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(71) Applicant *(for all designated States except US)*: **INTER-ROLLER ENGINEERING LIMITED** [SG/SG]; 20 Benoi Crescent, Singapore 629983 (SG).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **LIM, Yee, Min** [SG/SG]; 49, Jalan Limau Purut, Singapore 468223 (SG). **CHAI, Kor, Yoon** [MY/SG]; 336 #06-301, Bukit Batok Street 32, Singapore 650336 (SG).

(74) Agent: **WUN, Rizwi**; KhattarWong, 80 Raffles Place, #25-01 UOB Plaza 1, Singapore 048624 (SG).

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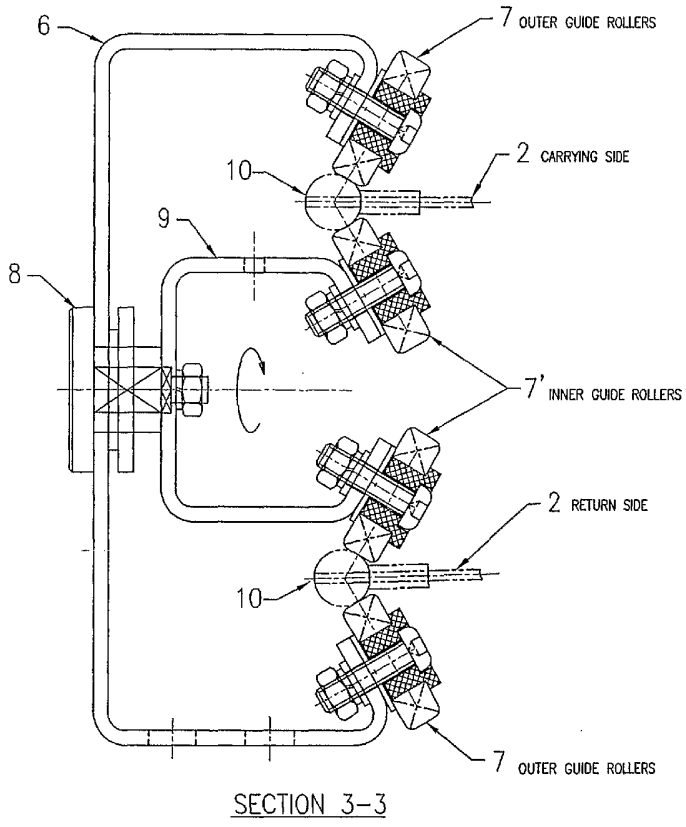
[Continued on next page]

(54) Title: BELT HOLDING SYSTEM



SECTION 3-3

(57) Abstract: A conveyer system is provided having a first and second plates (6), (9) ; a first guide roller (7) for engaging a collar bead (10) on a first side of the belt (2) and mounted on the first plate (6) ; a second guide roller (7') for engaging the collar bead (10) on a second side of the belt (2) and mounted on the second plate (9), the second plate (9) rotatable with respect to the first plate (6) to engage and disengage and second guide rollers (7') from the second sides of the belt (2).

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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*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

BELT HOLDING SYSTEM

Field of Invention:

The invention relates to the means provided in belt curve conveyors to hold the belt on the curve conveyor against the centrifugal pull exerted during running of the belt. In the operation of belt curve conveyors, the belt experiences a radial force, which tends to pull the belt off the conveyors. So, the means provided to retain the belt on the curve conveyors becomes vital and important for the proper functioning of the belt curve conveyors and this invention pertains to one such type of means having the advantage in the maintenance of curve conveyors as compared to other existing known means.

Background of the Invention

From US Patent No 4,955,466 and DE 195, 35,384, the curve conveyor belt is provided with an enlarged bead, which is captured between upper and lower angled rollers is known. From U.S. patent no. 5,394,977, an apparatus and method of replacing the curve conveyor belts is also known. Also, from the U.S Patent No. 5,857,559 and 5,944,171, a belt curve conveyor with entirely different methods of holding the curve belt in place is disclosed.

