

Assembly for the collection and disposal of household waste

The invention relates to an assembly for the
5 collection and disposal of waste, in particular household
waste, in an urban or periurban area.

It is problematic to be able to reach city centres in
order to collect waste, in particular therefore household
waste, there and to dispose of it at the outskirts, at an
10 unloading site (landfill, reprocessing, selective sorting
if not carried out upstream, etc.) while:

- interfering as little as possible with the heavy urban
traffic (cars, trucks, two-wheeled vehicles, pedestrians,
etc.),
- 15 - limiting the carbon impact associated, after all, with
these collections and moving of waste,
- meeting the requirement of the quantity of waste to be
collected and disposed of,
- and also limiting the use of the energy or the energies
20 available for carrying out collection and disposal.

In this context, and in order to provide solutions to
this problem, an assembly is proposed, comprising at
least:

- a tank for storing the waste, the tank having at least
25 one opening for receiving this waste;
- a first vehicle, on which the tank is disposed in a
removable manner;
- a container which is able to simultaneously receive a
plurality of tanks to be emptied, the container comprising
30 side walls and a bottom wall;
- first means for transferring the tank from the first
vehicle into the container and vice versa;

- locking means, provided on a wall of the container, for reversibly locking the tank to the container;
- a second vehicle, heavier and more voluminous than the first vehicle, on which the container is mounted in a removable manner, when it contains a number of full tanks, in order then to move it to an area for unloading waste; and
- first tipping means for tipping the tank, then locked to the container, in order to empty the tank outside the container, either through the receiving opening or through another opening in the tank, this being done:
 - * by tipping the tank with respect to the container,
 - * and/or by tipping the container.

In the same context, it is possible to recommend in a complementary manner that:

- the first vehicle is provided with a power source which exclusively supplies energy to the first means for transferring the tank, and/or that:
- the first vehicle and the tank are designed such that only one tank can be mounted on this first vehicle; and
- the second vehicle and the container are designed such that only one container can be mounted on this second vehicle; and
- the container and the tank are designed such that the container receives a number of full tanks to be emptied and to be transported via the second vehicle.

In order to help meet the requirement of the quantity of waste to be collected and disposed of and to limit the use of the energy or energies available for carrying out collection and disposal, it is recommended that the container comprises at least one passage, provided in at least one of the side walls of the container, for

transferring the tank into the container, onto the bottom thereof, via the first transfer means.

Moreover, it is preferred that the first transfer means comprise:

- 5 - a support for the tank, said support being mounted so as to be able to move on the first vehicle between an advanced position on the vehicle, for filling the tank with waste through said receiving opening, and a moved-back overhanging position with respect to the vehicle, for
10 transferring the tank to the container; and
- second tipping means mounted partially on the first tipping means and on the container, for tipping the tank in the moved-back overhanging position.

Thus, in the moved-back overhanging position, the tank
15 may tip itself by gravity and preferably then rest on the ground (or even preferably in the container, if an opening in a side wall has been provided to let it pass through). This thus limits the use of the energy or the energies available for manoeuvring the tank, without hindering the
20 manipulation or the transfer thereof.

Likewise for the same purpose (limiting the use/consumption of energy and of ancillary devices, outside the vehicle(s), or even the container), it is recommended:

- 25 - that the first transfer means are installed exclusively between the tank and the first vehicle, and/or
- that the first locking means and the first tipping means are installed exclusively between the tank and the container.

30 Still in order to limit the use/consumption of energy, it is furthermore recommended that the first and second means for tipping the tank operate in one and the same

direction and take action, for tipping the tank, respectively at two opposite side walls of the container.

Thus, the (each) tank may be introduced into the container on one side, and following on therefrom it maybe
5 tipped towards the opposite side, thereby avoiding energy expenditure to change direction and/or complex mechanisms.

In this respect, it is recommended that the tank is transferred from the first type of vehicle into the container exclusively by way of the first transfer means
10 installed between the tank and the first type of vehicle and that the tank is rolled in the container.

If the tank is emptied outside the container by the tank being tipped with respect to the container, and preferably through the receiving opening of this tank, it
15 is furthermore preferred that the first means for tipping this tank are mounted so as to be rotatable towards the top of one of said side walls carrying the first locking means, in order to tip the tank over this wall while it is being emptied, the first locking means then preventing the
20 tank from falling out of the container.

Thus, all that will be necessary will be to lift the tank at the time of emptying it and to tip it, preferably following on from its first tipping which has "lowered" it from the first (type of) vehicle. The energy required for
25 these manoeuvres is limited.

