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(54) Ship and method for the transport of containers and the like

(57) A ship (1) adapted for transport of containers and such packings, comprising a lifting device (12), which lifting device is arranged to lift the packings on board and off board over the bow (10) and/or the stern of the ship.

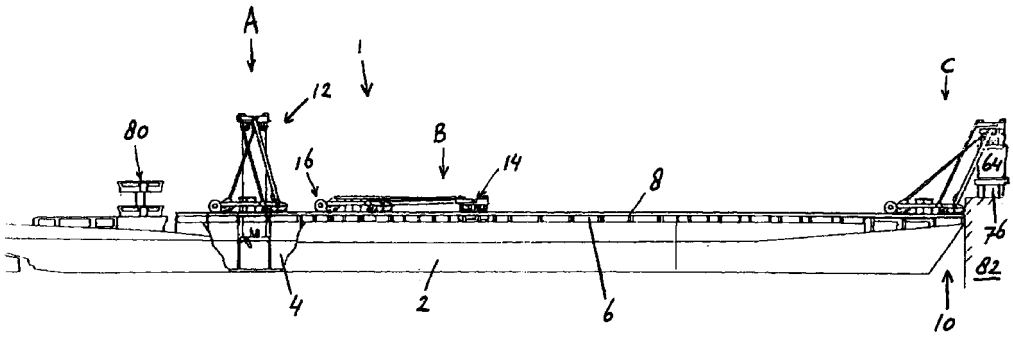

Fig.1

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Description

[0001] The invention relates to a ship adapted for the transport of containers and the like, in particular an inland ship.

[0002] For the transport of containers and the like on inland waterways inland vessels are used on which a number of containers are placed beside, behind and/or above each other in a cargo space. The containers are moved into and out of the cargo space over a side of the ship by means of a crane mounted in the loading and unloading place. Such a ship and the method used therewith have the drawback that loading and unloading of the containers is only possible in a loading and unloading place equipped with a crane as mentioned. This adversely affects the flexibility of transport, while, moreover, it is necessary to always man at least the crane, which is cost-increasing. A further drawback is that for loading and unloading the ship must be maneuvered with the long side near a quay, which is difficult and, moreover, requires relatively much quay space. Moreover, especially when containers are placed transversely, a crane with a relatively long arm will have to be used, which is relatively expensive and leads to undesirably great resulting forces. Moreover, maneuvering with the containers is thereby made considerably more difficult.

[0003] The invention relates to a ship of the type described in the opening paragraph, in which the above drawbacks are avoided while retaining the advantages thereof. To this end, a ship according to the invention is characterized by the features of claim 1.

[0004] By providing the ship according to the invention with its own lifting device for lifting the containers on and off board, the ship is prevented from being useful only between loading and unloading places provided with a crane adapted for loading and unloading containers. Furthermore, a lifting device adapted for loading and unloading containers over the bow and/or the stern of the ship has the advantage that the ship only needs to be moored with the bow or the stern directed to a quay, so that only relatively little quay space is required. Moreover, the effect thus obtained is that a number of ships can be moored side by side to the same quay without the ships directly depending on each other when mooring and sailing away. Furthermore, a ship with a lifting device according to the invention offers the advantage that maneuvering with the containers is relatively easy, both during loading and unloading and on board of the ship itself, for instance when displacing the cargo.

[0005] As referred to in this specification, a ship is at least a vessel, in particular used for inland navigation, whether or not provided with their own driving means.

[0006] In an advantageous embodiment a ship according to the invention is further is characterized by the features of claim 2.

[0007] Such a ship offers the advantage that the lifting device can be moved in the longitudinal direction of the ship between a container positioning place and the end of the ship along which the containers are to be brought on and off board. This readily prevents the necessity of providing the ship with arrangements for displacing the containers in the cargo space with respect to the ship and/or with respect to each other.

[0008] In a very advantageous further elaboration a ship according to the invention is further characterized by the features of claim 3.

[0009] The use of wheel sets for supporting and displacing the lifting device with respect to the ship offers the advantage that the displacements require relatively little force, while displacements can be carried out in a relatively simple and accurate manner. When displacing containers, in particular on and off board, the load on in particular the or each wheel set located near the quay will become relatively high as a result of the moments arising from the load and the relatively large arm of the force. In particular when the lifting device with the cargo hanging over the quay is completely swung out, it is possible that the load on the wheel sets directed to the quay will become unacceptably high. In order to take up this load in a simple manner, without requiring the use of very heavy constructions for the relevant wheel sets, supporting means are provided which, when the lifting device is swung out and the load is relatively high, transmit at least part of the resulting forces to the ship and thus relieve the wheels of the relevant wheel sets at least partly. Moreover, the supporting means can provide, at least contribute to, a stable positioning of the lifting device with respect to the ship, since the supporting means can at least partly prevent displacements of the lifting device in the longitudinal direction of the ship.

[0010] Prior to displacement of the lifting device in the longitudinal direction of the ship, in particular when the ship carries a container, the position of the lifting device will be adjusted, preferably such that the container, seen in top view, is substantially carried between the wheel sets of the lifting device, such that the supporting means are put out of use. It is thus readily possible again to move the lifting device in the longitudinal direction of the ship by means of the wheel sets.

[0011] In a further advantageous embodiment a ship according to the invention is further characterized by the features of claim 6.

[0012] The use of supporting arms positioned on both sides of the cargo space and carrying a supporting frame arranged between them offers the advantage that containers or such packings can be taken up between the supporting arms by means of the supporting frame and be displaced, whereby resulting forces and moments can be kept relatively small and, moreover, can be readily absorbed by the construction. Furthermore, this has the advantage that maneuvering with the containers can be carried out more easily, since rotations and swings of the containers can be prevented in a relatively simple manner. Because of the fact that by means of the supporting arms the supporting frame can

be brought to outside the contours of the ship, above, for instance, a quay or such positioning place, the containers can, moreover, be readily moved between this positioning place and a cargo space of the ship.

[0013] In a very advantageous embodiment a ship according to the invention is further characterized by the features of claim 7.

[0014] A lifting device as used with a ship according to the invention will, during use, have a relatively great height above the deck of the ship in order to create sufficient maneuvering space for the containers. This means that the overall height of the ship will become such that the ship could not pass, for instance, bridges with a relatively small headroom. By folding the lifting device to a position of rest relatively flat against the ship, the advantage is obtained that the headroom of the ship is substantially reduced without requiring disassembly of the lifting device after use. This makes the lifting device suitable for use at all times. In folded position the height of the lifting device above the deck is preferably approximately equal to or lower than the height of a possible deck superstructure.

[0015] In a further elaboration a ship according to the invention is further characterized by the features of claim 8.

[0016] In such an embodiment the at least one lifting arm, when folding the lifting device, is positioned close to the deck, and the main lifting means are also moved to near the deck, such that the line of action of the main lifting means will extend approximately parallel to the main lifting arm. This means that, if the main lifting arm should be moved by means of the main lifting means from the folded position to an unfolded position, in particular as regards the first part of this movement, the force to be produced by the main lifting means should be very great. This means that very heavy main lifting means should be used therefor, for instance a heavy cylinder with hydraulic means adapted thereto. Such a construction is relatively heavy, takes up much space and is, moreover, relatively expensive as regards purchase, use and maintenance.

