

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

(19) World Intellectual Property
Organization
International Bureau



(10) International Publication Number
WO 2023/007212 A1

(43) International Publication Date
02 February 2023 (02.02.2023)

(51) International Patent Classification:

B25J 5/00 (2006.01)

(21) International Application Number:

PCT/IB2021/056787

(22) International Filing Date:

27 July 2021 (27.07.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(72) Inventors; and

(71) Applicants: **JAVAN, Abbasali** [IR/IR]; Isfahan (IR).
MIRBAGHERI, Hamidreza [IR/IR]; Tehran (IR).
ABRANDABADIZADEH, Seyedehtina [IR/IR]; Tehran (IR).

(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.

(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))

(54) Title: SMART ROBOT FOR CARRYING A SUPER HEAVY LOAD

(57) Abstract: The invention discloses an autonomous robot for carrying goods comprising a driving motor, cone rollers devised on the wheels, clamps and ultra weight sheets. The clamps are attached on the sides for gripping the goods. The ultra weight sheet s to withstand heavy loads.



WO 2023/007212 A1

SMART ROBOT FOR CARRYING A SUPER HEAVY LOAD

Technical Field

[0001] This invention belongs to the robots field ;and more specifically, to the smart robots used for transporting heavy materials .

This invention overlaps artificial intelligence, electrical and mechanical fields.

Background Art

[0002] As described in patent numberedUS20060106497 In a carrier robot system comprising a robot. which has a placement portion for placing an object presenting a low-profile form thereon and carries the object and a robot controller for controlling the robot, a jig mounted on the placement portion of the robot and having an image pickup member, an image processing portion for processing an image picked up by the image pickup member, and a superior control portion for controlling the robot controller and image processing portion from a superior position are provided.

[0003] In the other patent ,numberedUS4702661, the structure of carrier robot is studied. According to this patent, a robot carrier structure constituted by a portal wagon movable on rails and laterally supported by a pair of carriages each comprising a pair of wheels longitudinally coupled by motion transmission means actuated in synchronism by an electric motor. Further the two electric motors of the pair of carriages are so connected as to constitute an electric axis. Each wheel has a structure adapted to ensure a high adherence to the rail, particularly due to the provision of a pair of rings of elastomeric material engaging the rolling surface of the rail.

[0004] Another prior art ,numbered US20130209201,deals with carrier device whichin according to embodiments includes a carrier chamber that is provided with a plurality of connecting holes that are communicated with the outside, an articulated robot that is placed inside the carrier chamber, and a linear moving mechanism that makes at least the arm part of the articulated robot linearly move in a short side direction of the carrier chamber. The bottom end of the arm part of the articulated robot is provided on a base via an arm spindle to be rotatable horizontally and its leading end is provided with a hand that is rotatable horizontally and holds a board to be taken in and out via the connecting holes.

Summary of Invention

[0005] Accordingly, an object of the present invention is to provide a robot system which is so flexible to move in different directions and adjusts its height to carry loads in any size and material; even this autonomous carrier robot decreases its height to become

flat and go under heavy goods to lift them in an aligned way. The wheels of the said robot benefit from Sliding and rotating simultaneously to 360 degrees in longitudinal and transverse directions by using cone rollers and receiving commands from just one motor to move the goods without any damage.

Technical Problem

[0006] The safe shipping of heavy materials in places such as airports ,terminals and malls seems to be very important ;especially align lifting of goods is the point should be regarded.

[0007] At the current time, forklifts are used to carry goods, but they consume too much energy .The other matter is that forklifts are unable to move the goods so aligned that may lead to damage them .Conducting the forklifts needs especial proficiency ,and in some places goods are placed in low height places ,wherein their safe moving and lifting is too hard; hence ,the need to a flexible device capable of moving in different directions to facilitate the process of moving the goods in a safe way is felt.

Solution to Problem

[0008] To solve the mentioned problems, an autonomous robot is invented which is so flexible and economical ,this robot is also able to get flat and go under objects to lift even super weighty goods without any damage.

[0009] This robot is designed in a way that doesn't require much space and enjoy the ability to rotate simultaneously in different directions to lift and carry the goods.

Advantageous Effects of Invention

[0010] The said invention benefits from the ability to decrease the height and even go under the heavy objects to lift them .Sliding and rotating simultaneous movements to 360degrees in longitudinal and transverse directions by using cone rollers and receiving commands from just one motor are considered as advantages of this invention .In addition , smart changeability of clamps due to weight of goods is regarded as another advantages of the said robot in comparison to the other current samples.

