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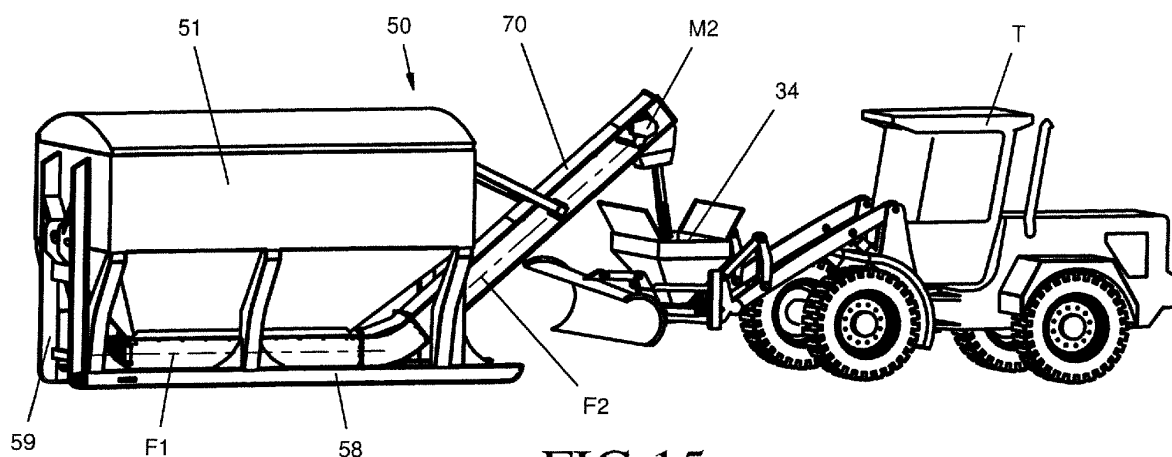
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(54) **MAINTENANCE ARRANGEMENT AND METHOD IN ANTISKID TREATMENT**

(57) Solution for antiskid treatment, wherein a device  
(10) is employed which is hooked up to a vehicle and  
which comprises means for dealing with snow. The de-  
vice further comprises in connection with it a container  
(34) from which the antiskid material is spread. The an-

tiskid material is first brought to a separate storage con-  
tainer (51). From the storage container, the antiskid sub-  
stance is transferred to the container in connection with  
the device.



**FIG 15a**

## Description

### Background of the invention

[0001] The invention relates to a maintenance arrangement in snow ploughing and antiskid treatment, as well as to a method for dealing with an antiskid substance in antiskid treatment.

[0002] Once winter weather sets in, snowfall and the slipperiness of roads is a major maintenance problem for the parties responsible for the maintenance of housing companies, property companies, grounds and storage areas, and generally speaking for parties responsible for antiskid treatment. Usually, after ploughing, sanding has been carried out with a dedicated sanding device or by hand.

### Brief description of the invention

[0003] This application discloses new types of snow ploughs and buckets, to be detachably connected to a vehicle such as a tractor or wheel loader, which solve the winter maintenance problems of yards, pavements, roads, and depots, as well as reduce the total investment costs, reducing the number of equipment and personnel needed.

[0004] The application sets forth a snowplough solution where one and the same device is used both to carry out snow ploughing and sanding of the ground surface. The disclosed device may be detachably hooked up to a vehicle such as a tractor or wheel loader with quick fastening means. The device comprises a snowplough or snow bucket and a snow collecting trough therein. In connection with the plough or bucket, the same device has an antiskid substance container from which antiskid substance may be spread onto the ground surface. The container comprises a screen such as a mesh to separate the coarsest grains from the finer grains or granules. The container comprises a scatterer for throwing antiskid material to a wider area. There may also be a separate mixer in the antiskid substance container itself. With the aid of the plough and bucket, snow is ploughed and handled, keeping passages and yards free of snow and slush.

[0005] In a preferred embodiment of the invention, the ploughing part is a fixed bucket and alignable by means of the vehicle, only. The solution is economic. Said embodiment has a transverse separating wall between a space for the snow and a space for the antiskid material. The antiskid material container is provided with a top lid. Advantageously there are two lids hinged to open to both sides. If so, visibility from the vehicle, such a tractor, will not be obscured. This is important when the antiskid material container is filled from a storage container, for example.

[0006] In a second preferred embodiment of the invention, an area plough has a separate curved plough plate which may be detachably connected by fastening means to cylinders and through them to the device body itself.

There are actuators between the plough plate and body to position the plough plate. Advantageously the actuators are cylinder devices, advantageously hydraulic cylinders. In the middle of the body part there is the antiskid substance container which narrows towards its bottom. In the vicinity of the outlet in the bottom part, advantageously below it, there is a scatterer device, such as a rotating scatter plate to distribute the substance over a wide area on the ground surface.

[0007] The inventive maintenance arrangement comprises a storage container for the antiskid substance, from which the antiskid substance may be supplied by a conveyor to the antiskid substance container of the plough part. A tractor comprising the connectable inventive plough device provided with the antiskid substance container is driven next to the storage container of the antiskid substance. Next, the conveyor, advantageously a chain scoop conveyor, is used and the antiskid substance container of the plough device is filled up.

[0008] The position of the plough plate may be adjusted in relation to the device body. In a second embodiment, the plough plate is replaced with a fixed bucket. The invention also relates to a method for dealing with an antiskid substance in antiskid treatment.

[0009] The maintenance arrangement and method according to the invention are characterised by what is disclosed in the claims.

### Brief description of the figures

[0010] In the following, the invention will be described with reference to the embodiments of the accompanying drawings without, however, exclusively restricting it to them.

Figure 1 shows a first preferred embodiment of the invention. A snow bucket axonometrically.

Figure 2 is a view of Figure 1 from the direction k1.

Figure 3 is a view of Figure 1 from the direction k2.

Figure 4 is a cross section A-A of Figure 2.

Figure 5 shows the snow bucket axonometrically with the lid open.

Figure 6 shows the snow bucket axonometrically with the rear wall cut partly open.

Figure 7 shows a cross-section A-A of Figure 6,

Figure 8 illustrates a second preferred embodiment of the plough.

Figure 9 shows the plough of Figure 8 seen from the direction of the arrow k7 of Figure 8, that is, obliquely from below.

Figure 10 shows the circled area of Figure 9.

Figure 11 is a top view of the plough.

Figure 12 illustrates a third preferred embodiment of the plough.

Figure 13 shows the circled area of Figure 12.

Figure 14 shows the maintenance arrangement in its entirety.

Figure 15a shows a second preferred embodiment

of the storage container of the antiskid substance container according to the inventive arrangement. Figure 15b shows a step where the container according to Figure 15a is pulled onto a platform of a lorry.

Figure 16a shows the storage container of the antiskid substance on a trailer, that is, a trailer with wheels, at its usage site delivering antiskid substance to a container 34, from which the substance is scattered on the ground surface.

Figure 16b shows the pulling of a storage container onto a trailer with a hook device.

Figure 17 shows the filling of storage containers according to Figures 15a, 15b and 16a, 16b with a tractor bucket by opening the lid of the storage container. Figure 18 shows a separate side view of the storage container.

Figure 19 shows a cross-section A-A of Figure 18. A conveyor is shown.

Figure 20 is a cross-section B-B of the storage container of Figure 18.

### Detailed description of the invention

**[0011]** Figure 1 is an axonometric representation of a snow plough 10. In this embodiment, the device is of the bucket type. Figure 2 shows the bucket 10 from the direction of the arrow k1 in Figure 1. Figure 3 shows the bucket 10 from the direction of the arrow k2 in Figure 1. Figure 4 is a cross section A-A of Figure 2.

**[0012]** The snow bucket 10 comprises a body 11 that is advantageously made of metal sheet. The snow collecting space G, that is snow scoop 12, of the body 11 is defined by a bottom wall 13, side wall 14 and a second side wall 15, as well as a rear wall 16. The antiskid substance container 17 is located on the other side of the rear wall 16. The portion 14a of the side wall 14, the portion 15a of the side wall 15, and the rear wall 19 of the body 11 and the portion 20 of the bottom wall 13, openable lid 18 and the rear wall 16 of the snow collecting space G define a sand collection space H. The lid 18 of the container 17 is turnable supported by hinge means 22. Inside the container 17, in the sand collecting space H there is a sieve/screen 23 at about the middle of the collecting space in its vertical direction. At the bottom part of the collecting space there is a mixer, scatterer, and distributor 24 rotated with the motor M1. At the bottom part of the space H there is an outlet 21 for the antiskid substance and in its vicinity, inside the space H, there is located a scatterer/distributor 24 advantageously a rotatable bar. The bar is rotated with the motor M1. The bar comprises on its surfaces distribution parts 24a that distribute the antiskid substance. The motor M1 is advantageously a hydraulic motor. When the bar 24 is not rotated, the bar 24 closes the outlet 21 from the container. When rotated, it distributes and scatters antiskid material such as crushed stone used for sanding.

**[0013]** The hinge means 22 are in the figure perpen-

dicularly from their geometrical axis X2 in relation to the longitudinal axis X1 of the device 10. In Figure 1, the lid 18 of the sand container of the bucket 10 is in the closed position. The rear wall 16 is located between the snow collecting space G and the antiskid material space H.

**[0014]** In Figure 5, the lid 18 of the bucket is open. The rear wall 16 runs in a transverse direction in relation to the axis X1.

**[0015]** Figure 6 shows the structure in an opened form. Figure 7 is a partly cross-section A-A of Figure 6.

**[0016]** Fastening means 25a and 26a are located at the rear wall 19 of the bucket. The means 25a are hooks and the means 26a are lugs with openings. The sieve 23 is located in the space H. The sieve, that is, screen 23, is located in the space H transversely, dividing the space H into a top part for a substance to be screened, such as sand or crushed stones, and into a bottom part for a screened substance. The bottom part comprises the mixer/scatterer/distributor 24 and advantageously a bottom opening 21 at the top.

