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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 September 2018 (13.09.2018)

WIPO | PCT

(10) International Publication Number
WO 2018/164646 A1

(51) International Patent Classification:
E04B 1/61 (2006.01) *E04B 1/08* (2006.01)
E04B 2/74 (2006.01)

(21) International Application Number:
PCT/TR2017/000041

(22) International Filing Date:
22 March 2017 (22.03.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2017/03733 10 March 2017 (10.03.2017) TR

(71) Applicant: **MMS MODÜLER VE MOBIL SİSTEMELER SAN. VE TİC. A. Ş.** [TR/TR]; Kemalpaşa Org. San. Bolg. M. K. A. Mah. Kemalpaşa Asfaltı 2 Çıkmazı No:4, Kemalpaşa/İzmir (TR).

(72) Inventors: **KAVAKDAN, Ali Osman**; Kemalpaşa Org. San. Bolg. M. K. A. Mah. Kemalpaşa Asfaltı 2 Çıkmazı No:4, Kemalpaşa/İzmir (TR). **KAVAKDAN, Selim**; Kemalpaşa Org. San. Bolg. M. K. A. Mah. Kemalpaşa Asfaltı 2 Çıkmazı No:4, Kemalpaşa/İzmir (TR).

(74) Agent: **BEKTAS, Alparslan**; Birlik Patent Marka Danişmanlik Hizmetleri, Ticaret Limited Şirketi, Mansuroğlu Mah. 289 Sok. No:2 D.118 Körfez iş Merkezi, 118 Bayrakli/Izmir (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, 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,

(54) Title: SMART STEEL PANEL AND ASSEMBLY SYSTEM

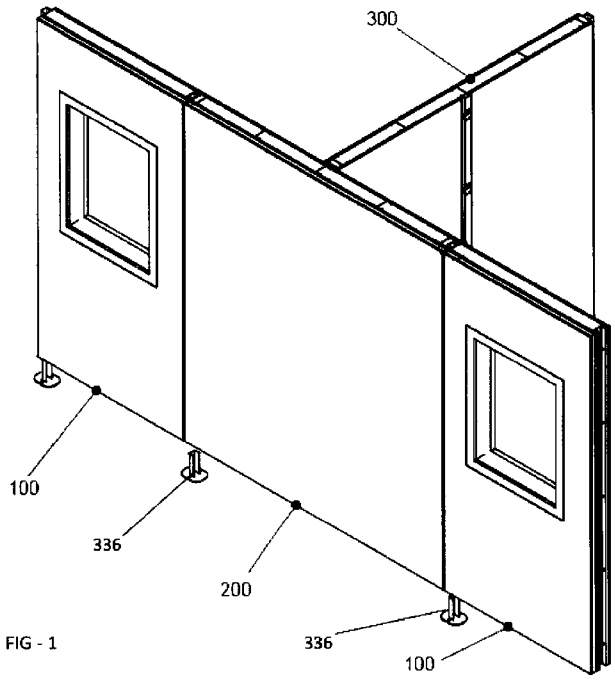

FIG - 1

(57) Abstract: The invention relates to a prefabricated modular steel and panel assembly embodiment with a prefabricated modular steel and panel structure developed for the installation of the prefabricated modular steel and panel structures in a rapid manner in the building construction and wall industry, wherein said embodiment enables the walls and floorings or any steel panel, sandwich panel and insulated panel, etc. to be joined together in a modular manner in line with the design or allows the joining of the same in the form of a kit.

WO 2018/164646 A1

[Continued on next page]

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))*

SMART STEEL PANEL AND ASSEMBLY SYSTEM

DESCRIPTION

Technical Field

The invention relates to a prefabricated modular steel and panel assembly embodiment with a prefabricated modular steel and panel structure developed for the installation of the prefabricated modular steel and panel structures in a rapid manner in the building construction and wall industry, wherein said embodiment enables the walls and floorings or any steel panel, sandwich panel and insulated panel, etc. to be joined together in a modular manner in line with the design or allows the joining of the same in the form of a kit.

