(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 June 2023 (22.06.2023)

WIPO | PCT

(10) International Publication Number
WO 2023/113709 A1

(51) International Patent Classification:
B65G 1/00 (2006.01) *B65G 1/137* (2006.01)
B65G 1/04 (2006.01) *B65G 27/02* (2006.01)

(21) International Application Number:
PCT/TR2021/051567

(22) International Filing Date:
28 December 2021 (28.12.2021)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2021/020180 16 December 2021 (16.12.2021) TR

(71) Applicant: **ERKUL KOZMETİK SANAYİ VE TİCARET ANONİM ŞİRKETİ** [TR/TR]; Cihangir Mahallesi Petrol Ofisi Caddesi No:1, Avcilar/İstanbul (TR).

(72) Inventor: **ERKUL, Murat**; Cihangir Mahallesi Petrol Ofisi Caddesi No:1, Avcilar/İstanbul (TR).

(74) Agent: **İNTER PATENT HİZMETLERI LİMİTED ŞİRKETİ**; Büyükdere Cad No:52/16-17, 34776 Şişli/İstanbul (TR).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(54) Title: A STORAGE SYSTEM

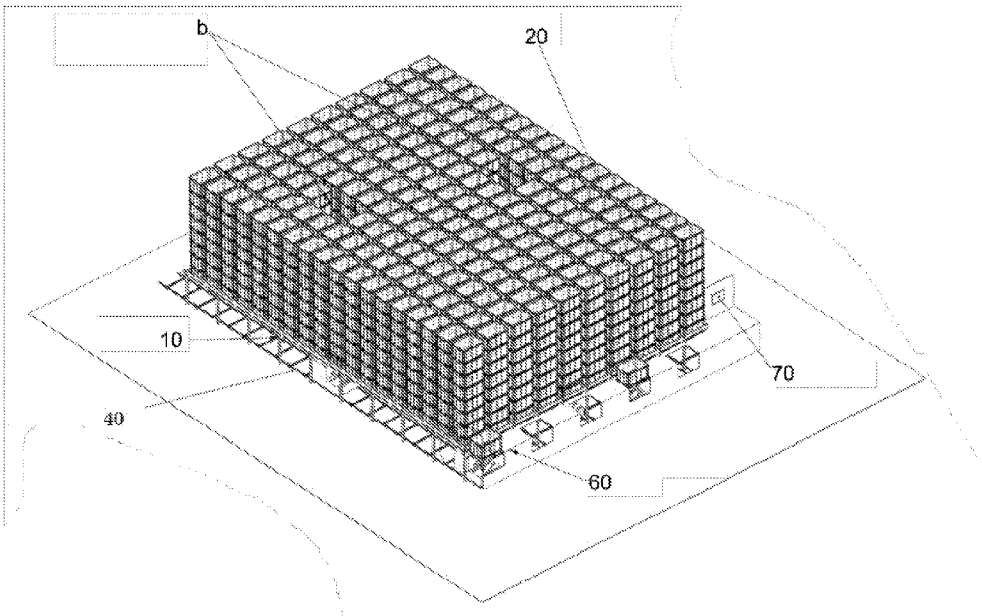


Figure 1

(57) Abstract: The present invention relates to a storage system used in enterprises to store goods, raw materials, products, and semi-finished products. A storage system used in the storage of goods, raw materials, products, semi-finished products in enterprises wherein comprising; depolama alanında zeminden yükseğe dikey şekilde konumlandırılan en az bir taşıyıcı profil (10), a plastic box (20) that stores products by stacking on carrier profiles (10), a lock (30) located on the carrier profile (10) and locking the lowest plastic box (20) stacked on the carrier profile (10) onto the carrier profile (10), a rail system (40) located on the floor under the carrier profiles (10), a carrier robot (50) that moves on the rail system (40) and delivers the plastic boxes (20) stacked on top of each other on the carrier profiles (10) to the delivery point (60) by taking them from under the carrier profile (10), or placing the plastic boxes (20) taken from the delivery point (60) on the carrier profile (10) or under the lowest plastic box (20) stacked on the carrier profile, a control panel

WO 2023/113709 A1

[Continued on next page]

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

(70), which is connected with the management system of the enterprise and which controls and commands the working regime of the storage system in order to ensure the storage according to the data coming from the management system and the preparation of the stored products in line with the demands.

A STORAGE SYSTEM

Technical Field

The present invention relates to a storage system used in enterprises to store goods, raw materials, products, and semi-finished products.

The present invention, in particular, relates to a storage system that allows products to be stored in plastic boxes stacked on carrier profiles and transported by a programmable carrier robot, thereby eliminating human errors and the need for additional storage spaces.

State of the Art

Enterprises use specific areas as warehouses to store goods, raw materials, finished products, and semi-finished products for a variety of purposes. Various systems are installed in these warehouse areas to allow for easy access to the products stored in general.

Racks are the most prominent feature of conventional storage systems. The said racks are structures that are typically divided into side-by-side and overlapping partitions. In these structures, areas are left in front of or behind the racks for stackers to work, allowing products to be taken and placed from the racks. This wastes a lot of warehouse space. Furthermore, as the number of floors of racks increases, there are some difficulties in removing products from racks and placing them in their proper locations. In conclusion, due to intermediate spaces, traditional rack storage systems require significantly more storage space.

Another well-known conventional storage method is stacking boxes or plastic boxes on top of each other and on a pallet. In the said system, in addition to the rack storage system, when a product is removed from the lower boxes, the upper boxes must also be removed. Pallets must be transported using large forklift-type work machines. More warehouse space is needed because forklift-type vehicles require a large movement area.

As the number and variety of products stored by businesses increases over time, so do the challenges of warehouse management. A common issue in warehouse management is that raw materials or products cannot be delivered to the specified location without wasting time. This causes production processes to be disrupted and goods to be delivered late.

When a warehouse employee requires a product, the product is taken to the rack at the address and delivered to the required place in systems where racks are planned by addressing in storage systems. These systems, however, are a conventional practice that is prone to errors and wastes time due to the employee's reaction time. Furthermore, in this system, it is not possible to pre-program warehouse activities to be performed the following day. At the same time, because semi-finished products are shipped in bulk, the traditional storage system in question requires additional pre-storage areas in the production areas. For example, if 500 units of semi-finished products are required during production based on the daily calculation, a special extra area is required to stack such semi-finished products in the production area at the start of production.

There are also robotic systems in use today that do not require humans to work in storage areas. One of the said robotic systems is the one that controls the robots that travel to the target using GPS data or various sensors. However, workspaces are required during stacking, just as they are when working with robots. This results in a loss of space.

Vertical storage systems created by making various constructions and robots working on the said vertical storage systems are examples of alternative storage systems created to take up less space in storage areas. Because the carrier robots are mounted on vertical storage systems, there is no need for additional workspace. However, in this system, structures that reduce ceiling height, such as ventilation, water, electricity, and lighting on the ceilings of storage areas, cause the ceilings to be of varying heights. As a result, the working height of the robot is limited by the height of the lowest part of the structures in question. This results in a loss of storage space. Furthermore, vertical storage systems extend to the top plastic box. As a result, a vertical profile system can be used throughout the warehouse space.

