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(54) Bag filling apparatus

(57) A bag filling apparatus comprising a receptacle for produce, the receptacle having an opening at a lower part thereof, a bag holding means disposed to hold a bag below said opening, and a support means to engage said bag to maintain a lower part of said bag at a desired position relative to said receptacle.

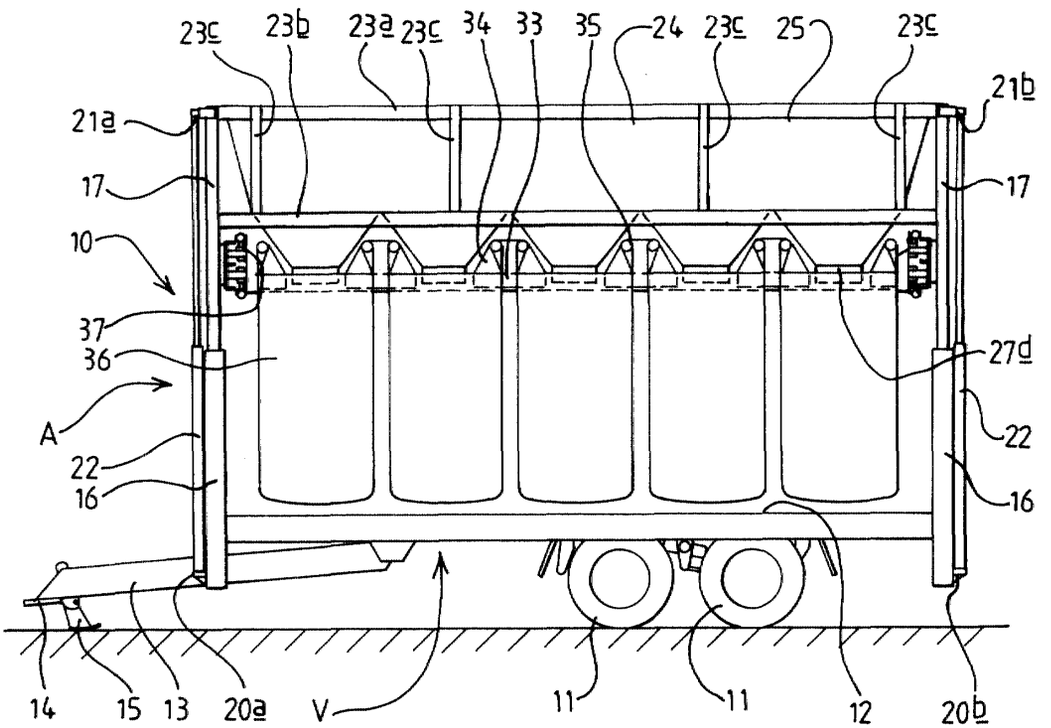

FIG 1

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Description

Description of Invention

[0001] This invention relates to a bag filling apparatus preferably but not exclusively for filling bags with produce.

[0002] Produce, such as potatoes, is commonly stored and transported in wooden one tonne boxes. These boxes are usually filled at a central location with produce being carried to said central location by trailer or bulk transport from the fields from which the produce is being harvested. After being filled, the boxes are loaded on an appropriate vehicle for transport of the produce to its destination, for example a processing plant. When the boxes have been emptied of produce at their destination, the boxes have to returned to the central location for reuse. This method of handling produce causes unnecessary damage to the produce which can reduce the value of the produce, and requires that the empty boxes be returned to the central location, thus incurring additional transport costs.

[0003] As a result, bags are becoming more popular than boxes, but again produce must still be transported to a central location where the bags are filled, and damage to the produce can still result during filling of the bags.

[0004] An aim of the invention is to provide a new or improved bag filling apparatus.

[0005] According to a first aspect of the present invention we provide a bag filling apparatus comprising a receptacle for produce, the receptacle having an opening, a bag holding means disposed to hold a bag below said opening, and a support means adapted to engage said bag wherein said support means and said bag holding means are relatively movable.

[0006] Lifting means may be provided to move the bag holding means relative to the support means.

[0007] Said lifting means may be operable to move said receptacle relative to said support means and said bag holding means may be movable with said receptacle.

[0008] Said lift means may comprise a fluid pressure operated ram.

[0009] The bag holding means may comprise a plurality of tines.

[0010] Said tines may engage suspension means provided on said bag.

[0011] The bag holding means may be movable by transverse movement means between a first position to permit a bag held in said bag holding means to be filled and a second position to permit a bag to engage or disengage from said bag holding means.

[0012] When in the first position, said bag holding means may be substantially below said receptacle.

[0013] When in the second position, said bag holding means may be disposed away from said opening.

[0014] Said transverse movement means may comprise a fluid pressure operated ram.

[0015] The support means may comprise a generally horizontal platform disposed below said receptacle.

[0016] The apparatus may comprise a plurality of bag holding means and wherein the receptacle may comprise a plurality of corresponding openings.

[0017] Each opening may comprise a lower part having a first width, an upper part having a second width greater than said first width, and an inclined wall connecting said lower part and said upper part.

[0018] Said bag holding means may be disposed between said wall parts of adjacent openings.

[0019] At least some of said bag holding means may be provided on a common support, said common support being movable by said transverse movement means to move said at least some of said bag holding means between said first position and said second position.

[0020] The apparatus may comprise auxiliary lift means to move the bag holding means relative to the receptacle.

[0021] Said bags may comprise 1.2 tonne bags.

[0022] According to a second aspect of the invention we provide a vehicle carrying a bag filling apparatus according to the first aspect of the invention.

[0023] The vehicle may comprise a trailer having a chassis, ground engaging means and a hitch means to enable the trailer to be drawn by another vehicle.

[0024] Said support means may comprise a load carrying part of said vehicle.

[0025] According to a third aspect of the invention we provide a method of filling a bag by means of an apparatus according to the first aspect of the invention or a vehicle according to the second aspect of the invention comprising the steps of providing said bag holder with a bag, operating said lift means such that said support means holds a lower part of said bag adjacent said opening, disposing produce in said receptacle and operating said lift means to raise said receptacle relative to said support part such that produce passes from said receptacle through said opening into said bag.

[0026] The method may further comprise the step of extending said bag holding means transversely of said apparatus to permit said bag to be removed from said apparatus.

[0027] The invention will now be described by way of example only, with reference to the accompanying drawings wherein

[0028] Figure 1 is a side view of a trailer provided with a bag filling apparatus according to a first aspect of the present invention,

[0029] Figure 2 is a plan view of the trailer of Figure 1,

[0030] Figure 3 is a side view on a larger scale of part of the trailer of Figure 1,

[0031] Figure 4 is a section on line 4-4 of Figure 3,

[0032] Figure 5 is a partially broken away end view of the trailer of Figure 1,

[0033] Figure 6a is a side view of the trailer of Figure

1 in a first stage of operation,

[0034] Figure 6b is a plan view of the trailer of Figure 6a,

[0035] Figure 6c is a partly broken away end view of the trailer of Figure 6a,

[0036] Figure 7a is a side view of the trailer in Figure 1 in a second stage of operation,

[0037] Figure 7b is a plan view of the trailer of Figure 7a, and

[0038] Figure 7c is a partly broken away end view of the trailer of Figure 7a

[0039] Figure 8a is a side view of the trailer in Figure 1 in a third stage of operation,

[0040] Figure 8b is a plan view of the trailer in Figure 8a, and

[0041] Figure 8c is a partly broken away end view of the trailer of Figure 8a,

[0042] Figure 9a is a side view of the trailer in Figure 1 in a fourth stage of operation,

[0043] Figure 9b is a plan view of the trailer of Figure 9a, and

[0044] Figure 9c is a partly broken away end view of the trailer of Figure 9a,

[0045] Figure 10a is a side view of the trailer in Figure 1 in a fifth stage of operation,

[0046] Figure 10b is a plan view of the trailer of Figure 10a, and

[0047] Figure 10c is a partly broken away end view of the trailer of Figure 10a,

[0048] Figure 11a is a side view of the trailer in Figure 1 in a sixth stage of operation,

[0049] Figure 11b is a plan view of the trailer of Figure 10a, and

[0050] Figure 11c is a partly broken away end view of the trailer of Figure 11a,

[0051] Figure 12a is a plan view of the trailer of Figure 1 in a seventh stage of operation,

[0052] Figure 12b is a plan view of the trailer of Figure 12a, and

[0053] Figure 12c is a partially broken away end view of the trailer of Figure 12a.

[0054] Referring now to Figures 1 to 4, a vehicle V comprising a trailer 10 is shown provided with a bag filling apparatus A. The trailer 10 has, ground engaging means in the form of wheels 11, a pair of wheels 11 being disposed at each side of the trailer 10, a support load carrying surface 12 and a forwardly projecting tow bar 13 comprising at one end a hitch 14 for engagement with a vehicle to draw the trailer 10 and further comprising a pivotably mounted foot member 15 to maintain the load carrying surface 12 in a generally horizontal configuration when the tow bar 13 is detached from a vehicle.

[0055] Provided at each corner of the trailer 10 is a vertically extending post 16 in the present example of square cross section. Telescopically received in each post 16 is an upright member 17, the pair of upright members 17 towards the front of the trailer being interconnected by a transversely extending bar 18 and the rearward pair of upright members 17 being interconnected by a transversely extending bar 19.

