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(71) Applicant: **Hyytinen, Pasi**
29631 Arroyo De La Miel (Malaga) (ES)

(72) Inventor: **Hyytinen, Pasi**
29631 Arroyo De La Miel (Malaga) (ES)

(74) Representative: **Helke, Kimmo Kalervo**
Kespat Oy
Vasarakatu 1
40320 Jyväskylä (FI)

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(54) **TRASH COMPACTOR AND TRASH BIN EQUIPPED WITH A TRASH COMPACTOR**

(57) The invention is related to a trash compactor including a scissors system (12) to be connected to the cover (10) included in the trash bin (11). Furthermore, the trash compactor includes a pusher (13) connected to the scissors system (12) and equipment (14) for operating the scissors system (12) and compacting waste while the trash compactor is connected to the cover (10). The equipment (14) includes a pivot shaft (15), which is connected to an arm (17, 18) included in the scissors system (12) with a lever arm (16) for operating the scissors system by turning the pivot shaft (15). The invention also relates to a trash bin equipped with a trash compactor.

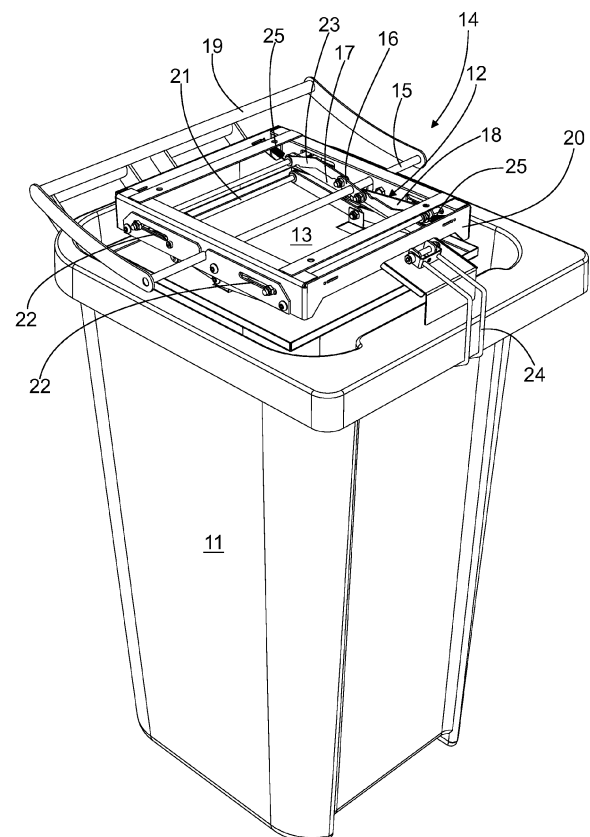


Fig. 2

Description

[0001] The invention is related to a trash compactor including:

- a scissors system to be connected to a cover included in a trash bin,
- a pusher connected to the scissors system, and
- equipment for operating the scissors system and compacting waste while the trash compactor is connected to the cover.

The invention is also related to a trash bin equipped with a trash compactor.

[0002] The collection of particularly dry and mixed waste is inefficient. This is mainly due to inefficient filling of trash bins. In practice, waste is airy and it is often packed in bags or sacks. Thus, a trash bin may already become filled up with a few bags of waste, although, when compacted, the trash bin might take even a double amount of waste compared to uncompacted waste.

[0003] US patent No. 7237480 discloses a scissors mechanism integrated in a trash bin cover for providing a compaction effect. The scissors mechanism is used to push down waste contained in the waste bin. The cover and the scissors mechanism itself are large, and a cover suitable for normal trash bins is not disclosed. The cover and the entire scissors mechanism are made of plastic.

[0004] An object of the invention is to provide a novel trash compactor, which is simpler and more efficient than before, yet easier and lighter to use than heretofore. The characteristic features of the trash compactor according to this invention are set forth in the appended claim 1. Another object of the invention is to provide a novel trash bin equipped with a trash compactor, which can be filled more efficiently than before and which is easier to empty than heretofore. The characteristic features of the trash bin according to this invention are set forth in the appended claim 12. The principle of operation of the scissors mechanism of the trash compactor according to the invention is new. Thus, the scissors mechanism has been made compact, yet efficient. The use of the trash compactor is easy without a risk of injuries. In addition, the trash bin can be filled and emptied without obstacles despite the trash compactor. The trash compactor is firmly supported and its operation is fast. A trash compactor can remarkably increase the filling ratio of a trash bin, thus reducing waste treatment costs. At the same time, problems related to smells and vermin reduce.

[0005] The invention is described below in detail by making reference to the appended drawings that illustrate some of the embodiments of the invention, in which:

Figure 1a is a diagonal top view of a trash bin equipped with a trash compactor according to the invention,

Figure 1b is a front view of a trash bin equipped with a trash compactor according to the inven-

tion,

Figure 2 is a diagonal top view of a trash bin according to the invention equipped with a trash compactor, shown without a cover,

5 Figure 3a is a lateral view of a trash compactor according to the invention,

Figure 3b is a partial enlargement of Figure 3a,

Figure 4 is a diagonal top view of a trash compactor according to the invention,

10 Figure 5 is a top view of a trash compactor according to the invention,

Figure 6a is a diagonal top view of a second embodiment of the trash compactor according to the invention,

15 Figure 6b is a lateral view of the trash compactor of Figure 6a,

Figure 7 depicts a third embodiment of the trash compactor according to the invention, shown in the rest position,

20 Figure 8 depicts the trash compactor of Figure 7 shown in the compaction position,

Figure 9a depicts the trash compactors of the trash bin according to the invention shown in the rest position,

25 Figure 9b depicts the trash compactors of the trash bin of Figure 9a shown in the compaction position.

[0006] Figure 1a depicts a trash compactor according to the invention arranged in a trash bin 11 equipped with a cover 10. As such, a trash compactor can also be used to compact other things; however, a practical example is illustrated here. Generally, the apparatus can be used to increase the filling ratio of a container, such as the filling ratio of a trash bin in this example. The cover of a trash bin prevents water and snow from getting into the trash bin. On the other hand, the cover prevents access of vermin, such as rodents and birds, into the trash bin. Figure 1b is a front view of a trash bin 11 equipped with a trash compactor according to the invention. The trash compactor is drawn with broken lines. Excluding the pusher 13 included in the trash compactor, the trash compactor fits under the cover and the trash compactor can be placed above the collar of the trash bin 11.

45 **[0007]** The trash compactor includes a scissors system 12 to be connected to the cover 10 included in the trash bin 11. The scissors system is illustrated more specifically in Figure 3a. In Figure 2, the trash compactor is shown in the position where it is when the cover is closed. Here, the pusher 13 connected to the scissors system 12 included in the trash compactor is in the top position. Furthermore, the trash compactor includes equipment 14 for operating the scissors system 12 and compacting waste while the trash compactor is connected to the cover 10. Figure 3a is a lateral view of a trash compactor according to the invention, shown separated from the whole. The scissors system fits in a small space, but a long work movement can be achieved with it. Thus, the

trash compactor easily fits under the cover, but the pusher extends deep into the trash bin. During the time between uses, the pusher is lifted up, i.e. close to the cover, with the scissors system.

[0008] The equipment 14 includes a pivot shaft 15, which is connected to an arm 17, 18 included in the scissors system 12 with a lever arm 16, for operating the scissors system by turning the pivot shaft 15. With the pivot shaft and the lever arm, it is possible to accelerate the movement of the trash compactor. At the same time, adequate performance can be achieved for the trash compactor by arranging a handle 19 in the pivot shaft, the length of the handle being greater than that of the lever arm 16. Generally, the pivot shaft 15 includes a handle 19, the length L of which is 4 - 15, more preferably 6 - 10 times the length P of the lever arm 16 (Figure 5).

[0009] The pivot shaft 15 is positioned in the transverse direction relative to the scissors system 12. In addition, the scissors system includes two arms 17 and 18, and the pivot shaft 15 is arranged at an equal distance from both of the arms 17 and 18. Thus, by operating the pivot shaft, both arms move equally, but in opposite directions when using the scissors system. Both the scissors system 12 and the pivot shaft 15 are supported to a circular frame construction 20, which is fastened to the cover of the trash bin. Generally, the angle of rotation of the pivot shaft 15 is 100 - 200°, more preferably 140 - 160°. Thus, the handle moves from the rear to the front during which time the pusher performs a maximum work movement.

