



(43) International Publication Date
26 January 2017 (26.01.2017)

- (51) International Patent Classification:
B65G 21/08 (2006.01) *B65G 39/12* (2006.01)
- (21) International Application Number:
PCT/EP2016/066777
- (22) International Filing Date:
14 July 2016 (14.07.2016)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
PA 2015 70478 17 July 2015 (17.07.2015) DK
- (71) Applicant: FLSMIDTH A/S [DK/DK]; Vigerslev Alle 77,
2500 Valby (DK).
- (72) Inventors: OLSEN, Anders; Krebsevej 51, 2650
Hvidovre (DK). SØRENSEN, Henrik; Sydkærsvej 15,
2650 Hvidovre (DK). NIELSEN, Kim Dyreborg;
Landevejen 113, 4060 Kirke Saaby, SJ (DK).
MIKKELSEN, Mads; Bodil Ipsensvej 6, 3tv, 2500 Valby
(DK). RASMUSSEN, Anders Bejder; H. C. Ørstedes vej
54A 1.mf, 1879 Frederiksberg (DK).
- (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, 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, KN, KP, KR,
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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))

(54) Title: A COVERED BELT CONVEYOR WITH AN ADJUSTABLE IDLER FRAME AND A METHOD FOR SAFELY ADJUSTING THE SAME

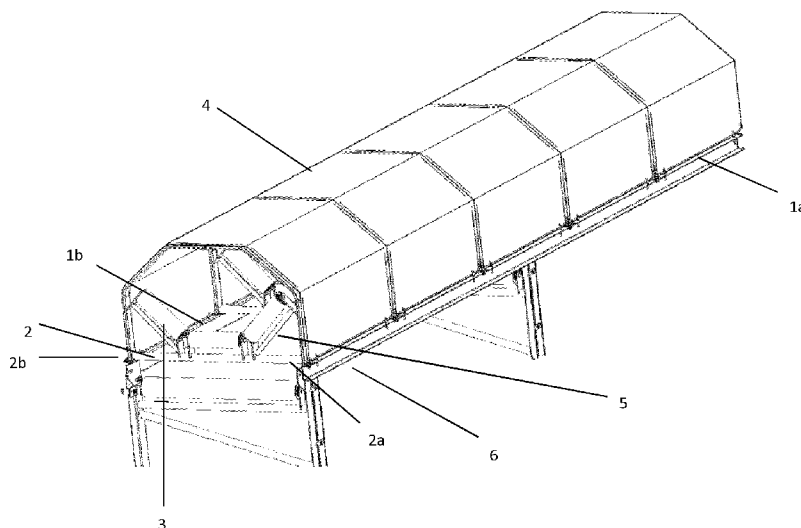


FIGURE 2

(57) Abstract: A covered belt conveyor comprising a belt; a cover (4); a base frame (1) having a first longitudinal rail (1 a) and a second longitudinal rail (1 b); and an idler frame (2). The cover (4) defines an inside un-safe region (5) inside the cover (4) and an outside safe region (6) outside the cover (4), wherein the idler frame (2) is attached to the base frame (1) in the outside safe region (6) outside the cover (4) such that the idler frame (2) may be adjusted during operation of the covered belt conveyor without entering the inside un-safe region (5) inside the cover (4). Also provided is a method for correcting the misalignment of a moving conveyor belt on such a covered belt conveyor.

A COVERED BELT CONVEYOR WITH AN ADJUSTABLE IDLER FRAME AND A METHOD FOR SAFELY ADJUSTING THE SAME

FIELD OF THE INVENTION

5

This invention relates to a covered belt conveyor intended for the transport of bulk materials, for example in the mining, cement and minerals industries.

BACKGROUND OF THE INVENTION

10

Belt conveyors are used to transport bulk materials. In the overland transportation of bulk materials it has been found that the use of long stretches of belt conveyors are a cost efficient and reliable method of transporting materials from place to place. In the in-plant transportation of bulk material it is often the only solution possible.

15

Typical belt conveyors have base frames on which one or more idler frames are mounted. The idler frames support idlers which support a belt on which the bulk material moves. Many belt conveyors also have covers for covering part or all of the conveyor belt / idlers e.g. in order to protect the bulk material on the belt from the weather elements, to shield belt operators and maintenance personnel from the running belt and material being transported thereon and to reduce the amount of dust.

20

25

Quite frequently the belt on a belt conveyor can become misaligned on the idlers, e.g. it may pull to one side or another and not be centered. Accurate alignment is necessary to insure proper operation of the belt conveyor and efficient transportation of bulk materials.

30

Belt training is a process of adjusting idlers in a manner which will correct the belt position and will correct any tendency of the belt to become misaligned or run off the idlers. One technique for training a belt of a belt conveyor is called knocking, in which the idler frames are adjusted which causes increased friction between

the knocked idler and the conveyor belt which in turn forces the belt back towards the middle of the idlers / idler frame. However, it is required that the knocking procedure be completed when the belt is running and preferably loaded with bulk material. As such, this procedure can pose significant safety risks to
5 maintenance personnel by exposing such personnel to moving parts and debris.