Furthermore, it is recommended:

- that the first means for transferring the tank place the tank in the container;
- and that moving means, carried at least in part by the
30 first vehicle, move the tank placed in the container between the first (type of) vehicle and a part, carried by the container, of the first tipping means.

With regard again to the emptying tipping action, it is furthermore proposed that pulling means are provided which are fixable, in a separable manner, to the tank (then disposed in the container) and are moved by a power source with which the second (type of) vehicle is provided in order thus to mechanically actuate the pivoting of the first means for tipping the tank.

So as only to have to use energy (necessarily available, even if limited) which is available on the vehicles, and in particular the second, larger vehicle, by limiting the power peaks, it is proposed that the first tipping means:

- are moved by an energy source of the second vehicle;
- and comprise means for selecting a single tank to be emptied from a number of tanks which are then disposed in the container.

In accordance with a comparable consideration, it is proposed that preferably the first tipping means are disposed between the container and the second vehicle and are moved exclusively by an energy source of the second vehicle.

Another simple manner, having relatively low power consumption, for transferring the tanks to the container, optimizing the transport of the tanks to the container, consists in providing:

- that second tipping means are mounted partially on the first vehicle (in order to tip the tank) and/or between the tank and the container;
- that a lift plate, which is mounted so as to be able to tip on the first vehicle, tips the tank via the second tipping means;

- and that the container and the tank are designed such that the container receives a number of full tanks, which are stacked in the container via the lift plate.

Again in order to optimize the collection and disposal
5 of waste with respect in particular to limiting the carbon impact, it is recommended that the first vehicle comprises a hopper for collecting and loading the waste in the tank, the hopper being able to be connected to means for compressing the collected waste, said compression means
10 being mounted in a movable manner with respect to the tank, which is then disposed on this first vehicle, in order to compress the waste therein.

Thus, the tank will not have to be moved from the first vehicle in order to be filled since it will be
15 filled directly on the first vehicle by way of the hopper. Furthermore, its capacity for accommodating waste may be optimized if the compression means are provided, thereby meeting all the better and easily the requirement of the quantity of waste to be collected and disposed of.

20 In addition to the abovementioned assembly, the invention also relates to a method for the collection and disposal of said waste.

In order to solve the abovementioned problems, the following is proposed:

- 25 a) waste is collected in a tank mounted in a removable manner on a first type of vehicle;
b) the first type of vehicle moves the full tank to a container designed to receive a plurality of full tanks;
c) the tank is transferred from the first type of vehicle
30 into the container;
d) steps a) to c) are repeated at least once;

e) the container, which then contains a number of full tanks, is loaded onto a second type of vehicle, which is heavier and more voluminous than the first;

f) the second type of vehicle carrying the container is moved up to and immobilized in the vicinity of an unloading area; and

g) the tanks are tipped out of the container in order to empty them in the unloading area.

Once again, in order to transfer the tanks to the container in another simple manner having relatively low energy consumption, optimizing the transport of these tanks to the container, it is furthermore recommended that the transfer of the tanks from the first type of vehicle to the container comprises a step of lifting and/or tipping at least one of the tanks.

Again, in order to manage energy, it is recommended:

- to supply the first means for transferring the tank with energy (a priori electric, pneumatic or hydraulic energy), in order to manoeuvre them, exclusively from a power source with which the first vehicle is provided; and/or
- to supply the first tipping means with energy (ditto), in order to manoeuvre them, exclusively from a power source with which the second vehicle is provided.

Another recommendation in this context is that step c) comprises a step of transferring the tank from the first type of vehicle into the container exclusively by way of first transfer means installed between the tank and the first type of vehicle and rolling the tank in the container.

Yet another recommendation in this context is that:

- in order to supply energy, said power source with which the first vehicle is provided is weaker than that with which the second vehicle is provided,
- and, in order to collect the waste in the tank, the first type of vehicle is selected such that only one tank can be mounted thereon.

A more detailed description of, in particular, an embodiment given by way of example follows, with reference to the appended drawings, in which:

- 10 Further features and advantages of the invention will become more clearly apparent from reading the following description of an embodiment, given simply by way of illustrative and non-limiting example, and from the appended drawings, in which:
- 15 - Figure 1 is a perspective view of a first vehicle carrying a tank, according to a first embodiment of the invention;
 - Figure 2 is a perspective view of the container according to the first embodiment of the invention;
 - 20 - Figures 3, 4, 5 and 6 are sectional side views illustrating four successive phases of the transfer of a tank from a first vehicle to a container, according to the first embodiment of the invention;
 - Figures 7 and 8 illustrate two successive phases of the transfer of two tanks from a first vehicle to a container, according to a second embodiment of the invention;
 - 25 - Figure 9 is a perspective view of the phase of transferring a container onto a second vehicle, according to the first embodiment of the invention;
 - 30 and
 - Figures 10, 11, 12 and 13 are perspective views

illustrating different embodiments of the phase of emptying tanks in an unloading area.

