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(54) Kinematic chain for window winder

(57) A kinematic chain for window winders, with a double drive rail (1, 1', 42, 43) and supports (7, 8, 36, 37) for the window pane, in which, thanks to the special arrangement of the path or route of the cables, an improvement is achieved in the mechanical performance of the assembly, a reduction is achieved in the friction on the pulleys or guides for the cable and the tension on the said cable is also decreased.

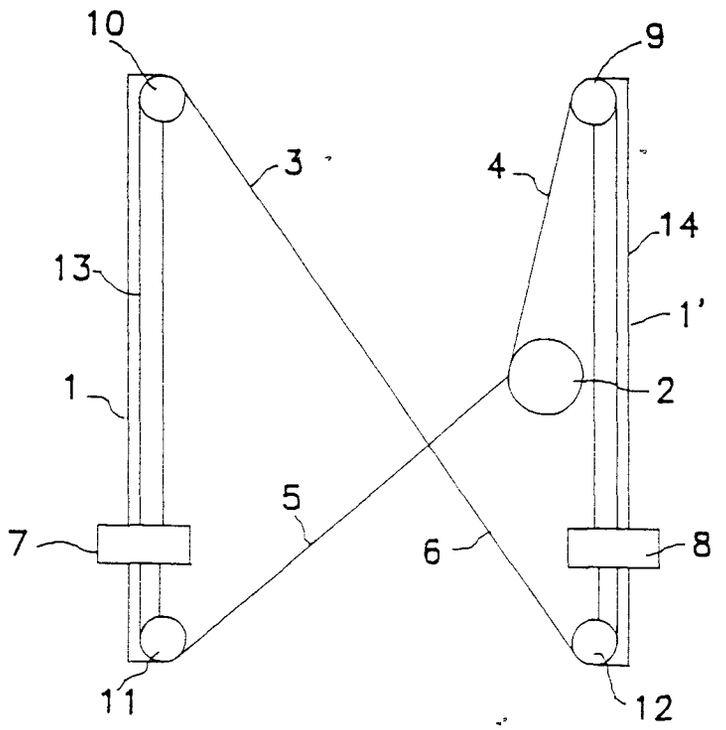

Fig:1

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Description

This invention relates to a kinematic chain for window winders, particularly studied for window winders which are composed of a single drive, usually a drum. two guides which are usually parallel and two supports to which the vehicle window pane is connected.

In conventional window winder devices of the type mentioned, the drive transmits the driving torque to the assembly or unit by means of two cables, which close a kinematic system common to both window pane supports. In these window winders, in the window pane raising and lowering processes, the cable withstands the tension resulting from the stresses exerted by both window pane supports and, moreover, the dissipative friction forces due to the contact of the cables with the elements arranged at the ends of the guides, such as clips, pulleys or similar items, which allow the angle of the cable to change.

Given that the friction of the cable on the elements mentioned above, in terms of the tension of the cable on them, each item, especially the ends of one of the guides when being raised and those of the other guide when being lowered, are submitted to high levels of friction, which contribute towards increasing the tension that the cables have to withstand and, in fact, increase the drive torque needed to guarantee good operation.

As opposed to these disadvantages of the conventional techniques, the invention claims a kinematic chain whose purpose is to reduce the stress that the cables are subjected to.

A second object of the invention lies in achieving a reduction in the levels of friction of the cables on the angle change elements.

A third and final objective is the reduction of the drive torque needed in order to achieve efficient operating of the system.

For the putting into practice of these objectives, the invention claims a kinematic chain for window winders whose drive is composed of two drums on which two cables are wound, respectively. Some of these cables are directed towards the upper and lower ends of one of the guides, while the others do the same in relation to the other guide of the window winder.

With this arrangement, the kinematic independence of the two systems is achieved, as described below:

System M).

- The cables that come from a drum or half-drum.
- A first guide rail.
- A window pane support.
- Two elements to change the angle of the cables, arranged at the ends of the first rail, such as clips, pulleys or similar items.
- A first drum or half-drum.

System N).