Known belt curve conveyors tend to have different methods of belt holding system which in turn determine the extent of difficulty of maintenance and time requirement for replacements, thus affecting the availability of the equipment. This is especially the case with replacement of belt which requires disassembly of virtually the entire holding brackets and conveyor sections in some cases. Additionally, difficult alignment procedures have to be followed once again as the holding brackets are displaced, thus adding to the downtime of the conveyor undergoing maintenance or installation which affects the availability of the system. So, said known curve conveyor is satisfactory per se, but in some cases there exists a need for an improved belt holding system that is simple, compact and in which it is relatively easy to install and replace curve belts.

Summary of the Invention

The present invention provides for a conveyer system having a first and second plates (6),(9); a first guide roller (7) for engaging a collar bead (10) on a first side of the belt (2) and mounted on the first plate (6); a second guide roller (7') for engaging the collar bead (10) on a second side of the belt (2) and mounted on the second plate (9), the second plate (9) rotatable with respect to the first plate (6) to engage and disengage the first and second guide rollers (7) from the first and second sides of the belt (2).

Brief Description of the Drawings

The invention will be explained in more detail hereafter with reference to an embodiment of the construction according to the invention which is diagrammatically illustrated in the following Figures.

Fig. 1 is a diagrammatic plan view of belt curve conveyor, showing several rollers supported on a frame;

Fig. 2 is a front view of a pair of guide rollers supported by a common support along with a lock mechanism;

Fig. 3 is a sectional view of the Fig. 2, along line 3-3 in Fig. 2;

Fig. 4 is a view of key handle for lock;

Fig. 5 is a perspective view of the holding system assembly in "lock" position; and

Fig. 6 is a perspective view of the holding system assembly in "open" position.

Detailed Description of the Invention

As is diagrammatically shown in Fig. 1, a belt curve conveyor 1 includes an endless belt 2 driven by a driven pulley 3 and an idler pulley 4. As is conventional, the endless belt 2 has a shorter inner length than an outer length. Endless belt 2 is preferably a single piece of belt material formed into a ring-shape. Endless belt 2 is also preferably a single belt connected at its ends by belt splicing devices, such as fasteners or mechanical lacing or vulcanized. Furthermore, the endless belt 2 is reinforced by stitching at the outer edge using a specially designed projecting collar bead 10 for holding purpose. Pulleys 3,4 are tapered to frictionally engage with the endless belt 2 over its full width so that the endless belt 2 which is stretched between two pulleys can be driven by driven pulley 3 using drive motor 5.

Referring once again to Fig. 1, there are belt holding assemblies 6 near the outside of the bend described by the endless belt 2. A plurality of such belt holding roller assemblies 6 is disposed along the outer edge of the curve.

As will be apparent from Figs. 2-6, said belt holding assemblies 6 are arranged in pairs of two guide rollers 7, 7′ one above the other to hold carrying and return side of the endless belt 2. Further more, the inner guide rollers 7′ are connected to a lock assembly 8

using a supporting plate 9. This lock assembly 8 is fitted on the main frame of the holding assembly 6.

The two guide rollers 7 and 7' positioned one above the other make contact with the projecting collar bead 10 of the endless belt 2. During running of the conveyor belt 2, the centrifugal radial force generated will make the endless belt 2 to shift inward towards the center. However, the guide rollers 7, 7' which are in contact with the bead 10 of the endless belt 2 prevent the inward shifting of the belt 2, as a result of which the desired movement of the endless belt 2 will be maintained.

During the belt 2 replacement, the inner guide rollers 7' will be rotated to "open" position as shown in Fig. 6, by operating the lock assembly 8 using the key handle 11. After all the holding assemblies are turned in to "open" position, the inner guide rollers 7' are no longer in contact with the bead 10 of the belt 2 at the bottom sides and the belt 2 can be pulled out easily.

The steps to be carried out to remove the endless belt 2 are as follows:

1. Using the key handle 11, make all holding assemblies 6 into "open" position;
2. Loosen the belt 2 by dismantling the pulleys 3,4 at inner ends;

3. Press the belt 2 at ends to get it released from guide rollers 7 and pull it out from sideways.

4. Repeat the process in reverse order for installation of a new endless belt 2.

As will be apparent from the above, the above described belt holding system is relatively simple with less number of parts and without dismantling the holding assemblies for belt installation and replacement.

