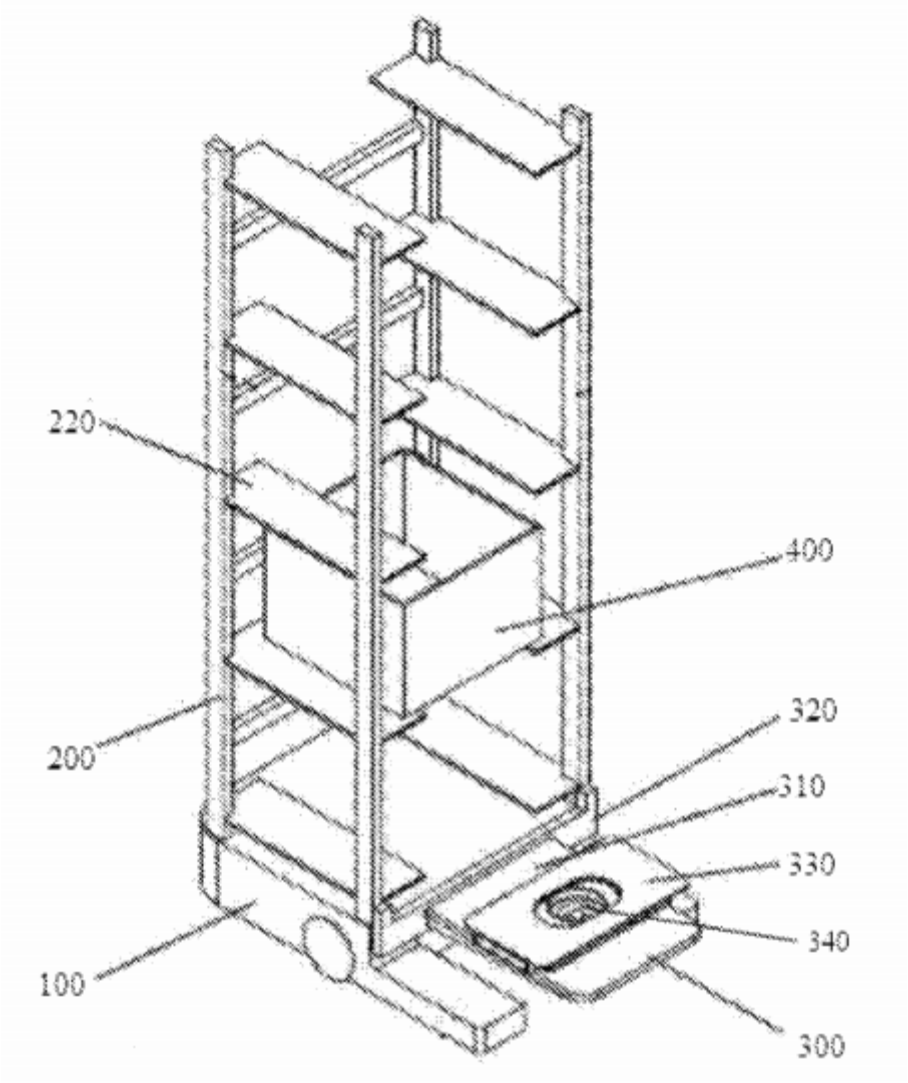


Fig. 1

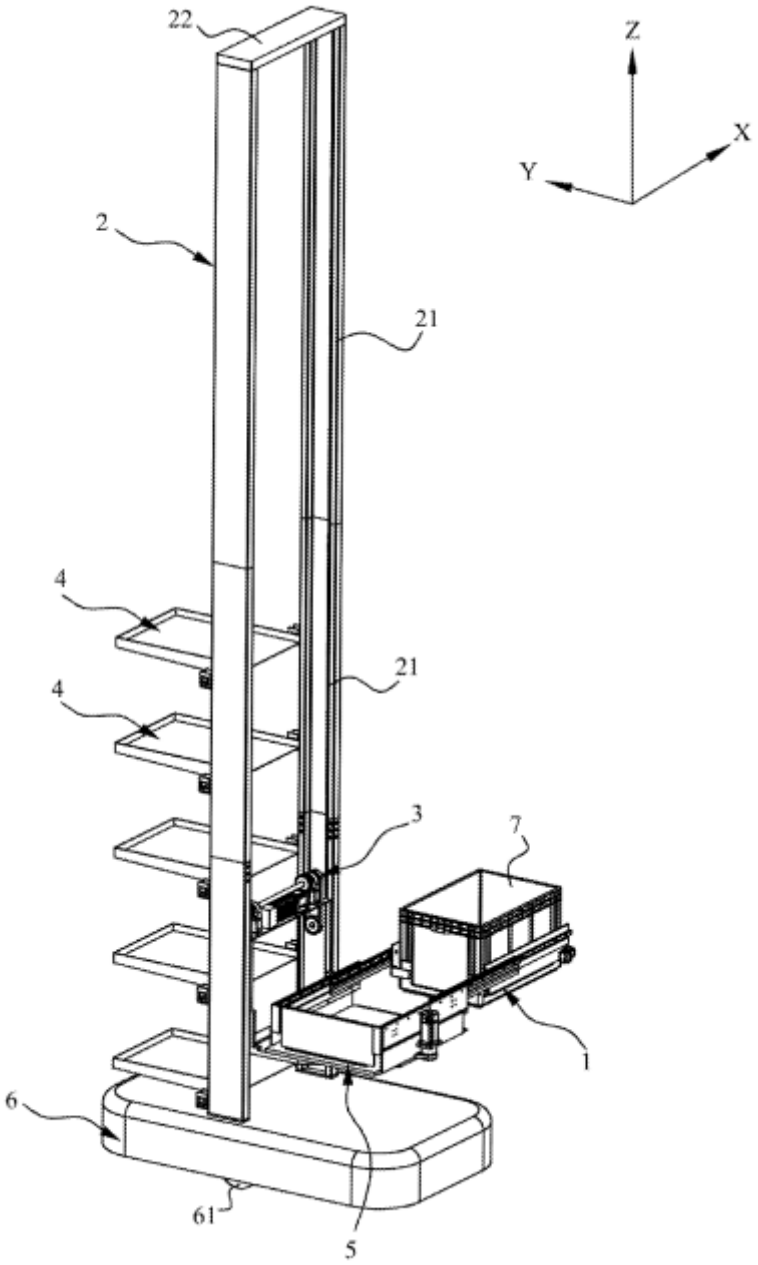


Fig. 2

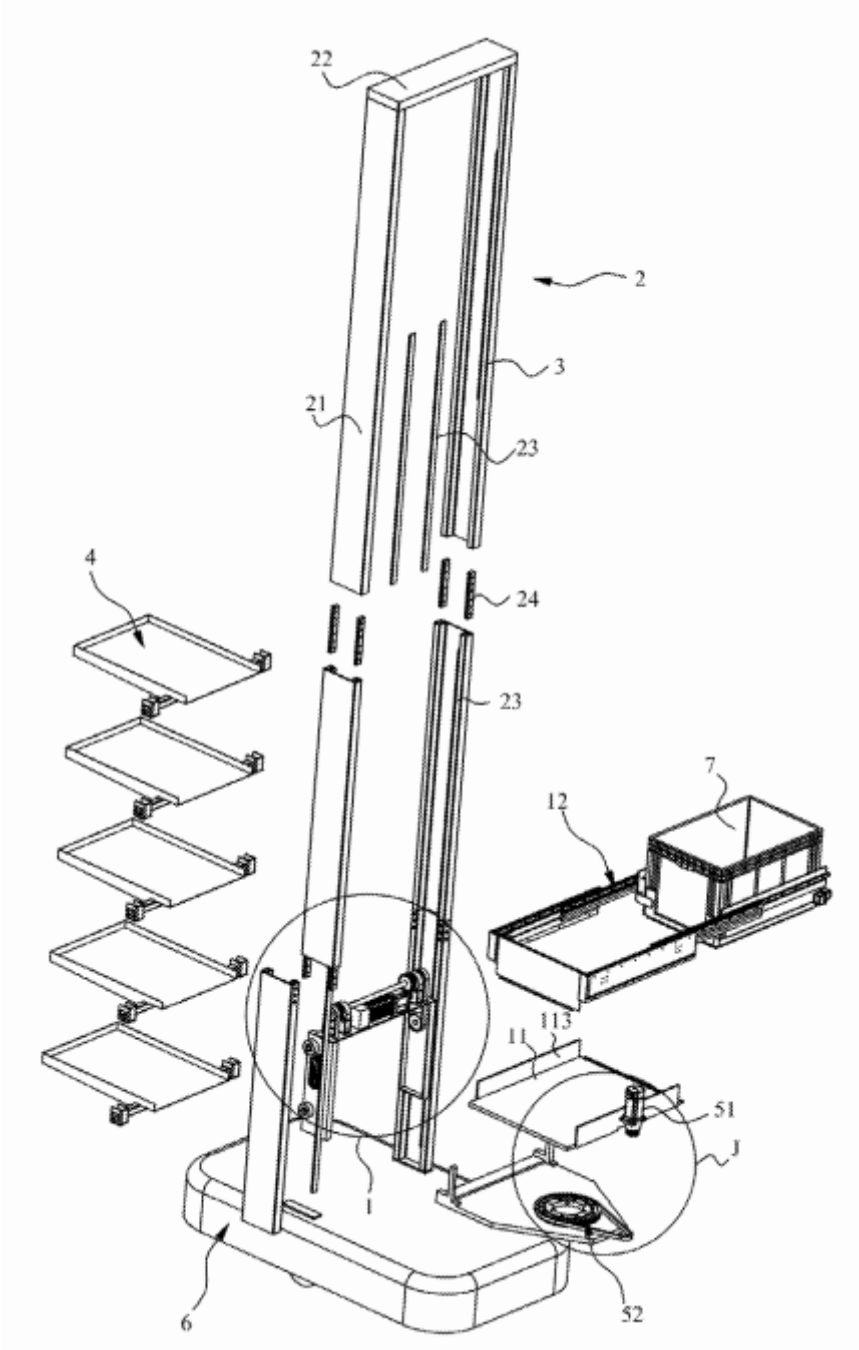


Fig. 3

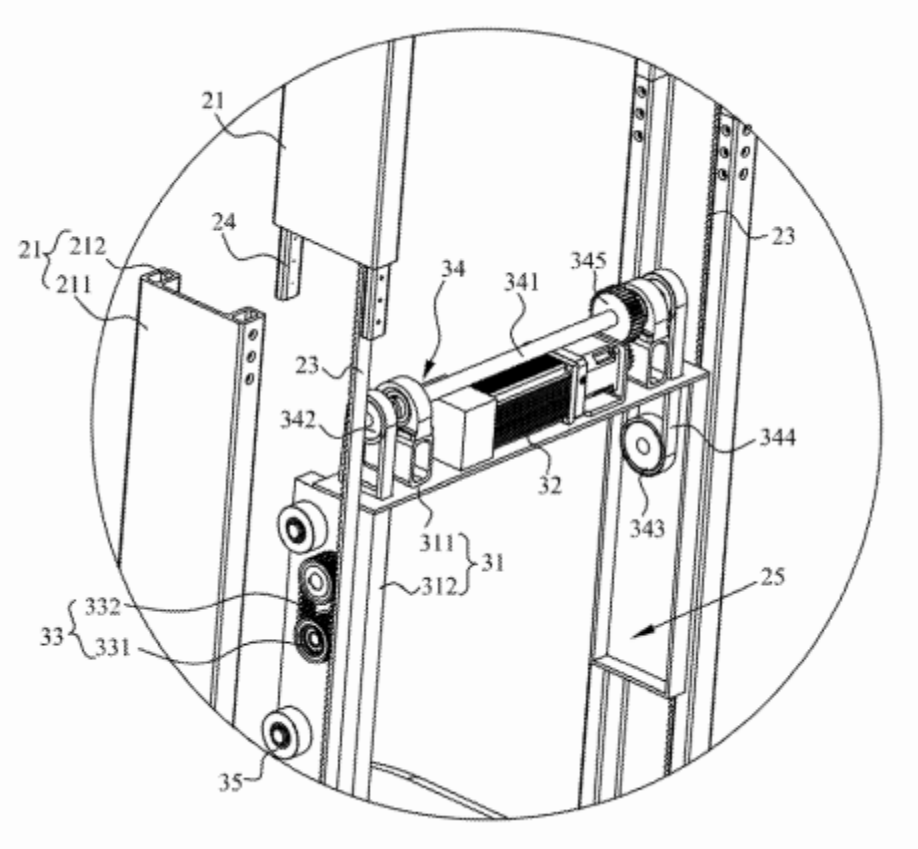

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Fig. 4

