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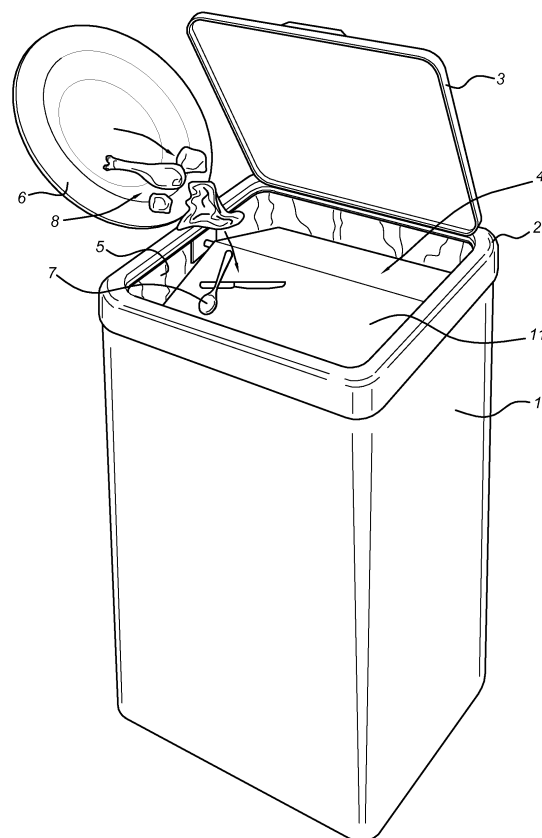
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(54) **Retaining device for retaining magnetisable objects and refuse receptacle provided with a retaining device of this type.**

(57) The invention relates to a retaining device (4) for retaining a magnetisable object (7) which has been thrown in a waste bin (1). The retaining device (4) comprises a retaining body (12) and a pivot pin (13). The retaining body (12) is in the shape of a saddle roof. The retaining body (12) is mounted on the pivot pin (13) at the ridge (17) of the saddle roof so as to be able to pivot to and fro about the pivot pin (13). The retaining body (12) is provided at the longitudinal edges (18) which are turned away from the ridge (17) with a magnet element (20) in order to detain, by means of magnetic attraction, said magnetisable object (7) which slides along the roof surface (14,15) in the direction of inclination. The invention furthermore relates to a waste bin (1) provided with a retaining device (4) according to the invention.

Fig 1



Description

[0001] The present invention relates to a retaining device for retaining a magnetisable object which has been thrown into a refuse receptacle.

[0002] One of the problems encountered in the hotel, restaurant and catering trade, as well as in canteens, is that when food remains are thrown away, the cutlery is inadvertently also thrown away. This problem occurs in particular in the hotel, restaurant and catering trade and in canteens where meal trays are used, which are emptied over a waste bin. However, the problem also occurs with plates containing food remains, which are emptied over a dustbin.

[0003] In this context, it is known to position magnets at the inlet passage of a refuse receptacle which then retain magnetisable objects which are inadvertently thrown away. Thus, it is possible to retain cutlery and other objects which contain a magnetisable material. The cutlery or other object is attracted by the magnet and can subsequently be removed again without having ended up in the refuse receptacle itself.

[0004] Examples of such systems can be found, inter alia, in US 4,782,970, WO 03/018441, US 6,129,213, US 4,494,657 and US 4,706,818. All these systems comprise a lid design with an inlet chute or inlet funnel which leads to an inlet passage. The inlet passage in turn ends in the interior of the refuse receptacle. The material to be thrown away, such as food remains, is deposited in the inlet chute or inlet funnel and guided to the inlet passage by the inlet chute/inlet funnel.

[0005] In the case of publication US 4,782,970, a rectangular inlet duct defining the inlet passage is provided, as are magnets which are positioned along opposite side walls of said duct.

[0006] In the case of publications WO 03/018441 and US 6,129,213, magnets are provided along the bottom of the immovably fixed inlet chute leading to the inlet passage.

[0007] In the case of publications US 4,706,818 and US 4,494,657, magnets are provided which extend substantially horizontally through the passage area of the inlet opening. A funnel is arranged around the inlet opening in order to guide the material to the inlet opening.

[0008] In US 4,706,818, two tubular magnet elements are provided, which are immovable and extend in the horizontal direction through a round inlet duct.

[0009] In US 4,494,657, an elongate horizontally extending magnetic retaining element is provided in the inlet passage below the disposal aperture. The magnetic retaining element in this case comprises a shaft made of a non-magnetic material, on which spaced-apart pairs of metal plates in the shape of an equilateral triangle are provided. Between each pair of metal plates in each case one magnet is provided. The central shaft in this case runs through the centre of the metal plates. The triangular metal plates can be rotated about the longitudinal axis of the shaft. The triangular plates are magnetic on ac-

count of the magnets between each pair of plates.