- The other two cables.
- A second guide rail.
- The window pane support on board this second rail.
- Two elements to change the angle of the cables, arranged at the ends of this second rail.
- A second drum or half-drum.

The two kinematic systems A. and B. are connected to each other by means of two coaxial drums of the same diameter, or, in the case of using two independent drums, through some other torque transmission system, gearing or similar.

From all the above it is deduced that the cables under most tension during raising, those which are directed from the drums to the upper ends of the two guides, and the which are under most tension during lowering, the other two which are directed from the drums to the lower ends of the two guides, will now withstand only the load transmitted by one of the window pane supports, respectively, with which, in this way, the tension is reduced to half in relation to the conventional solution commented on at the beginning of this specification.

Because of all the above, it is also deduced that as a result of this reduction in the tension on the angle change elements of the cables, the said pulleys, clips or similar items offer a lower level of friction, with an improvement therefore being achieved in the mechanical performance of the whole unit.

As mentioned previously, the two drums required by the invention can be connected by means of a coaxial axis or by means of some other transmission element.

In the possible case that the drums are not coaxial, they are connected kinematically by a torque transmission element, gearing or similar system.

In the same way and included in the same basic idea of the invention, it is established that when the drive is carried out by two drums which are not coaxial, these are directly connected to each other by means of a toothed transmission system, which is incorporated into the drums themselves.

A construction variant of the invention uses different diameters in each of the drive half-drums or drums, in order to achieve different speeds in the two window pane supports of each of the two guides.

This variant is particularly applicable in window panes that need complex displacement movements, such as, for instance, the rear windows of convertible cars or in doors which have items inside the door cavity that do not allow the use of traditional systems.

Within the context of the invention, a kinematic chain is also claimed for window winders whose drive is composed of two independent drums, on which are wound, respectively, one cable that connects the upper end of one of the guides with the lower end of the other parallel guide.

The drive torque is transmitted to the system by means of two coaxial drums of the same diameter, for

instance, or by means of a coaxial axis or shaft in the case of two independent drums.

In the same way, it is also feasible, within the concept of the invention, to use drums which are not coaxial, in which case the torque transmission system used can be a gear train or similar.

In accordance with the invention, from the drive unit, each cable is directed towards the upper end of one of the guides and towards the lower end of the other guide, with the particularity that the cables which are under more tension during the raising operation are those that run from the drive unit to the upper ends of the two guides, and during the lowering operation, the two that run from the drive unit to the lower ends of the two guides, which withstand only the load transmitted by one of the window pane supports on board each guide, thus reducing the tension or stress to half in relation to the conventional technique mentioned previously.

Besides all this, which in terms of the reduction of the tension on the cables, the pulleys, clips or similar items at the ends of the guides that permit the change of angle of the cables at the ends of the guides, offer a lower level of friction, thus improving the mechanical performance of the system.

As stated previously, the two drums of the invention can be joined to each other by means of a coaxial axis or shaft or by means of some other transmission element.

In the same way, the drive can consist of two drums which are not coaxial, kinematically connected by a torque transmission element, gearing or similar.

In like manner, in the case of using two non-coaxial drums, these drums can be directly connected to each other by means of a toothed transmission system incorporated into the drums themselves.

All these and other details of the invention will be understood with greater clarity with reference to the accompanying sheets of drawings, in which the following are represented with a non-restrictive nature.

- Figure 1 is a view of a conventional kinematic chain for window winders.
- Figure 2 represents a view of a kinematic chain in accordance with the invention.
- Figure 3 represents a perspective of a coaxial drum useable with the invention.
- Figure 4 shows a window winder solution incorporated into the invention, in which the drums are not coaxial.
- Figure 5 is another practical version of Fig. 4.
- Figure 6 represents a final version of the window winder, according to which the two drums are of different diameters.
- Figure 7 represents a window winder with a kinematic chain in accordance with the invention.
- Figure 8 shows, in a perspective view, two coaxial drums of the same diameter receiving the two cables.
- Figure 9 makes it possible to appreciate the layout of a mechanical system for a window winder provided with a drive system with two non-coaxial drums.
- Figure 10 is another variant of the invention, also using two non-coaxial drums.