Within the warehouse areas, there may be sections at various levels. For example, a section of the tank may be 6 m long and another 4 m long. Storage systems should be installed separately for each compartment or based on the lowest remaining elevation in this case. This results in a reduction in storage space. When using this type of system, vertical profile storage sections must be tall enough to reach the maximum working height. Furthermore, because the load will be carried on the storage areas with vertical profiles, they must be strong and thick. This implies that the aluminum or metal profiles used are expensive.

At the delivery points in storage systems with robotic systems, a different second system is used in current applications. When the product arrives at the delivery point, it is transferred to a different system and transported to the location where the product will be received via that system. If these systems are relocated due to a warehouse relocation, the new location's ceiling height must be the same. When the ceiling height is low, the profiles are cut; when the ceiling height is high, the profiles are completely renewed. Furthermore, each of these systems must use its own unique plastic boxes. Because the robots working on vertical storage systems and the boxes in question have been synchronized. As a result, the requirement to purchase the boxes from the system manufacturer arises.

The document numbered US10289111 can be used to demonstrate the state of the art in the literature research. The said document is concerned with automated warehouses in general, and one or more types of warehouse devices in particular for picking up items on the warehouse floor and returning them to a suitable location. The system in question consists of an autonomous or semi-autonomous robot with additional equipment for picking up and removing items from the warehouse floor in order to move rack units. Rack units are carried by the said autonomous or semi-autonomous robots. As a result, in the said system, a working area for the robots is required, and there are losses from the warehouse area.

Another example of the state-of-the-art is the document WO2017081281. The said document is about a robotic picking system for retrieving objects from bulk storage boxes in storage systems. The said stacks are contained within a grid structure. This grid structure is also utilized by robots. There is no need for additional working space in the invention in question because the robots are housed in vertical storage systems. However, in this system, if there are structures on the storage area ceilings that reduce

the ceiling height, the working height of the robot is limited to the height of the bottom part of the said structures, resulting in warehouse space loss. Furthermore, because the grid structure extends to the top frame, grids can be used throughout the entire height of the warehouse. This has serious financial consequences.

The document numbered EP3459879 can be used as another example of the state of the art. The said document is about a robot-based storage system. The said storage system includes at least one frame structure with several vertical shafts for receiving storage containers and at least one lifting device mounted horizontally on the frame structure. The lifting device can also be used to lift a storage container from one of the vertical shafts and transport it to another location. A transport system is also installed in the storage system to transport the shipping container to and from a receiving position. The ceiling height in the said vertical shaft storage system must be at a certain distance for the transport system, and there are structural issues that limit the ceiling height.

As a result of the existence of the said problems and the inadequacy of existing solutions, advancement in the relevant technical field was required.

Objectives of the Invention

The present invention relates to a storage system that eliminates the said disadvantages while also introducing new advantages to the related technical field.

The main objective of the invention is to present a storage system that allows products to be stored in plastic boxes stacked on carrier profiles and transported by a programmable carrier robot, thereby eliminating human errors and the need for additional storage space.

The objective of the invention is to present a storage system that can be used in areas with different level heights by transferring carrier robots to carrier profiles at different elevations using lifts in storage areas with different level heights.

Another objective of the invention is to present a storage system that can store on carrier profiles without the use of specially designed boxes.

Another objective of the invention is to provide a storage system that can be modularly disassembled, transported, and easily reinstalled.

Another objective of the invention is to present a storage system that does not require any additional systems because the products are delivered to the delivery point by being transported by a programmable carrier robot.

Another objective of the invention is to present a storage system that can be adapted to different heights and elevation differences thanks to the positioning of the carrier profiles on the floor at a height (approximately 1m) where the carrier robot can work on the underside of the carrier profiles, and the stacking of the plastic boxes on top of the carrier profiles, which can be installed with fewer carrier profiles and the system height is created with plastic boxes.

To address all of the above-mentioned and detailed explanations, the invention relates to a storage system used in enterprises to store goods, raw materials, products, and semi-finished products. The features of the invention;

- at least one carrier profile positioned vertically above the ground in the storage area,
- a plastic box that stores products by stacking on carrier profiles,
- a lock located on the carrier profile and locking the lowest plastic box stacked on the carrier profile onto the carrier profile,
- a rail system located on the floor under the carrier profiles,
- a carrier robot that moves on the rail system and delivers the plastic boxes stacked on top of each other on the carrier profiles to the delivery point by taking them from under the carrier profile, or placing the plastic boxes taken from the delivery point on the carrier profile or under the lowest plastic box stacked on the carrier profile,
- a control panel, which is connected with the management system of the enterprise and which controls and commands the working regime of the storage system in order to ensure the storage according to the data coming from the management system and the preparation of the stored products in line with the demands,

The figures below, as well as the detailed description written with reference to these figures, will help you understand the structural and characteristic features of the

invention, as well as all of its advantages. As a result, the evaluation should take these figures and detailed descriptions into account.

Figures For A Better Understanding of the Invention

Figure 1 is an overall view of the storage system which is the subject of the invention.
Figure 2 is the detailed view of the lock of the storage system which is the subject of the invention.
Figure 3 is the view of the carrier robot of the storage system which is the subject of the invention.
Figure 4 is the view of the lock of the storage system, which is the subject of the invention, locked to the plastic box.
Figure 5 is the unlocked view of the storage system that is the subject of the invention.
Figure 6 is the view of the overlapping carrier profiles of the storage system in an alternative embodiment of the invention.
Figure 7 is the view of side-by-side carrier profiles at different elevations of the storage system in another alternative embodiment of the invention.
Figure 8 is the view of the carrier profiles in the protruding storage area of the storage system in another alternative embodiment of the invention.

Disclosure of Partial References

10. Carrier profile
20. Plastic box
30. Lock
40. Rail system
50. Carrier robot
51. Car
52. Lifting system
53. Wheel
54. Unlocking mechanism
60. Delivery point
70. Control panel
80. Lift

b. space

y. protruding structure

Detailed Description of the Invention

In this detailed explanation, the preferred alternatives of the invention's storage system are explained only for the purpose of a better understanding of the subject and have no limiting effect.

Figure 1 depicts a general view of the storage system under consideration for the invention. Accordingly, the storage system, in its most basic form, comprises; a carrier profile (10) positioned vertically from the floor in the storage area, a plastic box (20) that stores the products by stacking on top of the carrier profiles (10), a lock (30) that locks the lowest plastic box (20) stacked on the carrier profile (10) on the carrier profile (10), the rail system (40) located on the floor under the carrier profiles (10), a carrier robot (50), which moves on the rail system (40) and carries the plastic boxes (20) stacked on top of each other on the carrier profiles (10) from under the carrier profile (10) and delivers them to the delivery point (60), a control panel (70), which controls and commands the operating regime of the storage system, a lift (80) that carries the carrier robot (50) between carrier profiles (10) in case the carrier profiles (10) are connected side by side with more than one storey on top of each other or at different heights in the storage area.