Additionally, in order to knock the idler frames in a belt conveyors with a cover, many regulations and safety procedures require that the cover be lifted, opened or removed in order to access and knock the idler frames. Lifting, opening or
10 removing the cover is time consuming and can also pose safety risks to maintenance personnel.

There are currently no guidelines or procedures on how to quickly, safely and effectively knock or adjust idlers on sites with covered belt conveyors and the
15 industry and customers have been and are still demanding a solution to the problem.

It will be clearly understood that any reference herein to background material or information, does not constitute an admission that any material, information,
20 forms part of the common general knowledge in the art, or is otherwise admissible prior art.

OBJECT OF THE INVENTION

It is an object of the invention to overcome or at least alleviate one or more of the
25 above problems and/or provide the consumer with a useful or commercial choice.

SUMMARY OF THE INVENTION

A covered belt conveyor is provided. The covered belt conveyor may comprise: a belt supported by a plurality of idlers; a cover for preventing user access to the belt and idlers during operation as a safety measure as well as covering the belt ,
30 idlers and transported bulk material from surrounding weather conditions; a base frame for supporting the plurality of idlers, the base frame extending in a

longitudinal direction of the covered belt conveyor having a first longitudinal rail and a second longitudinal rail, the first longitudinal rail being substantially parallel to the second longitudinal rail; an idler frame for supporting the idlers on the base frame, the idler frame extending in a transverse direction substantially normal to the longitudinal direction, the idler frame having a first frame attachment portion, a second frame attachment portion and at least one idler attached to the idler frame, wherein the first frame attachment portion is attached to the first longitudinal rail and the second frame attachment portion is attached to the second longitudinal rail; the cover defining an inside un-safe region inside the cover and an outside safe region outside the cover; wherein the idler frame is attached to the base frame in the outside safe region outside the cover such that the idler frame may be adjusted during operation of the covered belt conveyor without entering the inside un-safe region inside the cover.

Other details, objects, and advantages of the invention will become apparent as the following description of certain present exemplary embodiments thereof and certain present exemplary methods of practicing the same proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention, by way of example only, will be described with reference to the accompanying drawings in which:

Figure 1 shows an overview of an exemplary embodiment of a base frame of the covered belt conveyor contemplated herein.

Figure 2 shows an isometric side view of an exemplary embodiment of the covered belt conveyor contemplated herein.

Figure 3 shows an isometric bottom view of overview of the covered belt conveyor shown in Figure 2.

Figure 4 shows a cross sectional view of an exemplary embodiment of the covered belt conveyor contemplated herein.

Figure 5 shows a close-up side view of an exemplary embodiment of the cover and the attachment portion of the covered belt conveyor contemplated herein.

Figure 6 shows another close-up side view of an exemplary embodiment of the cover and the attachment portion of the covered belt conveyor contemplated
5 herein.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Figures 1 through 6, exemplary embodiments of a covered belt conveyor are shown. Figure 1 depicts an exemplary embodiment of a base frame (1) of the covered belt conveyor. The base frame (1) is constructed to
10 support a plurality of idlers (3) as shown in e.g. Figures 2-4. The base frame (1) extends in the longitudinal direction of the covered belt conveyor. The base frame (1) may have a first longitudinal rail (1a) and a second longitudinal rail (1b). In an exemplary embodiment, the first longitudinal rail (1a) is substantially parallel to the second longitudinal rail (1b). Legs (9) can also be attached to the
15 underside (or lower face) of the longitudinal rails (1a, 1b). The legs (9) function to lift the base frame off of the ground and to provide support for the base frame (1) and other structures which are attached to or supported by the base frame (1). In some embodiments, the longitudinal rails (1a, 1b) can be C-shaped beams (e.g. as shown more clearly in Figure 5) and such rails may have an
20 upper face (1c) and a lower face.

Figures 2-3 depict two different views of an assembled covered belt conveyor. As shown the covered belt conveyor may be comprised of an idler frame (2). The idler frame (2) supports idlers (3) on the base frame (1). In an exemplary embodiment, the idler frame (2) may extend in a transverse direction
25 substantially normal to the longitudinal direction. The idler frame (2) may have a first frame attachment portion (2a) which may be attached to the first longitudinal rail (1a) of the base frame (1) and a second frame attachment portion (2b) which may be attached to the second longitudinal rail (1b) of the base frame (1). At least one idler (3) is attached to the idler frame (2). As shown in Figures 2-3,
30 three idlers (3) may be attached to the idler frame. The attachment of such idlers (3) to the idler frames (2) is well known in the art. The idlers (3) are used for

supporting a belt (100, as shown in e.g. Figure 4). Proper positioning of the idler frame (2) is necessary so that the belt (100) is accurately aligned to insure proper operation of the covered belt conveyor and efficient transportation of bulk materials. In some embodiments, the idler frames (2) may be single integral
5 pieces or in other embodiments may be constructed of separate pieces and fused together, for example by using screws or welding.