State of the Art

The living quarters made from the prefabricated modular steel and panels, which are frequently preferred to meet today's needs for use in particular, have now become able to be used for longer durations owing to the improvement in the technology and in the quality of the material. These constitute a structural model that is substantially suitable for the shelters used in cases of emergency action, earthquake, flood and fire, for the accommodation of the refugees, for the accommodation of the staff, for the residences, villas, offices and warehouses and for the other social activities and that also has a commercial market on the global scale. The need has emerged to provide a novel design for the steel and panel assembly systems as a result of the assembly technique according to the state of the art having many different forms of application as well as disadvantages.

Regarding the installation of such living quarters, the reasons like the faulty workmanship in the on-site assembly installation of the steel panels, sandwich panels, insulated panels, etc., the resolution and practice of the coating details on site, extended labor durations and labor losses, time losses experienced during the coating depending on the ambient weather conditions, occupational safety and strength losses cause the tendency to employ novel designs. Moreover, it is not possible to obtain the economical structures with the existing practices as a result of the losses of energy and time associated with the delivery of the facing materials from the storage areas of the factories to the site where the structure is to be installed. Further, the problem arises regarding the sale and shipment of the products to the international market due to the issues related to the shipment of the products to the international market and the logistic issues. The structure and its assembly is not functional, and further, the structures emerge, which may be erected only in long durations of time and which are not manufactured as ready to use prefabricated items.

The application no. "2015/14293" found as a result of the technical search relates to a structure having modular panel units intended for construction. Said application relates to a smart steel panel

and assembly embodiment, which comprises the connecting members intended for the interlocking of the specially designed connecting profiles mounted to the steel panels, sandwich panels, insulated panels, etc. The abstract of said application includes the following phrases: "A panel unit (2) intended for structural purposes comprises at least two connecting flanges (10, 12), which are positioned at the common corner of said panel unit or adjacent to the same and which protrude in opposite directions. Such two panel units (2) may be positioned side by side according to an end to end arrangement and there is fixed a two-part connecting member (17), which comprises a base portion adapted to fit a fixed structural member (20) and to attach the flanges on a first surface (49) of the panel units (2) and a cap portion (19) adapted to attach the flanges (12) on the opposing surface (4) of the panel units (2) and fit the same to the base portion."

The invention relates to a modular panel assembly embodiment with a prefabricated modular steel and panel structure developed for the installation of the prefabricated modular steel and panel structures in a rapid manner in the building construction and wall industry, wherein adequate strength is provided by way of fitting the male and female connecting members of said panels such that they are engaged with one another.

Object of the Invention

The present invention relates to a smart steel panel and assembly embodiment, which meets the aforesaid requirements, eliminates all the disadvantages and provides some additional advantages.

The primary object of the smart steel panel and assembly embodiment according to the invention is to enable easy and rapid installation of the prefabricated modular steel and panel structures in completed form (along with coatings and/or accessories) in the national and international sites owing to the manufacture involving a readymade system fabrication.

Another object of the invention is to provide savings in the labor costs.

Another object of the invention is to provide the advantage of a sustainable manufacture and export.

Another object of the invention is to provide the possibility of convenient and easy assembly in any place in the world.

Another object of the invention is to provide the ability to perform off-the-site coating and accessory assembly procedures (in a factory site) independent from the weather conditions and ambient conditions.

Still another object of the invention is to provide advantages in terms of easy transportation and logistics.

Still another object of the invention is to provide the strength and rigid connections.

Still another object of the invention is to enable the faulty workmanship to be minimized.

Still another object of the invention is to provide savings in time and economy owing to the easy and rapid assembly and the low requirement for labor.

Yet another object of the invention is to provide the advantage of an ergonomic and concept-based design.

Yet another object of the invention is to enable the production of the energy saving steel and panels with insulation, which are finished as prefabricated in a factory and which are able to be designed according to various climate conditions.

Yet another object of the invention is to provide advantages in terms of architectural interior design and exterior design.

