

Description

Field of the Invention

[0001] The present invention relates to a sliding plug door bearing mechanism, which is the key bearing component of sliding plug door, and pertains to the technical field of sliding plug doors.

Background of the Invention

[0002] The bearing mechanism directly determines the service life, cost and reliability of sliding plug door. Existing sliding plug doors are mainly based on the following two operating principles (with reference to Patent Application No. CN200420026953.7). One operating principle is that the door leaf translates in X-axis direction and Y-axis direction along a predefined trace to accomplish door leaf sliding (displacement in Y-axis direction). With respect to this operating principle, two bearing guide systems must be arranged in X-axis direction and Y-axis direction. Therefore, the structure is complex, and the manufacturing cost is high. The other operating principle is that the door leaf translates in X-axis direction and swings in the plane (X, Y) to accomplish door leaf sliding (displacement in Y-axis direction). With respect to this operating principle, two bearing guide systems are also required.

Summary of the Invention

[0003] The present invention provides a novel sliding plug door bearing mechanism in order to overcome the drawbacks of existing sliding plug doors. The sliding plug door bearing mechanism provided in the present invention not only has high sealing performance, but also has simple structure, high reliability, reduced requirement for precision of parts, good machinability, and lower manufacturing cost.

[0004] The technical scheme of the present invention is characterized in that: the sliding plug door bearing mechanism comprises bearing rail, bearing rollers, guiding slide, bearing carriage, door carrying frame, upper connecting shaft, lower connecting shaft, upper hinge holder, lower hinge holder, and guiding wheel, wherein, the bearing carriage, upper connecting shaft, upper hinge holder, and door carrying frame are connected sequentially to form a turning pair I; the door carrying frame, lower connecting shaft, lower hinge holder, and door leaf are connected sequentially to form a turning pair II; the bearing rollers are connected to the bearing rail to form a prismatic pair I; the guiding slide is connected to the guiding wheel to form a prismatic pair II with a predefined trace; the bearing carriage translates in X-axis direction along the bearing rail, while the door carrying frame drives the door leaf to turn around the X-axis of the bearing carriage; the door carrying frame turns around the X-axis of the bearing carriage while it moves straightly along

the bearing rail, and the door carrying frame drives the door leaf to accomplish displacement in Y-axis direction along the trace of the guiding slide as guided by the guiding wheel.

[0005] The present invention has the following advantages: the bearing guide mechanism of the door leaf translates in X-axis direction and turns around X-axis to accomplish door leaf sliding in Y-axis direction. The bearing guide mechanism incorporates translation motion and turning motion, and therefore has compact structure, high reliability, reduced requirement for precisions of parts, good machinability, and low manufacturing cost.

Brief Description of the Drawings

[0006]

Figures 1 and 2 are structural diagrams of an embodiment of the sliding plug door bearing mechanism.

Figure 3 is a schematic diagram of the sliding plug door bearing mechanism.

[0007] In the figures, 1 is bearing rail, 2 is bearing roller, 3 is guiding slide, 4 is bearing carriage, 5 is door carrying frame, 6 is upper connecting shaft, 7 is lower connecting shaft, 8 is upper hinge holder, 9 is lower hinge holder, 10 is guiding wheel, 11 is anti-bounce wheel, and 12 is door leaf.

Detailed Description of the Embodiments

[0008] As shown in Figure 1, the sliding plug door bearing mechanism comprises bearing rail 1, bearing rollers 2, guiding slide 3, bearing carriage 4, door carrying frame 5, upper connecting shaft 6, lower connecting shaft 7, upper hinge holder 8, lower hinge holder 9, and guiding wheel 10, wherein, the bearing carriage 4, upper connecting shaft 6, upper hinge holder 8, and door carrying frame 5 are connected sequentially to form a turning pair I; the door carrying frame 5, lower connecting shaft 7, lower hinge holder 9, and door leaf 12 are connected sequentially to form a turning pair II; the bearing roller 2 is connected to the bearing rail 1 to form a prismatic pair I; the guiding slide 3 is connected to the guiding wheel 10 to form a prismatic pair II with a predefined trace.

[0009] An anti-bounce wheel 11 is additionally provided on the bearing carriage 4 to control the moving position of the bearing carriage 4.

[0010] In operation, the bearing carriage 4 translates along the bearing rail 1 in X-axis direction, while the door carrying frame 5 drives the door leaf 12 to turn around the X-axis of the bearing carriage, so as to accomplish the movement of door leaf in Y-axis direction.