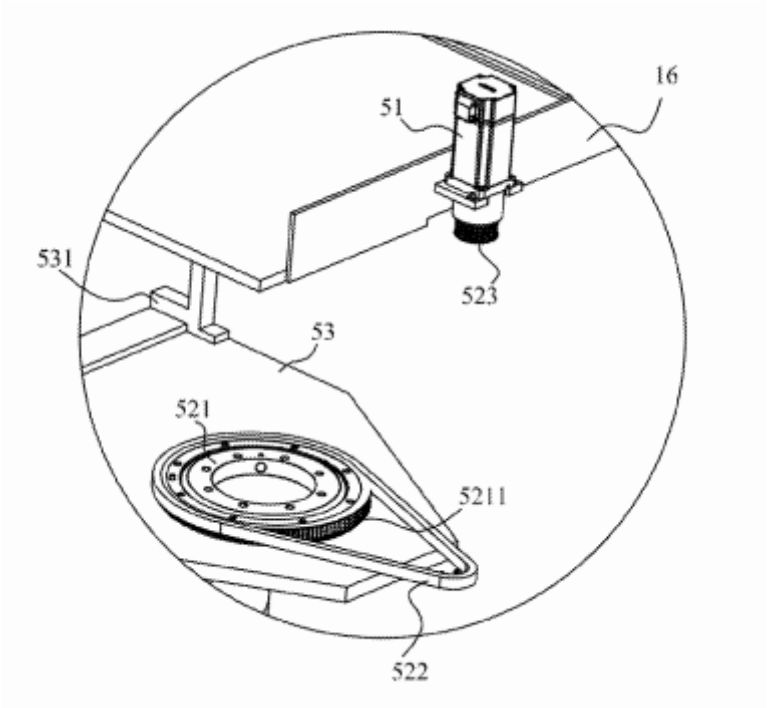


Fig. 5

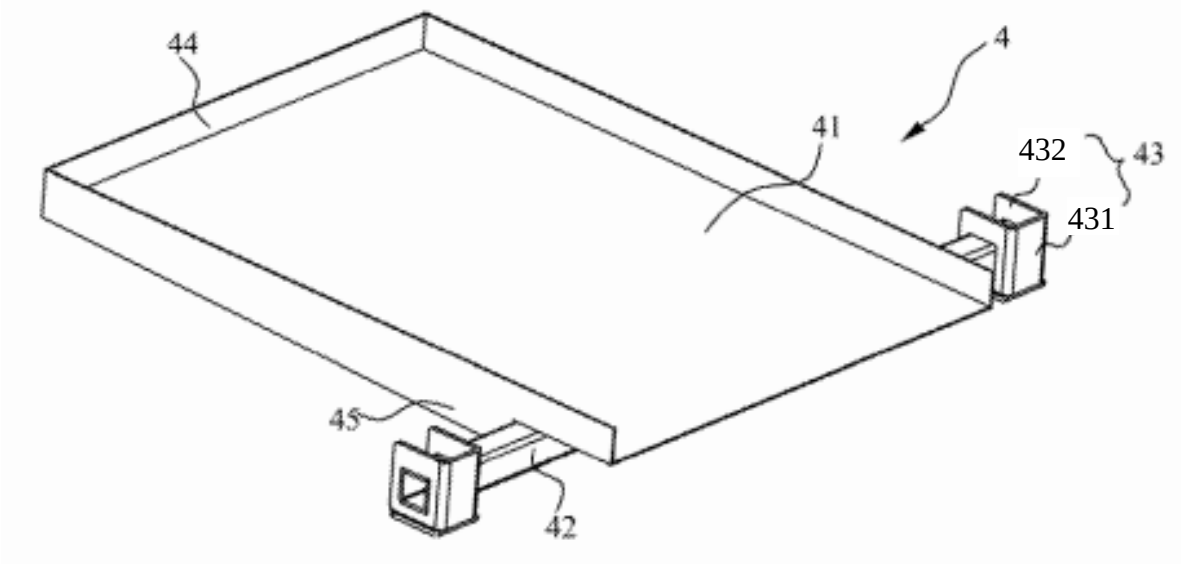


Fig. 6

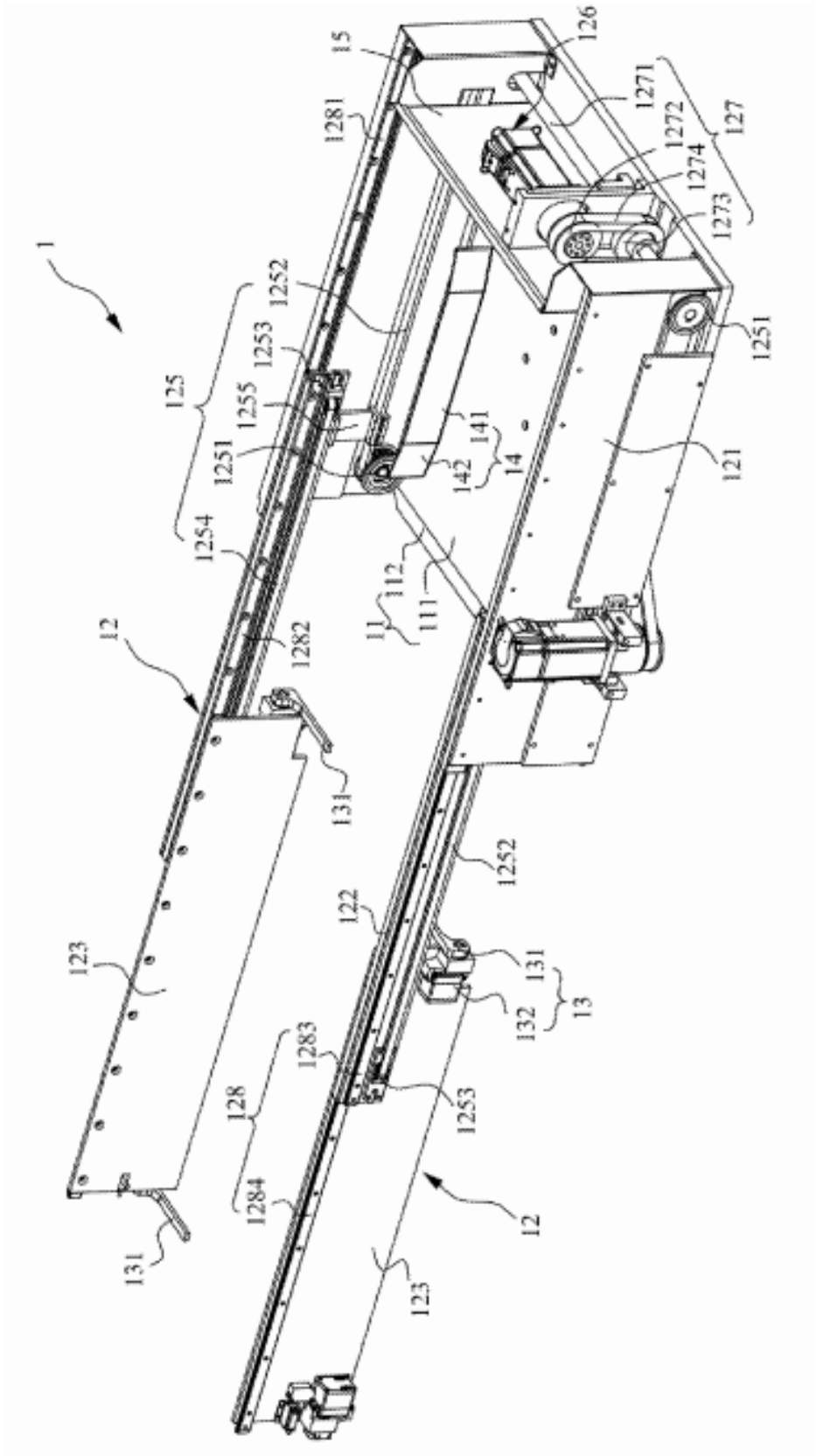

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Fig. 7

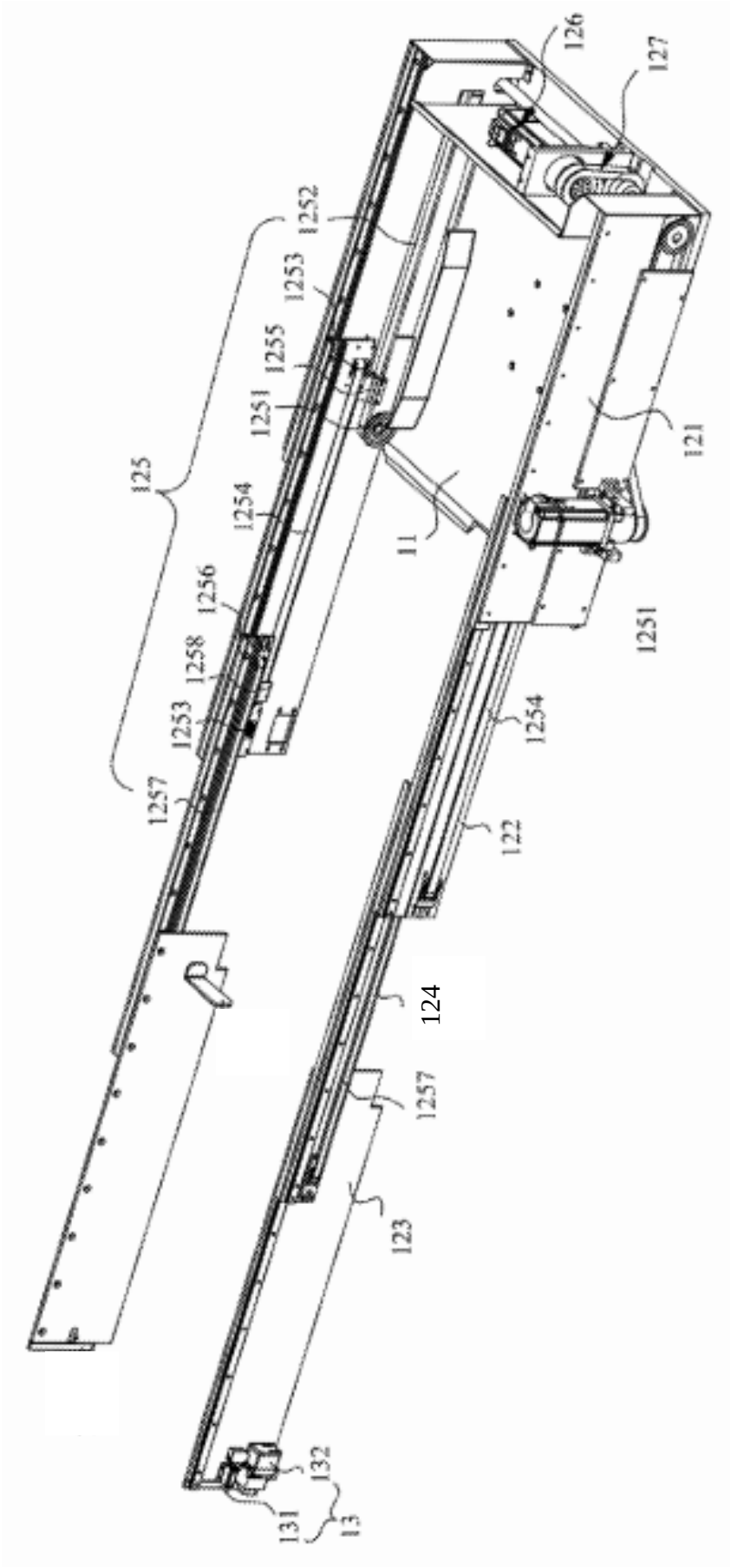

