



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 726 431 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.11.2006 Bulletin 2006/48

(51) Int Cl.:
B30B 9/30 (2006.01) B65F 1/14 (2006.01)

(21) Application number: **06076031.1**

(22) Date of filing: **11.05.2006**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

(72) Inventor: **Cartagenova, Elio**
West Kensington
London W14 0HD (GB)

(74) Representative: **Harman, Michael Godfrey**
Hillgate Patent Services,
No. 6 Aztec Row,
Berners Road
Islington,
London N1 0PW (GB)

(30) Priority: **25.05.2005 GB 0510619**

(71) Applicant: **Didall Projects Limited**
Berkshire SL4 5BU (GB)

(54) Waste bins with compaction mechanism

(57) Twin upright waste bins 1 with a shared compaction and force multiplication mechanism 20 each have a straight sided compaction portion 8 for receiving a compaction plate 29 of corresponding size and shape, arranged above a longer, wider waste storage portion 9; the sidewall of each bin is axially separable into two removable halves 2, 2' to facilitate removal of the compacted waste. The compaction plate 29 may have a resilient peripheral seal 29' for sealing the plate in the compaction portion while preventing damage to a disposable bag which lines both compaction and storage portions. The compaction mechanism 20 may include a compression rod 28 with two rows of teeth 50, 51, which are manually operated respectively by a lever 52, 58 for compacting the waste and by a rotating gear 56 for rapidly withdrawing the compaction plate. The reduced length and cross sectional area of the compaction portion allow more effective compaction.

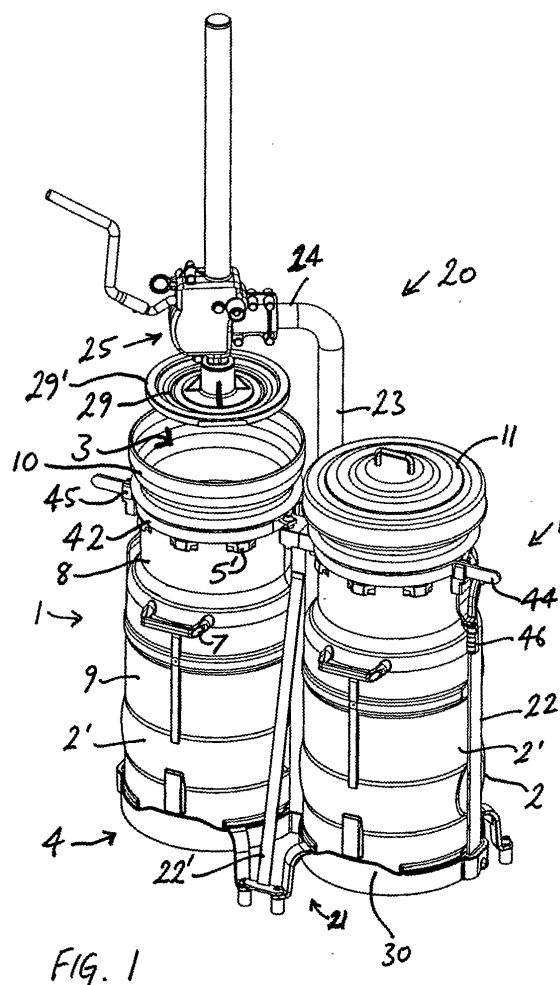


FIG. 1

EP 1 726 431 A2

Description

[0001] This invention relates to waste compactors, and particularly domestic waste compactors of the type comprising a substantially upright waste bin and a compaction mechanism including a compaction plate arranged at the lower end of a substantially vertical compression rod which is advanceable into the bin.

[0002] Many different waste compactors of the above type have been disclosed, often having manual compaction mechanisms which due to their simplicity, reliability and economy are particularly suitable for domestic or small scale commercial use. Often the compactor includes a removable lid to prevent the escape of objectionable odours.

[0003] JP 08208001 A discloses a simple manual compactor having an axially divided body with a straight sided upper section which receives a hand operated plunger.

[0004] In order to achieve an acceptable degree of compaction it is necessary to apply substantial pressure to the refuse in the bin, and more effective manual compactors accordingly include a geared operating lever which engages the compression rod so as to multiply the force applied by the user as the compaction plate is incrementally advanced into the bin. In order to further increase the applied pressure, a compaction plate of relatively small diameter can be employed. Examples include W02004/011349 A1; DE 299 19 933 U1; and US 3 760 718. In each of these disclosures the operating lever is mounted on the top of a straight sided or tapering bin and engages a toothed or serrated compression rod; a relatively small compaction plate is arranged at the lower end of the rod.

[0005] GB 2 347 919 A discloses a similar compaction mechanism which is mounted on the top of the bin, but has a compaction lever with a flat plate which engages the surface of a smooth compression rod; at the end of each compression stroke the rod is engaged and locked in the downward position by a flat, spring loaded plate which can be released to allow the compaction plate to be withdrawn from the bin.

[0006] While these compactors may achieve an adequate pressure for effective compaction, it is found in practice that the gap between the compaction plate and the sidewall of the bin can allow refuse to pass through and collect above the compaction plate as it is advanced into the bin; this refuse may then be ejected from the top of the bin when the compaction plate is withdrawn.

[0007] US 5 115 736 discloses a compactor with twin operating levers and a larger compaction plate which substantially covers the whole area of the bin; this ensures that most of the refuse remains below the plate. However, in practice the larger size of the compaction plate may require an unreasonable amount of effort from the user unless the bin is made relatively small.

[0008] In most compactors of this general type a disposable waste bag or bin liner is inserted into the bin before the introduction of the compaction plate, and the

compression rod and compaction plate are then advanced into the bin to compress the waste inside the bag. US 3 850 094 discloses a compaction mechanism which is mounted on a wheeled bin; one half of the generally cylindrical side wall of the bin is hinged to form a large door which facilitates removal of the disposable bag containing the compacted waste.

[0009] US 5 619 915 discloses a compaction mechanism rotatably mounted on a vertical post which extends from a wheeled base. The compression rod is formed as a rack gear which is engaged by a pinion driven by a hand operated wheel. The refuse bin is mounted on the base and has an octagonal sidewall of which one half is hinged to form a door for removal of the filled bag. As the compaction plate and compression rod are progressively advanced into the bin, a spring is progressively tensioned which when released withdraws the plate and rod from the bin. This disadvantageously requires the user to apply additional force to the operating wheel in order to tension the spring, and therefore necessarily reduces the force available for compaction.

[0010] NL 7903519 discloses a simpler type of compaction mechanism in which an operating lever is pivoted on a wheeled frame and the upper end of the compression rod is pivotably fixed to the centre of the operating lever. The sidewall of the bin has a slight upward taper and is releasably mounted on the base of the frame, so that once the disposable bag inside the bin is filled with compacted waste, the sidewall of the bin can be lifted away from the filled bag. NL 8501293 shows a similar arrangement.

[0011] In alternative arrangements the compaction mechanism may be mounted on a separate frame and the plate advanced into a bin which is positioned beneath the mechanism. In DE 297 07 748 U1 for example the compaction mechanism is mounted on a free standing frame, whereas in DE 93 14 727 U1 it is mounted on a bracket attached to a wall.

[0012] DE 295 15 698 U1 discloses a lever operated manual compactor which is mounted on a freestanding frame and incorporates a spring for retracting the compression rod and compaction plate. As the rod and plate are advanced downwardly into the bin the spring is tensioned so that it lifts the plate up out of the bin when the rod is released. Again, the user must provide sufficient additional force to tension the spring during the compaction operation.

