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(54) Device and method for supplying and filling bags

(57) A description is given of a device for supplying bags and filling them with bulk goods, comprising a storage station (2) which is arranged for hanging, in said storage station, a stock of bags (Z) on bag supports (5) which can be moved by means of drive members (6), a transfer member (3) which is arranged to take over the bags hanging from the bag supports (5) and open the bags, a filling station (4) where the open bags are filled

after which they are carried away. The movements performed by the drive members (6) to move the bag supports (5), and the movements by which the transfer member (3) takes over the bags and opens them all are rectilinear and substantially parallel movements in the same direction. By virtue thereof, the device and the method are both simple, and the device can be manufactured and operated at lower cost.

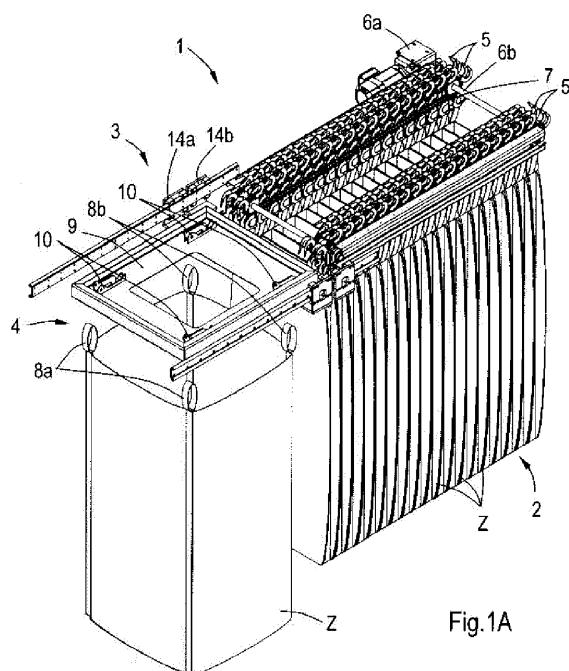


Fig. 1A

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Description

[0001] The present invention relates to a device for supplying and filling bags, and to an associated method.

[0002] Such devices are known and are used to fill bags, such as so-termed big bags, which are comparatively large bags having a large filling hole surrounded by generally four handles or carrying straps. After they have been filled, the bags are carried away.

[0003] A device and a method which are known in the art make use of a -jointed- robot which is capable of controlled spatial manipulation. This robot grips bags which have been put ready, moves them to a filling station, holds the bags open so that they can be filled, and then moves them away, after which a subsequent bag can be filled. This imposes high demands on the manipulators and the joints in such a robot.

[0004] The known device has the additional drawback that both the initial cost and the operating cost are high.

[0005] It is an object of the present invention to provide an improved method and device for supplying bags and filling them, which can be manufactured at a lower cost price and is less labour-intensive.

[0006] This object is achieved by means of the device according to claim 1 and the method according to claim 8.

[0007] The device according to the invention enables a basic, functional construction of successive sub-trajectories with respect to a storage station for the bags to be supplied, a transfer member which takes the bags from the storage station before moving the bags along and opening the bags, and a filling station, which in practice can be readily assembled in a single frame. This leads to short, straight trajectories, which eventually results in a lower cost price. This is also advantageous for the operating figures, because the method can be automated to a very large extent, and only one person is required to occasionally hang a supply of hung-out and semi-folded bags on the bag supports, like clothes in a wardrobe. Subsequently, said worker, whose presence is not permanently required, can perform other duties, since it is not necessary, for example, for him to open the bags which he hangs on the bag supports, because this takes place automatically when using this device and this method.

[0008] An additional advantage resides in that no complex combinations of control and drive mechanisms with many degrees of freedom are required for the implementation of the invention, because only simple, substantially rectilinear movements have to take place which require only linear drive means. In practice, this leads to simple construction elements in the device according to the invention, such as, for example, straight rail guides, linear actuators and rectilinearly movable conveyors.

[0009] The simplicity of the necessary rectilinear movements additionally enables a faster, shorter method to be achieved having a higher output of filled bags.

[0010] An advanced embodiment of the device according to the invention is characterized in that the filling sta-

tion comprises a framework which is provided with hooks on the lower side thereof, and in that the transfer member is arranged to take over the bags hanging from the bag supports and move them to the filling station and hang them on the hooks.