Also shown in Figures 2-4 is a cover (4). The cover (4) prevents or restricts user access to the belt (100) and/or idlers (3) during operation of the covered belt conveyor. The cover (4) is for preventing user access to the inside un-safe
10 region inside the cover (4) as a safety measure as well as for covering the belt (100) and/or idlers (3) from surrounding weather conditions and for preventing dust and debris from flying off the belt into the environment in which the covered belt conveyor is placed. The cover (4) defines a region inside un-safe region (5)
15 which is inside or under the cover (4) and an outside safe region (6) which is outside or above or to the sides of the cover (4). Within the inside un-safe region (5) are the idlers (3), the belt (100) and any such material which is being transported on the belt (100). In some embodiments, the cover (4) is a single integral and continuous piece. In other embodiments, the cover may be
20 constructed in sheets and fused or connected together. In some embodiments, there may be gaps in the cover (4) however, it should be understood that the region under the cover with the small gaps is still the inside-unsafe region (5) inside the cover (4). In some embodiments the cover (4) is comprised of steel, aluminum, plastic or other similar material.

The idler frame (2) is attached to the base frame (1). As most clearly shown in
25 e.g. Figures 4-6, the idler frame (2) is attached to the base frame (1) in the outside safe region (6) outside the cover (4). In some embodiments, the attachment portions (2a, 2b) of the idler frame (2) may be directly attached to the base frame (1) in the outside safe region (6) outside the cover (4). Such placement and attachment of the idler frame (2) in the outside safe region (6)
30 outside the cover (4) allows the idler frame (2) to be adjusted (e.g. by knocking) during operation of the belt conveyor without entering the inside un-safe region (5) inside the cover (4). Such placement and attachment significantly decreases

accidents of maintenance personnel in that they are no longer exposed to moving parts or debris during adjustment of the idler frames and adjustment of the idler frames can be performed much quicker because the cover does not need to be lifted, opened or removed.

5 In some embodiments, and as shown most clearly in Figures 5-6, the frame attachment portions (2a, 2b) may comprise an adjustment portion (7). The adjustment portion (7) may be attached to or integral to the attachment portions (2a, 2b). The attachment portion (7) may be disposed on an upper face (1c) of the first longitudinal rail (1a) or the second longitudinal rail (1b). As with the
10 attachment portion (2a, 2b) in other embodiments, the adjustment portion (7) is located in the outside safe region (6) outside the cover (4). In some embodiments, the adjustment portion (7) may have a first upper face (7a) and a second lower face (7b) with a hole (8) therethrough. The second face (7b) is typically disposed on and directly abuts an upper face (1c) of the first longitudinal
15 rail (1a) or second longitudinal rail (1b). The adjustment portion (7) may be attached to the first or second longitudinal rails (1a, 1b) by bolts (40), nuts (50) or washers (60). In an exemplary embodiment, the bolts (40) protrude through the hole (8) and through the longitudinal rail (1a); a washer is sandwiched between the bolt (40) and the adjustment portion (7) so that it abuts the first upper face
20 (7a) of the adjustment portion (7); and a nut (50) is disposed on the lower end of the bolt (40), e.g. the nut (50) abuts lower face of the longitudinal rail. The nut (50) may be welded onto the first longitudinal rail (1a) or the second longitudinal rail (1b). Other methods of attachment of the adjustment portion (7) and/
attachment portions (2a, 2b) are contemplated herein. By way of example, the
25 adjustment portion (7) and/or attachment portions (2a, 2b) may be attached to the longitudinal rails (1a, 1b) using, screws, welding, nails and other like known attachment means.

In some embodiments, the cover (4) may be attached to one or more of the longitudinal rails (1a, 1b) by a cover attachment means (70). As shown in e.g.
30 Figure 6, the cover attachment means (70) may be a metal rod affixed to the longitudinal rails (1a, 1b) by nuts. Other attachment means e.g. include screws,

nuts, bolts, welding, nails, and other like attachment mechanisms well known in the art.

A method for correcting the misalignment of a moving conveyor belt (100) on a covered belt conveyor is also contemplated herein. Such a method includes, 5 providing the previously discussed covered belt conveyor and thereafter adjusting the idler frame(s) (2) of the provided covered belt conveyor when the belt is in operation without physically entering the inside un-safe region (5) inside the cover. In some embodiments of the method, the method may include loosening or tightening the adjustment portion (7) of the idler frame (2). In some 10 embodiments, the idler frames (2) may be adjusted with a wrench or a hammer without entering the inside un-safe region (5) inside the cover (4).

It is to be understood that the form of this invention as shown is merely a preferred embodiment. Various changes may be made in the function and arrangement of parts; equivalent means may be substituted for those illustrated 15 and described; and certain features may be used independently from others without departing from the spirit and scope of the invention as defined in the following claims.