[0010] Advantageously, the trash compactor includes two scissors systems arranged parallel to each other, both connected to the same pivot shaft. Thus, the pusher is robustly supported and both scissors systems operate in sync with each other. At the same time, the cover is uniformly loaded and the handle can be operated with either hand or both hands. The trash compactor thus includes a circular frame construction 20, to which the arms 17 and 18 of the scissors system are moveably supported. In the embodiment proposed, corresponding arms of the parallelly arranged scissors systems are connected to each other with connecting rods 21, which contribute to the robustness of the trash compactor. Here, the connecting rods 21 slide along elongated holes 22 in the frame construction 20; however, various slide bearings or rollers can also be used. Generally, the scissors system is fastened to the connecting rod by the arms and the connecting rod is arranged moveably to the frame construction.

[0011] In the embodiment proposed, the lever arm is connected to the arm via the connecting rod. Thus, the connecting rod functions as a pivot point for both the arm and the draw element 23 arranged between the pivot shaft 15 and the arm. Here the draw element is rigid and it is pivoted to both the connecting rod and the lever arm. Then the movement of the handle corresponds to the location of the pusher and vice versa. When the pusher is in the top position, the handle is at the rear. When the handle is brought to the front, the pusher moves to the

bottom position. During this work movement, the pusher presses waste into a more compact state against the bottom of the trash bin.

[0012] A rigid pivot construction is described above, wherein the position of the handle changes according to the pusher and vice versa. Instead of a rigid draw element, a flexible draw element, such as a cable, can be installed. In this case, it is possible to return the handle to the position of rest, although the pusher would have been locked in the midst of the work movement. Advantageously, a roller arranged on the pivot shaft is used achieving thereby uniform cable loading and simultaneously preventing cables from mingling with each other.

[0013] A ratchet system can be used between the pivot shaft and the lever arm. The ratchet system 30 may also be placed between the pivot shaft 15 and the handle 19 (Figure 3). A ratchet system can reduce the angle of rotation of the handle and, on the other hand, turn the handle to the rest position. Then the movement of the handle becomes shorter and more ergonomic; however, the handle must be moved back and forth. By varying the setting of the ratchet system, it is then possible to return the pusher to the top position even with a single movement. In the idle position, the handle can be turned to the desired position and the pusher can then be moved in the desired direction using short movements.

[0014] A latch 24 is provided at the front edge of the cover for locking the cover 10. When adding waste, the latch is released and the cover can then be opened. With the cover closed, the handle is grasped and the pivot shaft is turned. The pusher performs its entire stroke with a single handle movement. By returning the handle the pusher lifts up to its top position. After this, it is again possible to add waste.

[0015] The draw springs 25 shown in Figure 3a provided between the frame construction 20 and the arm 17 and 18 strive to return the pusher 13 to the top position. Thus, the return movement of the handle is simultaneously relieved. In Figure 4b, long return springs 26, which lift the pusher 13 upwards, have been added between the pusher 13 and the frame construction 20.

[0016] Figure 4b is an enlarged view of a locking element 27 included in the scissors system. With the locking element, the scissors system can be left in the midst of the work movement independently of the draw springs 25. The locking element thus prevents the pusher from returning. Thus, the pusher can even be left in the work position to compact waste in the bin. Advantageously, the locking element is connected to a latch so that it is easy to release the pusher by opening the latch. At the same time, it is ensured that, before emptying the bin, the pusher is lifted up to the top position when opening the cover. Here, the locking element 27 includes a toothed wheel 28 and a tongue 29 contacting it. The toothed wheel releases in one direction. Here the release direction is the forward direction, and the pinion is placed between the frame construction and the scissors system. In the situation of Figure 3a, the handle 19 has been

turned almost fully to the front and the toothed wheel 28 has allowed the tongue 29 to jump from one tooth to the other. When releasing the handle, the tooth is pressed against the tongue 29 preventing the rotation of the pivot shaft. Thus, the pusher remains in place pushing waste regardless of the draw and return springs. With a rigid draw element, the handle remains slightly high, whereas in a trash compactor equipped with a flexible draw element or a ratchet system, the handle can be returned to the rear position.

[0017] In practice, by rotating one pivot shaft, it is possible to vary the distance between the arms and thereby operate the scissors system. In this way, it is possible to lift and lower the pusher. Waste is compacted by lowering the pusher. Before adding waste, the pusher can be lifted for fitting the waste. In the embodiment proposed, two arms are used, which are pivoted together like scissors. In this way, the structure remains simple and sturdy. In addition, the movement of the pusher becomes adequately long. By increasing the number of arms, it is possible to increase the movement of the pusher, which is usually unnecessary. At the same time, the number of joints increases, which complicates the construction and makes it susceptible to clearances.

[0018] In addition to the scissors system, the pivot shaft is mainly under the cover inside the trash bin. Thus, it is possible to open the cover and add waste to the trash bin. At the same time, the trash bin can be emptied without removing the trash compactor. A central position for the pivot shaft firstly accelerates the movement of the pusher and secondly, keeps the pusher position at the centre of the trash bin. In other words, the pusher remains in place relative to the trash bin. Only its position in the vertical direction changes. This prevents the pusher from contacting the inner walls of the trash bin.

[0019] The invention also relates to a trash bin equipped with a trash compactor, the trash bin 11 being equipped with a cover 10. This trash bin includes an aforescribed trash compactor, which is arranged to fit in the trash bin 11 when the cover 10 is closed. In practice, the entire trash compactor excluding the handle fits inside the trash bin. In this case, the trash compactor can be fixedly fastened to the trash bin. In other words, it is not necessary to remove the trash compactor between various uses and when emptying it. This essentially facilitates the use of the trash compactor. The handle can also be removable. In addition, the trash compactor can be securely fastened avoiding in this way loss and stealing of the trash compactor. In other words, the trash compactor can be fastened with fasteners, the removal of which requires special tools or breaking of constructions. Various locking devices can also be used. The minimum installation space required by the trash compactor is as small as 90 millimetres; therefore, it fits under the cover when the cover is closed. If necessary, a shim plate is provided between the frame construction and the cover enabling a secure fastening of one type of frame construction to covers of different designs.

[0020] When adding waste, the cover is opened in a normal way with the trash compactor simultaneously lifting up. If necessary, waste in the trash bin is compacted by operating the trash compactor so that more waste can again be inserted to the trash bin. Thus, the filling ratio of the trash bin can be remarkably improved. Opening of the cover is prevented during the use of the trash compactor. The pusher can be left in the waste compaction position so that waste compacted cannot be re-expanded. In addition, access of vermin to waste is prevented. The pusher is almost equal in size with the trash bin thereby compacting waste uniformly. Advantageously, a mesh plate is used, in which case the pusher becomes robust, yet light and permeable to air.

[0021] A trash bin of 240 litres is shown in the example, but the trash compactor also operates equally in a trash bin of 660 litres, for example. A large trash bin can be equipped with two trash compactors. However, using a suitable adapter, one trash compactor can be fastened in such a way that it can be laterally moved to the desired position.

[0022] In the embodiment proposed, the stroke of the scissors system is approximately 300 millimetres, which corresponds approximately to a quarter of the depth of the trash bin. In practice, the trash bin is first filled and then compacted, as necessary, using the trash compactor.

[0023] In the modification of Figures 6a and 6b, an additional lever 31 and an additional joint 32 are provided between the lever arm and the draw element. This construction creates a clearance in the initial movement of the handle. In other words, the handle can first turn upwards while the joints only turn. Then the lever arm starts to pull the draw element thus providing efficient compaction. Secondly, in the latter part of the handle movement, the additional lever contacts the pivot shaft thereby allowing additional force to be applied to the scissors system. Thirdly, the additional lever is easy to replace with a lever of different dimensions for changing the ratio. Thus, one type of compactor is suitable for different trash bins and different types of waste, as the stroke can be adjusted suitable. The same reference numbers are used for functionally identical parts.