Although the present invention has been described in detail with respect to the illustrated embodiment, it should be understood that various changes, substitutions and alterations can be made thereto without departing from the spirit and scope of the invention as defined by the appended claims.

Claims

1. A conveyor system using a belt (2), comprising:

a first and second plates (6) (9);

a first guide roller (7) for engaging a collar bead (10) on a first side of the belt (2) and mounted on the first plate (6);

a second guide roller (7') for engaging the collar bead (10) on a second side of the belt (2) and mounted on the second plate (9), the second plate (9) rotatable with respect to the first plate (6) to engage and disengage the second guide rollers (7') from the second sides of the belt (2).

2. The system as claimed in claim 1 wherein the first (7) and second guide rollers (7') engage the collar bead (10) and the first and second sides therebetween.

3. The system as claimed in claim 1 further comprising:

a third guide roller (7) for engaging the collar bead (10) on the first side of the belt (2) and mounted on the first plate (6); and

a fourth guide roller (7) for engaging the collar bead (10) on the second side of the belt

(2) and mounted on the second plate (9), the second plate (9) rotatable with respect to the first plate (6) to engage and disengage the third and fourth guide rollers (7) from the first and second sides of the belt (2) when the first and second guide rollers (7) respectively are engaged and disengaged from the first and second sides of the belt (2).

4. The system as claimed in claim 1 further comprising:

a third guide roller (7) for engaging the collar bead (10) on the first side of the belt (2) and mounted on the first plate (6), the third and first guide rollers (7) in a line perpendicular to the first side of the belt (2);

a fourth guide roller (7) for engaging the collar bead (10) on the second side of the belt (2) and mounted on the second plate (9), the fourth and second guide rollers (7) in a line perpendicular to the second side of the belt (2) when engaged and parallel to the second side of the belt (2) when disengaged.

5. The system as claimed in claim 1 further comprising:

first and second tapered pulleys (3) (4);

a motor (5) for driving the first tapered pulley (3); and

the belt (2) is ring-shaped to ride on the first and second tapered pulleys (3) (4).

6. The system as claimed in claim 1 further comprising:

first and second tapered pulleys (3) (4);

a motor (5) for driving the first tapered pulley (3);

the belt (2) is ring-shaped to ride on the first and second tapered pulleys (3) (4); and

the first and second tapered pulleys (3) (4) include mechanisms for moving a smaller tapered end of the first or second pulley (3) (4) towards the other for removal of the belt (2).

7. The system as claimed in claim 1 further comprising:

first and second tapered pulleys (3) (4);

a motor (5) for driving the first tapered pulley (3);

the belt (2) is ring-shaped to ride on the first and second tapered pulleys (3) (4) in a continuous loop;

a third guide roller (7) for engaging the collar bead (10) on a first portion of the continuous loop of the belt (2) and mounted on the first plate (6), the third and first guide rollers (7) in a line perpendicular to the first side of the belt (2);

a fourth guide roller (7) for engaging the collar bead (10) on a second portion of the continuous loop of the belt (2) and mounted on the second plate (9), the fourth and second guide rollers (7) in a line perpendicular to the second side of the belt (2) when engaged and parallel to the second side of the belt (2) when disengaged.

8. The system as claimed in claim 1 further comprising:

a lock assembly (8) for preventing rotation of the second plate (9).

9. The system as claimed in claim 1 further comprising:

a lock assembly (8) for preventing while allowing rotation of the second plate (9); and

a levered handled key (11) for operating the lock assembly (8).

10. The system as claimed in claim 1 further comprising:

a lock assembly (8) for preventing and allowing rotation of the second plate (9) located distally from the belt (2).