List of Components:

- 1 - base frame
- 1a - first longitudinal rail
- 1b - second longitudinal rail
- 5 1c - upper face of first lateral rail
- 2 - idler frame
- 2a - first frame attachment portion
- 2b - second frame attachment portion
- 3 - idler
- 10 4 - cover
- 5 - inside un-safe region
- 6 - outside safe region
- 7 - adjustment portion
- 7a - first face of attachment portion
- 15 7b - second face of attachment portion
- 8 - hole
- 9 - legs
- 40 - bolt
- 50 - nut
- 20 60 - washer
- 70 - cover attachment means
- 100- belt

CLAIMS

1. A covered belt conveyor comprising:

a belt (100) supported by a plurality of idlers (3),

5 a cover (4) for preventing user access to the belt (100) and idlers (3) during operation as a safety measure as well as covering the belt (100), the idlers (3) and bulk material from surrounding weather conditions,

a base frame (1) for supporting the plurality of idlers (3), the base frame (1) extending in a longitudinal direction of the covered belt conveyor having a first longitudinal rail (1a) and a second longitudinal rail (1b), the first longitudinal rail (1a) being substantially parallel to the second longitudinal rail (1b);

an idler frame (2) for supporting the idlers (3) on the base frame (1), the idler frame (2) extending in a transverse direction substantially normal to the longitudinal direction, the idler frame (2) having a first frame attachment portion (2a), a second frame attachment portion (2b) and at least one idler (3) attached to the idler frame (2), wherein the first frame attachment portion (2a) is attached to the first longitudinal rail (1a) and the second frame attachment portion (2b) is attached to the second longitudinal rail (1b);

the cover (4) defining an inside un-safe region (5) inside the cover (4) and an outside safe region (6) outside the cover (4),

wherein the idler frame (2) is attached to the base frame (1) in the outside safe region (6) outside the cover (4) such that the idler frame (2) may be adjusted during operation of the covered belt conveyor without entering the inside un-safe region (5) inside the cover (4).

25 2. The covered belt conveyor of claim 1 wherein the first frame attachment portion (2a) comprises an adjustment portion (7).

3. The covered belt conveyor of claim 2 wherein the adjustment portion (7) further comprises a first face (7a), a second face (7b) and a hole (8) there through, wherein the second face (7b) is disposed on an upper face (1c) of the first longitudinal rail (1a).
- 5 4. The covered belt conveyor of any of claims 2-3 wherein the adjustment portion (7) is attached to the first longitudinal rail (1a) with a bolt (40), nut (50) or washer (60).
5. The covered belt conveyor of any of the preceding claims wherein the cover (4) is attached to at least one of the first longitudinal rail (1a) or the second longitudinal rail (1b).
- 10 6. The covered belt conveyor of any of the preceding claims wherein the cover (4) is attached by a cover attachment means (70).
7. A method for correcting the misalignment of a moving conveyor belt (100) on a covered belt conveyor comprising:
- 15 providing the covered belt conveyor of any of claims 1-6;
- adjusting the idler frame (2) of the covered belt conveyor during operation of the covered belt conveyor without entering the inside un-safe region (5) inside the cover (4).
8. The method of claim 7 wherein the step of adjusting the idler frame (2) comprises loosening or tightening the adjustment portion (7).
- 20 9. The method of any of claims 7-8 wherein the idler frame (2) is adjusted with a wrench or a hammer.

