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(54) **OPENING MECHANISM FOR THE SIDE SLIDING DOOR OF A MOTOR VEHICLE**

ÖFFNUNGSMECHANISMUS FÜR DIE SEITENSCHIEBETÜR EINES KRAFTFAHRZEUGS

MECANISME D'OUVERTURE DE PORTIERE COULISSANTE LATERALE DE VEHICULE A  
MOTEUR

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## Description

**[0001]** The present invention relates to a mechanism adapted to open the side sliding door of a motor vehicle and more in particular the door of a motor vehicle intended for passenger transportation.

**[0002]** Different mechanism to open sliding side doors of commercial vehicles part of which has been adapted to transport passengers too, both as public and private/family vehicles, are already known. As far as known mechanism are concerned, the door is anchored to the bodywork and is guided not only at its lower and upper part, but also at its middle part. When this solution is adopted, designers have to provide a more or less large guide all along the side of the vehicle, so that the overall esthetical aspect of the vehicle is highly affected. Besides, known sliding doors, see as an exemple the mechanism disclosed in US-A-5921613, are mounted on vehicles the bodywork of which is provided with the central side upright, which stops both the front door and the sliding side door. However, the central upright reduces the space available to reach the seats, more in particular the backseats, so that it would be better to count on a side opening completely free, that is without upright. It is to be noted that the lack of the central upright is a problem for the stopping of the front door since the stopping is to be achieved against the rear sliding door, as well as for the achievement of a mechanism that allows to open the sliding door even if the front door is closed and rests against it.

**[0003]** It is an object of the present invention to provide a mechanism adapted to open a sliding door that overcomes the aforementioned drawbacks.

**[0004]** Said object is achieved by means of a mechanism adapted to open the side sliding door or a motor vehicle presenting the characteristics set forth in claim 1.

**[0005]** Additional characteristics and advantages will become more clear from the following description referring to the appended drawings provided as non-restrictive example and in which:

figure 1 is a perspective view of the arm mechanisms according to the invention, housed in the lower side member of a motor vehicle and connected to a sliding door.

figures 2 to 5 are schematic views of the mechanism in figure 1 with the sliding door shown in its different operational positions, from a completely closed position to the completely open position;

figures from 6 to 10 are perspective view of an enlarged detail of the arm mechanism in figure 1 in its different operational position.

**[0006]** The following description refers to a motor vehicle without central upright at its side, and in which the front profile of the side, rear, sliding door serves as stop for the weather strips of the front door. With reference to the figures, reference number 1 indicates a sliding door

of a motor vehicle, shown in a schematic view, while reference number 2 indicates the part of the lower side member, which experts in the field call "sill". Inside the sill 2 there is an elongated space where a wheeled trolley 3 (figures 6-8) slides according to a well known technique. Hinged to the trolley 3 at points 7 and 8 there is an end of two lower arms so that they can rotate around an axle which is basically perpendicular to the plane defined by the flat car of the bodywork. The other two ends of the arms 9 and 10 are rotatably engaged around a single axle with joints 12 and 13, to the lower part of the sliding door. The run of the trolleys 3 and 4 is limited, at the opening of the door (right side in the drawing), by a stop 17 provided with a system of engagement, for example a hook (not shown) of the trolley 3 and, at the closing of the door, by the bottom wall 19 of the space 2a, in order to get locked at the stop of the front doorlock (not shown). A microswitch allows to adjust both mechanically and electrically both the engagement and the release of the trolley 3 by means of the locking system 18.

**[0007]** On the external wall of the space 2a, in front of the trolley 3, there is a wall 20 the length of which is basically equal to the length of the space 2a where the trolley 3 slides, and the front and rear ends 21 and 22 of which are curved towards the inner part of the space 2a. The height of the wall shall be calculated so that it will not interfere with the arms 9 and 10 when they rotate on their hinges 8 and 9. A bridge 23 is fixed to the lower wall of the front arm 10 by means of an axle 25. At its ends there are two small wheels or rollers 27 and 28 covered in antifriction material, and it is basically perpendicular to the axis of the arm supporting it. The diameter of the rollers 27 and 28 is such that it interacts with the external surface of the wall 20 while the arm 10 is rotating as a consequence of the opening of the sliding door.