An assembly for the collection and disposal of household waste according to a first embodiment will now
5 be presented with respect to **Figures 1 and 2**.

As illustrated in these two figures, the assembly comprises a first vehicle 3, on which a tank 1 for collecting waste, a priori household waste, is mounted. The first vehicle 3, also known as a collection vehicle,
10 is a relatively lightweight and fairly compact vehicle that makes it possible to limit the inconvenience brought about by the movement of this first vehicle 3 in the centre of a city. In this example, this collection vehicle 3 is equipped with a clean-energy and low-consumption
15 motor, such as an electric motor, a hybrid motor or a compressed-air motor, so as to limit the environmental impact and the energy costs. Thus, it is recommended that the drive motor 30 of the vehicle 3 is a clean-energy motor and thus not an internal combustion engine. The
20 first vehicle 3 will furthermore preferably comprise a hopper 31 for loading waste and also means 32 (Figure 3) for compressing this waste, said means compressing the waste fed by the hopper 31 before conveying said waste to the tank 1. A side passage 310 connects the hopper and the
25 inside of the tank, on the side having the opening 10.

This embodiment illustrates a first vehicle which is designed such that only a single tank can be mounted thereon, this being preferred.

This tank 1 for storing waste has, in this embodiment,
30 a cylindrical profile. It is mounted in a removable manner with respect to the collection vehicle 3 by way of a support 41. It comprises an opening 10 for receiving waste

which can be introduced through the hopper 31. This opening may also serve, in this embodiment, to empty the tank 1. It is conceivable for the tank to have a number of openings, in particular one for filling it, one for emptying it, it being possible for this second opening 110 to be placed on the side of the tank (see Figure 11) or opposite. Favourably, the tank 1 will be mounted horizontally on the support or cradle 41, that is to say in a direction in which its longest side is approximately parallel to the ground and to the longitudinal axis 3a of the vehicle 3 and of its support 41. Its opening 10 is oriented towards the front (AV) of the vehicle, its fixed bottom 100 towards the rear (AR), through which the tank is loaded and unloaded, in this case longitudinally.

The assembly also comprises a container 2. This container 2 comprises (in this case four) upright walls 21, 22, 23, 24 (the wall 21 called the front wall not being shown in Figures 1 and 2 for the sake of clarity) and a horizontal bottom 25, the walls and the bottom delimiting the volume of the container. In this example, the volume of the container is around 40 m³. It comprises a number of (in this case three) compartments that can each receive a tank 1. The container 2 also comprises passages 26 provided on the front wall 21 in order to transfer the tanks from the first vehicle into the container 2 via transfer means 4. These passages 26 may be closed, in a preferred embodiment, by doors 260 (see Figure 9), or hatches, which are closed in a selective manner in order to open and close the access to the passage. These doors may for example be mounted in a pivoting manner with respect to the bottom 25 or with respect to one of the side walls.

Preferably, this container will be positioned outside a large conurbation so as not to impede traffic in this area. For example, such a container 2 can be positioned at the periphery of the city centre, the collection vehicles 5 3 conveying full tanks to or from this container 2, by making return journeys.

The assembly for the collection and disposal of waste also comprises first means 4 for transferring the tank 1 onto the container 2, locking means 5 for reversibly 10 locking the tank 1 to the container 2, and first means 6 for tipping the tank 1, then locked to the container 2, in order to empty the tank 1 outside the container 2. The locking means 5 are provided on a wall of the container and on the/each tank.

15 It is recommended that the/each first vehicle 3 is provided with a power source, such as the motor 30 or an ancillary source 300, which exclusively supplies energy to the first means 4 for transferring the tank.