[0011] This has the advantage that while the bag is being filled, the respective running gear or framework can at least partly reverse its motion already to take over a next bag from the storage station. This saves time, resulting in a reduction of the time that passes before the device can put ready a next bag to be filled.

[0012] The invention will now be explained in greater detail with reference to the figures mentioned below, in which corresponding parts are indicated by means of the same reference numerals. In the Figures:

Figures 1A and 1B show, respectively, perspective views of an embodiment of a device according to the invention, which comprises, in the filling station, a framework and an overall system in which the device is applied;

Figures 2A and 2B show an embodiment of a device according to the invention, which is devoid of such a framework;

Figures 3A and 3B show a detail of a transfer member to be used in the device according to the invention as shown in figures 1A and 1B; and

Figures 4A and 4B show details of a running gear to be used in the embodiments of figures 1A, 1B, 2A and 2B.

[0013] Figures 1A, 1B, 2A and 2B show a device 1 by means of which bags Z, for example so-termed big bags, can be filled with bulk goods. The device 1 comprises, in succession, a storage station 2, a transfer member 3, and a filling station 4, which are preferably all assembled in one frame. The storage station 2 has bag supports 5 which are coupled to drive members 6. It is shown that said drive members 6 are formed, in this case, by an

electromotor 6a which drives, via a driving shaft 6b connected thereto, endless chain conveyors 7. Other types of conveyors, such as belt conveyors, are also applicable. The bag supports 5 on which the bags Z hang are suspended from the chain conveyors 7 by which they are to be moved. The bags Z being hung on the bag supports 5 hang out in the longitudinal direction but in the transverse direction they are in a compact partly folded-flat state. In this case, the bag supports hang in 2 x 2 rows which can be independently driven, because in this case

the bags Z can each be moved via the two front carrying straps 8a and the two rear carrying straps 8b, to the front side of the storage station 2 by means of separate conveyors 7.

[0014] On said front side there is provided the transfer member 3. Said transfer member 3 takes over the front bag Z from the bag supports 5, in a manner which will be described in greater detail hereinbelow, and thereby opens the bag. Figure 1A shows a representation of the

device 1 which, at the location of the filing station 4, comprises a fixed framework 9 below which the bag Z is placed by the transfer member 3, said bag being hung in pivotably movable strap carriers 10 projecting from the lower side of the framework 9. In this position, the bag Z is filled from a silo or supply belt, not shown, arranged above the bag in the filling station 4.

[0015] Figure 1 B shows the overall system, wherein in this case the filled bag Z is placed on a transversely positioned conveyor belt 11 in the filling station 4, allowing it to be carried away from the filling station 4 after the carrying straps 8a, 8b have been detached.

[0016] Figures 2A and 2B show a frameless embodiment. Analogous to the embodiment shown in figures 1A and 1B, the transfer member 3 is provided with a guide system 12 arranged above the bags, in which a rectilinearly movable, controllable running gear 13 is provided. Said running gear 13 comprises two separately movable transverse sections 14a, 14b on which respective pin supporting arms 15 having pivotably controllable pins or forks 16 are mounted.

[0017] The operation of the device 1 is as follows. After, in the manner explained hereinabove, the front and rear carrying straps 8a and 8b have each been manually hung on their respective row of driven bag supports 5 and individually moved forward by the respective conveyors 7, the -hook-shaped- bag supports 5, which are open on one side, rotate upwards. Before the bag supports completely swing aside in an upward direction, first the two front carrying straps 8a are taken over by fork 16 of a first set of pivotable pin supporting arms 15 of the transverse section 14a moving in combination with said pin supporting arms. This is best visible in figures 3A and 4A. Then the transverse section 14a moves forward in a straight line in the figures, causing the bag Z to be opened. Subsequently, when the bag supports 5 on which the rear carrying straps 8b hang swing aside in an upward direction, said carrying straps 8b are taken over by the second set of pin supporting arms 15 which are mounted on the second transverse section 14b. As, in practice, the weight of the bulk goods in the bag may be very substantial, the bag preferably hangs on four pin supporting arms 15 and, in general, is also supported by a base when being filled in the filling station 4. This base may be part of an elevator L which vertically moves as a function of the degree of filling and/or the weight of the bag which is being filled. In principle, it is possible to fill the bag Z when it only hangs on two bag supports and a set of pin supporting arms 15.

