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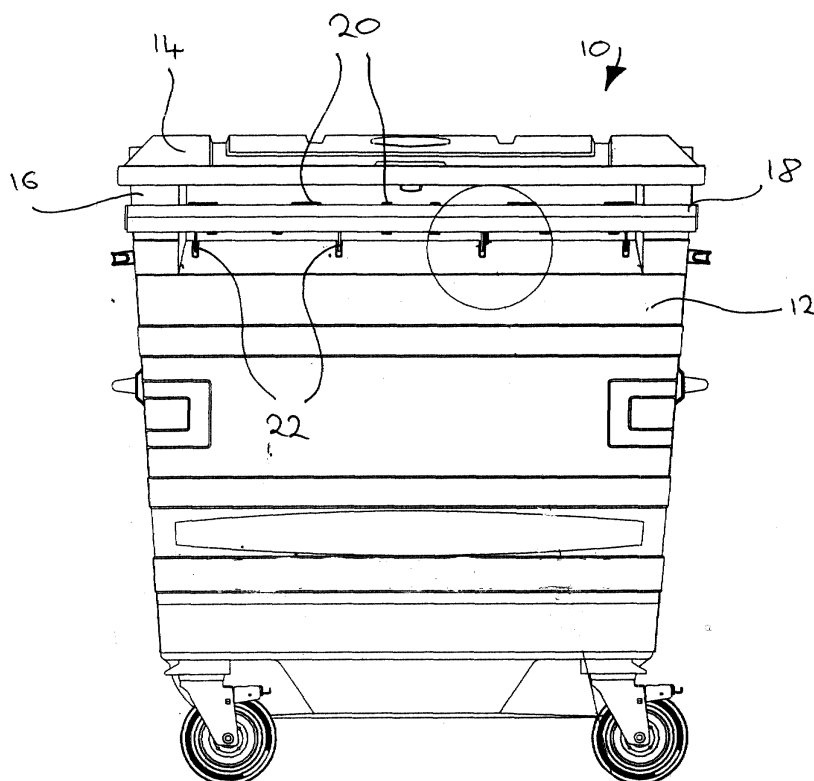
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(54) **Container identification**

(57) A refuse container 10, figure 1, includes a comb bar 18 having spaced gusset plates 22. A transponder assembly 30 is attached to one of the gusset plates 22

and shielded by the comb bar 18. The comb bar 18 protects the transponder assembly 30 from damage due to rough handling of the container 10, and from environmental factors such as rain and direct sunlight.



**Fig. 1**

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## Description

**[0001]** The present invention relates to the electronic identification of containers and in particular, though not exclusively, to containers for use in refuse collection.

**[0002]** It has been proposed to charge for refuse disposal by weight of refuse generated. In order for such a system to be effective there must be reliable identification of individual refuse containers to enable the charge to be made to the correct individual or business. While such identification can be made manually, for example by manually logging a reference number on a container before it is emptied, it is preferable that identification is carried out electronically and automatically during an emptying procedure.

**[0003]** One solution is to embed in a container a passive electronic transponder which carries sufficient information to identify the bin. The transponder is interrogated by a suitable antenna provided on a refuse collection vehicle when the container is emptied, and the identity of the container logged by software on the vehicle.

**[0004]** Embedding the transponder in the container typically requires a recess to be made in the container, for example by drilling or moulding, followed by the securing of the transponder therein with, for example, adhesive. The retrofitting of transponders to existing containers can lead to problems such as the interruption of any anticorrosive barrier of the container and the weakening of the structural integrity of the container. The fitting of transponders in this manner to new containers increases the unit manufacturing cost. Furthermore the transponders must not be placed in a location which is shielded from the antenna by structure of the vehicle or the container itself. Yet another difficulty is that the transponder location must be suitable for use with many different kinds of container emptying apparatus.

**[0005]** According to a first aspect of the present invention there is provided a refuse container having an identification transponder, the container having a comb bar adapted to receive a lifting comb of a refuse collection vehicle, and a plurality of gusset plates extending between the comb bar and the container, wherein the identification transponder is provided on one of said gusset plates.

