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(54) **BEARING MECHANISM FOR SLIDING PLUG DOOR**

**LAGERMECHANISMUS FÜR EINE SCHIEBETÜR**

**MÉCANISME DE ROULEMENT POUR UNE PORTE ENCASTRÉE COULISSANTE**

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## Description

### Field of the Invention

[0001] The present invention relates to a sliding plug door bearing mechanism, according to the preamble of claim 1. Such a sliding plug bearing mechanism 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.

[0003] A sliding plug door bearing mechanism according to the preamble of claim 1 is known from US 2 774 998.

### Summary of the Invention

[0004] The present invention is characterized by the characterizing part of claim 1 and 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.

[0005] The technical scheme of the present invention is summarized 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 non-linear predefined trace; the bearing carriage translates in X-axis di-

rection 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 non-linear predefined trace of the guiding slide as guided by the guiding wheel.

[0006] 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

[0007]

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.

[0008] 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

[0009] 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 non-linear predefined trace.

[0010] An anti-bounce wheel 11 is additionally provided on the bearing carriage 4 to control the moving position of the bearing carriage 4.

[0011] 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.

**[0012]** 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 carrying 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.

## Claims

1. A sliding plug door bearing mechanism, comprising a bearing rail (1), bearing rollers (2), a guiding slide (3), a bearing carriage (4), a door carrying frame (5), an upper connecting shaft (6), a lower connecting shaft (7), an upper hinge holder (8), a lower hinge holder (9), and a guiding wheel (10), wherein the bearing carriage (4), the upper connecting shaft (6), the upper hinge holder (8), and the door carrying frame (5) are connected sequentially to form a first turning pair (I); wherein the door carrying frame (5), the lower connecting shaft (7), the lower hinge holder (9), and a door leaf (12) are connected sequentially to form a second turning pair (II); wherein the respective bearing roller (2) is connected to the bearing rail (1) to form a first prismatic pair (I); wherein the guiding slide (3) is connected to the guiding wheel (10) to form a second prismatic pair (II) with a predefined trace; wherein the bearing carriage (4) translates along the bearing rail (1) in an X-axis direction, while the door carrying frame (5) drives the door leaf (12) to turn around the X-axis of the bearing carriage (4); wherein the door carrying frame (5) turns around the X-axis of the bearing carriage (4) while it moves straightly along the bearing rail (1), and it drives the door leaf (12) to accomplish displacement of the door leaf (12) in a Y-axis direction along the trace of the guiding slide (3) as guided by the guiding wheel (10), **characterized in that** the guiding slide (3) is formed on a member at a side facing the door leaf (12), said member defining the bearing rail (1); **that** the guiding wheel (10) is attached to the door leaf (12) at a side facing the bearing rail (1).

2. The sliding plug door bearing mechanism according to claim 1, wherein an anti-bounce wheel (11) is additionally provided on the bearing carriage (4) to control the moving position of the bearing carriage (4).

## Patentansprüche

1. Schwenkschiebetür-Lagermechanismus, der eine Auflageschiene (1), Lagerwalzen (2), eine Füh-

rungsschiene (3), einen Lagerschlitten (4), einen Türtragrahmen (5), eine obere Verbindungswelle (6), eine untere Verbindungswelle (7), einen oberen Scharnierhalter (8), einen unteren Scharnierhalter (9) und ein Führungsrad (10) umfasst,