[0024] In the modification of Figures 7 and 8, the lever arm 16 is composed of a disc 33 welded to the pivot shaft 15; here, there are two discs placed parallel to each other. The frame 20 is assembled with rivets using simple sheet components, which have been perforated and bent. Thus, the frame is light-weight, yet rigid. The arms of the scissors system are also made of folded sheet and they are placed partly within each other. The scissors system is thus rigid and small. Here the return springs 25 are connected to the arms. Therefore, the return is efficient and the return springs are short. The fastening point of the draw element 23 can be fine-tuned using the holes in the disc 33. In other words, there are several fastening points on the circumference of the disc 33 for the draw element 23. Here the fastening points are holes, to which

the draw element can be fastened. A cable can be used instead of rigid draw elements. In this case, adjustor pins can additionally be fitted in the disc holes to change the cable length and movement path. In this way, it is possible to adjust the movement of the handle and the stroke of the scissors system. The pusher 13 is also made of a sheet material, which is light-weight but rigid due to forming and perforation.

[0025] Figures 9a and 9b depict a trash bin 11 with a capacity of 660 litres, having two trash compactors installed on its cover 10. More generally, one pivot shaft has between two and four trash compactors arranged on it. In addition, the trash compactors are connected to a common handle, more precisely, a common pivot shaft. Thus, the whole content of the trash bin can be compacted with one turn of the handle. In Figure 9a, the trash compactors are under the cover 10 and the handle 19 is in the rest position. The trash bin can also be a multicompartment bin. In this case, different trash compactors are separated from each other with a partition wall 34 arranged in the trash bin 11. This trash bin has one partition wall 34, but a suitable number of partition walls is arranged depending on the number of trash compactors. Thus, more than one fraction can be collected in one trash bin. Suitable compaction can be adjusted for each fraction by adjusting the properties of the trash compactors. For example, plastic is more easily compacted than mixed waste and compacts more. In practice, a longer stroke is then adjusted in the trash compactor for plastic compared to mixed waste. This is shown in Figure 9b, where the handle 19 has been turned upwards. However, one pusher 13 is lower than the other. In a large trash bin, the mass portion of the trash compactor is smaller than in a small one; therefore, an additional trash compactor has a smaller effect than before on the use of the trash bin. At the same time, however, more waste can be fitted in the trash bin. The number of trash compactors can also be three or four, and advantageously, an adequate number of partition walls are provided. Thus, several fractions can be collected into one trash bin and these can be compacted using a single handle.

[0026] In the trash bins proposed above, one trash compactor size is utilised varying the number as needed. Nevertheless, the structure of the trash compactor is easily scalable so that a trash compactor of a suitable size can be manufactured ranging from kitchen trash bins to deep collection containers.

Claims

1. Trash compactor including

- a scissors system (12) to be connected to a cover (10) included in a trash bin (11),
- a pusher (13) connected to the scissors system (12), and
- equipment (14) for operating the scissors sys-

tem (12) and compacting waste while the trash compactor is connected to the cover (10),

characterised in that the equipment (14) includes a pivot shaft (15), which is connected to an arm (17, 18) included in the scissors system (12) with a lever arm (16) for operating the scissors system by turning the pivot shaft (15).

2. Trash compactor according to Claim 1, **characterised in that** an additional lever (31) and an additional joint (32) are provided between the lever arm (16) and the draw element (23).
3. Trash compactor according to Claim 1 or 2, **characterised in that** the lever arm (16) is composed of a disc (33) arranged in the pivot shaft (15) having several fastening points on its circumference for the draw element (23).
4. Trash compactor according to any of Claims 1 to 3, **characterised in that** the pivot shaft (15) includes a handle (19), the length (L) of which is 4 - 15, more preferably 6 - 10 times the length (P) of the lever arm (16).
5. Trash compactor according to any of Claims 1 to 4, **characterised in that** the angle of rotation of the pivot shaft (15) is 100 - 200°, more preferably 140 - 160°.
6. Trash compactor according to any of Claims 1 to 5, **characterised in that** a ratchet system (30) is provided between the pivot shaft (15) and the lever arm (16) or between the pivot shaft (15) and the handle (19).
7. Trash compactor according to any of Claims 1 to 6, **characterised in that** the scissors system includes two arms (17, 18), and the pivot shaft (15) is arranged at an equal distance from both arms (17, 18).
8. Trash compactor according to any of Claims 1 to 7, **characterised in that** the trash compactor includes two scissors systems arranged parallel to each other, both connected to the same pivot shaft (15).
9. Trash compactor according to any of Claims 1 to 8, **characterised in that** the trash compactor includes a circular frame construction (20), to which the arm (17, 18) of the scissors system is moveably supported, and a draw spring (25) is provided between the frame construction (20) and the arm (17, 18).
10. Trash compactor according to Claim 9, **characterised in that** the scissors system includes a locking element (27) for leaving the scissors system in the midst of the working movement independently of the

draw spring (25).

11. Trash compactor according to any of Claims 1 to 10,
characterised in that the pivot shaft (15) is in the
transverse direction relative to the scissors system
(12). 5

12. Trash bin equipped with a trash compactor, the trash
bin (11) being equipped with a cover (10), and the
trash compactor including: 10
 - a scissors system (12) connected to the cover
(10),
 - a pusher (13) connected to the scissors system
(12), and 15
 - equipment (14) for operating the scissors sys-
tem (12) and compacting waste while the trash
compactor is connected to the cover (10),

characterised in that the equipment (14) includes 20
a pivot shaft (15), which is connected to an arm (17,
18) included in the scissors system (12) with a lever
arm (16) for operating the scissors system by turning
the pivot shaft (15). 25

13. Trash bin according to Claim 12, **characterised in
that** the trash compactor is a trash compactor ac-
cording to any of Claims 2 to 12.

14. Trash bin according to Claim 12 or 13, **character-
ised in that** between two and four trash compactors 30
are arranged on one pivot shaft (15).