In the conventional system shown in Fig. 1, we can appreciate the drive unit (2) with the respective cables (3, 4, 5, 6), which pass through their angle change elements, such as clips, pulleys or similar items (9, 10, 11, 12), logically arranged at the ends of the two guides (13, 14) along which the two supports (7, 8) travel in order to move the window pane, not represented.

In this arrangement it can also be appreciated that the drive unit transmits the drive torque to the unit by means of two cables (4, 5), that close the kinematic system, which, as can be observed, is common to both window pane supports (7,8).

In the raising process, the cable (4) withstands the tension resulting from the stresses exerted by the supports (7, 8), plus the dissipative friction forces due to the items (9, 10, 11, 12). As the friction on these latter items, in terms of the tension of the cable on them, each item, particularly those indicated with the positions (23, 26) (9, 12) have high friction levels, which contribute towards increasing the tension that the cable (4) has to withstand and, in short, the drive torque (2) needed in order to guarantee the correct operation of the system.

Obviously, in the lowering process the friction levels are similar and, for this reason, their explanation is omitted.

In accordance with Figures 2 and 3, we can appreciate how the drive unit is composed of two drums (16, 16'): the cables (18, 20) are connected to one drum or half-drum, while the cable (17, 19) are connected to the other.

In this way, the kinematic independence of the two systems (M) and (N), indicated in Fig. 2, is achieved, namely:

M). Cables (17, 19); guide rail (27); window pane support (21); clips, pulleys or similar items (24, 25) and drum or half-drum (16').

N). Cables (18, 20); guide rail (28); window pane support (22); clips, pulleys or similar items (23, 26) and drum of half-drum (16).

It can be deduced, as mentioned previously, that the cables which are under greater tension or stress in the raising operation (17, 18) and those under greater tension in the lowering operation (19, 20), withstand only the load transmitted by one of the window pane supports (21) or (22), with which the tension is reduced to half in relation to the traditional solution.

In the same way, this reduction of the tension or stress on the cables means, as a result, that the pulleys, clips, etc. (23, 24, 25, 26) offer a lower level of friction, noticeably improving the mechanical performance of the system.

In Fig. 3, we can observe the two coaxial drums (16,

16') used for winding the cables and in Fig. 4, the two non-coaxial drum (16A) and (16B) connected together kinematically by a torque transmitter element, gearing or similar item (29).

According to Fig. 5, we can appreciate the two non-coaxial drums (16C) and (16D) directly connected to each other by means of a toothed transmission system incorporated into the drums themselves.

Finally, in Fig. 6, we can observe the special drive configured by the two drums (16E) and (16F) of different diameters, a solution applicable to special cases mentioned previously.

According to Fig. 7, we can point out the twin drum drive (31) with a cable (32, 35) which is directed towards the upper end (39) of one of the guides (42) and towards the lower end (41) of the other guide, whereas the other cable (33, 34) does the same with the ends (40) and (38) of the guides. In the raising operation, the cables most submitted to stress (32, 33) withstand, as can be seen, only the load transmitted by one of the window pane support (7), and in the lowering operation, the cable (33, 35) only withstand the load of the support (8). This reduces tension or stress by approximately half.

Evidently, this obvious reduction of the tension on the cables extends to the clips, pulleys or similar items (38, 39, 40, 41) of the guides (42, 43), which offer less friction that improves the mechanical performance of the system.

In accordance with Fig. 8, we can appreciate the two independent drums (31) and (31'), onto which the cables (32, 35) are connected on one side and the cable (33, 34) are connected on the other side, all in terms of what is represented in Fig. 7.

In Fig. 9, we can deduce how in the window winder assembly of the invention, the drive unit is composed of two drums (31G, 31H) which are not coaxial and are connected by a torque transmission element (44), gearing or similar.

Finally, with regard to Fig. 10, we can appreciate the particular drive based on the two non-coaxial drums (31I, 31J) directly connected to each other by means of a toothed transmission system incorporated into the drums themselves.