[0056] The forward pair of posts 16 are each provided at their lower end with forwardly extending lower ears 20a. The rearward pair of posts 16 are similarly each provided at their lower end with a pair of rearwardly extending lower ears 20b. The forward pair of upright members 17 are similarly each provided with a pair of forwardly extending upper ears 21a adjacent their upper ends whilst the rearward pair of upright members 17 are each provided with a pair of rearwardly extending upper ears 21b. Connected between the lower ears 20a, 20b and upper ears 21a, 21b of each post 16 and upright member 17 is a lift means comprising upwardly extending fluid pressure operated ram 22. In operation, the four rams 22 are supplied with hydraulic fluid under pressure by a flexible hose from a suitable source e.g. from a tractor. The rams 22 are operable to raise and lower the corresponding upright member 17 guided by the post 16.

[0057] The upright members 17 disposed on each side of the vehicle are interconnected by an upper longitudinal member 23a connected adjacent to the top of each slider 17 and a lower longitudinal member 23b connected below the upper longitudinal member. The upper longitudinal member 23a and lower longitudinal member 23b are interconnected by vertically extending struts 23c. Supported on the longitudinal members 23a, 23b is a receptacle 24 having a pair of relatively long side walls 25 and a pair of relative short end walls 26. The lower part of the receptacle 24 comprises a plurality of openings 27 each comprising a lower part 27a comprising a generally square aperture, an upper part 27b also of generally square cross section and a plurality of inclined wall parts 27c connecting the upper part 27b and the lower part 27a. A further downwardly extending neck part 27d is provided attached to and extending downwardly from the lower part 27a of each opening. The receptacle is provided with a plurality of such openings, in the present example ten disposed two abreast and with five of such pairs disposed along the length of the receptacle 24. The wall parts 27c of adjacent openings 27 abut such that there is no part of the lower part of the receptacle 24 where produce will lodge and not enter one of the openings 27.

[0058] Referring now to Figure 5, a further transversely extending bar 18a is connected between the forward pair of upright members 17 generally parallel to and below the transversely extending bar 18 and at the same height as the lower longitudinal member 23b. Although Figure 5 shows a broken away end view of the forward part of the trailer 10, it would be appreciated that equivalent structures are provided at the rearward end of the trailer 10. The further transversely extending bar 18a is disposed slightly inwardly of the vehicle compared to the transversely extending bar 18. Connected between the transversely extending bars 18, 18a are a pair of sleeves 28 of generally square cross-section extending generally vertically, one sleeve 28 disposed either side of the

trailer in symmetrical fashion. Extending between the sleeves 28 is a connecting bar 29. Provided at each end of the trailer disposed generally transversely horizontally is a track means 30 comprising a pair of parallel U-shaped elements to provide an upper track 30a and a lower track 30b respectively (see also Fig 3). Connected to the track means 30 are vertically extending posts 31 slidably received in the corresponding sleeve 28. Auxiliary lift means comprising an auxiliary fluid operated ram 32 is provided adjacent to each sleeve 28 connected between ears 32a provided on the connection element 29 and ears 32b provided on the track means 30. The auxiliary fluid operated rams 32 are operable to raise and lower the track means 30 relative to the receptacle 24 in a direction guided by the sleeves 28 and post 31.

[0059] Referring to Figures 3 and 4, a pair of longitudinally extending support bars 33a, 33b are disposed beneath the receptacle 24, one at each side of the trailer 10. Provided on each support bar 33a, 33b is a bag holding means comprising an upwardly extending generally triangular bracket 34, towards the apex of which is provided a generally horizontal tine 35 which extends in a direction generally outwardly of the apparatus. Two of said brackets 34 and tines 35 are provided corresponding to each opening 27, disposed below the receptacle 24 such that each tine 35 is adjacent a midpoint of the transversely extending inclined wall 27 of an opening 26. Bags 36 may be suspended from the tines 35, one bag for each opening 27. The bags 36 are suspended from the tines 35 by means of loops 37 disposed in each corner of the bags 36 through which the tines 35 pass.

[0060] The support bars 33a, 33b are supported for transverse movement relative to the trailer 10 on the track means 30. Received in the upper track 30a is a first carriage 38a comprising a pair of rollers 38b which engage the upper track 30a. Support rail 33a is attached to the carriage 38a by bracket 38c. Similarly, a second carriage 39a is provided with rollers 39b which are received in the lower track 30b. The support bar 33b is attached to the carriage 39a by bracket 39c. Because the support bars 33a, 33b are at the same height while the carriages 39a, 39b are disposed in a vertically offset position, the brackets 38c, 39c are consequent of different lengths. The rollers 38b, 39b are mounted on stub shafts 40a, 40b respectively.

[0061] A first transverse extension ram 41 is provided disposed parallel to and above the carriage 38a. The first extension transverse ram 41 is connected between a pair of ears 42 provided on the first carriage 38a, and a further pair of ears 43 provided on a plate 44 attached to an upper part of the track means 30. A second transverse extension ram 45 is similarly provided disposed parallel to and below the carriage 39a. The second extension transverse ram 45 is connected between a pair of ears 46 provided on the carriage 39a, and a further pair of ears 47 provided on a plate 48 attached to the track means 30.

[0062] The transverse extension rams 41, 45 are operable to move the support bars 33a, 33b such that the tines 35 are movable between a first position wherein the tines 35 are disposed substantially underneath the receptacle 24 and a second position wherein the tines 35 extend outwardly of the receptacle 24. The auxiliary lift means (32 et al) is operable to lower the track means 30 relative to the receptacle as seen in Figure 4, such that the support bars 33a, 33b are disposed lower than the neck parts 27d. In Figure 4, once the auxiliary lift means (32 et al) have been operated to lower the track means 30, operation of first transverse extension ram 41 will cause the carriage 38a and hence the support bar 33a to move to the left as seen in Figure 4, extending the tines on the left hand side of the receptacle.

[0063] The mode of operation is as follows;

[0064] Referring to Figures 6a to 6c, in a first stage of operation the transverse extension rams 41, 45 are actuated such that the tines 35 extend outwardly of the apparatus for the greater part of their length as seen in Figures 6b and 6c. A bag 36 is suspended from each pair of tines 35 by engaging the loops 37 of the bag 36 with the tines 35.

[0065] The auxiliary fluid operated rams 32 are operated such that the track means 30 and hence the support bars 33a, 33b are in a lower position relative to the receptacle 24, such that the support bars 33a, 33b are able to pass below the neck parts 27d. The upwardly extending fluid pressure operated rams 22 are operated to position the support rails 33a, 33b at a height such that when the bags are mounted on the tines 35, the base of each bag 36 rests on the ground. Once a bag 36 is provided on each pair of tines 35, in a second stage of operation the upwardly extending fluid pressure operated rams 22 are operated to raise receptacle 24 and hence the track means 30 and the support bars 33a, 33b such that the bottom part of each bag 38 is higher than the load carrying surface 12, as seen in Figures 7a and 7b. The transversely extension rams 41, 45 are then operated to retract the tines 35 in a direction inwardly of the apparatus. In Figures 7b and 7c the tines 35 are shown in partly retracted position part way between the first position and the second position, with the support bars 33a, 33b passing below the neck parts 27d. The tines 35 are shown in their retracted position in Figures 8a, 8b, 8c.

[0066] In a fourth stage of operation as shown in Figures 9a to 9c, once the tines 35 have been retracted such that each bag 36 is disposed beneath the corresponding opening 27, the upwardly extending fluid pressure operated rams 22 are operated to lower the support bars 33a, 33b and receptacle 24 such that a lower part of the bags 36 engages the load carrying surface 12. As the bar 33a, 33b are lowered further, the bags 36 collapse in a concertina fashion as shown in Figure 9a. The auxiliary fluid operated rams 32 are further operated to raise the track means 30 relative to the receptacle 24, such that the support bars 33a, 33b are raised above the bottom of the neck part 27d, such that each neck

part 27d is at partly received in the corresponding bag 36. In this position, produce 50 is introduced into the receptacle 24, for example by means of a conveyor 51 from a suitable harvesting device (not shown).

[0067] To fill the bags 36 with the produce 50 once the receptacle 24 has been provided with a sufficient quantity of produce, in a fifth stage of operation the upwardly extending fluid pressure operated rams 22 are operated to raise the receptacle 24. As the support bars 33a, 33b and receptacle 24 are raised, the upper part of the bags 36 are lifted and produce 50 descends from the receptacle 24 through the openings 27 into the bags 36. During at least-part of the lifting process, the lower part of each bag 36 is supported on the load carrying surface 12. The upwardly extending fluid pressure operated rams 22 continue to lift the support bars 33a, 33b and receptacle 24 until the lower part of each bag 38 is suspended spaced from the load carrying surface 12 and the produce has been transferred from the receptacle into the bags 36, as shown in Figures 10a to 10c. The auxiliary fluid operated rams 32 ensure that produce 50 is received within the bags 36 by raising the mouth of each bag 36 above the bottom of the neck parts 27d.