[0018] Referring back to the embodiment of figures 1A, 1B, four pivotably movable strap carriers 10 are present in the four vertices of the frame 9 situated there, and the four pin supporting arms, briefly indicated by reference numeral 15, move past said strap carriers in such a way that the four carrying straps 8 of the bag Z are hooked on to said pin supporting arms. Next, the bag is filled. Advantageously, during the filling operation, the transverse sections 14a, 14b can already move back in order

to be ready on the front side of the storage station 2 to take over a next bag from said storage station without loss of time.

[0019] Figures 4A and 4B show details of the rectilinearly controllable running gear 13 in the form of, in this case, electrically movable transverse sections 14a or 14b. These figures also show a possible arm construction 21 which enables each pivotably controllable pin 16 on these sections, given the sometimes heavy weight it carries, to be locked in a rotation position. Said locking takes place by means of a rotatable triangular member 17, shown in a larger detailed view in Fig. 4B, which at one vertex is coupled by means of a rod 18 to the pivotable pin 16 and which, at the other vertex, is attached to the arm 21 by means of a pneumatic piece. In the rotation position shown of the pin 16, first the pneumatic piece 19 must be activated to tilt the member 17 before the pin 16 can swing back in a downward direction, enabling the carrying strap 8 to be detached therefrom. Frequently, pneumatic means 20 enable the arm constructions 21 to be adjustable with respect to each other but also to adjust the rotation position of said arm constructions, thereby making it easier for them to hook into the carrying straps 8 of the bags Z and to detach from said carrying straps.

[0020] The movements carried out by the drive members 6, 6a, 6b to move the bag supports 5 and the movements carried out by the transfer member 3 to take over and open the bags all are rectilinear, substantially parallel movements in the same direction, in this case forward movements. This leads to the advantages already mentioned in the preamble.

[0021] In order to cause the various means and members comprised in the device 1, and explained hereinabove, to carry out translatory or rotary movements in a suitable manner, at the right speed and, if necessary, continuously or step by step, and in the proper sequence, programmable control means and associated sensors connected thereto, not shown in the figures, are provided in the desired locations.

[0022] Elements and aspects explained herein with regard to or for certain embodiments may be combined in an obvious manner with elements and aspects of other embodiments explained herein, for example with a view to desired advantages which can thus be achieved.

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Claims

1. A device for supplying bags and filling them with bulk goods, comprising:
 - (a) a storage station which is arranged for hanging, in said storage station, a stock of bags on bag supports, which can be moved by means of drive members,
 - (b) a transfer member which is arranged to take over the bags hanging from the bag supports and open the bags,

(c) a filling station where the open bags are filled after which they are carried away, wherein the movements performed by the drive members to move the bag supports, and the movements by which the transfer member takes over the bags and opens them all are rectilinear and substantially parallel movements in the same direction.

2. The device according to claim 1, **characterized in that** the bags are provided with front and rear straps for hanging the bags on rows of bag supports which are driven in parallel directions by the drive members in the storage station.

3. The device according to claim 1 or 2, **characterized in that** the drive members in the storage station are provided with endless belt or chain conveyors for moving the hanging bags.

4. The device according to any one of claims 1 to 3, wherein the transfer member is provided with a guide system arranged above the bags, in which a rectilinearly movable, controllable running gear is provided on which a first set of pivotably controllable pins are provided, which are each controlled in such a manner that the first set of pins partly takes over the hanging bags from the bag supports and that the running gear moves to the filling station, causing the bag to open, and the device comprises respective programmable control means suitable for this purpose.

5. The device according to claim 4, **characterized in that** the control means are further programmed to subsequently control each of the running gear and a second set of pins in such a manner that, in the filling station, the bag taken over hangs completely on both sets of pins.

6. The device according to claim 4 or 5, **characterized in that** the control means are also programmed to fill the open bag while said bag hangs on at least one of the sets of pins.

7. The device according to any one of claims 1 to 6, **characterized in that** the filling station comprises a framework which is provided with hooks on the lower side thereof, and **in that** the transfer member is arranged to take over the bags hanging from the bag supports and move them to the filling station and hang them on the hooks.