[0013] It is the object of the present invention to provide a waste compactor of the general type described above which is more effective and convenient in domestic use.

[0014] According to the present invention there is provided a waste compactor as defined in the appended claims.

[0015] Preferably the compaction plate substantially conforms to the cross section of the compaction portion, and the storage portion is axially longer than the compaction portion.

[0016] By providing the waste bin with an upper,

straight sided compaction portion and an enlarged, lower portion for storing the compacted waste, the invention allows the use of an effective force multiplication mechanism acting on a relatively small compaction plate, which features in combination substantially increase the pressure applied to the waste, without incurring the disadvantage, either of a relatively small bin which must be emptied more frequently, or of a gap which becomes large enough at any point along the axis of the compaction portion to allow refuse to bypass the compaction plate and collect above it.

[0017] Further features and advantages will become evident from the illustrative embodiments which will now be described, purely by way of example and without limitation to the scope of the invention, and with reference to the accompanying drawings, in which:

Fig. 1 shows a first waste compactor comprising two waste bins and a compaction mechanism;

Fig. 2 is an exploded view showing the various components of the first compactor;

Figs. 3A and 3B are respectively front and perspective views of the first and second sidewall portions of one of the waste bins of the first compactor;

Figs. 4A and 4B are respectively perspective and front views of the gearbox of the compaction mechanism, with the upper extension housing removed;

Fig. 4C shows the view of Fig. 4A with one half of the casing removed;

Fig. 5 is a longitudinal section of part of the compaction mechanism; and

Figs. 6 and 7 respectively show the compaction mechanisms of second and third embodiments.

[0018] Corresponding parts in each of the Figures are indicated by the same reference numerals.

[0019] Referring to Figs. 1, 2, 3A and 3B a first waste compactor comprises a pair of substantially vertical, generally cylindrical waste bins 1 and a compaction mechanism 20. The compaction mechanism includes a base portion 21 which supports upwardly extending side support posts 22 and centre post 22' and a vertical post 23. The upper end of the post 23 supports a short horizontal neck 24 on the distal end of which is mounted a gearbox 25.

[0020] The gearbox comprises a casing 26, 26' with an upper extension housing 27 which encloses the compression rod 28; a compaction plate 29 is mounted at the lower end of the compression rod.

[0021] The sidewall of each waste bin 1 is axially divided into first and second portions 2, 2'. The two sidewall portions 2, 2' are advantageously formed as identical

moulded plastics shells, so that each shell 2, 2' extends from the open, upper end 3 to the lower end 4 of the bin so as to form one axial half of the axially continuous bin sidewall. Each shell 2, 2' includes moulded upper lugs 5, 5' which are engageable with one of two fixed half collars 40 of the compaction mechanism, which are mounted on the top of the centre post 22'. Each of two corresponding releasable half collars 42 is pivoted at its proximal end 43 on the corresponding fixed half collar 40 and has a handle portion 44 at its distal end.

[0022] In use, the first shell 2 is positioned on the base 21 so that the upper lugs 5 locate over the corresponding fixed half collar 40; tabs 41 extending upwardly from the fixed half collar 40 locate between the lugs 5 so as to ensure that the shell 2 is correctly positioned. The lower end of the shell is located inside an upwardly extending rim 30 of the base 21, and is provided with moulded tabs 6 which extend beneath the rim 30 to hold the first shell 2 in position.

[0023] The second shell 2' has corresponding upper lugs 5' and tabs 6' and is placed next to the first shell 2 on the base 21 and secured in position by the corresponding releasable half collar 42, which extends around the outer surface of the shell 2' and above the upper lugs 5'. The releasable half collar 42 is locked by engaging its handle portion 44 in a corresponding slot 45 in the distal end of the corresponding fixed half collar 40. Locking handles 46 are provided on the support posts 22 to assist in locking the parts together. The second sidewall portion 2' is also provided with a handle 7 which makes it easy to lift it away from the base 21 and first sidewall portion 2 when the releasable half collar 42 is opened.

[0024] The two shells 2, 2' which form the sidewall of each waste bin define together an upper, compaction portion 8 and a lower, storage portion 9, as best shown in Fig. 3A. An widened mouth or waste receiving portion 10 is provided above the compaction portion to make it easier to introduce the waste for compaction. The storage portion 9 has a greater cross sectional area than the compaction portion 8, which maximises its capacity and hence the intervals at which it must be emptied, and in the embodiment shown is slightly more than three times as deep. The overall height of the bin is limited by the height at which refuse can conveniently be introduced into its open upper end.

[0025] By providing a compaction portion which is axially shorter than the storage portion, the further advantage is realised that the necessary travel of the compaction plate can be reduced. This allows the force multiplication means, comprising the gearing of the compaction mechanism (as will be further described below) to be arranged so as to produce a smaller increment of travel of the compaction plate for each cycle of the operating lever, so that the pressure applied by the compaction plate is advantageously increased and the waste is still more effectively compacted. Most preferably the storage portion is at least 2.5 times the axial length of the compaction portion; this ratio is found to produce highly ef-

fective compaction and sufficient storage volume to avoid unnecessarily frequent emptying of the bin, while still leaving enough space in the reduced diameter compaction portion to allow a convenient amount of waste to be placed therein before the next compaction cycle must be carried out.

[0026] The compaction portion has straight sides and an axially uniform cross section, and in the embodiment shown is cylindrical. Other straight sided shapes are possible, such as parallelepipeds or straight sided projections of a curved, non-circular cross section. This ensures that the compaction plate 29 can substantially conform to the cross section of the compaction portion 8 at all points along its axis - which is to say, the compaction plate 29 is so dimensioned that, while it can freely advance down through the compaction portion 8, the periphery of the compaction plate remains sufficiently close to the sidewall of the bin to substantially prevent waste from passing between the plate and the sidewall as it is compacted.

[0027] Before using the compactor each bin is lined with a disposable bin liner or waste bag, the mouth of which is secured by means of a bag retainer (not shown) such as a ring which fits snugly over or within the waste receiving portion 10 of the bin sidewall 2, 2'.

[0028] The base of the bin liner rests on the base 21 of the compaction mechanism, which in the illustrated embodiment also forms the closed lower end 4 of each of the bins 1. A resilient seal 29' is arranged around the periphery of the compaction plate 29, which avoids damage to the bin liner while providing effective sealing between the compaction plate and the sidewall of the compaction portion 8 as the compaction plate 29 advances. This further helps to reduce the escape of objectionable odours from the bin.

[0029] In a development (not shown), a sleeve may be provided which extends downwardly within the liner into the compaction portion 8 to protect the liner and to form in use the inner sidewall of the compaction section against which the compaction plate is slidingly sealed. The sleeve may form part of the bag retainer.

[0030] In the embodiment shown, two bins are provided, which makes it possible to divide the waste for recycling and the like. Of course, in alternative embodiments a single bin or more than two bins may be provided. The compaction mechanism is moved from one bin to the other by first retracting the compression rod 28 so that the compaction plate 29 is raised clear of the bin, and then rotating the neck 24 on the post 23 so that the gearbox 25 is positioned above the other bin. One or both of the bins 1 are preferably provided with a separate lid 11 which is used to seal the bin after the compaction plate is withdrawn. A separate inner sealing plate (not shown) having a handle on its upper surface and one or two resilient peripheral seals may also be provided. The sealing plate is placed in the neck of the compaction portion so as to prevent the escape of odours after the compaction plate is withdrawn. By ensuring that the compaction plate

29 is a close fit in the compaction portion 8, and by providing a resilient seal 29' around its periphery, the additional advantage is obtained that the compaction plate may be left in position in one of the bins so as to effectively seal that bin and prevent odours from escaping.