[0068] In a sixth stage of operation as shown in Figures 11a to 11c, to unload the full bags 36 the tines 35 are first lowered by operation of the auxiliary fluid operated rams 32 until the support bars 33a, 33b are below the neck parts 27d. The tines 35 are then moved to their second position by operation of the transverse extension rams 41, 45 such that the tines 35 extend outwardly of the vehicle 10 and such that the bags 36 are suspended clear of the load carrying surface 12. The upwardly extending fluid pressure operated rams 22 are then operated to lower the support bars 33a, 33b and receptacle 24 such that the bags 36 rest on the ground as shown in Figures 11a and 11c. As shown in Figures 12a to 12c, in a seventh stage of operation the tines 35 are then retracted out of engagement with the loops 37 of the bags 36 and moved to their first position by the transverse fluid pressure operated rams 41, 45. The bags 36 may then be removed, for example by means of a forklift truck or other suitable material handling vehicle, or indeed the apparatus 10 may be towed to a new position. To load additional produce, new bags are provided as shown in Figures 6a to 6c and the operation is repeated.

[0069] The use of the apparatus according to the invention thus reduces damage to the produce since the produce is loaded into the bags 36 by raising the receptacle 24, rather than, for example, being dropped onto other produce in a bag or box. The provision of the apparatus on a trailer or other vehicle is particularly advantageous. The receptacle 24 may be filled directly from the harvesting apparatus, and the filled bags 36 carried to the edge of the field or to another convenient pick up point for loading directly onto lorries for transport to a processing plant or other site. The need to transport the produce in a trailer to a central loading point for loading into containers for onward transport is entirely removed. Where the apparatus is mounted on a trailer or other vehicle, the apparatus itself can be used to transport the filled bags 36 to the field edge or other pick up point, or alternatively, filled bags can be left in the field for subsequent collection. The simultaneous loading of a plurality, in the present example ten, 1.2 tonne bags add greatly to the speed and efficiency of the filling operation as does the relative ease of unloading filled bags 36 from the apparatus and supplying empty bags 36. Since the bags 36 are considerably lighter than conventional one tonne boxes, the cost and other problems associated with the return of the boxes to the farm is much reduced.

[0070] Although in the present example an apparatus A according to the present invention is shown provided on a vehicle comprising a trailer 10, it will be apparent that an apparatus A could be mounted as a static loading apparatus to take advantage of the reduced level of damage to produce during loading at a central loading point.

[0071] Although in the present example, the apparatus A is mounted on a trailer 10 and is supplied with hydraulic fluid under pressure from a separate source, for example a tractor, the apparatus may be provided with its own source of fluid pressure, and indeed be provided on a vehicle with its own motor which may also provide motive power to the vehicle. Alternatively, other means could be provided in place of the fluid pressure operated rams 22, 32, 41, 45, for example electrical or mechanical drives as appropriate.

[0072] In the present specification "comprise" means "includes or consists of and "comprising" means "including or consisting of'.

[0073] The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A bag filling apparatus comprising a receptacle for produce, the receptacle having an opening, a bag holding means disposed to hold a bag below said opening, and a support means adapted to engage said bag wherein said support means and said bag holding means are relatively movable.

2. An apparatus according to Claim wherein lifting means is provided to move the bag holding means relative to the support means.

3. An apparatus according to Claim 2 wherein said lifting means is operable to move said receptacle rel-

ative to said support means and said bag holding means is movable with said receptacle.

4. An apparatus according to Claim 2 or Claim 3 wherein said lift means comprises a fluid pressure operated ram.

5. An apparatus according to any one of the preceding claims wherein the bag holding means comprises a plurality of tines.

6. An apparatus according to Claim 5 wherein said tines are adapted to engage suspension means provided on said bag.

7. An apparatus according to any one of the preceding claims wherein the bag holding means is movable by transverse movement means between a first to permit a bag held on said bag holding means to be filled and a second position to permit a bag to be engaged or disengaged from said bag holding means.

8. An apparatus according to Claim 7 wherein when said bag holding means is in the first position, the bag holding means is substantially below said receptacle.

9. An apparatus according to Claim 7 or Claim 8 wherein when the bag holding means is in the second position, said bag holding means is disposed away from said opening.

10. An apparatus according to any one of Claims 7 to 9 wherein said transverse movement means comprises a fluid pressure operated ram.

11. An apparatus according to any one of the preceding claims wherein the support means comprises a generally horizontal platform disposed below said receptacle.

12. An apparatus according to any one of the preceding claims wherein the apparatus comprises a plurality of bag holding means and wherein the receptacle comprises a plurality of corresponding openings.

13. An apparatus according to Claim 12 wherein each opening comprises a lower part having a first cross-sectional area, an upper part having a second cross-sectional area greater than said first width, and an inclined wall connecting said lower part and said upper part.

14. An apparatus according to Claim 13 wherein said bag holding means is disposed between said wall parts of adjacent openings.

15. An apparatus according to any one of Claims 12 to 14 where dependent directly or indirectly on Claim 7 wherein at least some of said bag holding means are provided on a common support, said common support being movable by said transverse movement means to move said at least some of said bag holding means between said first position and said second position.

16. An apparatus according to any one of the preceding claims comprising auxiliary lift means to move the bag holding means relative to the receptacle.

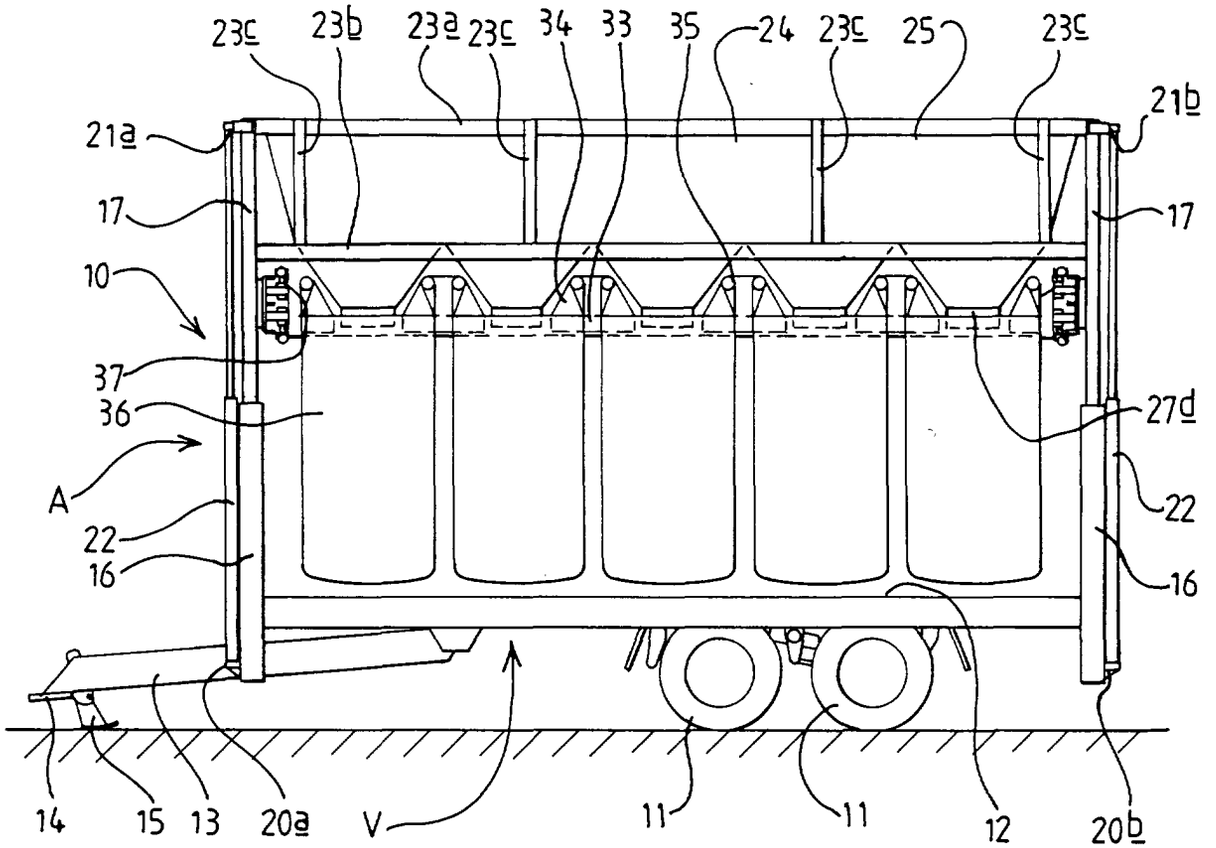
17. A vehicle comprising a bag filling apparatus according to any one of Claims 1 to 16.

18. A vehicle according to Claim 17 wherein the vehicle comprises a trailer having a chassis, ground engaging means and a hitch means to enable the trailer to be drawn by another vehicle.

19. A vehicle according to Claim 17 or 18 wherein said support means comprises a load carrying part of said vehicle.

20. A method of filling a bag by means of an apparatus according to any one of Claims 1 to 16 or a vehicle according to any one of Claims 17 to 19 comprising the steps of providing said bag holder with a bag, operating said lift means such that said support means holds a lower part of said bag adjacent said opening, disposing produce in said receptacle and operating said lift means to raise said receptacle relative to said support means such that produce passes from said receptacle through said opening into said bag.