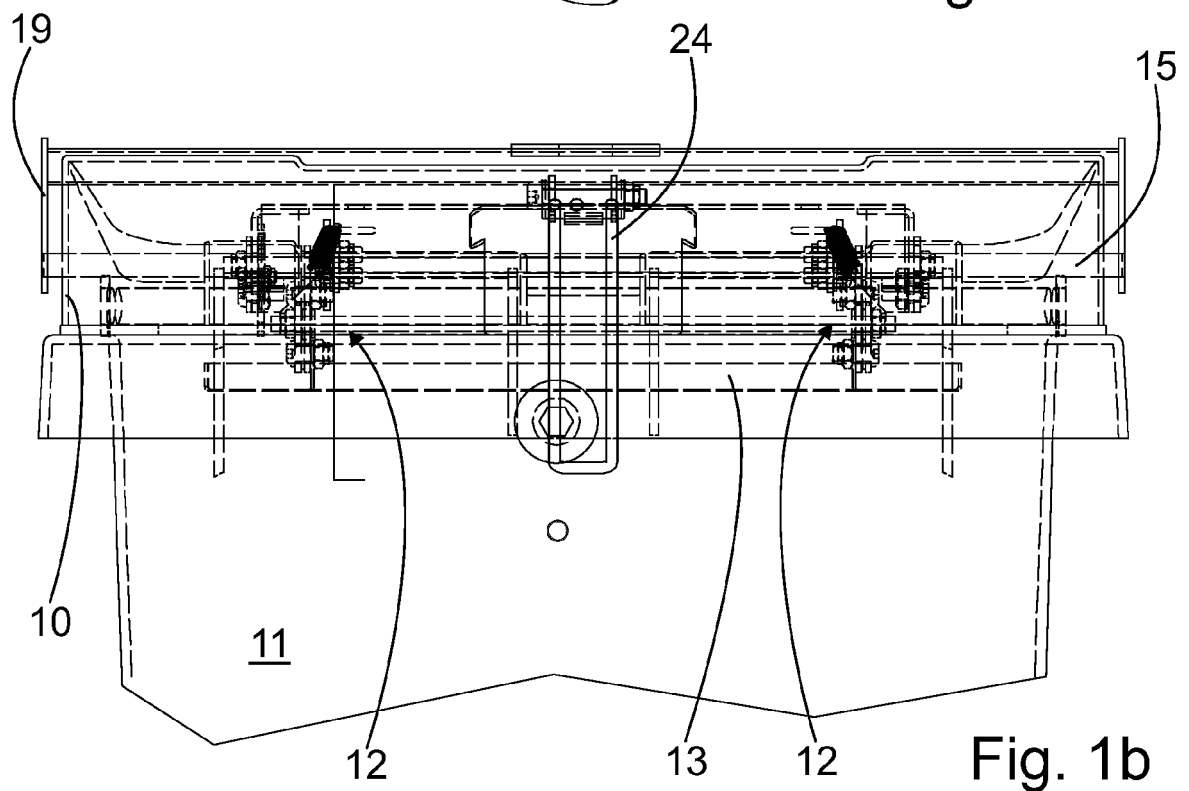
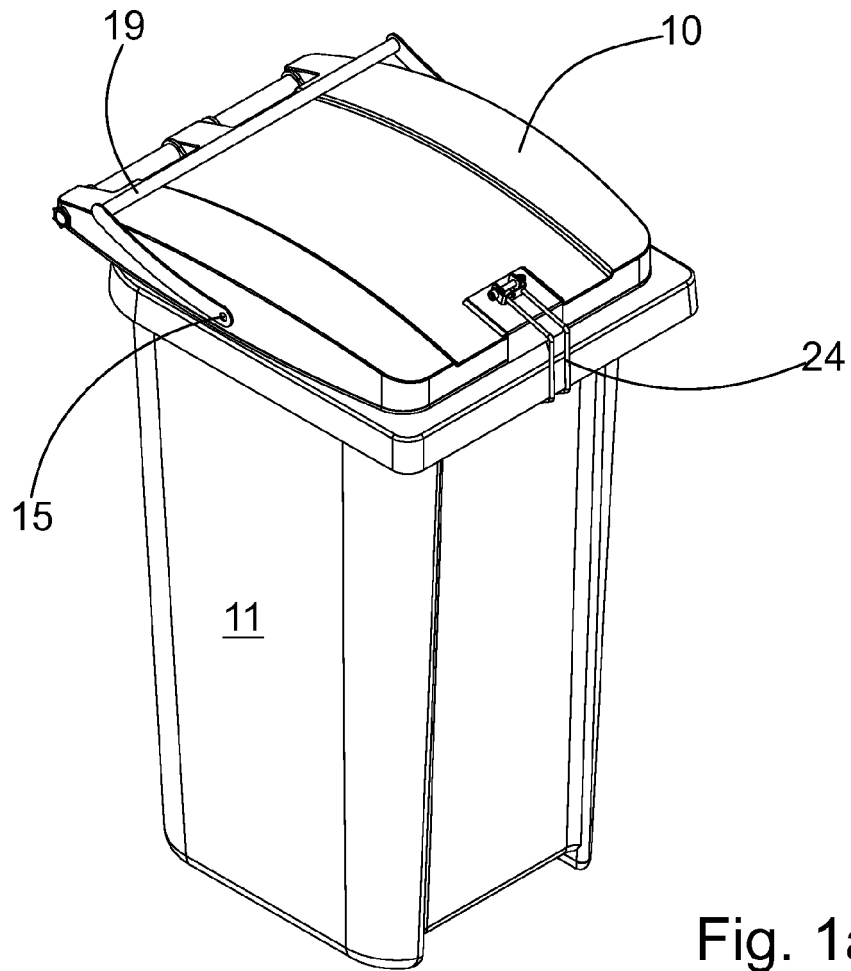
15. Trash bin according to Claim 14, **characterised in
that** the different trash compactors are separated 35
from each other with a partition wall (34) arranged
in the trash bin (11).

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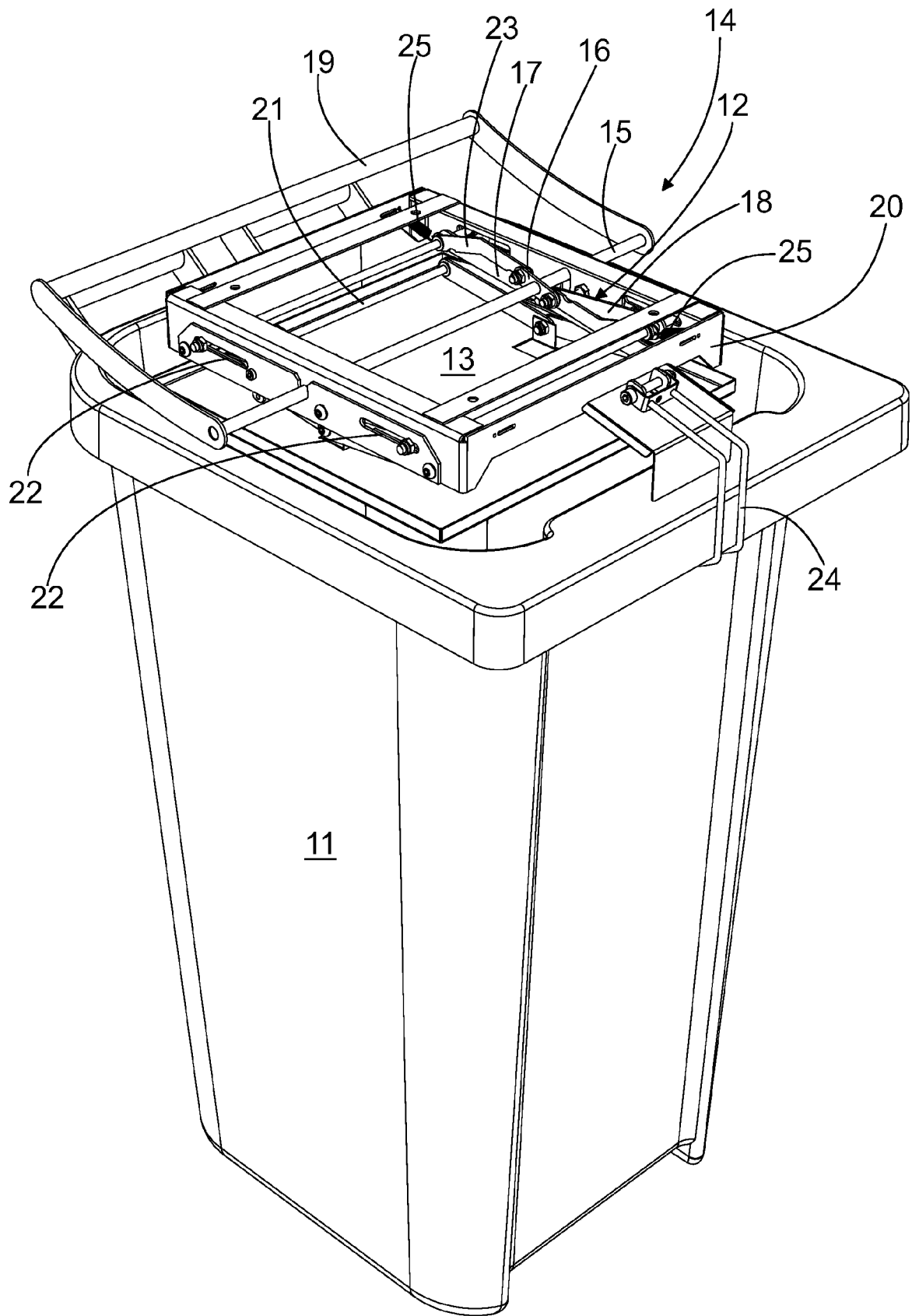


Fig. 2

Fig. 3b

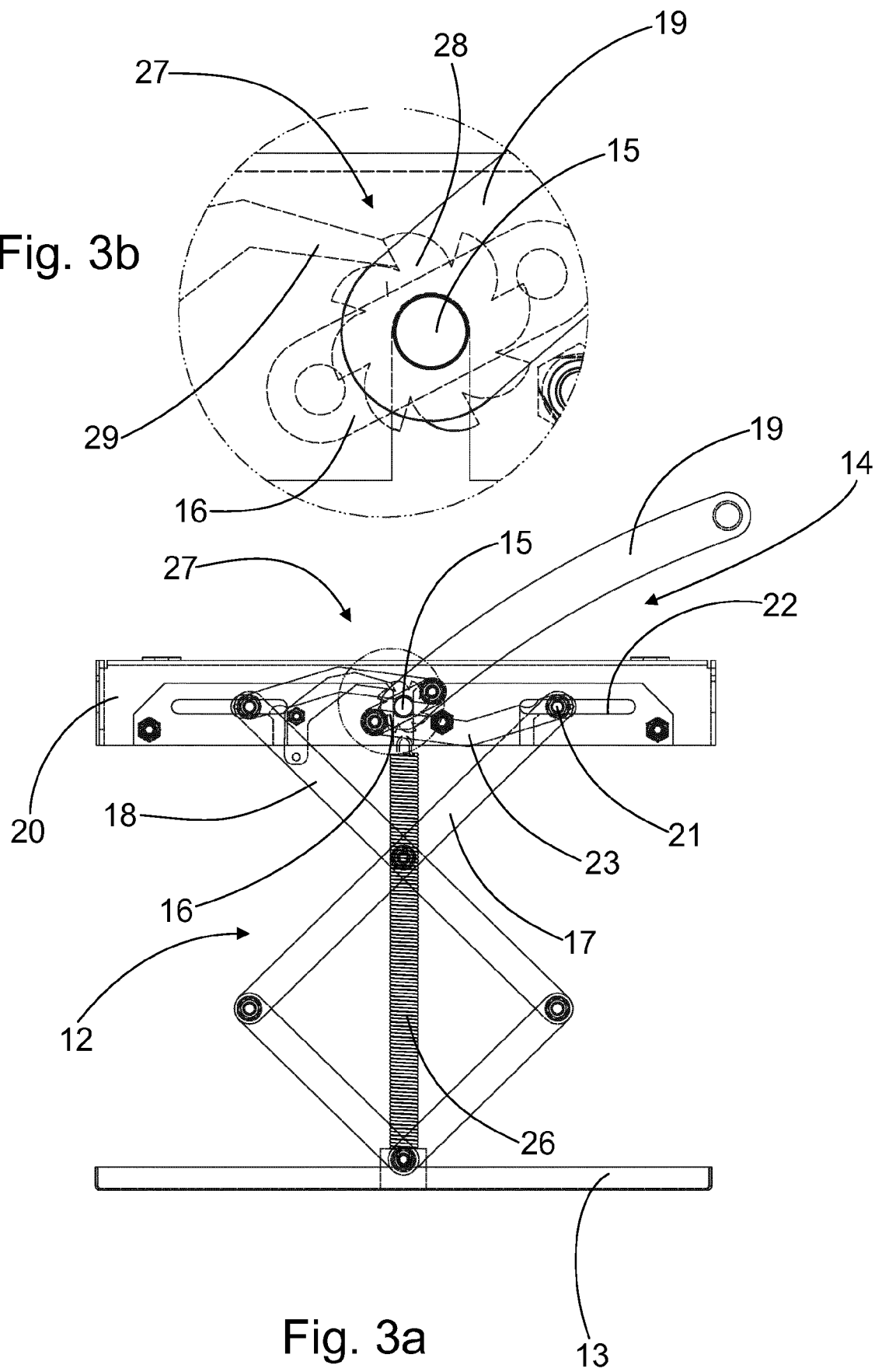


Fig. 3a

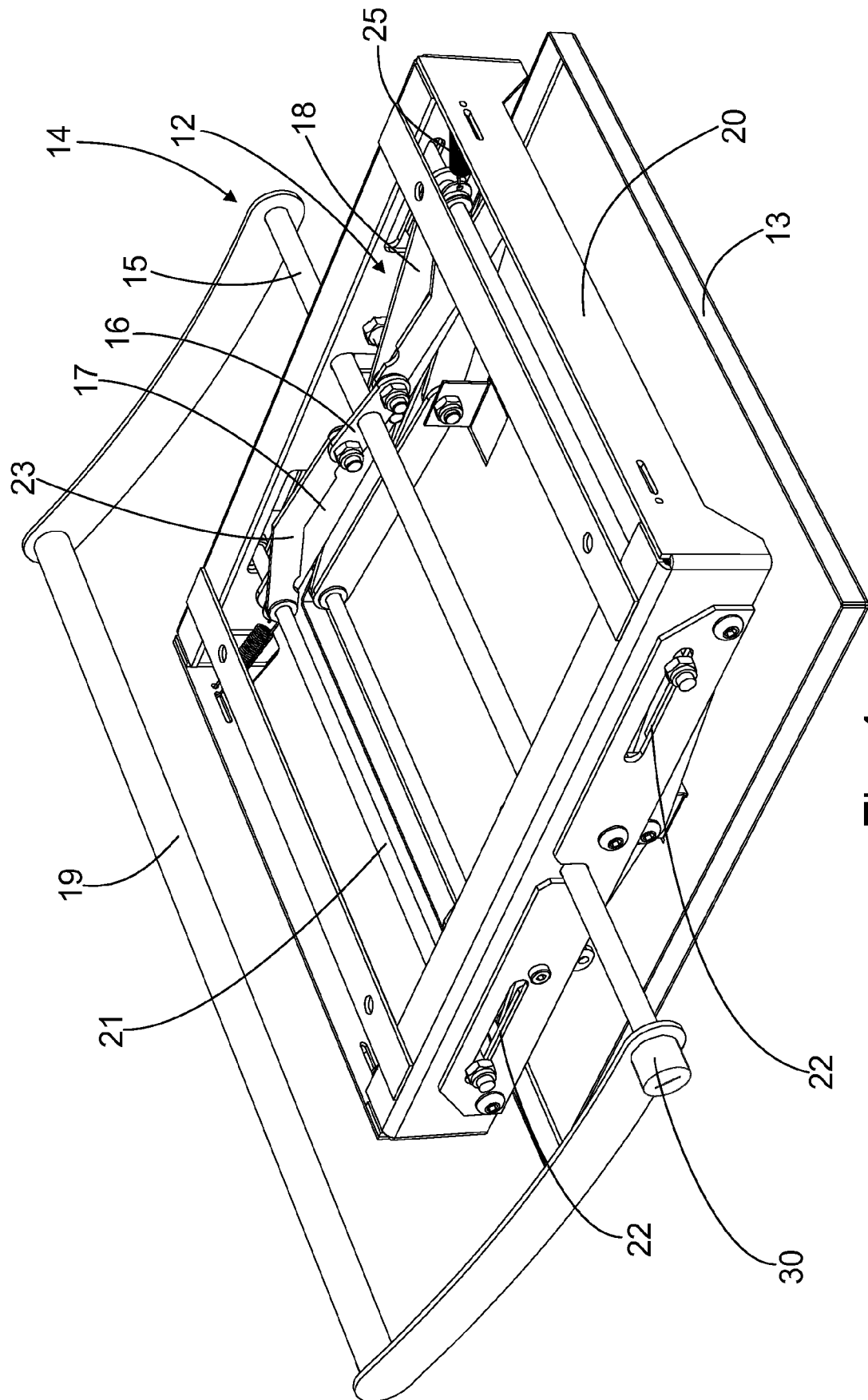


Fig. 4

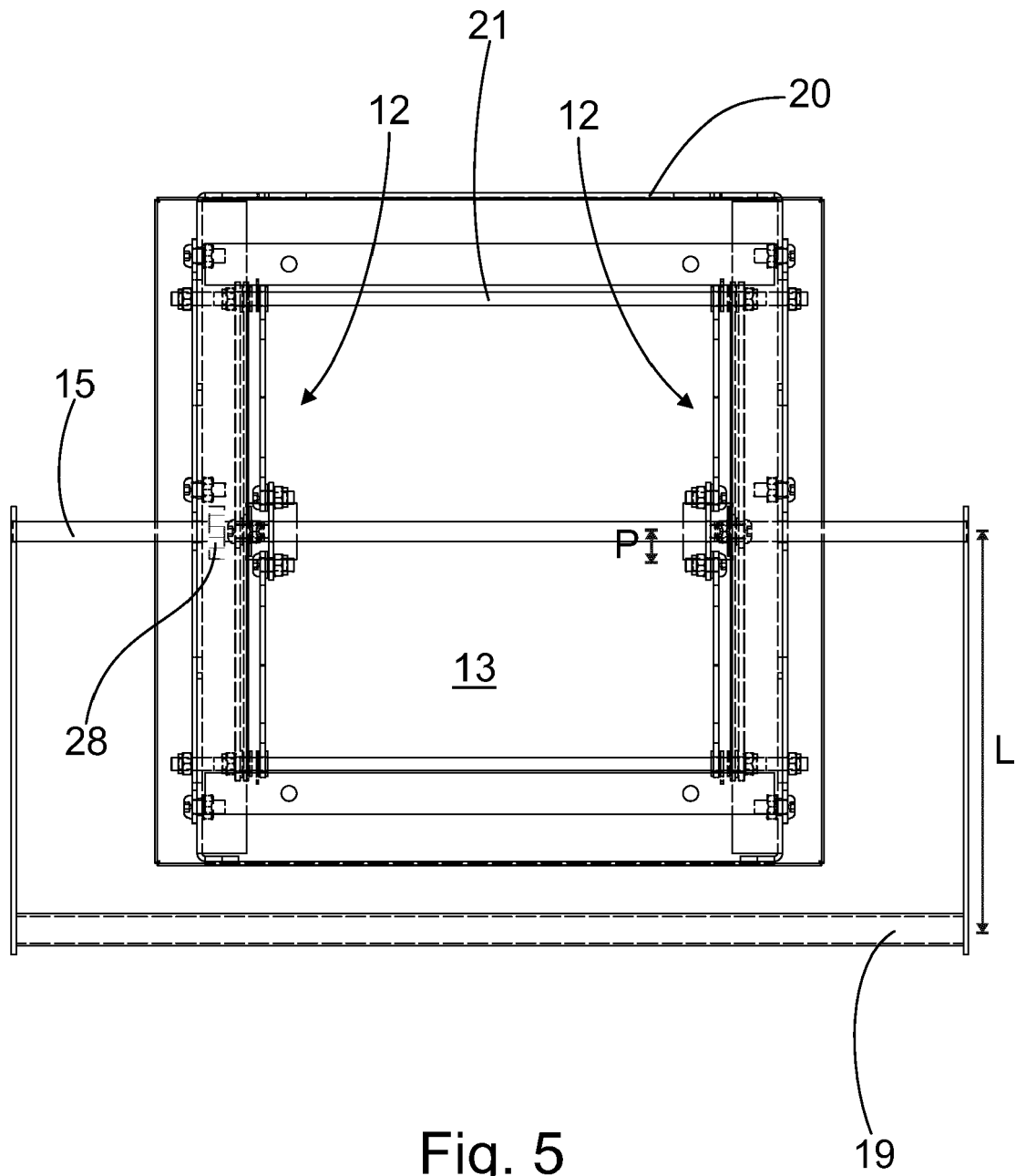


Fig. 5

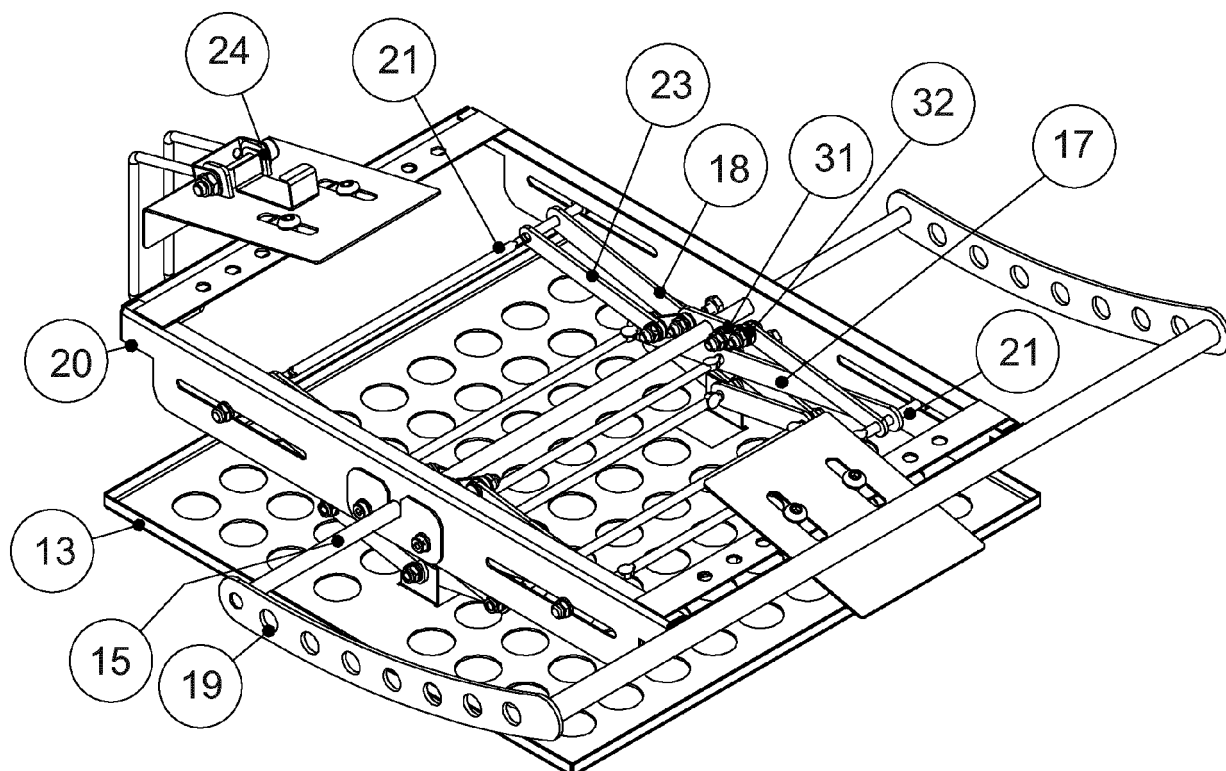


Fig.6a

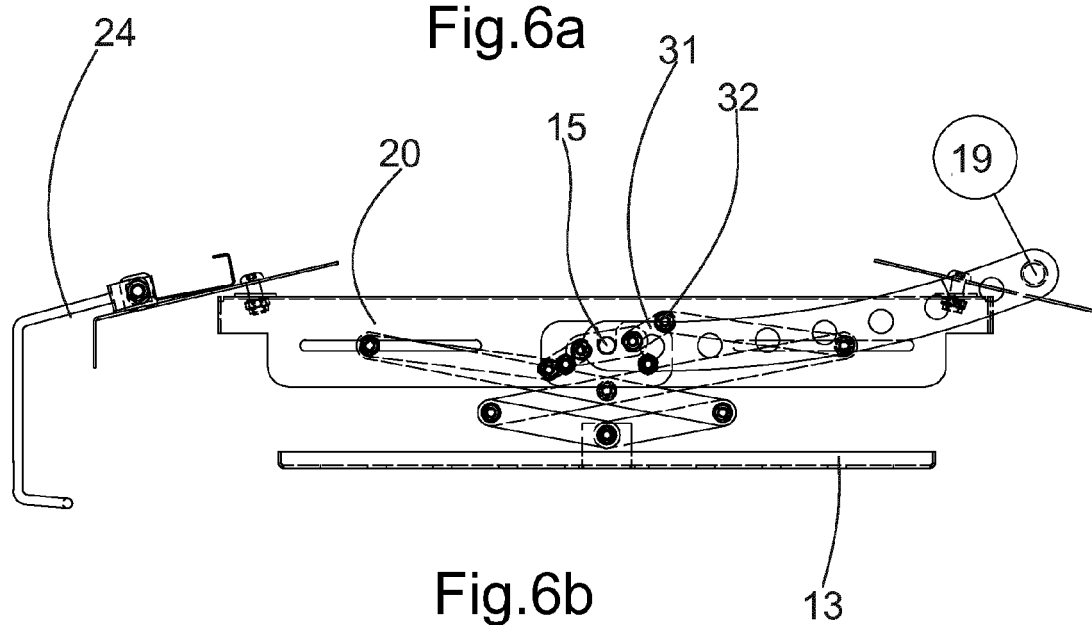


Fig.6b