[0031] In use, waste is first introduced into the mouth 10 of the bin and drops down into the storage portion 9. Once the waste has risen to a level at which it partially or completely fills the compaction portion 8, the gearbox 25 is positioned above the bin and the compaction plate introduced through the mouth 10 and advanced down through the compaction section 8 until the waste has been compacted to the bottom of the compaction section. The compaction plate 29 may then be left in position if desired until further waste is added to the bin, or alternatively it may be withdrawn and pivoted away from the bin, and the bin covered by a lid 11 and / or sealed with an inner sealing plate (not shown). Once the level of added waste has reached the top of the compaction section 8 the compaction cycle is repeated; in this way the contents of the storage section 9 are progressively compacted by pressure from the waste above until the density of waste in the storage section 9 prevents further compaction and the bin 1 must be emptied.

[0032] The second shell 2' is easily removed by releasing the half collar 42 and lifting the second shell 2' away from the base 21 and first shell 2. The second shell 2' can then be cleaned if required and the full bin liner can be removed. Advantageously, the first shell 2 can also be removed for cleaning; moreover, since the two shells 2, 2' not only form the openable part of the storage portion 9, but also the sidewall of the compaction portion 8, both storage portion and compaction portion are easily cleaned. Less preferably, the first shell 2 might be fixed in position. In alternative embodiments a hinged door or the like may be provided in the storage portion 9, or alternatively the sidewall may be formed in one piece and lifted away from the base to release the bag. It is also possible to provide the sidewall of each bin with an integral base.

[0033] Referring now to Figs. 4A, 4B, 4C and 5, the compaction plate 29 is mounted at the lower end of the compression rod 28 which is supported in the gearbox 25; the upper extension housing 27 encloses the upper end of the compression rod 28, which is formed as a rack having a row of teeth 50 and a second row of teeth or cogs 51.

[0034] A manually operable lever mechanism is provided for engaging and incrementally advancing the compression rod, and comprises a lever base 52 which is pivoted on the gearbox casing 26 and carries a pawl 53 which is biased into engagement with the rack by a spring (not shown). As the lever base 52 is moved downwards the pawl 53 engages the teeth 50 so that the compression rod 28 is moved down by a single tooth increment for each stroke of the lever. As explained above, the increment is advantageously smaller (and hence the pitch of the teeth 50 is finer) than it would otherwise be due to

the reduced axial length of the compaction portion 8 of the bin. A second spring loaded pawl 54 engages the teeth 50 so that they form a ratchet which holds the compression rod 28 in position after each downward movement. The spring (not shown) of the second pawl 54 may apply enough pressure to prevent the rod 28 from falling under its own weight until the user releases the pawl by pulling the release ring 55; the rod 28 and compaction plate 29 then drop down to rest on the top of the waste, at which point the lever mechanism may be operated to begin the process of compaction.

[0035] The lever base 52 may be lightly spring biased to its uppermost position as shown in the Figures, in which the pawl 53 is clear of the teeth 50 so that it does not prevent the compression rod 28 from being raised.

[0036] Since as described above the force multiplication and compaction ratio is advantageously high, so that a relatively large number of strokes of the lever base 52 are required to fully advance the compaction plate 29, it is desirable to provide means for more rapidly withdrawing the plate 29 from the bin. A manually operable rotary retraction mechanism is therefore provided for withdrawing the compression rod 28 and compaction plate 29, and comprises a rotating gear 56 which engages the second row of cogs 51. A spindle 57 is provided for rotating the gear 56, which is adapted to receive a removable cranked operating handle 58. The handle 58 is provided at one end with a socket 59 which may be fitted over the lever base 52 as shown in the Figures so that the handle 58 then forms a lever for advancing the compaction plate 29. When it is desired to raise the plate, the handle 58 is removed from the lever base 52 and fitted to the spindle 57. The user then pulls the ring 55 to release the ratchet pawl 54 while rotating the handle 58 to operate the gear 56 and raise the rod 28 and plate 29 to their uppermost position as shown. Additional means may be provided for preventing the compression rod 28 from moving downwards during this process until the pawl 54 is released or the compression cycle is started.

[0037] Of course, the compression rod may alternatively be smooth or finely serrated and the pawls replaced by resiliently biased flat plates or the like.

[0038] Referring lastly to Figs. 6 and 7, the invention may alternatively be implemented using a hydraulic, electric or other powered compaction and force multiplication mechanism, in which case the hydraulic piston may serve as the compression rod.

Fig. 6 shows an electric compaction mechanism wherein the compression rod 28' is advanced by means of an electric motor 60 and gearing 61. Similarly to the manually operated embodiments described above, the bin incorporates straight sided compaction and wider, openable storage portions and hence is not shown. An integral enclosure 62 is provided, and the bin is secured in position by a collar 63.

[0039] In the embodiments of Figs. 1 - 6, the bins are of generally cylindrical cross section; it will be understood that other shapes may alternatively be employed.

Fig. 7 shows an electrically operated compactor similar to that of Fig. 6 but with a generally square compaction plate 64, for use with a bin having a compaction portion with a generally square cross section in accordance with the invention. The compaction and storage portions of each bin may also be of different cross sectional shapes, and while the compaction section is necessarily straight sided, the storage portion may if desired have, for example, curved or tapering sides. In alternative embodiments the compaction mechanism may be mounted directly on the bin or on a separate stand or bracket. Many further adaptations may be made to these and other aspects of the invention within the scope of the appended claims.

[0040] In summary, a preferred embodiment provides twin upright waste bins with a shared compaction and force multiplication mechanism; each bin has a straight sided compaction portion for receiving a compaction plate of corresponding size and shape, arranged above a longer, wider waste storage portion. Desirably, the sidewall of each bin is axially separable into two removable halves to facilitate removal of the compacted waste. The compaction plate may have a resilient peripheral seal for sealing the plate in the compaction portion while preventing damage to a disposable bag which lines both compaction and storage portions. The compaction mechanism may include a compression rod with two rows of teeth, which are manually operated respectively by a lever for compacting the waste and by a rotating gear for rapidly withdrawing the compaction plate. The reduced length and cross sectional area of the compaction portion allow more effective compaction.