21. A method according to Claim 20 further comprising the step of extending said bag holding means transversely of said apparatus to permit said bag to be removed from said apparatus.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20b

FIG 1

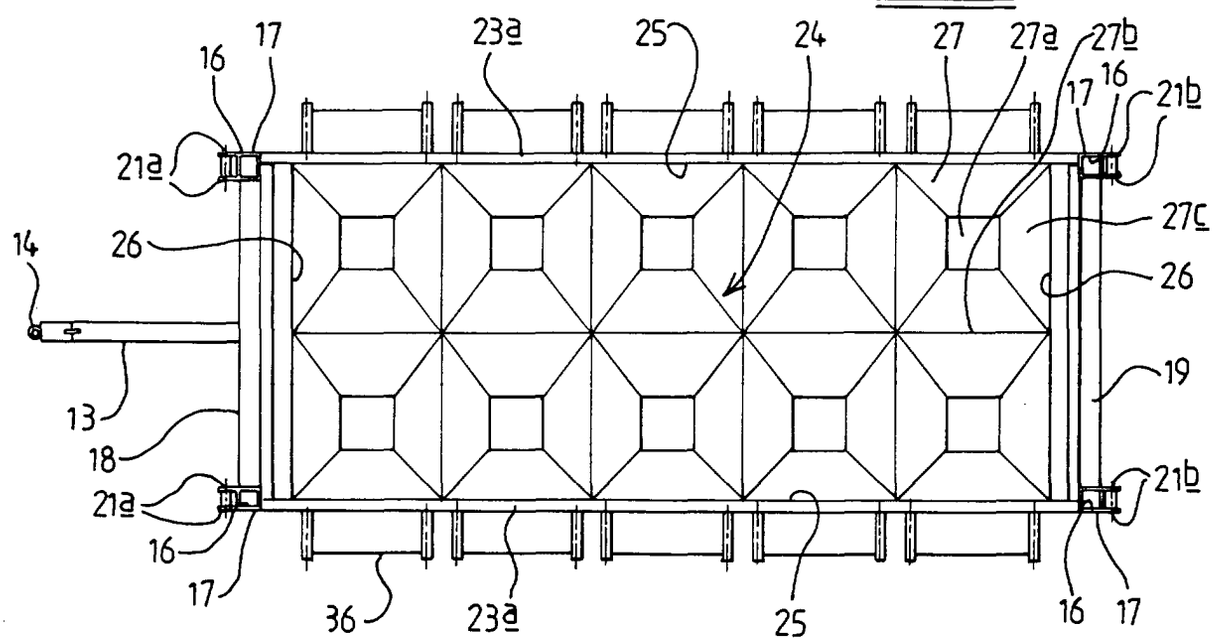
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FIG 2

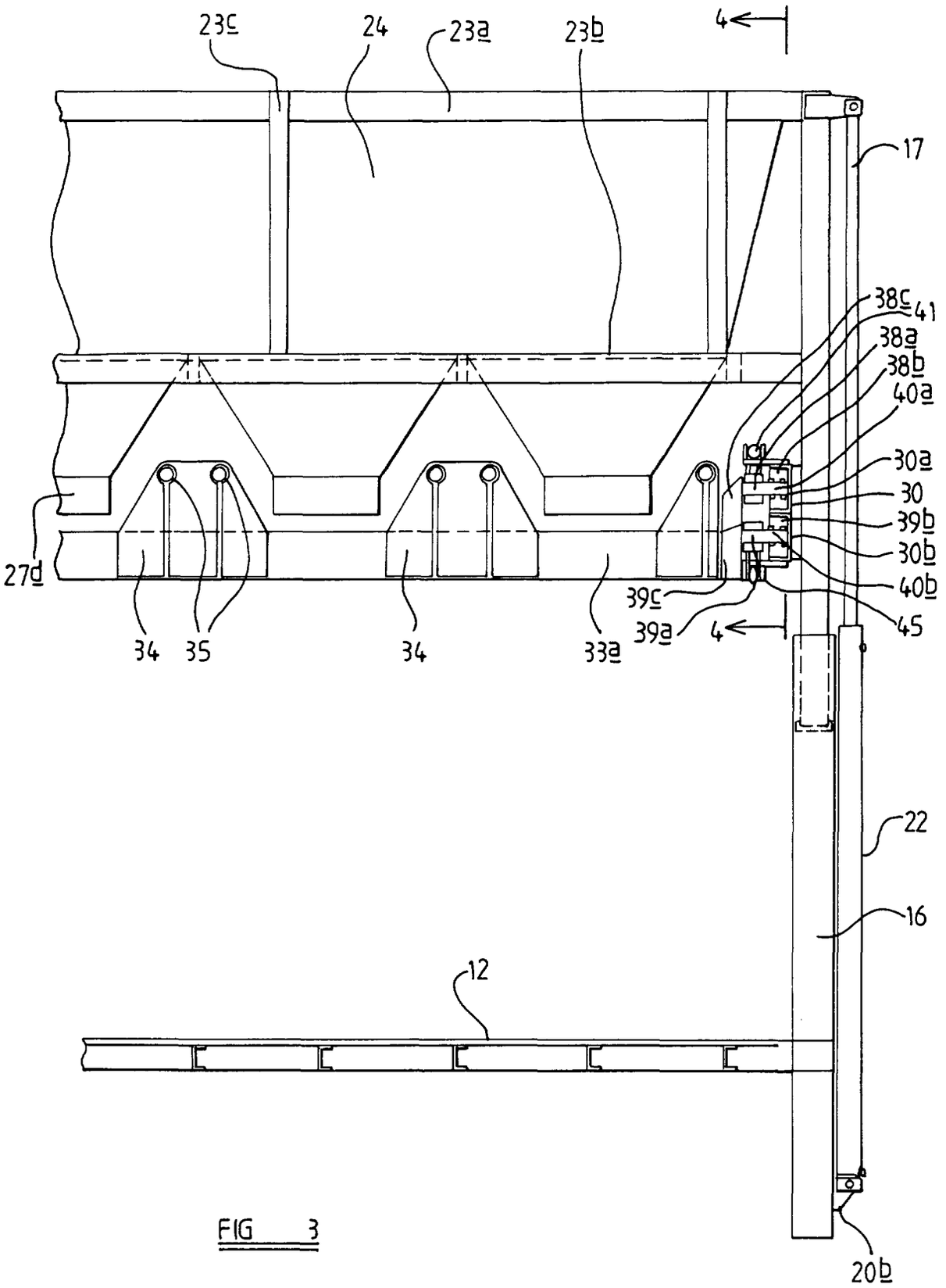
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FIG 3

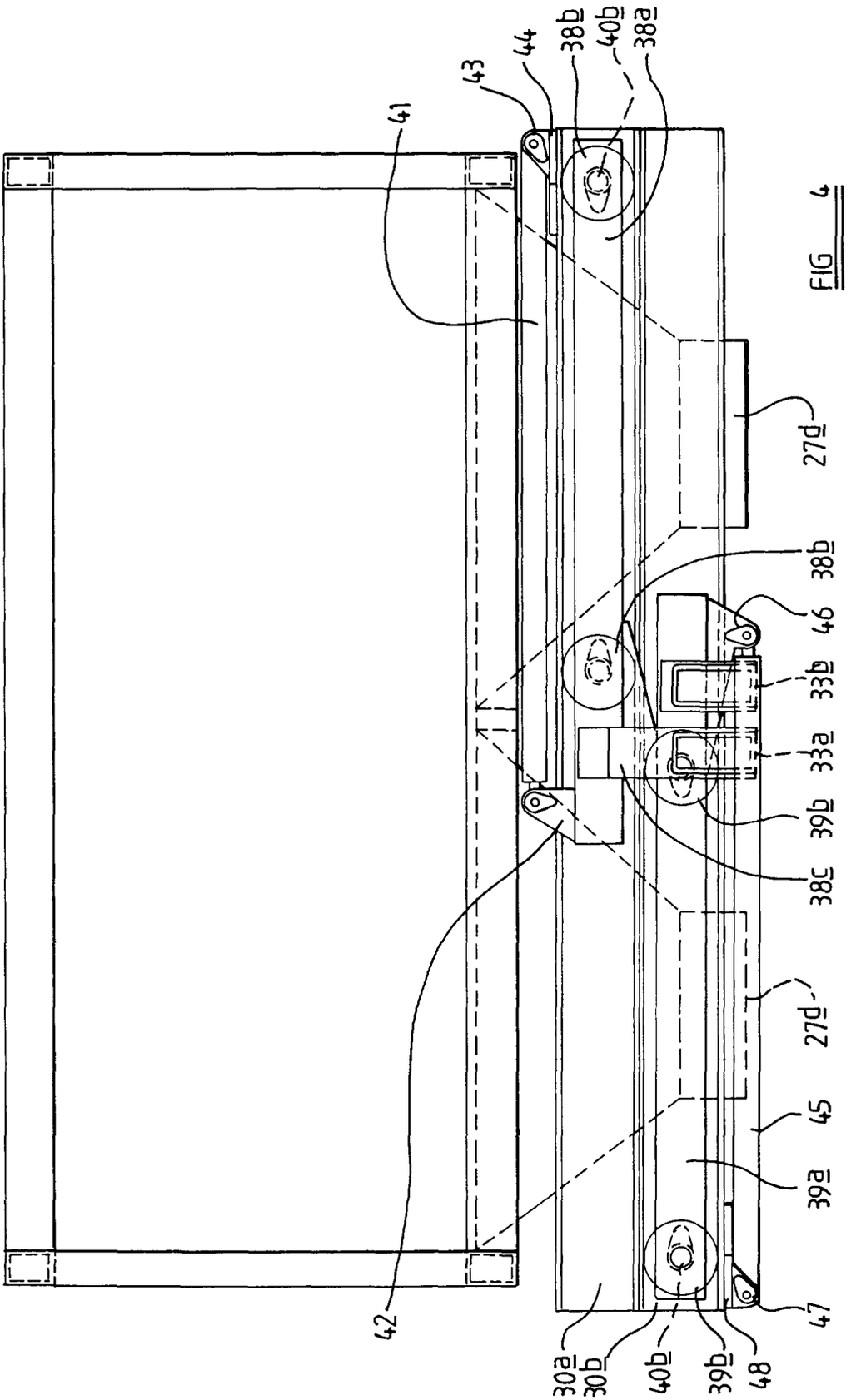
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FIG 4

