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A mechanism for locking and releasing closure bolts for automatic doors of lifts.

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Proprietor : **OTIS ELEVATOR COMPANY**
10 Farm Springs
Farmington, CT 06032 (US)

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Inventor : **Martin, Juan**
Jose del Pino, 9
E-28021 Madrid (ES)
Inventor : **Sevilleja, Jose**
La del Manojito de Rosas, 95
E-28041 Madrid (ES)

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Representative : **Jolly, Jean-Pierre et al**
Cabinet Jolly
54, rue de Clichy
F-75009 Paris (FR)

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Description

OBJECT OF THE INVENTION

As expressed in the statement of this descriptive memorandum, the present invention relates to a mechanism for locking and releasing closure bolts for automatic doors of lifts, the special design of the mechanism providing a number of advantages from the structural point of view as well as the functional and including the maintenance aspect, compared with conventional systems provided for the same purpose.

The locking mechanism is constructed so that it permits a movement of the doors on each floor and of the lifts and of the cabin doors, being firmly connected to one another without any play, during periods of opening and closing. At the same time, the structure of the mechanism is reduced to the minimum in terms of the number of constituent parts, basically in the floor door of the lift.

ANTECEDENTS OF THE INVENTION

Conventional mechanisms for locking and releasing the closure bolts on automatic doors of lifts are, in the simplest of designs, actuated by a U-shaped rigid profile situated in the door of the cabin.

Such a structural design concept means that each door on the floor or storey requires an extremely complex arrangement of rollers, levers, spindles, powerful springs etc., all of which helps to create noise problems and problems of malfunction of the lift, since some of the buffers and springs produce forces which are orientated in a direction opposite to the direction of closure of the door and which have to be overcome by an over-dimensioning of the counterweights and of the devices which actuate the door proper.

On the other hand, in the conventional systems to which we are referring, in the final stage of closure and in the initial stage of opening, there is a lack of control over the bolt which drops abruptly under the effect of the combined action of the spring and of gravity, producing an unpleasant noise since the cam profile on the cabin door has to be left free in order to obtain the desired clearance which is needed for normal vertical movement of the door of the cabin in the entire cavity of the floor door of the lift.

Another problem offered by conventional systems resides in the fact that the connection between the door of the cabin and the floor door is not solid and normally gives rise to rattling and vibration which has a negative effect on the functioning quality.

Therefore, it can be said that conventional mechanisms for automatic doors of lifts, intended for releasing and locking the corresponding closure bolt, are complex mechanisms due to the considerable

number of movable parts which have to operate in conjunction with more or less complex devices so that among the numerous problems which are created in this type of mechanism, the following may be quoted:

- A high cost of the mechanism which has to incorporate the door at the floor or storey and which will be multiplied logically by the number of floors.
- Difficult maintenance due to the large number of parts which have only a minor range of movement but which have various rollers, springs etc.
- The transmission of a linear movement between the door of the cabin and the lift door at the floor is not entirely without clearance during the end of the closure phase or the start of the opening phase, which results in shaking and rattles.
- A noisy operation of closure and opening because during this phase the mechanism is subjected to the control of the door of the cabin and its movement is accelerated by the force of gravity to which is added the force of one or more springs.

DESCRIPTION OF THE INVENTION

The invention has conceived a locking and release mechanism applicable to automatic doors of lifts for the actuation of the closure bolts, which allows movement of the lift doors at the floor and also of the door of the lift cabin, the doors being firmly connected with no clearance in either direction of movement and during the periods of opening and closure.

In the same way, the mechanism is based on a considerable reduction in the number of elementary parts such as rollers, spindles, moving parts etc., mainly in the lift door at the floor.

Structurally, the mechanism is extremely rugged.

Among the most important advantages offered by the mechanism according to the invention, the following may be quoted:

1. A smooth movement of the door panel, with no rattling.
2. A reduction in cost due to the elimination of parts and sub-assemblies in the many lift doors at the various floors.
3. A substantial reduction in the number of malfunctions of the lift.
4. Elimination of noise caused during closing and opening.