[0017] In a lifting device of the present preferred embodiment an auxiliary lifting frame is provided with auxiliary lifting means, the lifting device in the folded position having a line of action which makes an angle with the line of action of the main lifting means. The start of the movement of the lifting device from the folded position can be supported or effected with these auxiliary lifting means in a relatively simple manner, and the auxiliary lifting means can be of relatively light construction. In fact, as a result of the favorable line of action of the auxiliary lifting means the at least one lifting arm can be relatively easily lifted somewhat from the folded position so far that the main lifting means can effect the further folding movement of the lifting device without requiring the main lifting means to be of very heavy construction.

[0018] In a further advantageous embodiment a ship according to the invention is further characterized by the features of claim 11.

[0019] By providing the ship near the end along which the containers are loaded and unloaded with a positioning place for a vehicle on which a container has to be placed or from which the container has to be taken up, the advantage obtained is that a ship according to the invention can be moored to quays of different types and other banks for loading and unloading containers. In fact, the relevant vehicles can be brought from the quay or bank onto the positioning place and be removed therefrom for loading and unloading the containers, which positioning place can bridge a space, if any, between the relevant end of the ship and an adjacent bank part to be traversed by the vehicle. By designing this positioning place as part of a lift, the further advantage obtained is that differences in height can also be bridged in a simple manner.

[0020] The present invention further relates to a method for the transport of containers, characterized by the measures of claim 12.

[0021] The invention further relates to a lifting device suitable and intended for use with a ship or a method according to the invention.

[0022] Further advantageous embodiments of a ship according to the invention are given in the subclaims. In explanation, practical examples of a ship and a method according to the invention will be further illustrated in the drawing in which:

Fig. 1 is a diagrammatic side view of a vessel according to the invention with a lifting device placed thereon in three different positions, namely a movable position, a lowered position, and a loading/unloading position;
Fig. 2 is an enlargement of the lifting device in the lowered position;
Fig. 3 is an enlargement of the lifting device in the movable position;
Fig. 4 is an enlarged side view of the lifting device in the loading/unloading position, with a trailer;
Fig. 5 is a front view of a lifting device with a container taken up;
Fig. 6 shows a part of a lifting device in an alternative embodiment, in the loading/unloading position with a container suspended therefrom;
Fig. 7 shows the lifting device of Fig. 6, in the lowered position;
Fig. 8 is a diagrammatic side view of a wheel set for use with a lifting device according to the present invention; and
Fig. 9 shows a front end of a vessel according to the invention, in an alternative embodiment.

[0023] In this specification similar or corresponding parts have similar or corresponding reference numerals.

[0024] A vessel according to present invention is particularly suitable for use as an inland ship but can, for

instance, also be used for coastwise navigation.

[0025] In the practical examples shown, a vessel is adapted for the transport of containers. It is, however, also possible to transport packings of another type or even bulk goods, provided the lifting device comprises suitable grabs or pick-up means.

[0026] Fig. 1 is a diagrammatic side view of a vessel 1, comprising a hull 2 which defines a cargo space 4, visible in the drawing through a partly removed ship's side. On both sides of the cargo space 4, a rail 8 extends on the deck 6 of the vessel 1. The rails 8 extend in the longitudinal direction of the vessel to near the bow 10. Placed on the rails 8 is a movable lifting device 12, which will be further described below. The cargo space 4 of the vessel 1 has such dimensions that, for instance, a standard container can be placed in the width between the walls of the hold 4, while two superposed rows of containers can be stored.

[0027] The lifting device 12 can be moved, in a manner to be further described below, between a movable condition, as shown in Fig. 1 on the left-hand side under A, a lowered position as shown in Fig. 1 in the middle under B and a loading/unloading position, shown in Fig. 1 on the right-hand side under C. The lifting device is supported on the rails 8 by means of a pair of front wheel sets 14 and a pair of rear wheel sets 16 and is drivable, preferably on the rear wheel sets, with known per se means not shown.

[0028] A lifting device 12, as shown in more detail in Figs. 2-5, comprises two base frame girders 18 extending parallel to each other and to the rails 8, which connect the front wheel sets 14 and the rear wheel sets 16 together. Provided near the front end 20, facing the bow, of each base frame girder 18 is a first pivoting point 21 with which a first lifting arm 22 of a main lifting frame 24 with a lower end 26 is attached. Provided at some distance behind the first pivoting point 21 is a second pivoting point 28 with which the lower end 30 of a supporting arm 32 is pivotally connected. The upper ends 34, 36 of respectively the first lifting arm 22 and the supporting arm 32 are connected to the side of a supporting frame 42 in respectively a third pivoting point 38 and a fourth pivoting point 40. The length of and the mutual distance between the first lifting arm 22 and the supporting arm 32 are selected such that the first lifting arm 22, the supporting arm 32, the base frame girder 18 and the supporting frame 42 form a parallelogram construction with the lifting arm and the supporting arm as well as the base frame girder 18 and the supporting frame 42 extending parallel to each other. The movement of the first lifting arm 22 and the supporting arm 32 will therefore move the supporting frame 42 with respect to the base frame girder 18, and the supporting frame 42 will maintain a position parallel to the deck 6.

[0029] Provided near the rear end 44 of the base frame girder 18 is a fifth pivoting point 46 with which the lower end of the operating arm 48 of the main lifting means 50 is pivotally attached. The upper end 52 of the operating arm 48 is pivotally attached in a sixth pivoting point 54 which is arranged at some distance below the upper end 34 of the first lifting arm 22. The operating arm 48 comprises a main operating cylinder 56 with which the distance between the fifth pivoting point 46 and the sixth pivoting point 54 is adjustable. A change of the length of the main operating cylinder 56 provides movement of the supporting frame 42 between the lowered position B, as shown in more detail in Fig. 2, the movable position A, as shown in more detail in Fig. 3 and the loading/unloading position, as shown in more detail in Fig. 4. It will be clear that on both sides of the vessel 1 are provided a main lifting frame 24, main lifting means 50 and a base frame girder 18 with front and rear wheel sets 14, 16, connected together through a substantially rectangular supporting frame 42.

[0030] Arranged near each of the corners of the supporting frame 42 is one of the four main hoisting winches 56, each provided with a hoisting cable 58 which is connected with a free end 60 to a so-called spreader 62, with which a container 64 can be gripped at the upper end. Such a spreader 62 is known to those skilled in the art. On the other hand, other gripping means may of course be used too. By means of the hoisting winches 56 the container 64 can be taken up and moved in the vertical direction. By means of independent control of the four hoisting winches with respect to each other the position of the container 64 can always be adjusted, for instance depending on the vessel 1 rolling or canting to one side. As appears from particularly Fig. 6, the hoisting winches 56 are suspended from the supporting frame 42 by means of sleeves 68, such that the hoisting winches 56 can be moved along the supporting frame 42 in a direction normal to the longitudinal direction of the vessel 1. Arranged at the upper side of the supporting frame 42 are a number of hydraulic cylinders 70 which, on the one hand, are connected to the supporting frame 42 near the middle 72, seen in the transverse direction, of the supporting frame 42, while the opposite ends 74 are connected to the respective sleeves 68 to obtain the desired lateral movement of the hoisting winches 56. Thus a container 64 can always in a very accurate manner, in cooperation with the independent control of the hoisting winches, be placed in the cargo space 4 of the vessel or taken up therefrom and placed on a vehicle like a trailer 76 removed therefrom, as will be further explained below.