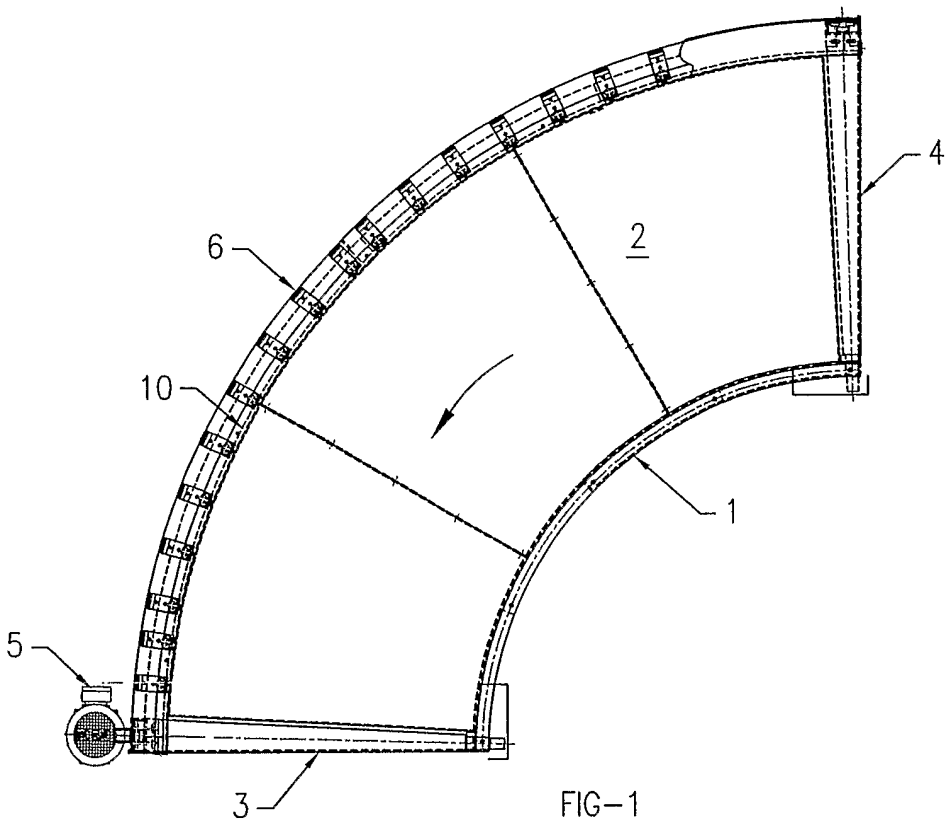
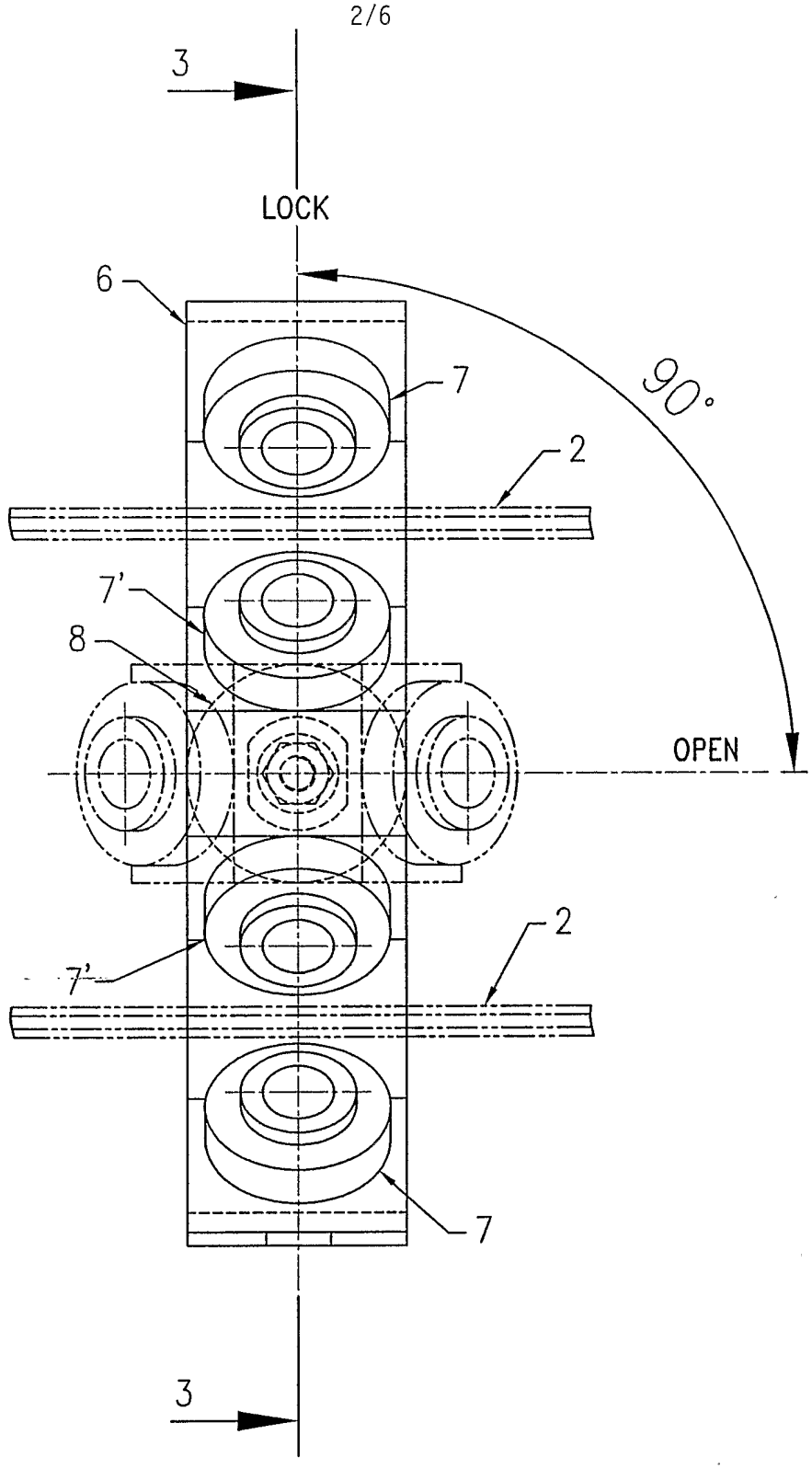
