lifting refuse sacks during re-stacking or removal thereof. Cuts are caused by sharp objects cutting through the sacks.

Further, the system is easy to handle and does not allow for alternative waste management. This is important since experience has shown that many of today's dustmen do not use mechanical aids, such as conveyor belts and the like, because of the time consumption involved. Thus, where possible, a faster familiar routine is preferred, irrespective of bodily risks and after-effects.

The changes made so far in older buildings to improve the working environment have involved costly reconstructions and in many cases the convenience of the tenants has also been deteriorated. One example of this are older buildings having their refuse storage chambers located in the basement, where, for technical reasons of transportation for removing the refuse, it has not been possible to comply with current demands on the working environment. In these instances, it has been necessary, for example, to erect isolated refuse storage facilities in the yard and abolish the refuse chutes.

As a consequence, the tenants have been obliged to accept a lower standard and therefore demanded a reduction in rent at the same time as the expenses of the houseowners have increased by the cost of the new refuse storage facilities.

The invention here presented means that all existing refuse storage chambers are maintained and that the comfort of the tenants is not deteriorated.

The invention can thus be said to constitute an overall solution, like the stationary pneumatic disposal units, but at only a fraction of the investment costs thereof and with considerably enhanced reliability and accessability in the event of disturbances. Further, the system according to the invention offers a flexi-

bility which means that it may easily be modified according to the development within the field of conveying technique and in compliance with demands on refuse separation and the like.

The invention will be described in greater detail hereinbelow with reference to the accompanying drawings showing an at present particularly preferred embodiment. Fig. 1, in perspective obliquely from above and with certain parts broken away, shows a container being part of the invention, and the equipment associated therewith. Fig. 2, schematically from the side, shows the container of Fig. 1 as disposed in a refuse storage chamber and connected to a vehicle for removing the refuse.

A substantially parallelepipedal receiving container 1 is placed in an existing refuse storage chamber 2 in a building (not shown in greater detail) and is of such a volume as to hold for example one week's deposit of refuse. The container 1 has three bottom walls 3, 4 and 5 slanting inwardly towards its lowermost point, two vertical long sides 6 and 7, and two vertical short sides 8 and 9. At the short side 9 which is connected to a refuse chute 10 opening in the refuse storage chamber 2, there is mounted an inflatable bag 11 of rubber or similar material which has a specially designed profile.

At the bottom of the receiving container 1, there is provided a transport device 12 in the form of a rotary waste conveyor screw 13. This screw is connected at one end to a drive, for instance an electric motor 14, which is mounted on the outer side of the short side 8 of the container 1. Parallel to and underneath the conveyor screw 13 there is a part-circular waste collecting duct 15 which has a circular connecting discharge 16 at the short side 8 of the container 1.

In one of the long sides of the container 1, in this instance the long side 7, there is also an inspection cover 17 through which it is possible to supervise

the management of the refuse and withdraw such refuse as either is too bulky or must be disintegrated manually. To permit displacing the container 1 for maintenance and/or repairs, it rests on suitable transport wheels 18.

The system according to the invention also includes a transport vehicle 19, see Fig. 2, which is equipped with a collecting tank 20, a vacuum pump 21, and a tube equipment 22. The other components and details of the transport vehicle 19 are not comprised by the invention and thus need not be described here.

Waste management is carried out by means of the above-described system in the following way.

According as the items of refuse descend through the refuse chute 10 and are piled on each other, the space below the opening of the refuse chute will be filled. In order that the refuse should not obstruct this opening, the inflatable bag 11 is automatically pumped up at preset intervals. This bag has a volume larger at the top than at the bottom, such that the top of the refuse layer will be pressed away towards the other end of the receiving container 1. In that the container 1 has slanting bottom walls 3, 4, 5, the refuse will descend towards the conveyor screw 13 being on a level with the bottom of the container. When the container 1 is full and should be emptied, the electric motor 14 is started for rotation of the conveyor screw 13. By this rotation, the refuse will be pressed out into the part-circular collecting duct 15, from where it is sucked out through the connecting discharge 16 with the aid of a tube 23 which is part of the tube equipment 22 and connected at one end to the discharge 16 and at the opposite end to the collecting tank 20 of the transport vehicle 19, suction being produced by the vacuum pump 21 mounted on the transport vehicle 19. When the receiving container 1 has been emptied, the vehicle is driven to the next

refuse storage chamber and the same procedure is repeated. When the collecting tank 20 has been filled, the transport vehicle 19 is driven to an intermediate waste storage site or to a waste deposit for emptying, which is done by tipping or blowing out the refuse. The vehicle is then driven to the next refuse storage chamber to be emptied and so forth.

Depending on the composition of the refuse, it must in some cases be disintegrated before conveyance to the collecting tank 20. Such disintegration may be ensured by mounting a suitable waste grinder, for instance a so-called jaw crusher 24, in the tube equipment 22, suitably between the tube 23 and the connecting discharge 16. This jaw crusher is suitably so designed that the refuse is sucked therethrough under the action of the vacuum pump 21 at the same time as the disintegrating means, generally a rotating spiked roller or the like, of the jaw crusher is rotated by means of a separate motor (not shown).