**[0008]** Even if no detailed description is provided, the same mechanism can be used in a similar elongated space, made in the upper side member of the bodywork so that it can support and guide the sliding door not only at its lower part but also at its upper part.

**[0009]** The mechanism for sliding doors according to the invention works as follows. By means of the handle (not shown) on the door 1, the locks (in the case two locks are used, a front lock and a rear lock) are unlocked and the door makes a circular movement being supported by the arms 9 and 10 which make a basically 90 degrees rotation on the hinges 7 and 8 and reach a position which is basically perpendicular to the body side of the motor vehicle. The roller 27 guides the movement of the arm 10 (and consequently that of the whole door) and slides on the front curved part 21 of the wall 20 (figures 6 and 7). When the arm 10 has reached a position which is basically perpendicular to the body side (and the arm 9 has reached the same position too), both rollers come into contact with the wall 20 thus preventing an additional rotation of the arm itself.

**[0010]** At this point, a further action on the handle of the door makes the trolley 3 slide on the wheels 4 inside

the space 2a, so that the door 1 translates along the body side and the rollers 27 and 28 slide on the flat part of the wall 20 (figures 3 and 8).

[0011] When the trolley 3 bumps against the stop 17 (figure 4) being engaged by it as described above, the roller 28 reaches the rear curved part 21 of the wall 20, so that being no longer supported on said wall, allows arm 10, and therefore arm 9, to further rotate so that the door 1 moves further and the door opening widens (figures 5 and 10).

[0012] The adjustment of the length of the arms 9 and 10 as well as that of the space 2a allows to determinate how much can the door move.

### Claims

1. Mechanism adapted to open a side, rear, sliding door of a motor vehicle without central side upright, provided with front and rear arms (9, 10), a trolley (3) and guiding means (20,27,28), said arms (9,10) being adapted to make said door (1) make a pantograph movement, and being rotatably connected to a trolley (3) sliding on wheels in an elongated space (2a), made laterally in the bodywork of the motor vehicle, at the lower position; said arms (9, 10) being such that the door (1) is allowed a first pantograph movement to open and set aside the door from the body side, a second movement to translate along the body side of the motor vehicle and a third pantograph movement to achieve the maximum opening of the door; said movements being guided by means of the guiding means (20, 27, 28) connected to one of the two arms and consisting of a wall (20) fixed in use in the elongated space (2a) in front of the trolley (3), the length of which is basically equal to the length of the space (2a), wherein the wall (20) is adapted to interact with at least one of two rollers (27, 28) connected in rotation to one (10) of the arms, and in that the ends (21, 22) of said wall (20) are both curved towards the inner part of the elongated space (2a).
2. Mechanism as claimed in claim 1, **characterised in that** the rollers are connected to the arm (10) by means of a bridge (23) that keeps them apart and the longer axis of which is basically perpendicular to the axis of said arm.
3. Mechanism as claimed in claim 1, **characterised in that** the position of the trolley (3) is controlled by means of a stop (17) made on the edge of the spaces (2a) and provided with a system of releasable locking (18)
4. Mechanism as claimed in claim 1, **characterised in that** the elongated space (2a) is made in the lower and upper side members of the bodywork of the motor vehicle.

5. Side, rear, sliding door of a motor vehicle with no side central upright **characterised in that** it is provided with two opening mechanism as claimed in claim 1.

### Patentansprüche

1. Mechanismus zum Öffnen einer seitlichen hinteren Schiebetür eines Kraftfahrzeugs ohne seitliche Mittelsäule mit vorderen und hinteren Armen (9, 10), einem Schlitten (3) und Führungsmitteln (20, 27, 28), wobei die Arme (9, 10) ausgebildet sind, die Tür (1) dazu zu veranlassen, eine Pantografbewegung durchzuführen, und die drehbar mit einem Schlitten (3) verbunden sind, der auf Rollen in einem lang gestreckten Hohlraum (2a) gleitet, welcher seitlich an der unteren Stelle in der Karosserie eines Kraftfahrzeugs ausgebildet ist; wobei die Arme (9, 10) so ausgebildet sind, dass der Tür (1) eine erste Pantografbewegung zum Öffnen und zum Beabstanden der Tür von der Karosseriefront, eine zweite Bewegung, um sich entlang der Karosseriefront des Kraftfahrzeugs zu verschieben, sowie eine dritte Pantografbewegung ermöglicht wird, um die maximale Öffnung der Tür zu erzielen; wobei die Bewegungen mit Hilfe der Führungsmittel (20, 27, 28) geführt werden, welche mit einem der beiden Arme verbunden sind, und die aus einer Wandung (20) bestehen, welche während des Betriebs in dem langgestreckten Hohlraum (2a) auf der Vorderseite des Schlittens (3) befestigt sind, deren Länge im Wesentlichen der Länge des Hohlraums (2a) entspricht, wobei die Wandung 20 ausgebildet ist, um mit zumindest einer der beiden Rollen (27, 28) in Wechselwirkung zu treten, welche drehbar mit einem (10) der Arme verbunden sind, und wobei die Enden (21, 22) der Wandung (20) in Richtung der Innenseite des längsgestreckten Hohlraums (2a) gebogen sind.
2. Mechanismus nach Anspruch 1, **dadurch gekennzeichnet, dass** die Rollen mit dem Arm (10) über eine Traverse (23) verbunden sind, welche diese auseinander hält und deren längere Achse im Wesentlichen rechtwinklig zu der Achse des Arms steht.
3. Mechanismus nach Anspruch 1, **dadurch gekennzeichnet, dass** die Stellung des Schlittens (3) durch einen Anschlag (17) begrenzt wird, welcher an dem Ende des Hohlraums (2a) ausgebildet ist, und der mit einem lösbaren Einrastmechanismus (18) ausgestattet ist.
4. Mechanismus nach Anspruch 1, **dadurch gekennzeichnet, dass** der längsgestreckte Hohlraum (2a) in den unteren und oberen Seitenbauteilen der Karosserie des Kraftfahrzeugs ausgebildet ist.

5. Seitliche, hintere Schiebetür eines Kraftfahrzeugs ohne Mittelsäule, **dadurch gekennzeichnet, dass** sie mit zwei Öffnungsmechanismen gemäß Anspruch 1 ausgestattet ist.

d'ouverture selon la revendication 1.

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## Revendications

1. Mécanisme adapté pour ouvrir une portière coulissante, arrière, latérale d'un véhicule à moteur sans montant latéral central, muni de bras avant et arrière (9, 10), d'un chariot (3) et de moyens de guidage (20, 27, 28), lesdits bras (9, 10) étant adaptés pour faire réaliser à ladite portière (1) un mouvement de pantographe, et étant reliés en rotation à un chariot (3) coulissant sur des galets dans un espace allongé (2a), créé latéralement dans la carrosserie du véhicule à moteur, au niveau de la position inférieure; lesdits bras (9, 10) étant tels que la portière (1) est autorisée à réaliser un premier mouvement de pantographe pour ouvrir et placer la portière sur le côté par rapport au flanc de la carrosserie, un deuxième mouvement pour coulisser le long du flanc de la carrosserie du véhicule à moteur et un troisième mouvement de pantographe pour réaliser l'ouverture maximale de la portière ; lesdits mouvements étant guidés par l'intermédiaire des moyens de guidage (20, 27, 28) reliés à l'un des deux bras et consistant en une paroi (20) fixée en usage dans l'espace allongé (2a) en face du chariot (3), dont la longueur est pratiquement égale à la longueur de l'espace (2a), dans lequel la paroi (20) est adaptée pour interagir avec au moins un des deux galets (27, 28) reliés en rotation à l'un (10) des bras, et en ce que les extrémités (21, 22) de ladite paroi (20) sont toutes les deux courbées vers la partie intérieure de l'espace allongé (2a).
2. Mécanisme selon la revendication 1, **caractérisé en ce que** les galets sont reliés au bras (10) au moyen d'une entretoise (23) qui les maintient séparés et dont l'axe le plus long est pratiquement perpendiculaire à l'axe dudit bras.
3. Mécanisme selon la revendication 1, **caractérisé en ce que** la position du chariot (3) est contrôlée au moyen d'une butée (17) réalisée sur le bord de l'espace (2a) et munie d'un système de blocage déverrouillable (18).
4. Mécanisme selon la revendication 1, **caractérisé en ce que** l'espace allongé (2a) est créé dans les éléments latéraux inférieurs et supérieurs de la carrosserie du véhicule à moteur.
5. Portière coulissante, arrière, latérale d'un véhicule à moteur sans montant latéral central, **caractérisé en ce qu'elle** est munie de deux mécanismes