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Fig. 8

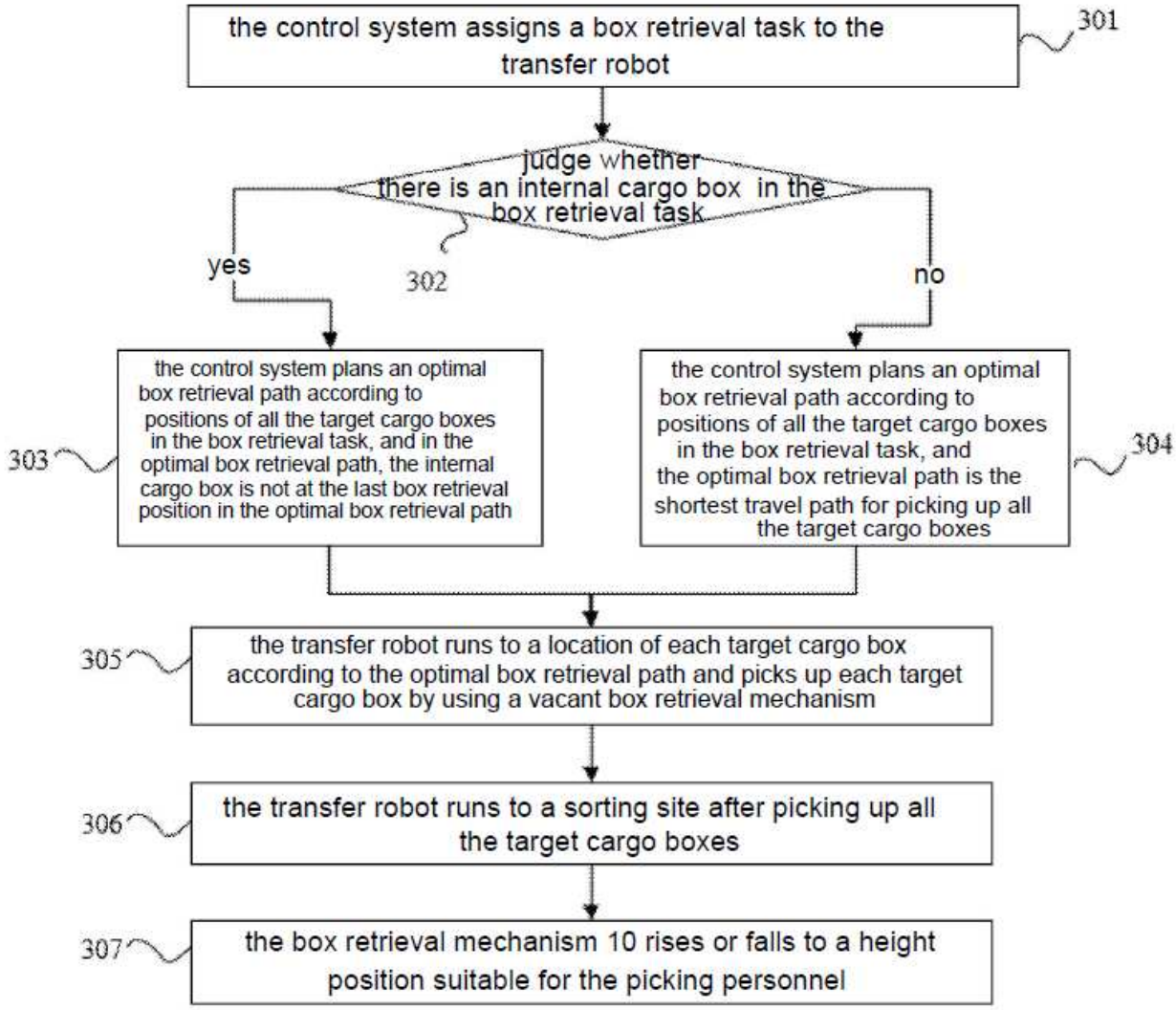

the control system assigns a box retrieval task to the transfer robot
301
judge whether there is an internal cargo box in the box retrieval task
302
yes
no