These transfer means 4 transfer the tank 1 transported 20 by the first vehicle 3 onto the container 2. In this example, they comprise the support 41, which is mounted on the first vehicle 1, and second means 42 for tipping the tank 1, said second means tipping the tank 1 with respect to the support 41 between the first vehicle 3 and the 25 container 2. The support 41 for the tank 1 is mounted so as to be able to move on the first vehicle 3 between a rear moved-back position (AR), for tipping the tank 1, and an advanced second position for loading waste into the tank 1 via the hopper 31. The rear position (AR) is 30 preferably a moved-back overhanging position with respect to the vehicle, for transferring the tank to the container. For their part, the second tipping means 42

are, in this embodiment, mounted partially on the tank 1, the container 2, the first vehicle 3, and the first tipping means 6. In this particular example, the second tipping means 42 are in the form of guide pins 421 (mounted on the first tipping means 6) that move in guide rails 422 (mounted on the container 2), and of a cable (mounted on the first vehicle 3, not shown in these two figures) connected to a fastener (mounted on the tank 1, not shown in these two figures).

Thus, these transfer means 4 move the tank 1 from a horizontal position, when it is on the support 41, to an upright position in the container, by way of the second tipping means 42.

For their part, the locking means 5 lock the tank to the container in a reversible manner. In this example, the locking means are in the form of vertical "hooks" 51 that are provided along an upright wall 23 of the container 2 and engage with a retaining bar 52 provided on the first tipping means 6.

Thus, it is preferred:

- that the first transfer means 1 are installed exclusively between the tank 1 and the first vehicle 3, and/or
- that the locking means 5 and the first tipping means 6 are exclusively installed between the/each tank 1 and the container.

The second tipping means 42 are mounted partially on the first tipping means and on the container 2, in order to tip the tank into the latter from the moved-back overhanging position on the support 41.

In this example, the first tipping means 6, also known as rockers, are individual. In other words, each tank 1

engages with different tipping means 6. Thus, in this example, the assembly comprises three "first tipping means 6", that is to say three rockers.

Four successive phases of transferring the tank 1 from the first vehicle 3 to the container 2, according to the first embodiment of the invention, will now be presented with reference to **Figures 3 to 6**.

Before the tank 1 full of waste is transferred from the first vehicle 3 to the container 2, the first vehicle 3 is moved up to and immobilized in the vicinity of the container 2. It is positioned opposite a passage 26, and thus a rocker 6. In this phase, the support 41 supports the tank 1 in the collection vehicle 3.

Once the collection vehicle 3 has been positioned in this way, the full tank 1 is transferred by moving it back, in a first phase, into an overhanging position with respect to the support 41. To this end, the tank 1 is moved in translation by a mechanical action which moves back side arms connected to the support 41, and thus this support, which is then in the rear moved-back position. Figure 3 illustrates this first phase. During the, in this case substantially horizontal, movement in translation of the support 41, the first tipping means 6 engage with the tank, in this example by way of three bars 611 which are accommodated in hollow lugs 11 provided on the tank 1. The sidebars 611a, 611b slide horizontally in rails 422 fixed to the container.

In a second phase, and as illustrated in Figures 4 and 5, the tank 1 is tipped, still preferably in an overhanging position with respect to the support 41, by gravity in a first direction α which is, in this example and at this viewing angle, the anticlockwise direction, so

as to stand it up. The tank is tipped and stood up likewise by the second tipping means 42 which guide the descent/drop by gravity of the tank 1 and which then stand it up when it has arrived in contact with or in the vicinity of the bottom 25 of the container 2. In this example, the guide pins 421 move in the rails 422, which are divided into a horizontal portion followed by a vertical portion, so as to guide the descent under gravity of the tank 1, then the cable 423 (manoeuvred by the power source 30 or 300) pulls the tank 1 at its base by way of the fastener 424 in order to stand it up. The tank 1 is then stood up vertically. This standing up by way of the cable 423 may be carried out by the support 41 being returned into its advanced position, the cable being fixed to a pulling means connected in this example to the support 41. As a result, the cable pulls the base of the tank 1 in its pivoting direction and stands it up, thereby positioning the tank 1 on moving means 8 (in this case wheels located under its fixed, solid bottom 100). It should be noted that this cable, also known as a rigid rod, is mounted in a detachable manner with respect to the tank. In a variant of the invention, moving means mounted on the tank 1 and also on the first vehicle 3, in the form for example of an arm, are conceivable.

In a third step, and as illustrated in Figure 6, the upright tank 1 is moved in the container 1 by the moving means 8 associated with a mechanical action output by the collection vehicle 3 (in this case a reverse movement of the first vehicle and more particularly of the support 41 mounted on the first vehicle 3), until the tank 1 is positioned so as to be locked in a reversible manner to the locking means 5 carried by the "back" wall 23. Locked

in this way to the container 2, the tank 1 is in position to be tipped and emptied, in a second direction β , out of the container. The second direction is, in this case and preferably, also the anticlockwise direction, the first
 5 direction α and the second direction β thus being identical. In a variant of the invention, the first vehicle may be positioned at a distance from the container, this distance being relatively small, so as to "participate" in the forces exerted on the container in
 10 order to move it back into the first tipping means and/or the locking means. For example, the first vehicle may be positioned at a distance of less than two metres from the container, so as also not to be too far away for the deposition of the tank in the container.