Claims

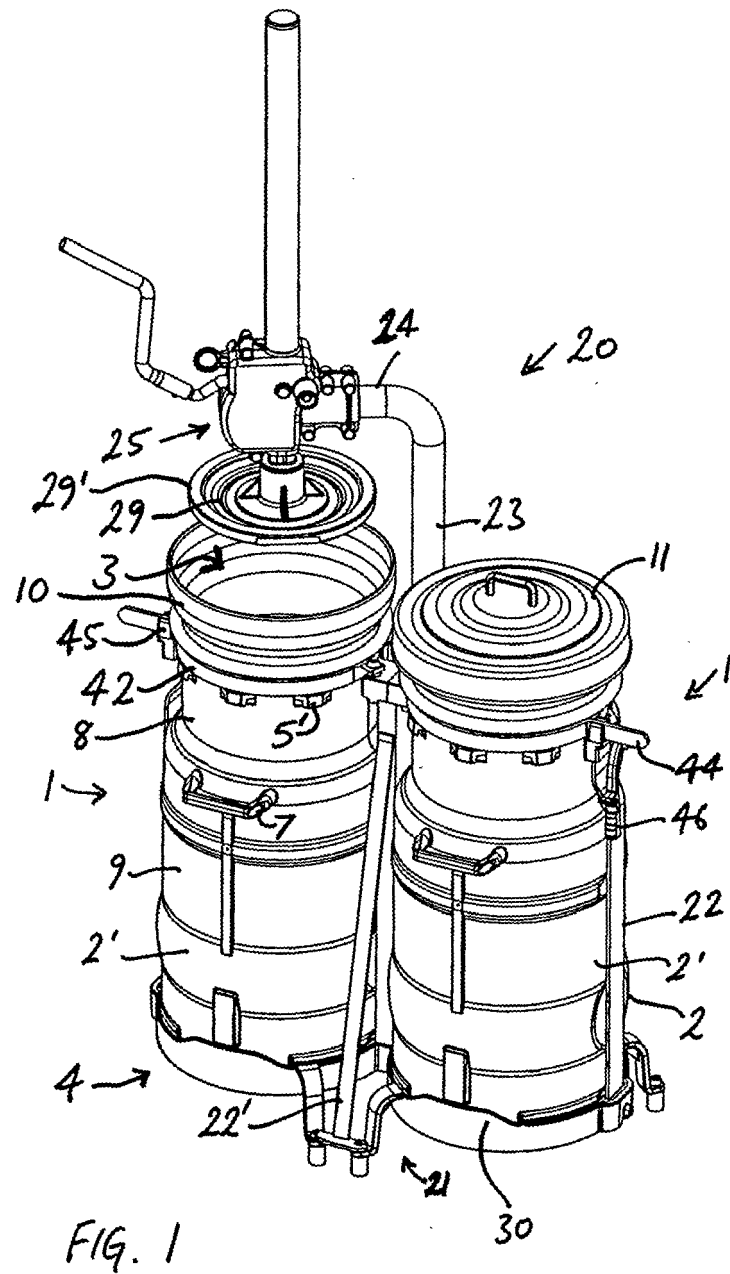
1. A waste compactor comprising at least one waste bin (1) and a compaction mechanism (20), the waste bin having a substantially vertical axis and including a sidewall (2, 2') and an open upper end (3) for the introduction of waste, the compaction mechanism including a compaction plate (29) which is advanceable downwardly into the open end of the waste bin so as to compact the waste inside the bin and force multiplication means (25) for multiplying a compaction force applied to the compaction plate; **characterised in that** the sidewall of the waste bin defines an upper, straight sided compaction portion (8) having an axially uniform cross section, and a lower, storage portion (9) having a greater cross sectional area than the compaction portion, wherein the storage portion is openable for the removal of the compacted waste.
2. A waste compactor according to claim 1, **characterised in that** the compaction plate (29) substantially conforms to the cross section of the compaction portion (8).

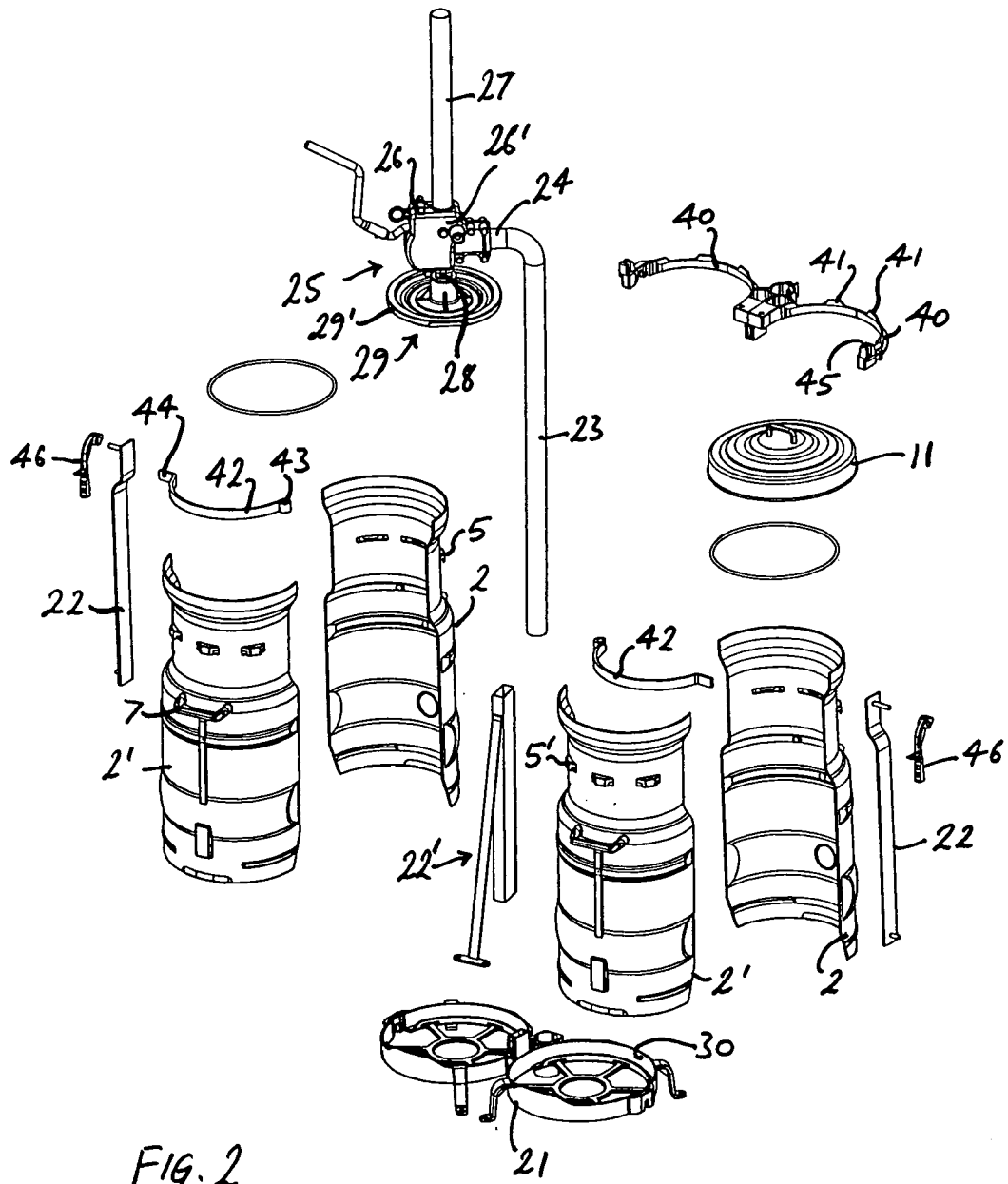
3. A waste compactor according to claim 2, **characterised in that** the compaction plate has a resilient peripheral seal (29') which engages the sidewall of the compaction portion.
5
4. A waste compactor according to any of claims 1 - 3, **characterised in that** the storage portion (9) is axially longer than the compaction portion (8).
10
5. A waste compactor according to claim 4, **characterised in that** the storage portion (9) is axially at least 2.5 times as long as the compaction portion (8).
15
6. A waste compactor according to any preceding claim, **characterised in that** the sidewall is axially divided into a first portion (2) and a second, removable portion (2').
20
7. A waste compactor according to any preceding claim, **characterised in that** the compaction mechanism (20) includes a compression rod (28) for advancing the compaction plate into the bin, and a manually operable lever mechanism (52, 53) for engaging and incrementally advancing the compression rod.
25
8. A waste compactor according to claim 7, **characterised in that** the compaction mechanism includes a manually operable rotary retraction mechanism (56, 57) for withdrawing the compression rod and compaction plate from the bin.
30
9. A waste compactor according to claim 8, **characterised in that** the compression rod (28) comprises a rack having two rows of teeth, a first row (50) engaging the lever mechanism (52, 53) and a second row (51) engaging the retraction mechanism (56, 57).
35
10. A waste compactor according to any preceding claim, **characterised in that** at least two waste bins (1) are provided, and the compaction mechanism (20) is selectively engageable with each of the bins.
40