The carrier profile (10), which constitutes the main structure of the storage system subject to the invention, is positioned vertically above the floor in the storage area, and its interior is in the form of a rectangular shape with a hollow structure. Plastic boxes (20) are stacked on top of the carrier profiles (10). The said plastic boxes (20) are the sections where the products are stored.

As seen in Figure 2, there is a lock (30) on the carrier profile (10) that locks the lowest plastic box (20) stacked on the carrier profile (10) onto the carrier profile (10). Thus, the safe stacking of plastic boxes (20) on carrier profiles (10) is ensured.

The rail system (40) is connected to the floor on the underside of the carrier profiles (10). The carrier robot (50) carrying the plastic boxes (20) moves on the said rail system (40). The carrier robot (50) carries the plastic boxes (20) stacked on top of each other on the carrier profiles (10) from under the carrier profile (10) and delivers

them to the delivery point (60) or places the plastic boxes (20) taken from the delivery point (60) on the carrier profile (10) or under the lowest plastic box (20) stacked on the carrier profile (10).

As seen in Figure 3, the carrier robot (50) basically has a car (51) with wheels (53) with a 90°rotation movement on its lower surface. There is a lifting system (52) on the said car (51) that opens and closes by moving up and down. When the carrier robot (50) is positioned under the carrier profile (10) to carry the plastic boxes (20) or when it reaches the delivery point (60), it lowers and lifts the plastic boxes (20) utilizing the lifting system (52). There is an unlocking mechanism (54) on the carrier robot (50) to unlock (30) the plastic box (20) that is locked on the carrier profile (10). The closed position of the mentioned lock (30) is seen in Figure 4 and the open position of the mentioned lock (30) in Figure 5 is seen.

The operating regime of the storage system is controlled and commanded by the control panel (70). The control panel (70) is connected to the management system of the enterprise and provides storage according to the data coming from the said management system and the preparation of the stored products in line with the demands.

As can be seen in Figure 6, there may be more than one storey carrier profiles (10) in the storage area. Alternatively, as shown in Figure 7, carrier profiles (10) can be connected side by side at different elevations in storage areas. In both cases, a lift (80) can be connected next to or between the carrier profiles (10) in order to transport the carrier robot (50) to the carrier profiles (10), and the carrier robot (50) can be transported between the carrier profiles (10) utilizing the said lift (80).

In an alternative embodiment of the invention, there may be protruding structures (y) such as a building beam, ventilation duct, fire extinguishing system on the ceiling of the storage area, as seen in figure 8. In this case, plastic boxes (20) can be stacked on each carrier profiles (10) in accordance with the height of the protruding structures (y) in the storage area. As a result, a storage system is formed according to the physical and mechanical structure of the storage area.

The following is the operating principle of the storage system under consideration for the invention;

The storage activity is initiated from the control panel (70) in response to a command from the enterprise's management system. The carrier robot (50) moves beneath the carrier profiles (10) via the rail system (40) in order to receive the plastic box (20) at the specified address.

When the carrier robot (50) is positioned beneath the carrier profile (10) at the specified address, the lifting system (52) moves up and carries the lower plastic boxes (20) to the spaces (b) that do not exist in the carrier profiles (10) in order to reach the plastic box (20) that must be removed from the stacked plastic boxes (20). During the removal of each plastic box (20) with the carrier robot (50), the unlocking mechanism (54) on the carrier robot (50) opens the lock (30) that locks the plastic case (20). As a result, the plastic box (20) is released from the carrier profile (10) and transferred to the carrier robot (50). The plastic box (20) on the plastic box (20) taken from the carrier profile (10) is locked to the carrier profile (10) by a lock (30) instead of the plastic box (20) taken.

The carrier robot (50) transports the plastic box (20) to the delivery point (60) by moving it along the rail system (40).

In the storage area, if the carrier profiles (10) are connected side by side with more than one storey on top of each other or at different heights, the carrier robot (50) is transported between the carrier profiles (10) via a lift (80).

CLAIMS

1. A storage system used in the storage of goods, raw materials, products, semi-finished products in enterprises ***wherein comprising;***

- depolama alanında zeminden yükseğe dikey şekilde konumlandırılan en az bir taşıyıcı profil (10),
- a plastic box (20) that stores products by stacking on carrier profiles (10),
- a lock (30) located on the carrier profile (10) and locking the lowest plastic box (20) stacked on the carrier profile (10) onto the carrier profile (10),
- a rail system (40) located on the floor under the carrier profiles (10),
- a carrier robot (50) that moves on the rail system (40) and delivers the plastic boxes (20) stacked on top of each other on the carrier profiles (10) to the delivery point (60) by taking them from under the carrier profile (10), or placing the plastic boxes (20) taken from the delivery point (60) on the carrier profile (10) or under the lowest plastic box (20) stacked on the carrier profile,
- a control panel (70), which is connected with the management system of the enterprise and which controls and commands the working regime of the storage system in order to ensure the storage according to the data coming from the management system and the preparation of the stored products in line with the demands.

2. A storage system according to claim 1 wherein the said carrier robot (50) includes a car (51) with wheels (53) with 90° rotation on its lower surface and a lifting system (52) that lowers and lifts plastic boxes (20) by opening and closing on the car (51) with up and down movement.

3. A storage system according to claim 1 or 2 wherein the said carrier robot (50) includes an unlocking mechanism (54) that enables unlocking (30) of the plastic box (20) on it and locked on the carrier profile (10).

4. A storage system according to claim 1 wherein it comprises a lift (80) that is connected to the side or between the said carrier profiles (10) and carries the carrier robot (50) between the carrier profiles (10) in case the carrier profiles

(10) are connected side by side with more than one storey or at different elevations in the storage area.