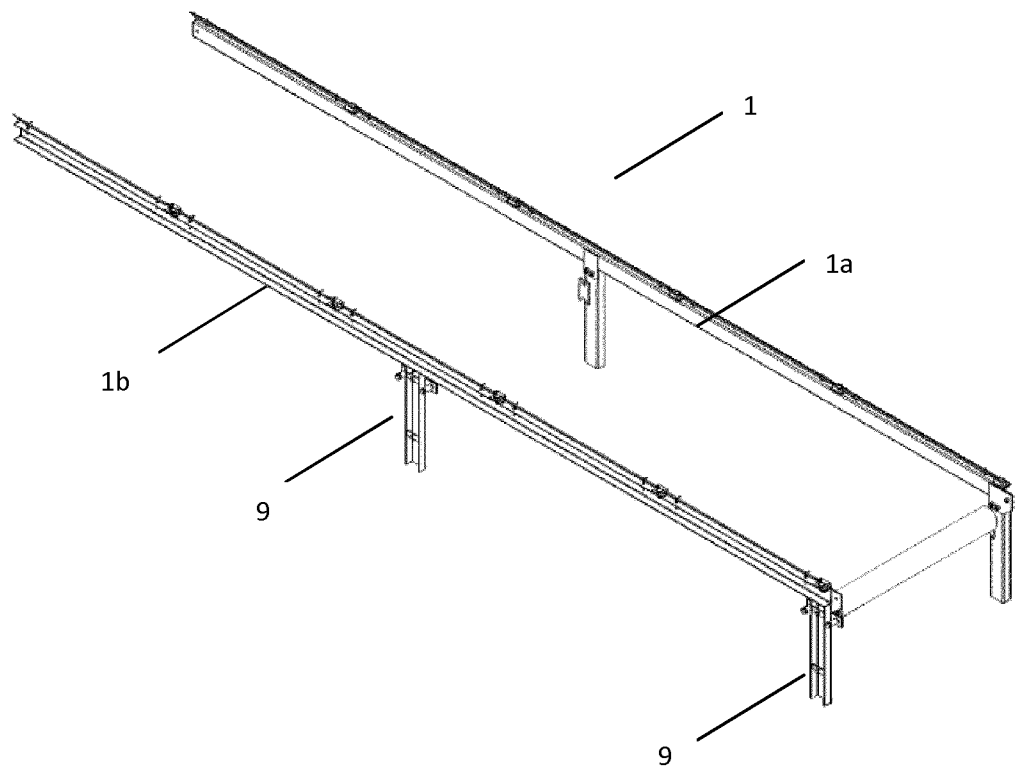


FIGURE 1

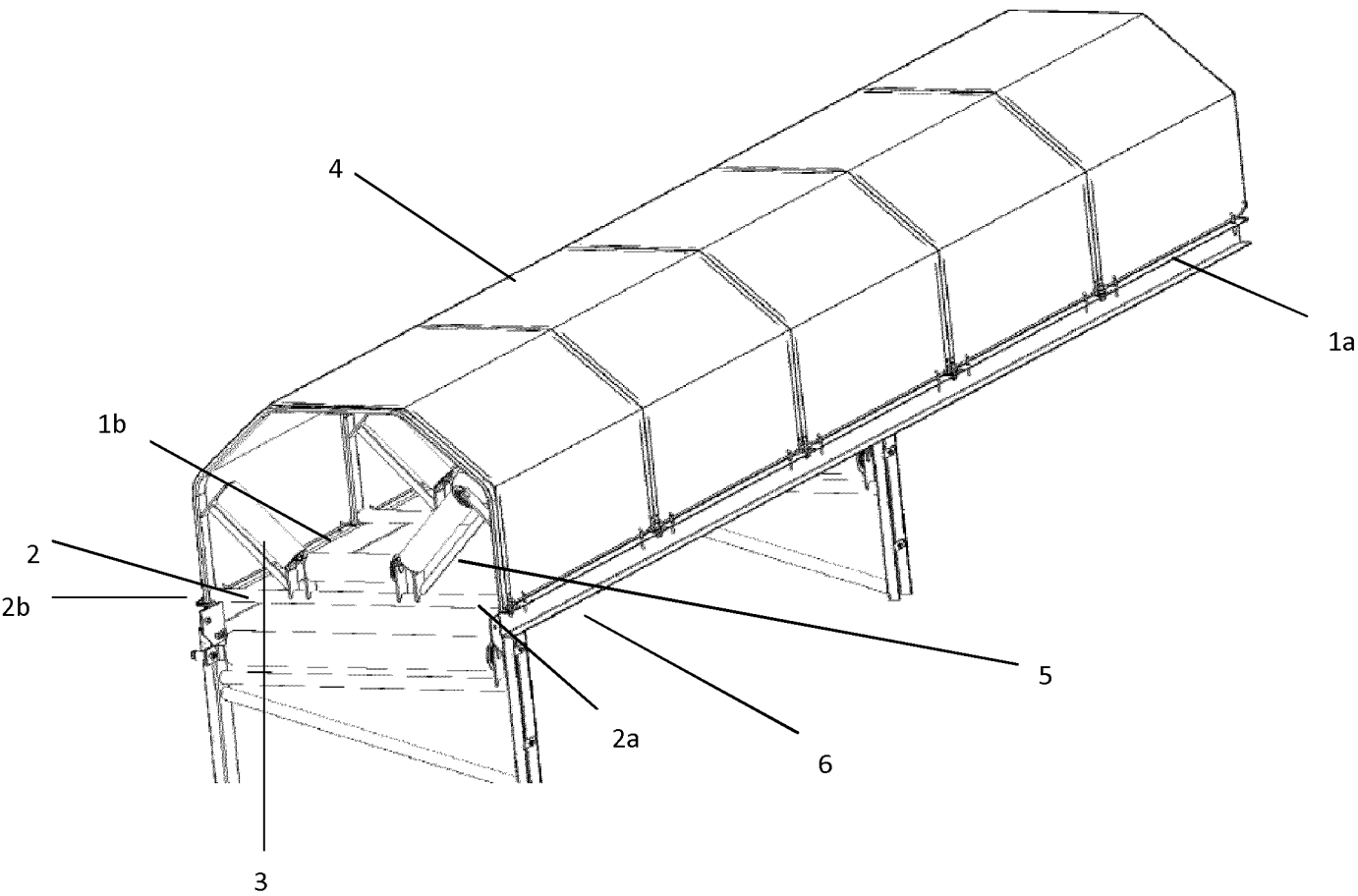


FIGURE 2

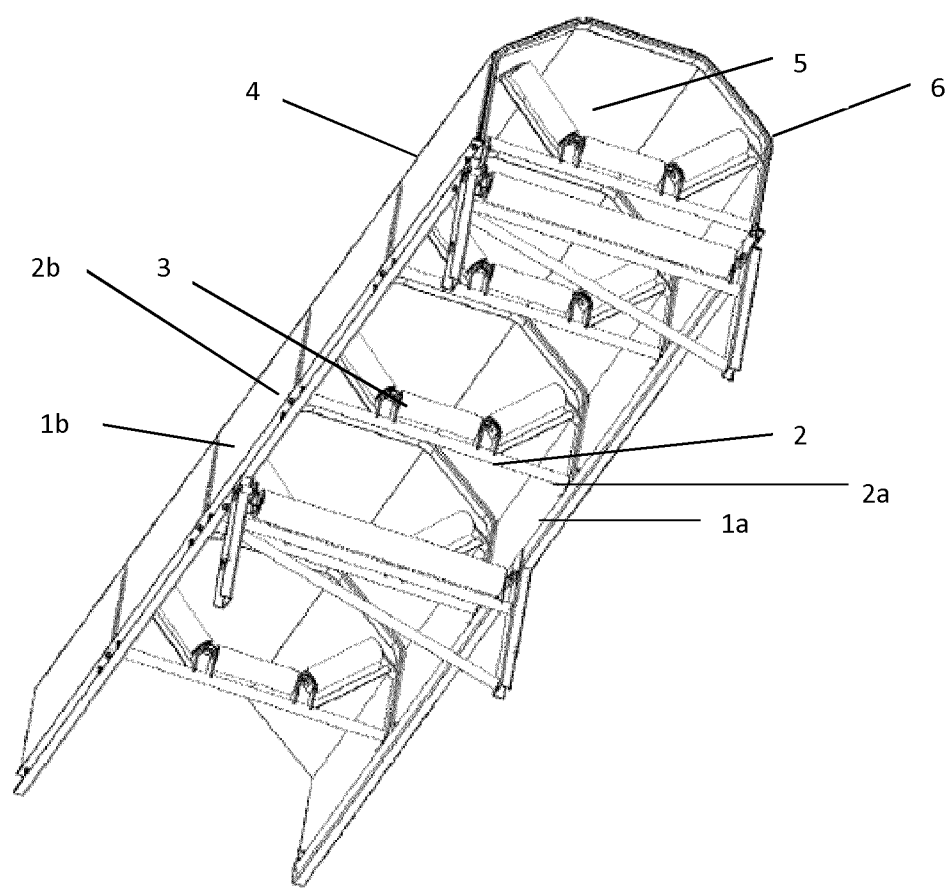


FIGURE 3

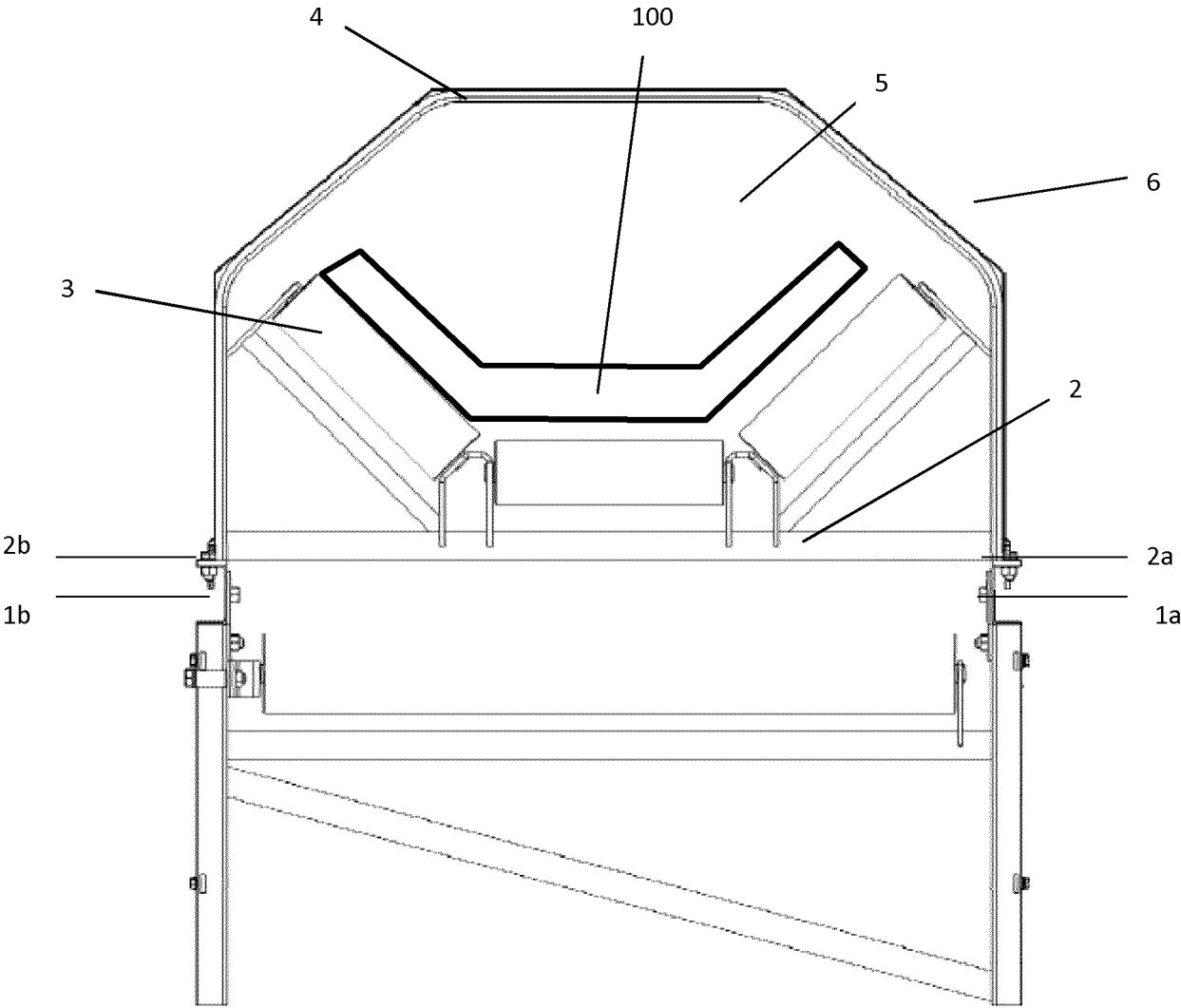


FIGURE 4

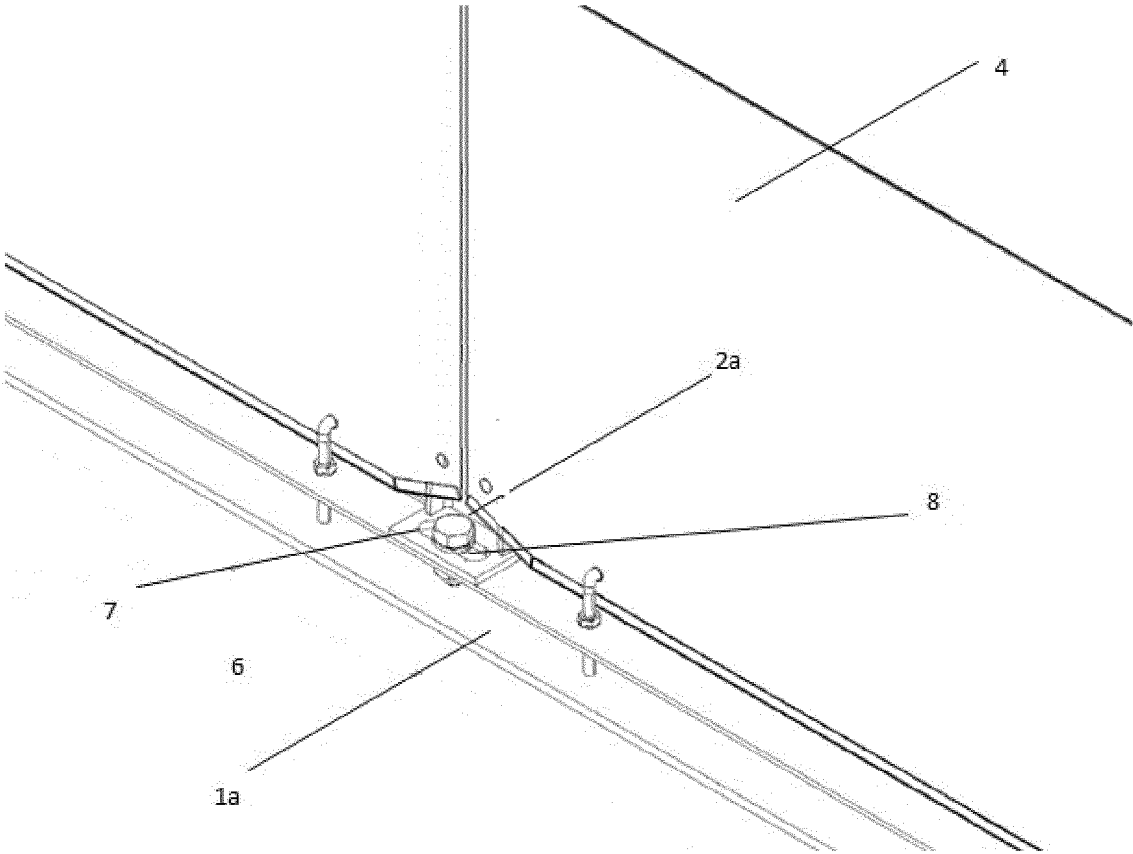


FIGURE 5

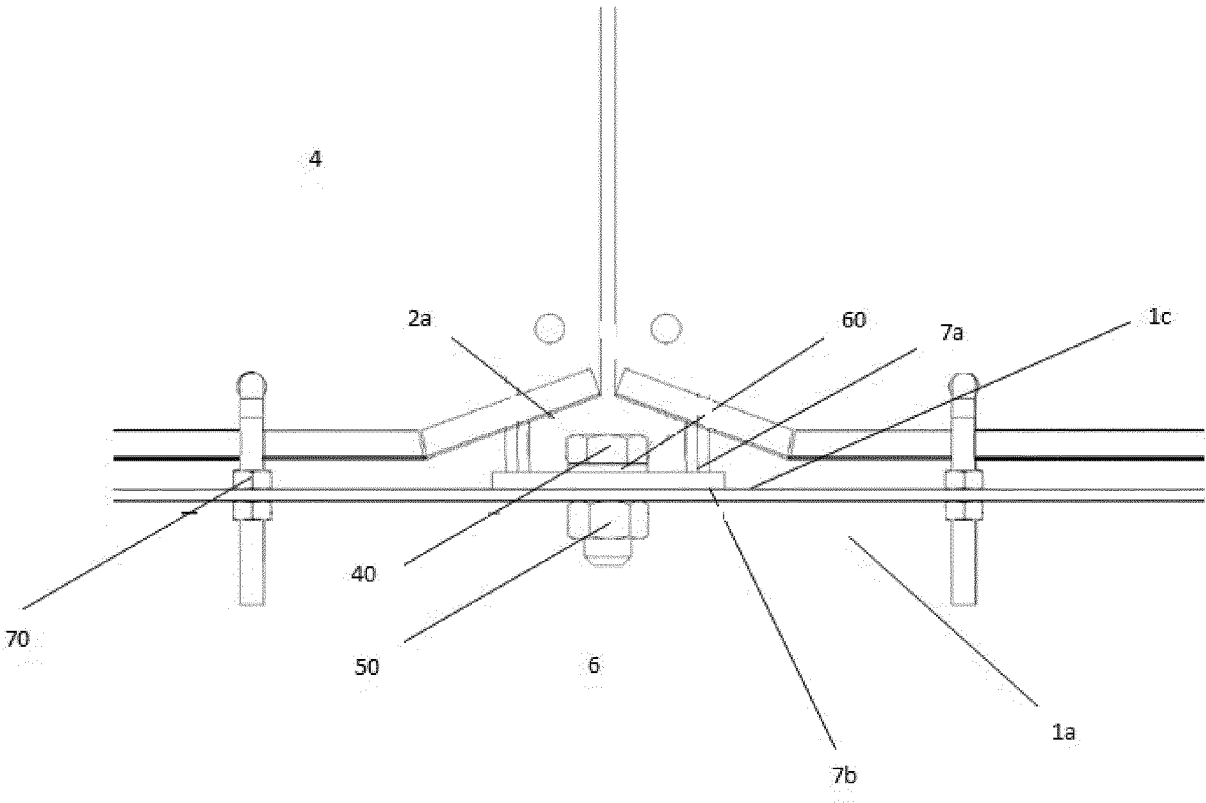


FIGURE 6

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/066777

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65G21/08

ADD. B65G39/12

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