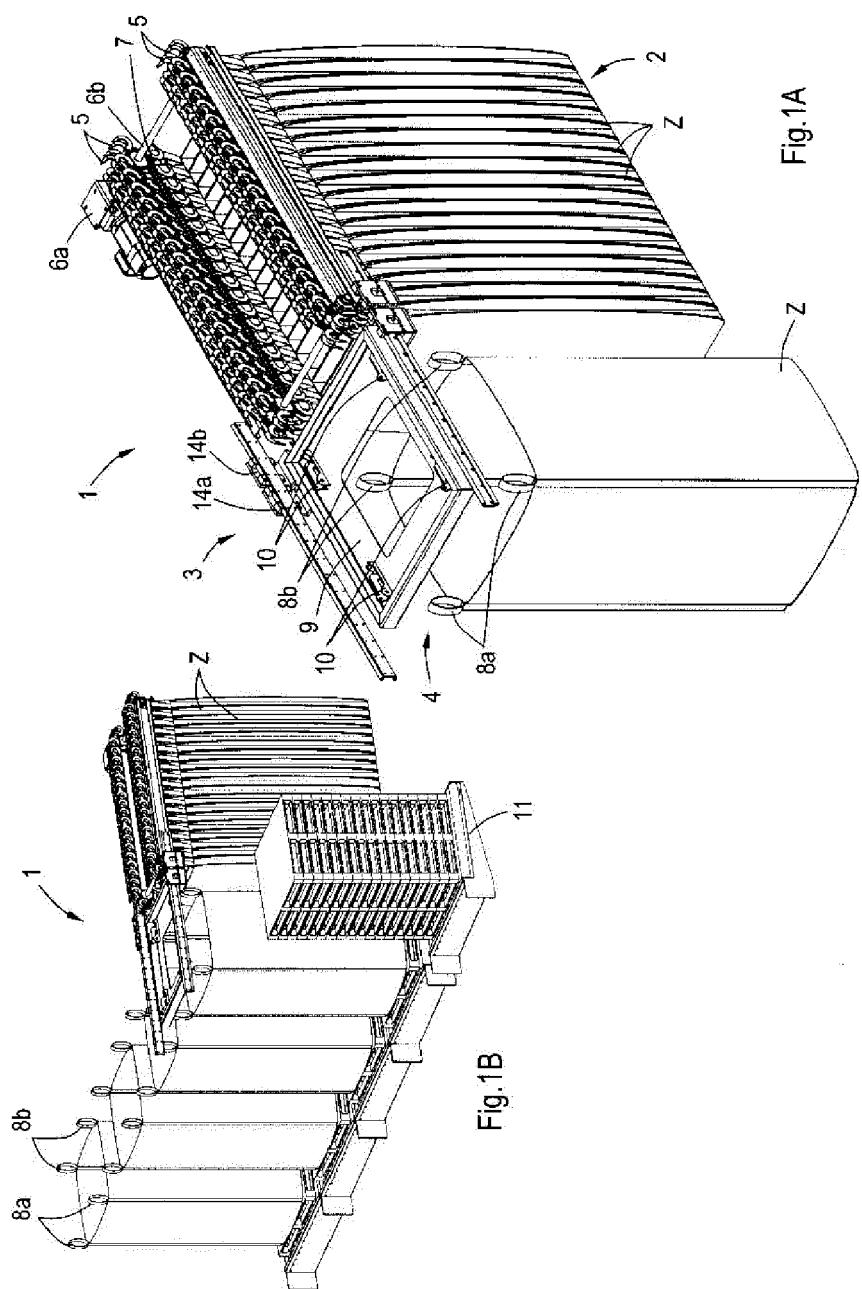
8. A method wherein, in a storage station, partly flat-folded bags hung on movable bag supports are at least partly taken over, in a continuous movement, by moving pins, as a result of which the bag is opened and moves to a filling station where the bag is filled

with bulk goods, wherein the movements performed to move the bag supports, and the movements by which the bags are taken over by the pins and the movements performed to move the pins, all are rectilinear and substantially parallel movements in the same direction.

9. The method according to claim 8, **characterized in that** the bags comprising carrying straps and hanging in rows are moved in parallel directions in the storage station.

10. The method according to claim 8 or 9, **characterized in that** the open bag is filled while it hangs partly or completely on said pins.

11. The method according to any one of claims 8 to 10, **characterized in that** the drive members in the storage station move step by step.