[0010] The systems comprising an inlet chute have the drawback that they require the modification of the entire lid of the refuse receptacle, which makes this retaining device unsuitable for use with refuse receptacles if it is envisaged to use the associated original lid. Providing magnets in the bottom of the inlet chute furthermore has the drawback that when a magnetisable object has been retained by the magnet, said retained object forms an obstacle for the expedient discharge of further waste via the inlet chute to the inlet passage. In this case, it is even conceivable that the further waste nevertheless pushes the initially retained magnetic object further down the discharge chute through the discharge passage. The magnetic object to be retained will then still have ended up in the refuse receptacle.

[0011] Refuse receptacles which are provided with magnets in the walls of the inlet duct, as is the case with US 4,782,970, and refuse receptacles in which magnet elements extend horizontally between the walls of the inlet duct basically have the same drawback. Magnetic objects retained by the magnets form impediments for further waste to pass through and may, in addition, also be pushed down further by the further waste and still end up in the refuse receptacle.

[0012] In the case of the system according to US 4,494,657, the elongate retaining element is arranged in such a manner - see column 6, lines 49-52 - that the entire stream of material is forced to engage with the magnetic retaining element. This means that all objects made of magnetic material would be retained, as indeed intended. However, this design has a number of serious drawbacks. Firstly, elongate objects, such as cutlery, the longitudinal axis of which is at right angles to the pivot pin, can be caught by the triangular plates magnetised by the magnets. In this situation, some rotation about the shaft of the retaining element may take place, but the inlet opening will essentially immediately become blocked. In case an elongate object, such as a piece of cutlery, the longitudinal direction of which is substantially parallel to the axis of the retaining element, is retained against the side edges of the triangular plates - which is not likely in practice since the magnetic force will be too small there - then the retaining element will rotate on account of the weight of the retained object so that the retained object will be suspended from it, as it were. However, waste which follows directly behind the retained objects will easily knock this suspended object off, so that it still ends up in the refuse receptacle. Furthermore, it is the case that, when cutlery is thrown in the refuse receptacle inadvertently, this will usually be not just a single piece of cutlery, but generally two or more pieces of cutlery. As soon as the first piece of cutlery is retained and hangs from the retaining element, any further piece of cutlery which is retained in a corresponding manner will result in the triangular plates which still have an empty side becoming oriented in the horizontal direction. Thus, the flow of material through the inlet opening is blocked.

In order to remove the retained cutlery - should it not have been knocked off - from the retaining element, the waste which is situated on top of the retaining element has to be removed first, which is usually quite cumbersome. The retaining device disclosed in US 4,494,657 is therefore not reliable and if the object is retained at all, it is in this case cumbersome to effectively remove the object from the retaining element. There is a high risk that the initially retained object is knocked off during the removal of the other waste and ends up in the refuse receptacle.

[0013] It is an object of the present invention to provide an improved retaining device for retaining a magnetisable object thrown into a collecting receptacle, which retaining device according to the invention eliminates the drawbacks of the prior art retaining devices.

[0014] According to the invention, this object is achieved by providing a retaining device for retaining a magnetisable object which has been thrown into a refuse receptacle, such as a waste bin, comprising:

- a retaining body;
- a pivot pin;
- in which the retaining body is in the shape of a saddle roof;
- in which each roof surface of the saddle roof, viewed in the direction of inclination (A) of the respective roof surface, extends between the ridge of the saddle roof and a longitudinal edge turned away from the ridge;
- in which the retaining body is mounted on the pivot pin at the ridge of the saddle roof so as to be able to pivot to and fro about the pivot pin;
- in which the retaining body is provided at and along each longitudinal edge with a magnet element in order to detain, by means of magnetic attraction, said magnetisable object which moves along the respective roof surface in the direction of inclination (A).

[0015] The retaining body in the shape of a saddle roof in this case acts as a kind of guide surface along which the waste, which may contain a magnetisable object, is guided into the refuse receptacle. Under the effect of the weight of the waste, the saddle roof which is able, as it were, to pivot along the ridge, will be able to tilt in order to facilitate the flow of waste to the interior of the refuse receptacle. Now if there is a magnetisable object, such as a piece of cutlery, in the waste, then this will likewise be guided along a roof surface of the saddle roof. As each roof surface is provided with a magnet element at and along the longitudinal edges turned away from the ridge - in the case of a real roof, as it were the edges where the gutter is provided - the retained magnetisable object is retained at the bottom edge of the roof surface and the saddle roof thus tends to tilt further on account of the weight and thus assists the further flow of waste by increasing the passage therefor.