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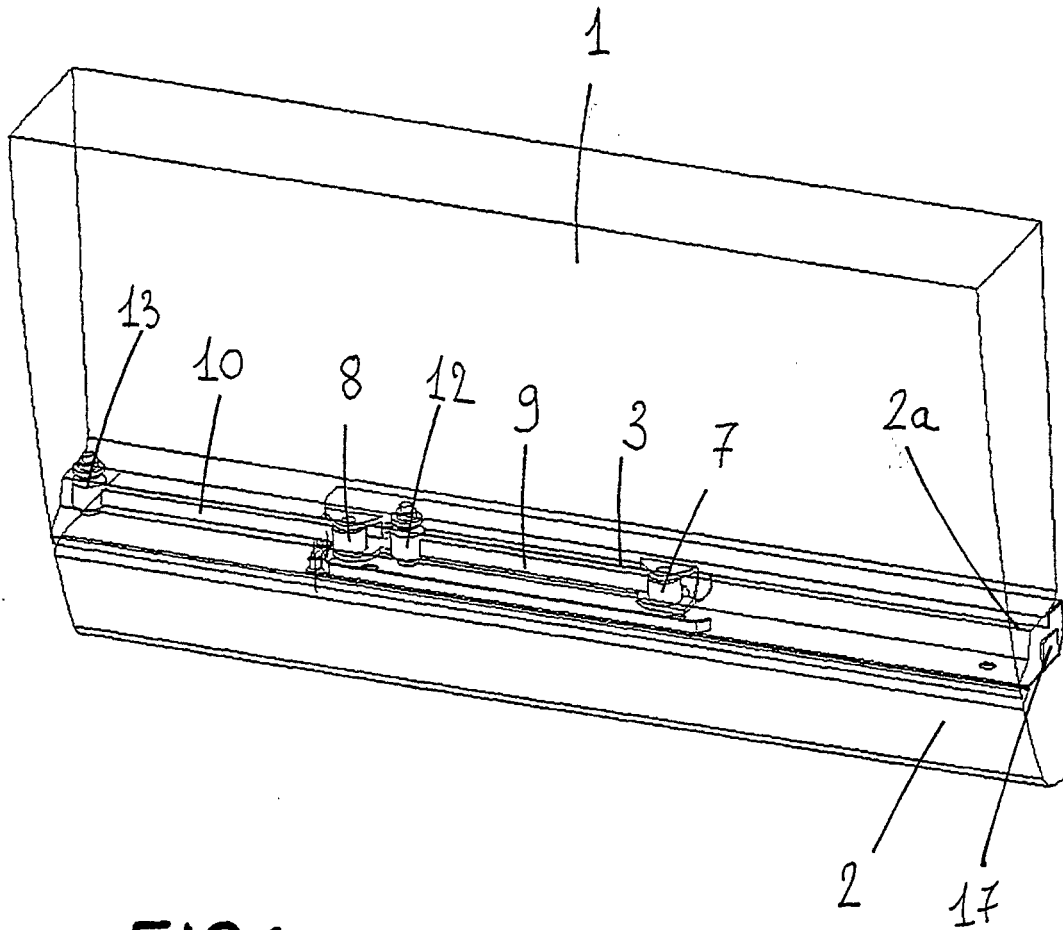