**[0006]** Providing the identification transponder on a gusset plate has the following advantages. The transponder can be hidden from view and hence is less likely to be tampered with or vandalised. It is protected by the comb bar from possible damage as a result of a collision of the container with another object, and also from refuse being placed in the container. The comb bar protects the transponder from environmental factors such as direct sunlight and rain. The gusset is at chest height and thus easily accessible should a hand-held antenna be used to interrogate the transponder, nevertheless it is below the normal eye line.

**[0007]** The transponder is operable to provide information relating to the identity of the container in response to a signal sent by suitable antenna means. Typically the antenna means are provided on a lifting comb of a refuse collection vehicle, or on the support structure of the lifting comb. By positioning the transponder on the gusset it can be in close proximity to such an antenna, yet retain the advantages noted above.

**[0008]** The comb bar of a typical refuse container is provided with several gusset plates, two of which have a standard spacing, typically 300 mm, about the container centre. In a preferred embodiment the transponder is provided on one of these gusset plates. Such a position further acts to protect the transponder from damage due to end impacts which may be received by the comb bar.

**[0009]** According to a second aspect of the present invention there is provided a refuse container having an identification transponder, said identification transponder being adapted to provide information in response to a signal sent by antenna means of a refuse collection vehicle, wherein said transponder is mounted to a surface of said container and aligned with respect to a surface feature of said container so as to ensure, in use, alignment of the transponder with respect to the antenna and reception of said signal.

**[0010]** In a preferred embodiment the transponder is provided with alignment means which enable it to be correctly aligned with said surface feature. The alignment means may be defined by an edge of a housing of the transponder or an extension thereof, for example a flange. The surface feature may be an edge or corner of the container or an edge or corner of a member extending from the container. By utilising the transponder or a housing thereof, and a feature of the container to position the transponder on the container, the need for accurate measurement and marking of the container before application of the transponder is eliminated.

**[0011]** Preferably the transponder is mounted on a portion of the container adapted to receive lifting apparatus of a refuse collection vehicle. This ensures the close proximity of the transponder to the collection vehicle in use. More specifically the transponder may be mounted on a support member or reinforcement for said portion adapted to receive lifting apparatus.

**[0012]** Typically a refuse container is provided with a comb bar having reinforcing gusset plates extending between the comb bar and the container. In a preferred embodiment the transponder is provided on one of the gusset plates. In such an embodiment the surface feature may be an edge of the gusset plate. Preferably the transponder is positioned on the gusset plate so as to be shielded from accidental damage and environmental factors, such as sunlight and rain, by the comb bar.

**[0013]** An embodiment of the present invention will now be described with reference to the accompanying drawings in which:

**[0013]** An embodiment of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a side view of a wheeled refuse con-

tainer; and

Figure 2 shows a cross-section side view of a portion of the container ringed in Figure 1 and a lifting comb.

**[0014]** Referring to the figures there is shown a refuse container, generally designated 10, which comprises a generally rectangular steel body 12 and a hinged lid 14. Along an upper edge 16 of the body 12 there is provided a comb bar 18. The comb bar 18 which, as can be seen in figure 2, is generally "L" shaped in cross-section and has a downward facing lip 24. The comb bar 18 is attached to the body 12 by spaced welds 20.

**[0015]** In other constructions, the comb bar may be mechanically attached in other ways (for example by rivets) or may be formed integrally (as in the case of containers moulded in plastics material).

**[0016]** Typically, four gusset plates 22 are provided between the comb bar 18 and the body 12 to both strengthen the bar 18 and to assist in its location relative to the body 12 if attached by welding. The number of gusset plates 22 may, however, vary; two or eight such plates are found on some containers.

**[0017]** The container 10 is configured so as to be lifted, in use, by lifting apparatus of a refuse collection vehicle. Typically the collection vehicle is provided with a lifting comb 26 which has a plurality of teeth 28 adapted to engage the underside 42 of the comb bar 18. The teeth 28 are spaced so as not to foul the gusset plates 22 during a lifting operation.