45

50

55





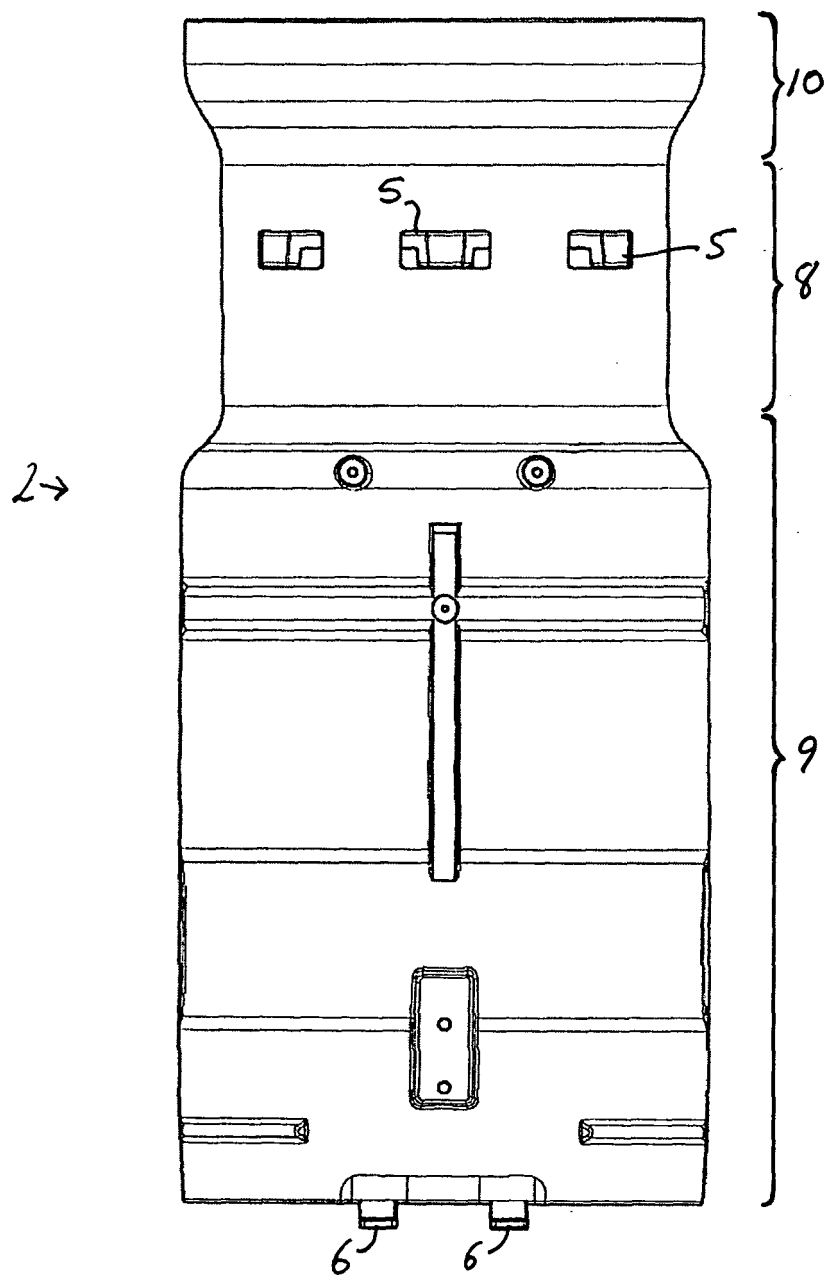


FIG. 3A