FIG.1

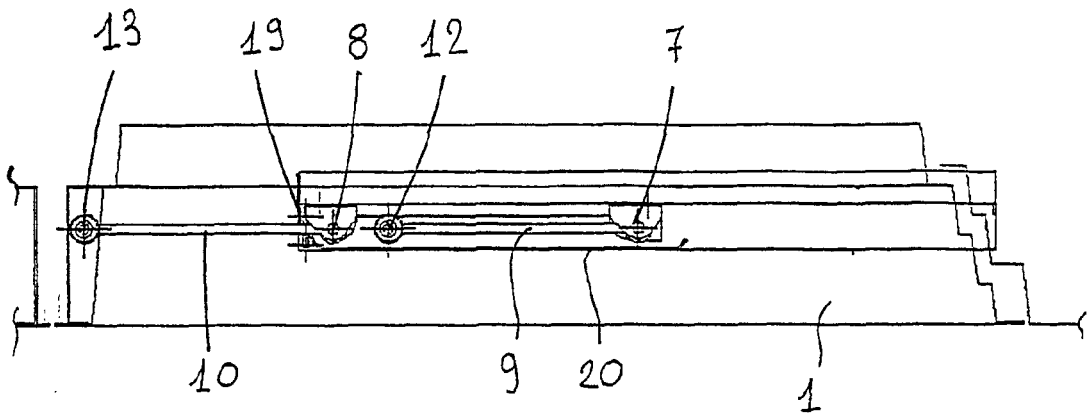
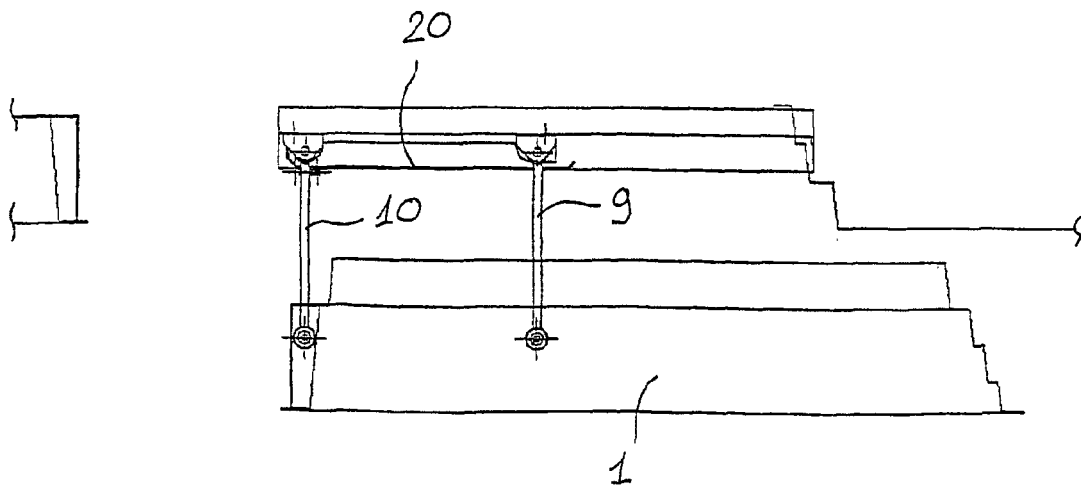