These advantages are obtained due to the fact that the mechanism has the particular feature that the buffers for carrying out the said locking and releasing of the bolt are constituted by respective flat

and rectangular profiles, one of these belonging to the door at the floor while the other belongs to the door of the lift, between which there is disposed a roller which is rigid with the floor door and on the top and rear of which rests the associated bolt, while externally of the flat profile which is attached to the floor door there is another roller connected to a tilting member which is actuated by the thrust from a straight arm which is part of the cabin door, all so that the distances, in the closed position, between the roller connected to the floor door and the flat profile connected to the cabin door, and also the distance between the roller connected to the cabin door and the flat profile rigid with the floor door, are constant and equal distances which allows the doors to be connected without any clearance of any type, so that no noises are created while smooth movements are obtained without any kind of rattling in the door panels.

Accordingly, this invention relates to a mechanism for locking and releasing closure bolts for automatic doors of lifts, which being envisaged to produce a tilting of the bolt by means of which it is possible to lock and/or release the corresponding floor door to prevent or allow respectively the opening of the said door, characterised in that the aforesaid bolt has its upper and rear part bearing on a roller provided on the floor door, on which roller it is possible for a flat rectangular profile in a vertical disposition to bear and press, the said profile belonging to the cabin door, with the particular feature that on this cabin door there is in turn mounted a second roller which is disposed on a tilting member, a roller which is capable of biasing and pressing on a second flat rectangular profile in the vertical position, belonging to the floor door, there being also provision for the said tilting member to be also provided with a new roller which is capable of being acted on and biased at the end of a straight arm belonging to the cabin door, all so that the displacement of the flat profile belonging to the cabin door when the door opening phase commences, and the displacement of the roller belonging to the floor door, pushed by the flat profile, produces a tilting of the closure bolt, which releases the floor door, and a rotation of the tilting member so that the second roller reaches the flat profile of the floor door, allowing a clearance-free connection of the two doors.

To supplement the description which will be given hereinafter and in order to assist better comprehension of the characteristic features of the invention, there are attached to the present descriptive memorandum a set of drawings which will make it easier to appreciate the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1 and 1a show the mechanism in the closed position at the moment when the opening operation

is about to commence, so that in the diagram in Fig. 1a there are clearly shown the constant distances which were referred to hereinabove, between the flat profiles connected to the doors and the corresponding rollers which form part of the mechanism.

Figs. 2 and 2a show the same diagrams as those shown in Figs. 1 and 1a but in the position of tilting of the bolt in order to release and correspondingly open the door.

Fig. 3 is a side view of the bolt in its locked position associated with the roller on the top of which it rests, also showing the flat profile corresponding to the cabin door.

Fig. 4 is a side view of the rear part of the mechanism and showing the tilting part as well as the form of thrust of the flat profile corresponding to the cabin door.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Looking at these drawings, it is possible to see how the mechanism for locking and releasing closure bolts for automatic doors of lifts is designed to make it possible to carry out the tilting action of the bolt by means of which it is possible to achieve locking and/or release in respect of the corresponding floor door to allow or prevent such a door being opened.

In Fig. 1a and according to the diagram shown reference numeral 2 corresponds to the cabin door while reference 3 corresponds to the door at the floor or storey, the references "a" and "2a" corresponding to the distances between the elements which form part of the mechanism and which will be described hereinafter.

The actual mechanism includes a flat and rectangular profile 4 which is connected to the cabin door and a similar profile 5 which is connected to the door on the floor or storey, so that Fig. 1 shows the bolt 1 in the locked position and immediately prior to commencement of the movements needed to open or release it.

In this position, it can be seen that the bolt 1 has its upper and rear part resting on a roller 6 which is connected to the floor door 3, the roller 6 on which it is possible to support and impel a flat and rectangular profile into a vertical arrangement identified by reference numeral 7 and belonging to the cabin door 2.

A second roller 8 is also mounted on this cabin door 2, with the particular feature that in this case the said roller 8 is associated with a tilting member 9 which rotates about the spindle 10. The said roller 8 is, according to the tilting of the member 9, capable of acting upon and biasing the end of a straight arm 12 which is part of the cabin door 2, all so that displacement of the profiles 4 and 5 by the action of the rollers 6 and 8 produces a tilting of the bolt 1 in order to release and open the door, in addition to which the

connection between them is made without any kind of clearance.

Fig. 3 shows the actual bolt 1 in the closed or locked position, clearly demonstrating how the member 7 is constantly biased by a spring 13, the said bolt being associated with a contact 14 combined with a make-and-break switch 15.

Finally, Fig. 4 shows the rear part of the mechanism where it is possible to see the tilting member 8 and the arm 12 which bears on the roller 11, the said tilting member 9 being biased by the spring 16.

According to this embodiment and on a basis of the position shown in Fig. 1, that is to say the closed position, when the cabin door 2 moves to the right, according to Fig. 1a, so that some door actuating device is actuated, the flat profile 4 situated on the cabin door 2 will travel the distance "a" shown in Fig. 1a and then comes in contact with the roller 6. At the moment, the door which is remote from the arm 12 which is nevertheless maintained against the roller 11, permits the movement of this latter with the associated rotation so that the roller 8 reaches the flat profile 5 of the floor door 3.

From that moment on, the connection between the cabin door 2 and the floor door 3 of the lift will be bereft of any kind of clearance and therefore its movement will be smooth and there will be no rattles, the process starting by the rotation of the bolt 1, the opening of the switch 15 associated with the contact 14, which then produces movement of the floor door 3 in a horizontal direction.

During the closure process, the same cycle is followed but in the opposite direction.

During the process of opening and closing, the bolt 1 will be permanently subject to the control of displacement of the cabin door 2 and therefore its movement is never free, which avoids the typical problem of the noise caused in other mechanisms due to the uncontrolled dropping of the bolt during the final phase of door closure.

Claims

1. A mechanism for locking and releasing closure bolts for automatic doors of lifts, which being envisaged to produce a tilting of the bolt (1) by means of which it is possible to lock and/or release the corresponding floor door (3) to prevent or allow respectively the opening of the said door (3), characterised in that the aforesaid bolt (1) has its upper and rear part bearing on a roller (6) provided on the floor door (3), on which roller (6) it is possible for a flat rectangular profile (4) in a vertical disposition to bear and press, the said profile (4) belonging to the cabin door (2), with the particular feature that on this cabin door (2) there is in turn mounted a second roller (8) which

is disposed on a tilting member (9), a roller (6) which is capable of biasing and pressing on a second flat rectangular profile (5) in the vertical position, belonging to the floor door (3), there being also provision for the said tilting member (9) to be also provided with a new roller (11) which is capable of being acted on and biased at the end of a straight arm (12) belonging to the cabin door (2), all so that the displacement of the flat profile (4) belonging to the cabin door (2) when the door opening phase commences, and the displacement of the roller (6) belonging to the floor door (3), pushed by the flat profile (4), produces a tilting of the closure bolt (1), which releases the floor door (3), and a rotation of the tilting member (9) so that the second roller (8) reaches the flat profile (5) of the floor door (3), allowing a clearance-free connection of the two doors (2, 3).

2. A mechanism for locking and releasing closure bolts for automatic doors of lifts, according to Claim 1, characterised in that in the state of closure of the bolt (1), the distance (9) between the flat profile (4) of the cabin and the roller (6) of the floor door (3) is equal to the distance (9), between the flat profile of this floor door (3) and the first roller of the tilting member belonging to the cabin door.
3. A mechanism for locking and releasing closure bolts for automatic doors of lifts, according to Claims 1 and 2, characterised in that the tilting shaft of the bolt (1) is situated under the roller (6) of the floor door (3) which bears on the said bolt (1), while the tilting axis (10) of the tilting member (9) to which the cabin door roller is connected is situated under the second roller (8) of the said tilting member (9).

Revendications

1. Un mécanisme destiné à bloquer et débloquent des loquets de fermeture pour portes automatiques d'ascenseurs, qui est conçu pour obtenir un basculement du loquet (1) au moyen duquel il est possible de bloquer et/ou débloquent la porte (3) de palier correspondante, pour interdire ou permettre respectivement l'ouverture de ladite porte (3), caractérisé en ce que ledit loquet (1) a sa partie supérieure et arrière portant sur un galet (6) prévu sur la porte (3) du palier, sur lequel galet (6) un profilé rectangulaire plat (4) placé dans une disposition verticale, peut porter et presser, ledit profilé appartenant à la porte (2) de la cabine, avec la caractéristique particulière que, sur cette porte (2) de cabine, est à son tour monté un deuxième galet (8) qui est disposé sur un élément

basculant (9), un galet (6) qui est capable de solliciter et presser sur un deuxième profilé rectangulaire plat (5) en position verticale appartenant à la porte (3) du palier, cependant qu'il est aussi prévu que ledit élément basculant (9) soit aussi muni d'un nouveau galet (11) qui peut subir l'action et être sollicité par l'extrémité d'un bras (12) rectiligne appartenant à la porte (2) de la cabine, tout ceci de manière que le déplacement du profilé plat (4) appartenant à la porte (2) de la cabine, au moment où commence la phase d'ouverture de la porte, et le déplacement du galet (6) appartenant à la porte (3) du palier, poussé par le profilé plat (4), produisent un basculement du loquet (1) de fermeture, qui libère la porte (3) du palier, et une rotation de l'élément basculant (9) de manière que le deuxième galet (8) atteigne le profilé plat (5) de la porte (3) du palier, en permettant ainsi de réaliser une liaison exempte de jeu entre les deux portes (2, 3).

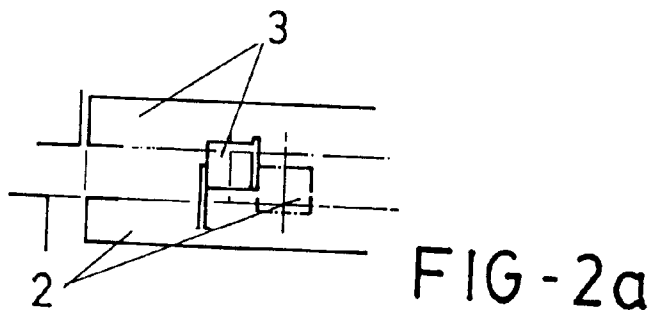
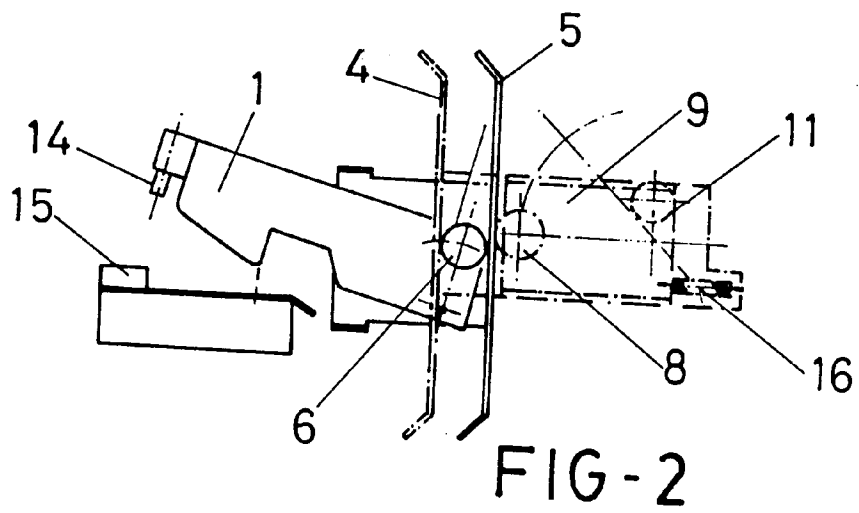
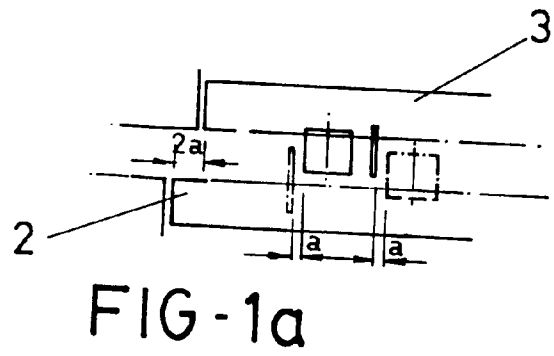
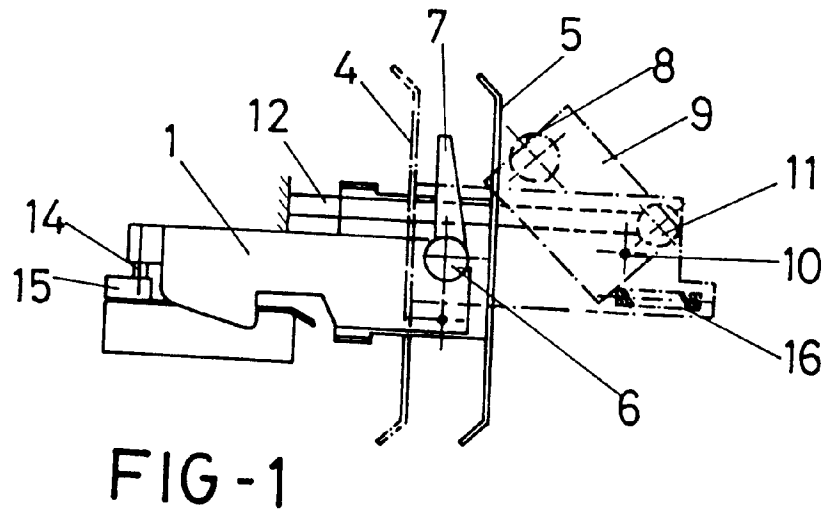
2. Mécanisme destiné à bloquer et débloquent des loquets de fermeture pour portes automatiques d'ascenseurs selon la revendication 1, caractérisé en ce que, dans l'état de fermeture du loquet (1), la distance (9) entre le profilé plat (4) de la cabine et le galet (6) de la porte (3) du palier est égale à la distance (9) entre le profilé plat de cette porte (3) de palier et le premier galet de l'élément basculant appartenant à la porte de la cabine.
3. Mécanisme destiné à bloquer et débloquent des loquets de fermeture pour portes automatiques d'ascenseurs selon les revendications 1 et 2, caractérisé en ce que l'arbre de basculement du loquet (1) est situé sous le galet (6) de la porte (3) du palier qui porte sur ledit loquet (1), tandis que l'axe de basculement (10) de l'élément basculant (9) auquel le galet de la porte de cabine est relié est situé sous le deuxième galet (8) dudit élément basculant (9).