In order to break loose refuse which for some reason or other has stuck in the receiving container 1 by bridging, wedging, sticking together etc., one or more inflatable bellows of rubber or the like can be provided on or in the bottom and/or walls of the container 1, such bellows means being shown at 25 in Fig. 1. The one or many bellows 25, like the inflatable bag 11, can be pumped up automatically at preset intervals or manually, when required.

The invention must of course not be considered restricted to the embodiment described above and shown in the drawings but may be modified in different ways within the scope of the claimed patent protection.

CLAIMS

1. A method for waste management by removal of refuse from a refuse storage chamber located in a building to a final deposit or an intermediate storage space, c h a r a c t e r i s e d by carrying out said removal in a closed mobile system.

2. Method as claimed in claim 1, c h a r a c t e r i s e d by carrying out said removal by means of a mobile tank equipped with a vacuum pump.

3. A system for waste management by removal of refuse from a refuse storage chamber (2) located in a building to a final deposit or an intermediate storage space, c h a r a c t e r i s e d in that the refuse storage chamber (2) in the building is provided with a transport device (12) for conveying the refuse from the receiving area to the point of discharge.

4. System as claimed in claim 3, c h a r a c t e r i s e d in that it comprises a mobile collecting tank (20) with a vacuum pump (21) and a tube equipment (22) which is connectible directly to a discharge (16) associated with the refuse storage chamber (2).

5. System as claimed in claim 3 or 4, c h a r a c t e r i s e d in that the refuse storage chamber (2) houses a receiving container (1) with an equipment (11, 12) for conveying the refuse in the container so that the major part of the container volume can be used for storage.

6. System as claimed in any one of claims 3-5, c h a r a c t e r i s e d in that the receiving container (1) is equipped with a transport device (12) for conveyance and compaction of the refuse towards the discharge (16) in conjunction with emptying.

7. System as claimed in any one of claims 3-6, c h a r a c t e r i s e d in that the mobile collecting tank (20) is equipped with a compactor for maximum

exploitation of the tank volume.

8. System as claimed in any one of claims 3-7, c h a r a c t e r i s e d in that there is provided between the receiving container (1) and the collecting tank (20) a device (24) for disintegrating the refuse in connection with the evacuation thereof.

9. System as claimed in any one of claims 3-8, c h a r a c t e r i s e d in that there are provided in or on the bottom and/or walls (3-9) of the receiving container (1) one or more breaker devices (25) for breaking loose refuse that has stuck in the receiving container.