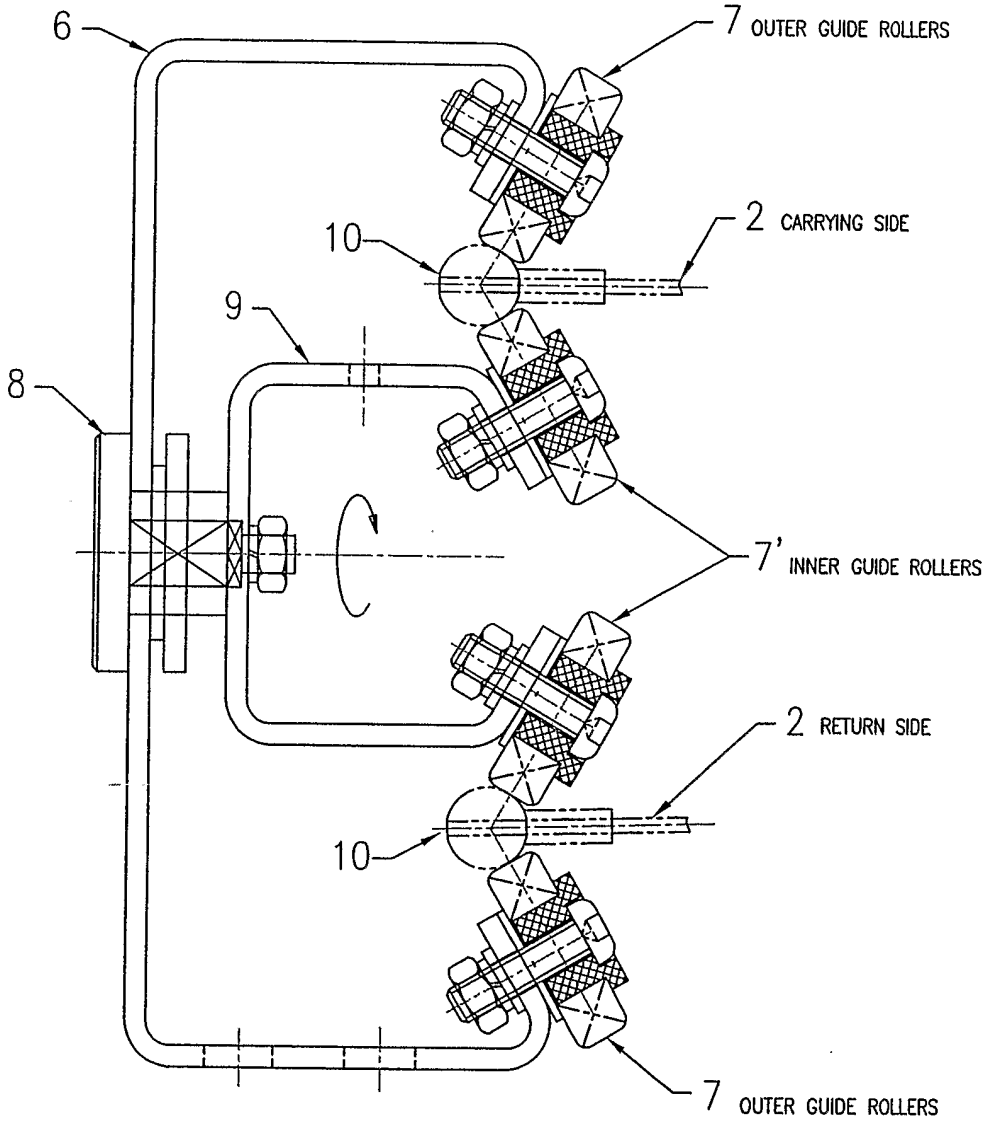