15 During a reverse process, that is to say when there is a desire to transfer a tank from the container to the collection vehicle, the operation is reversed compared with the transfer of a tank from the collection vehicle to the container. In other words, the steps are carried out
 20 in the reverse order when there is a desire to transfer a tank from the container to the collection vehicle.

Thus:

- the means for transferring the tank have positioned the tank, preferably on its fixed bottom 100, in the container
 25 2,
- and moving means 8, at least in part carried by the tank and/or the first vehicle (pushing means such as the cable or rod 423 or the support 41), have moved the tank, positioned in the container, between the first vehicle 3
 30 and a part (611a, 611b), carried by the container, of the first tipping means 6.

A second embodiment of the assembly for the collection

and disposal of waste will now be presented with reference to **Figures 7 and 8.**

In this embodiment, the assembly comprises a storage tank 1' which has a parallelepipedal profile and is
 5 mounted on a support 41' of a first collection vehicle 3'. The assembly also comprises a container 2' which has three upright walls 21', 22', 23', and a front passage or front opening 26' provided to make it easier to transfer the tanks 1' from the first collection vehicle 3' to the
 10 container 2'. One upright face of the container 2' is thus open. The container is likewise open at its top here.

Located on the first vehicle 3' is a hopper 31 for loading waste, or means 32' for compressing this waste through the side passage 310'.

15 Similarly to the assembly of the first embodiment, the assembly in question here also comprises transfer means 4' in the form of the support 41' mounted so as to be able to move in translation and rotation on the first vehicle 3', and second tipping means 42'. In this example, the second
 20 tipping means 42' are mounted partially on the tank 1' (by way of guide pins 421'), on the container 2' (guide rails 422' in which the guide pins 421' can move) and on the support 41' (retaining hook 423').

Furthermore, this assembly also comprises means 5' for
 25 reversibly locking the tank 1' in the container 2', these locking means being provided partially on the container 2' and on the tank 1'.

Finally, the assembly comprises first means (not shown in these figures) for tipping the tank 1', these means
 30 being positioned partially on the container 2' and partially at a distance from this container.

As illustrated in these Figures 7 and 8, the container

is provided to receive a number of full tanks 1', preferably by these tanks being stacked. In order to transfer the bottom tank, the front part of the support 41', that is to say the part closest to the front of the first vehicle 3', is tipped in a first direction α' which is directed towards the rear so as to slide the full tank by gravity. This descent of the tank is controlled by the second tipping means 42', which may also serve as a brake to slow down the drop and thus to prevent the tank or the support from being damaged. In parallel with this tipping of the support towards the rear, the second tipping means 42', and more particularly the means provided on the tank and on the container 2', guide the tank into its position in the container. When the tank is partially, or completely, in contact with the container, the locking means 51' are brought into engagement with the tank and the container by way of a mechanical action output by the first vehicle 3'. This may be a reverse movement of this first vehicle so as to push the tank 1' towards the upright wall 22' of the container opposite the opening 26'.

For its part, the upper tank (Figure 8) is transferred from the first vehicle 3' to the container 2' by a vertical upward movement in translation of the support 41', or by a lift plate 410', such that the tank is positioned opposite its position in the container 2'. Next, the top tank is pushed by a part of the second tipping means 42', in this case the hook 423', in order to position it at the end of the container and to lock it reversibly to the container 2' by way of the locking means 5'. It should be noted that this phase of pushing the tank into the container may be guided by guide pins 421' of the

tank, which slide in second guide rails of the container.

Thus:

- the second tipping means 42':

5 * mounted partially (reference 420') on the first vehicle (3') tip the tank,

* and/or, in part (references 421', 422') between the tank 1' and the container 2', then guide the tank along the container,

10 - the lift plate 41', mounted so as to be able to tip on the first vehicle, tips the tank via these second tipping means (420'), and

- the container and the tank are designed such that the container receives a number of full tanks which are stacked in the container via the lift plate.

15 The means 420' may be jacks.

It is furthermore recommended that the first tipping means 6' are disposed between the container 2' and the second vehicle 9' and are moved by an autonomous energy source 300' of the second vehicle.