0093825

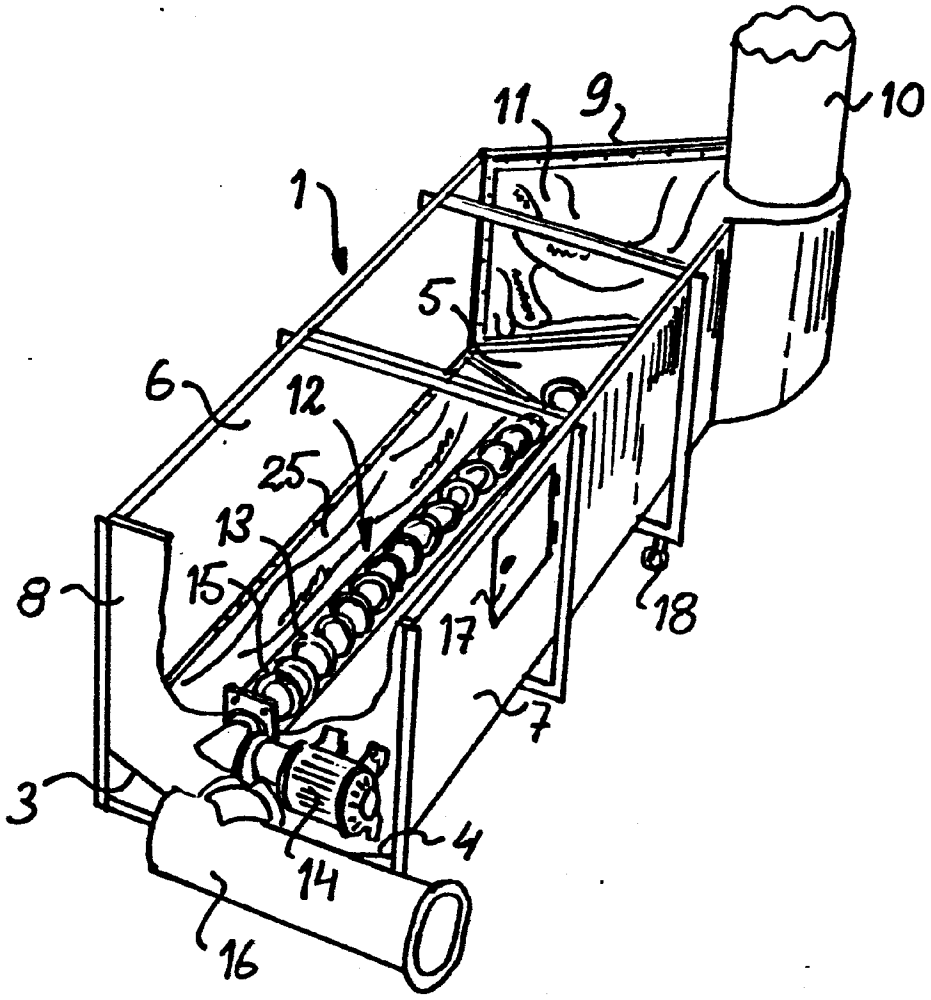


FIG 1

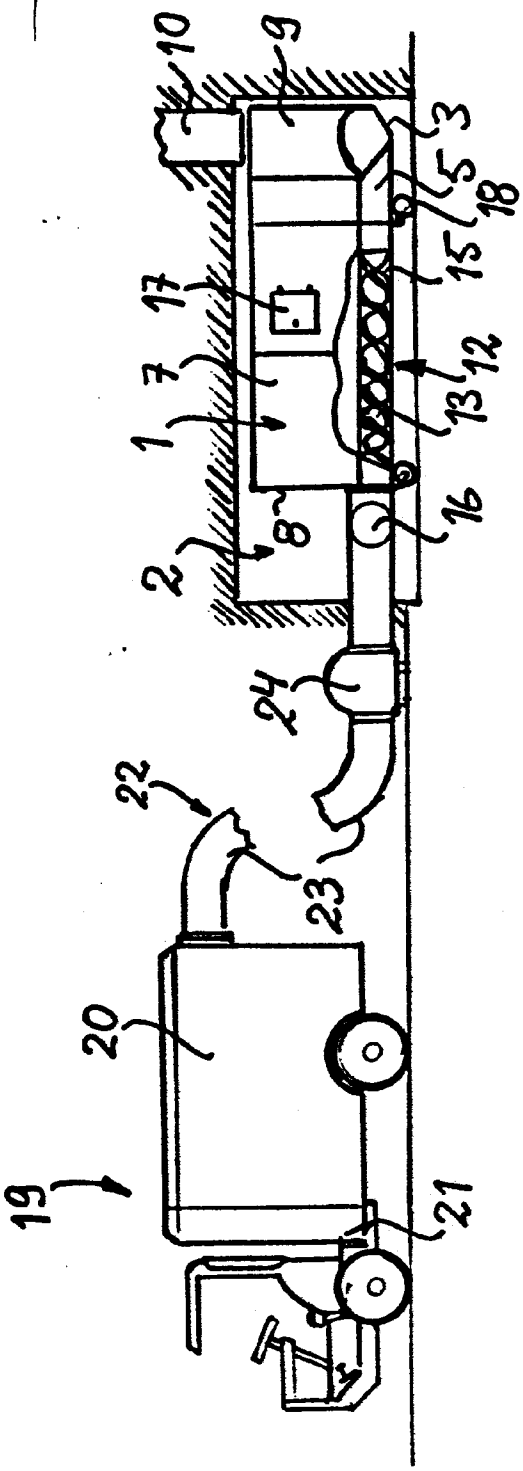


FIG 2

European Patent Office

EUROPEAN SEARCH REPORT

0093825
Application number

EP 82 85 0104

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	FR-A-1 385 399 (COLAS DES FRANCS) * Page 2, left-hand column, line 39 - right-hand column, line 49; figures 1,3,5 *	1,2	B 65 F 5/00
Y		3-9	

Y	GB-A-1 581 925 (MASSEY-FERGUSON) * Page 2, lines 99-109; figure 6 *	3-9	

Y	DE-A-2 513 290 (JANSKY) * pages 4,5; figure 1 *	7	
	---		TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
X	DE-A-2 504 212 (INDUSTRIE-WERKE KARLSRUHE AUGSBURG) * Page 4, line 16 - page 5, line 15; page 9, line 5 - page 11, line 23; figure 3 *	1	B 65 F B 65 G
Y		8	

A	US-A-2 583 648 (HENSLEY) * Column 2, line 32 - column 3, line 38; column 4, lines 10-44; figure 1 *	3,5,6	
	--- -/-		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13-07-1983	MARTENS L.G.R.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503. 03.82

European Patent Office

EUROPEAN SEARCH REPORT

0093825
Application number

EP 82 85 0104

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	FR-A-2 215 352 (SOC. ARTESIENNE DE CONSTRUCTIONS MECANIQUES) * Whole document *	3,5,6	
A	DE-B-2 208 586 (KELLER & KNAPPICH)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13-07-1983	MARTENS L.G.R.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503. 03.82