[0011] Considering different situations ,this smart carrier robot enjoys the ability to operate both electrically and manually. This robot consumes the least amount of energy.

[0012] It is also worth mentioning that in this developed generation of robots , ultralight sheets which are of cut mesh structure are used. This kind of especial structure allows the carrier robot to tolerate super heavy loads to lift and carry.

[0013] This device functions so accurately with minimum error rate ;hence ,it can be replaced man power.

Brief Description of Drawings

[0014] Fig1.It shows the oblique view of the body .

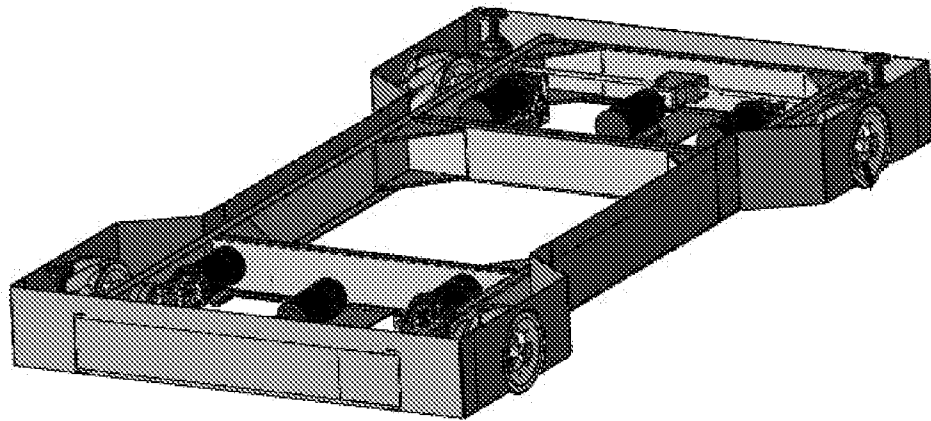


Fig2.It shows the top view of the invention.

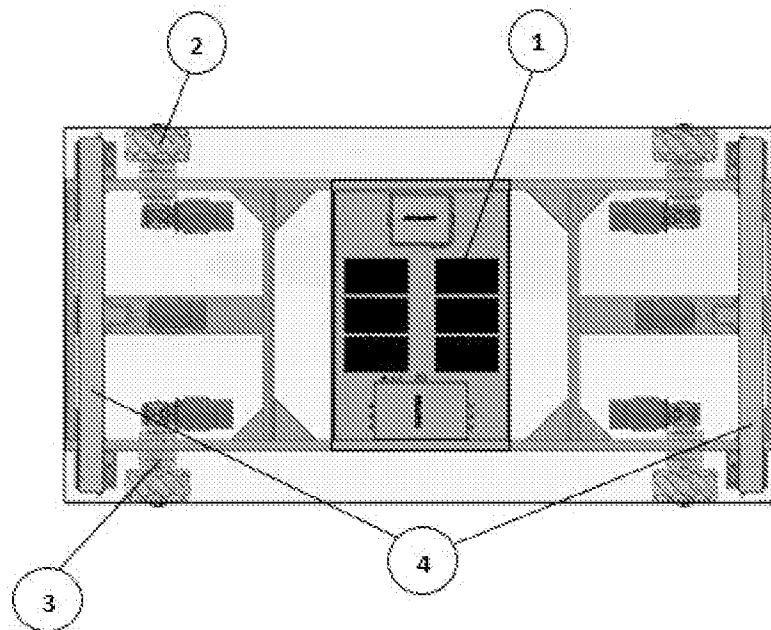
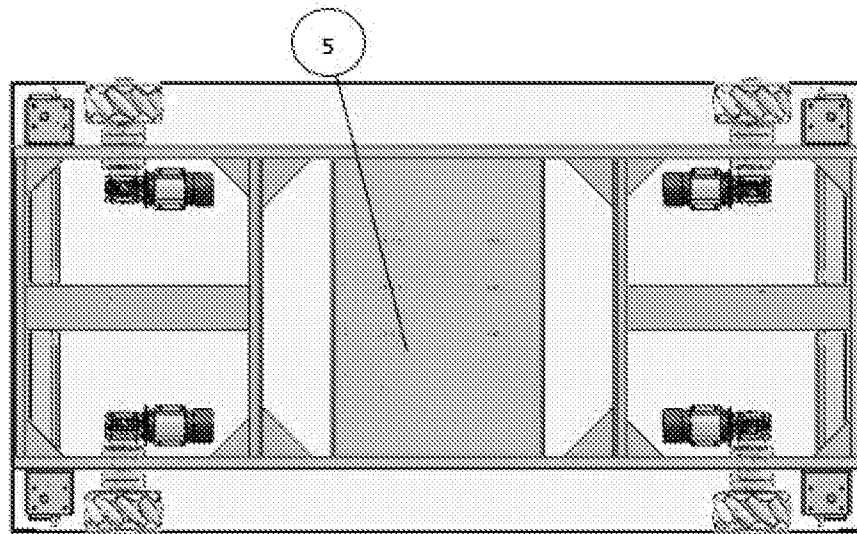


Fig3.It shows the schematic view of the invention.