Figures to Aid in Understanding the Invention

The present invention should be considered along with the figures, the descriptions for which are provided below, in order to best understand the embodiment of the invention and the advantages thereof along with the additional members.

Figure – 1: An overall assembly view of the panel assembly embodiment according to the invention.

Figure – 2: An exploded outline view of the panel assembly embodiment according to the invention within a wall.

Figure – 3: An outline view of the intermediate connecting piece of the panel assembly embodiment according to the invention.

Figure – 4: An outline view of the male connecting piece of the panel assembly embodiment according to the invention.

Figure – 5: An outline view of the female connecting piece of the panel assembly embodiment according to the invention.

The figures are not necessarily drawn to scale and it is possible that some details not necessary to understand the invention may have been omitted. Moreover, the members that are at least substantially identical or that have at least substantially identical functions are represented by the same reference numerals.

Part Reference Numerals

100. Exterior wall

200. Intermediate wall

300. Interior wall

310. Exterior coating

320. Interior coating

330. Steel panel

331. Female connecting apparatus

332. Male connecting apparatus

333. Connecting bracket

334. Interior wall connecting apparatus

335. Connection space

336. Connection tab

337. Gasket insulating strip

Detailed Description of the Invention

The invention relates to a prefabricated modular steel and panel assembly embodiment with a prefabricated modular steel and panel structure developed for the installation of the prefabricated modular steel and panel structures in a rapid manner in the building construction and wall industry, wherein said embodiment enables the walls and floorings or any steel panel, sandwich panel and insulated panel, etc. to be joined together in a modular manner in line with the design or allows the joining of the same in the form of a kit.

Said embodiment is comprised by an exterior wall (100), an intermediate wall (200) and an interior wall (300) constituting the modular structure. Said exterior wall (100) is a component, which forms the exterior facing of the structure and has a window opening or door opening, and said interior wall (300) is the building component, which forms the interior facing of the structure and enables the room partitions to be made within the structure. The connection of the interior wall (300) with the exterior facing is provided by the intermediate wall (200). The intermediate wall (200) is able to be engaged one within the other with both interior and exterior walls (100, 300) and it enables the formation of a resistant structure by way of being fitted to the exterior wall (100) by means of the side connections and by way of being fitted to the interior wall (300) via the interior facing thereof.

Said walls (100, 200, 300) are constituted by the exterior coating (310), interior coating (320) and steel panel (330) during their formation. Said steel panel (330) has a framed structure and it forms the framework of the wall's interior. Owing to the male and female connecting apparatus (331, 332)

located on the sides of the steel panel (330) and the interior wall connecting apparatus (334) located on the panel, the connection between the walls (100, 200, 300) is provided.

During the assembly, the strength of the structure is increased by way of engaging the male connecting apparatus (332), which is located on any wall side, in the female connecting apparatus (331). Said increase of strength is achieved by the connection space (335) and the connection tabs (336) present on the respective connecting apparatus (332, 334). The male connecting apparatus (332) and the interior wall connecting apparatus (334) bear the connection spaces (335), which are positioned at certain intervals. The female connecting apparatus (331) in turn bear the connection tabs (336), which are also positioned at certain intervals and which are engaged in the connection spaces (335) present on the male and intermediate connecting apparatus (332, 334) during assembly. During the assembly, a structure with greater strength is enabled to be obtained by way of engaging said connection tabs (336) in the connection spaces (335) on the horizontal axis and shifting the same along the vertical axis. The connection of the walls (100, 200, 300) with the base is provided by means of the connecting bracket (333) in the lower region of the steel panels (330), said connecting bracket extending downward. By means of the gasket insulating strips (337), which are placed on the side surfaces of the male connecting apparatus and which have the same length as that of said apparatus, the side surfaces of the male and female connecting apparatus (331, 332) are enabled to contact each other in the desired manner during the assembly and the inner surfaces of said male and female connecting apparatus (331, 332) are enabled to be protected from the dust, dirt, etc. likely to reach from the outside after the assembly, said gasket insulating strips also serving the purpose of preventing the formation of the thermal bridges and providing the insulation. The gasket insulating strips (337) may vary according to the climate conditions in the site where the project is to be implemented and they may also be removed altogether to provide a direct surface-to-surface connection with the female connecting apparatus (331) and the male connecting apparatus (332). The male and female connecting apparatus (331, 332) enable the structure to have strength along the horizontal axis, while the connecting brackets (333) perform this function along the vertical axis.