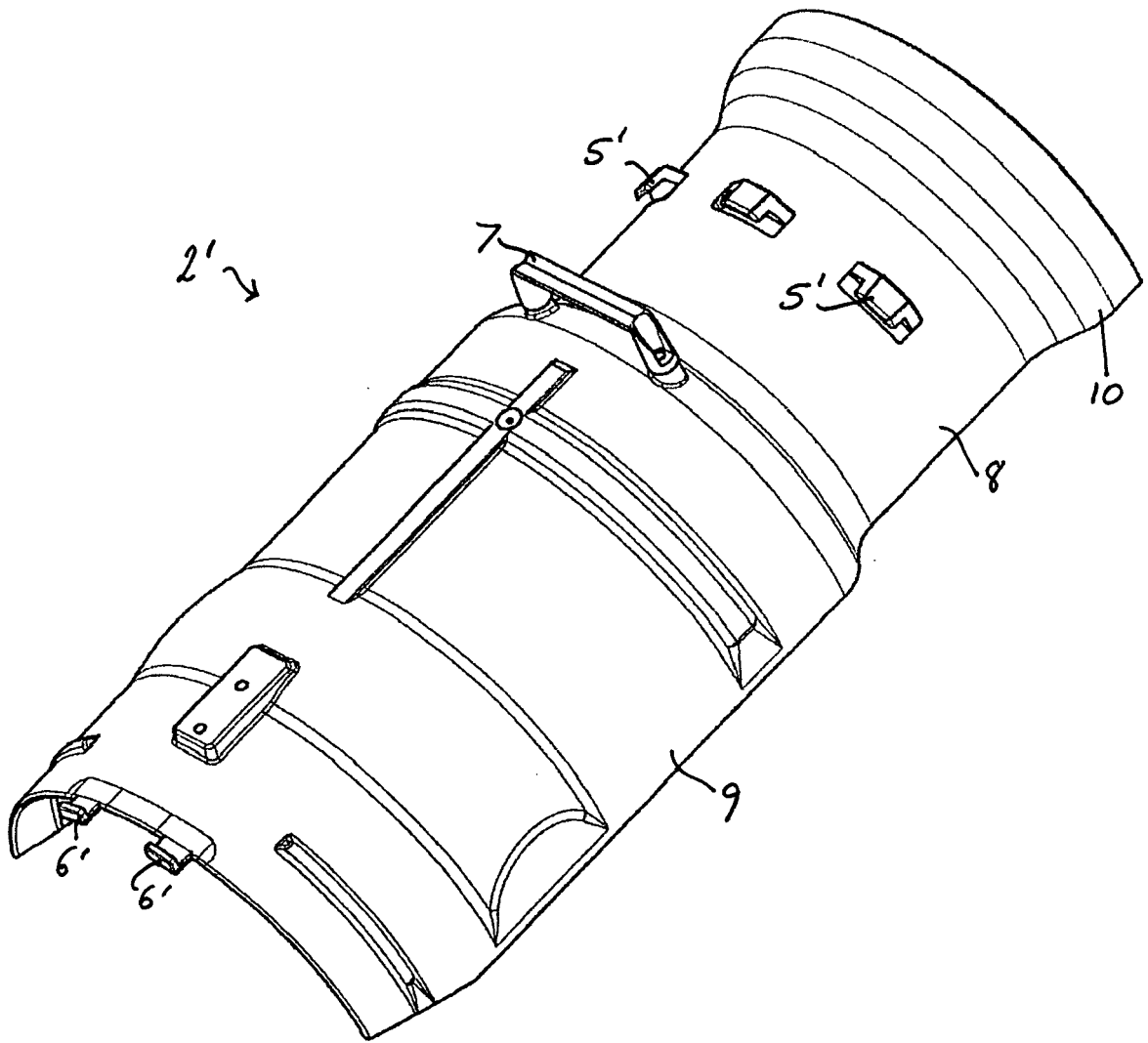
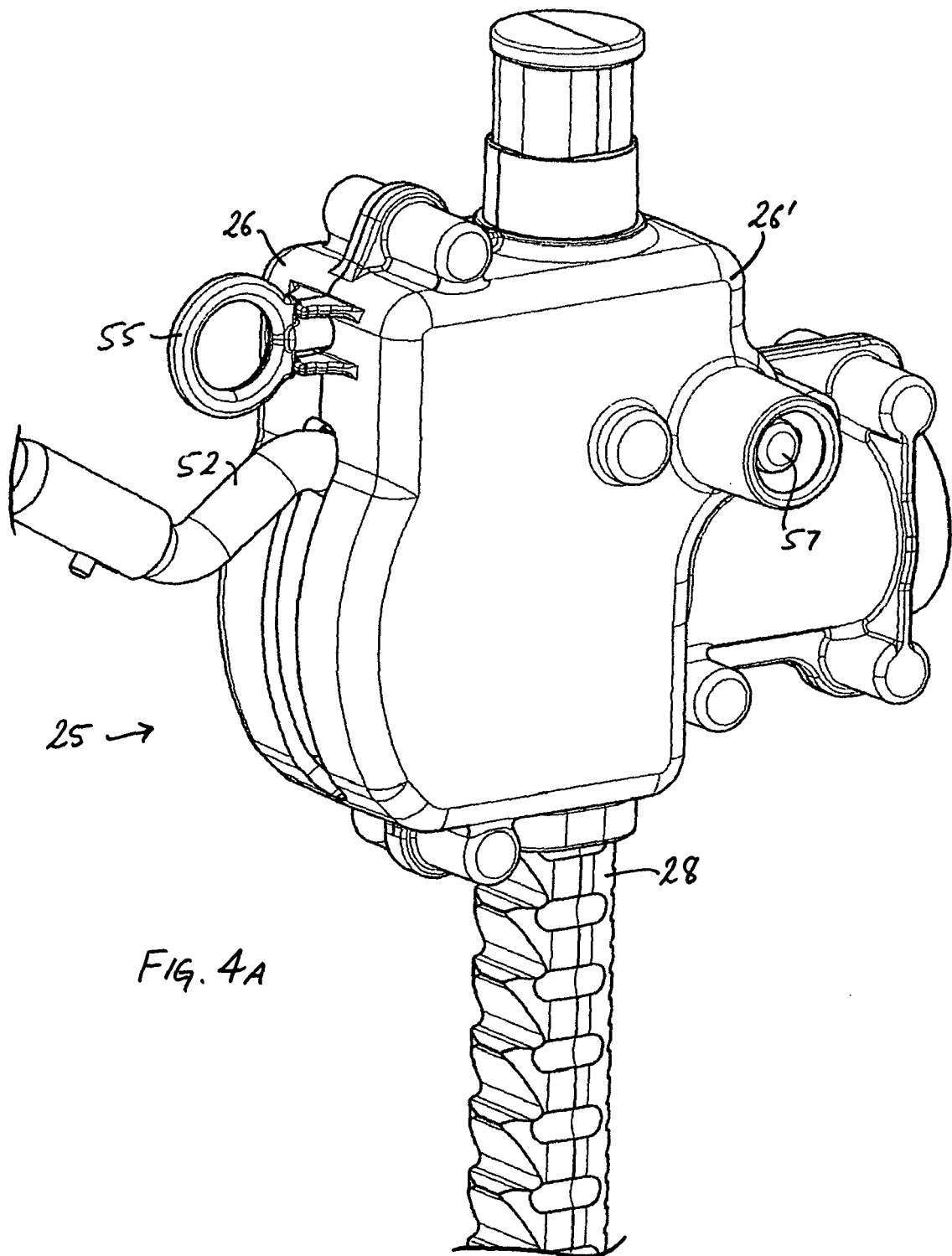