- wobei der Lagerschlitten (4), die obere Verbindungswelle (6), der obere Scharnierhalter (8) und der Türtragrahmen (5) sequenziell verbunden sind, um ein erstes Drehpaar (I) zu bilden;
- wobei der Türtragrahmen (5), die untere Verbindungswelle (7), der untere Scharnierhalter (9) und ein Türblatt (12) sequenziell verbunden sind, um ein zweites Drehpaar (II) zu bilden;
- wobei die jeweilige Lagerwalze (2) mit der Auflageschiene (1) verbunden ist, um ein erstes prismatisches Paar (I) zu bilden;
- wobei die Führungsschiene (3) mit dem Führungsrad (10) verbunden ist, um ein zweites prismatisches Paar (II) mit einer vordefinierten Spur zu bilden;
- wobei sich der Lagerschlitten (4) in einer X-Achsenrichtung entlang der Auflageschiene (1) bewegt, während der Türtragrahmen (5) das Türblatt (12) so treibt, dass es sich um die X-Achse des Lagerschlittens (4) dreht;
- wobei sich der Türtragrahmen (5) um die X-Achse des Lagerschlittens (4) dreht, während er sich gerade entlang der Auflageschiene (1) bewegt, und er treibt das Türblatt (12), um eine Verschiebung des Türblatts (12) in einer Y-Achsenrichtung entlang der Spur der Führungsschiene (3), wie sie durch das Führungsrad (10) geführt wird, zu erreichen,
- **dadurch gekennzeichnet,**
- **dass** die Führungsschiene (3) auf einem Element an einer dem Türblatt (12) zugewandten Seite gebildet ist, wobei das Element die Auflageschiene (1) definiert;
- **dass** das Führungsrad (10) an einer der Auflageschiene (1) zugewandten Seite an dem Türblatt (12) befestigt ist.

2. Schwenkschiebetür-Lagermechanismus nach Anspruch 1, wobei zusätzlich ein Rücklaufsperrrad (11) auf dem Lagerschlitten (4) bereitgestellt ist, um die Bewegungsposition des Lagerschlittens (4) zu steuern.

## Revendications

1. Mécanisme de roulement de porte coulissante encastrée, comprenant un rail de roulement (1), des galets de roulement (2), une coulisse de guidage (3), un chariot d'appui (4), un châssis porteur de porte (5), un arbre de raccordement supérieur (6), un arbre de raccordement inférieur (7), un porte-charnière su-

périeur (8), un porte-charnière inférieur (9) et une  
roue de guidage (10),  
dans lequel le chariot d'appui (4), l'arbre de raccor-  
dement supérieur (6), le porte-charnière supérieur  
(8) et le châssis porteur de porte (5) sont raccordés 5  
en séquence pour former une première paire tour-  
nante (I) ;  
dans lequel le châssis porteur de porte (5), l'arbre  
de raccordement inférieur (7), le porte-charnière in-  
férieur (9) et un vantail de porte (12) sont raccordés 10  
en séquence pour former une seconde paire tour-  
nante (II) ;  
dans lequel le galet de roulement respectif (2) est  
raccordé au rail de roulement (1) pour former une  
première paire prismatique (I) ; 15  
dans lequel la coulisse de guidage (3) est raccordée  
à la roue de guidage (10) pour former une seconde  
paire prismatique (II) avec une trace prédéfinie ;  
dans lequel le chariot d'appui (4) effectue une trans-  
lation le long du rail de roulement (1) dans une di- 20  
rection de l'axe X, tandis que le châssis porteur de  
porte (5) entraîne le vantail de porte (12) à tourner  
autour de l'axe X du chariot d'appui (4) ;  
dans lequel le châssis porteur de porte (5) tourne  
autour de l'axe X du chariot d'appui (4) tandis qu'il 25  
se déplace en ligne droite le long du rail de roulement  
(1) et il entraîne le vantail de porte (12) pour assurer  
le déplacement du vantail de porte (12) dans une  
direction de l'axe X le long de la trace de la coulisse  
de guidage (3) telle que guidée par la roue de gui- 30  
dage (10),  
**caractérisé en ce que**  
la coulisse de guidage (3) est formée sur un élément  
disposé sur un côté en regard du vantail de porte  
(12), ledit élément définissant le rail de roulement 35  
(1) ;  
la roue de guidage (10) est fixée au vantail de porte  
(12) sur un côté en regard du rail de roulement (1).

2. Mécanisme de roulement de porte coulissante en- 40  
castrée selon la revendication 1, dans lequel une  
roue antichoc (11) est disposée en outre sur le cha-  
riot d'appui (4) pour commander la position en dé-  
placement du chariot d'appui (4).