**[0017]** The drive wheels 27a, 27b, and 27c of the mixer/scatterer 24 are located outside the device, fastened to the side plate. The drive wheel 27a couples to the axle of the drive motor M1, the drive wheel 27c couples to the axle of the scatterer 24, and the drive wheel 27b rotates the axle of a tedder 28. The drive wheel 27b may be positionable. A drive belt 27d is passed via the drive wheels. The drive belt may be a chain, too.

**[0018]** Figure 8 shows a second preferred embodiment of the device of the invention. The snow plough 10 is of the area plough type. The snow plough 10 comprises a body 30. The body 30 consists of vertical beams 31a, 31b. Connecting the vertical beams 31a, 31b there is a transverse beam 32. The transverse beam 32 is a plate and comprises fastening means 42a, 42b, 43a, 43b to connect the body detachably to a vehicle, such as a tractor, loader, or similar.

**[0019]** The container 34 for an antiskid substance, such as crushed stones, is at the front of the body 30. It comprises a rectangular edging 35a, a lid 35b, and a funnel-shaped collecting box 36, narrowing downwards, for the antiskid substance such as crushed stones. The curved plough plate 37 is fastened to a subframe 42, and the subframe 42 to the body 30 through cylinders 38a, 38b. The cylinders 38a, 38b are advantageously hydraulic cylinders. By means of the cylinders 38a, 38b, the plough plate 37 is turned and positioned around the vertical axis Y1. The cylinder 39 is a damping cylinder. The cylinder 39 is advantageously a spring cylinder. It allows the plough plate 37 to rotate around the horizontal axis X3 when impacted on. The cylinder 39 is pivoted at one end to the body 30, and at the other end to the plough plate 37 on its rear surface. This way, a plurality of degrees of freedom is achieved for the plough plate 37.

**[0020]** The plough plate 37 is pivoted to rotate in relation to the subframe 42 at joints C1, C2, C3 around the horizontal axis X3. The joint C1, C2 is formed of a lug that has a vertical slot J for a pin. The joint C3 is a loose-

fitted pin-and-hole joint. This creates a vertical degree of movement for the plough 37 in plough impacts.

**[0021]** Figure 9 shows the device seen from the direction of the arrow k7 in Figure 8, that is, obliquely from below. Figure 10 shows the circled area of Figure 9. Figure 11 shows the device from the top.

**[0022]** The scatterer 41 closes the outlet 40 of sand or crushed stones. It is a plate that has been rotated with a motor, advantageously a hydraulic motor M1. The plate comprises, on its top surface, gripping parts 43 by means of which the grains are scattered from the plate surface as the plate is being rotated. When not rotated, the plate closes the material outlet 40 underneath the container, whereby the plate acts as the closer of the outlet. Under gravity, the sand or similar substance flows in the container from the upper opening of the container to the lower outlet 40 and further onto the ground surface. When the plough 10 and the antiskid substance container 34 are in one and the same device, ploughing and antiskid treatment may be carried out at the same work stage. Savings are made in equipment costs and working time.

**[0023]** Figure 12 illustrates a third preferred embodiment of the plough. For the most part, the plough corresponds to the previous embodiment, but there are two plough plates 37a, 37b. The device comprises a body 30, an antiskid substance container, such as a sand or crushed stone container 34, a framework 35a, a substance box 36, and openable and closable lid 35b, vertical beams 31a, 31b of the body and a horizontal beam 32 linking them and comprising first sliding means, advantageously a sliding plate 60c that moves along and controlled by second sliding means, advantageously a sliding plate 61c.

**[0024]** The second sliding means, advantageously the sliding plate 61c, comprises quick fastening means 42a, 42b, 43a and 43b, by which the ploughing device 10 may be quickly hooked up to a work machine such as a tractor, loader, or similar. The ploughing device 10 itself moves vertically by means of the sliding system 60c, 61c and receives the vertical impacts of ploughing.

**[0025]** The first quick fastening means 42a, 42b are hooks the tips of which point down. The second quick fastening means 43a, 43b are located below the first ones at a narrower width and are lugs with holes. The same division and structure with different division is in place in an the plough and bucket embodiments.

**[0026]** The embodiment has two curved plough plates 37a, 37b. They are pivoted to rotate around the vertical axis Y1 at the joint C5. The joint is located at the longitudinal central axis X1 of the device 10. There are cylinder devices 38a, 38b that turn the plough plates 37a, 37b. The cylinders 38a and 38b are pivoted and fastened at both ends thereof. At one end, to the rear surface of the plough plate 37a, 37b, and to the body 11 at the other end.

**[0027]** Figure 13 shows the circled area of Figure 12. The plough 10 comprises a scatterer/spreader 41 for the material. With the motor M1 advantageously being a hydraulic motor the scatter plate 41 is rotated. It comprises,

on its top surface, nodules 43 or similar gripping parts that grip on the antiskid material being scattered, which flows from the bottom opening 40 of the container 34. When not rotated, the plate 41 closes the bottom opening 40.

**[0028]** Figure 14 shows a maintenance arrangement 50 for snow ploughing/snow scooping and antiskid treatment of a ground surface. The maintenance arrangement 50 comprises a storage container 51 for antiskid substance in order to fill up the ploughing device container. The antiskid substance is brought to the storage container 51 by a lorry and unloaded from it to the storage container 51 by a conveyor 53 of the lorry. The storage container 51 comprises a conveyor 52, such as a motor M2 driven screw conveyor, belt conveyor, chain conveyor, or similar. By means of it, the antiskid substance such as sand is transferred through the bottom opening of the storage container 51 by means of the conveyor 52 from the lower position to upper position and directly to the antiskid substance container 34, 17 of the snow plough 10 itself, which is hooked up to a tractor T. The conveyor 52 is driven by a motor M2, advantageously with a hydraulic motor. The hydraulic drive thereof is taken from the hydraulic system of the tractor T, or similar.

**[0029]** The storage container 51 is equipped with an openable and closable lid 52a, 52b. Opening may be carried out with an actuator by remote control and wirelessly from a vehicle such as a tractor or similar work machine T moving the plough. In Figure 14, the lids 18a and 18b of the antiskid substance container of the plough device are pivoted to turn supported by hinge means the geometrical slewing axes X5 and X6 of which are parallel to the longitudinal axis X1 of the vehicle T. In such a case, the lids 18a and 18b may be turned aside and to an open position where they do not obscure visibility from the work machine such as a tractor or loader T pushing the plough. The turning of the lids 52a, 52b; 18a, 18b; 18 may be carried out by an actuator S1 such as a cylinder device.

**[0030]** As shown in Figure 14, the slewing axes of the lid/lids of the antiskid substance container of the snow plough are parallel to the longitudinal axis of the vehicle. This way the lid/lids when open do not obscure the forward view from the tractor cabin.

**[0031]** Figure 15a shows a second preferred embodiment of the storage container 51 of the invention. The storage container 51 is a longitudinal structure that is advantageously more than twice the length of its cross sectional size. This allows the storage container structure to be low but still very spacious regarding its internal storage space 56. The storage container 51 comprises a conveyor 70 by means of which antiskid material such as sand or crushed stones is transferred to the container 17; 34 of the sanding or scattering device. The antiskid material flows under gravity through a slot 53, running under the container along its length, to the conveyor 70. The conveyor 70 is advantageously a chain conveyor which comprises, at a distance from each other along

the length of the conveyor, scoop parts 71 such as transverse bars that grip the antiskid material and move it forward and further upward and to the separate inventive container 17; 34 of the device scattering the antiskid material.

**[0032]** Under the container body, the storage container 51 comprises a support body and an upward body portion that has quick fastening means 60 such as a V-shaped means such as a bar to which the hook device couples by its hook in order to pull the storage container onto a platform of a truck as in Figure 15 or onto a platform of a trailer as in Figure 16b.

**[0033]** The pulling onto a platform may also be performed with a wire device in which case the hook of the wire is connected to the fastening means of the storage container 51, such as lugs with holes. The wire is drawn onto the reel of a winch and the storage container is further pulled on a dumpable body. The lowering onto the ground of the storage container takes place by tilting the dumpable body in the wire device embodiment. In such a case, the lowering onto the ground takes place under gravity.

**[0034]** Figure 16a shows an embodiment of the invention where the storage container 51 with the included conveyor 70 rest on a trailer with wheels, which may be moved with a tractor or similar. This way, the usage location of the container may be easily changed. In Figure 16b, the container is pulled onto a trailer with a hook device 61, which is an accessory of the trailer. The hook 63 on the turning body 62 of the hook device 61 is coupled to a mating fastening means 60 on the storage container 51, such as a bar 60a. By turning the body 62 of the hook device 61 with a hydraulic cylinder 64, the storage container 51 is pulled onto the trailer, and by turning it to the other direction the storage container 51 with its conveyor 70 is lowered onto the ground.

**[0035]** Figure 17 shows the filling up of the storage container 51 with a bucket loader. The openable/closable lid 520 of the storage container is in its open position. It is hinged with hinge means 521, parallel to the length X20 of the container and located at a longitudinal edge of the container body 52. The hinging of the lid 520 extends along the length of the container 51. The lid 520 may be opened and closed by an actuator or manually by hand. The load may be picked up from a large pile of material, which is in an enclosed space such as a hall space.

**[0036]** By means of the arrangement according to the invention, the filling up of the storage container 51 and its use may be easily allocated to different actors. The ownership of the storage containers may reside with yet another actor and the actual sanding with another actor.