FIG-1



FIG–2



SECTION 3-3

FIG-3

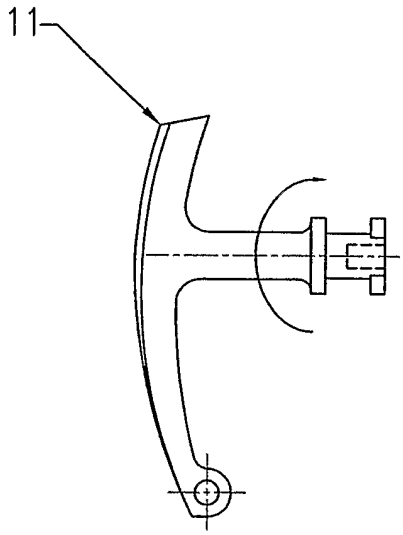
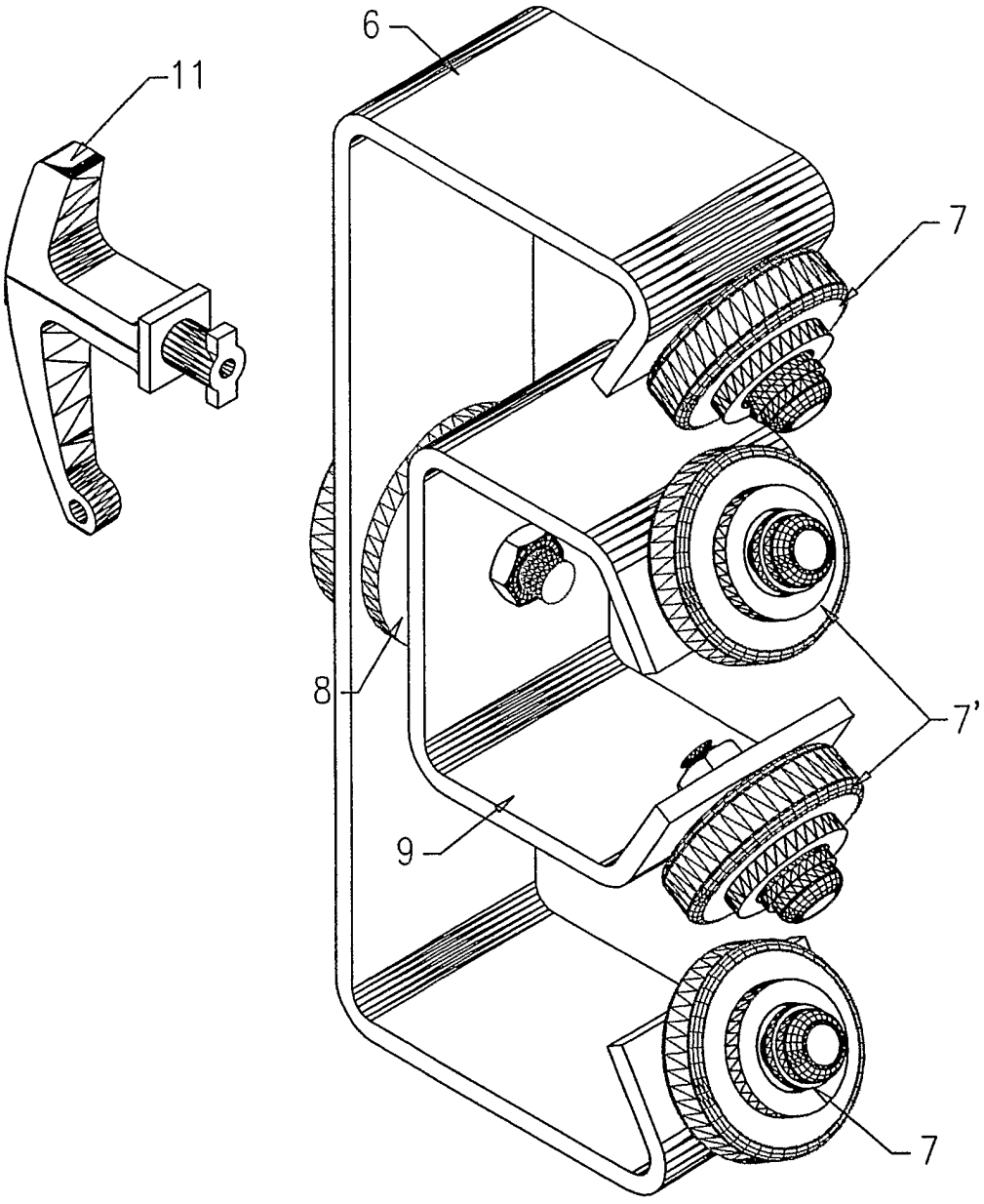
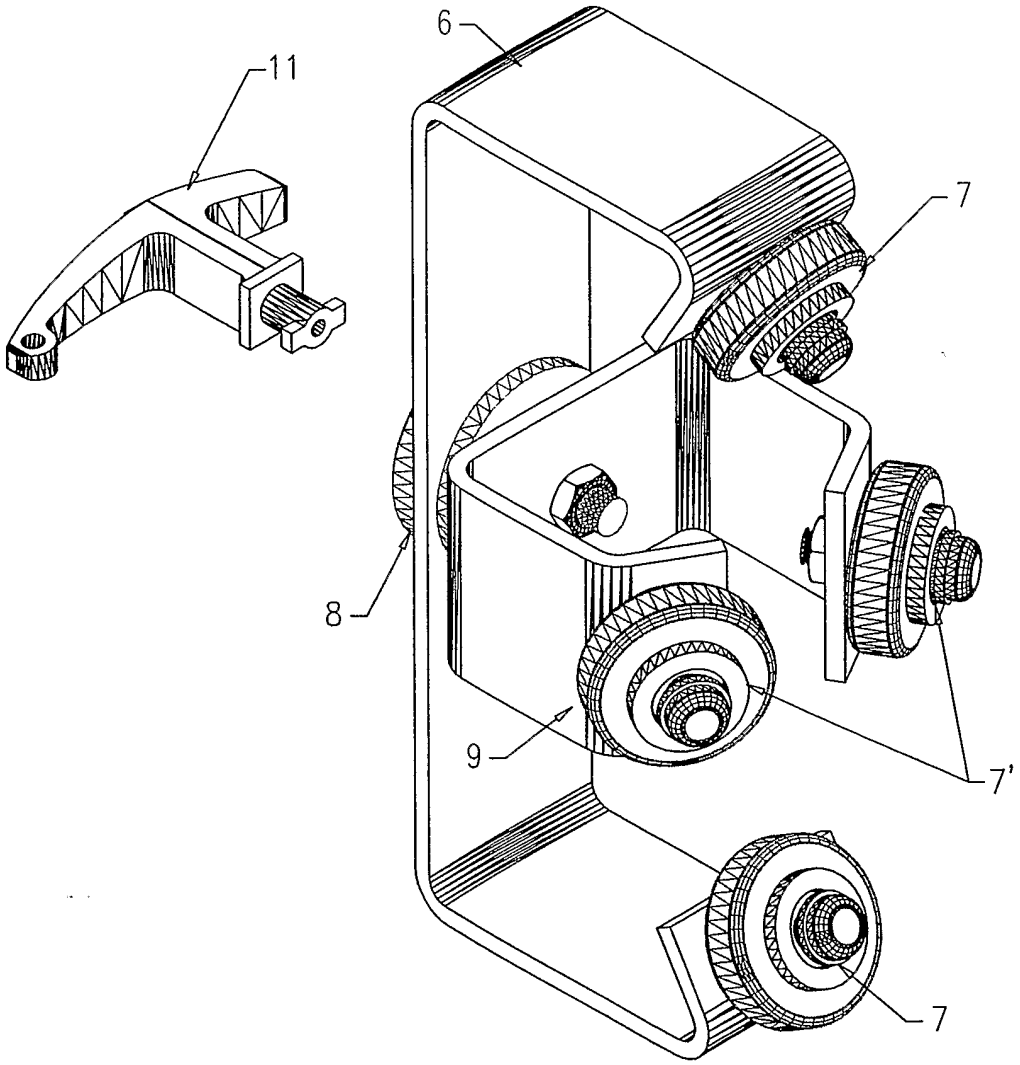