**[0018]** Attached to one of the gusset plates 22 is a transponder assembly 30. The assembly 30 comprises a transponder 32 and a housing 34 which is attached by adhesive to the gusset plate 22. In the embodiment shown, an edge 36 of the housing 34 is aligned with an edge 40 of the gusset plate 22. The transponder housing 34 may be manufactured from a plastics material within which the transponder 32 is embedded. In an alternative embodiment the housing 34 may be provided with an extension or flange having an edge which is alignable with an edge of a gusset plate 22.

**[0019]** The siting of the transponder assembly 30 on the gusset plate 22 is advantageous for a number of reasons. Firstly, the overhanging comb bar 18 and the gusset plate 22 act as a shield for the transponder assembly 30 and thus reduce the possibility of the assembly 30 being damaged during handling of the container 10. The comb bar 18 and gusset plate 22 also act to shelter the transponder assembly 30 from environmental elements such as rain and direct sunlight. As the transponder assembly 30 is attached to the gusset plate 22, the possibility of it being damaged during lifting of the container is also reduced for, as described above, the teeth 28 of the lifting comb 26 are spaced so as not to engage the gusset plates 22.

**[0020]** The use of adhesive to attach the transponder housing 34 to the gusset plate 22 eliminates the need to drill the container 10 to provide a recess to house the

transponder assembly 30, and enables the simple fitting of transponder assemblies 30 to containers during manufacture and retrofitting of existing containers. Attachment by fasteners such as screws and rivets is however also possible.

**[0021]** To interrogate the transponder 32, a refuse collection vehicle is provided with an antenna operable to send an interrogation signal. Typically, the antenna is sited on the lifting apparatus of the refuse collection vehicle to ensure the close proximity of the transponder and antenna, in use. To ensure adequate reception of the interrogation signal by the transponder 32, it is known to orient the transponder 32 at an angle of between 40 and 50 degrees to the antenna, and preferably 45 degrees as indicated by arrow 38. The provision of the edge 36 on the transponder housing 34 ensures that the housing 34 can be accurately positioned without the need for measurement and marking of the gusset plate 22 before attachment of the housing 34 thereto. The transponder 32 is not, of course, necessarily perpendicular to the edge 36, as illustrated in the drawing.

**[0022]** Whilst this description relates to a four wheeled refuse container, the invention is equally applicable to other kinds of container having a comb bar, and particularly to the smaller two wheeled domestic type of container.

## Claims

1. A refuse container (10) having an identification transponder (32), said identification transponder (32) being adapted to provide information in response to a signal sent by antenna means of a refuse collection vehicle, wherein said transponder (32) is mounted to a surface of said container (10) and aligned with respect to a surface feature of said container (10) so as to ensure, in use, alignment of the transponder (32) with respect to the antenna and reception of said signal.
2. A refuse container (10) as claimed in claim 1 wherein the transponder (32) is provided with alignment means which enable it to be correctly aligned with said surface feature.
3. A refuse container (10) as claimed in claim 2 wherein the alignment means are defined by an edge (36) of a housing (34) of the transponder (32).
4. A refuse container (10) as claimed in claim 2 wherein the alignment means are defined by an extension of the housing (34) of the transponder (32).
5. A refuse container (10) as claimed in any preceding claim wherein the surface feature is an edge of the container (10).

6. A refuse container (10) as claimed in any preceding claim wherein the transponder (32) is mounted on a portion of the container (10) adapted to receive lifting apparatus of a refuse collection vehicle. 5
7. A refuse container (10) as claimed in claim 6 wherein the transponder (32) is mounted on a support member for said portion adapted to receive lifting apparatus. 10
8. A refuse container (10) as claimed in claim 7 wherein the transponder (32) is provided on a gusset plate (22) of a comb bar (18). 15
9. A refuse container (10) having an identification transponder (32), the container (10) having a comb bar (18) adapted to receive a lifting comb of a refuse collection vehicle, and a plurality of gusset plates (22) extending between the comb bar (18) and the container (10), wherein the identification transponder (32) is provided on one of said gusset plates (22). 20
10. A refuse container (10) as claimed in claim 9 wherein the transponder (30) is shielded by the comb bar (18). 25
11. A refuse container (10) as claimed in claim 9 or claim 10 wherein the comb bar (18) is provided with several gusset plates (22), two of which are spaced about the container centre, the transponder (32) being provided on one of said centre gusset plates (22). 30