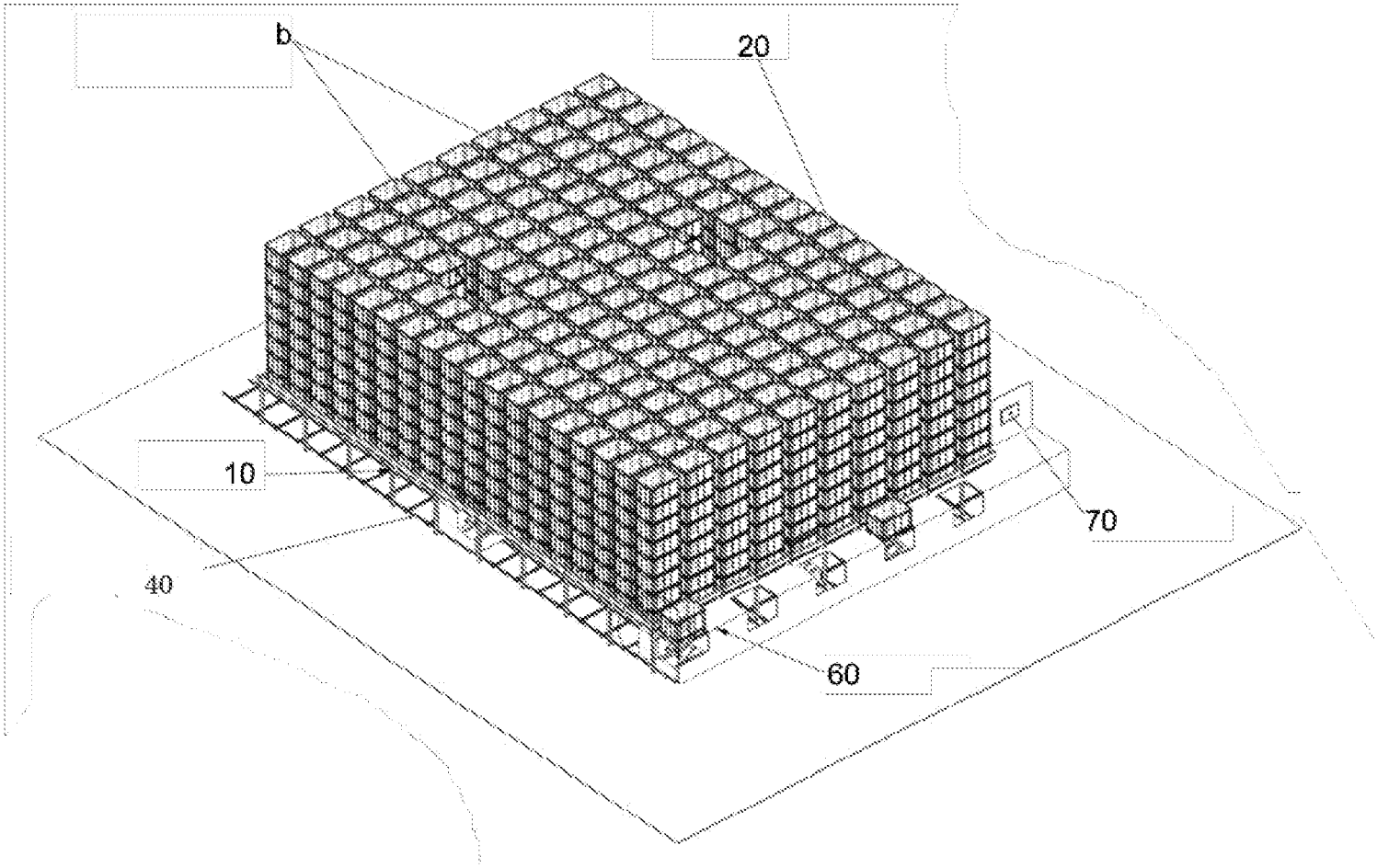


Figure 1

40

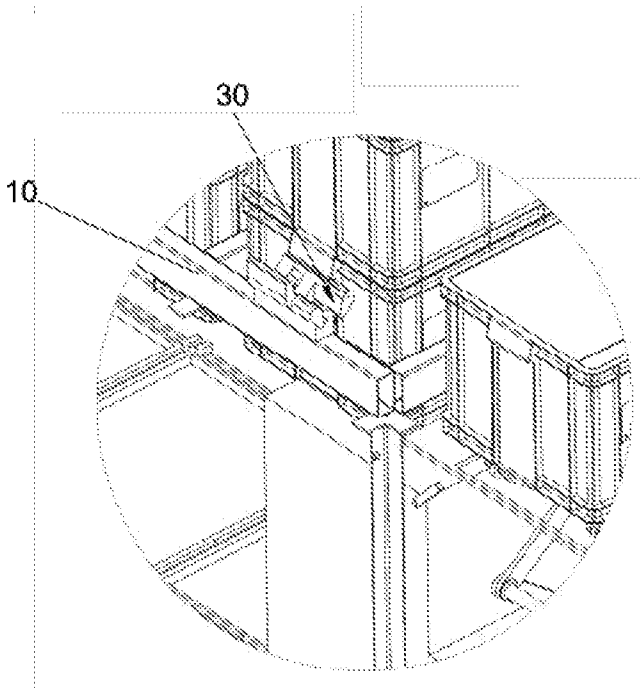


Figure 2

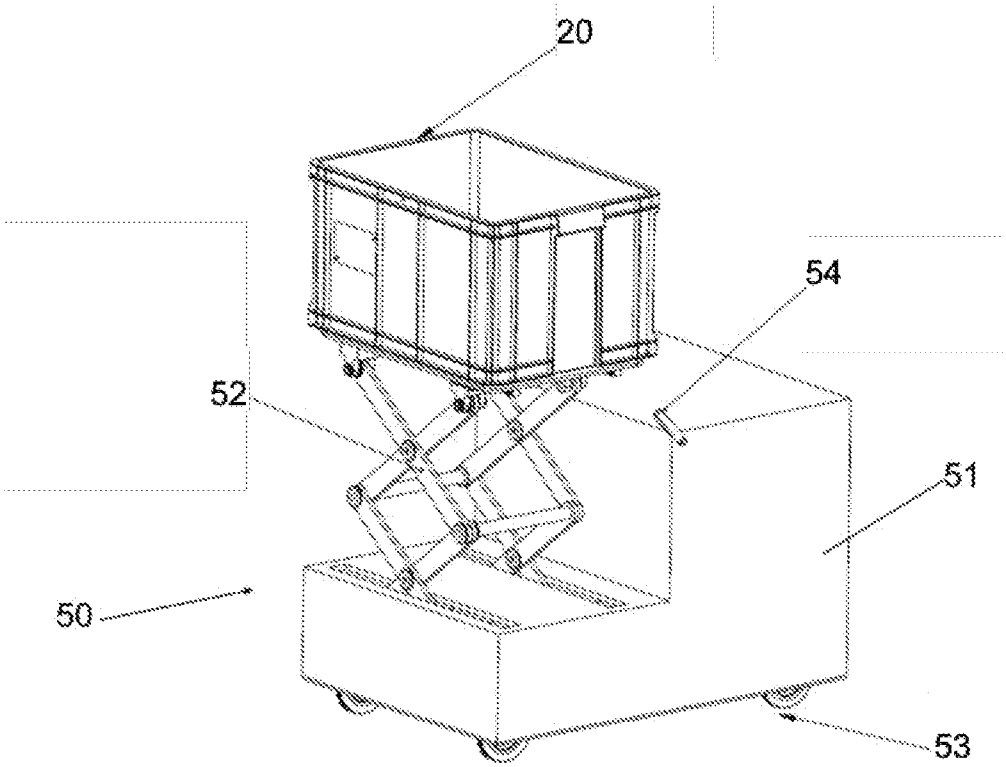