[0011] The door carrying frame 5 turns around the X-axis of bearing carriage 4 within a certain range while it moves straightly along the bearing rail 1. The door car-

rying frame 5 drives the door leaf 12 to accomplish the displacement of door leaf in Y-axis direction along the trace of the guiding slide as guided by the guiding wheel.

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Claims

1. A sliding plug door bearing mechanism, comprising bearing rail, bearing rollers, guiding slide, bearing carriage, door carrying frame, upper connecting shaft, lower connecting shaft, upper hinge holder, lower hinge holder, and guiding wheel, wherein, the bearing carriage, upper connecting shaft, upper hinge holder, and door carrying frame are connected sequentially to form a turning pair I; the door carrying frame, lower connecting shaft, lower hinge holder, and door leaf are connected sequentially to form a turning pair II; the bearing roller is connected to the bearing rail to form a prismatic pair I; the guiding slide is connected to the guiding wheel to form a prismatic pair II with a predefined trace; the bearing carriage translates along the bearing rail in X-axis direction, while the door carrying frame drives the door leaf to turn around the X-axis of bearing carriage; the door carrying frame turns around the X-axis of bearing carriage while it moves straightly along the bearing rail, and it drives the door leaf to accomplish displacement of door leaf in Y-axis direction along the trace of the guiding slide as guided by the guiding wheel.
2. The sliding plug door bearing mechanism according to claim 1, wherein, an anti-bounce wheel is additionally provided on the bearing carriage to control the moving position of the bearing carriage.

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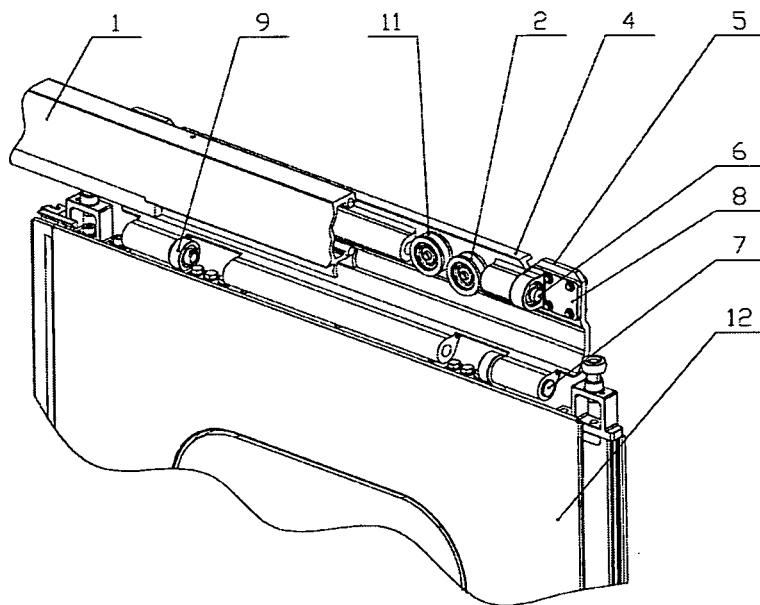


