



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 336 544 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
20.08.2003 Bulletin 2003/34

(51) Int Cl.7: **B61D 19/00**, E05D 15/10,
B60J 5/06, E05F 5/04

(21) Application number: **00976085.1**

(86) International application number:
PCT/ES00/00448

(22) Date of filing: **22.11.2000**

(87) International publication number:
WO 02/042143 (30.05.2002 Gazette 2002/22)

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **CARRION ESPELTA, Juan**
E-43080 Tarragona (ES)

(71) Applicant: **Faiveley Espanola, S.A.**
43080 Tarragona (ES)

(74) Representative: **Carpintero Lopez, Francisco**
HERRERO & ASOCIADOS, S.L.
Alcalá, 35
28014 Madrid (ES)

(54) **BLOCKING DEVICE FOR EMBEDDABLE SLIDING DOORS**

(57) The conventional pneumatic cylinder acting on a longitudinal guide (3) for sliding doors, with which said doors (1) are released or locked in the body (2) of the car, simultaneously acts on a shaft (4) to which is radially attached a crank (5) that on its free end is hinged to a connecting rod (6), that is in turn hinged to the longitudinal guide (3), so that when the longitudinal guide (3) is displaced outwards so that the doors (1) may slide in

order to open or close, the crank (5) and the connecting rod (6) form a small angle α , that is gradually reduced during the maneuver that locks the guide (3) and therefore the doors (1), until an end position in which the value of said angle slightly exceeds zero, and in which the aforementioned connecting rod (6) acts as a blocking and safety element that keeps the doors in the locked position, preventing their improper opening.

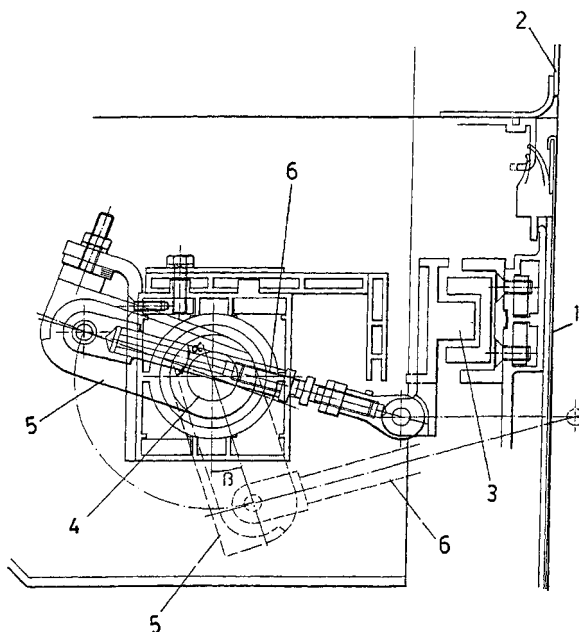


FIG.1

EP 1 336 544 A1

Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a device specifically designed to block or secure the closure of sliding-locking doors such as those used in subway and train cars or the like, wherein their opening is initiated by a forward displacement of the door to release it from the body of the car or element in question, and continues with the aforementioned sideways sliding motion.

[0002] The object of the invention is to ensure that after the door closing operation the doors are securely blocked in said position, making impossible an accidental or forced opening by an agent foreign to the actuation device.

BACKGROUND OF THE INVENTION

[0003] In closures such as those of the aforementioned examples, wherein usually two sliding and locking doors are involved that must move in a synchronized manner, one of the commonly employed solutions due to its structural and functional simplicity is a pneumatic cylinder that acts directly on one of the doors, while the second door receives the motion of the first door through a transmission belt to achieve a synchronized motion.

[0004] More specifically, the door directly driven by the pneumatic cylinder is provided with a rack that in its longitudinal displacement turns a pinion, on the shaft of which is mounted a transmission belt that relates said pinion with another one coupled to the rack of the second door, so that by using identical racks and pinions the motion of one door is transmitted to the other with perfect symmetry.