[0016] In order to increase the retaining force of the

magnet element, it is advantageous according to the invention if each magnet element is composed of a row of magnets, in which each magnet has a N-Z centre axis which extends parallel to the longitudinal edge, and in which the corresponding poles of adjacent magnets in the row are in each case turned towards one another. In this context, the term N-Z centre axis is understood to mean the north/south centre axis, which extends from the north pole to the south pole of the magnet. Turning the corresponding poles of adjacent magnets in the row of magnets towards one another - that is to say the north pole of one magnet will be turned towards the north pole of the adjacent other magnet or the south pole of one magnet will be turned towards the south pole of the adjacent other magnet - achieves the effect that the magnetic field strength along the row remains strong along the entire length of the row. If the magnets were placed in a row with the north poles facing the south poles, then the magnetic field lines would run from the ends of the row in an arc along the row towards one another, with the concentration of the field lines - and thus the magnetic field strength - in the centre of the row being relatively small, resulting in a relatively low retaining force in the centre of the row.

[0017] According to the invention, it is furthermore advantageous if, on the side of each row of magnets which is turned away from the roof surface, a strip of ferromagnetic material is provided, so that the magnetic field force is greater on the side of the row which faces the roof surface than on the side of the row which is turned away from the roof surface. As a result thereof, the magnetic attraction is greatest on the top side of the roof surface. This prevents that a magnetisable object, which partly projects beyond the bottom edge (gutter edge) of the roof surface, can topple over the bottom edge of the roof surface on account of magnetic forces prevailing on the underside of the roof surface. This could, for example, be caused by further waste which is deposited in the refuse receptacle. This also reduces the risk of a retained magnetisable object becoming stuck exactly along the bottom edge/gutter edge of the roof surface where it is relatively susceptible to being pushed off the roof surface by further waste deposited in the refuse receptacle.

[0018] In this case, it is furthermore advantageous if the magnetic field force is at least twice as large on the side of the row which faces the roof surface as on the side of the row which is turned away from the roof surface.

[0019] In order to make it possible to retain magnetisable objects along the entire roof surface, it is advantageous according to the invention if the magnet element extends along substantially the entire longitudinal edge.

[0020] In order to make it possible to install the retaining device in a refuse receptacle easily and to readily remove it therefrom for the purpose of, for example, cleaning, it is advantageous according to the invention if the pivot pin, at its free ends, has supports in order to be supported on an edge, such as the top edge of the wall of a refuse receptacle. Thus, the retaining device accord-

ing to the invention can easily be placed inside the top of a refuse receptacle by placing it on the top edge of the wall of a refuse receptacle by means of the supports. If desired, the usual lid construction associated with the respective refuse receptacle can simply be placed on the refuse receptacle when the retaining device according to the invention is suspended therein. In this case, it is advantageous according to the invention if the supports have an L-shaped or U-shaped cross section. In the case of an L-shaped cross section, one leg of the L will point downwards in the vertical direction and the other leg of the L will be in line with the shaft, in the horizontal direction. A support of this type can be supported on many kinds of edges. If desired, the support can also be of a U-shaped design. However, in that case, the legs of the U-shape have to be sufficiently wide apart in order to accommodate the edge therebetween on which the retaining device is supported. In addition, the L-shaped or U-shaped supports make it easy to displace the retaining device along the edge on which it is supported, in a direction transverse to the longitudinal direction of the pivot pin. Thus, the position of the retaining device can be adjusted.

[0021] With the retaining device according to the invention, it is furthermore advantageous if the pivot pin is of a telescopic design so that the length thereof is adjustable. This makes it possible to match the length of the pivot pin to the width of the inlet passage of the refuse receptacle in which the retaining device is to be fitted. Such a telescopic pivot pin can be designed in many different ways. In this case, it is advantageous according to the invention if the pivot pin comprises a central tube part with a shaft part at both ends, which shaft parts are displaceable in the tube part. Thus, the pivot pin can be adjusted at both ends and the position of the retaining device in the inlet passage of the refuse receptacle can be more readily adjusted.

[0022] According to the invention, it is furthermore advantageous if the retaining body is displaceable along the pivot pin. Thus, the position of the retaining body with respect to the inlet passage of the refuse receptacle can be adjusted in the longitudinal direction of the pivot pin.

[0023] With the invention, it is advantageous if the roof surfaces between them enclose an angle which, on the one hand, is 90° or greater, preferably 120° or greater, and, on the other hand, is 160° or smaller, preferably 150° or smaller. The angle enclosed by the roof surfaces is thus in the range of 90-160° or 90-150° or 120-160° or 120-150°. The angle enclosed by the roof surfaces may be, for example, approximately 135°. On the one hand, it is important that the roof surfaces are not excessively steep, as the waste otherwise passes through much too easily, even at a neutral position. This determines the lower threshold of at least 90°. In practice, it was found that 90° (at which each roof surface is at an angle of 45° with respect to the vertical) is at a relatively steep angle, but still works well. Preferably, the lower threshold of the angle enclosed by the roof surfaces is therefore 120°,

that is to say, in the starting position, each roof surface is at an angle of 30° with respect to the horizontal. On the other hand, it is important in this case that there is an already sufficiently steep initial incline in the starting position since the waste would otherwise not have a tendency to slide along the roof surface and could remain stuck (if the saddle roof remains balanced). This results in a maximum angle of approximately 160° enclosed by the roof surfaces, which is preferably at most 150°.