FIG.1

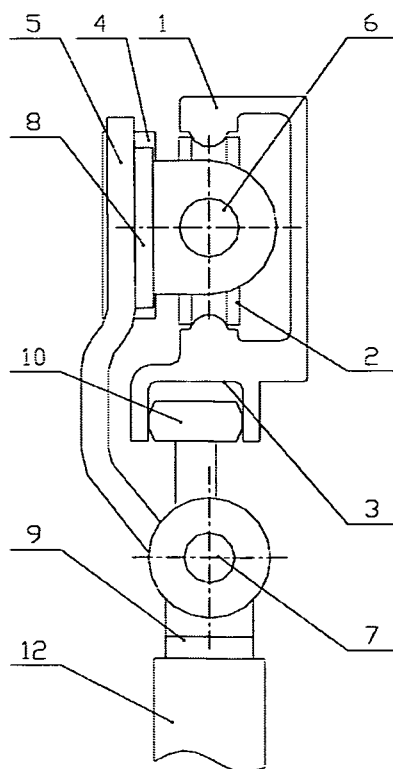


FIG.2

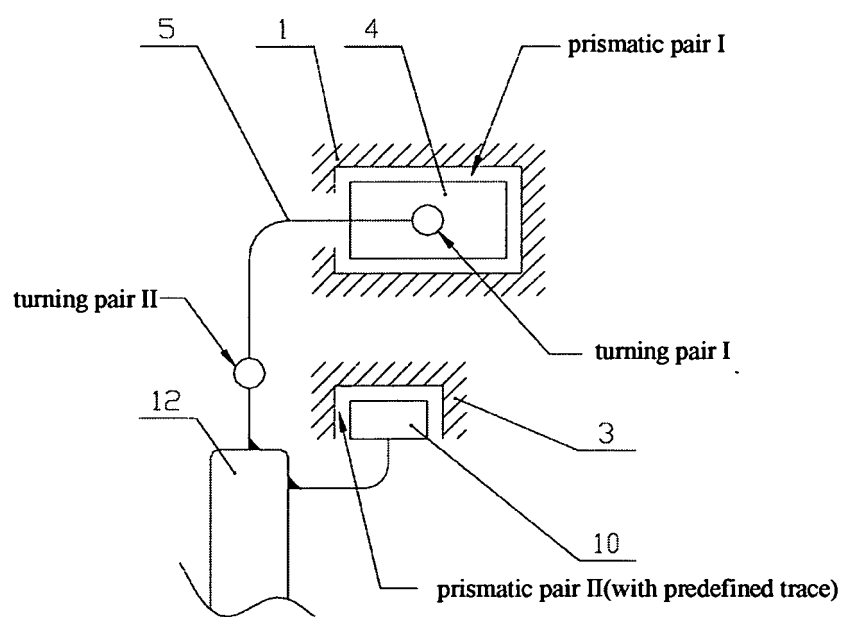


FIG.3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2010/079250

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC: B61D E06B E05D E05F

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)

EPODOC, WPI, CNPAT, CNKI: sliding, plug, door, bearing, vehicle, guide, rail, hinge, leaf, move, rotate, displacement

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	CN101716941A (NANJING KANGNI M & E CO LTD) 02 Jun. 2010(02.06.2010) see claims 1-2, figures 1-3	1-2
E	CN201671462U (NANJING KANGNI M & E CO LTD) 15 Dec. 2010(15.12.2010) see paragraphs 0009-0011, figures 1-3	1-2
A	CN2705563Y (NANJING KANGNI M & E NEW TECHNOLOGY CO LTD) 22 Jun. 2005(22.06.2005) see description, page 3, line 8 – page 4, line 14, figures 1-4	1-2
A	CN2787794Y (BEIJING BODE TRANSP EQUIPMENT) 14 Jun. 2006(14.06.2006) see the whole document	1-2

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	“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
“A” document defining the general state of the art which is not considered to be of particular relevance	“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
“E” earlier application or patent but published on or after the international filing date	“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
“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)	“&” document member of the same patent family
“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	

Date of the actual completion of the international search

18 Feb. 2011(18.02.2011)

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INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN1580476A (NABOCK LTD) 16 Feb. 2005(16.02.2005) see the whole document	1-2
A	CN1348882A (WESTINGHOUSE AIR BRAKE TECHNOLOGIES CORP) 15 May 2002(15.05.2002) see the whole document	1-2
A	US5483769A (MARK IV TRANSPORTATION PROD CORP) 16 Jan. 1996(16.01.1996) see the whole document	1-2
A	GB2403265A (DEANS SYSTEMS LTD) 29 Dec. 2004(29.12.2004) see the whole document	1-2
A	GB2447226A (DOOR SYSTEMS GROUP LTD) 10 Sep. 2008(10.09.2008) see the whole document	1-2

Form PCT/ISA /210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2010/079250

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN101716941A	02.06.2010	NONE	
CN201671462U	15.12.2010	NONE	
CN2705563Y	22.06.2005	NONE	
CN2787794Y	14.06.2006	NONE	
CN1580476A	16.02.2005	JP2005061065A	10.03.2005
		CN1270044C	16.08.2006
		JP3875967B2	31.01.2007
CN1348882A	15.05.2002	EP1197413 A2	17.04.2002
		AU4378301 A	18.04.2002
		CA2346623A1	16.04.2002
		BR0102877A	04.06.2002
		JP2002180731A	26.06.2002
		MXPA01009761A	24.05.2002
		CA2346623C	21.03.2006
		INMUM200100490A	05.05.2006
US5483769A	16.01.1996	CA2135344A	08.06.1995
GB2403265A	29.12.2004	WO2005000486A2	06.01.2005
		GB2403265B	28.12.2005
GB2447226A	10.09.2008	NONE	

Form PCT/ISA /210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2010/079250

A. CLASSIFICATION OF SUBJECT MATTER

B61D19/00 (2006.01)i

E06B3/46 (2006.01)i

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 200420026953 [0002]