CLAIMS

1. The invention relates to a prefabricated modular steel and panel assembly embodiment with a prefabricated modular steel and panel structure developed for the installation of the prefabricated modular steel and panel structures in a rapid manner in the building construction and wall industry, said embodiment enabling the walls and floorings or any steel panel, sandwich panel and insulated panel, etc. to be joined together in a modular manner in line with the design or allowing the joining of the same in the form of a kit, characterized in that it comprises

- the exterior walls (100), which form the exterior facing of the structure and have window openings or door openings,
- the interior wall (300), which forms the interior facing of the structure and enables the room partitions to be made within the structure, and
- the intermediate walls (200), which are able to be engaged one within the other with both interior and exterior walls (100, 300) and which enable the formation of a resistant structure by way of being fitted to the exterior wall (100) by means of the side connections and by way of being fitted to the interior wall (300) via the interior facing thereof.

2. A modular steel and panel assembly embodiment according to Claim 1 characterized in that it comprises a steel panel (330) within said walls (100, 200, 300), said steel panel having a framed structure and enabling the framework of the wall's interior to be formed.

3. A modular steel and panel assembly embodiment according to Claim 1 characterized in that it comprises the male, female and interior wall connecting apparatus (331, 332, 334), which are located on the sides of said steel panel (330) and which enable the walls (100, 200, 300) to be engaged with each other, thereby enabling a structure having strength along the horizontal axis to be obtained.

4. Male, female and interior wall connecting apparatus (331, 332, 334) according to Claim 3 characterized in that

- said male and intermediate connecting apparatus (332, 334) comprise the connection spaces (335), which are positioned at certain intervals, and
- said female connecting apparatus (331) comprise the connection tabs (336), which are positioned at certain intervals.

5. A modular steel and panel assembly embodiment according to Claim 1 characterized in that a structure with greater strength is obtained by way of engaging said connection tabs (336) in the connection spaces (335) on the horizontal axis and shifting the same along the vertical axis.

6. A modular steel and panel assembly embodiment according to Claim 1 characterized in that it comprises the connecting brackets (333) in the lower region of said steel panels (330), said connecting brackets extending downward and enabling the structure to have strength along the horizontal axis.