FIG-4



"LOCK" POSITION

FIG-5



"OPEN" POSITION

FIG-6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2005/000004

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: B65G 021/20, 023/12, 015/64

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)

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)
DWPI: IPC B65G/IC and BELT, ENDLESS, CURVE, CORNER etc., SIDE, EDGE etc., BEAD, REINFORCE etc., GUIDE, RETAIN

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 716034 B1 (VANDERLANDE INDUSTRIES NEDERLAND B.V.) 15 March 2000 Whole document	1-2, 5-6, 8-10
X	GB 2054507 A (CLOUTH GUMMIWERKE AG) 18 February 1981 Whole document	1-2, 5-6, 8-10
A	US 5394977 A (CLINE) 7 March 1995 Whole document	1

☐ 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
8 February 2005	10 FEB 2005
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **L. DESECAR** Telephone No : (02) 6283 2381

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2005/000004

Supplemental Box
(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: Box III

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1-4 and 8-10 are directed to a conveyor system using a belt, the system involving the features as defined and in particular a first and a second plates, a first and a second guide rollers, the first roller mounted on the first plate for engaging a collar bead on a first side of the belt and the second roller mounted on the second plate for engaging the collar bead on a second side of the belt, the second plate rotatable with respect to the first plate to engage and disengage the second guide rollers from the second side of the belt. It is considered that "*the second plate rotatable with respect to the first plate to engage and disengage the second guide rollers from the second side of the belt*" comprises a first special technical feature.

2. Claims 5-7 are directed to a conveyor system using a belt, the system involving the features as defined at (1) and in particular first and second tapered pulleys, a motor for driving the pulleys, the belt being ring shaped to ride on the first and second pulleys. It is considered that "*first and second tapered pulleys, a motor for driving the pulleys, the belt being ring shaped to ride on the first and second pulleys*" comprises a second special technical feature.
These groups of claims are not linked as to form a single general inventive concept, that is, they do not share any special technical features. The common concept linking together these groups of claims is *a conveyor system using a belt, a first and a second plates, a first and a second guide rollers, the first roller mounted on the first plate for engaging a collar bead on a first side of the belt and the second roller mounted on the second plate for engaging the collar bead on a second side of the belt, the second plate rotatable with respect to the first plate to engage and disengage the second guide rollers from the second side of the belt* . However this concept is not novel in the light of for example document GB 2054507 A (CLOUTH GUMMIWERKE AG) 18 February 1981. Therefore these claims do not relate to one invention only, a posteriori.

Accordingly the claims do not relate to one invention or to a single inventive concept within the meaning of PCT 13.2.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG2005/000004

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
See Supplemental Box.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/SG2005/000004

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
EP	0716034	JP	8225137	NL	9402081	US	5839570
GB	2054507	AU	60819/80	CA	1137011	DE	2930551
		FR	2462286	JP	56023107	SE	8005397
US	5394977	CA	2166775	EP	0706489	WO	9501928

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX