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(54) Waste collection device

(57) A waste collection device, comprising, inside a pit (2), a structure (1) which has a base (4) suitable to support at least one container (5) and a lid (6) provided with at least one pillar (7,8) for inserting waste; the base (4) and the lid (6) are connected by way of actuators (9,10,11,12) which allow to vary the mutual distance between the lid and the base between a minimum value, allowing to accommodate the container (5), and a maximum value, allowing to fully empty the at least one pillar into the container (5), the structure (1) being further provided with a lifting element (13) which acts between the bottom of the pit (2) and the base of the structure (1) and is suitable to produce a vertical translatory motion between a lower stroke limit in which the lid (6), being in the situation in which its distance from the base (4) reaches the minimum value, is at the level of the paving (3) that surrounds the pit, and an upper stroke limit, in which the base (4) is at the paving level.

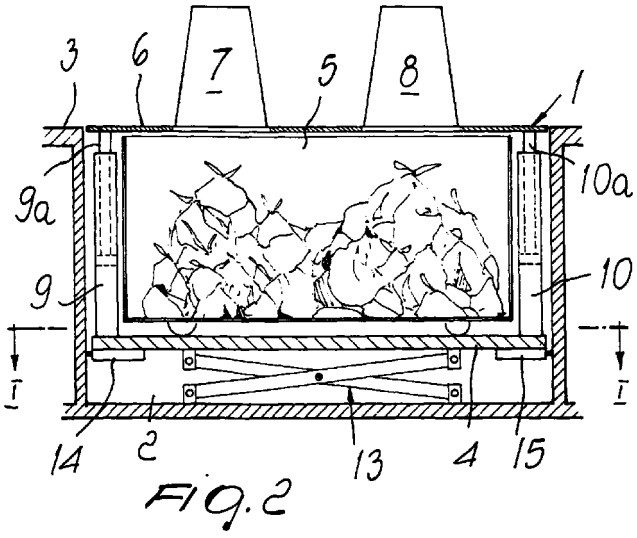

Fig. 2

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Description

[0001] The present invention relates to a waste collection device.

[0002] It is known that one of the systems currently used to collect waste, particularly municipal waste, provides for the presence of containers placed in pits formed in the road paving and provided with means for moving from a position in which they are retracted into the pit into a position in which they protrude from said pit.

[0003] When a container is inserted in the pit, the opening of the pit is closed by means of a lid which lies above the container and is provided with at least one hollow pillar in which users introduce the bags of waste, which fall into the underlying container.

[0004] The container is periodically removed from the pit to be emptied.

[0005] The aim of the present invention is to make devices of the described type particularly effective.

[0006] The intended aim is achieved by a waste collection device according to the invention, characterized in that it comprises, inside a pit, a structure which comprises a base which is suitable to support at least one container and a lid provided with at least one pillar for inserting waste, said base and said lid being connected by way of means which allow to vary their mutual distance between a minimum value, which allows to accommodate said container, and a maximum value, which allows to fully empty said pillar into said container, said structure being provided with actuation means which act between the bottom of the pit and the base of said structure and are suitable to produce a vertical translatory motion between a lower stroke limit in which said lid, in the situation in which the distance from the base reaches its minimum value, is at the level of the paving that surrounds the pit, and an upper stroke limit, in which said base is at said level.

[0007] Further characteristics and advantages of the present invention will become apparent from the following detailed description of preferred but not exclusive embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional plan view of the invention, taken along the plane I-I of Figure 2;

Figures 2, 3 and 4 are sectional views, taken along the plane II-II of Figure 1, during three different steps of operation;

Figure 5 is a plan view of the invention according to a second embodiment thereof;

Figure 6 is a sectional view, taken along the plane VI-VI of Figure 5;

Figure 7 is a sectional plan view of the invention according to a third embodiment, taken along the plane VII-VII of Figure 8;

Figures 8, 9 and 10 are sectional views, taken along the plane VIII-VIII of Figure 7, during three different steps of operation.

[0008] With reference to the above Figures 1 to 4, the reference numeral 1 generally designates the structure of the device that lies within a pit 2 formed within a paving 3; said structure comprises a base 4, which is suitable to support a waste container 5, and a lid 6, provided with pillars 7 and 8 for inserting the waste.

[0009] The important characteristic of the invention consists of the fact that the base 4 and the lid 6 are connected by actuation means which are suitable to vary their mutual distance by abutting between them; said actuation means comprise the four hydraulic cylinders 9, 10, 11 and 12, in which the body is connected to the base 4 and the end of the stem, such as 9a, 10a for the cylinders 9 and 10, is connected to the lid 6.

[0010] It is thus possible to pass from the situation in which the distance between the base and the lid is smallest, as shown in Figure 2, to the one in which it is greatest, as shown in Figures 3 and 4 and as described in detail hereinafter.

[0011] The hydraulic circuit for actuating the four actuation cylinders 9, 10, 11 and 12 comprises means which are suitable to change the mutual operating conditions of the cylinders; it is thus possible to produce a motion of the lid 6 that moves it into an upper stroke limit position in which it lies horizontally, as shown in the figures, but it is also possible to raise said lid to a final position which is inclined in any manner, according to particular requirements.

[0012] The device is provided with actuation means which act between the bottom of the pit 2 and the base 4 of the structure 1 and comprise the pantograph 13, which is suitable to produce the vertical translatory motion of said structure between the lower stroke limit position, shown in Figure 2, in which the lid 6, at the minimum distance from the base 4, is at the level of the paving 3 that surrounds the pit, and the upper stroke limit position, shown in Figure 4, in which the base 4 is at said level.

[0013] A structure of the device is thus obtained which is particularly compact and allows to minimize the depth of the excavation for building the pit 2, with a consequent great cost reduction.

[0014] Finally, the reference numerals 14 and 15 designate safety elements to prevent the accidental fall of the structure 1, which comprise abutments provided with means for movement between a position in which they do not interfere with the walls of the pit and a position in which they are inserted in seats formed in said walls.

[0015] The operation of the invention is now described starting from the condition shown in Figure 2, which is the condition for normal use, in which users gradually insert the waste bags into the pillars 7 and 8 and said bags fall into the container 5; the structure 1 has been moved by the pantograph 13 to the lower stroke limit, and the cover 6 of said structure is at the

lower stroke limit, at the level of the paving 3 that surrounds the pit.

[0016] When it is necessary to empty the container, first of all the hydraulic cylinders 9, 10, 11 and 12 are actuated, causing the lid 6 to rise with respect to the base 4, as shown in Figure 3, and thus achieving the dual result of emptying the pillars 7 and 8, which are full of the last bags to be inserted, into the container 5, and of preparing the structure for easy extraction of said container 5 after the subsequent step of operation, which consists in actuating the pantograph 13 so as to bring the structure 1 into the position shown in Figure 4, in which the base 4 is at the level of the surrounding paving.

[0017] Figures 5 and 6 illustrate a different embodiment of the invention which comprises, within the pit 2, a structure 16 with a base 17 which is suitable to support the waste container 5, and a lid 18 provided with the pillars 19 and 20 for inserting the waste; said structure is provided with the pantograph 21, which is suitable to produce the vertical translatory motion of said structure in the same manner described above.

[0018] In this embodiment, the actuation means that connect the base 17 and the lid 18 and are suitable to vary their mutual distance comprise the pantograph 22, which acts between the guides 23, 24 of the container 5 which are rigidly coupled to the base 17 and said lid.

[0019] Figure 6 is a view of the position of the lid 18 at the upper stroke limit, which corresponds to the position of Figure 3; said lid has been brought to said position by the pantograph 22 from a lower stroke limit position in alignment with the surrounding paving.

[0020] Another embodiment of the invention is now described with reference to Figures 7 to 10.

[0021] With reference to the above figures, the reference numeral 25 generally designates the structure of the device that lies within the pit 2 formed in the paving 3; said structure comprises the base 26, which is suitable to support the waste container 5, and the lid 27, provided with the pillars 28a, 28b for waste insertion.

[0022] Said base and said lid are connected by way of means which allow to vary their mutual distance between the minimum value, shown in Figures 8 and 9, and the maximum value, shown in Figure 10; said means comprise the four telescopic columns 29, 30, 31, 32; said columns are identical and therefore only the columns 29 and 30 are described herein.

[0023] The column 29 comprises the section 29a, which is rigidly coupled to the base 26, and the telescopically associated section 29b, which is rigidly coupled to the lid 27, and there is a cable-like element which is constituted by the articulated chain 33, which has an end which is fixed at 34 to the bottom of the pit 2, winds around the pulleys 35 which are supported proximate to the top of the section 29a after passing through the hole 36 in the base 26, and another end which is fixed at 37 to the section 29b.

[0024] Likewise, the column 30 comprises the section 30a, which is rigidly coupled to the base 26, and the telescopically associated section 30b, which is rigidly coupled to the lid 27, and there is an articulated chain 38, in which one end is fixed at 39 to the bottom of the pit 2, winds around the pulleys 40 supported proximate to the top of the section 30a after passing through the hole 41 in the base 26, and the other end is fixed at 42 to the section 30b.

[0025] The length of the chains 33 and 38 is calculated so as to provide the operating conditions described hereinafter.

[0026] The device is provided with actuation means which act between the bottom of the pit 2 and the base 26 of the structure 25; said means comprise the pantograph 43, which is appropriately motorized and is suitable to produce the vertical translatory motion of said structure 25 between the lower stroke limit position, shown in Figure 8, in which the lid 27 is in the condition of minimum distance from the base 26, at the level of the paving 3 that surrounds the pit, and the upper stroke limit position, shown in Figure 10, in which the base 26 is at said paving level.

[0027] The operation of the invention is now described starting from the situation shown in Figure 8, which is the situation for normal use, in which the users gradually insert the waste bags in the pillars 28a and 28b and said bags fall into the container 5, which is accommodated in the portion of space delimited by the base 26 and by the lid 27 at the minimum mutual distance.

[0028] When it is necessary to empty the container 5, the pantograph 43 is actuated, causing the structure 25 to rise, and the chains 33 and 38, together with the chains related to the columns 31 and 32, which were partially resting on the bottom of the pit 2, are drawn upward.

[0029] The situation shown in Figure 9 is thus reached, in which said chains have extended fully but are not yet tensioned, and in this situation nothing has occurred to change the mutual distance between the base 26 and the lid 27, which are therefore still at the minimum mutual distance, as they were in the situation of Figure 8.

[0030] As the ascent of the structure 25 continues, the chains, such as 33, 38, slide on the corresponding pulleys, such as 35 and 40, causing the ascent of the sections of the telescopic columns that are rigidly coupled to the lid 27, such as 29b and 30b for the columns 29 and 30, with respect to the sections such as 29a, 30a which are rigidly coupled to the base 26, and the length of said chains is calculated so that when the structure 25 reaches the position shown in Figure 10, in which the base 26 is at the level of the paving 3 that surrounds the pit, the lid 27 has risen with respect to the base 26 by the amount considered ideal in order to completely empty the pillars 28a, 28b into the container 5 and to allow easy extraction of said container.

[0031] The described invention is susceptible of numerous other modifications and variations, all of which are within the scope of the inventive concept; thus, for example, the cable-like elements can be constituted by cables and can be guided along guides which are for example suitable to concentrate the coupling points to the bottom of the pit.

[0032] The actuation means suitable to cause the vertical translatory motion of the structure may further comprise at least one actuation cylinder which is accommodated at the bottom of the pit 2 so that the end of the stem is connected to the base of the structure.

[0033] Nothing changes, of course, if a compactor or a plurality of bins are provided instead of the waste container 5.

[0034] It is also possible to provide a device for weighing the waste container.

[0035] The disclosures in Italian Patent Applications No. MN99A000010 and MN99A000034 from which this application claims priority are incorporated herein by reference.

[0036] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A waste collection device, characterized in that it comprises, inside a pit (2), a structure (1,16,25) which comprises a base (4,17,26) which is suitable to support at least one container (5) and a lid (6,18,27) provided with at least one pillar (7,8,19,20,28a,28b) for inserting waste, said base and said lid being connected by way of means (9-12;22;29-32) which allow to vary their mutual distance between a minimum value, allowing to accommodate said container (5), and a maximum value, allowing to fully empty said at least one pillar into said container, said structure (1,16,25) being provided with actuation means (13,21,43) which act between the bottom of the pit (2) and the base (4,17,26) of said structure (1,16,25) and are suitable to produce a vertical translatory motion between a lower stroke limit in which said lid (6,18,27), in the situation in which the distance from the base (4,17,26) reaches its minimum value, is at the level of the paving (3) that surrounds the pit (2), and an upper stroke limit, in which said base (4,17,26) is at said level.

2. The device according to claim 1, characterized in that it comprises, inside a pit (2), a structure (1,16,25) which comprises a base (4,17,26) which is suitable to support at least one container (5) and a lid (6,18,27) provided with at least one pillar (7,8,19,20,28a,28b) for inserting waste, said base and said lid being connected by way of means which comprise actuation means (9-12;22;29-32) which are suitable to vary their mutual distance, by abutting between them, between a minimum value, which allows to accommodate said container (5), and a maximum value, which allows to fully empty said at least one pillar into said container (5), said structure (1,16,25) being provided with actuation means (13,21,43) which act between the bottom of the pit (2) and the base (4,17,26) of said structure (1,16,25) and are suitable to produce a vertical translatory motion thereof between a lower stroke limit in which said lid (6,18,27), in the situation in which the distance from the base (4,17,26) reaches its minimum value, is at the level of the paving (3) that surrounds the pit (2), and an upper stroke limit, in which said base (4,17,26) for supporting the at least one container (5) is at said paving level.

3. The device according to one or more of the preceding claims, characterized in that the actuation means that are comprised within the means for connecting the base (4,26) and the lid (6,27) of the structure and for varying their mutual distance comprise at least one actuation cylinder (9-12, 29-32).

4. The device according to one or more of the preceding claims, characterized in that the actuation means that are comprised within the means for connecting the base (4,26) and the lid (6,27) of the structure and for varying their mutual distance comprise four actuation cylinders (9-12, 29-32) which are located at the corners of the base and are provided with a hydraulic actuation circuit which comprises means which are suitable to vary the mutual operation conditions of said cylinders.

5. The device according to one or more of the preceding claims, characterized in that the actuation means that are comprised within the means for mutually connecting the base (17) and the lid (18) of the structure and for varying their mutual distance comprise a pantograph (22) which acts between guides (23,24) of the at least one container (5), which are arranged on two parallel sides of said base, and said lid.

6. The device according to claim 1, characterized in that it comprises, inside a pit (2), a structure (25) which comprises a base (26) which is suitable to support at least one container (5) and a lid (27) provided with at least one pillar (28a,28b) for inserting waste, said base and said lid being connected by way of means (29-32) which allow to vary their mutual distance between a minimum value, allowing to accommodate said container (5), and a max-

imum value, allowing to fully empty said at least one pillar (28a,28b) into said container (5), at least one cable-like element (33,38) being provided which has a first end anchored to a fixed point (34,39) of the pit and a second end fixed at the lid, winds around at least one pulley (35,40) which is supported at the base, and has such a length as to arrange the lid (27) at the maximum distance from the base (26) when said base is at the level of the paving (3) that surrounds the pit (2), said structure (25) being provided with actuation means (43) which act between the bottom of the pit (2) and the base (26) of said structure and are suitable to produce a vertical translatory motion between a lower stroke limit, in which said lid (27), in the situation in which the distance from the base (26) reaches its minimum value, is at the level of the paving (3) that surrounds the pit (2), and an upper stroke limit, in which said base (26) is at said level.

7. The device according to claim 6, characterized in that the means for connecting the base and the lid of the structure comprise a plurality of telescopic columns (29-32) which have a first section (29a,30a), which is rigidly coupled to the said base (26), and a second section (29b,30b), which is rigidly coupled to said lid (27), a cable-like element (33,38) being present for each one of said columns, having one end (34,39) anchored proximate to the bottom of the pit (2), being guided along at least one pulley (35,40) which is supported proximate to the top of said first section (29a,30a), and having the other end (37,38) fixed to said second section (29b,30b).

8. The device according to one or more of the preceding claims 6 and 7, characterized in that said cable-like element is constituted by an articulated chain (33,38).

9. The device according to one or more of the preceding claims 6 and 7, characterized in that the cable-like element (33,38) is constituted by a cable.

10. The device according to one or more of the preceding claims, characterized in that the actuation means suitable to produce the vertical translatory motion of the structure comprise a pantograph (43) which acts between the bottom of the pit (2) and the base (26) of the structure.

11. The device according to one or more of the preceding claims, characterized in that the actuation means suitable to produce the vertical translatory motion of the structure (1,16,25) comprise at least one hydraulic cylinder which acts between the bottom of the pit (2) and the base (4,17,26) of the structure.

12. The device according to one or more of the preceding claims, characterized in that it comprises a device for weighing the at least one waste container (5).

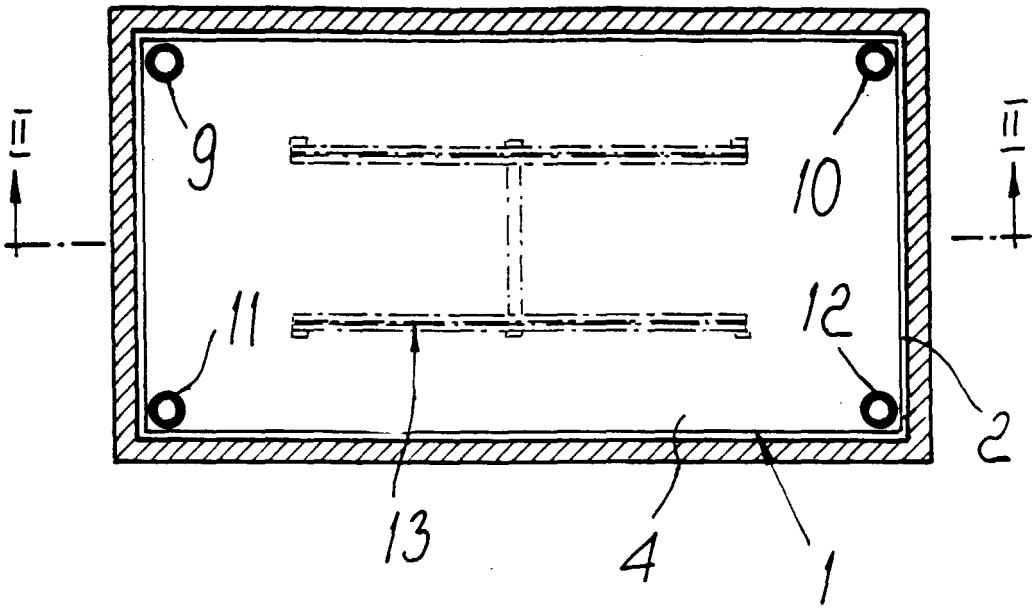

FIG. 1

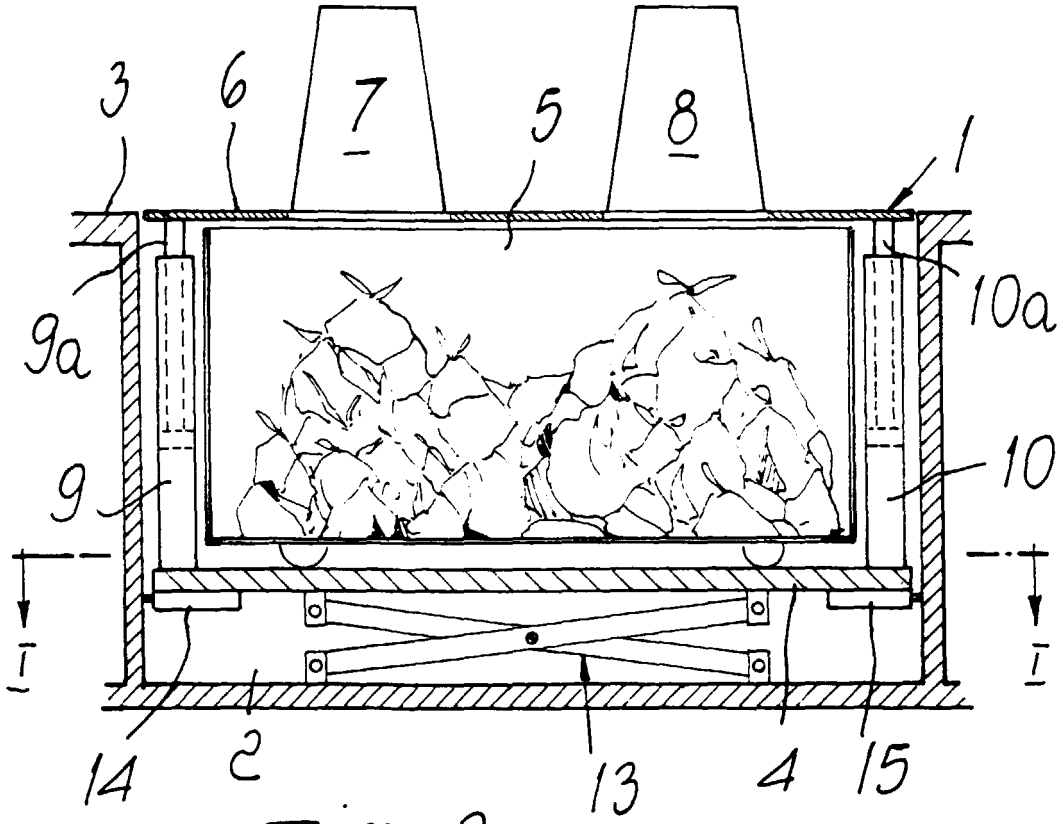

FIG. 2

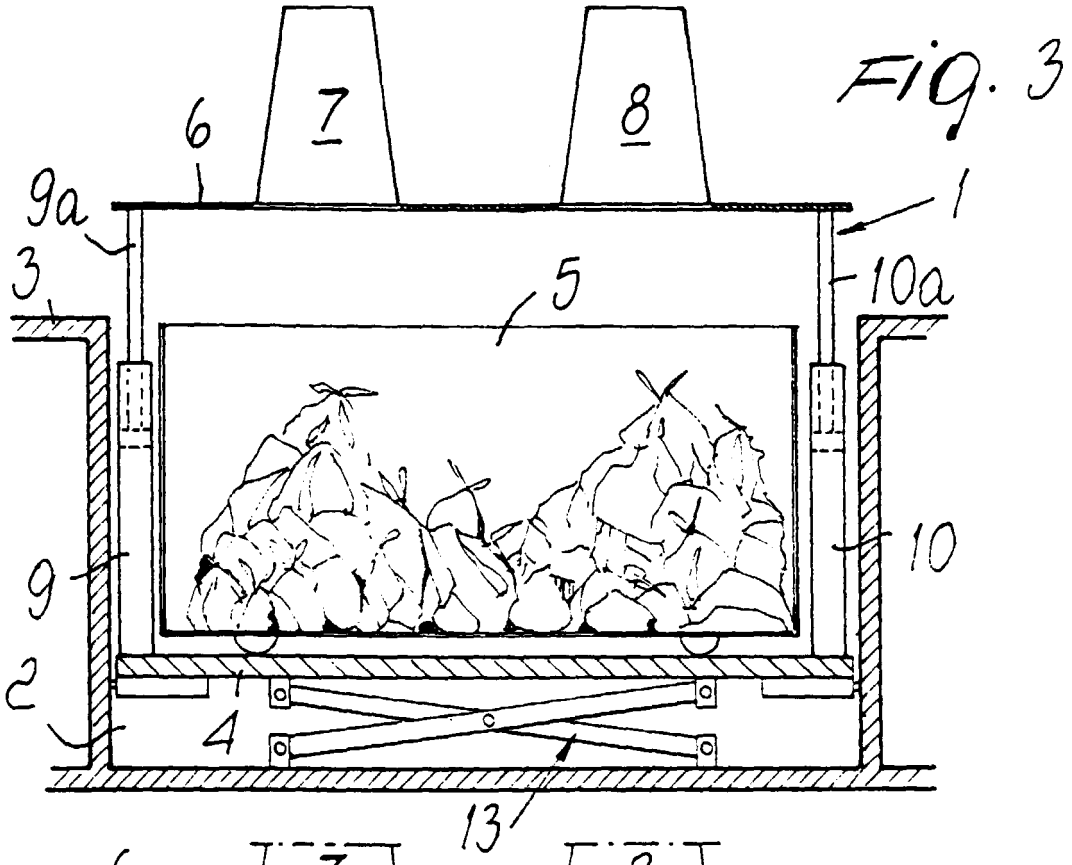

Fig. 3

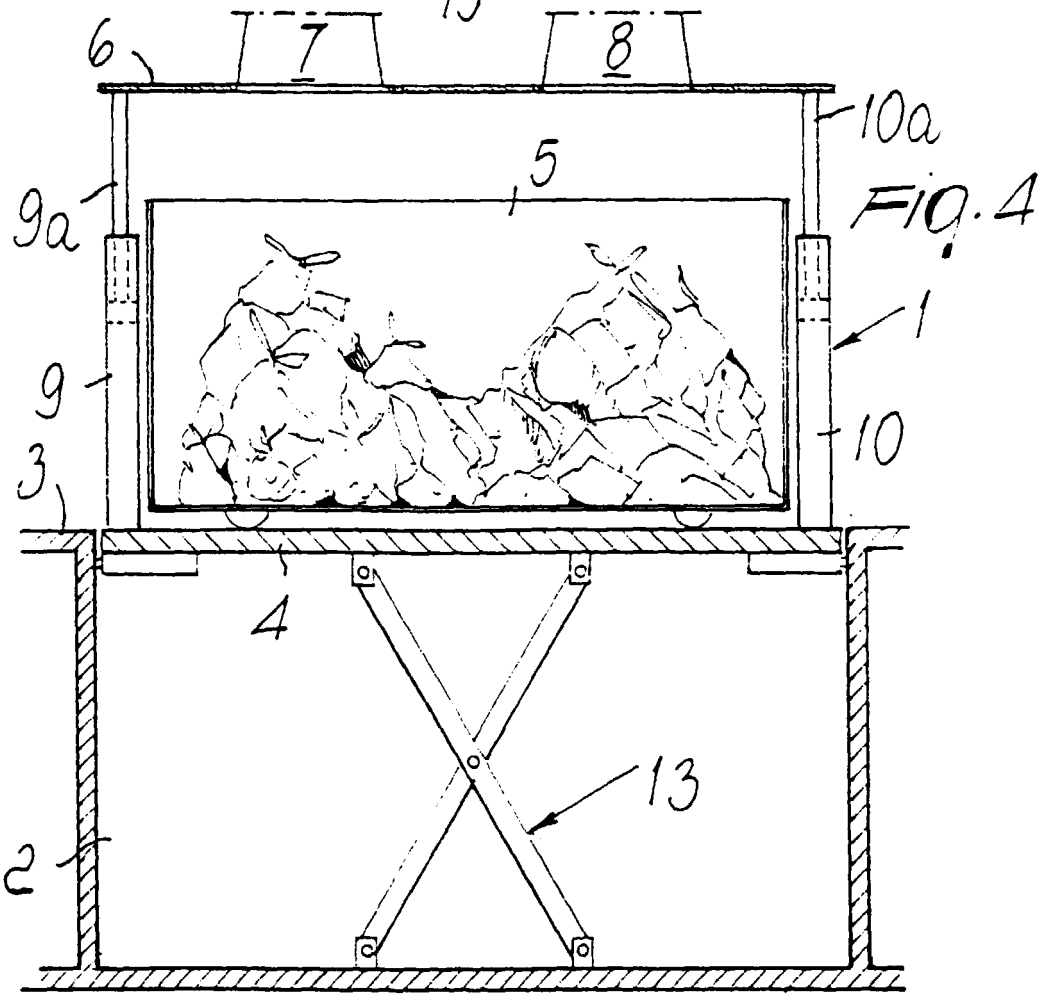

Fig. 4

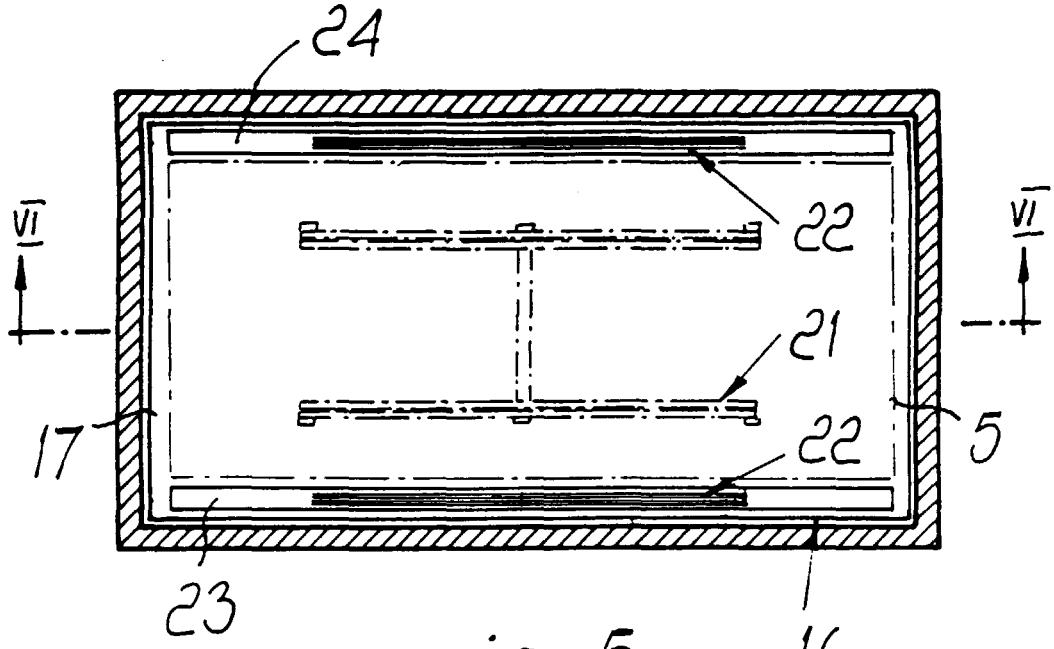

Fig. 5

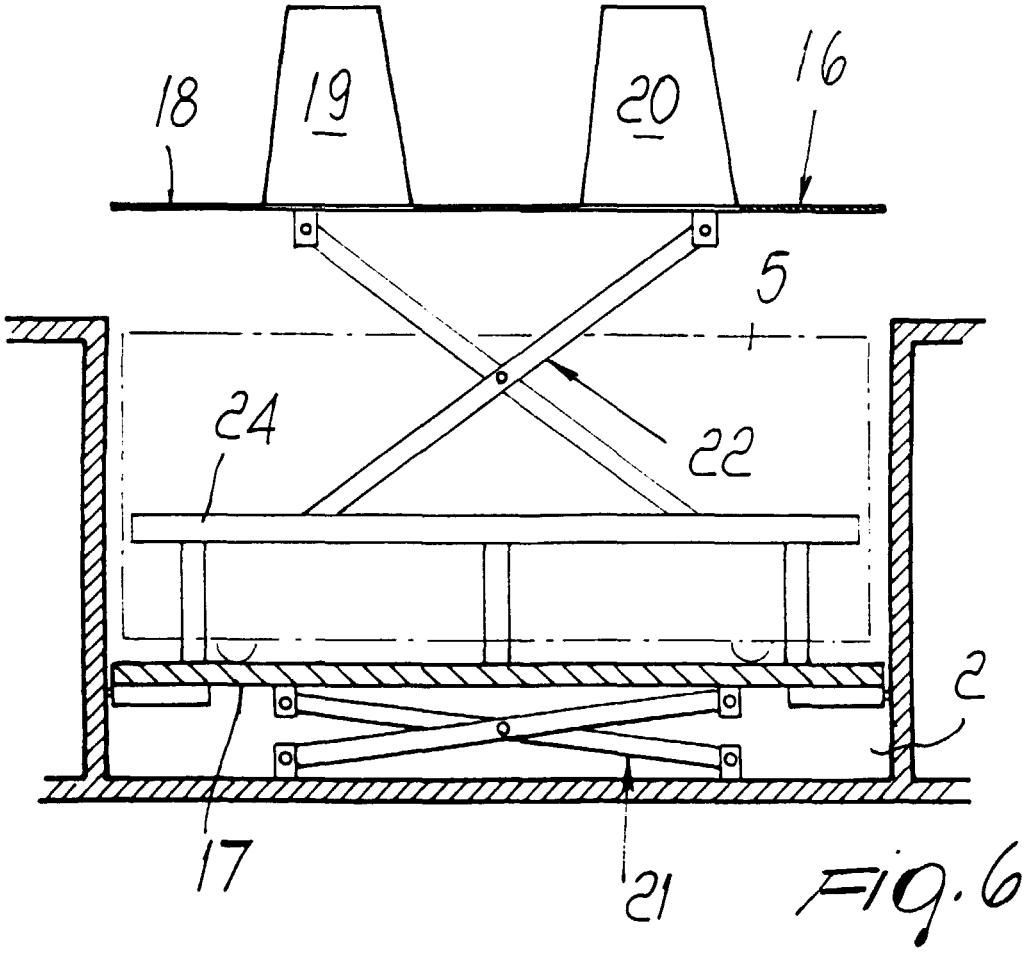

Fig. 6

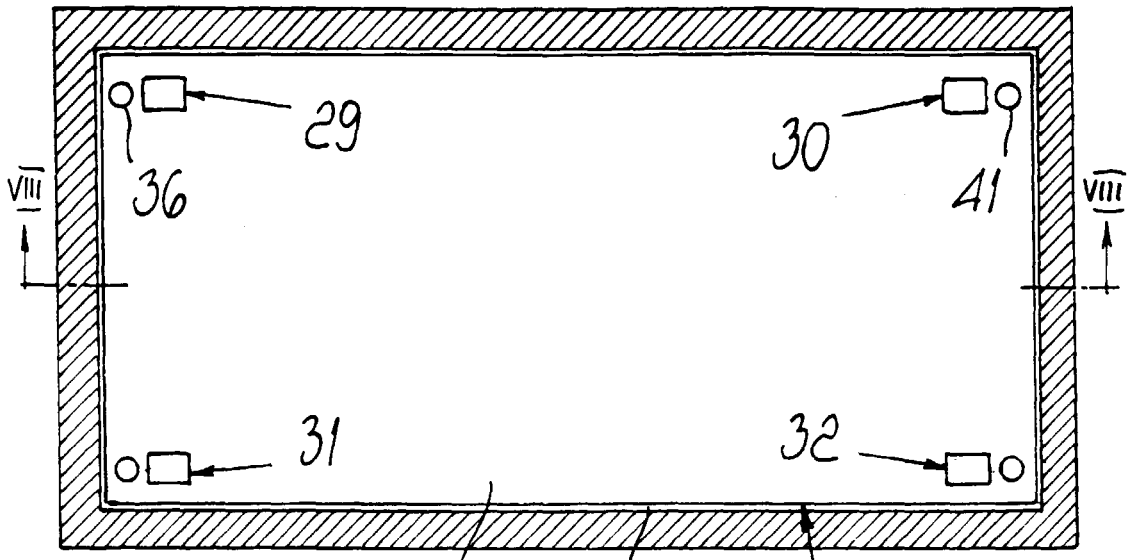
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FIG. 7