[0031] A vessel according to the invention can be used as follows.

[0032] The lifting device 12 is moved to a position B, at a distance from the bow 10, and is lowered there by means of the main lifting means 50. To this end, the main operating cylinder 56 is maximally extended, such that the supporting frame 42 is moved to near the deck, with the hoisting winches 56 being positioned at least partly between the rails 8. The main operating cylinder 56 then extends approximately horizontally, parallel to

the rails 8, while the first lifting arm 22 and the supporting arm 32 also lie substantially flat. This lowered position is shown in Fig. 2. In this position the overall height H_1 of the lifting device above the deck 6 is minimal and at least smaller than, for instance, the height of the deck superstructure 80, such as a pilothouse or the like. This ensures that the vessel can cover its usual itinerary and suitably pass bridges and the like.

[0033] As shown in Fig. 1, the vessel 1 can be navigated with the bow 10 to near or against a quay 82 to enable the loading and unloading of containers 64. The lifting device 12 is brought there to the movable position by means of the main operating cylinder 56, as shown in position A and in more detail in Fig. 3. In this position the supporting frame 42 extends, seen in top view, between the front wheel sets 14 and the rear wheel sets 16, whereby a favorable distribution of the forces acting on the rails 8 is obtained. By means of the hoisting winches 56, the hoisting cables 58 and the spreader 62 a container 64 can be gripped in the hold and hoisted therefrom, the position of the container 64, as described, being adjustable to the position of the lifting device, at least of the vessel 1. On each side of the lifting device 12 are arranged on the base frame girder 18 two clamping devices 84 which can engage below a flange 86 of the rail 8, which is suitably placed on, for instance, a C- or I-shaped section 88. During the vertical movement of the container and during the loading and unloading of the containers to be explained below, the clamping devices 84 can be tensioned, such that they firmly engage against the flange 86. Thus the lifting device is fixed on the rails 8, such that it cannot be moved or cannot tilt. Thus the safety and the ease with which the lifting device 12 can be used is considerably increased.

[0034] After a container 64 has been hoisted to above the deck 6 by means of the lifting device, the clamping devices 84 are released and the lifting device 12, together with the container 64, is moved along the rails 8 to the bow 10. Near the bow 10 a trailer 76 is positioned on the quay 82 to take over the container 64. The lifting device is fixed again near the bow in position C by means of the clamping devices 84, after which the supporting frame 42, together with the container 64, is maneuvered to beyond the bow 10, that is to say to above the relevant trailer 76. To this end, the main operating cylinder 56 is operated, such that it is extended. The parallelogram construction of the main lifting frame 24 ensures that the supporting frame 42 maintains its substantially horizontal position. Again, by means of the independently controllable hoisting winches 56 and/or the cylinders 70 and/or the main lifting means 50 the container 64 can be accurately positioned, so that placement on the trailer 76 is readily possible.

[0035] In the loading/unloading position C shown in more detail in Fig. 4, in which the container 64 is positioned above the trailer 76 by means of the lifting device 12, relatively great forces and moments will occur. In particular the load on the front wheel sets 14 will be very high. In a very advantageous embodiment, as particularly shown in Figs. 6-8, the front wheel sets 14 are therefore designed such that when exceeding a limit load a frame part can receive support from the rails 8, thus at least partially relieving the wheels 90 of the front wheel sets 14. A very advantageous embodiment of such a wheel set 14 is shown in more detail in Figs. 6-8. In this embodiment each front wheel set 14 comprises a frame plate 92, firmly connected to a base frame girder 18 in which a front pivot 94 and a rear pivot 96 are provided. Attached to each pivot 94, 96 is a pivoting wheel frame part 98 having a substantially triangular form. Positioned at the front wheel frame part 98a is the pivot 94 in the, during use, lowest point thereof, while a wheel axle 100a of the wheel 90 is arranged near the end 102a thereof directed forwards. Attached at the rear wheel frame part 98b is the wheel axle 100b near the end 102b thereof directed backwards. The parts 104a, 104b directed to each other, located above the pivots 94, 96 during use, are connected together by a relatively rigid spring 106. This means that when a force is exerted on the relevant base frame girder 19 in substantially vertical downward direction the frame plate 92 is pushed away downwards with respect to the wheels 90. The wheel frame parts 98a, 98b will then pivot about the pivots 94 and 96, respectively, such that the spring 106 is compressed. When the vertical force F is sufficiently great, the bottom 108 of the relevant frame plate 92 will begin to receive support from the top of the rails 8, such that a part, preferably the greater part of the relevant force F, is directly transmitted to the rails 8 by the frame plate 92, thereby relieving the wheels 90 at least for the greater part. The spring 106 will then have to be selected such that during normal load on the lifting device 12, at least in the movable position as shown in Fig. 3b, the bottom 108 of the frame plate 92 is clear of the rails 8, while in the loading/unloading position C the relevant force F exceeds a limit value and the frame plate 92 can receive support from the rails. Optionally, in addition to or instead of the spring, other force-absorbing means, for instance hydraulic means, may be used so that limit values are adjustable. An important advantage of such a wheel set 14 is that the wheels 90 and the bearings thereof can be of relatively small and light construction without causing risk of damage.

[0036] During unloading of the containers the lifting device 12 will always be brought from the loading/unloading position C to the movable position, be moved to above a container to be displaced and be fixed there with the clamping means 84, after which the relevant container 84 can be taken up and moved to a trailer in the manner described before. During loading of containers these operations are of course carried out in reverse order. With the lifting device 12 a container can also be displaced or replaced within the vessel. After use, the lifting device can be readily brought to the lowered position B. An important advantage of a vessel 1 according to the invention is that it needs to be moored

to a quay or the like only with the bow, whereby only a small length of a quay is necessary. Moreover, containers and such packings can also be loaded and unloaded in places where no suitable harbor infrastructure is present, in particular where no quay crane is available. It will be clear that in a comparable manner a vessel can be designed in which loading and unloading over the stern of the vessel is possible, optionally both over the bow and over the stern.

[0037] Figs. 6 and 7 show a part of a lifting device 12 according to the invention, in an alternative embodiment. An auxiliary lifting frame 110 is then provided. This auxiliary lifting frame 110 comprises a second lifting arm 112 which is connected to a first end 114 at a seventh pivoting point 116 arranged at some distance above the first pivoting point 21, while at the opposite end 118 a supporting foot 120 or roller is provided by means of a pivot 122. The purpose thereof will be further described below. Furthermore, the auxiliary lifting frame 110 comprises a second operating arm 124, equipped with, at least shaped as an auxiliary operating cylinder 126. The second operating arm 124 is with an upper end 128 pivotally connected in an eighth pivoting point 130 to the first lifting arm 22, near the upper end thereof, approximately opposite the sixth pivoting point 54. The lower end 132 of the second operating arm 124 is connected in a ninth pivoting point 134 to the second lifting arm 112, at a small distance from the supporting foot 120. Such an auxiliary lifting frame 110 can be used as follows.