[0005] In addition, this type of vehicles due to their operational conditions require a good aerodynamic penetration, minimizing the noise in its displacement and a good closure of the doors as relates to tightness. To achieve these objectives the sliding-locking doors of this type have mechanisms that allow them a combined motion; that is, when closed the doors, together with their guides for the sliding motion, insert in the car body to establish a more or less tight closure and a surface continuity between the doors and the car body, thereby optimizing the aerodynamics of the latter and preventing noises made by the air upon contact with the edges of the doors.

[0006] Typically, this front or transverse motion of the guides associated to the doors is achieved by double-action pneumatic cylinders, which with the aid of suitable guides generate the required motion. However, the main problem of this solution is that the same cylinders wedge the door in its closed position, so that if there is a pressure loss in them for any reason the door will be released and free to move outwards with any interior force, such as a passenger leaning on it.

[0007] There are other types of doors in which block-

ing is achieved by hooks, so that the full load is supported by these hooks, requiring that they be oversized or provided in great numbers, thereby complicating the situation even further.

DESCRIPTION OF THE INVENTION

[0008] The blocking device for doors of the invention solves the above-described problems in a fully satisfactory manner, as at the end of the door closing or locking operation it blocks said doors so that they cannot be acted upon other than with their own drive mechanisms during the opening maneuver.

[0009] For this purpose and more specifically, the conventional drive mechanism for the doors which locks/unlocks them while giving them a frontal displacement with respect to the longitudinal guides of said doors, supplies a rotational motion to a shaft provided with a crank that is radially attached to said shaft on one of its ends, so that it will follow it in the rotational motion with a swiveling movement, and which crank is hinged on its other end to a connecting rod that relates said crank to the longitudinal guides of the doors, all of this such that the relative arrangement of the system of doors, the crank swiveling axis, the length of the crank and the length of the connecting rod is such that when the doors are locked or wedged in the wagon the system can only be released by a sideways swiveling of the aforementioned connecting rod, which can only occur by means of a slight temporary increase in the closing sense of the system, which is naturally opposite to the normal loads applied by passengers to the inside of the doors when leaning on them. In this manner, by means of this connecting rod the doors are locked in their closed position with a full security in the event of a failure of their wedging cylinder or against any usual actions exerted from inside the car.

DESCRIPTION OF THE DRAWINGS

[0010] As a complement of the description being made and in order to aid a better understanding of the characteristics of the invention, according to an example of embodiment, the present description includes a single sheet of drawings where for purposes of illustration only and in a non-limiting manner, its single figure shows a profile and cross-sectional view of a system of sliding-locking doors for train cars and the like provided with the blocking device object of the invention, in the area of said blocking device, showing with a solid and dashed line the two end positions corresponding to the locked and released position of the door system.

PREFERRED EMBODIMENT OF THE INVENTION

[0011] Said figure shows how the device of the invention can be applied, for example, to doors (1) that lock in the body of the wagon (2) establishing an external

surface continuity with it, or release and move outwards with the aid of transverse guides, not shown, to which are joined longitudinal guides (3) on which takes place the longitudinal motion of the doors (1), resulting in the opening of the doors when said longitudinal guides (3) have emerged sufficiently outside the wagon body (2). This longitudinal actuation is effected for example by a pneumatic cylinder placed parallel to said guides (3), also not shown in the figures, while the locking and unlocking of the guides (3) is effected with the aid of another pneumatic cylinder, which due to its conventional nature has not been shown, and which while acting on said guides (3) supplies a rotational motion in either sense to a shaft (4) that relates the door driving system to the blocking device of the invention.

[0012] Thus, this shaft (4) is connected to a crank (5), conveniently keyed to it, so that said crank (5) swivels with the rotation of the shaft (4), following it as it turns in either sense and transmitting its motion to a connecting rod (6) that is hinged to the crank (5) and the longitudinal guide (3) of the doors.

[0013] More specifically, as can be clearly seen in the figure, the crank (5) and the connecting rod (6) for an angle of approximately 90° when the door system is unlocked, that is when the guide (3) is projected outwards, and from this situation and as locking takes place with the retraction of the drive cylinder the angle between the connecting rod (6) and the crank (5) is reduced, passing beyond zero before the end closing position is reached, so that in said position and as seen in the figure the connecting rod (6) has overtaken the shaft (4) and is in a self-locking position which completely prevents the unlocking of the doors (1) by an internally applied pressure, such as the bodily weight of the car passengers, as in order for said unlocking to take place the connecting rod (6) must first swivel sideways beyond the shaft (4), in an initial maneuver in which as mentioned before the locking position must first be increased to overtake the maximum tension or limiting position in which the axis of the connecting rod (6) passes through the center of the shaft (4).

is in turn hinged at its opposite end to the longitudinal guide (3), such that starting from the unlocked position of the longitudinal guide (3) in which the connecting rod (6) and the crank (5) form a large angle, said angle is gradually reduced as the longitudinal guide (3) is locked, and reaches zero before said locking position is attained, with said connecting rod (6) acting as a safety element which in the event of a possible failure of the driving cylinder will keep the door system locked in the closed position.

2. Blocking device for sliding-locking doors **characterized in that** it can be used with any type of door suspension mechanism.

Claims

1. Blocking device for sliding-locking doors, particularly for locking doors of the type used in train cars and the like, in which two combined and consecutive movements are established, one of longitudinal displacement on the outer face of the car body, and another of transverse displacement for locking-releasing the door from said body, wherein the longitudinal guide for the displacement of the doors can move forward, that is, in a locking-releasing sense, by the action of a pneumatic cylinder, **characterized in that** said pneumatic cylinder acts both on the longitudinal guide (3) of the doors and on a shaft (4), which is radially connected to a crank (5) that