**[0037]** The invention discloses a new method of dealing with an antiskid material for antiskid treatment, in which method

- a) The antiskid substance container 17; 34 of such a device is filled up with antiskid material, which de-

vice comprises a snow-ploughing plough or scoop 12;37;37a,37b in one and the same device, and to which device a work machine such as a tractor moving the device is detachably hooked up.

b) The antiskid substance container 17; 34 of the device is filled up from a storage container 51 which comprises a conveyor 70 by means of which the antiskid material is transferred to the container 17;34 of the scattering device through the bottom slot 53 of the storage container 51.

c) The storage container 51 of the antiskid substance is left to lie at its usage location and the filling up of the container 17; 34 of the scattering device is carried out from it.

d) The storage container 51 is pulled with a hook device 61 or similar onto the platform of a truck or a platform of a trailer and moved on to a new usage location, and that the storage container 51 comprises a quick fastening means 60 such as a bar 60a or a lug with a hole to which a pulling device such as a hook device 61 is detachably connected to by its hook 63, the mating fastening means 60 is a quick fastening means.

e) And in that in the method the antiskid material is made flow under gravity through a longitudinal free opening 53 at the bottom of the storage container directly on a horizontal conveyor flow F1 and after this transferred by means of a conveyor obliquely upward by means of a conveyor flow F2 and further to the container 17; 34 of the ploughing or scattering device as shown in Figure 15a, for example.

**[0038]** Figure 18 shows the storage container 51 of Figures 15a, 15b, 16a, 16b and 17 from the side and axonometrically. Figure 19 is a cross section A-A of Figure 18 and as a partial view,

**[0039]** The storage container 51 is a longitudinal structure that is more than twice the length of its cross sectional diameter. The container is advantageously a metal structure. It comprises a container body and below it a base body, that is, a lower body 58, which has an upward body portion 59 which comprises fastening means 60 to pull the storage container 51 with the hook device 61 or similar onto the platform of a truck or on the platform of a trailer. The fastening means 60 may be a bar 60a having a V-shape to keep the hook of the hook device at the centre on the longitudinal line X20 in a moving situation of the storage container 51.

**[0040]** When the transfer device being used is a wire winch, the hooks of the wire may be fastened to lugs that have holes in them. The storage container 51 narrows in a wedge-shaped manner towards the longitudinal bottom outlet, under which there is the horizontal flow F1 of the conveyor along the length of the longitudinal slot. Advantageously the conveyor 70 is a chain conveyor that passes as an endless loop through sheaves at its ends. To the upmost sheave is coupled a drive motor M2, advantageously a hydraulic motor, acquiring its driving power

from the work machine such as a tractor T moving the plough/scatterer. The chain conveyor 70 comprises scoops 71 at a distance from each other, used to grip the material and to transfer it. The scoops 71 may be bars. By means of the motor M2, the conveyor, its chain loop, is rotated. The storage container 51 does not need any closing device underneath, because the horizontal conveyor flow F1 acts as the closer of the container.

**[0041]** Then conveyor 70 is an essential part of the storage container 51 and is part of its structure when located at its usage location such as a yard.

**[0042]** Figure 20 is a cross-section B-B of the storage container of Figure 18. The openable and closable lid 520 is the topmost and closes the filling hole 55 covering the entire top part. Inside the storage container 51 there is a storage space 56 for the antiskid material such as sand or crushed stone.

**[0043]** The chain conveyor 70 is under the discharge outlet 53 beneath the storage container 51 and closes the discharge outlet 53 in such a manner, however, that the material reaches the conveyor flow F1 and forward. The discharge outlet 53 is a longitudinal slot parallel to the longitudinal axis X20 of the container along the length X20 of the container. Sand, crushed stones or a similar substance drops under gravity to the horizontal upper flow F1 of the conveyor 70, and transfers moved by the scoops 71 to an obliquely upward running vertical flow F2 and at its end the material drops to the container 34 and shown in Figure 15a. The inside of the storage container 51, that is, storage space 56, narrows in a wedge-like manner downward, and the material drops under gravity out from the inside of the storage container 51. The storage container 51, its container body 600 is supported by ribs 57 to the lower body 58 supported by which it rests. The lower body 58 also comprises an upward body portion 59 where the quick fastening means 60 are located to grip the storage container 51 with the hook device 61 or a wire winch. The quick fastening means 60 are advantageously formed of the bar 60a or lugs with holes in them for the wire device. The conveyor 70 is located as regards its horizontal flow F1 between the lower body 58 and the container body 52 of the storage container 51.

**[0044]** A person skilled in the art will find it obvious that, as technology advances, the basic idea of the invention may be implemented in many different ways. The invention and its embodiments are thus not restricted to the examples described above but may vary within the scope of the claims.

## Claims

1. A snow plough (10) for use in snow ploughing and antiskid treatment, which snow plough (10) comprises  
a body (30) of the snow plough,  
at least one plough plate (37, 37a, 37b),

cylinder devices (38a, 38b, 39) for fastening the at least one plough plate (37, 37a, 37b) to the frame (30) and

coupling means (42a, 42b, 43a, 43b) to connect the plough (10) detachably to a vehicle such as a tractor or loader or work machine, **characterised in that** snow plough (10) comprises in connection with the body (30) of the snow plough an antiskid substance container (34), whereby the antiskid substance container (34) comprises at a top part of the antiskid substance container (34) a lid (35b) by which the antiskid substance container (34) is openable and closable.

2. A snow plough (10) as claimed in claim 1, **characterised in that** the snow plough (10) comprises two plough plates (37a, 37b), and cylinders (38a, 38b) that are fastened and pivoted by their ends between the body (30) and the plough plates (37a, 37b) and which are adapted to turn the plough plates (37a, 37b) at the joint (C5) around the vertical axis (Y1) located at the centre axis (X1) of the device.

3. A snow plough (10) as claimed in claim 2, **characterised in that** the body (30) of the plough (10) comprises vertical beams (31a, 31b) and a horizontal beam (32) which links them and to which a sliding device (60c, 61c) has been connected, which allows the vertical movement of the plough (10) and **in that** the quick fastening means (42a, 42b; 43a, 43b) are located in the second sliding devices (61c) and **in that** the second sliding devices (61c) are a plate-like structure and the means (60c) slide along the means (61c), controlled by them.

4. A snow plough (10) as claimed in claim 1, **characterised in that** the snow plough (10) comprises cylinders (38a, 38b) for turning the plough plate (37) around the vertical axis (Y1), a damping cylinder (39) between the body (30) and the plough plate (37), and a subframe (42), whereby the cylinders (38a, 38b) are between the subframe (42) and body (30), and **in that** the plough plate (37) is fastened and pivoted to the subframe (42) and adapted to turn with it and adapted to rotate around the horizontal axis (X3) in impacts that the plough plate is subjected to in ploughing.

5. A snow plough (10) as claimed in any one of the preceding claims, **characterised in that** the antiskid material container (34) is open at the top and bottom and **in that** the container (34) narrows conically towards the bottom and **in that in that** there is, in the vicinity of the bottom opening (40) of the container (34), a motor (M1) driven scatter plate (41) the task of which is to close the bottom outlet (40) when not in use and when in use to distribute antiskid substance onto the ground surface.

6. A snow plough (10) as claimed in any one of the preceding claims, **characterised in that** the body (30) consists of vertical beams (31a, 31b) that are linked by a transverse beam (32) and **in that** the conically narrowing container (34) is located at the front side of the body (30) in relation to the direction of ploughing.
7. A snow plough (10) as claimed in any one of the preceding claims, **characterised in that** the coupling means consists of two hooks (42a, 42b) and two lugs (43a, 43b) with holes, to which the mating coupling means of the vehicle or similar may be coupled.
8. A snow plough (10) as claimed in any one of the preceding claims, **characterised in that** the coupling means (42a, 42b, 43a, 43b) are located in the transverse beam (32) of the body (30).
9. A maintenance arrangement (50) comprising a snow plough (10) as claimed in any one of the claims 1 to 8, **characterised in that** the maintenance arrangement (50) further comprises:  
a storage container (51) for the antiskid substance, from which the antiskid substance container (34) in connection with the snow plough (10) may be filled with the antiskid substance.
10. A maintenance arrangement (50) as claimed in claim 9, **characterised in that** the storage container (51) is open at the bottom and comprises in connection with the bottom opening a conveyor (52; 70) the top end of the conveyor (52; 70) being located at a higher position than the lower end to carry the antiskid substance upward to the antiskid substance container (34) of a plough (10) connected to the vehicle such as a tractor.
11. A maintenance arrangement (50) as claimed in claim 9 or 10, **characterised in that** the storage container (51) is open at the top and preferably closable by a lid (52a, 52b) with an actuator (S1) and **in that** the lid (35b) of the antiskid substance material container of the snow plough is openable and closable with the actuator (S1).
12. A maintenance arrangement (50) as claimed in any one of the claims 9 to 11, **characterised in that** the conveyor (52; 70) of the storage container (51) is a screw conveyor, belt conveyor, or chain conveyor, used from the other end of the conveyor (52) by a motor (M2), advantageously a hydraulic motor, from the hydraulic system of the tractor.
13. A maintenance arrangement (50) as claimed in any one of the claims 9 to 12, **characterised in that** the storage container (51) is a longitudinal container structure which comprises at the bottom a longitudinal opening (53) to make the antiskid material flow out from inside the container, and **in that** the container structure comprises, at the bottom part of the container, a horizontal flow (F1) of the conveyor (70), ending up in an upward flow (F2), and **in that** the conveyor (70) is driven by a motor (M2).
14. A maintenance arrangement (50) as claimed in claim 13, **characterised in that** the conveyor (70) is a chain conveyor that has been passed as a loop and driven by the motor (M2), and **in that** the motor drive is taken from the motor and hydraulic circuit of a tractor or similar and **in that** the storage container (51) comprises an openable and closable lid (52a) to open and close an opening (55) at the top of the container and **in that** the storage container (51) comprises fastening means (60) for connecting to the storage container (51) to pull it onto the platform of a truck or lorry and **in that** the conveyor (70) is a chain conveyor comprising material-moving scoops (71).
15. A method for dealing with antiskid material in antiskid treatment, **characterised in that**  
a) the method uses a maintenance arrangement as claimed in claim 9  
b) and **in that** the antiskid material is first brought to a storage container (51) from which it is transferred, by means of a conveyor (52; 70), to the antiskid substance container (34).
16. A method as claimed in claim 15, **characterised in that** the storage container (51) is moved from a usage location to the next on a platform of a lorry or trailer, and **in that** for the moving, it is pulled from the ground onto the platform of a lorry or trailer, and **in that** at the usage location it rests on the ground or on a trailer moved with a tractor or similar, and **in that** the pulling onto a platform makes use of a hook device (61) or wire device the fastening hook of which is attached to the fastening means (60; 60a; 90) of the storage container (51) for the pulling onto the platform.