[0038] In the lowered condition shown in Fig. 7 the auxiliary operating cylinder 126 is drawn in, such that the foot 120 receives support from the top of the rail 8. The line of action W_1 of the auxiliary operating cylinder 126, that is to say the line in which it can substantially transmit forces, then makes an angle α with the line of action W_2 of the main operating cylinder 56. At the start of the movement of the lifting device 12 from the lowered position B to the movable position A or the loading/unloading position C the auxiliary operating cylinder 126 is energized such that it is extended, whereby in a favorable direction a force is exerted on the first lifting arm 22 with a vertical component S_1. The effect thus obtained is that relatively light cylinders 56, 126 are sufficient for moving up the lifting device 12 from the lowered position. When the auxiliary operating cylinder 126 has reached its maximum length, the first lifting arm 22 makes an angle β with the horizontal, such that the force to be applied by the main operating cylinder 56 for further raising the lifting device 12 is relatively small. When moving the lifting device 12 further to the movable position A, the supporting feet 120 are released from the rails 8 and may optionally be drawn in to a position substantially against the first lifting arm 22. When lowering the lifting device 12, the supporting feet are returned to the position as shown in Fig. 6, such that the last part of the movement of the lifting device to the lowered position is controlled at least partially and taken up by operating the auxiliary operating cylinder 126. A lifting device 12 as shown in Figs. 6 and 7 may thus be of relatively simple and light construction without adversely affecting the lifting power of the lifting device 12.

[0039] Fig. 9 shows the front end of a vessel 101 according to the invention, with a lifting device 130 being provided near the bow 10. This lifting device 130 comprises a platform 132 on which a trailer 76 can be placed. By means of the lifting device 12 a container 64 can be placed on the trailer or removed therefrom in the manner as described before. With such a lifting device the advantage is obtained that containers and such packings can also be loaded and unloaded at quays or the like that are of such construction that the trailer 76 could otherwise not reach the bow 10 of the vessel 1, 101, for instance because the quay has a plane inclined towards the water, is too low or too high or, for instance, unsuitable for taking up the load from a trailer with cargo. During use, a trailer 76 can be driven onto the platform 132, a container can be placed on the trailer or removed therefrom, after which the trailer can drive away from the platform 132 again. The lifting device 130, at least the platform 132, can preferably be turned away or removed. Of course, a fixed platform arranged at a suitable height, at least a platform 132 without a lifting device, may also be used.

[0040] The invention is in no way limited to the practical examples shown in the specification and the figures. Many variations thereof are possible within the scope of the invention as defined in the claims.

[0041] Thus, a vessel according to the invention may be of different design, for instance without a deck superstructure and without a drive of its own, such as, for instance, a tug-pushed dumb barge. Moreover, the cargo space may be adapted to take up containers or the like in another way, for instance in only one or, on the contrary, several layers. Furthermore, a lifting device according to the present invention may comprise hoisting means of another type, for instance hoisting winches coupled together or the like. Different means for gripping containers or such packings may be provided in addition to or instead of the spreader. Moreover, the wheel sets, for instance, may be of different design and other means may be provided to fix the lifting device in a selected position, for instance by designing one of the wheel sets such that wheels run on different sides of a rail, while confining the relevant rail. A lifting device according to the present invention may be provided both in a newly built and in a renovated vessel, which is economically advantageous. Furthermore, the construction of the lifting device may of course be adjusted, for instance by means of another positioning of the main lifting frame and the main lifting means with respect to each other and with respect to the supporting frame. These and many comparable variations are deemed to fall within the scope of the invention defined by the annexed claims.

Claims

1. A ship adapted for the transport of containers and such packings, comprising a lifting device, which lifting device is arranged to lift the packings on and off board over the bow and/or the stern of the ship.

2. A ship according to claim 1, wherein guide means are provided for moving the lifting device at least along a part of the ship in the longitudinal direction thereof, wherein the lifting device comprises at least one arm for taking up a packing, wherein at least a part of the at least one arm together with the relevant container is movable to outside the ship.

3. A ship according to claim 2, wherein the guide means comprise a pair of first and a pair of second wheel sets for carrying and moving the lifting device, wherein at least one pair of wheel sets is of such construction that at least during use of the lifting device for carrying a packing outside the ship the wheels are at least partially relieved by means of supporting means.

4. A ship according to claim 3, wherein the supporting means comprise a part of the wheel frame of the relevant wheel sets, wherein the relevant wheel frames each comprise at least two wheel frame parts pivoting with respect to each other, wherein power means are included between the relevant wheel frame parts for causing, at least allowing the wheel frame parts to pivot at a load on the relevant wheel set above a selected value, such that at least a part of at least one of the wheel frame parts receives support from the ship, while at a smaller load of the relevant wheel set only the wheels receive support from the ship.

5. A ship according to claim 4, wherein the power means comprise spring means.

6. A ship according to any one of the preceding claims, wherein the lifting device comprises at least two supporting arms arranged on both sides of a cargo space, which supporting arms carry a supporting frame and are movable by means of lifting means, wherein the supporting frame can extend above the cargo space at least during use to place a packing therein or take it therefrom and can be moved by the supporting arms at least partly to outside the ship to place a packing on a quay or the like or take it therefrom.

7. A ship according to any one of the preceding claims, wherein lifting device can be folded into a position of rest relatively flat against the ship.

8. A ship according to claim 7, wherein the lifting device comprises a main lifting frame having at least one lifting arm and main lifting means for movement of the at least one lifting arm and an auxiliary lifting frame with auxiliary lifting means, wherein the main lifting means have a line of action which when the lifting device is folded runs approximately parallel to the at least one lifting arm, wherein the auxiliary lifting means have a line of action which when the lifting device is folded makes an angle with the line of action of the main lifting means.

9. A ship according to claim 8, wherein the main frame comprises at least one first lifting arm and a first operating arm pivotally connected thereto, provided with a main operating cylinder extending in the longitudinal direction thereof, wherein the associated auxiliary lifting frame comprises a second lifting arm and a second operating arm, which second lifting arm comprises an auxiliary operating cylinder, wherein when the lifting device is folded the at least one main lifting arm and the relevant first operating arm extend approximately parallel to each other, while the direction of adjustment of the auxiliary operating cylinder makes an angle with the direction of adjustment of the main operating cylinder.

10. A ship according to claim 9, wherein the second lifting arm is connected with a first end to the main lifting arm, at a distance from at least a lower end thereof, while the opposite end of the second lifting arm comprises guide means, in particular rollers for supporting against the ship, at least during a first phase of the lifting from the folded position.

11. A ship according to any one of the preceding claims, wherein near the bow and/or the stern of the ship a positioning place, in particular a lift is provided for positioning a vehicle, wherein the lifting device is arranged to place containers and the like on the vehicle and take them from the vehicle.

12. A method for the transport of containers, wherein successively:

- a lifting device on a ship is raised from a position folded against the deck of the ship;
- containers are taken up from a quay or a vehicle positioned thereon by means of the lifting device and are brought over the bow or the stern of the ship on board of the ship and positioned in a cargo space;
- the lifting device is returned to the folded position and the ship with the lifting device and the containers is moved to an unloading place;
- the lifting device is raised again from the folded position near the unloading place and containers are taken up from the cargo space and are

positioned on a quay or a vehicle over the bow or the stern.