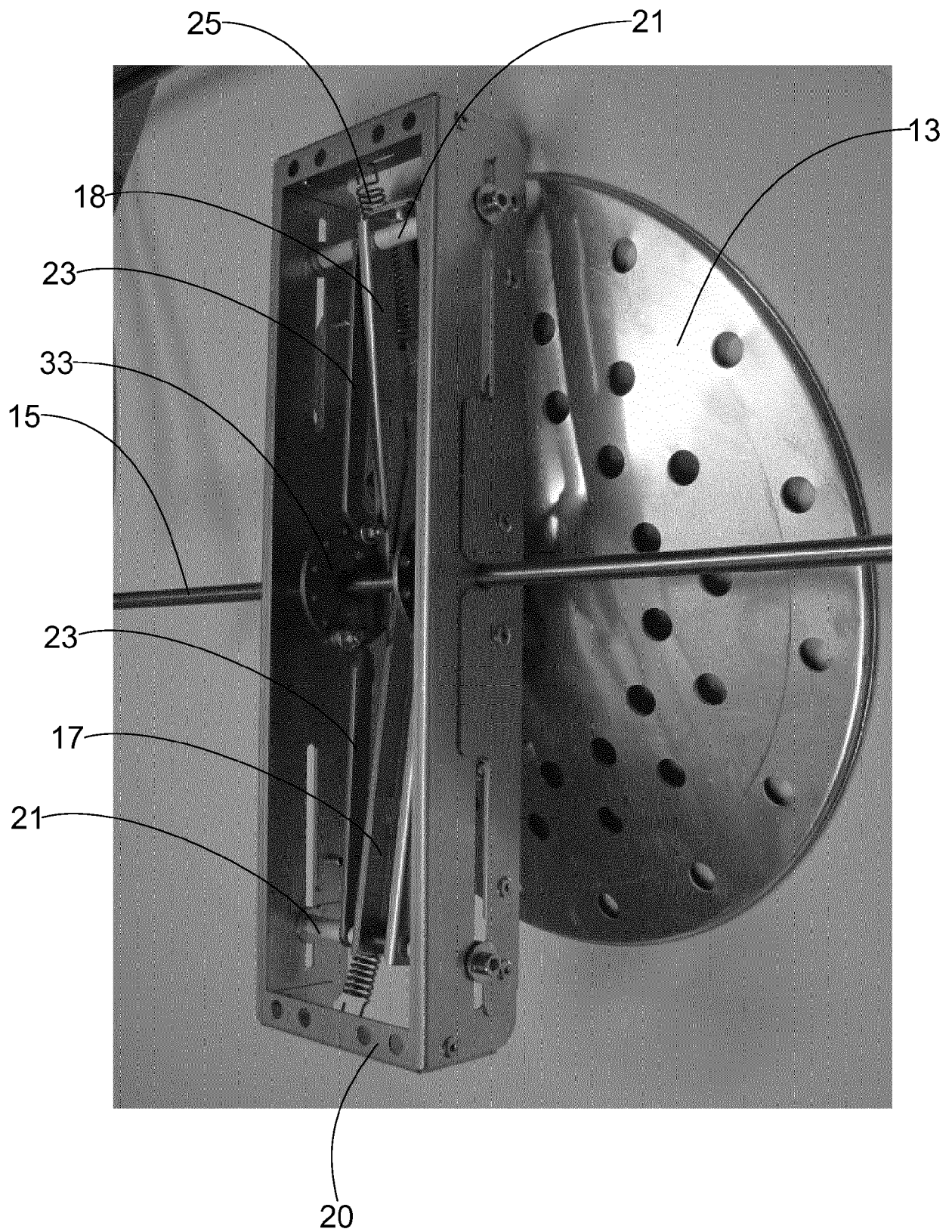
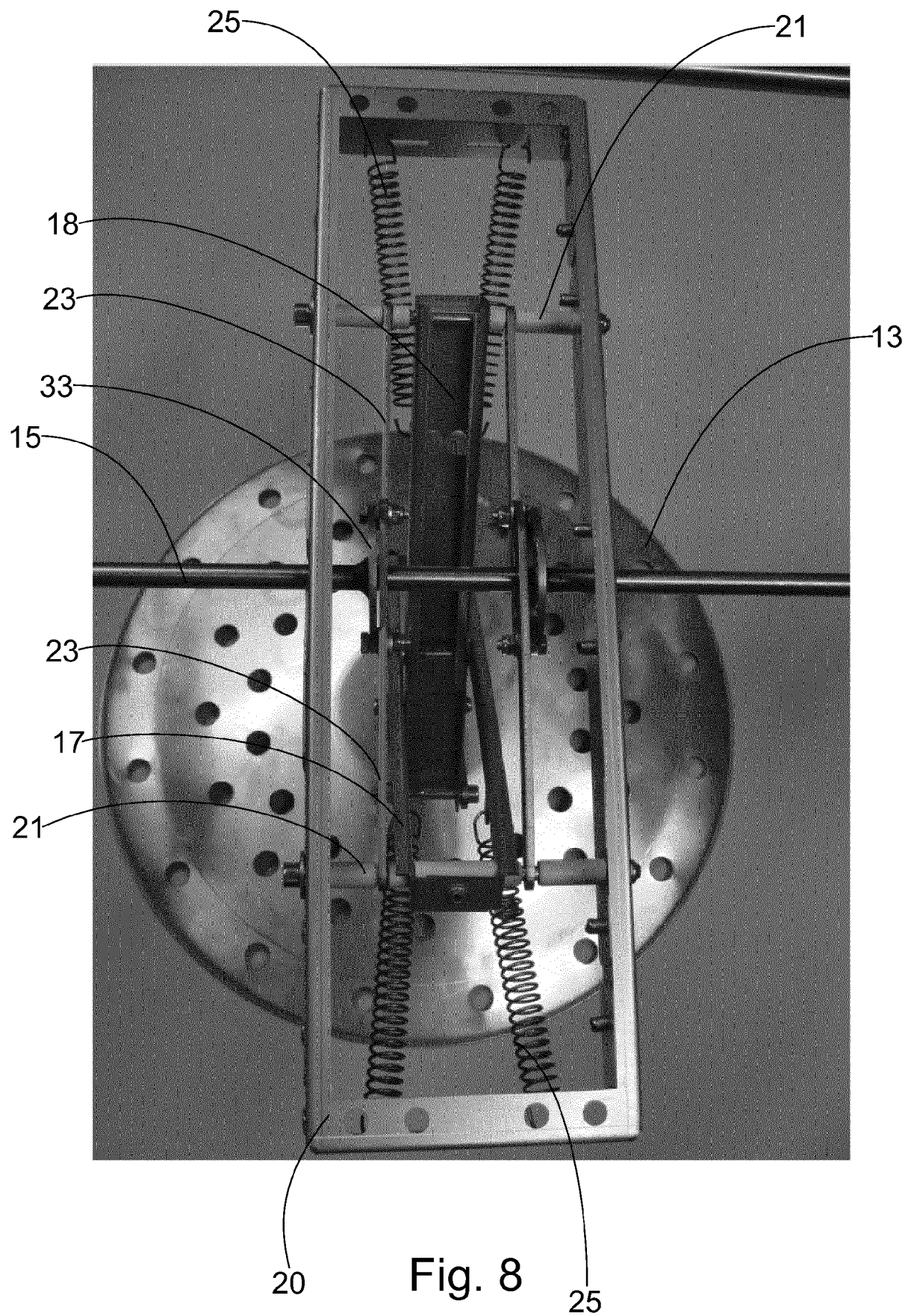
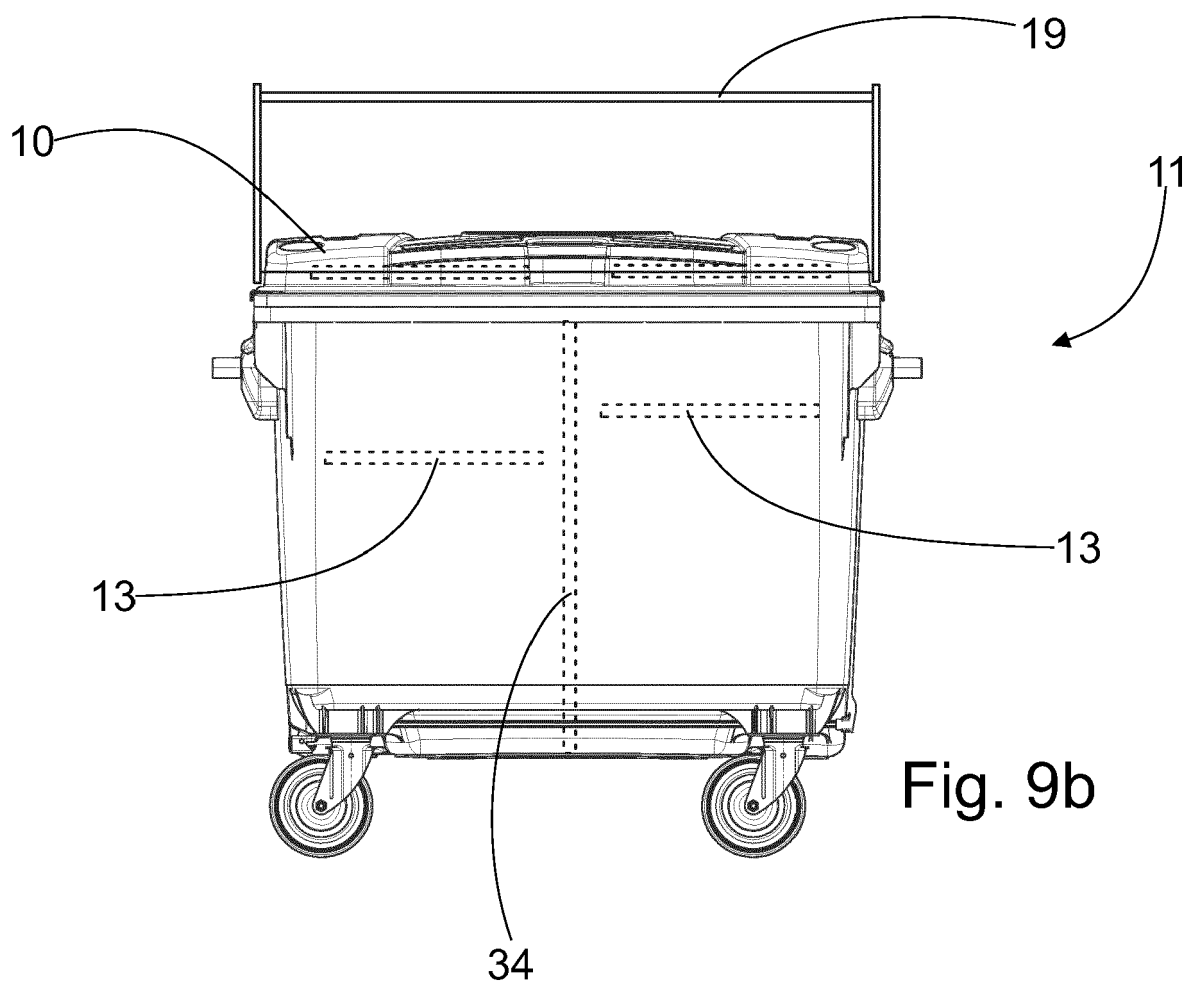
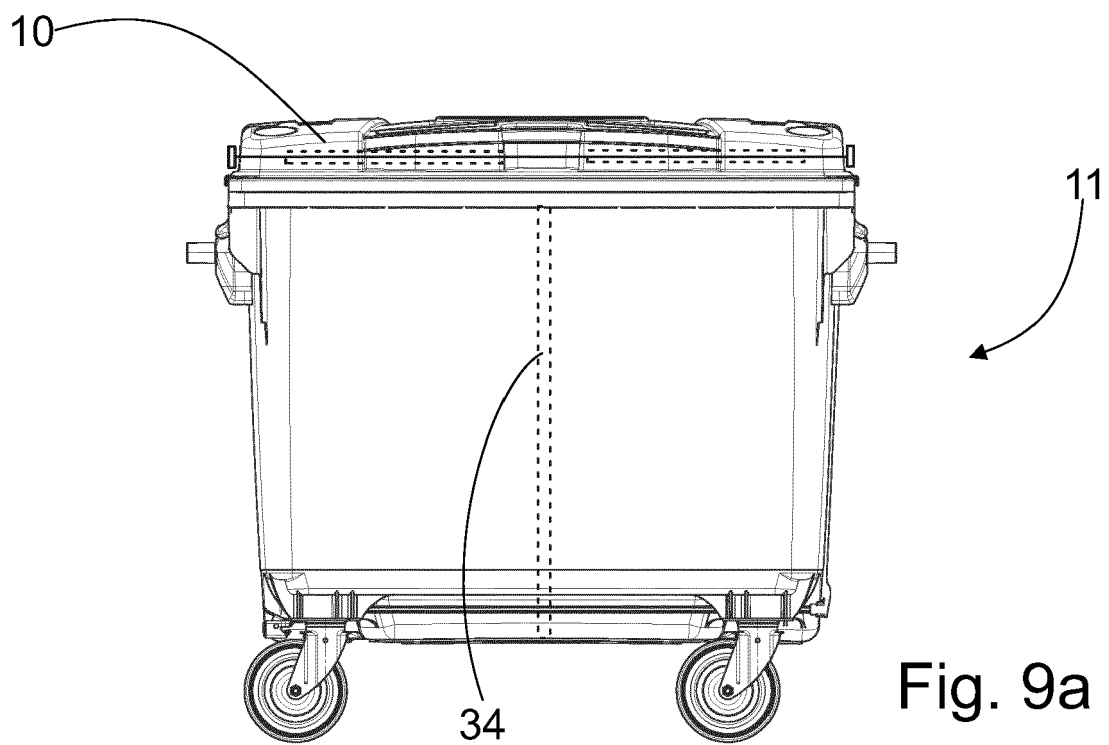


Fig.7







EUROPEAN SEARCH REPORT

Application Number
EP 18 17 9811

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2008/038317 A1 (TECAM S R L [IT]; MARTINI GIANCARLO [IT]) 3 April 2008 (2008-04-03) * page 5, lines 6-25; figures 1,2,4.1 * * page 8, lines 2-23 *	1-4,7,9, 11-13	INV. B65F1/14 B30B9/30
Y		5,14,15	
A		6,8,10	
X	JP 2006 110514 A (NANBU PLASTICS CO LTD) 27 April 2006 (2006-04-27) * figure 5 *	1,8	
Y	US 2011/203464 A1 (JOHANNESEN JR ARVID [NO]) 25 August 2011 (2011-08-25) * paragraphs [0053], [0054]; figures 4,5 *	5	
Y	WO 2015/001155 A1 (SAENZ BEA DANIEL [ES]; FERRERA ARANA GABRIEL [ES]) 8 January 2015 (2015-01-08) * abstract; figures 1-6 *	14,15	TECHNICAL FIELDS SEARCHED (IPC)
			B65F B30B B65D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 November 2018	Examiner Serrano Galarraga, J
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EPO FORM 1503 03/82 (P04C01)

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

EP 18 17 9811

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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16-11-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008038317 A1	03-04-2008	NONE	
JP 2006110514 A	27-04-2006	NONE	
US 2011203464 A1	25-08-2011	AU 2009258335 A1	17-12-2009
		CA 2727390 A1	17-12-2009
		CN 102099267 A	15-06-2011
		DK 2303725 T3	13-07-2015
		EP 2303725 A1	06-04-2011
		ES 2542528 T3	06-08-2015
		HK 1157716 A1	21-08-2015
		JP 5792345 B2	07-10-2015
		JP 2011522755 A	04-08-2011
		JP 2014177352 A	25-09-2014
		NO 329463 B1	25-10-2010
		PT 2303725 E	27-08-2015
		US 2011203464 A1	25-08-2011
		WO 2009151333 A1	17-12-2009
WO 2015001155 A1	08-01-2015	ES 1085204 U	16-07-2013
		WO 2015001155 A1	08-01-2015

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 7237480 B [0003]