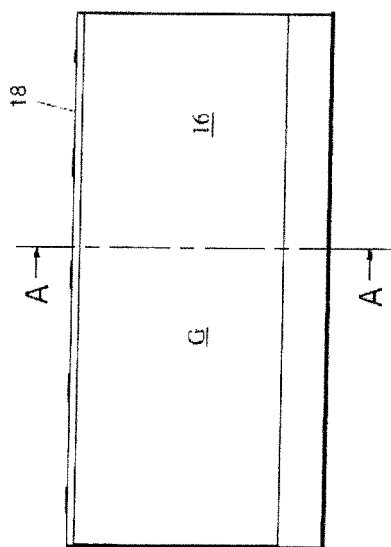


FIG 2

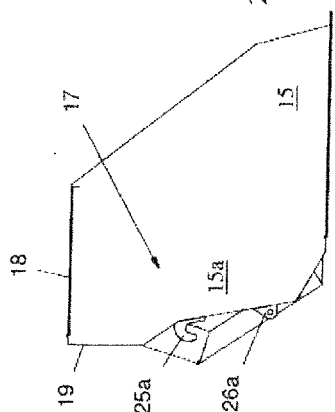


FIG 3

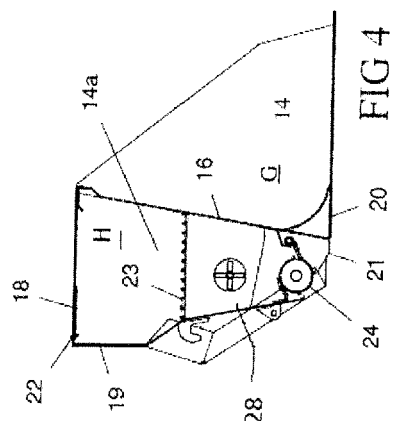


FIG 4

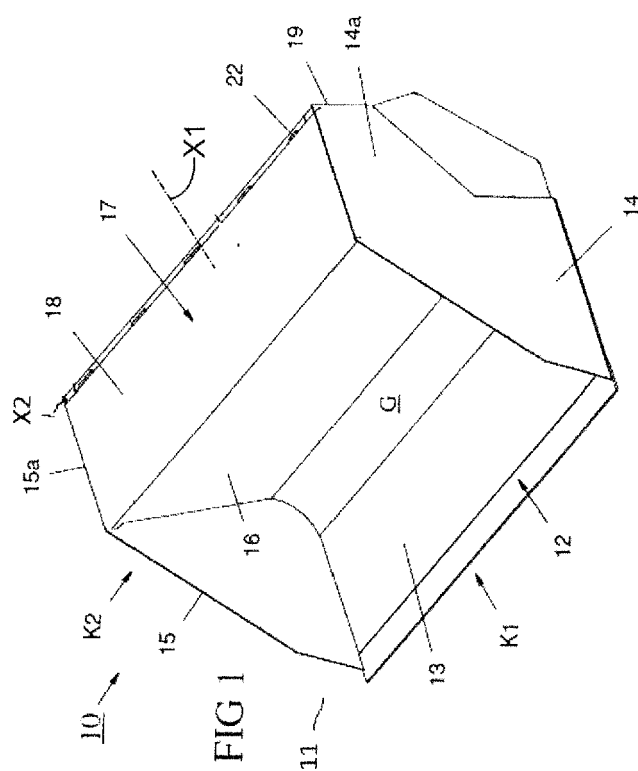


FIG 1

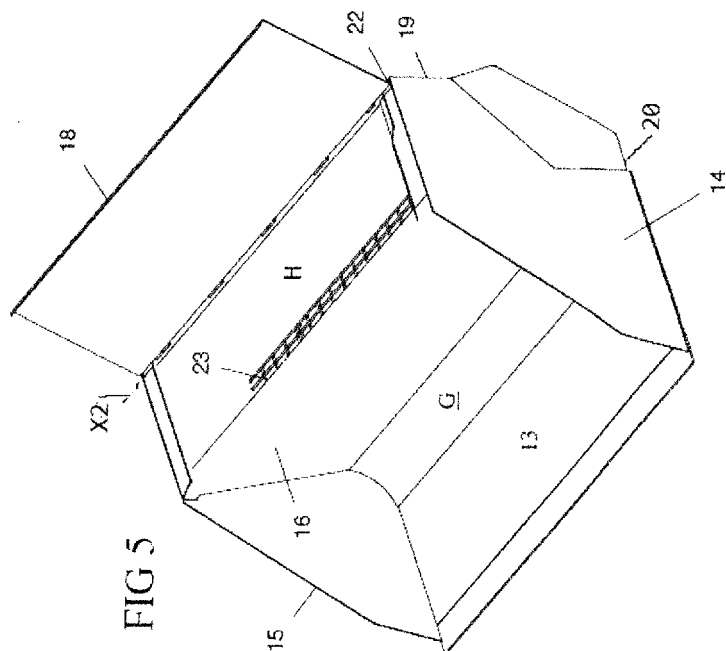
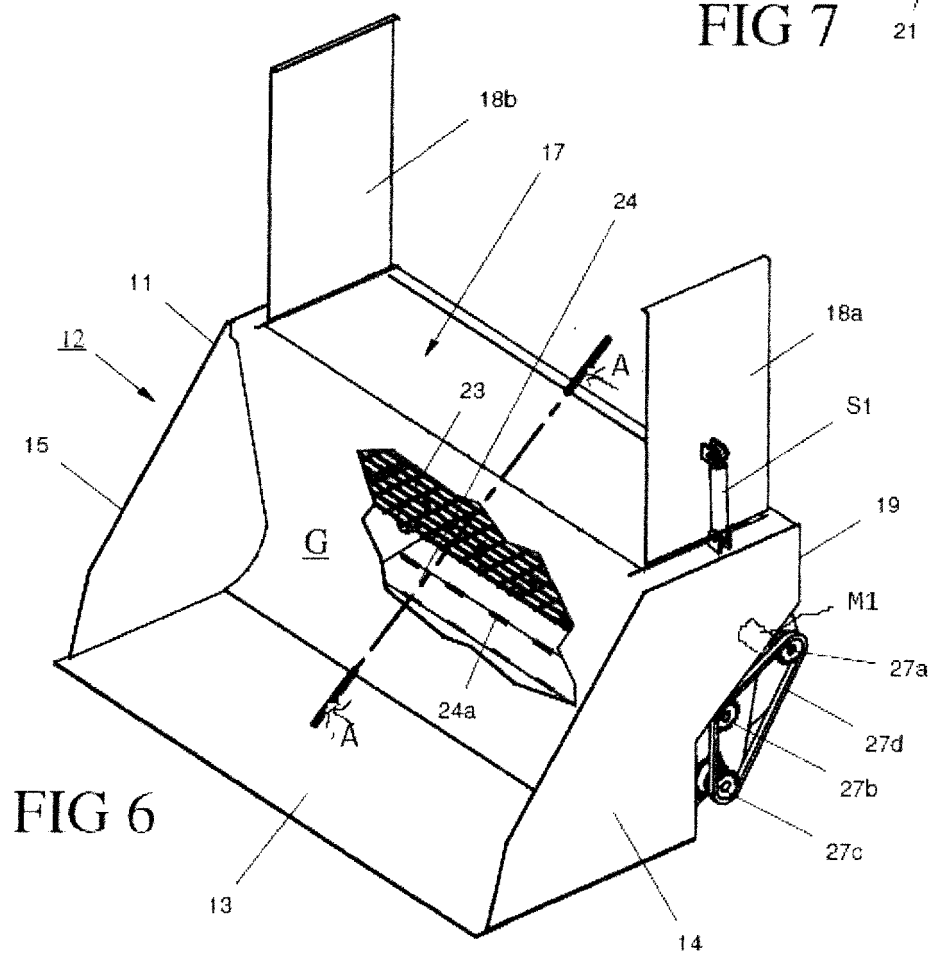
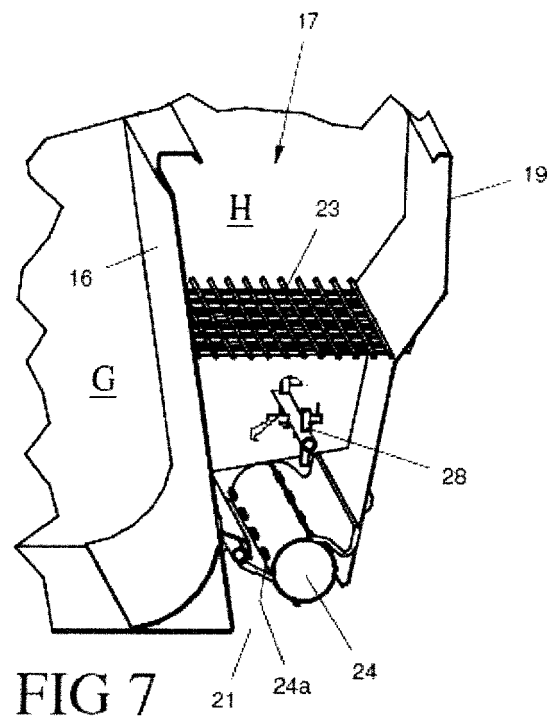
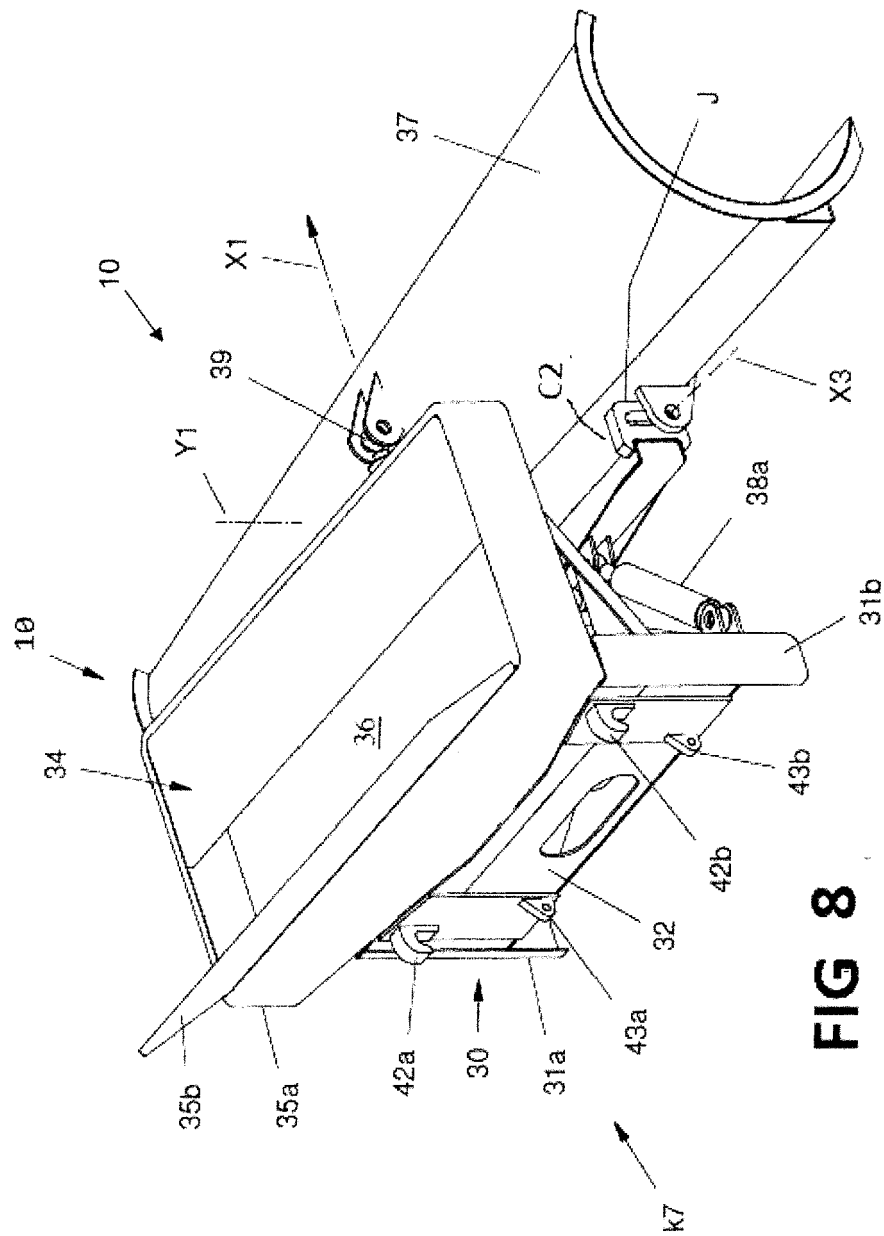