13. A lifting device, suitable and intended for use with a ship according to any one of claims 1 - 11 or a method according to claim 12.

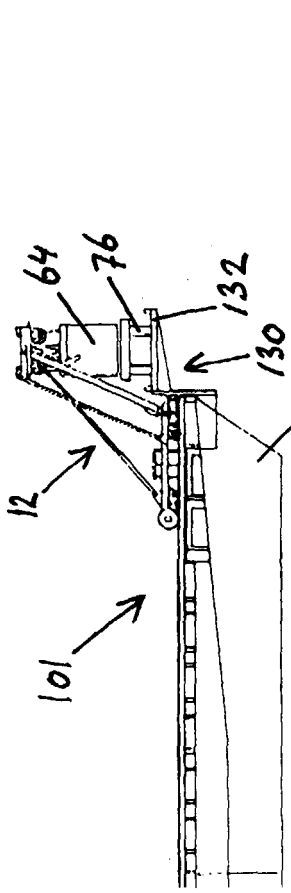

FIG. 9

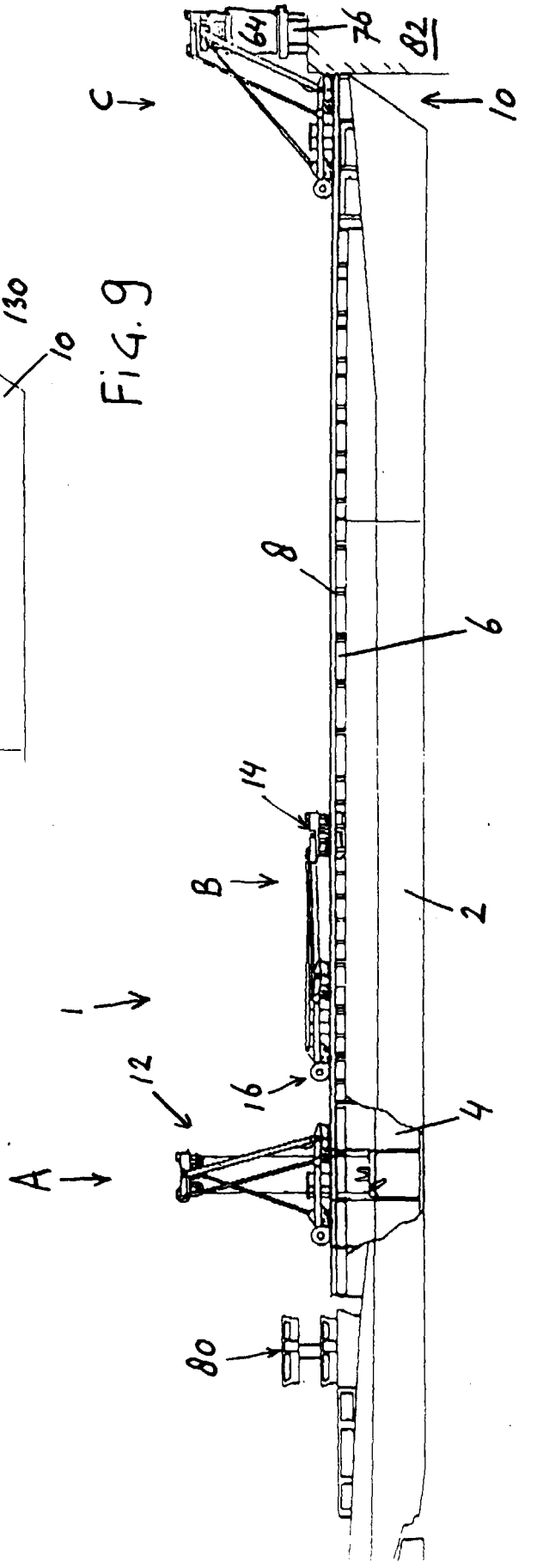

FIG. 1

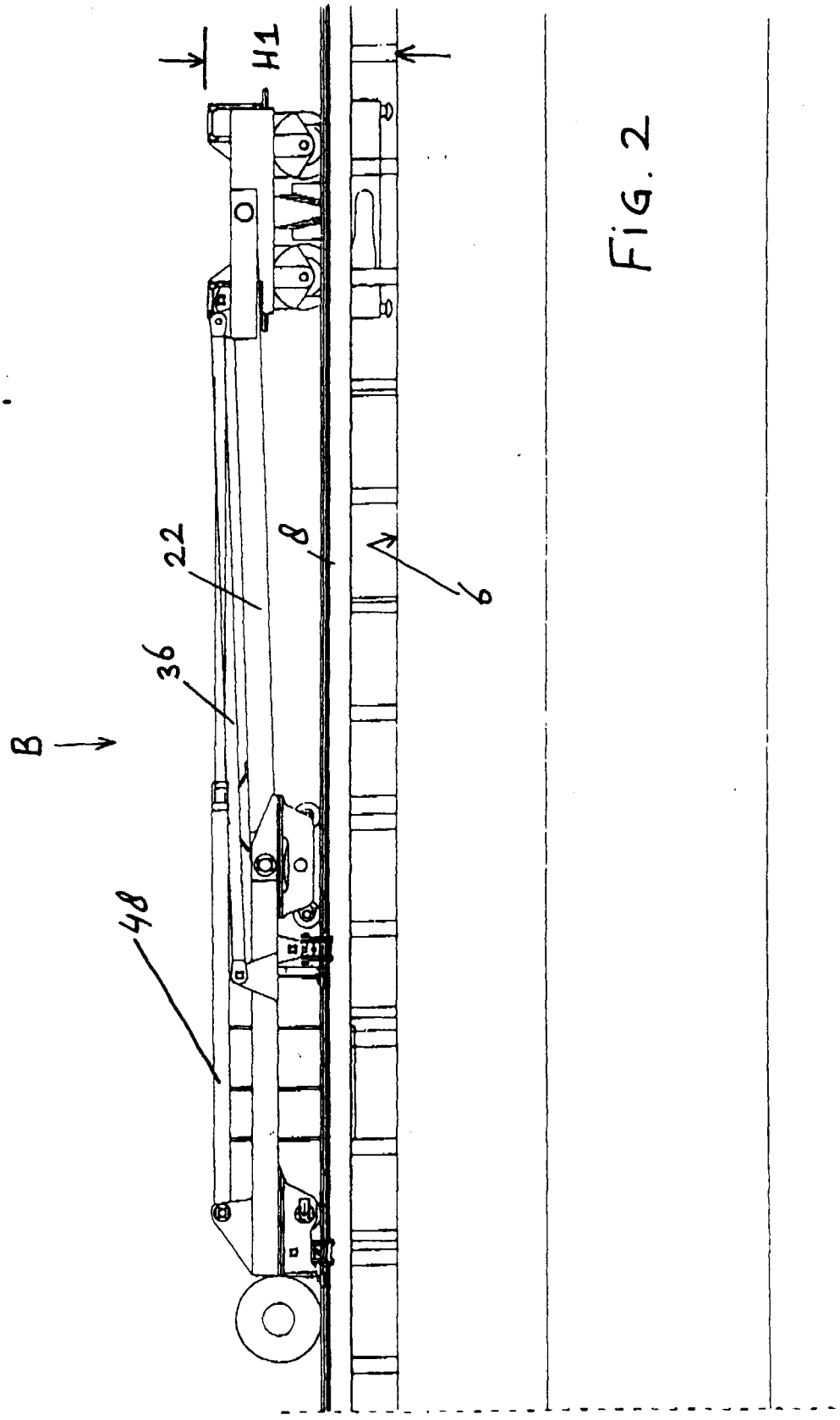

Fig. 2

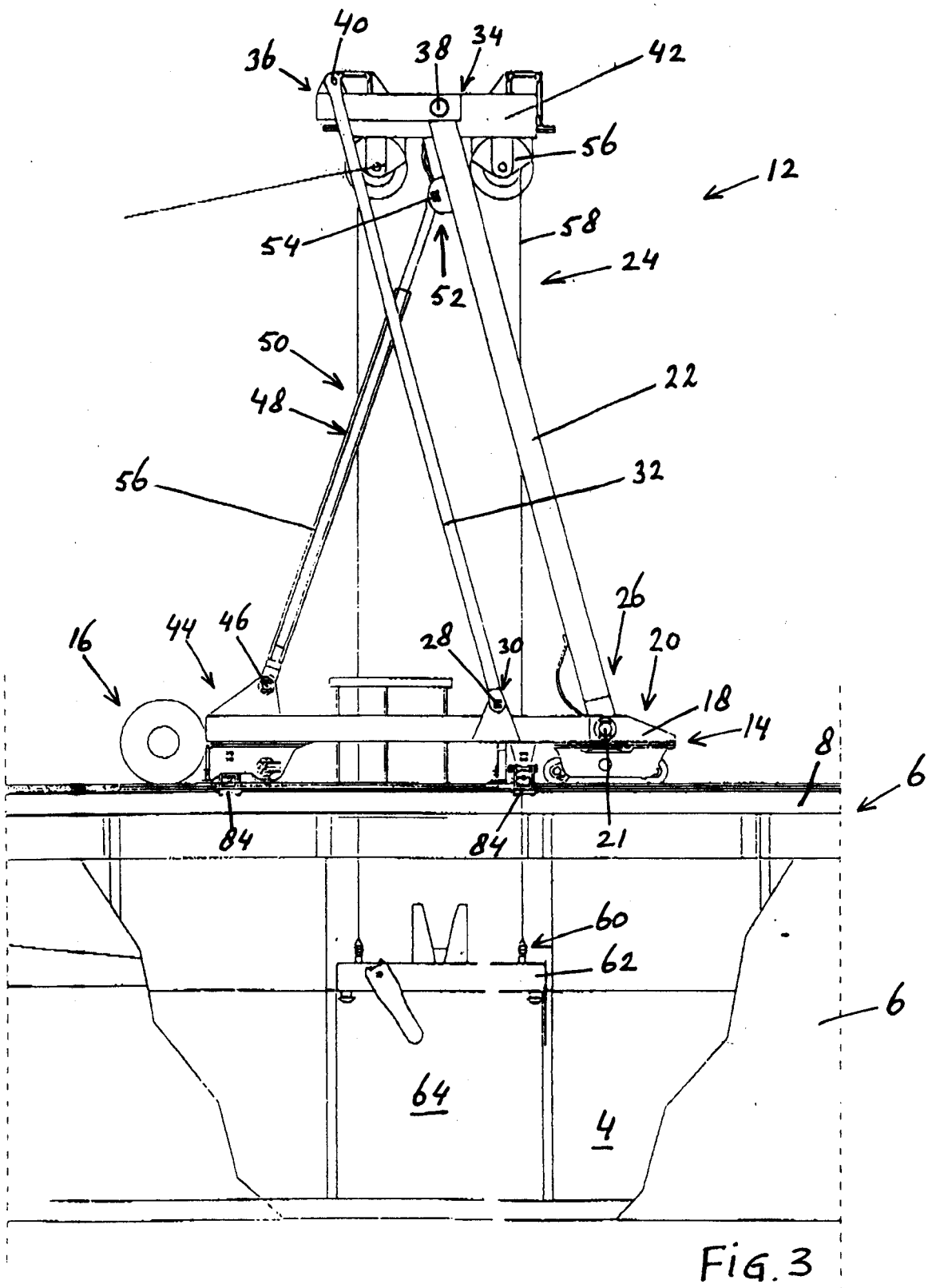
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Fig. 3