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	GB 2 234 482 A (DUDLEY FABRICATIONS LIMITED [GB]) 6 February 1991 (1991-02-06) page 3, line 29 - page 7, line 5; claims 1-15; figures 1-4	1-9
A	----- US 3 844 404 A (EMMENEGGER R) 29 October 1974 (1974-10-29) column 1, line 35 - column 4, line 17; claims 1-2; figures 1-4	1-9
A	----- US 4 330 056 A (MARINO SALVATORE R) 18 May 1982 (1982-05-18) column 2, line 50 - column 4, line 16; claims 1-3; figures 1-6	1-9
	----- -/-	



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

15 September 2016

Date of mailing of the international search report

10/10/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Hoffert, Rudi

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/066777

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 104 370 059 A (SUZHOU CITY OF GOD LIFTING TRANSP MACHINERY MFG CO LTD) 25 February 2015 (2015-02-25) figures 1-8 -----	1-9
A	AU 421 860 B2 (DOUGLAS MINTERN ELLIS) 29 February 1972 (1972-02-29) figures 1-4 -----	1-9
A	GB 1 518 053 A (BRIGHOUSE ENG LTD) 19 July 1978 (1978-07-19) page 2, line 5 - page 3, line 60; figures 1-3 -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/066777

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2234482	A	06-02-1991	NONE
US 3844404	A	29-10-1974	NONE
US 4330056	A	18-05-1982	NONE
CN 104370059	A	25-02-2015	NONE
AU 421860	B2	29-02-1972	AU 421860 B2 29-02-1972
		AU 3481768 A	13-08-1970
GB 1518053	A	19-07-1978	NONE