FIG. 2

FIG. 3



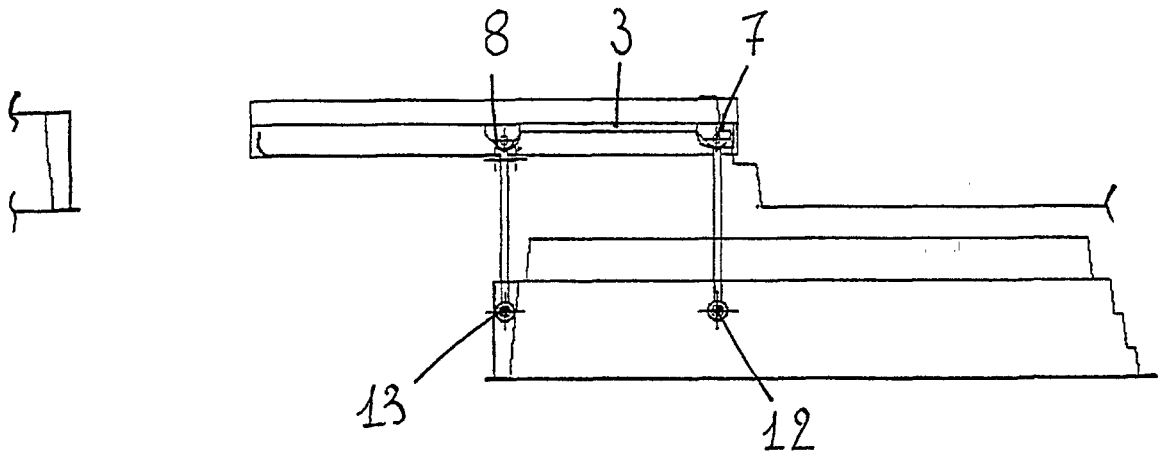


FIG. 4

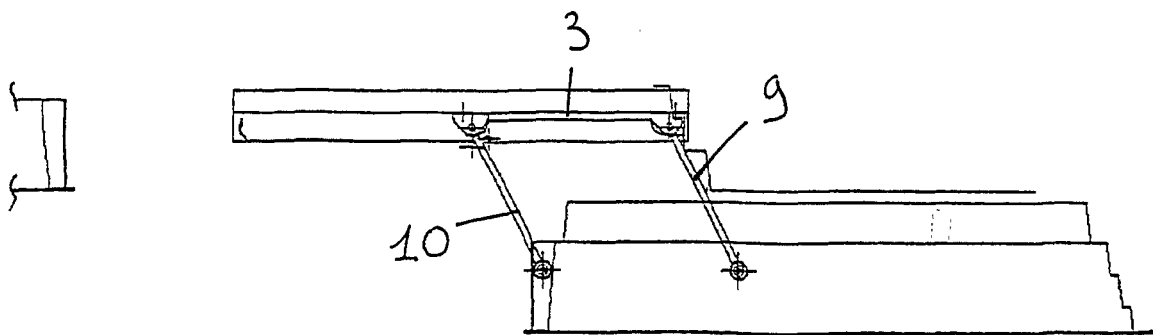