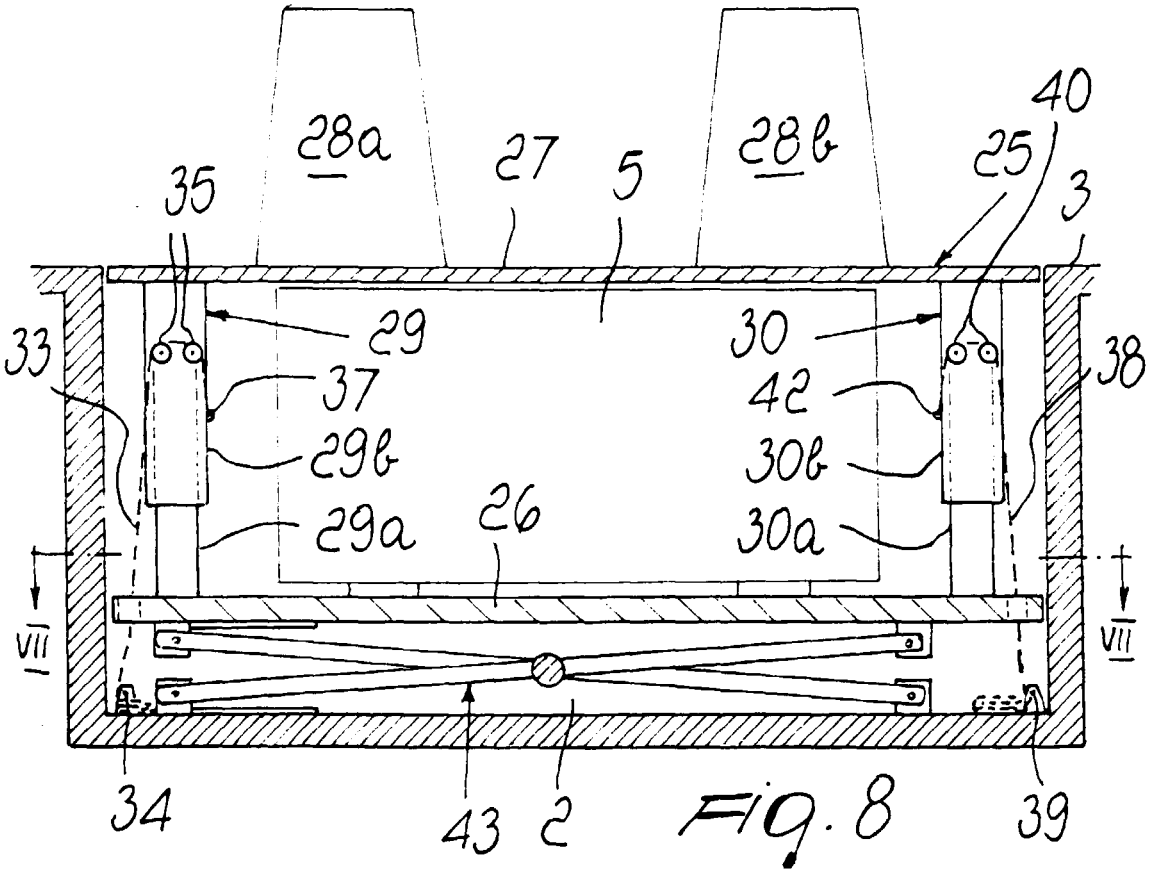
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FIG. 8