FIG. 3B



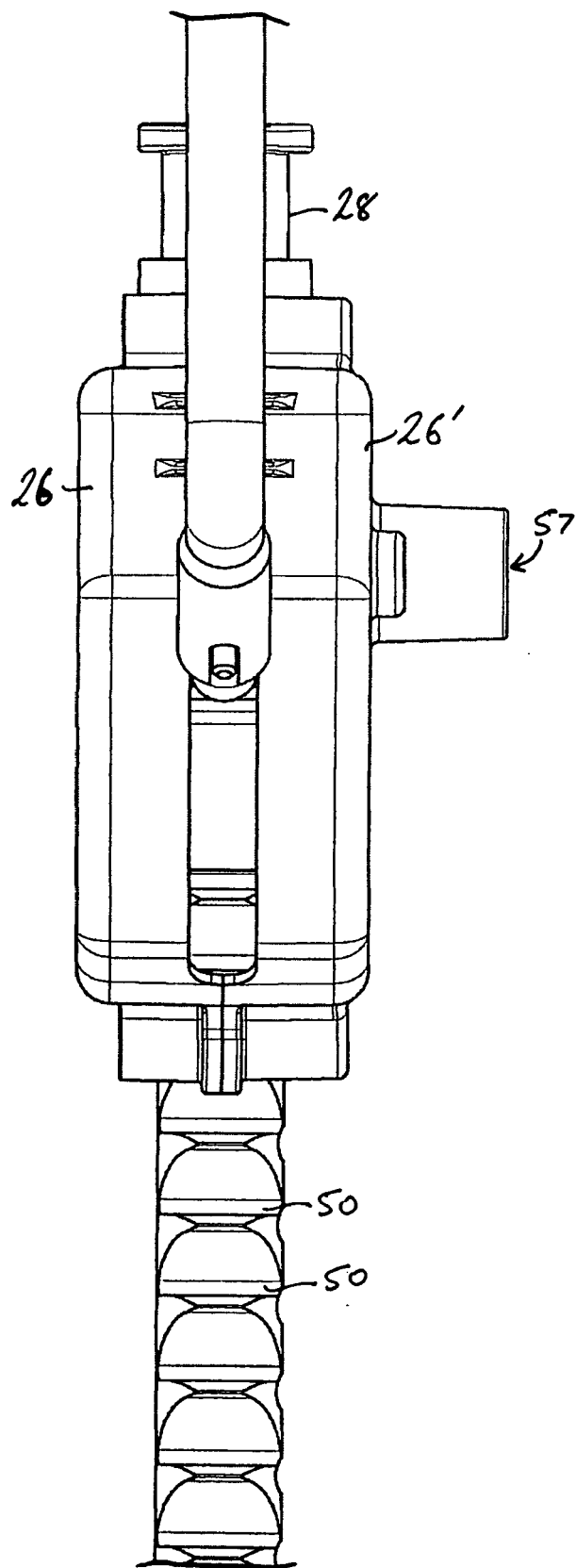
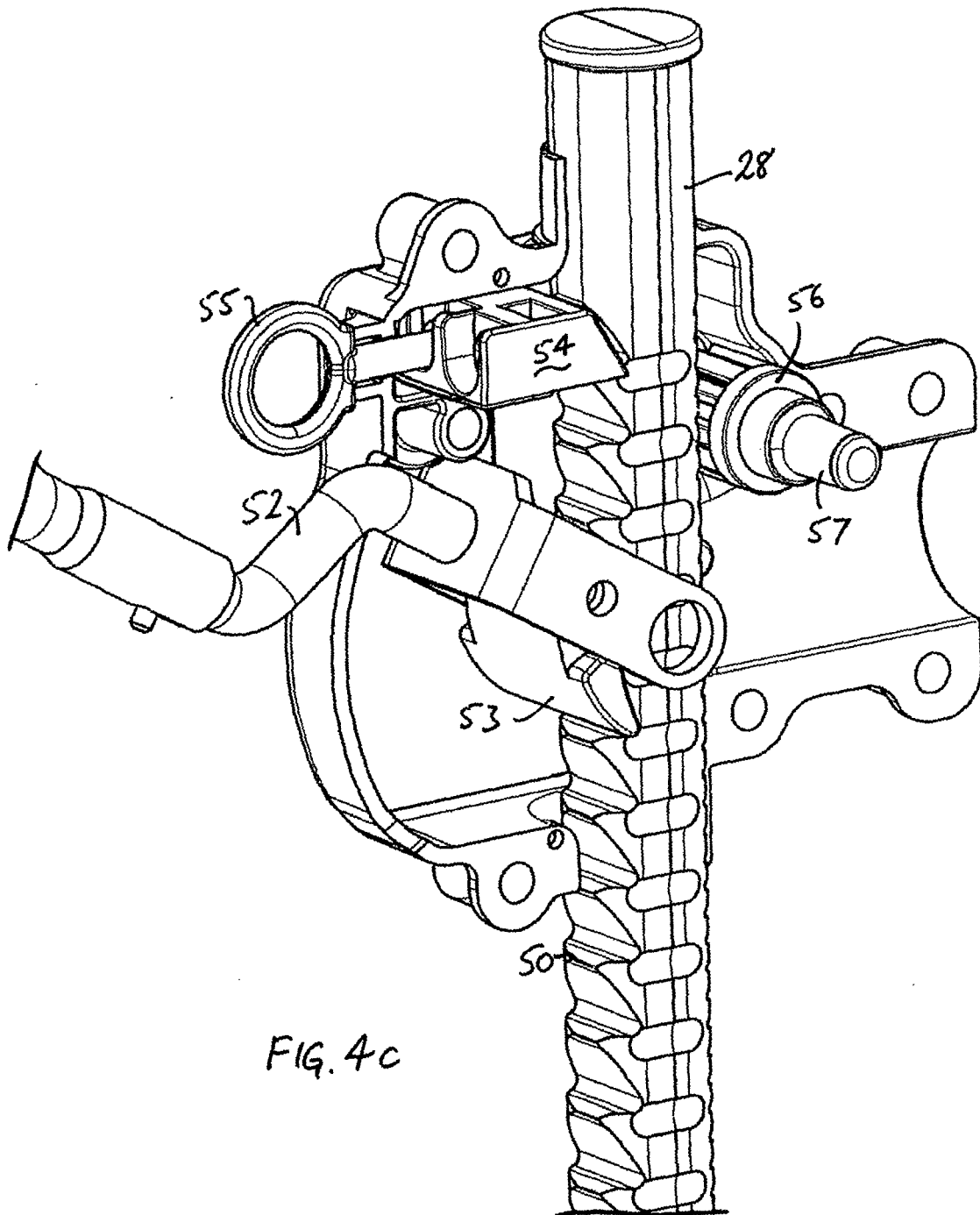
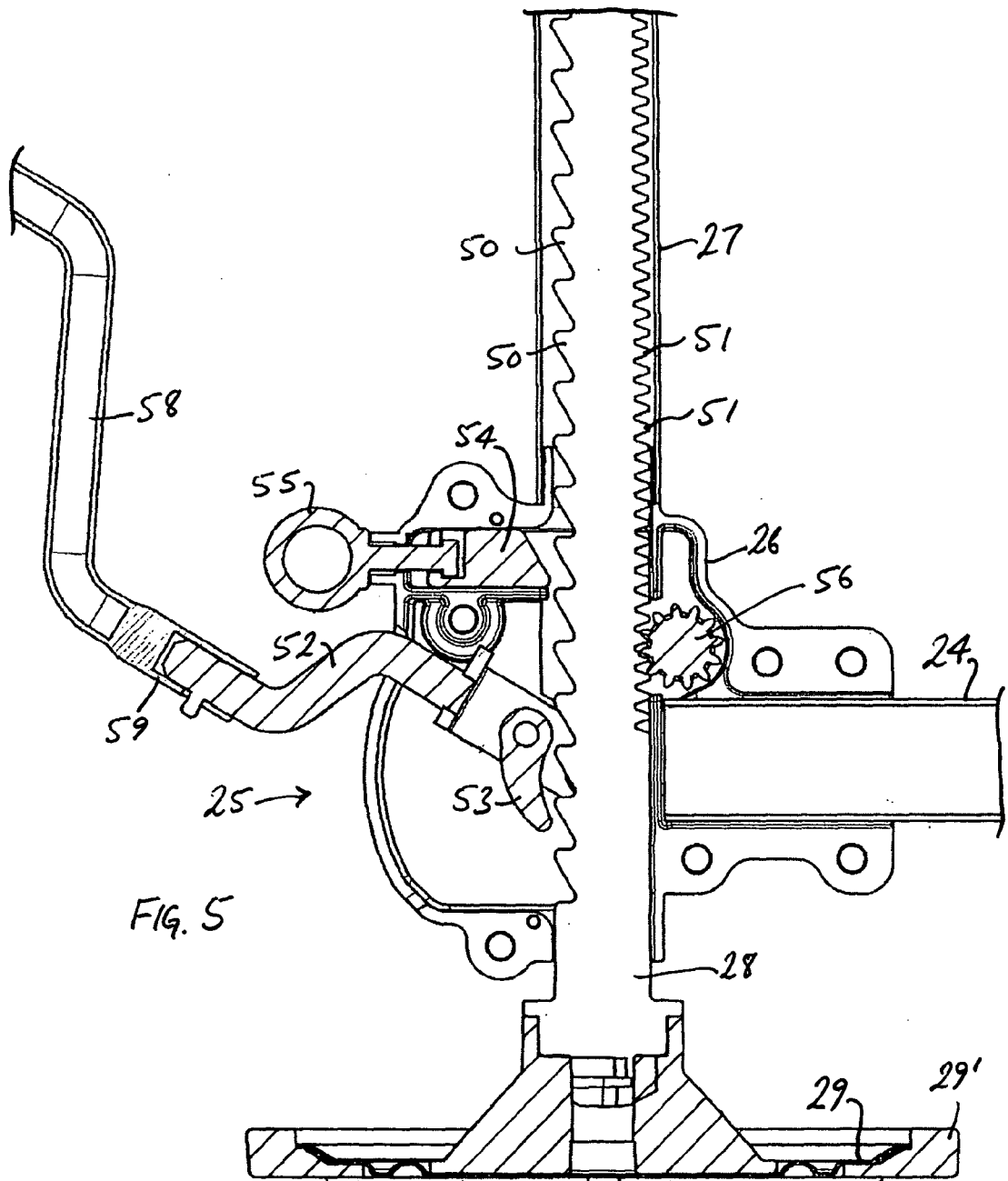