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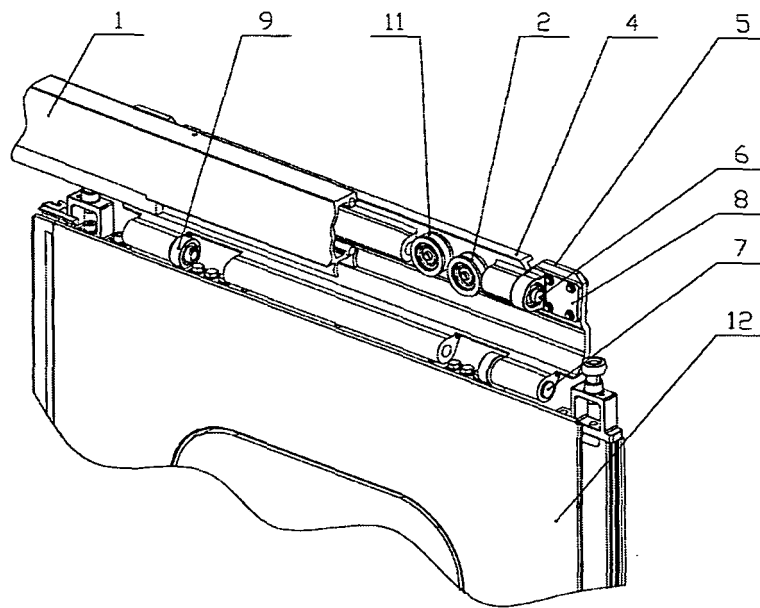


FIG.1

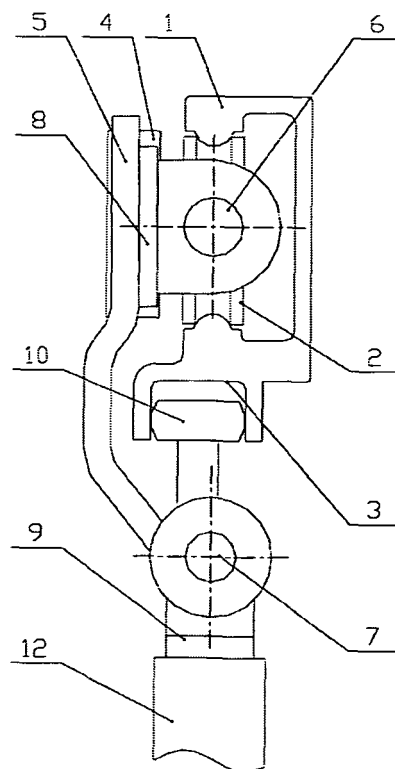


FIG.2

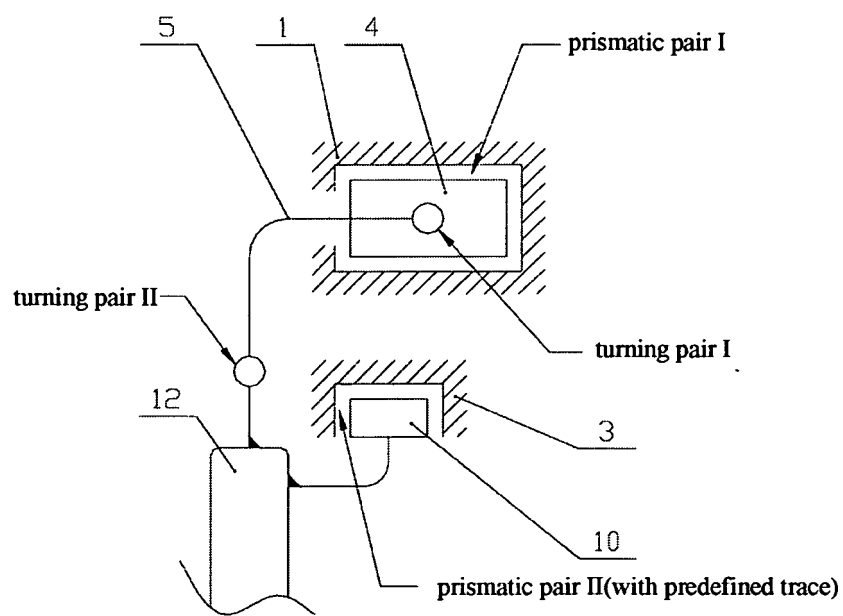


FIG.3

**REFERENCES CITED IN THE DESCRIPTION**

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