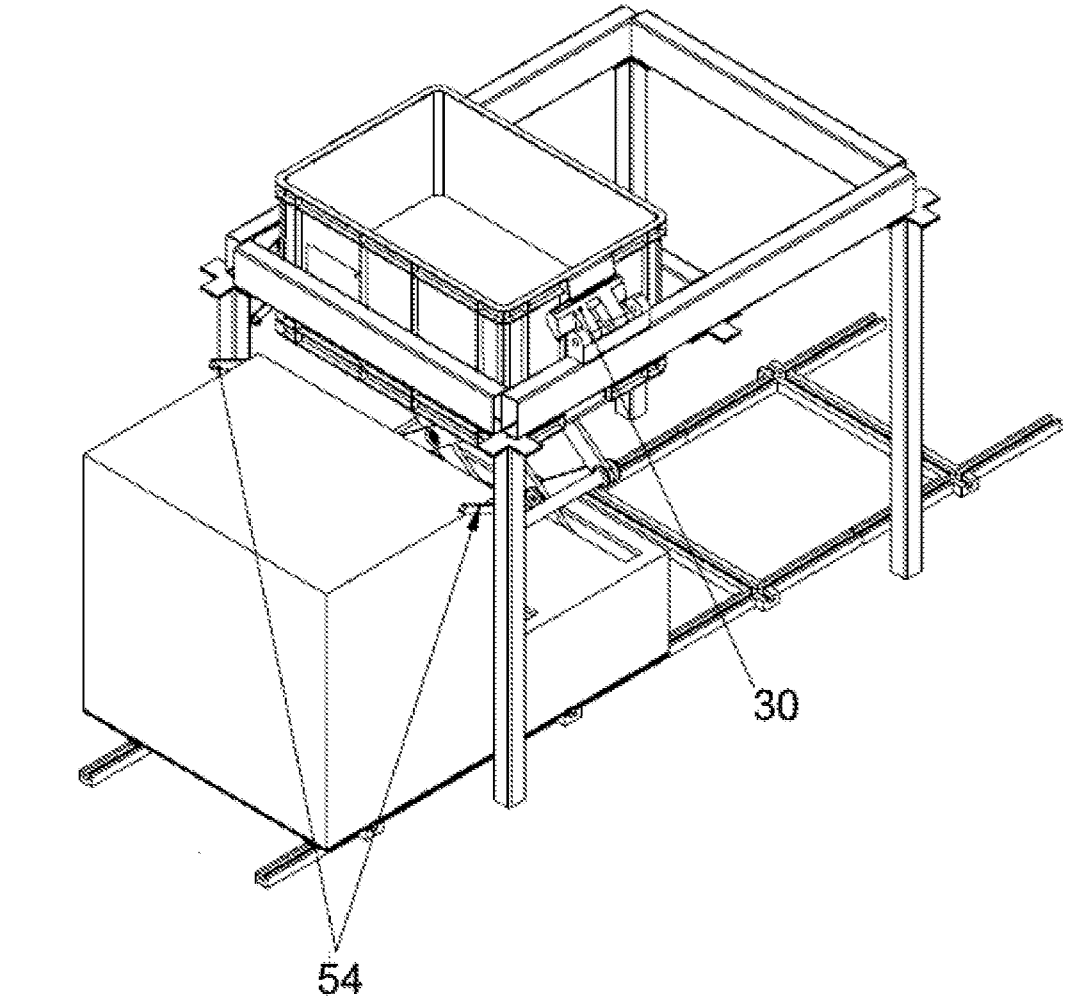


Figure3



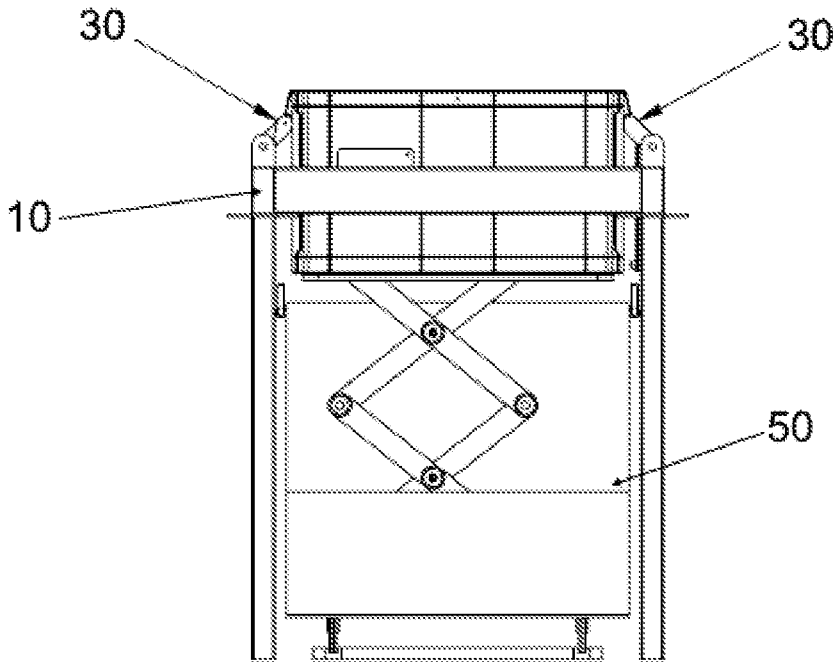
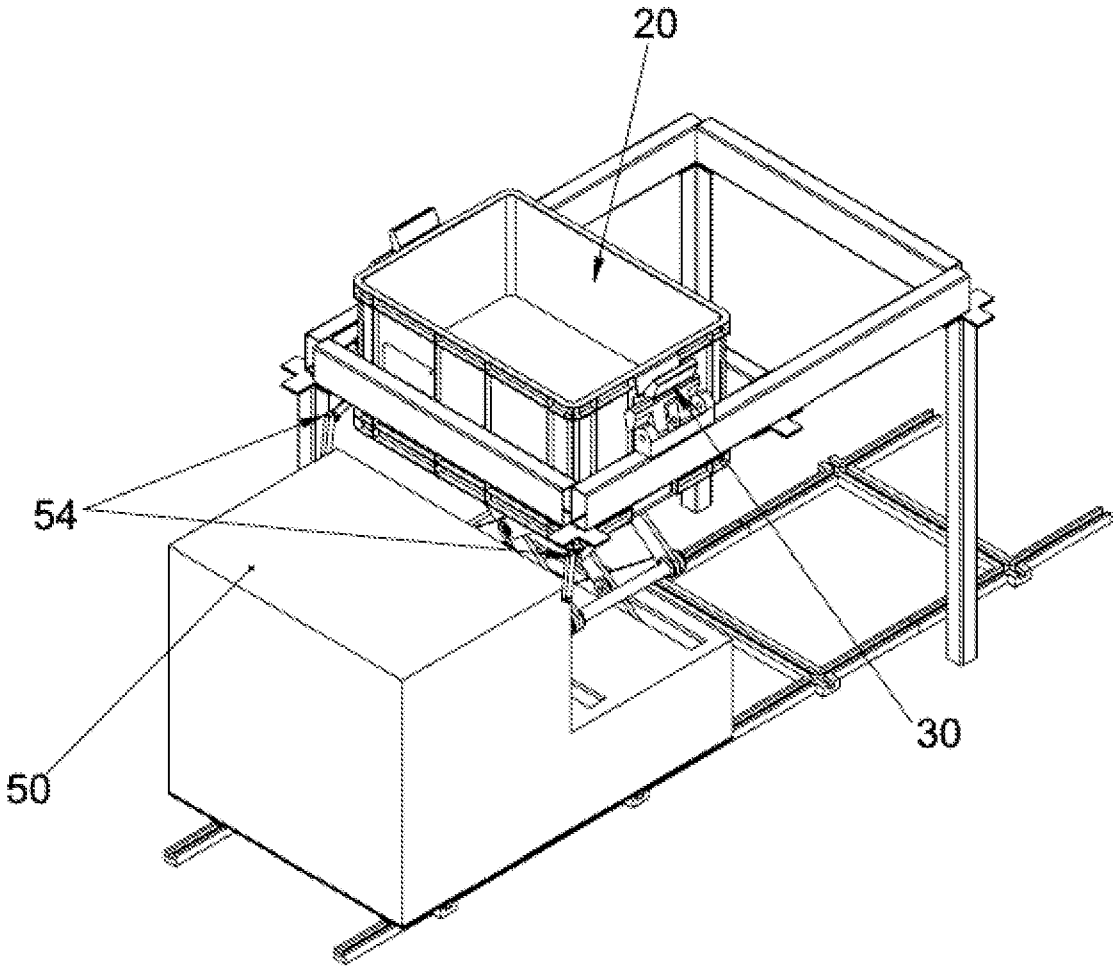