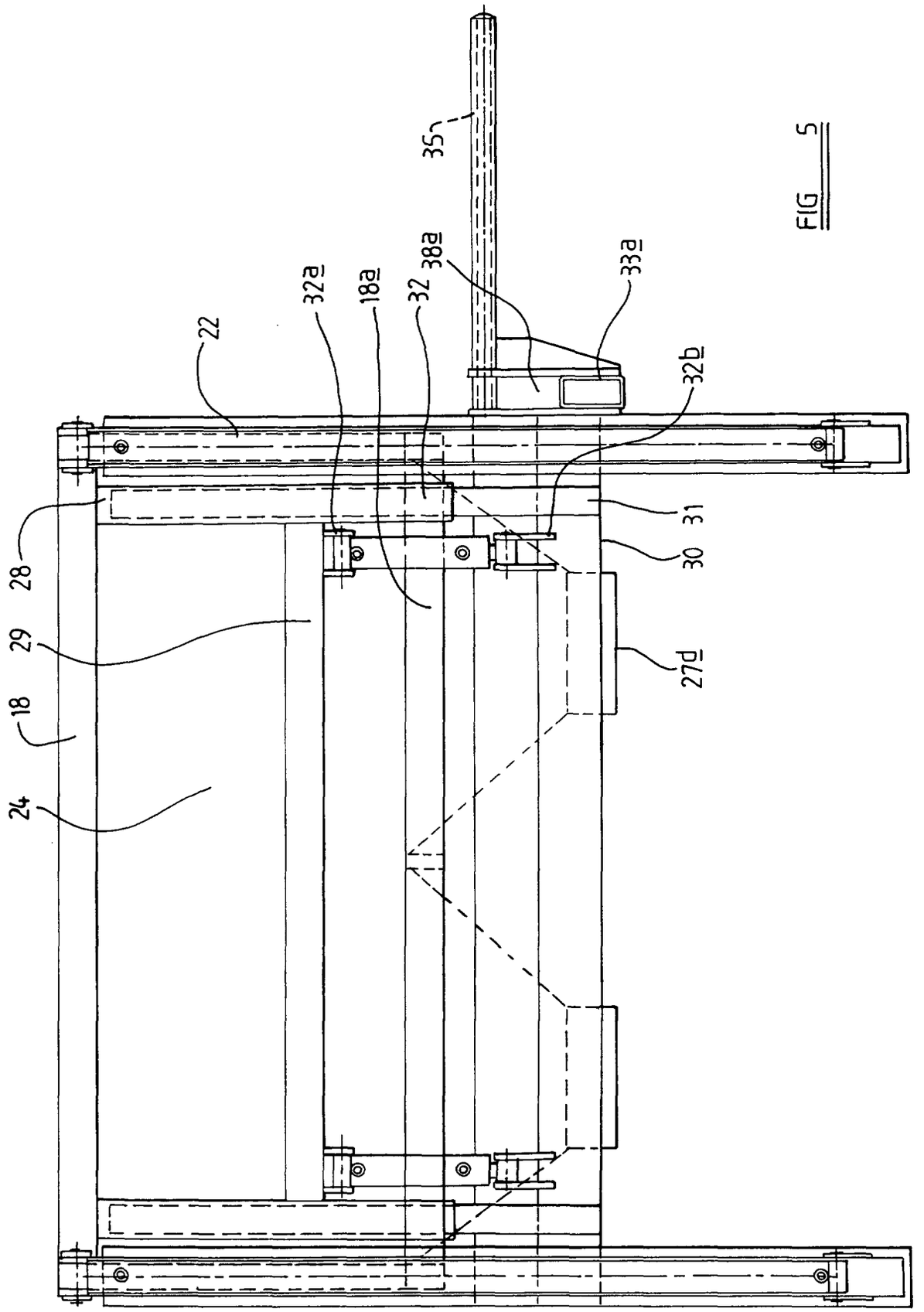

FIG 5

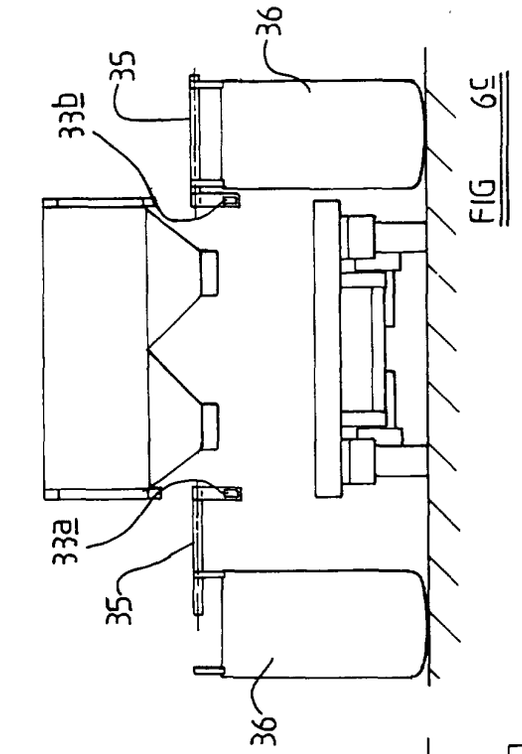

FIG 6c

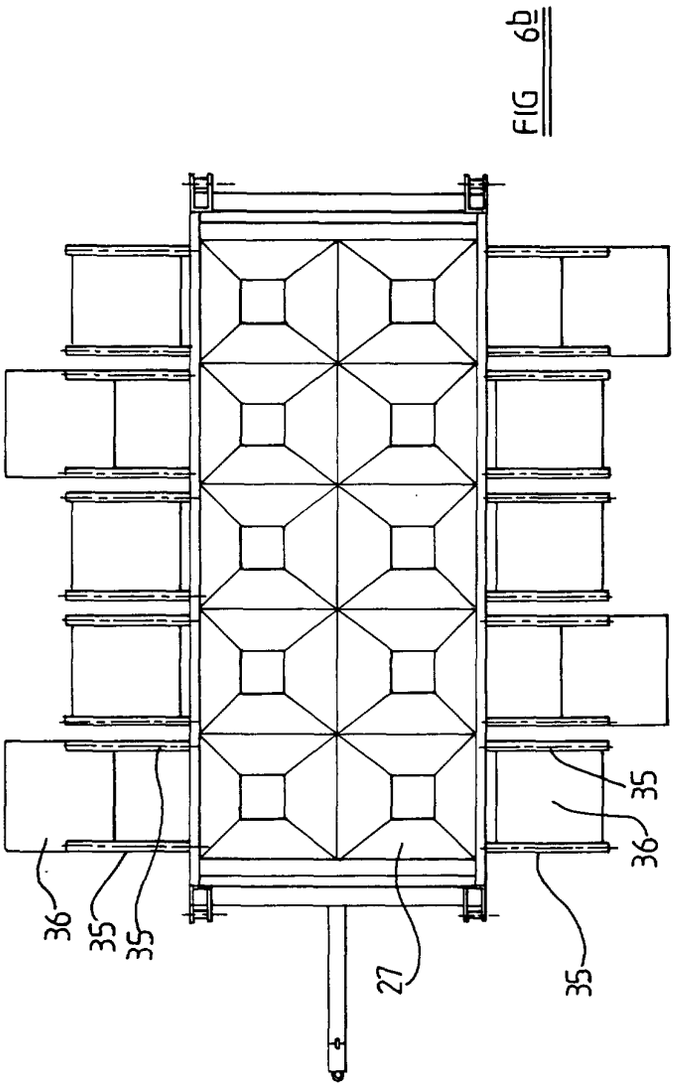

FIG 6b

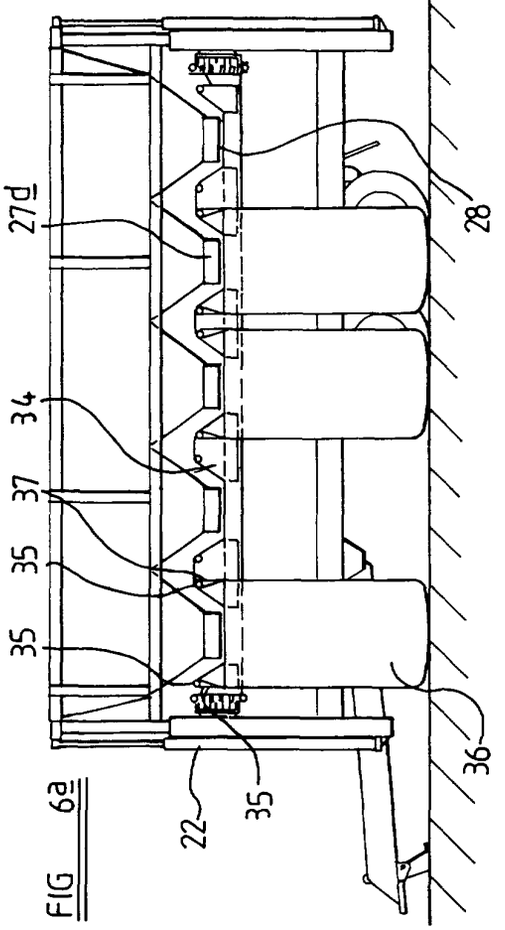

FIG 6a

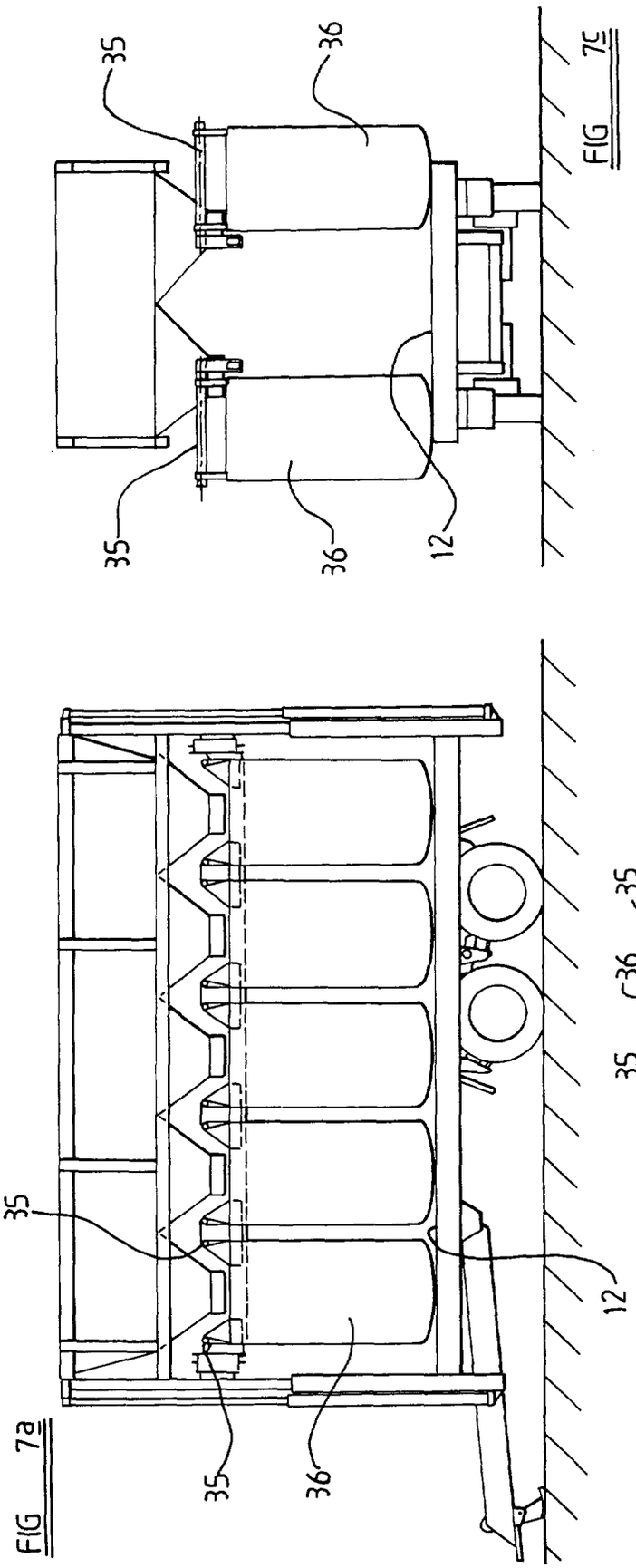

FIG 7a

FIG 7c

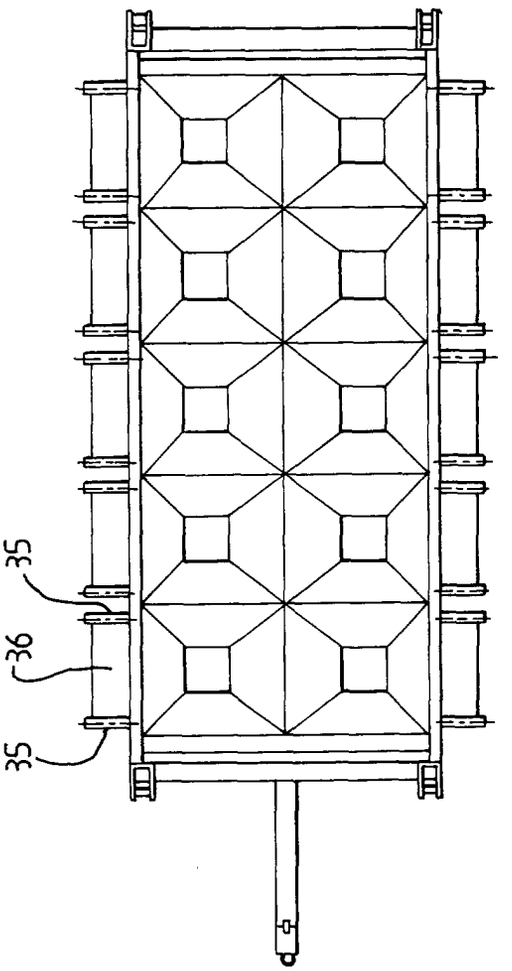

FIG 7b

