

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
12 December 2019 (12.12.2019)



(10) International Publication Number
WO 2019/232613 A1

(51) International Patent Classification:

B65G 1/04 (2006.01) *B65G 1/02* (2006.01)
B25J 5/02 (2006.01) *B65G 1/137* (2006.01)
B25J 9/18 (2006.01)

(21) International Application Number:

PCT/CA2019/050404

(22) International Filing Date:

03 April 2019 (03.04.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/682,691 08 June 2018 (08.06.2018) US
62/770,788 22 November 2018 (22.11.2018) US

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(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, 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, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

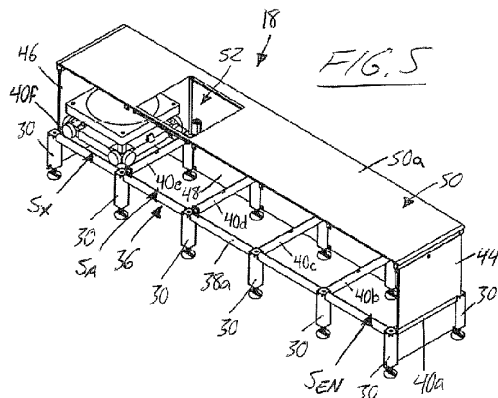
(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,

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: IMPROVED STORAGE AND RETRIEVAL SYSTEMS



(57) Abstract: An improved storage and retrieval system employ-
ing a gridded three-dimensional storage structure features worksta-
tions served by the same robotic vehicle fleet that serves the storage
structure, travel-through workstations using the same robotic vehi-
cles to carry storage units through the workstation without hand-
off to any other conveyor or handler, internal sortation using or-
chestrated navigation of the robotic vehicles to workstation intake
points, sensors on the robotic vehicles to confirm proper loading
and alignment of storage units thereon, lifting mechanisms for rais-
ing the robotic vehicles into shafts of the grid from a lower track
thereof, use of markers and scanners to align the robotic vehicles
with the grid shafts, and workstation light curtains for hand safety,
pick-counting and container content protrusion detection.

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