Figure 4



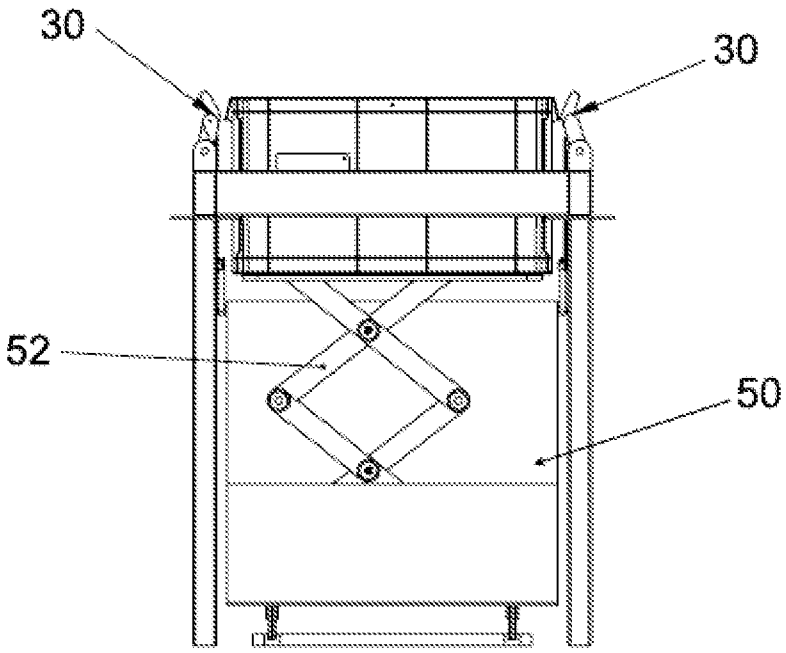


Figure 5

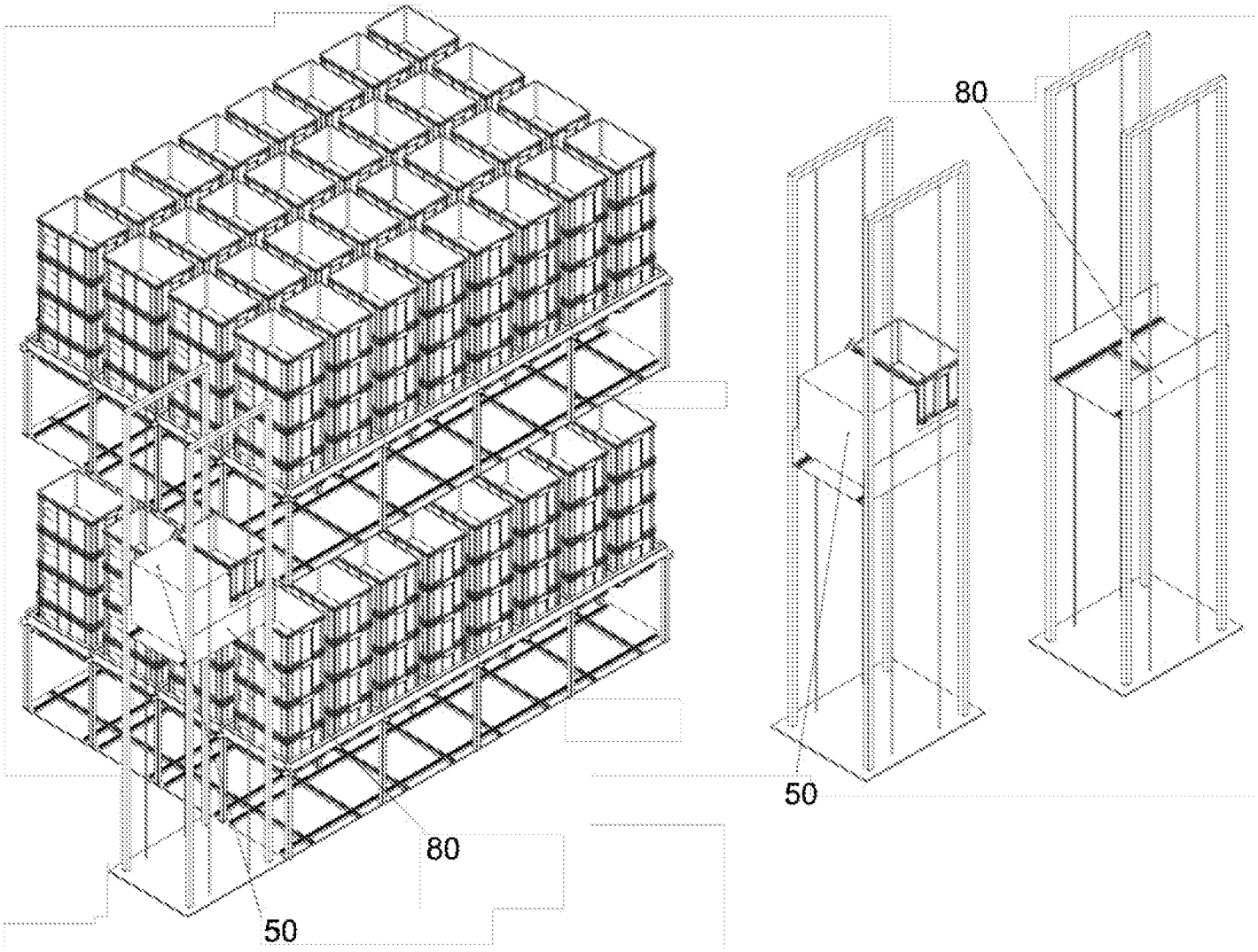


Figure 6

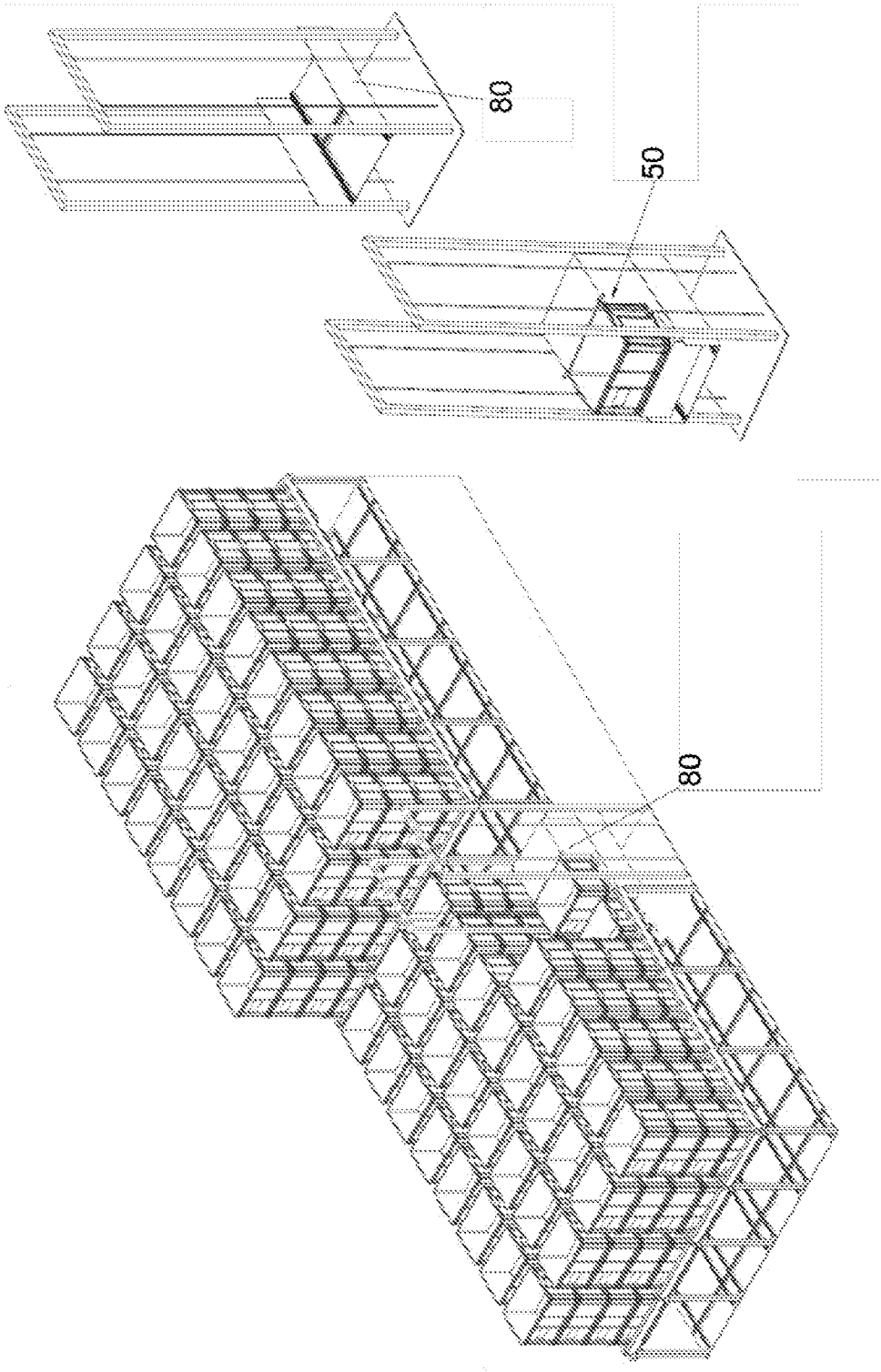


Figure 7

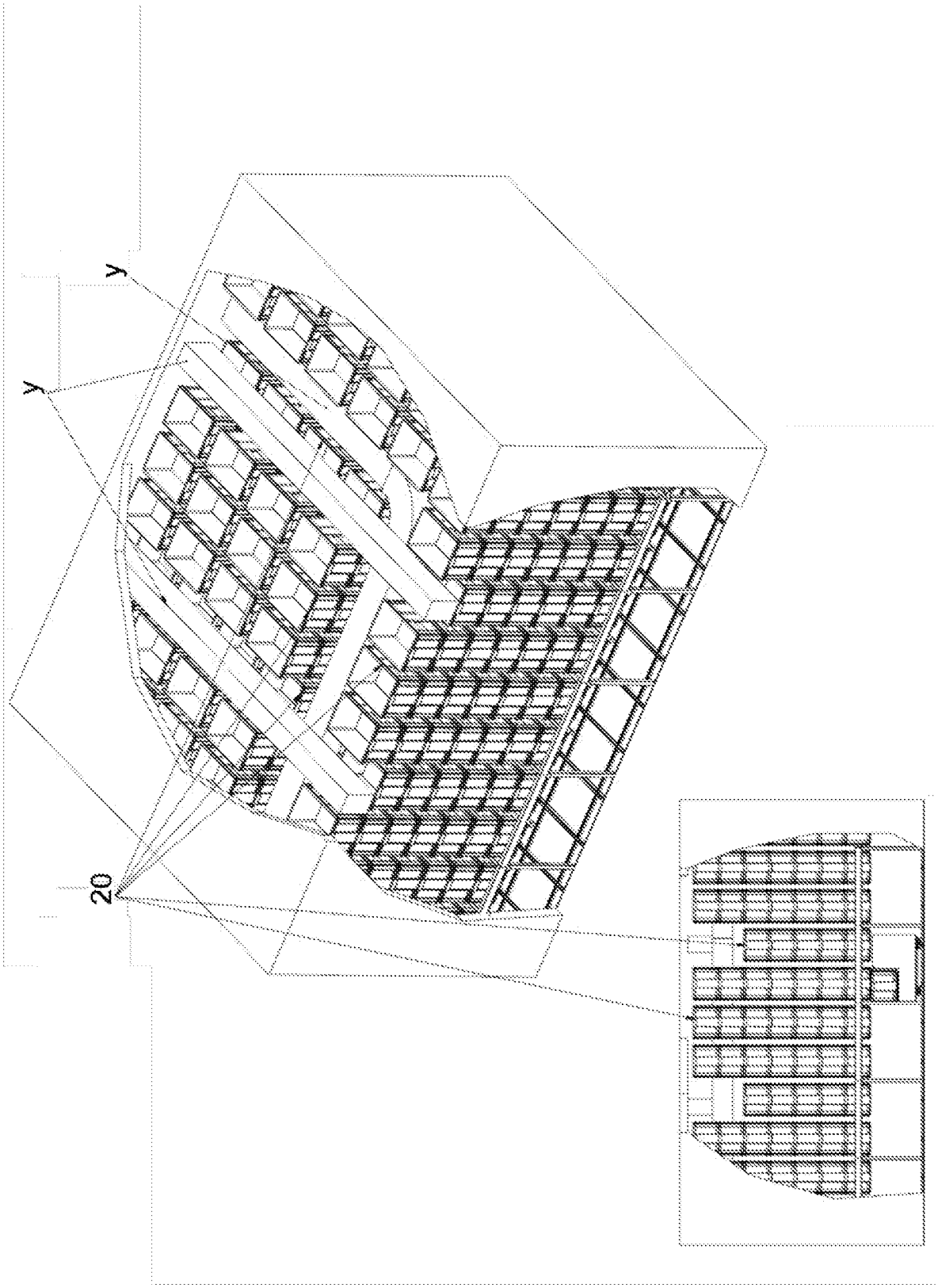


Figure 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/TR2021/051567

A. CLASSIFICATION OF SUBJECT MATTER

B65G 1/00 (2006.01)i; B65G 1/04 (2006.01)i; B65G 1/137 (2006.01)i; B65G 27/02 (2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

TURKPATENT Patent Databases

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO Abstract & Fulltext Databases & Keywords: programmable carrier robot, locking – unlocking mechanism, carrier profiles, container, rail system, storage system, lifting mechanism, wheel

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2019238641 A1 (AUTOSTORE TECH AS [NO]) 19 December 2019 (2019-12-19) Abstract, Figures	1-4
A	CN 112158507 A (ZHONGYUAN GLASS IND EQUIPMENT CO LTD DONGDAIHE NEW AREA LIAONING) 01 January 2021 (2021-01-01) Abstract, Figures	1-4
A	WO 2014090684 A1 (JAKOB HATTELAND LOGISTICS AS [NO]) 19 June 2014 (2014-06-19) Abstract, Figures	1-4

☐ Further documents are listed in the continuation of Box C.

☑ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 September 2022	**23 September 2022**

Name and mailing address of the ISA/TR

Turkish Patent and Trademark Office (Turkpatent)
Hipodrom Caddesi No. 13
06560 Yenimahalle
Ankara
Turkey

Telephone No. **+903123031000**
Facsimile No. **+903123031220**

Authorized officer

Erdal TEKİN