FIG. 5

FIG.6

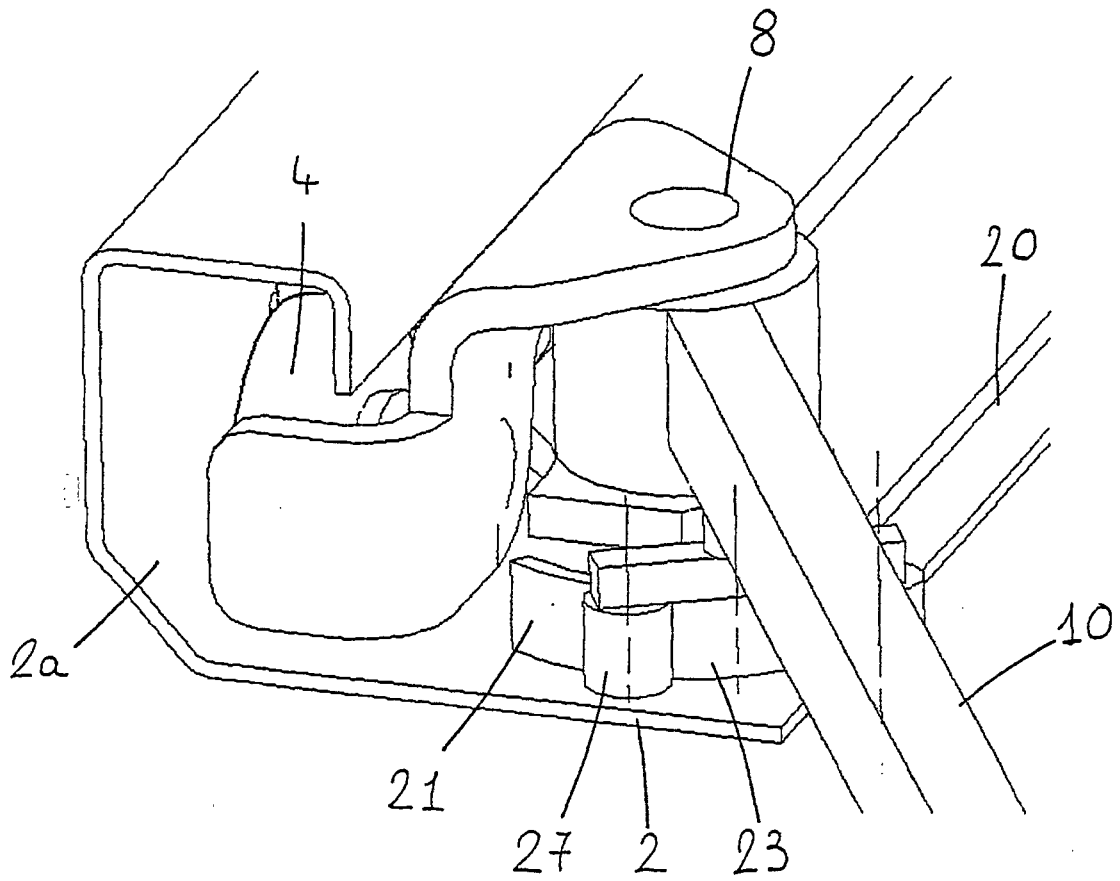


FIG.7

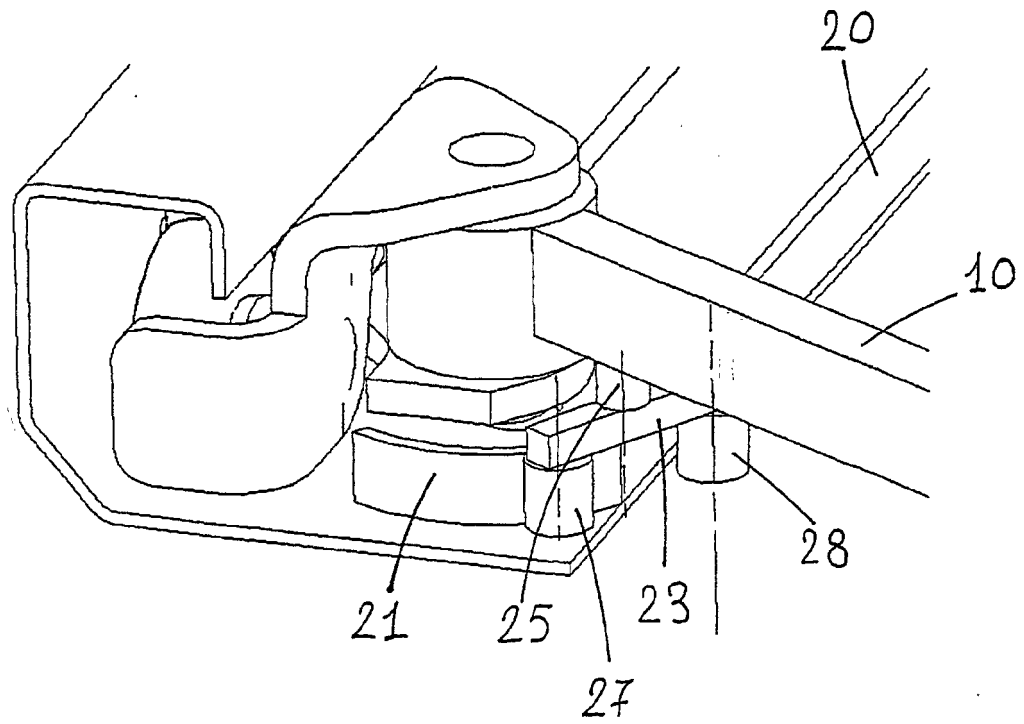