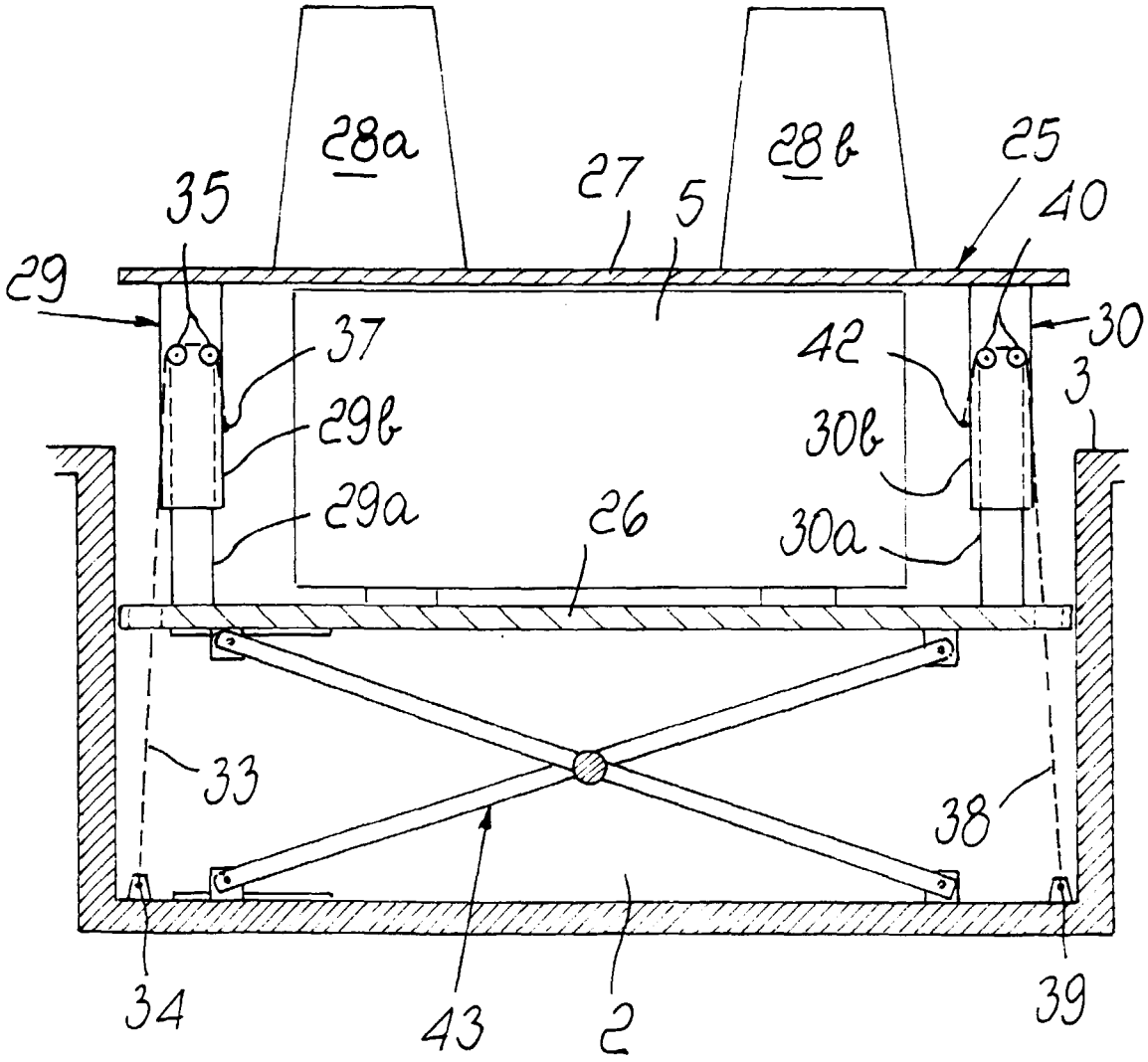

Fig. 9

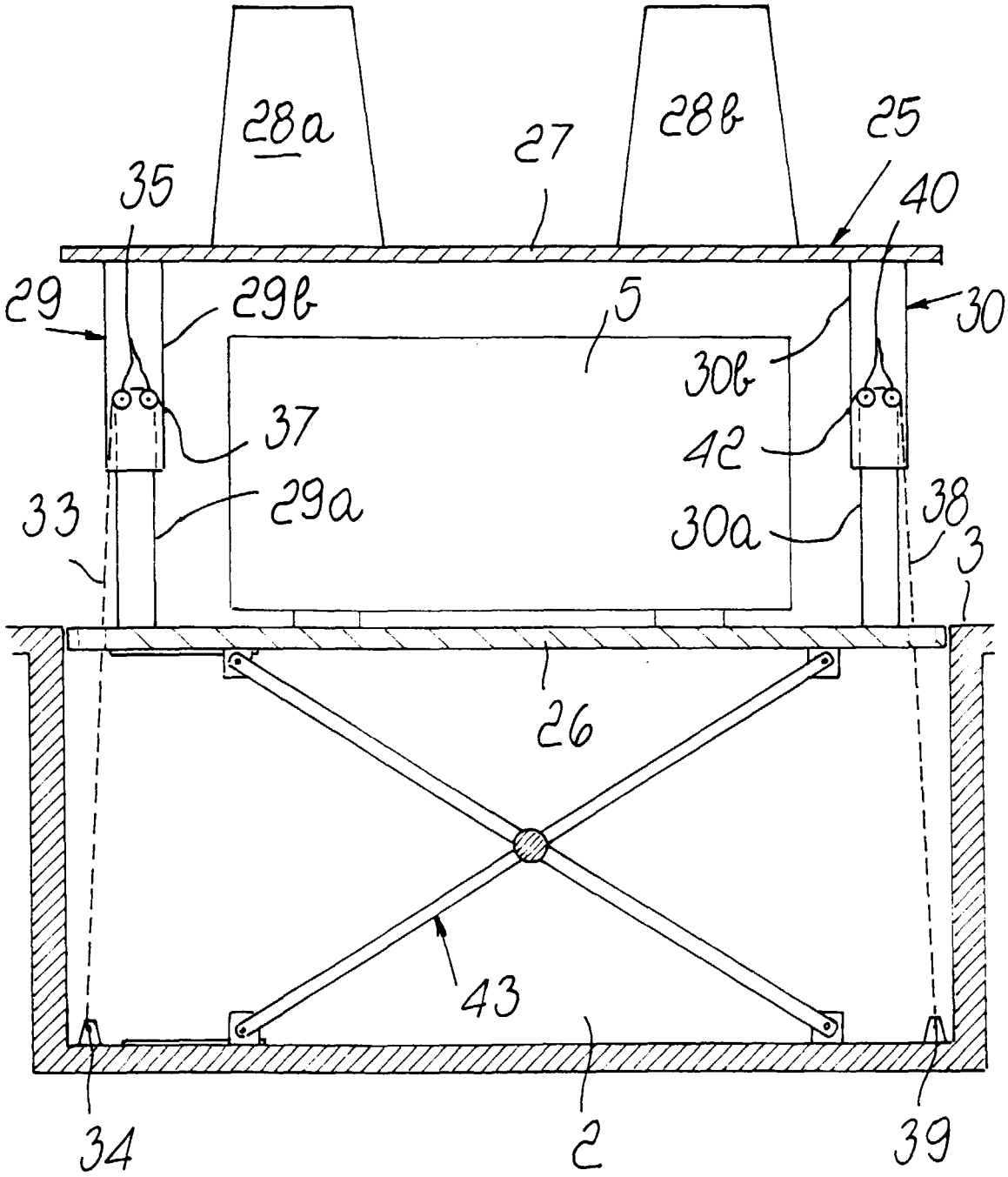

FIG. 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 10 3380

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Y	DE 94 16 305 U (A. NEUMANN) 27 April 1995 (1995-04-27) * claim 14; figure 1 *	12	
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 May 2000	Smolders, R

CATEGORY OF CITED DOCUMENTS

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