Telephone No. **+903123031587**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/TR2021/051567

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2019238641 A1	19 December 2019	NONE	
CN 112158507 A	01 January 2021	CN 112158507 B	12 April 2022
WO 2014090684 A1	19 June 2014	AU 2013357548 A1	21 May 2015
		AU 2013357548 B2	02 February 2017
		AU 2016204657 A1	21 July 2016
		AU 2016204657 B2	19 July 2018
		AU 2016219545 A1	08 September 2016
		AU 2016219545 B2	15 February 2018
		CA 2890843 A1	19 June 2014
		CA 2890843 C	12 February 2019
		CN 104837747 A	12 August 2015
		CN 104837747 B	31 May 2017
		CN 105947514 A	21 September 2016
		CN 105947514 B	10 July 2018
		CN 106241154 A	21 December 2016
		CN 106241154 B	10 August 2018
		DK 2928794 T3	15 April 2019
		DK 2962962 T3	06 June 2018
		DK 3070027 T3	07 January 2019
		DK 3372534 T3	07 March 2022
		EA 201591065 A1	30 November 2015
		EA 028798 B1	29 December 2017
		EA 201691434 A1	28 February 2017
		EA 031464 B1	31 January 2019
		EA 201691425 A1	28 February 2017
		EA 031514 B1	31 January 2019
		EP 2928794 A1	14 October 2015
		EP 2928794 B1	06 March 2019
		EP 2962962 A1	06 January 2016
		EP 2962962 B1	25 April 2018
		EP 3070027 A1	21 September 2016
		EP 3070027 B1	21 November 2018
		EP 3372533 A1	12 September 2018
		EP 3372534 A1	12 September 2018
		EP 3372534 B1	09 February 2022
		EP 3617097 A1	04 March 2020
		EP 3617098 A1	04 March 2020
		EP 3875404 A1	08 September 2021
		EP 3922581 A1	15 December 2021
		EP 3929109 A1	29 December 2021
		ES 2669600 T3	28 May 2018
		ES 2701327 T3	21 February 2019