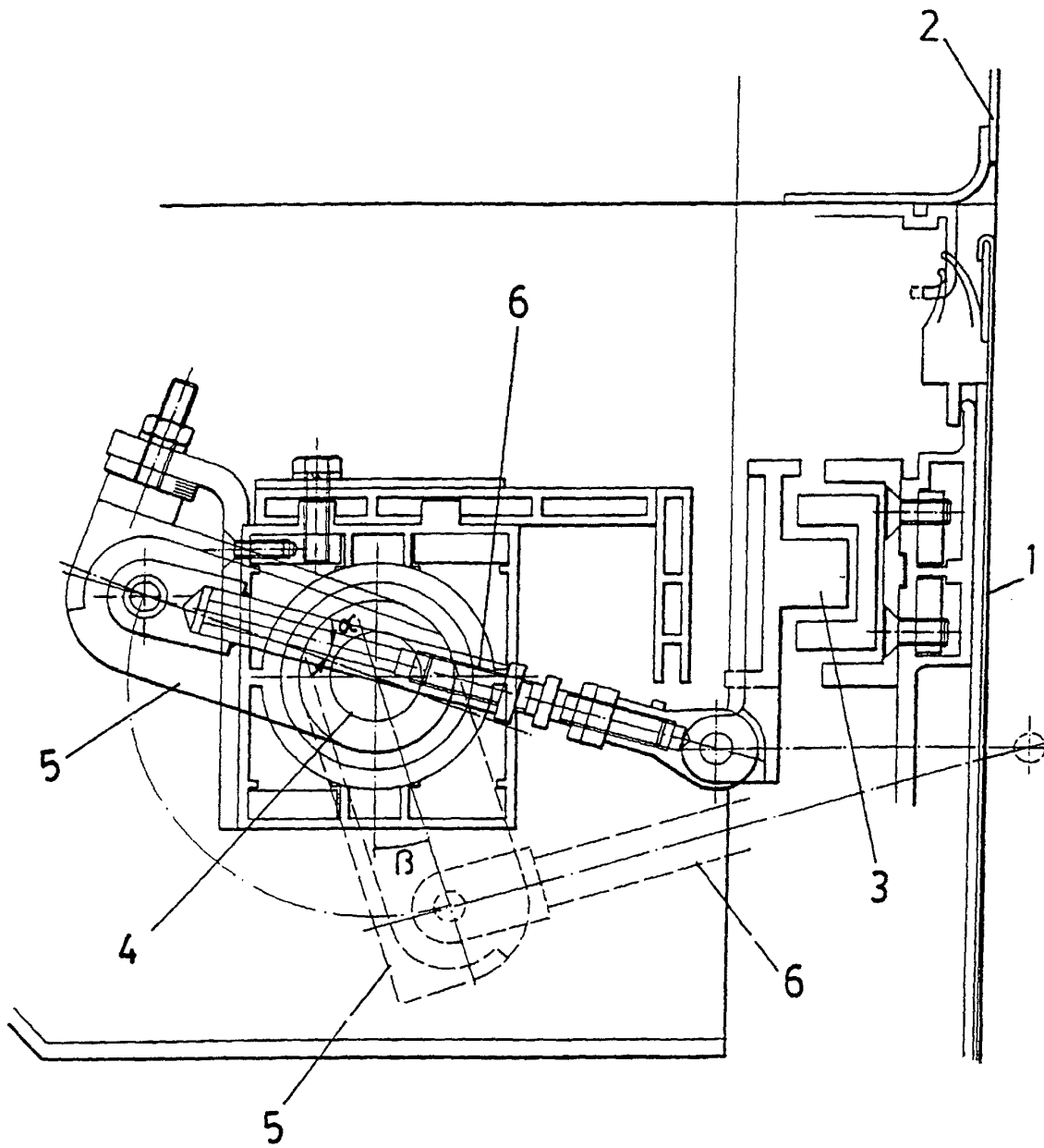


FIG.1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES00/00448

A. CLASSIFICATION OF SUBJECT MATTER		
IPC ⁷ B61D 19/00; E05D 15/10; B60J 5/06; E05F 5/04		
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 ⁷ B61D; E05F; B60J; E05D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
CAJETINES DE PATENTES Y MODELOS DE UTILIDAD ESPAÑOLES		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
OEPM PAT, EPODOC, PAJ, WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0259568 A, (KIEKERT GMBH & CO KG), 16.03.1988, Abstract, claims, figures	1,2
Y	EP 0878371 A, (WESTINGHOUSE AIR BRAKE COMPANY), 18.11.1998, column 4, lines 21-25, column 5, lines 5-16; figures 5, 6 and 6a	1,2
A	DE 4230888 A, (GOLDBACH, HORST), 17.03.1994, figures	1
A	US 4091570 A, (FAVREL), 30.05.1978, the whole document	1
A	US 5483769 A, (ZWEILL), 16.01.1996, Column 4, line 37-column 5, line 36; figures	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 document 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 6th of March 2001 (06.03.2001)		Date of mailing of the international search report 16th of March 2001 (16.03.2001)
Name and mailing address of the ISA/ S.P.T.O.		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES00/00448

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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/ ES00/00448

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0259568 A	16.03.1988	AT 55734 E DE 3630229 A DK 161441 B EP 259568 A1 AT 55734 E	15-09-1990 05-09-1986 08-07-1991 16-03-1988 15-09-1990
EP 0878371 A1	18.11.1998	CA 2217078 A CN 1198997 A JP 10317796 A2 US 5893236 A	13-11-1998 18-11-1998 02-12-1998 13-04-1999
DE 4230888 A	17.03.1994	NONE	
US 4091570 A	30.05.1978	AT 353315 B BE 835878 A1 BR 7508192 A CA1054859A1 CH 600112 A DE2554873A1 ES 443319 A1 FR 2294306A1 GB 1506418 A IT 1052493 A	12.11.1979 24.05.1976 24.08.1976 22.05.1979 16.05.1978 16.06.1976 01.05.1977 09.07.1976 05.04.1978 20.06.1981
US 5483769 A	16.01.1996	NONE	