20 An embodiment of the phase of transferring a container onto a second vehicle, according to a first embodiment of the invention, will now be presented with reference to **Figure 9.**

25 As illustrated in this Figure 9, the assembly comprises a second vehicle 9, which is heavier and more voluminous than the first vehicle 3. This second vehicle moves the container, then containing one or more full tanks, to an unloading area 50 (Figure 10). Since this second vehicle does not travel or only travels a little in
30 urban areas having a high concentration of vehicles and pedestrians, its relatively large size compared with that of the first vehicle is not problematic. In order to mount

the container 2 on the second vehicle 9, the latter comprises third tipping means 91 in the form, in this example, of a crane, which is provided on the rear part of the second vehicle and which pulls the container by way of a hook 911 of the crane connected to a lug 912 on the container. Once this transfer has been carried out, the container can for example be reversibly secured to the second vehicle by second locking means 500 (Figure 10), this making it possible to move it to the unloading area without there being a risk of it overturning.

Various embodiments of the phase for emptying full tanks from a container, preferably through the openings 10, in an unloading area will next be presented with reference to **Figures 10 to 13.**

Once the container has been brought into the unloading area 50, the full tanks are emptied.

For this purpose, the following procedure has thus been carried out:

- a) waste has been collected in a tank mounted in a removable manner on a first type of vehicle 3 or 3';
- b) this first type of vehicle has moved the full tank to a "multi-tank" container 2, 2';
- c) it has then been possible to transfer the tank from the first type of vehicle into the container;
- d) it has been possible to repeat steps a) to c) at least once;
- e) with the container full, it has been loaded onto a second type of vehicle 9, 9', which is heavier and more voluminous than the first;
- f) this second type of vehicle 9, 9' carrying the container has been moved up to and immobilized in the vicinity of an unloading area 50; and

g) the tanks have been tipped out of the container in order to empty them in the unloading area.

The transfer of the/each tank from the first type of vehicle 3, 3' to the container will thus favourably
 5 include a step of lifting and/or tipping at least one of the tanks.

In this regard, the first means 6, 6' for tipping the/each tank 1, 1', then locked to the container 2, 2', will make it possible to empty it, outside this container,
 10 in the area 50, which is thus located at the outskirts of an urban area, by:

- * tipping the tank with respect to the container (Figures 10-12),
- * and/or tipping the container (Figure 13), it being
 15 possible for the/each tank in question to be fixed to the container.

In addition, in the embodiment in Figures 10-12, these first means 6 for tipping the tank will favourably be mounted so as to be rotatable towards the top of one of
 20 said side walls (in this case the one 23 opposite the openings) carrying the first locking means, in order to tip the tank over this wall while it is being emptied, the first locking means then preventing the tank from falling out of the container.

25 As already noted, this emptying will be carried out either through the receiving opening 10, or through some other opening in the tank that is intended for this purpose.

In Figures 10 to 13, the tanks are emptied by these
 30 tanks 1 being tipped in the second direction β in order to empty them out of the container. In the embodiments in Figures 10 to 12, it may be noted that, from the point of

view of the tanks, the second direction β is the same as the first direction α , whereas in Figure 13, it may be noted that, from the point of view of the tanks, the second tipping direction is in the opposite direction to the first direction. However, in the figures shown, the first and second directions are identical.

As illustrated in Figures 10 to 12, the first means 6 for tipping the tanks 1 tip over the upright wall 23 of the container 2 which partially carries the locking means 5. This tipping takes place about a substantially longitudinal axis with respect to this wall, that is to say about an axis extending in the same direction as the wall 23. In a variant of the invention, it is also possible to employ means for retaining the tank, these being for example fixed to the base of this tank, so as to further prevent it from tipping over the wall 23.

In the embodiment in Figure 10, these tipping means are rotated by way of pulling means 61, which are provided on the body of the second vehicle 9 and are connected to the tipping means by way of connecting means such as straps 612. It should be noted that each rocker 6 has its own respective pulling means, these pulling means in addition being able to function independently or not to function independently of one another, thereby making it possible for all of the tanks to be emptied at the same time or for them to be emptied one by one. Emptying them one by one may have the advantage of avoiding tipping of an excessively large mass in one go and thus possible tipping of the vehicle, but has the drawback of being slower. According to the variants of the invention, the pulling means 61 may be moved by an energy source of the second vehicle 9.