5

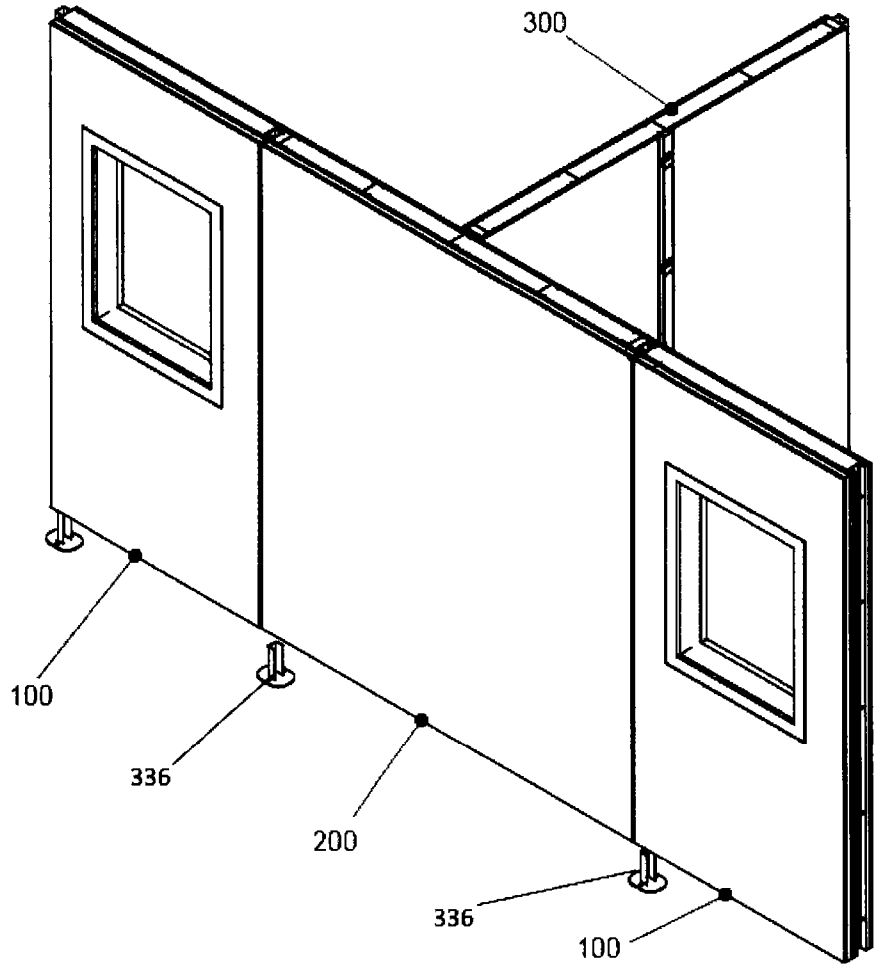

FIG - 1

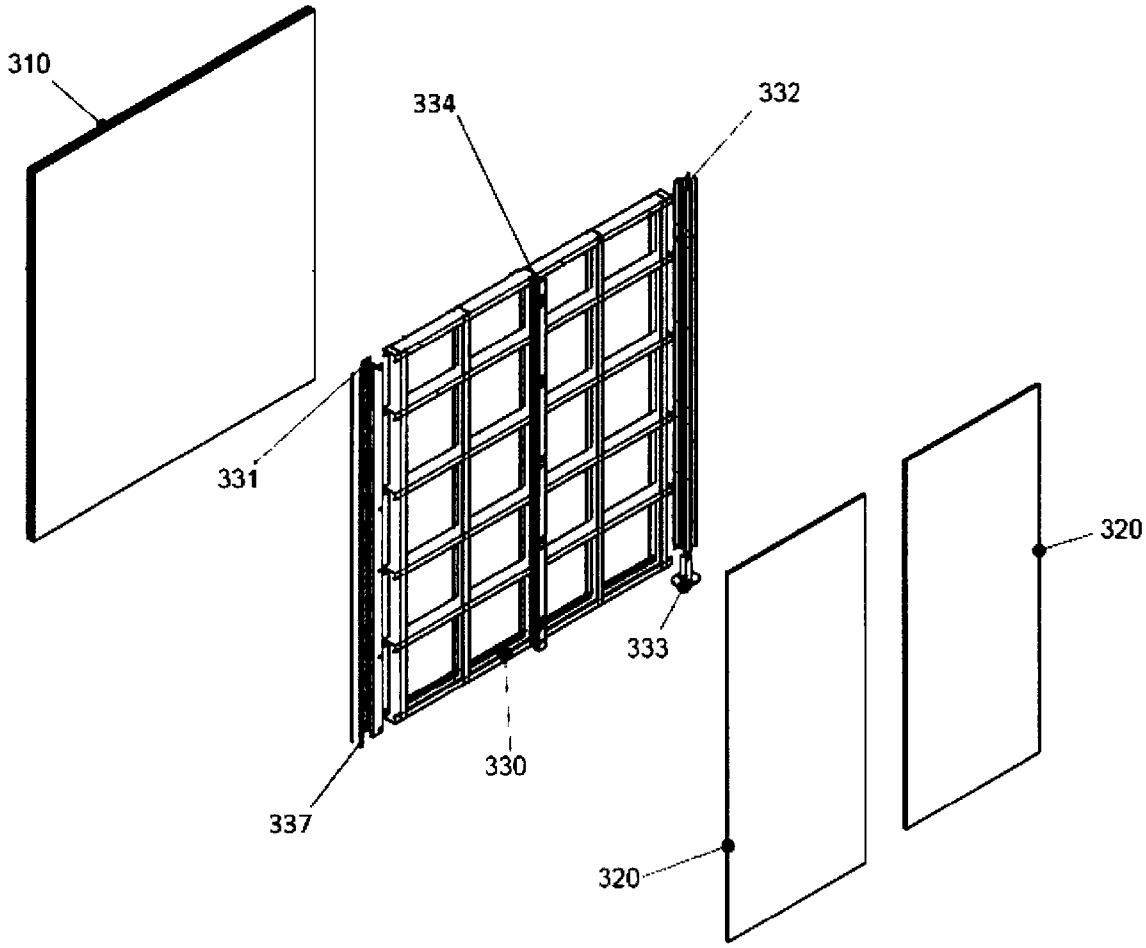

FIG – 2

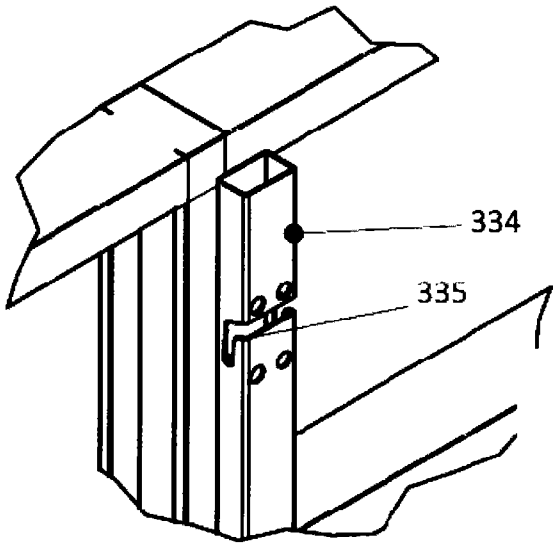

FIG – 3

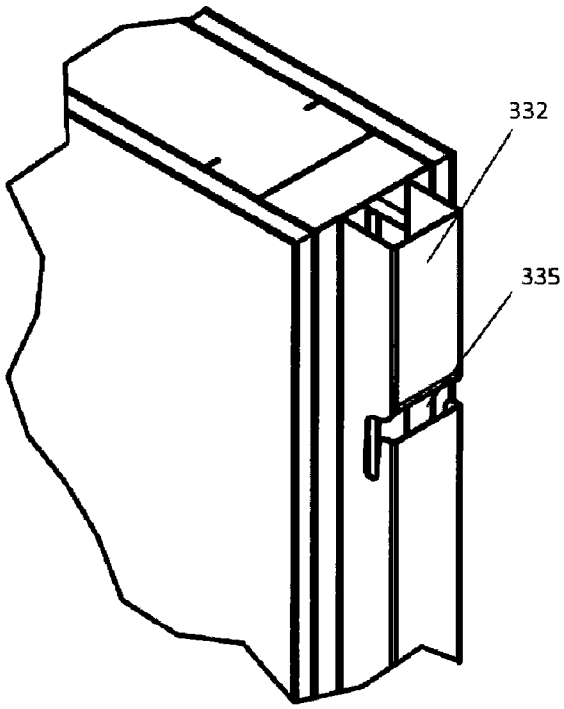

FIG – 4

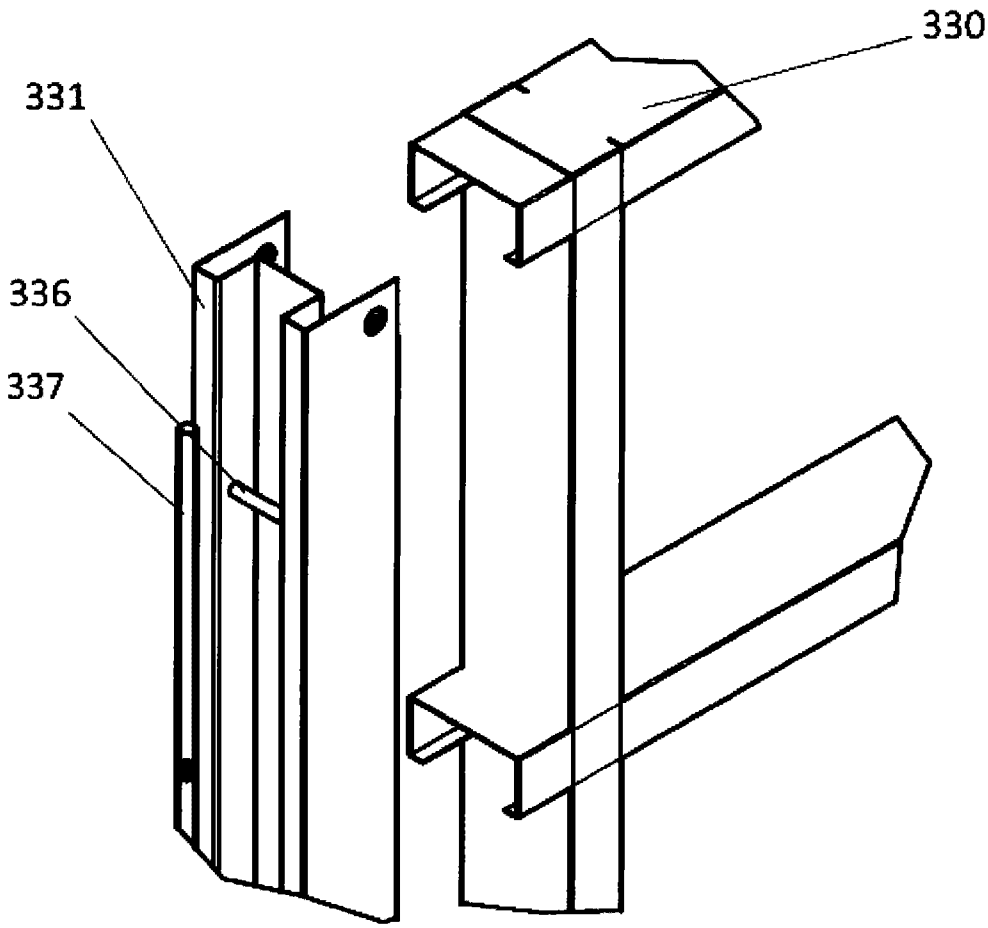

FIG – 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/TR2017/000041

A. CLASSIFICATION OF SUBJECT MATTER
INV. E04B1/61 E04B2/74 E04B1/08
ADD.

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)
E04B

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/107712 A1 (INOUE TADASHI [JP] ET AL) 12 May 2011 (2011-05-12) paragraph [0079] - paragraph [0119]; figures 1-7	1-6
X	US 5 054 255 A (MANINFIOR HERBERT E [US]) 8 October 1991 (1991-10-08) column 1, line 20 - line 23 column 4, line 50 - column 12, line 2; figures 1-10	1-6
X	EP 2 434 068 A2 (PRINCIPLE HOLDINGS LTD [GB]) 28 March 2012 (2012-03-28) abstract; figures 1, 5-11	1-6

☐ 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

"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
27 November 2017	04/12/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Galanti, Flavio

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/TR2017/000041

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011107712 A1	12-05-2011	BR PI0919383 A2	12-01-2016
		CN 102037195 A	27-04-2011
		JP 4944937 B2	06-06-2012
		JP 2010168887 A	05-08-2010
		US 2011107712 A1	12-05-2011
		WO 2010073896 A1	01-07-2010
US 5054255 A	08-10-1991	NONE	
EP 2434068 A2	28-03-2012	EP 2434068 A2	28-03-2012
		US 2012073233 A1	29-03-2012
		US 2015020470 A1	22-01-2015
		US 2017292266 A1	12-10-2017