FIG. 4B





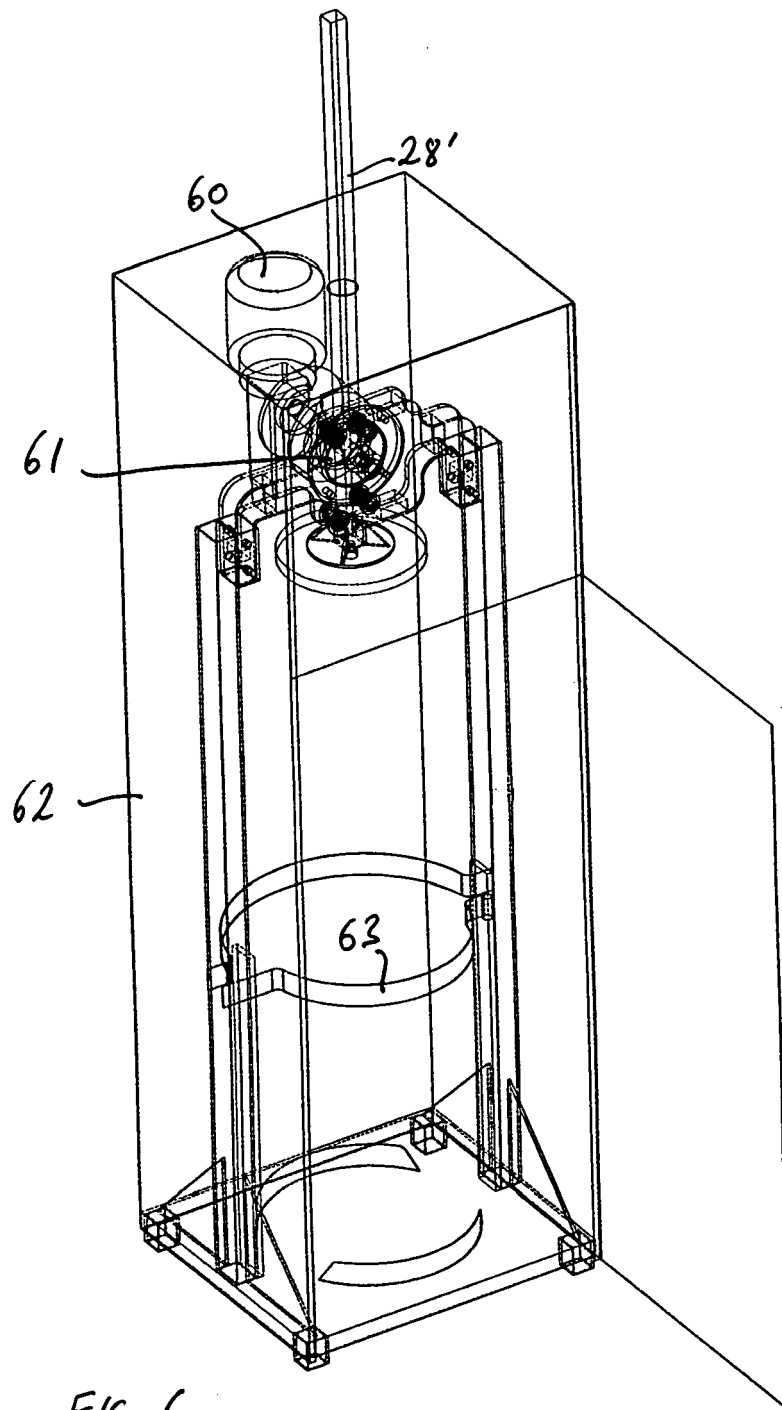


FIG. 6

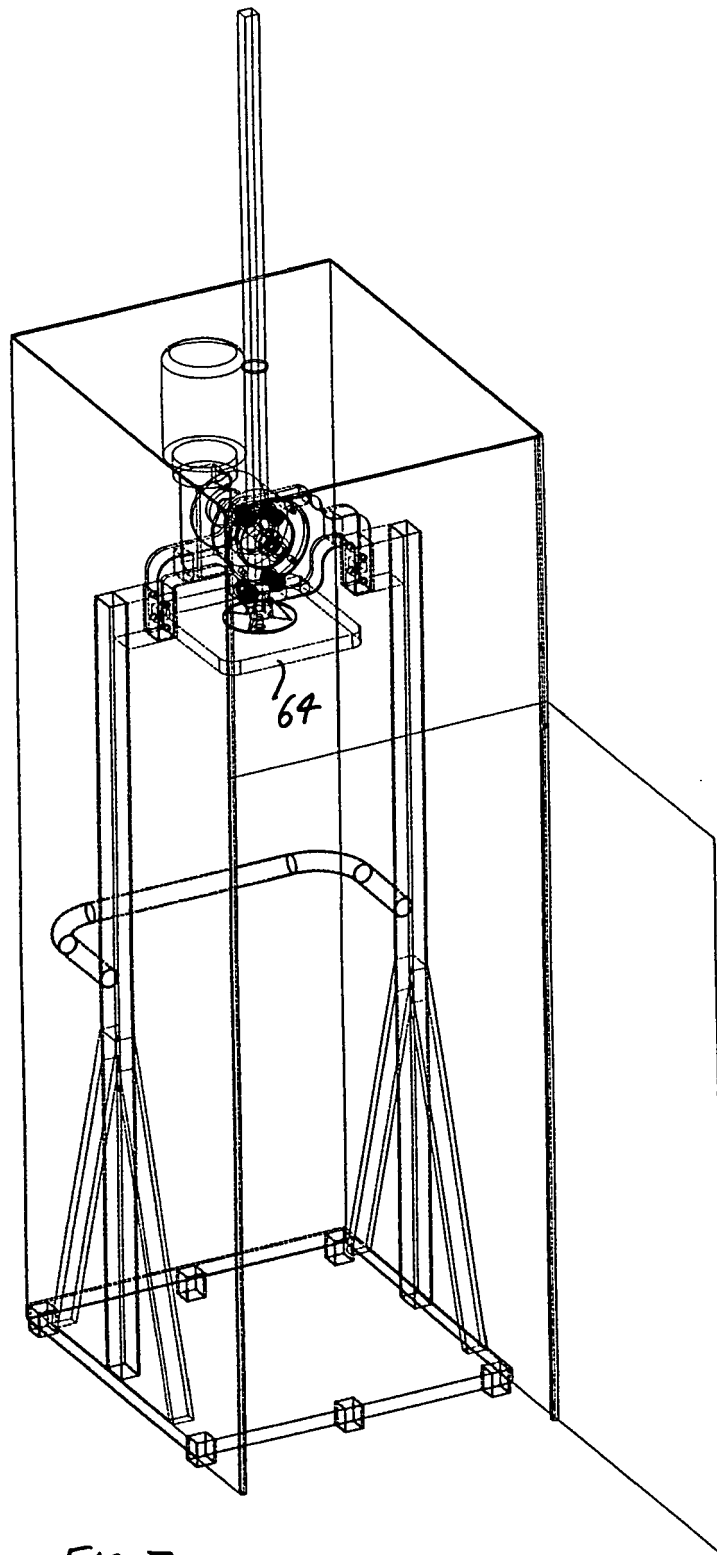


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 08208001 A [0003]
- WO 2004011349 A1 [0004]
- DE 29919933 U1 [0004]
- US 3760718 A [0004]
- GB 2347919 A [0005]
- US 5115736 A [0007]
- US 3850094 A [0008]
- US 5619915 A [0009]
- NL 7903519 [0010]
- NL 8501293 [0010]
- DE 29707748 U1 [0011]
- DE 9314727 U1 [0011]
- DE 29515698 U1 [0012]