Patentansprüche

1. Vorrichtung zum Sperren und Entsperren von Schließbolzen automatischer Aufzugstüren, die vorgesehen ist, ein Kippen des Bolzens (1) zu bewirken, durch den es möglich ist, die entsprechende Stockwerkstüre (3) zu versperren und/oder zu entsperren, um das Öffnen der genannten Türe (3) zu verhindern bzw. zu ermöglichen, **dadurch gekennzeichnet**, daß sich der obere und hintere Teil des genannten Bolzens (1) an eine an der Stockwerkstüre (3) vorgesehene Rolle (6) anlegt, gegen die ein flaches rechtwinkliges Profil (4) in einer vertikalen Anordnung sich anlegen und drücken kann, wo-

bei das genannte Profil (4) zu der Kabinentüre (2) gehört mit dem besonderen Merkmal, daß an dieser Kabinentüre (2) ihrerseits eine zweite Rolle (8) angebracht ist, die an einem Kippteil (9) angeordnet ist, eine Rolle (6), die ein zweites, flaches, rechtwinkliges Profil (5) in vertikaler Anordnung belasten und gegen dieses drücken kann, das zu der Stockwerkstüre (3) gehört, und wobei außerdem vorgesehen ist, daß das Kippteil (9) auch mit einer neuen Rolle (11) versehen ist, auf die an dem Ende eines zu der Kabinentüre (2) gehörenden, geraden Arms (12) eingewirkt werden kann und die belastet werden kann, alles so, daß die Verlagerung des zu der Kabinentüre (2) gehörenden, flachen Profils (4) zu Beginn der Türöffnungs-Phase und die Verlagerung der zur Stockwerkstüre (3) gehörenden Rolle (6), die durch das flache Profil (4) geschoben wird, ein Kippen des Schließbolzens (1) bewirkt, was die Stockwerkstüre (3) entsperrt und eine Verdrehung des Kippteils (9) bewirkt, so daß die zweite Rolle (8) an das flache Profil (5) der Stockwerkstüre (3) herankommt und ein abstandsfreies Verbinden der zwei Türen (2,3) erlaubt.

2. Vorrichtung zum Sperren und Entsperren von Schließbolzen automatischer Aufzugstüren nach Anspruch 1, **dadurch gekennzeichnet**, daß im Schließzustand des Bolzens (1) der Abstand (9) zwischen dem flachen Profil (4) der Kabinentüre und der Rolle (6) der Stockwerkstüre (3) gleich ist dem Abstand (9) zwischen dem flachen Profil dieser Stockwerkstüre (3) und der ersten Rolle des Kippteils, das zu der Kabinentüre gehört.
3. Vorrichtung zum Sperren und Entsperren von Schließbolzen automatischer Aufzugstüren nach Ansprüchen 1 und 2, **dadurch gekennzeichnet**, daß die Kippwelle des Bolzens (1) unter der Rolle (6) der Stockwerkstüre (3) angeordnet ist, die sich an den Bolzen (1) anlegt, während die Kippachse (10) des Kippteils (9), mit der die Kabinentürrolle verbunden ist, unter der zweiten Rolle (8) des Kippteils (9) angeordnet ist.