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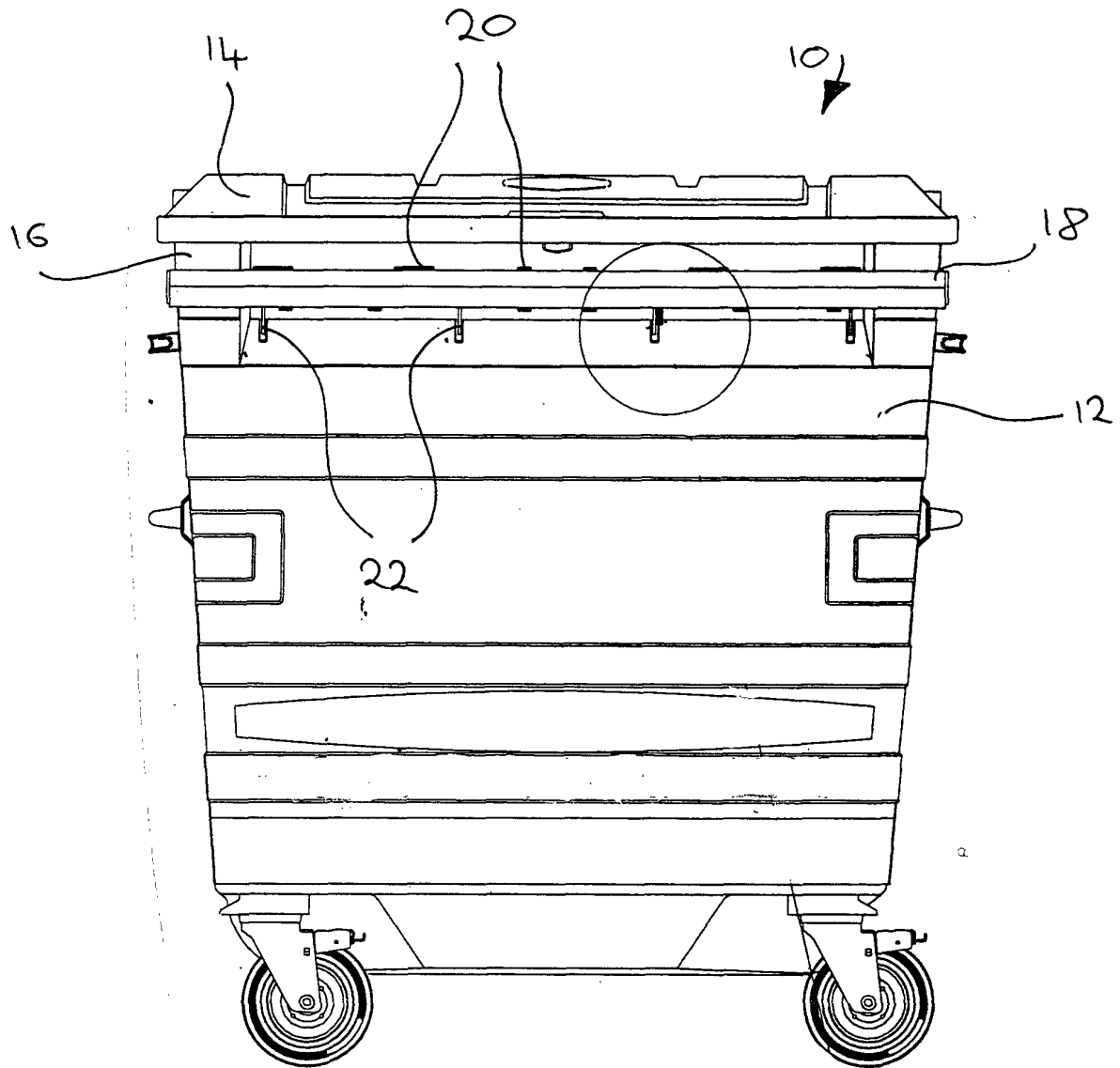


Fig. 1