FIG 5







**FIG 8**

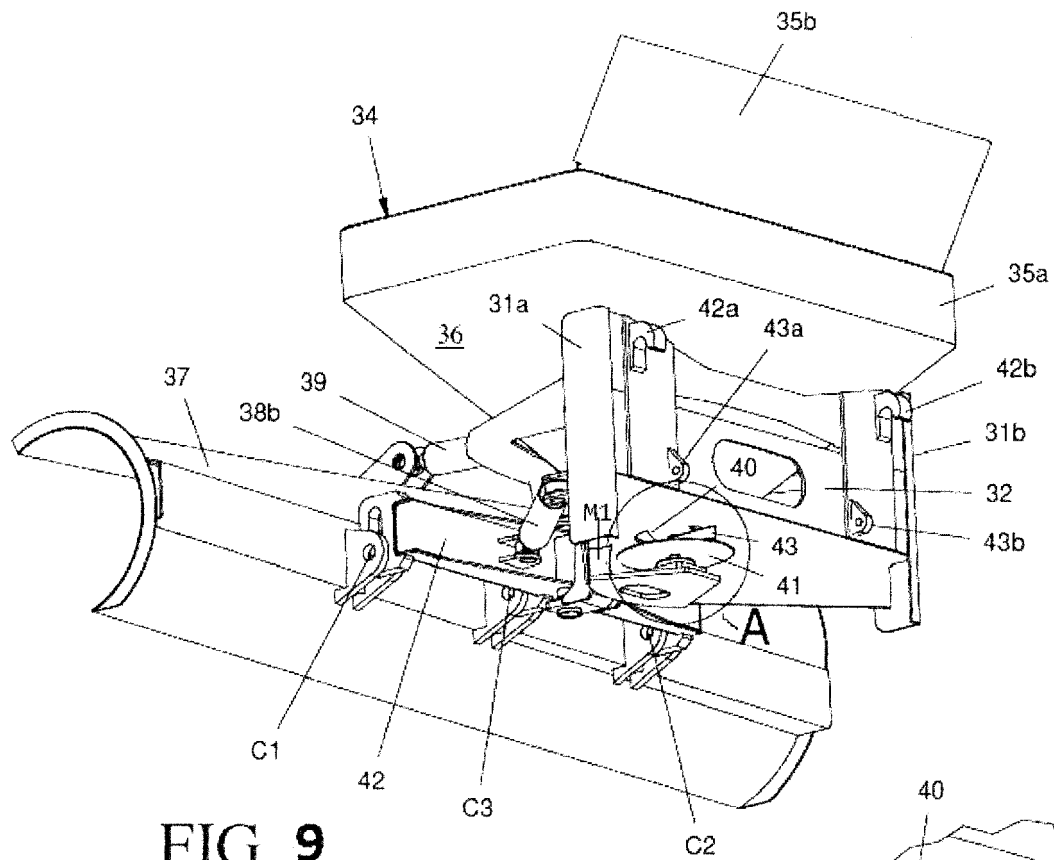


FIG 9

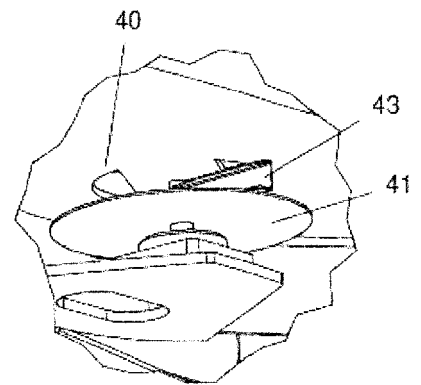


FIG 10

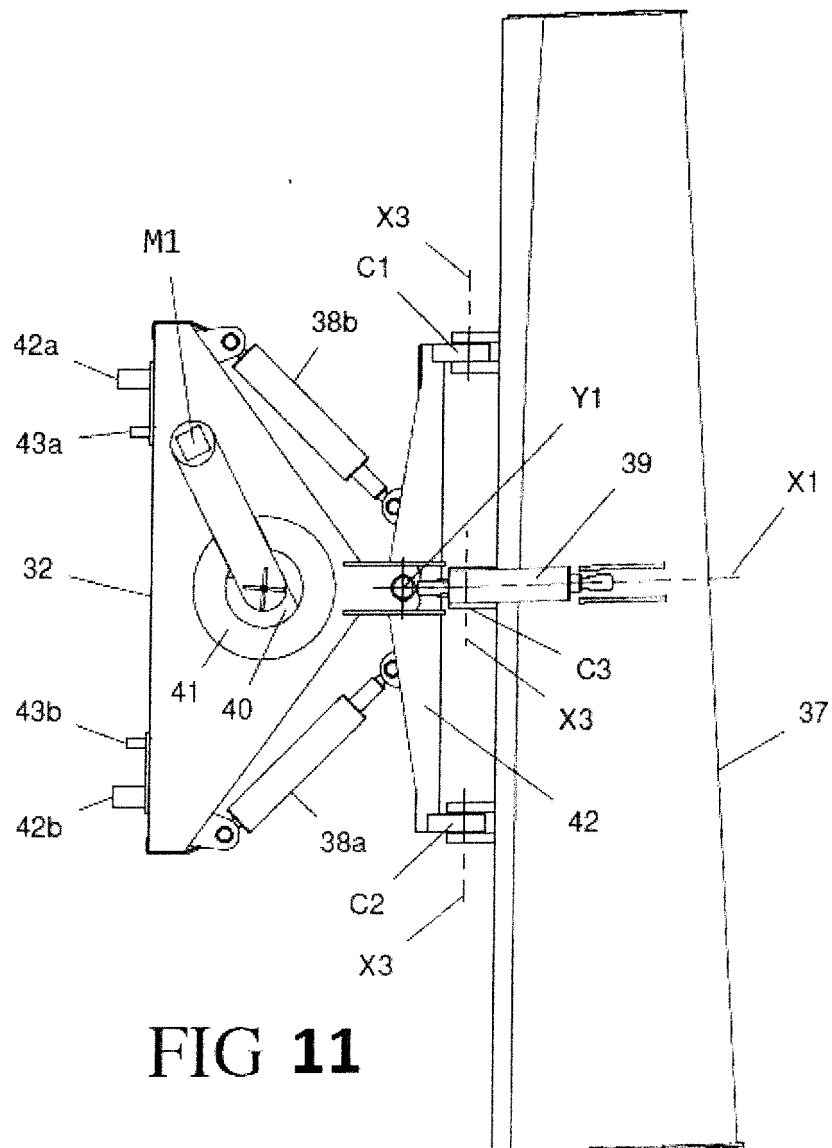


FIG 11

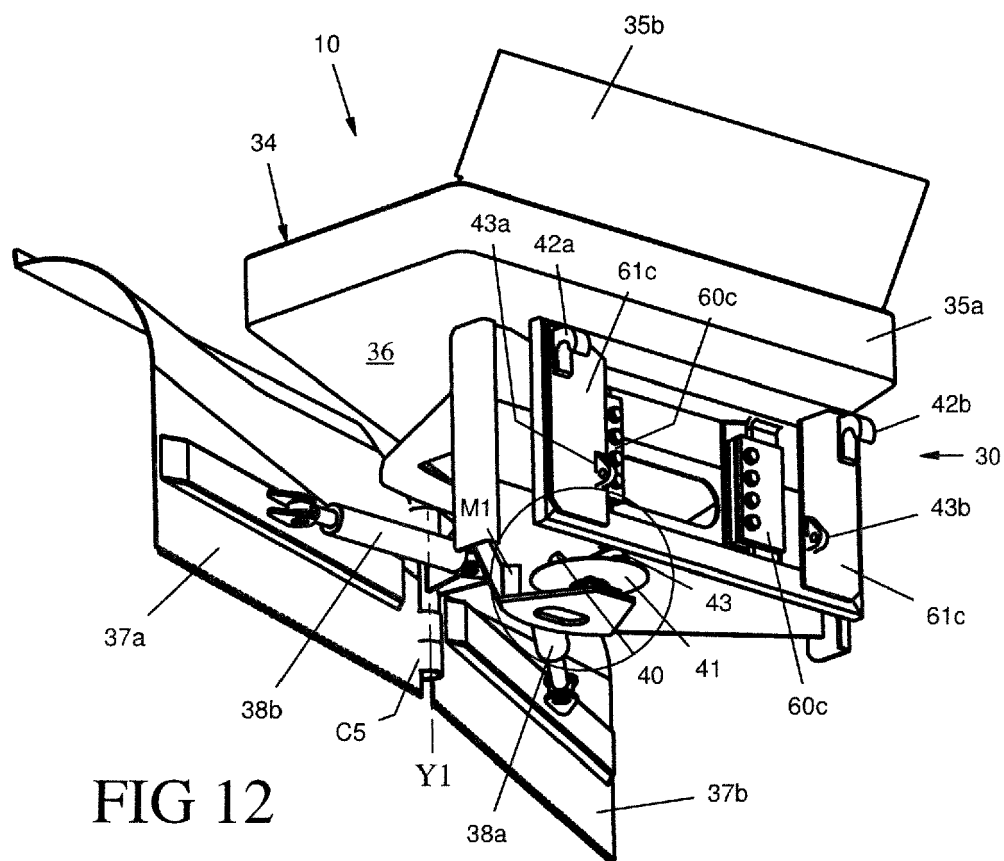