In the embodiment in Figure 11, the pulling means of the embodiment in Figure 10 have been replaced by lifting means 62 such as a crane which can lift full tanks, these tanks still being connected to the tipping means 6 and
 5 locked to the container 2 by the locking means 5. In this example, the crane lifts the full tanks one by one at their base by way of connecting means 601 which connect the arm of the crane to the tanks.

In the embodiment in Figure 12, the tipping means
 10 furthermore comprise means 63 for selecting a tank 1 to be emptied from the plurality of tanks disposed in the container 2. In this example, these selection means 63 are in the form of hydraulic jacks 631 which move selection
 15 carriages 632 vertically in translation, these carriages 632 then moving in a selective manner in the vicinity of the first tipping means of a tank, the tank tipping when the jack descends again, carrying with it the carriage and thus the tank. It should be noted that the movement of the
 20 carriages may be controlled manually, in particular by a user who selects one of the carriages which is intended to move by means of a control panel, or automatically. According to variants, the selection carriages may operate simultaneously or successively, making it possible to
 25 empty a number of tanks simultaneously or to empty them successively.

Figure 13 shows the emptying phase of the tank in an unloading area according to the second embodiment of the assembly. As illustrated in this figure, it is not the tanks 1' which are tipped directly by the tipping means
 30 6', but the container 2' which is tipped, indirectly causing the tanks to tip. Embodiments in which the container is partially tipped and the tanks are also

partially tipped, so as to share the tipping movement between these two elements, may also be conceivable. In this example, the two stacked tanks 1' are emptied simultaneously outside the container 2' by way of an opening provided on one side of these tanks. It should be noted that, in contrast to the first embodiment, in which the tanks are transferred and emptied at two opposite walls of the container, the tanks of the second embodiment are transferred and emptied at the same wall of the container. Of course, it may also be possible to provide embodiments in which the tanks are transferred and emptied towards two different walls which are not opposite one another.

It may also be possible to provide an embodiment in which the third tipping means and the first tipping means are coincident. It may also be possible to provide embodiments in which the container is originally positioned on the second vehicle, so as to remove the step of transferring the container onto this second vehicle.

CLAIMS

1. Assembly for the collection and disposal of waste, in particular household waste, in an urban or periurban area,
5 the assembly comprising at least:
 - a tank (1) for storing the waste, the tank (1) having at least one opening (10) for receiving this waste;
 - a first vehicle (3), on which the tank (1) is disposed in a removable manner;
- 10 the assembly also comprising:
 - a container (2) which is able to simultaneously receive a plurality of tanks (1) to be emptied, the container (2) comprising side walls (21, 22, 23, 24) and a bottom wall (25);
- 15 - means (4) for transferring the tank from the first vehicle (3) into the container (2) and vice versa;
- locking means (5), provided on a wall of the container (2), for reversibly locking the tank (1) to the container (2);
- 20 - a second vehicle (9), heavier and more voluminous than the first vehicle (3), on which the container (2) is mounted in a removable manner, when it contains a number of full tanks, in order then to move it to an area (50) for unloading waste; and
- 25 - first tipping means (6) for tipping the tank (1), then locked to the container (2), in order to empty the tank (1) outside the container (2), either through the receiving opening (10) or through another opening (110) in the tank (1), the emptying taking place:
- 30 * by tipping the tank (1) with respect to the container (2),
 * and/or by tipping the container (2),

characterized in that the transfer means (4) comprise:

- a support (41) for the tank, said support (41) being mounted so as to be able to move on the first vehicle (3) between an advanced position on the vehicle, for filling
5 the tank (1) with waste through said receiving opening, and a moved-backoverhanging position with respect to the first vehicle (1), for transferring the tank (1) to the container (2); and
- second tipping means (42) mounted partially on the first
10 tipping means (6) and on the container (2), for tipping the tank in the moved-back overhanging position.

2. Assembly according to Claim 1, wherein the container comprises at least one passage (26), made in at least one
15 of the side walls (21, 22, 23, 24), for transferring the tank (1) into the container (2), onto the bottom (25) thereof, via the transfer means (4).

3. Assembly according to Claim 1 or 2, wherein:

- 20 - the first vehicle (3) is provided with a power source which exclusively supplies energy to the means (4) for transferring the tank, and/or:
 - the first vehicle (3) and the tank are designed such that only one tank (1) can be mounted on this first
25 vehicle (3); and
 - the second vehicle (9) and the container are designed such that only one container (2) can be mounted on this second vehicle (9); and
 - the container (2) and the tank are designed such that
30 the container receives a number of full tanks (1) to be emptied and to be transported via the second vehicle.