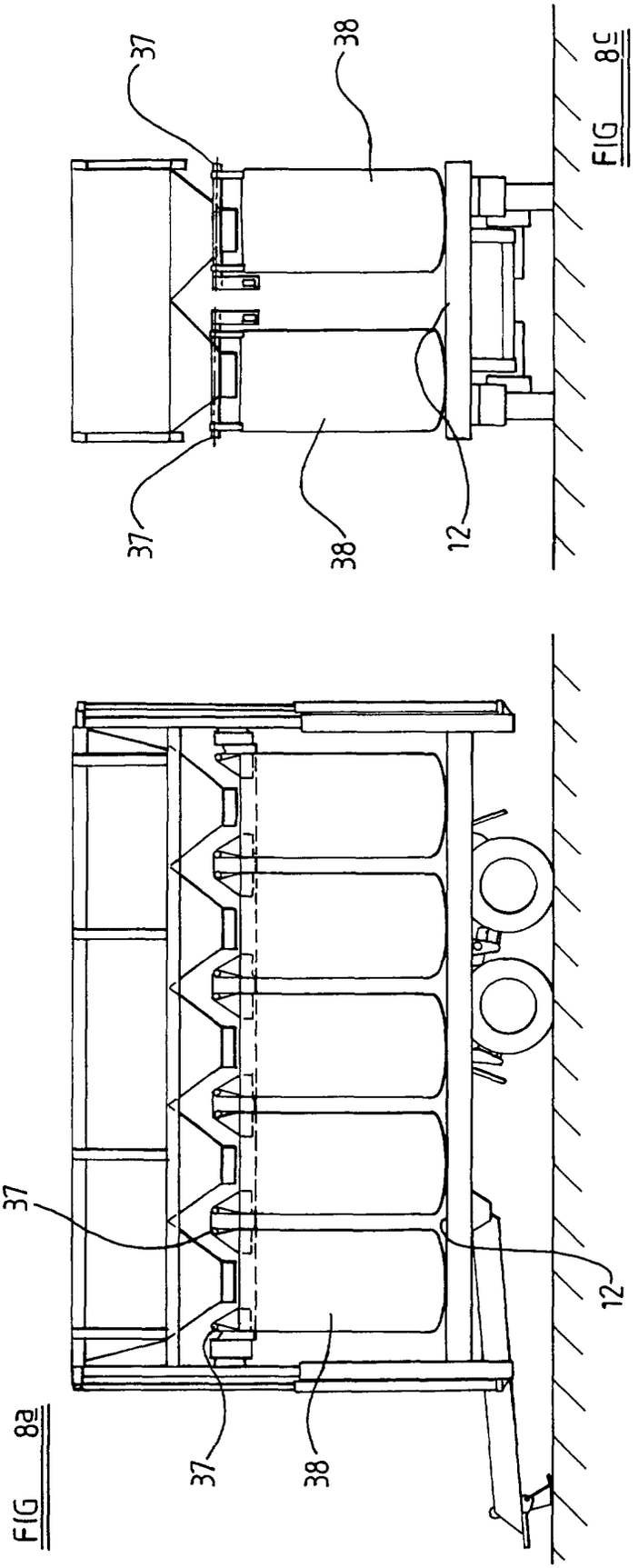

FIG 8a

FIG 8c

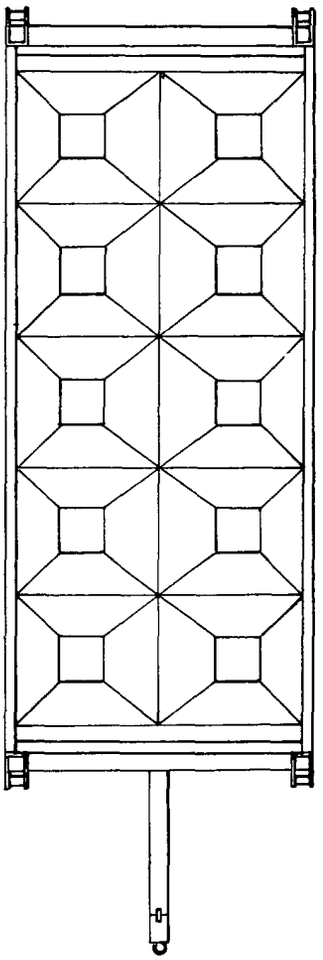

FIG 8b

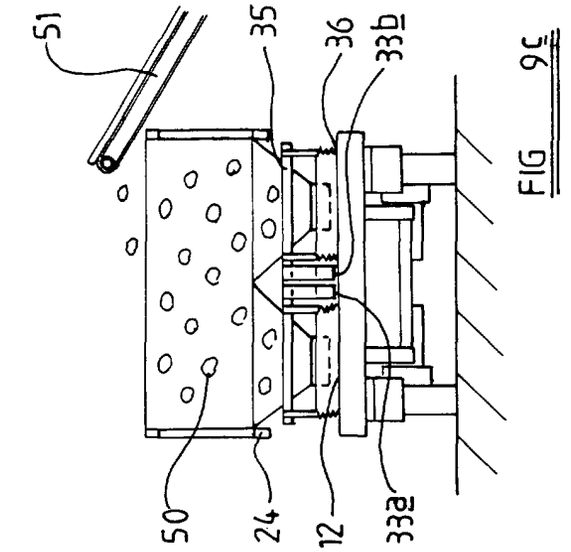

FIG 9c

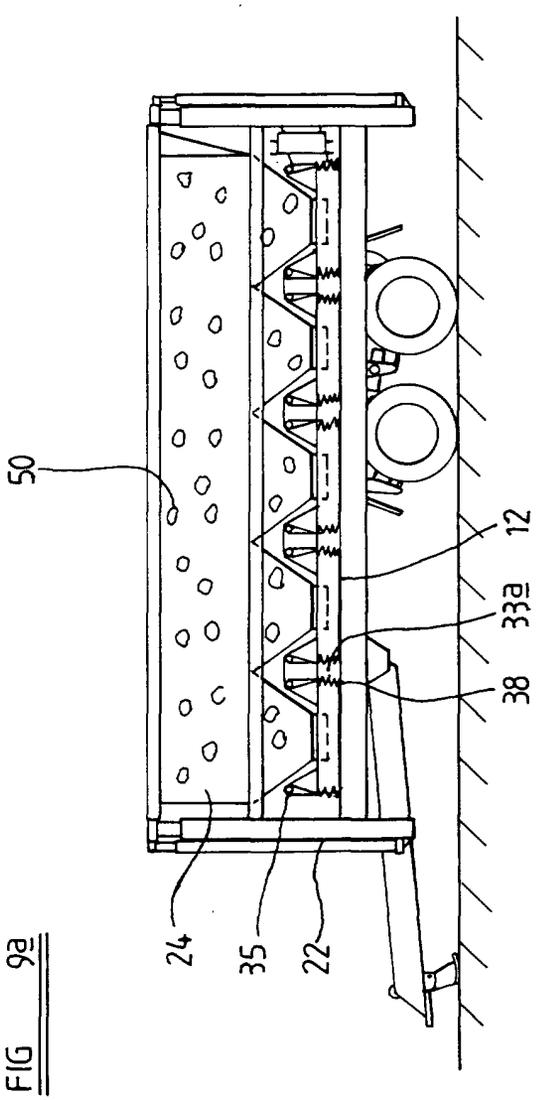

FIG 9a

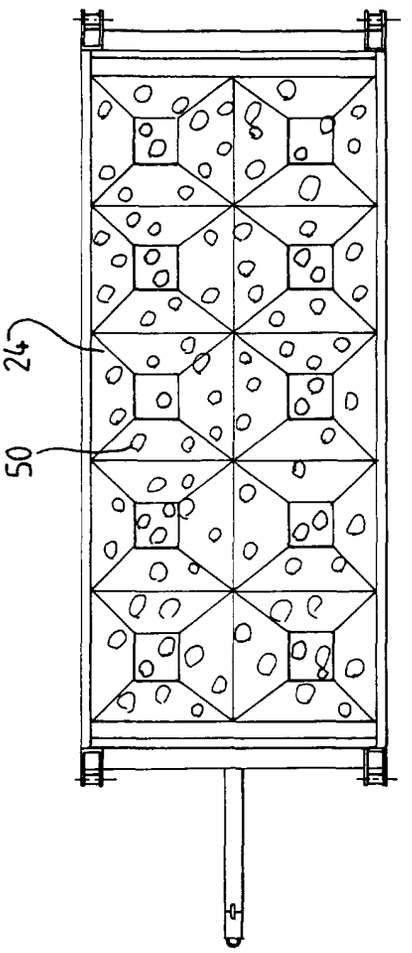

FIG 9b

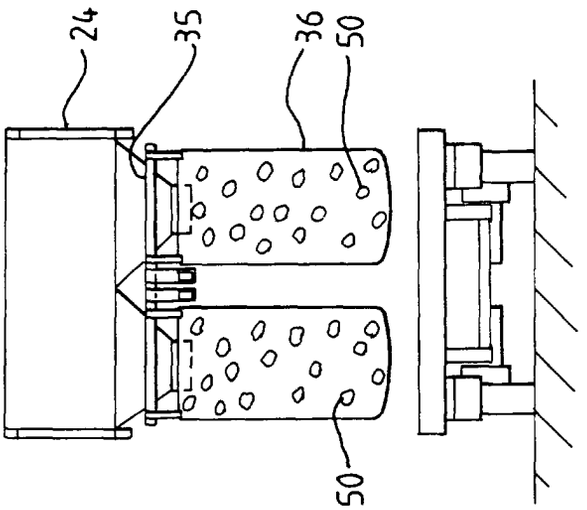