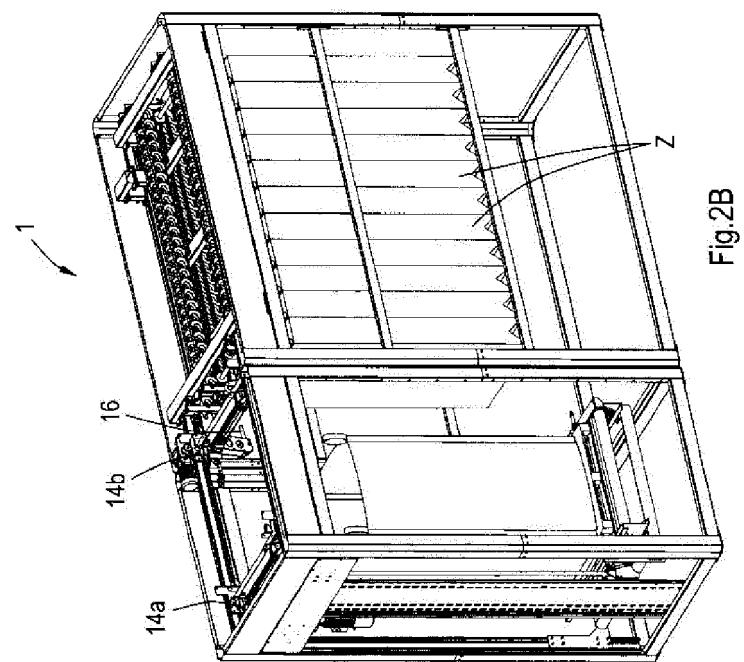


Fig.2B

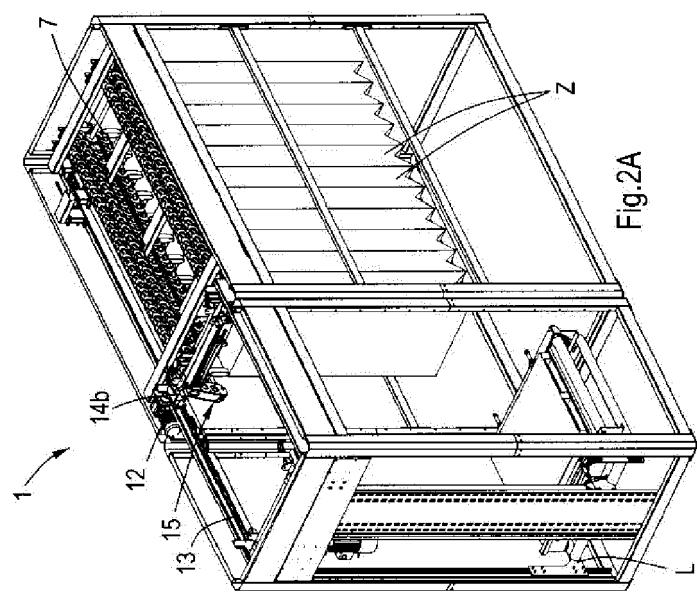


Fig.2A

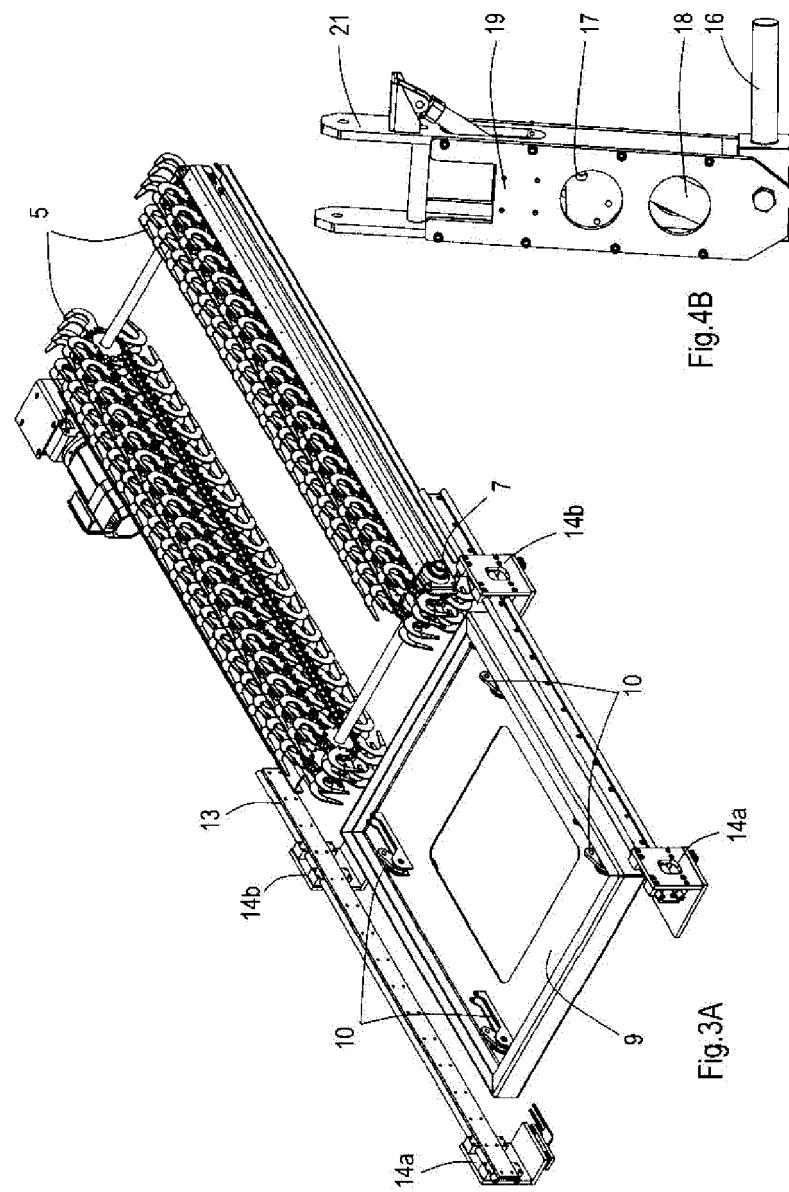


Fig.4B

Fig.3A

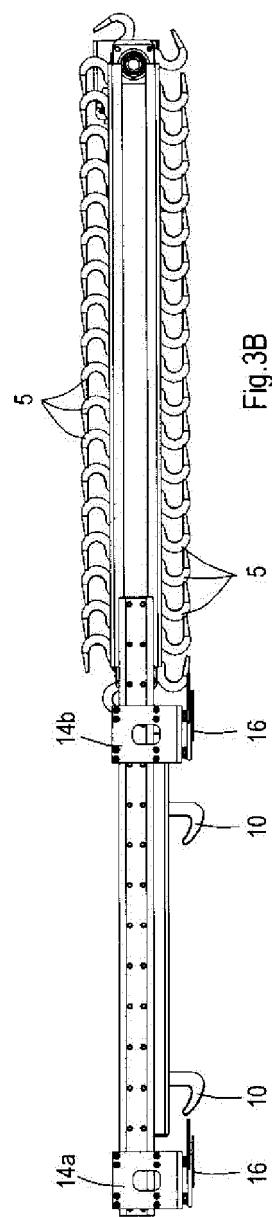


Fig. 3B

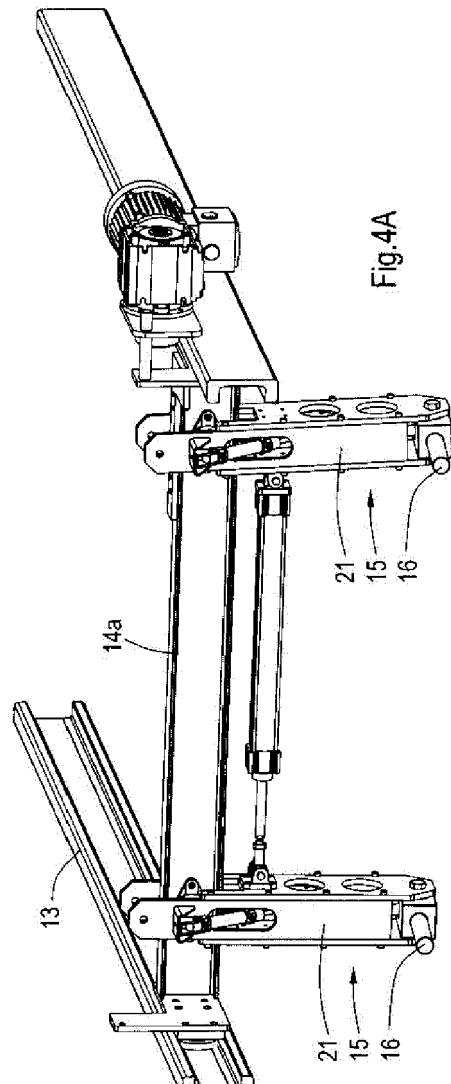


Fig. 4A



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Application Number

FP 14 15 5516

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Place of search	Date of completion of the search	Examiner
Munich	4 April 2014	Schelle, Joseph
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ANNEX TO THE EUROPEAN SEARCH REPORT
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