FIG. 8

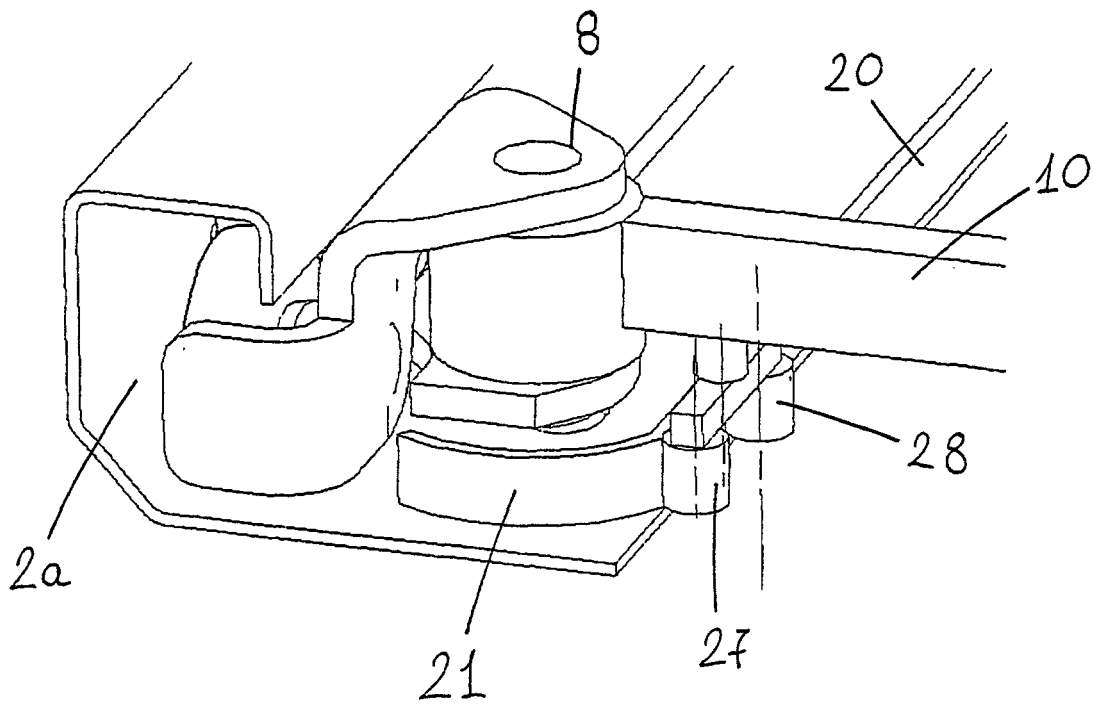


FIG. 9

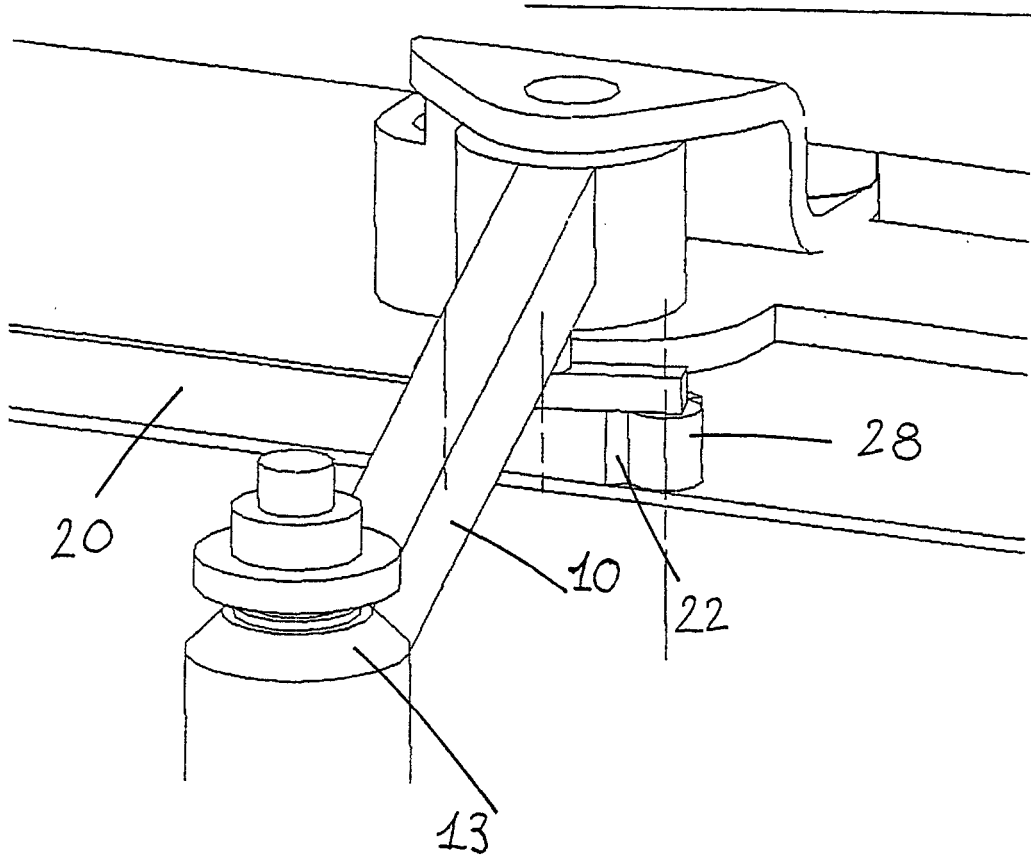


FIG.10