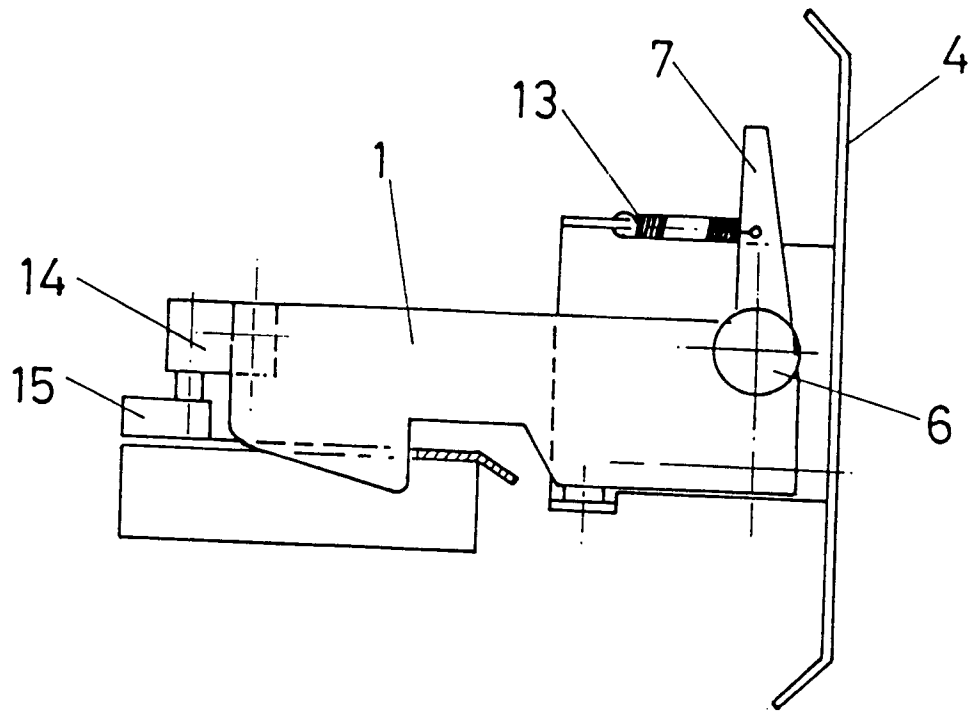


FIG - 3

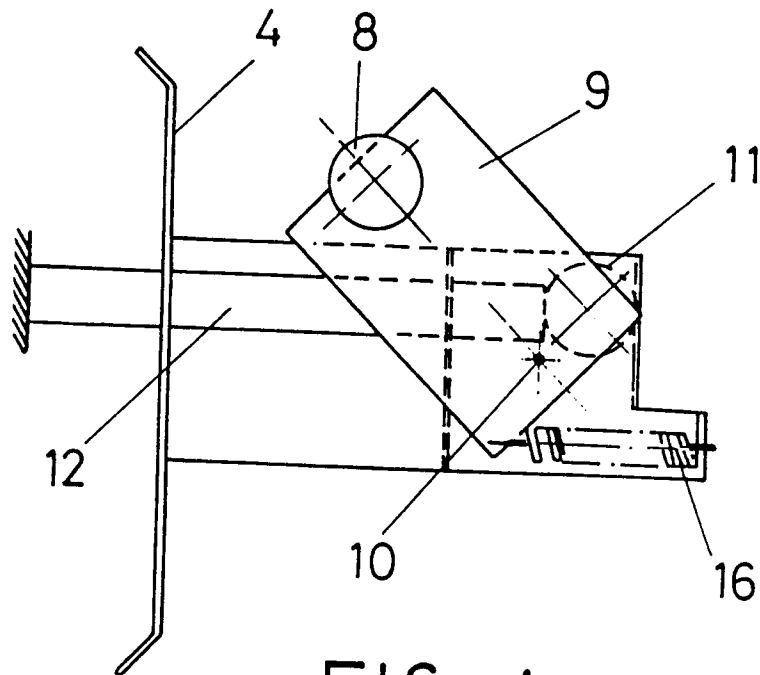


FIG - 4