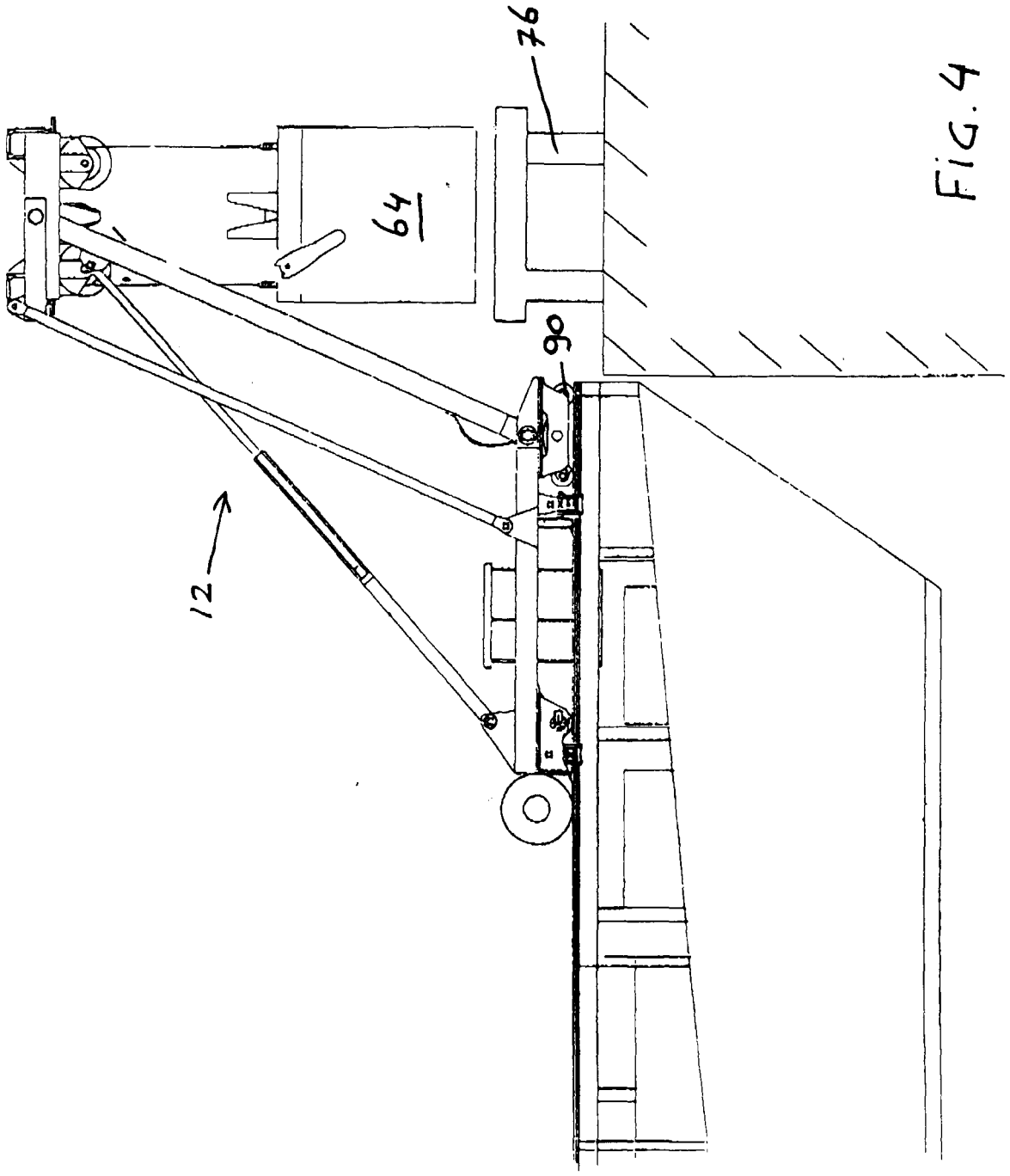

FIG. 4

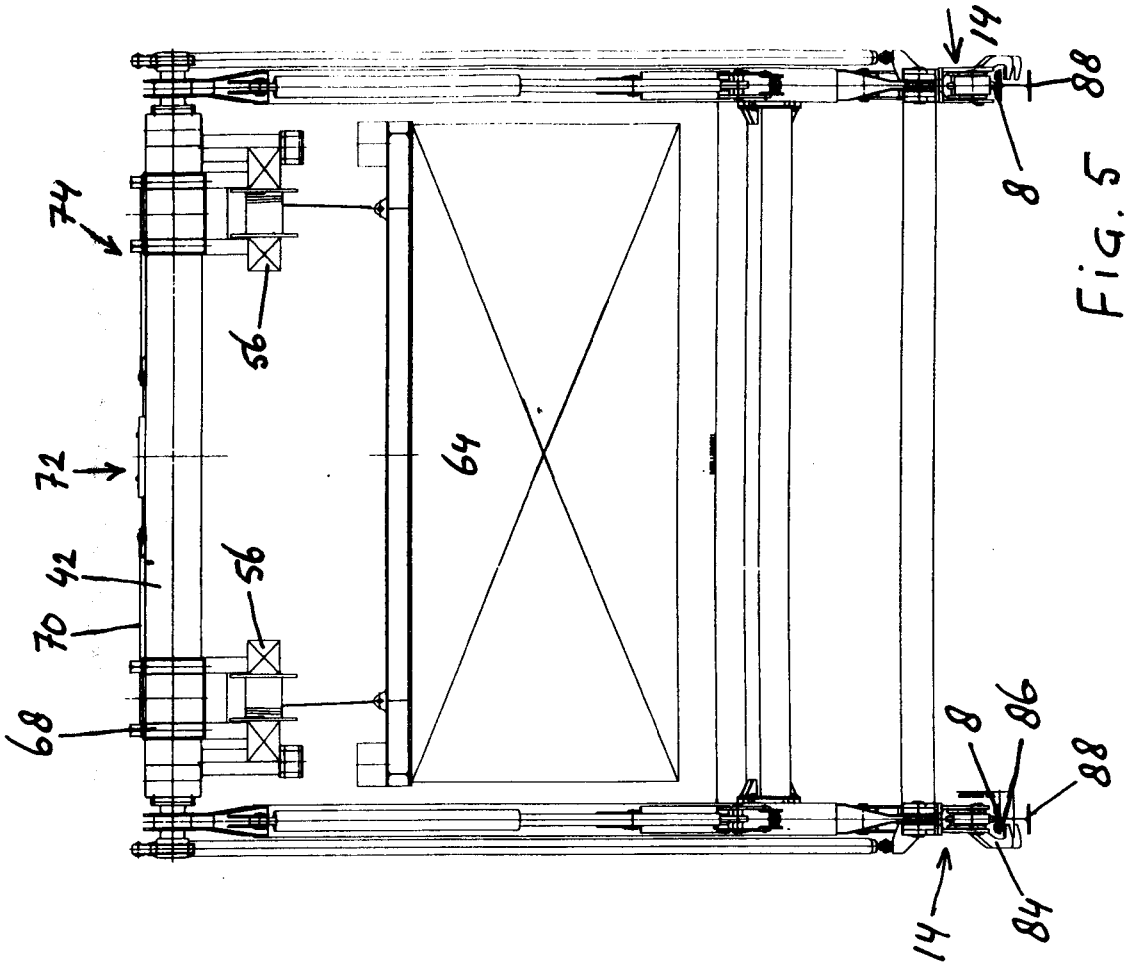
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Fig. 5

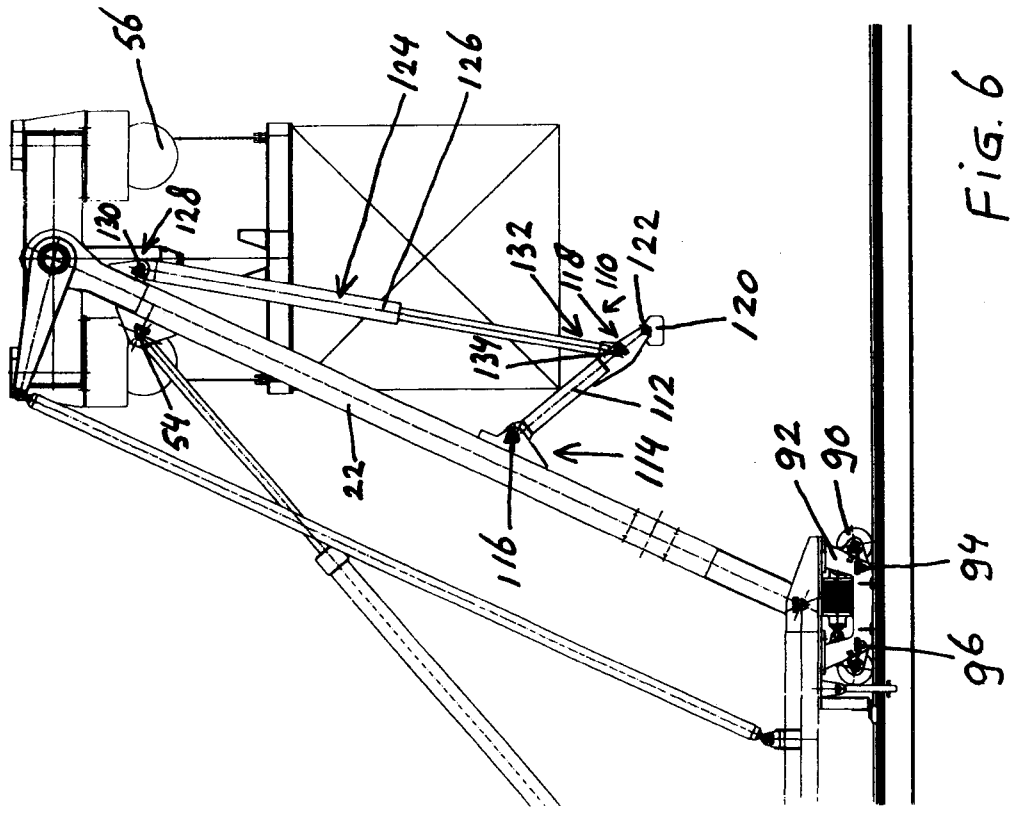
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Fig. 6