FIG 12

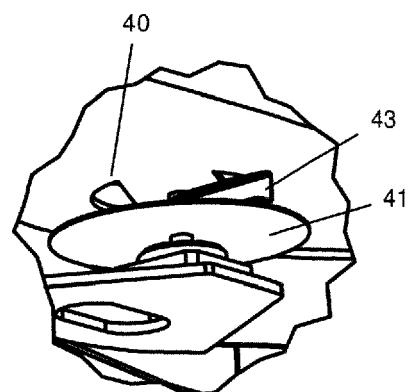


FIG 13

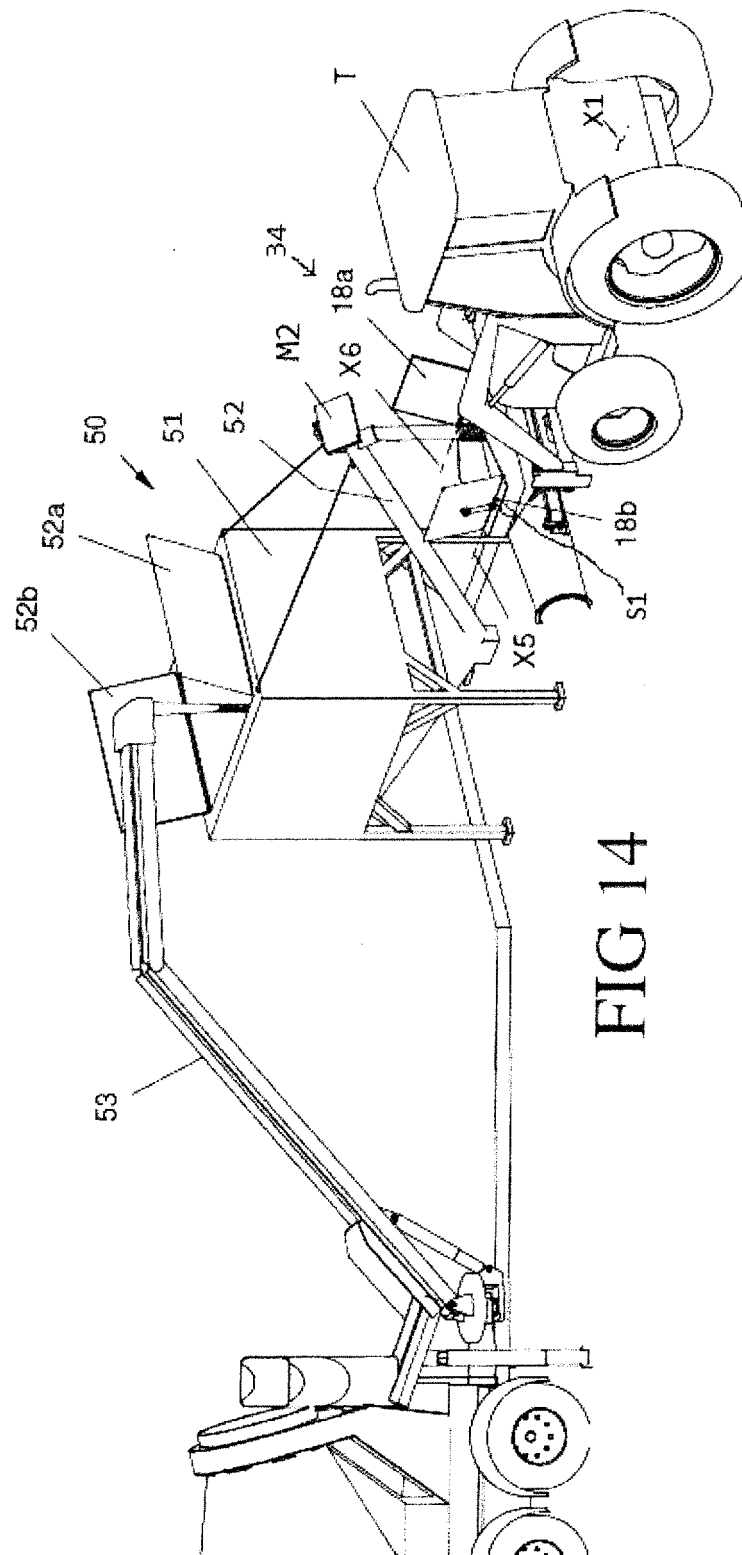
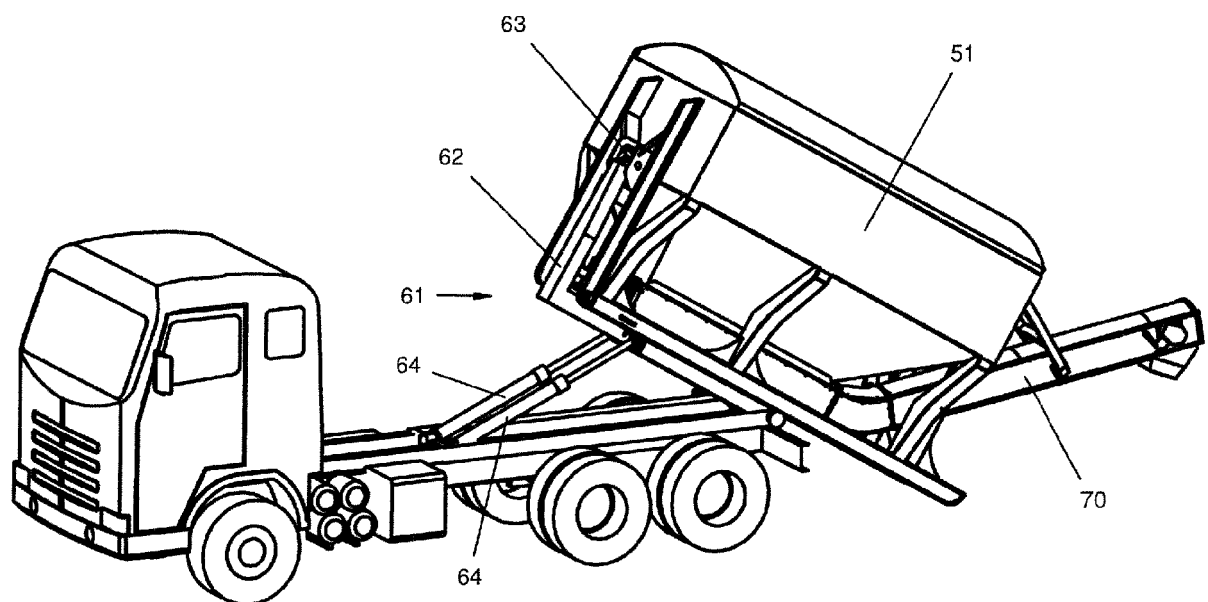
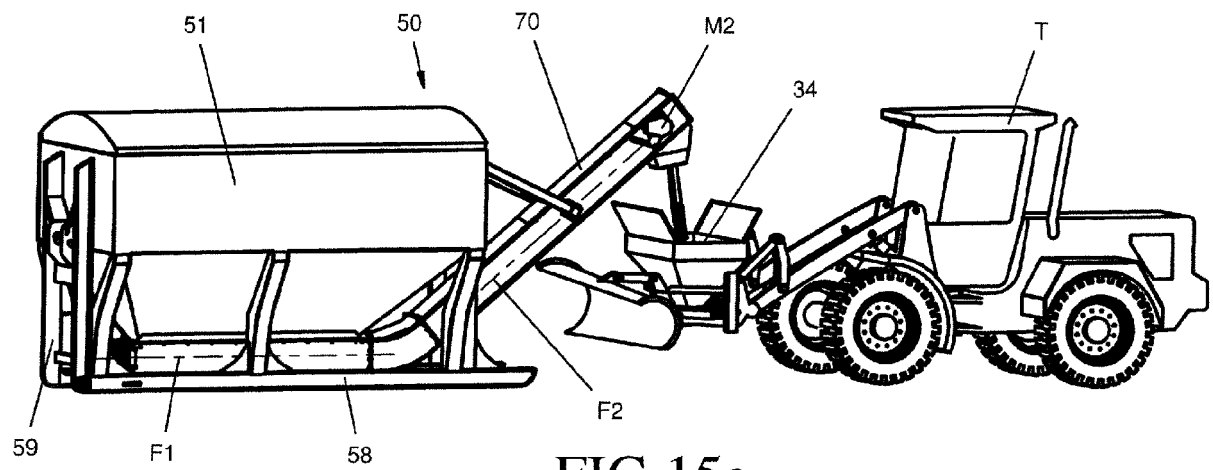