FIG 10c

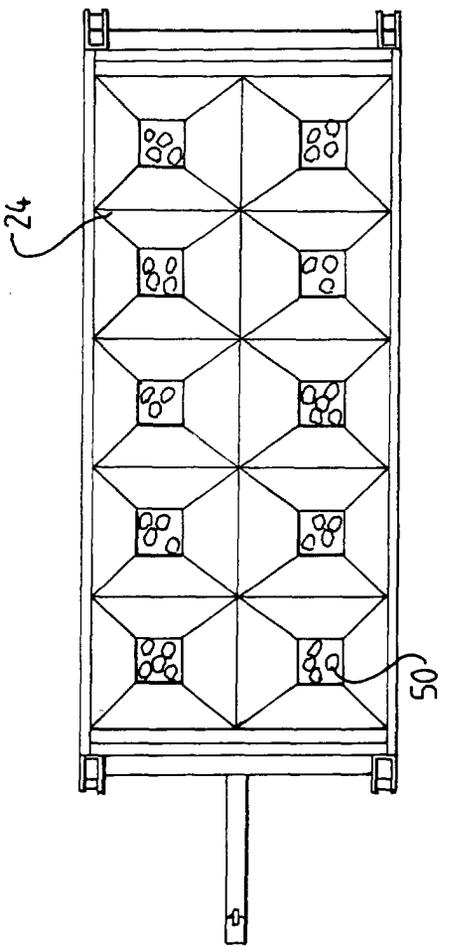

FIG 10b

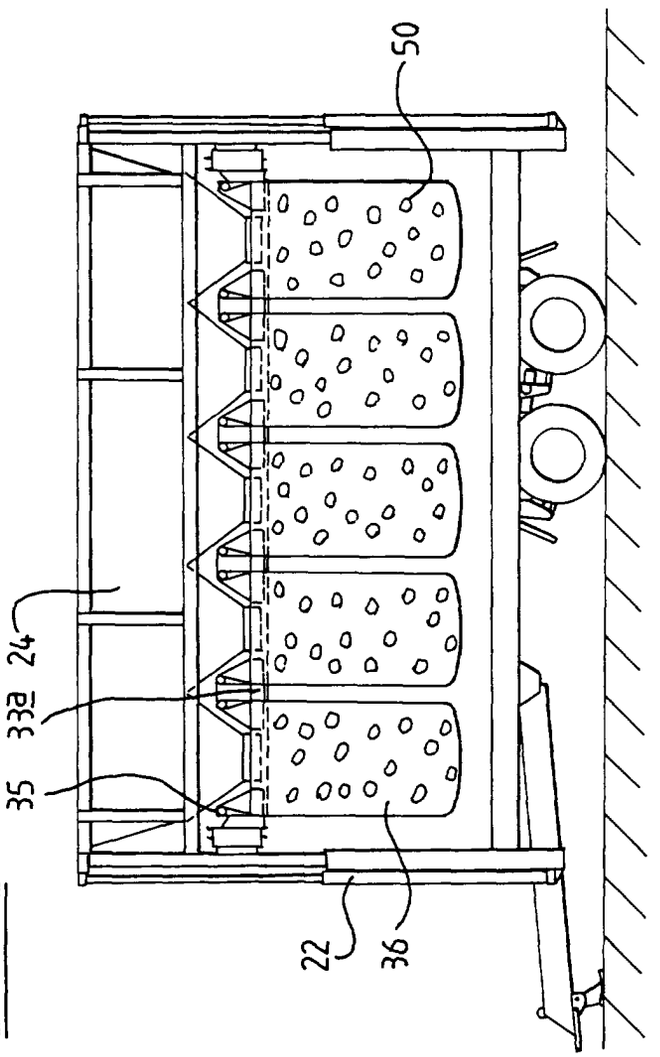

FIG 10a

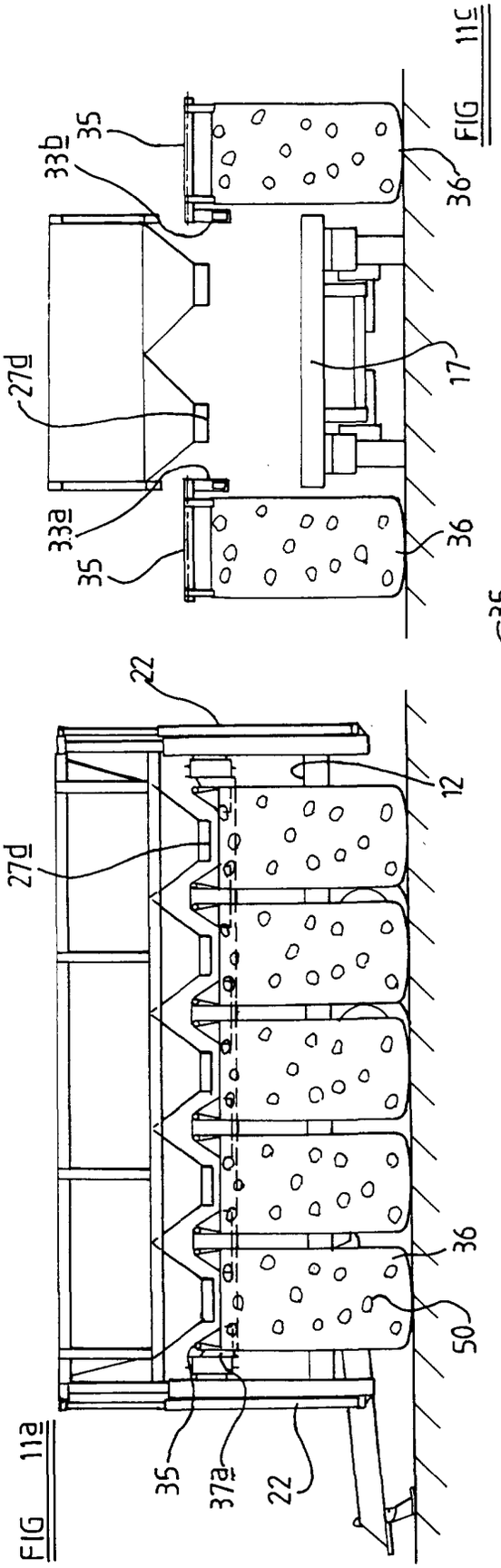

FIG 11c

FIG 11a

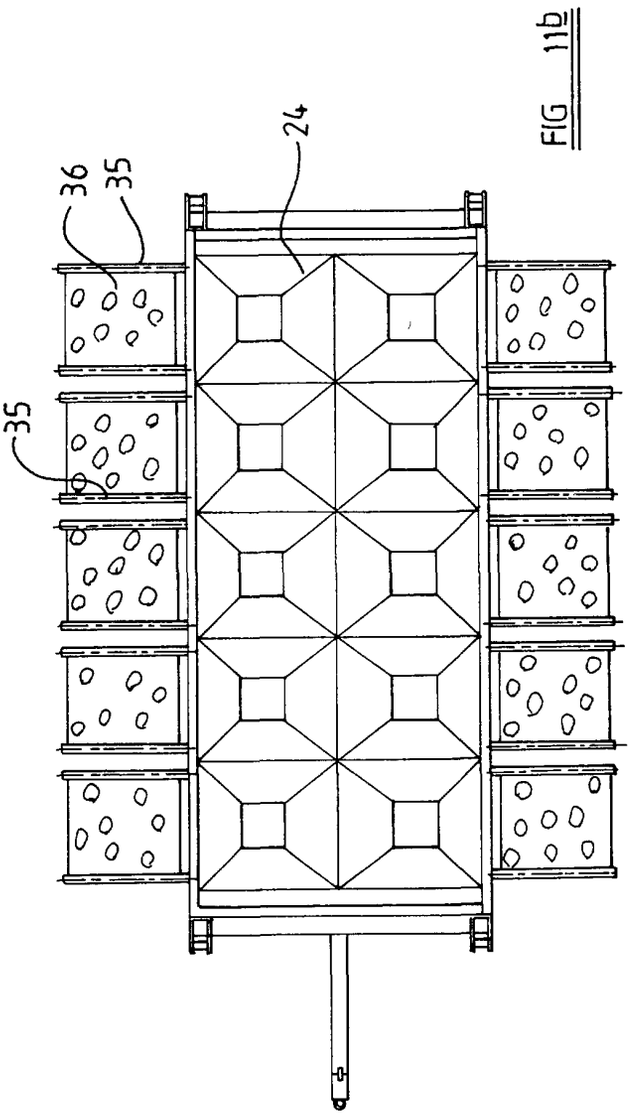

FIG 11b

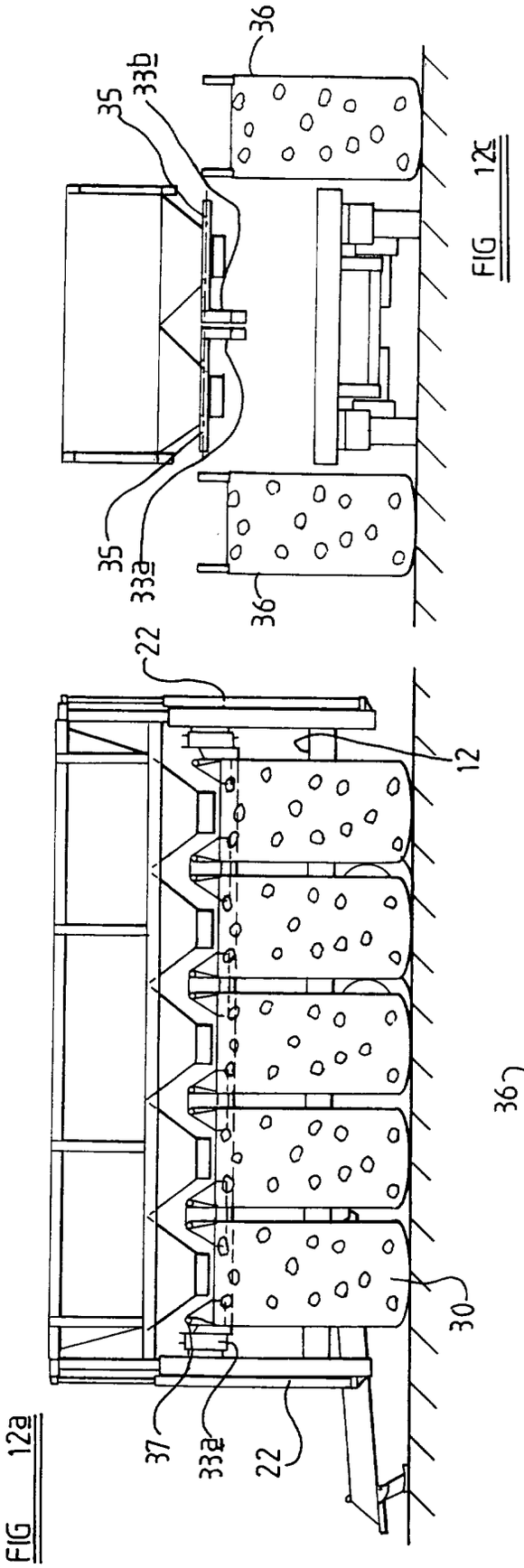

FIG 12c

FIG 12a

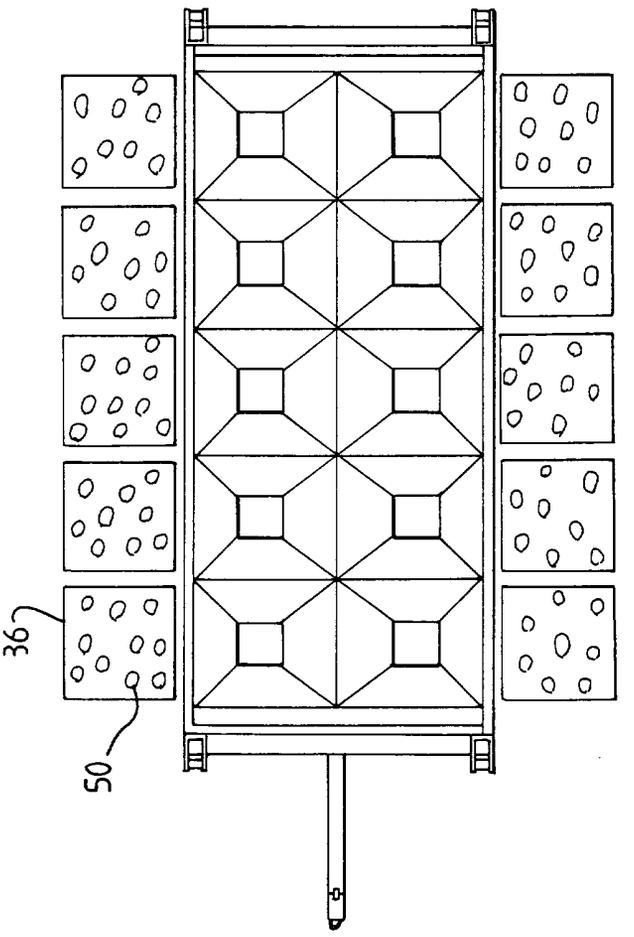

FIG 12b

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EUROPEAN SEARCH REPORT

Application Number
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B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 September 2001	Claeys, H

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