		ES 2716310 T3	11 June 2019
		ES 2907792 T3	26 April 2022
		HK 1208660 A1	11 March 2016
		HK 1219260 A1	31 March 2017
		JP 2016506346 A	03 March 2016
		JP 6454645 B2	16 January 2019
		JP 2016183050 A	20 October 2016
		JP 6463307 B2	30 January 2019

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/TR2021/051567

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
		JP	2017001887	A	05 January 2017
		JP	6463308	B2	30 January 2019
		KR	20160106777	A	12 September 2016
		KR	102190138	B1	14 December 2020
		KR	20150094602	A	19 August 2015
		KR	102269692	B1	29 June 2021
		KR	20160087922	A	22 July 2016
		KR	102422134	B1	18 July 2022
		KR	20220103826	A	22 July 2022
		NO	20121488	A1	11 June 2014
		NO	335839	B1	02 March 2015
		PL	2928794	T3	30 August 2019
		PL	2962962	T3	31 August 2018
		PL	3070027	T3	28 February 2019
		PL	3372534	T3	04 April 2022
		TW	201429851	A	01 August 2014
		TW	I583612	B	21 May 2017
		TW	201708083	A	01 March 2017
		TW	I609832	B	01 January 2018
		TW	201708084	A	01 March 2017
		TW	I610873	B	11 January 2018
		US	2015307276	A1	29 October 2015
		US	9422108	B2	23 August 2016
		US	2016304278	A1	20 October 2016
		US	9656802	B2	23 May 2017
		US	2017129706	A1	11 May 2017
		US	9856082	B2	02 January 2018
		US	2017291803	A1	12 October 2017
		US	9862579	B2	09 January 2018
		US	2018072546	A1	15 March 2018
		US	10093525	B2	09 October 2018
		US	2019002255	A1	03 January 2019
		US	10494239	B2	03 December 2019
		US	2020031640	A1	30 January 2020
		US	10696478	B2	30 June 2020
		US	2020262649	A1	20 August 2020
		US	2022185584	A1	16 June 2022