[0024] In order to concentrate the magnetic effect as much as possible around the magnet elements, it is advantageous according to the invention if the roof surfaces are made of a non-magnetisable material.

[0025] In order to further improve the magnetic action of the retaining device according to the invention, it is advantageous according to the invention if the retaining device is substantially - that is to say except for the magnet elements and the optional ferromagnetic strip underneath - made from a non-magnetisable material.

[0026] According to a further aspect, the invention relates to a refuse receptacle, such as a waste bin, having an inlet passage, in which a retaining device according to the invention is provided in the inlet passage.

[0027] The present invention will be explained below with reference to an exemplary embodiment which is illustrated diagrammatically in the drawing, in which:

Fig. 1 shows a diagrammatic, perspective view of a refuse receptacle according to the invention;

Fig. 2 shows a diagrammatic, perspective view of the disposal passage of the refuse receptacle from Fig. 1, but with the lid removed; and

Fig. 3, in the direction indicated by arrow III from Fig. 2, a diagrammatic top view of a retaining device according to the invention;

Fig. 4 shows a diagrammatic, perspective view of the retaining device according to Fig. 3.

[0028] Figs. 1 and 2 show a refuse receptacle 1 in the shape of a waste bin provided with a bin liner 5. As illustrated in Fig. 1, the refuse receptacle 1 is provided with a lid construction having a lid frame 2, to which a lid 3 is hingedly attached. The lid frame 2 rests on the top edge 9 of the refuse receptacle. In the inlet passage, in this case a disposal passage 11, of the refuse receptacle 1, a retaining device 4 according to the invention is provided. This retaining device 4 is provided with supports 10 having an L-shaped cross section. With a vertical limb of the L-shape, these supports rest against the inside of the wall of the refuse receptacle 1 and with a horizontal limb of the L-shape, these supports 10 rest on the top edge 9 of the refuse receptacle 1.

[0029] As Fig. 1 furthermore shows, it is possible, once the lid 3 has been opened, to throw food remains 8 from a plate 6 into the refuse receptacle 1 via the disposal

passage 11. If there are still pieces of cutlery 7 between the food remains 8, they will also be thrown from the plate 6 through the disposal passage 11. These pieces of cutlery 7 are retained by the magnet elements of the retaining device 4 which are still to be described. If these pieces of cutlery 7 were not retained, they would end up in the interior of the refuse receptacle 1, together with the remainder of the waste and be disposed of together with the rest of the waste, resulting in an economic loss.

[0030] The retaining device according to the invention will now be described in more detail with reference to Figs. 3 and 4. The retaining device 4 according to the invention is substantially composed of a retaining body 12 and a pivot pin 13. The retaining body 12 is preferably substantially made of stainless steel and/or galvanised steel, at least all external surfaces of the retaining body will preferably be made of stainless steel and/or galvanised steel. The reason for this is that stainless steel and galvanised steel can be cleaned in a simple and hygienic way, even after prolonged use, which is desirable for applications in the hotel, restaurant and catering trade and canteens. In addition, many grades of stainless steel, in particular the good grades, are not magnetic. As can readily be seen in particular in Fig. 4, but also in Figs. 1 and 2, the retaining body 12 has the shape of a saddle roof. The saddle roof has two roof surfaces 14 and 15 which enclose an angle α . Each of the roof surfaces 14 and 15, in the neutral position of the retaining body 12, extends at the same angle β with respect to the horizontal 16. The relation between the angles α and β is defined as $180^\circ = \alpha + 2\beta$. In this exemplary embodiment, the angle β is approximately 22° .

[0031] Each roof surface 14, 15 extends in a direction of inclination A of the respective roof surface 14, 15 between the ridge 17 of the saddle roof 12 and a longitudinal edge 18 turned away from the ridge 17. In the case of a real roof on a building, the longitudinal edge 18 would be the edge where the gutter is provided and is therefore also referred to as the gutter edge of the saddle roof 12.

[0032] The retaining body 12 in the shape of a saddle roof is substantially composed of a hollow box with stainless-steel walls.

[0033] The pivot pin 13 has a pivot axis 19 which extends along the ridge 17 of the saddle roof. A magnet element 20 is provided along the longitudinal edges/gutter edges 18 of each roof surface 14, 15. This magnet element is provided inside the retaining body, so that the magnet element 20 is protected from waste which passes along the retaining body. Each magnet element 20 is in this case composed of a row of magnets 21, 22 and 23. As is indicated in Figs. 3 and 4 by means of the letters N and Z, the corresponding poles of the magnets which are adjacent to one another in the row are in this case turned towards one another. The south pole of magnet 21 is thus turned towards the south pole of magnet 22. The north pole of magnet 22 is turned towards the north pole of magnet 23. Thus, the concentration of the magnetic field strength lines along the row 20 is increased in

the longitudinal direction of the row of magnets 20. In order to make the magnetic field strength of rows 20 of magnets 21, 22, 23 on the underside of said rows 20 (the side of the row turned away from the roof surface 14, 15) smaller than the magnetic field strength on the top side of the rows 20 of magnets 21, 22, 23 (the side of the row turned towards the roof surface 14, 15), the rows 20 of magnets 21, 22, 23 are arranged on a strip 24 of ferromagnetic material, in particular steel plate having a thickness of approximately 8 mm.

[0034] In the embodiment illustrated in Figs. 3 and 4, the pivot pin 13 is designed as a central tube part 25 with a shaft part 26 at both ends which can be displaced therein. Thus, as is indicated by means of double arrows in Fig. 3, the distance between the supports 10 and the retaining body 12 can be adjusted. As a result, the position of the supports can be adjusted depending on the width of the disposal passage 11 of the refuse receptacle 1. The central tube part 25 may be one long tube part which extends from one side of the retaining body 12 to the other side, but may also comprise two separate tube elements. As has been indicated in Fig. 2 by means of the double arrow, the supports 10 can also be displaced in a direction transverse to the pivot pin along the top edge 9 of the refuse receptacle 1.

[0035] It will be clear that various variants and modifications can be made to the refuse receptacle and retaining device illustrated in Figs. 1-4 without departing from the scope of the invention defined in the subclaims. Thus, for example, it is not necessary for the refuse receptacle to have a lid construction 2, 3. Furthermore, the retaining body may be of a different design.

Claims

1. Retaining device (4) for retaining a magnetisable object (7) which has been thrown into a refuse receptacle (1), such as a waste bin, comprising:

a retaining body (12);
 a pivot pin (13);
 in which the retaining body (12) is in the shape of a saddle roof;
 in which each roof surface (14, 15) of the saddle roof, viewed in the direction of inclination (A) of the respective roof surface (14, 15), extends between the ridge (17) of the saddle roof and a longitudinal edge (18) turned away from the ridge (17);
 in which the retaining body (12) is mounted on the pivot pin (13) at the ridge (17) of the saddle roof so as to be able to pivot to and fro about the pivot pin (13);
 in which the retaining body (12) is provided at and along each longitudinal edge (18) with a magnet element (20) in order to detain, by means of magnetic attraction, said magnetisable

ble object (7) which moves along the respective roof surface (14, 15) in the direction of inclination (A).

2. Retaining device (4) according to Claim 1, in which each magnet element (20) is composed of a row of magnets (21, 22, 23); in which each magnet has a N-Z centre axis which extends parallel to said longitudinal edge (18); in which the corresponding poles of adjacent magnets in the row are in each case turned towards one another. 5
3. Retaining device (4) according to Claim 2, in which, on the side of each row of magnets (21, 22, 23) which side is turned away from the roof surface (14, 15), a strip (24) of ferromagnetic material is provided, so that the magnetic field force is greater on the side of the row (20) which faces the roof surface (14, 15) than on the side of the row (20) which is turned away from the roof surface (14, 15). 10 15 20
4. Retaining device (4) according to Claim 3, in which the magnetic field force, on the side of the row (20) turned towards the roof surface (14, 15), is at least twice as large as on the side of the row (20) which is turned away from the roof surface (14, 15). 25
5. Retaining device (4) according to one of the preceding claims, in which the magnet element (20) extends along substantially the entire longitudinal edge (18). 30
6. Retaining device (4) according to one of the preceding claims, in which the pivot pin (13), at its free ends, has supports (10) in order to be supported on an edge (9), such as the top edge of the wall of a refuse receptacle (1). 35
7. Retaining device (4) according to Claim 6, in which said supports (10) have an L-shaped or U-shaped cross section. 40
8. Retaining device (4) according to one of the preceding claims, in which the pivot pin (13) is of a telescopic design so that the length thereof is adjustable. 45
9. Retaining device (4) according to Claim 8, in which the pivot pin (13) comprises a central tube part (25) with a shaft part (26) at both ends which shaft parts are displaceable in the tube part. 50
10. Retaining device (4) according to one of the preceding claims, in which the retaining body (12) is displaceable along the pivot pin (13).
11. Retaining device (4) according to one of the preceding claims, in which the roof surfaces (14, 15) between them enclose an angle which, on the one hand, is 90° or greater, preferably 120° or greater,

and, on the other hand, is 160° or smaller, preferably 150° or smaller.

12. Retaining device (4) according to one of the preceding claims, in which the roof surfaces (14, 15) are made of a non-magnetisable material.
13. Retaining device (4) according to one of the preceding claims, in which the retaining device (4) is substantially made of a non-magnetisable material.
14. Refuse receptacle (1), such as a waste bin, having an inlet passage (11), in which a retaining device (4) according to one of the preceding claims is provided in the inlet passage (11).

Fig 1

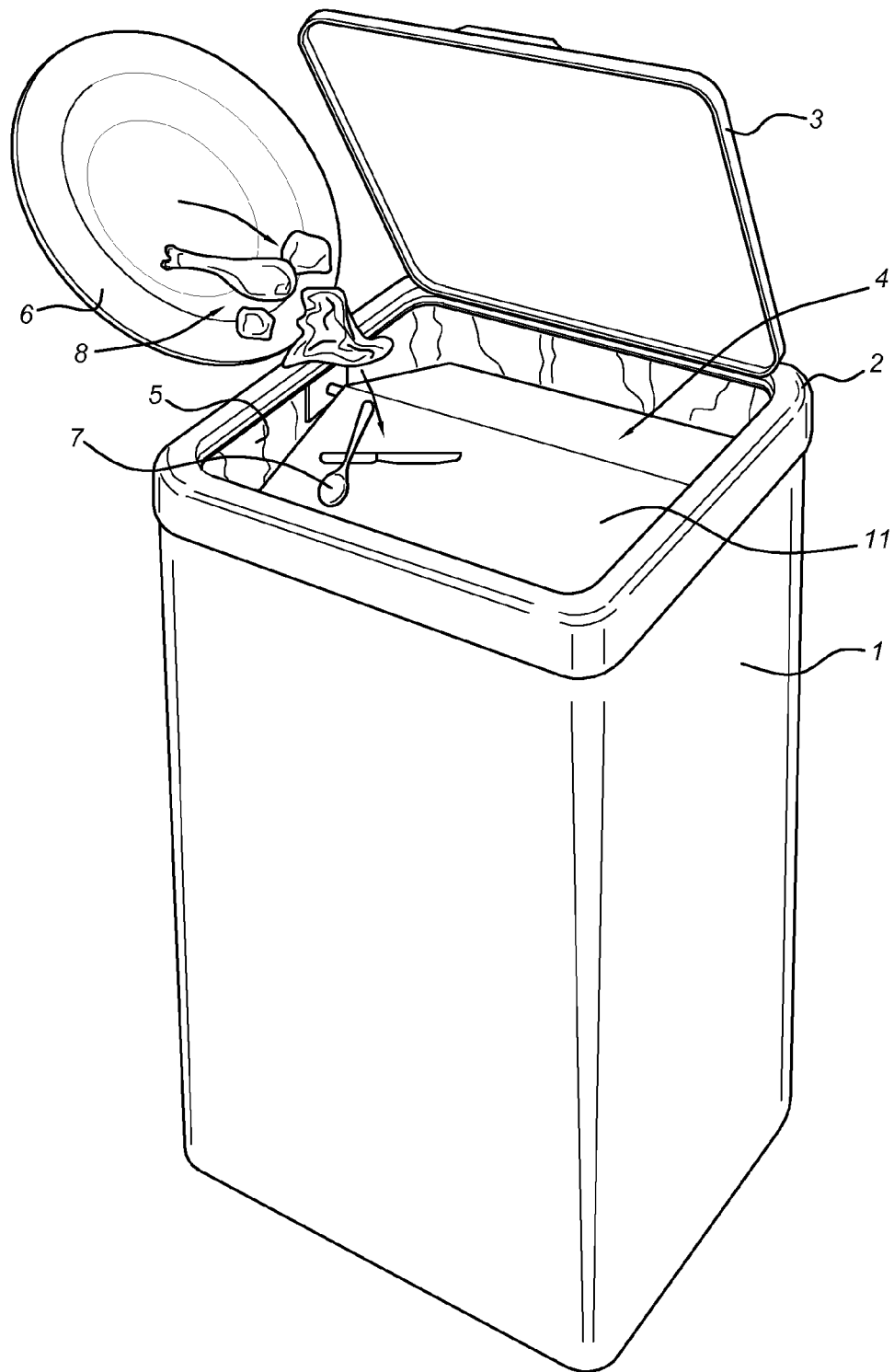


Fig 2

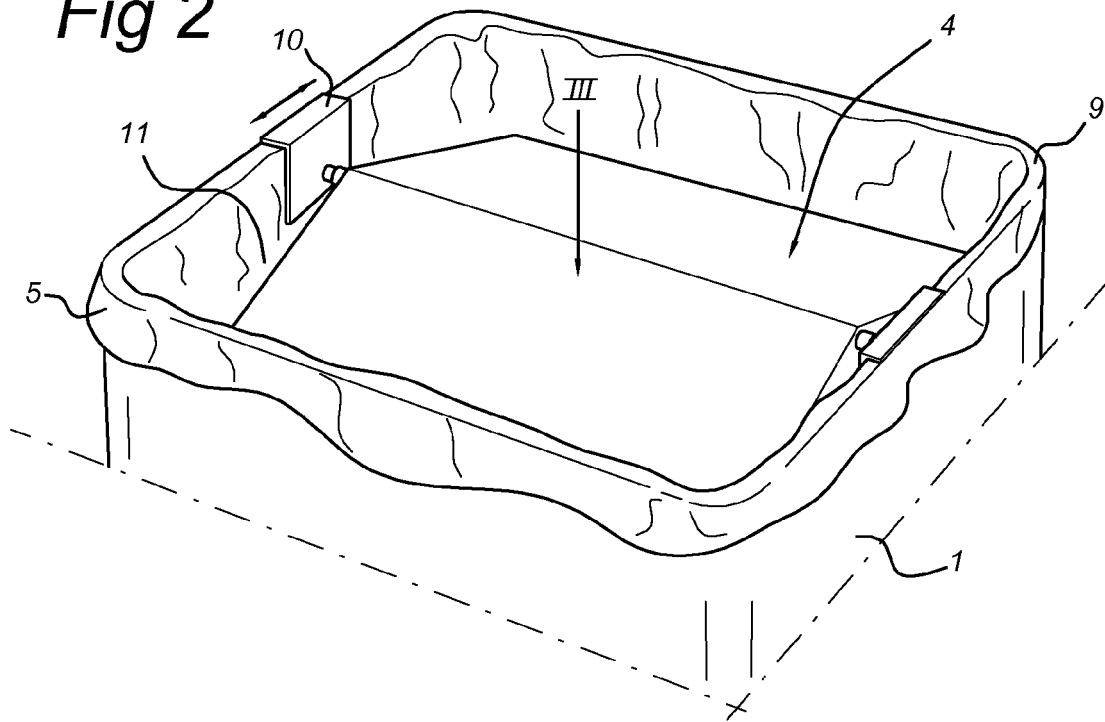
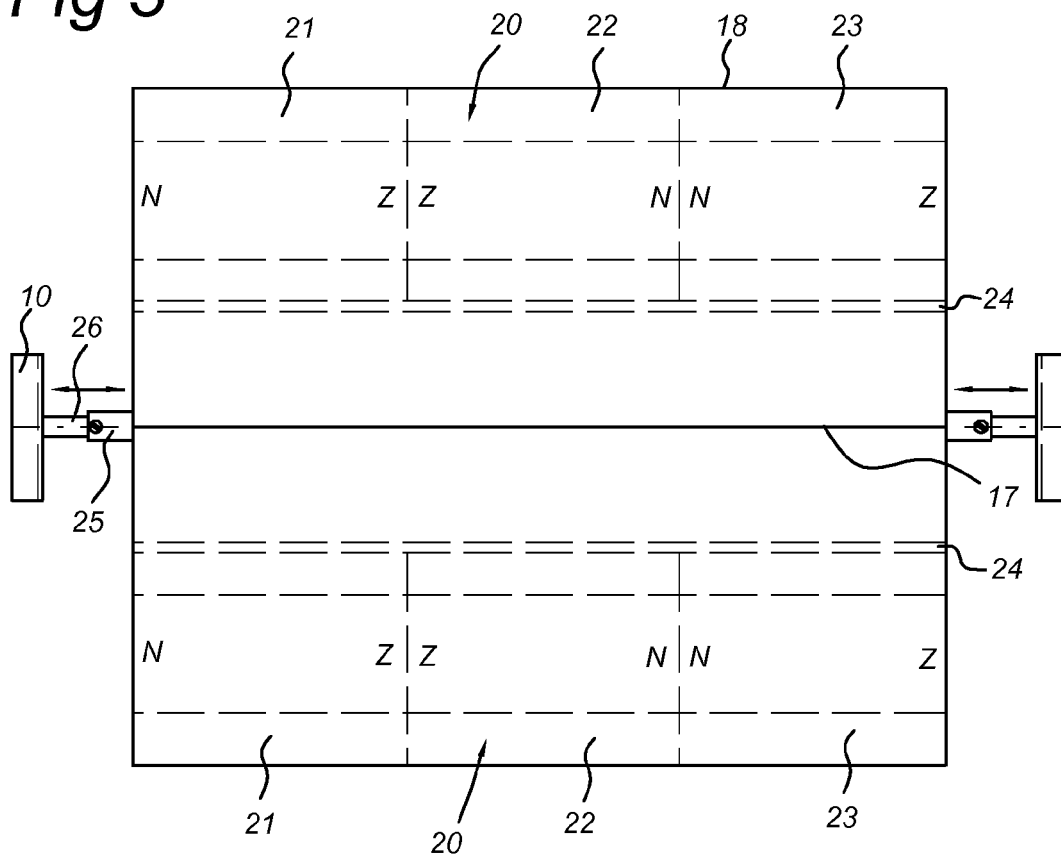


Fig 3



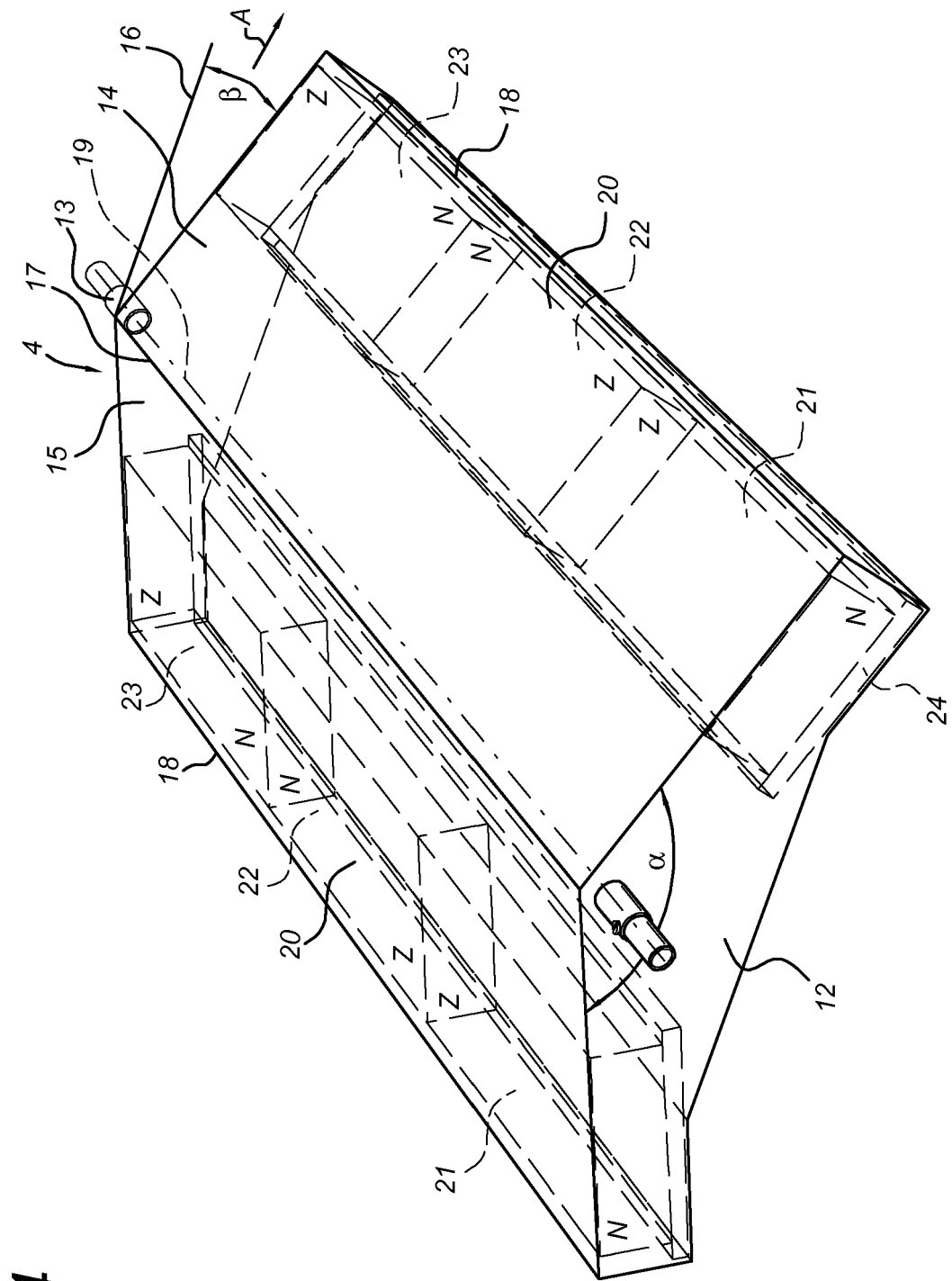


Fig 4



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 40 37 009 A (D-TEAM DESIGN GMBH) 27 May 1992 (1992-05-27) * column 4, line 62 - column 5, line 19 * * figures 1,2 *	1,6, 11-14	INV. B65F1/16
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			TECHNICAL FIELDS SEARCHED (IPC)
			B65F B03C B07C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 January 2008	Examiner Smolders, Rob
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 12 0759

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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17-01-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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US 6129213	A	10-10-2000	NONE	
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BE 1016017	A	10-01-2006	NONE	

REFERENCES CITED IN THE DESCRIPTION

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