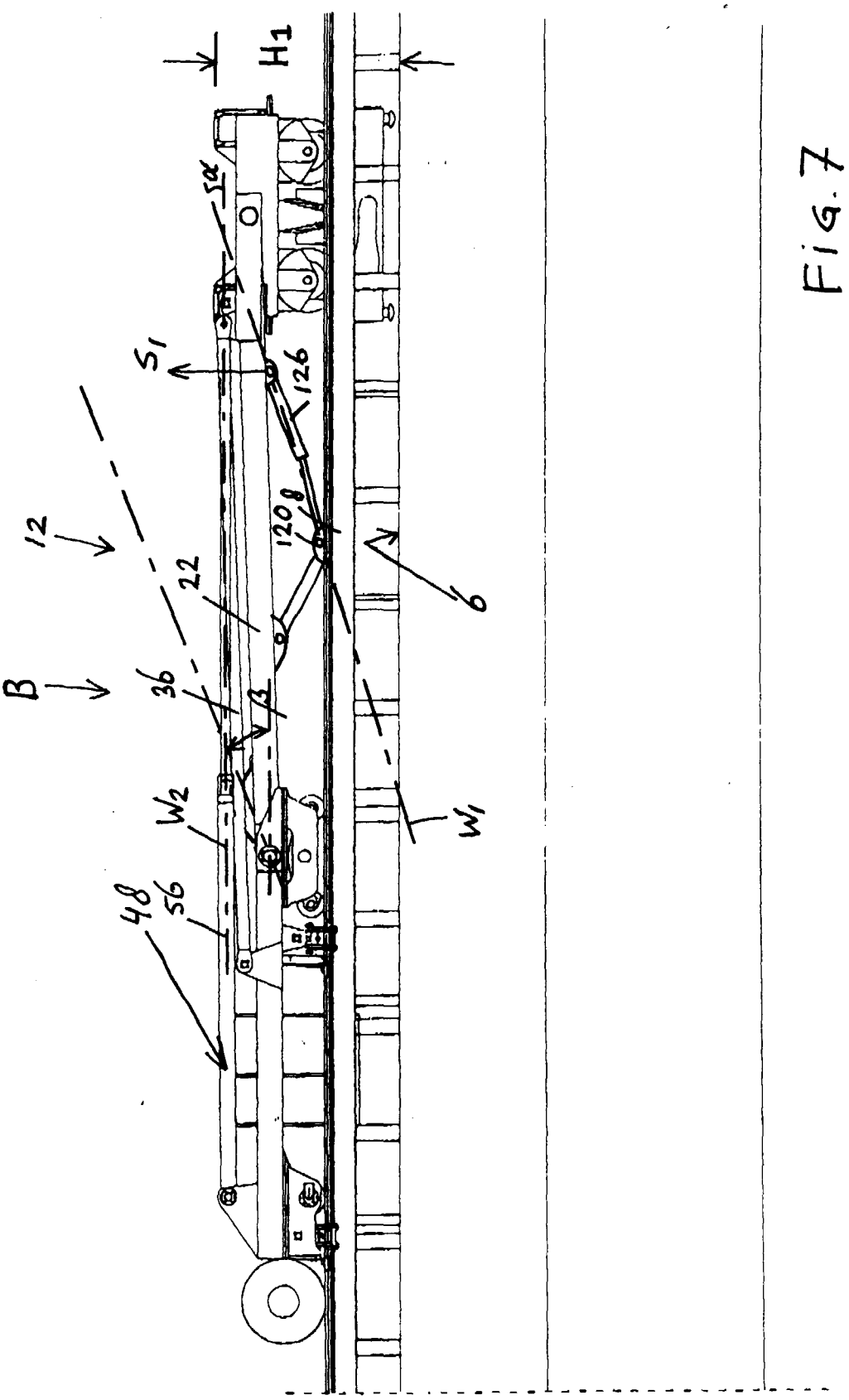

Fig. 7

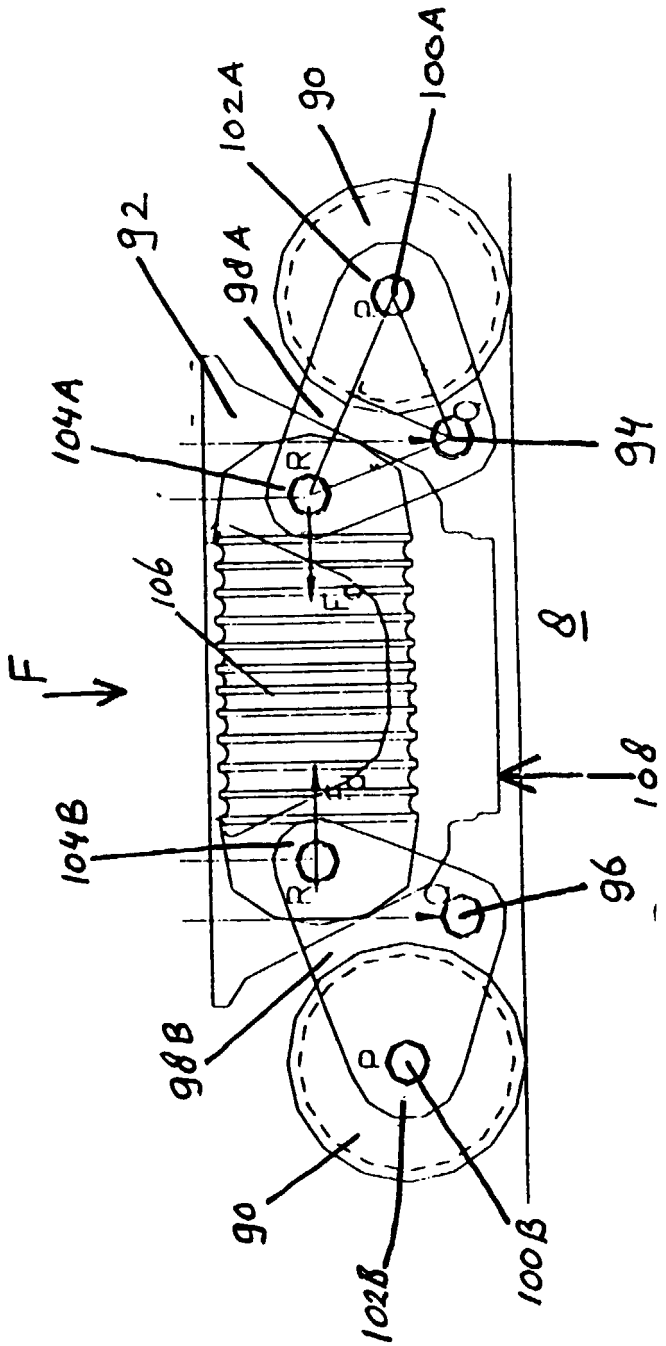

FIG. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 20 2223

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B63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 October 1999	DE SENA HERNAND.., A

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