Description of preferred Embodiments

[0015] The present invention is best understood by the description set forth herein. To achieve the foregoing and in accordance with the purpose of the invention, and to overcome the problems and shortcomings associated with the prior art, a variety of the most important embodiments are described here. The current invention presents an autonomous robot designed for aligned carriage of heavy loads. The motor 1 commands the cone rollers 3 devised on the wheels 2 connected to the body of the device. These embodiments are designed to move in different angles in longitudinal and transverse directions, they also benefit from the ability to rotate simultaneously to 360 degrees. Flexible clamps 4 are devised in the robot which smartly change due to weight of the item to lift it. Ultraweight sheets 5 are used in this robot to facilitate the process of lifting and evacuation of super heavy goods.

Industrial Applicability

[0016] Considering the increasing rate of governments interactions and consequently exporting and importing of goods, the importance of safe transportation and delivery of goods becomes more clear, so definitely it can be stated that this smart robot is so practical in different places such as exhibitions, public places to disclose the equipments, stores, workshops, exhibitions, car dealerships, terminals, airports, customs, shipping docks, train stations to transport commodities safely.

Claims

- [Claim 1] current invention presents an autonomous robot which is used to carry goods in any size and weight .This smart robot aligns the goods and lifts them without any harm. This device comprises: motor, wheels, roller cones ,clamps ,ultralight sheets.
- [Claim 2] As claimed in claim1,wheels are connected to the body of the robot to carry super heavy loads with simultaneous movements.
- 3-As claimed in claim1,the motor commands the cone rollers to move sliding and rotating to 360 degrees.
- 4-As claimed in claim1 and2 ,cone rollers are devised on the wheels of the robot.
- 5-As claimed in claims1,2,3.cone rollers rotate to 360degrees in longitudinal and transverse directions.
- 6- claimed in claim1 , different smart clamps are devised on the said robot to grip the goods to lift and carry.
- 7-As claimed in claim5, smart clamps are flexible to change due to weight of goods.
- 8-As claimed in claim1,ultraweight sheets are used in the robot are of cut mesh structure.
- 9- As claimed in claim7,the cut mesh structure allow the ultraweight sheets to withstand super heavy loads
- 10-As claimed in claim1,the said autonomous robot enjoys the ability to decrease its height to go under heavy goods to lift and carry them.
- 11-As claimed in claim9,the robot is so flexible to get flat to go under super goods to lift and carry.
- 12-The robot claimed in prior claims, aligns the goods to carry them without any damage.
- 13-Asclaimed in claim1, the robot functions both automatically and manually.
- 14-The smart control system of the invention causes it to change its height due to the weight of the goods.
- 15-This smart robot is so user-friendly and needs no especial proficiency to work with, and users are able to run it in different circumstances.
- 16-This smart carrier robot takes up little space.
- 17-This smart carrier robot consumes the least amount of energy.
- 18-This smart carrier robot moves in all directions simultaneously to

run the process of carriage and evacuations.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2021/056787

A. CLASSIFICATION OF SUBJECT MATTER

B25J5/00 Version=2022.01

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)

B25J

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

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

PatSeer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 208880695 U (XIAN UNIV OF TECHNOLOGY) 21 MAY 2019 (21.05.2019) English Translation of Description from Espacenet; Figures: 1-3;	1-18
Y	KR 101454005 B1 (HAN SOI INSPECTION ENGINEERING CO LTD, UNIV CHOSUN IACF) 22 OCT 2014 (22.10.2014) English Translation of Paragraphs [0084]-[0093] as per Espacenet; Figure:6;	1-18

 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

29-09-2022

Date of mailing of the international search report

29-09-2022

Name and mailing address of the ISA/

Indian Patent Office
Plot No.32, Sector 14, Dwarka, New Delhi-110075
Facsimile No.

Authorized officer

Sreedhar Panchumarthi

Telephone No. +91-1125300200