4. Assembly according to one of the preceding claims, wherein:

- the transfer means (4) are installed exclusively between the tank (1) and the first vehicle (3), and/or

5 - the first locking means (5) and the first tipping means (6) are installed exclusively between the tank (1) and the container (2).

10 5. Assembly according to one of the preceding claims, wherein the first (6) and second (42) means for tipping the tank (1) take action, for tipping the tank, respectively towards two different side walls of the container (2).

15 6. Assembly according to one of the preceding claims, wherein the first means (6) for tipping the tank (1) are mounted so as to be rotatable towards the top of one of said side walls carrying the first locking means (5), in order to tip the tank (1) over this wall (21, 22, 23, 24)
20 while it is being emptied, the first locking means (5) then preventing the tank from falling out of the container (2).

25 7. Assembly according to one of the preceding claims, which comprises pulling means which are fixable, in a separable manner, to the tank (1) disposed in the container (2) and are moved by a power source with which the second vehicle (9) is provided in order to mechanically actuate the pivoting of the first tipping
30 means (6) in order to empty the tank (1).

8. Assembly according to one of the preceding claims, wherein:

- the means (4) for transferring the tank place the tank in the container;

- 5 - and moving means (8), carried at least in part by the first vehicle (3), move the tank placed in the container (2) between the first vehicle (3) and a part, carried by the container (2), of the first tipping means.

10 9. Assembly according to one of the preceding claims, wherein the first tipping means (6):

- are moved by an energy source of the second vehicle;
- and comprise means for selecting a single tank (1) to be emptied from a number of tanks which are then disposed in
15 the container (2).

10. Assembly according to one of Claims 1 to 4, wherein the first tipping means (6') are disposed between the container (2') and the second vehicle (9') and are moved
20 by an energy source (300') of the second vehicle.

11. Assembly according to one of Claims 1 to 3 or one of these claims and Claim 11, wherein:

- 25 - second tipping means (42', 420', 421', 422') are mounted partially on the first vehicle (3') and/or between the tank (1') and the container (2') in order to tip the tank;
- a lift plate (41'), which is mounted so as to be able to tip on the first vehicle, tips the tank via the second tipping means (420'); and
30 - the container (2') and the tank are designed such that the container receives a number of full tanks (1'), which are stacked in the container via the lift plate.

12. Assembly according to one of the preceding claims, wherein the first vehicle (3) comprises a hopper (31) for collecting and loading the waste in the tank, the hopper
 5 being able to be connected to means for compressing the collected waste, said compression means being mounted in a movable manner with respect to the tank (1), which is then disposed on this first vehicle (3), in order to compress the waste therein.

10

13. Method for the collection and disposal of waste, in particular household waste, in an urban or periurban area, the method comprising steps in which:

a) waste is collected in a tank mounted in a removable
 15 manner on a first type of vehicle (3);

b) the first type of vehicle (3) moves the full tank to a container (2) designed to receive a plurality of full tanks (1);

c) the tank (1) is transferred from the first type of
 20 vehicle into the container (2);

d) steps a) to c) are repeated at least once;

e) the container (2), which then contains a number of full tanks (1), is loaded onto a second type of vehicle (9), which is heavier and more voluminous than the first (3);

25 f) the second type of vehicle (9) carrying the container (2) is moved up to and immobilized in the vicinity of an unloading area (50); and

g) the tanks (1) are tipped out of the container (2) in order to empty them in the unloading area (50);

30 step c) furthermore comprising a step of transferring the tank (1) from the first type of vehicle into the container (2) exclusively by way of transfer means (4) installed

between the tank (1) and the first type of vehicle (3) and rolling the tank in the container.

14. Method according to Claim 13, wherein the transfer of
5 the tanks from the first type of vehicle (3) to the container (2) comprises a step of lifting and/or tipping at least one of the tanks (1).

15. Method according to either of Claims 13 and 14,
10 wherein:

- the means (4) for transferring the tank (1) are supplied with energy, in order to manoeuvre them, exclusively from a power source (300) with which the first vehicle (1) is provided; and/or
- 15 - the first tipping means (6) are supplied with energy, in order to manoeuvre them, exclusively from a power source (300') with which the second vehicle is provided.

16. Method according to Claim 16 or Claims 14 and 15,
20 wherein:

- in order to supply energy, said power source (300) with which the first vehicle (3) is provided is weaker than that (300') with which the second vehicle (9) is provided,
- and, in order to collect the waste in the tank, the
25 first type of vehicle (3) is selected such that only one tank (1) can be mounted thereon.