FIG 14



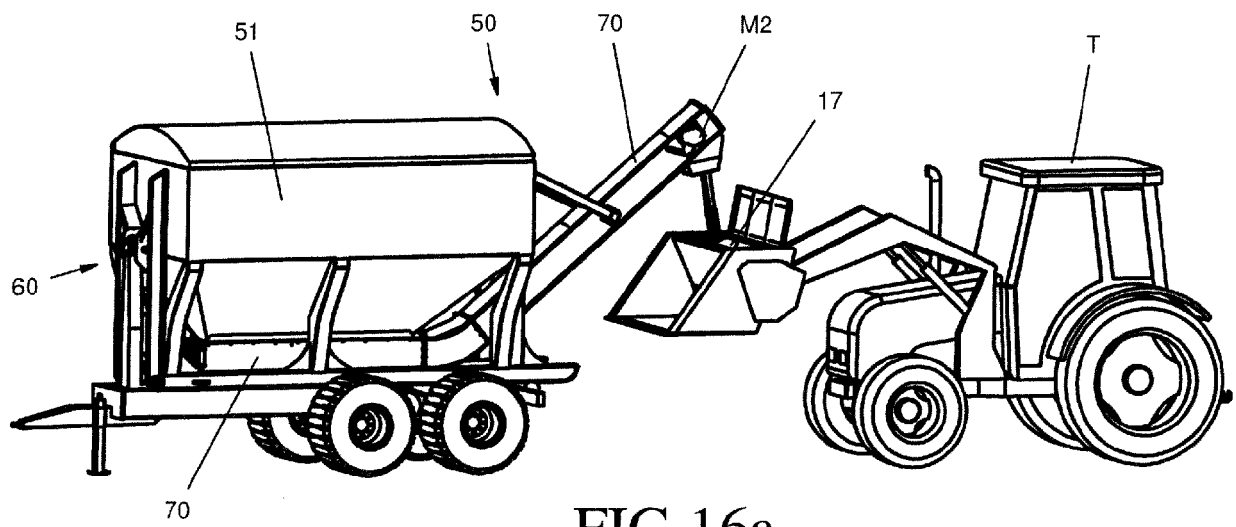


FIG 16a

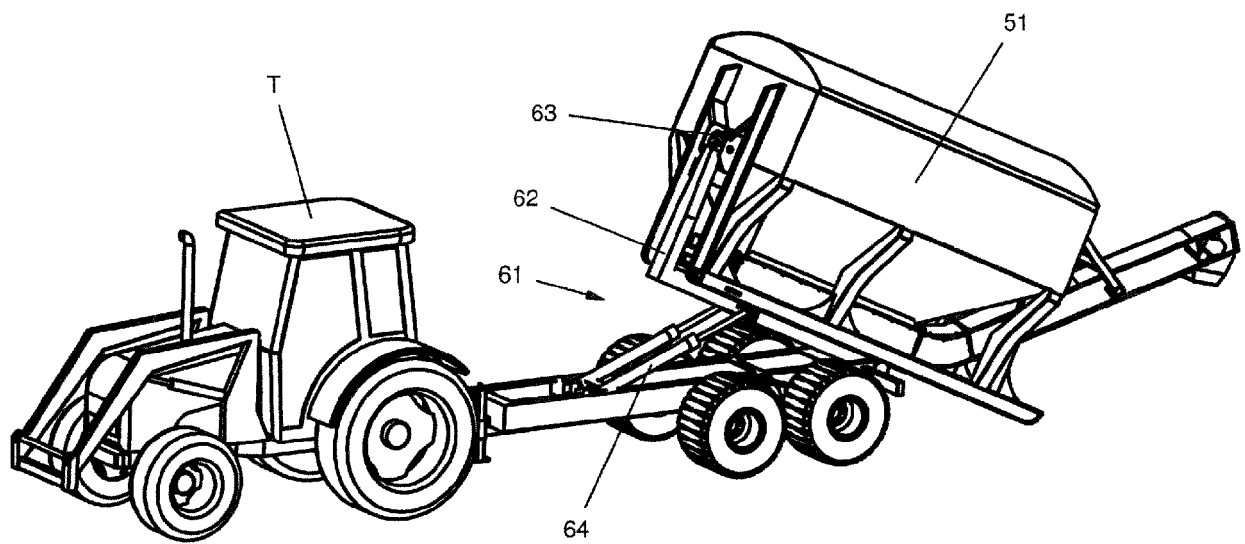


FIG 16b



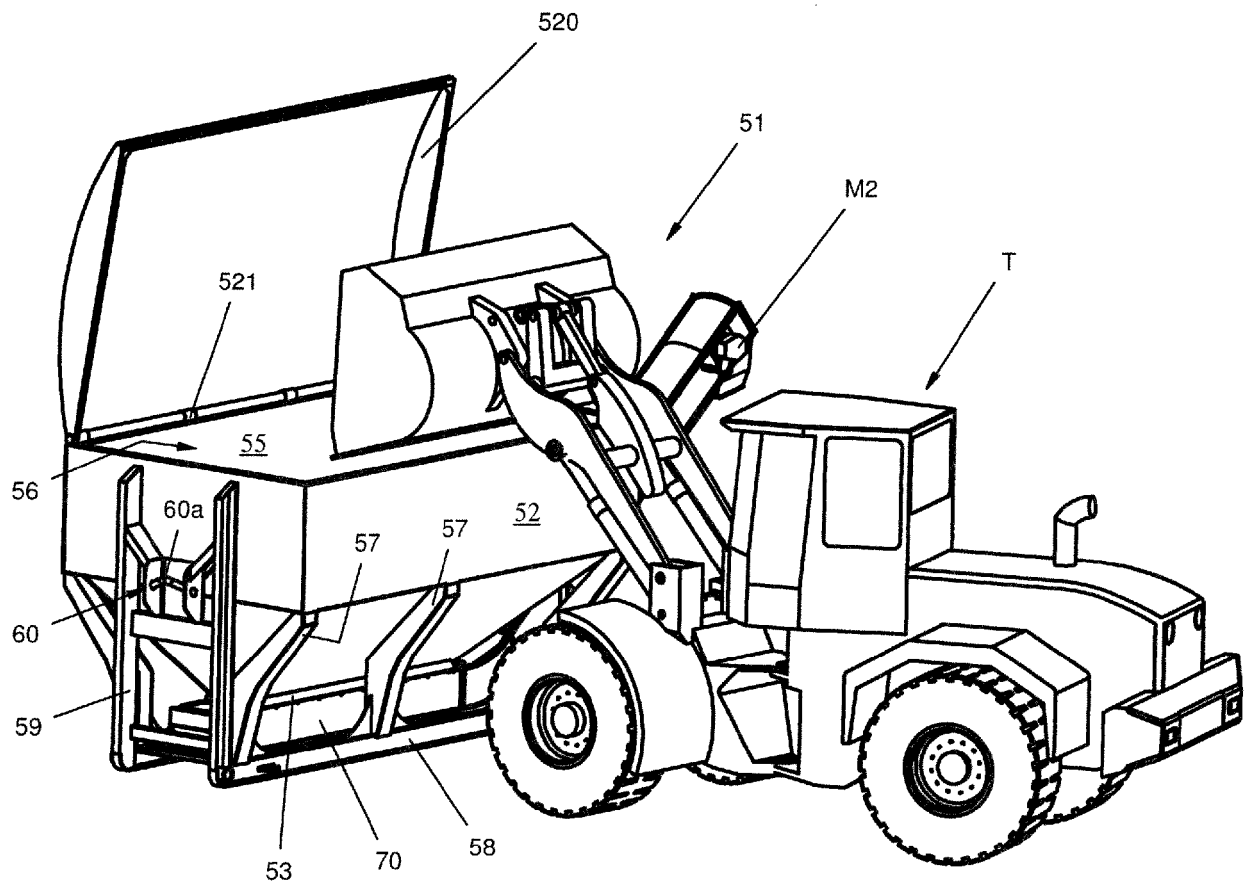


FIG 17

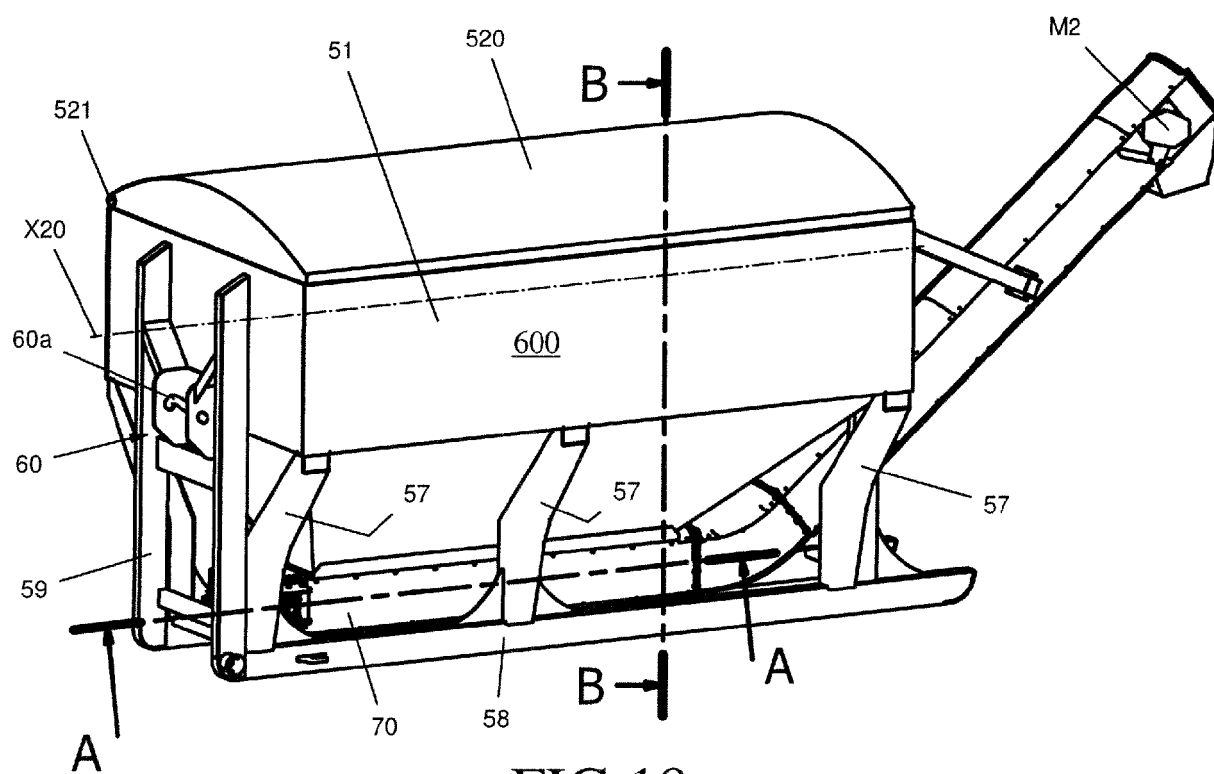


FIG 18

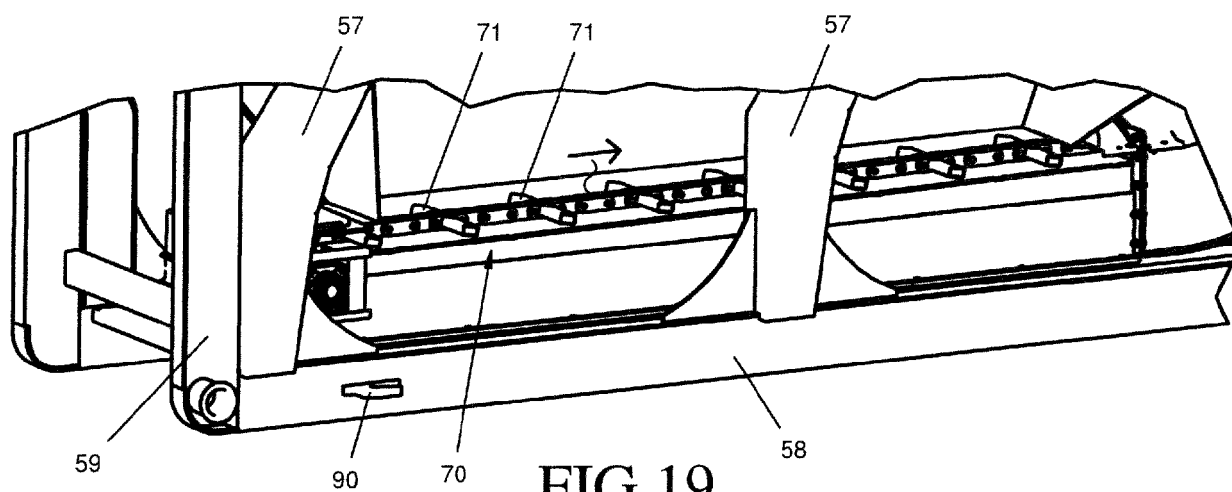


FIG 19

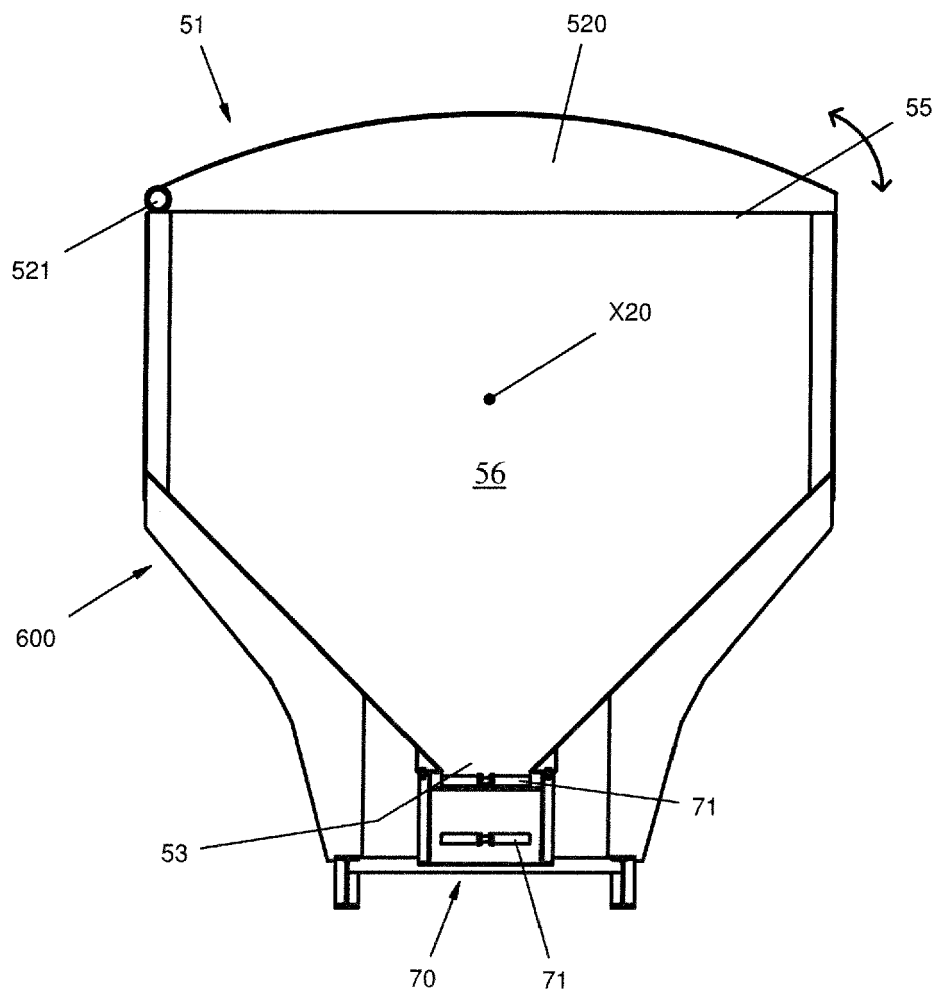


FIG 20



## EUROPEAN SEARCH REPORT

 Application Number  
 EP 19 20 8873

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Y A	US 2014/286739 A1 (HELMSDERFER JOHN A [US] ET AL) 25 September 2014 (2014-09-25) * paragraphs [0002], [0014], [0075], [0105], [0106] * * figures 16-19 * -----	1-13,15, 16 14	
Y A	WO 96/23108 A1 (NORDSTROEM GERT [SE]) 1 August 1996 (1996-08-01) * page 1, paragraphs 1,2 * * page 3, paragraph 2 * * page 4, lines 14-25 * * page 5, paragraph 3 * * page 6, paragraph 4 * * claims 1,11; figure 1 * -----	1-13,15, 16 14	TECHNICAL FIELDS SEARCHED (IPC) E01H E01C
A	DE 30 11 867 A1 (ELBA MASCHINENFABRIK KAISER GM [DE]) 27 May 1981 (1981-05-27) * page 3, paragraph 3-5 * * page 4, paragraphs 3,4 * * page 5, paragraphs 3,4 * * claims 1,4,5; figure 1 * ----- -/-	1-16	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 February 2020	Examiner Kremsler, Stefan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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A	US 4 491 275 A (HOLSWORTH HERBERT [US]) 1 January 1985 (1985-01-01) * column 1, lines 6-9,63-68 * * column 2, lines 21-26,57-60 * * column 3, line 54 - column 6, line 3 * * figures 1-9 *	1-16	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
Place of search <b>Munich</b>		Date of completion of the search <b>11 February 2020</b>	Examiner <b>Kremsler, Stefan</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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ON EUROPEAN PATENT APPLICATION NO.**

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82