the control system plans an optimal box retrieval path according to positions of all the target cargo boxes in the box retrieval task, and in the optimal box retrieval path, the internal cargo box is not at the last box retrieval position in the optimal box retrieval path
303
the control system plans an optimal box retrieval path according to positions of all the target cargo boxes in the box retrieval task, and the optimal box retrieval path is the shortest travel path for picking up all the target cargo boxes
304
the transfer robot runs to a location of each target cargo box according to the optimal box retrieval path and picks up each target cargo box by using a vacant box retrieval mechanism
305
the transfer robot runs to a sorting site after picking up all the target cargo boxes
306
the box retrieval mechanism 10 rises or falls to a height position suitable for the picking personnel
307

Fig. 9

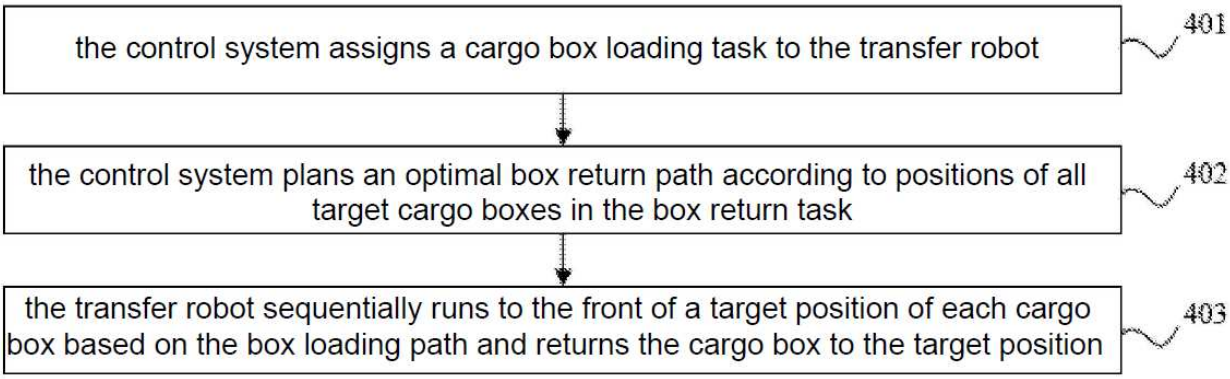

the control system assigns a cargo box loading task to the transfer robot
401
the control system plans an optimal box return path according to positions of all target cargo boxes in the box return task
402
the transfer robot sequentially runs to the front of a target position of each cargo box based on the box loading path and returns the cargo box to the target position
403

Fig. 10