It is important to point out, once having described the nature and advantages of this invention, its non-restrictive character, inasmuch as changes in the shape, materials or dimensions of its constituent parts will not in any way alter its essence, as long as they do not mean a substantial variation of the whole assembly.

Claims

1. Kinematic chain for window winders, for the use of cables or similar items (3, 4, 5, 6), with a double rail (1, 1') and manual or electric drive through a central drive unit (2), with each one of the said rails having guide elements for the cable, and the supports (7, 8) for the window pane sliding along these rails, which is characterized in that a cable (17, 19) is wound or coiled on a drum (16) of the central drive unit and connects the end guides (24, 25) of the first rail (27) and the window pane support (21) of the said rail, while the other cable (18, 20) is wound or coiled on another drum (16') of the central unit, connected to the end guides (23, 26) of the second rail (28) and to the window pane support (22) of this second rail, in that both drums (16, 16') are of the same diameter and coaxial.

2. Kinematic chain for window winders, in accordance with claim 1, characerized in that both drums (16A, 16B) are not coaxial and are joined kinematically by a torque transmission element, gearing or similar (29).

3. Kinematic chain for window winders, in accordance with claim 2, characterized in that both drums (16A, 16B) are directly connected to each other by means of a toothed transmission system incorporated into the drums themselves.

4. Kinematic chain for window winders, in accordance with claim 1, characterized in that both drums (16A, 16B) are of different diameters.

5. Kinematic chain for window winders, in particular with the use of cables or similar items (3, 4, 5, 6), with a double rail (1, 1') and manual or electric drive through a central unit (2), with each one of the said rails having guides for the said cable, and the supports (7, 8) for the vehicle window pane sliding along these rails, which is characterized in that of the cables (32, 35) that are connected to the central unit, one is would on a drum (31) and connects the upper cable guide (39) of one of the rails (42) with the lower cable guide (41) of the other rail (43), whereas the other cable (33, 34) is wound on another drum (31') of the same diameter, on the central unit, and is connected to the lower guide (40) of the first rail (42) and to the upper guide (38) of the other rail (43).

6. Kinematic chain for window winders, in accordance with claim 5, characterized in that the two drums (31, 31') are coaxial.

7. Kinematic chain for window winders, in accordance with claim 5, characterized in that the two drums (31G, 31H) are not coaxial and are joined together by a torque transmission element, gearing or similar (44), with the possibility that both drums can be directly connected to each other, by means of a toothed transmission system incorporated into the drums themselves.

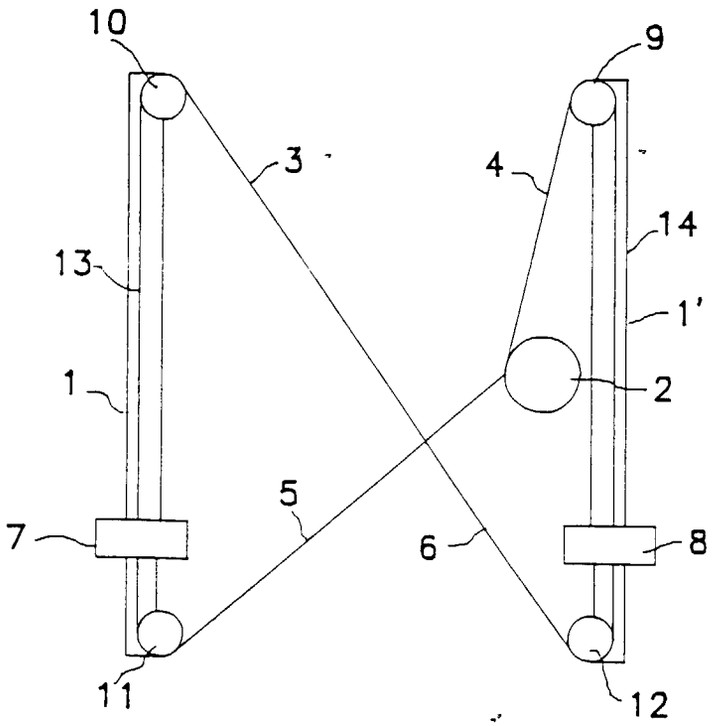

Fig:1

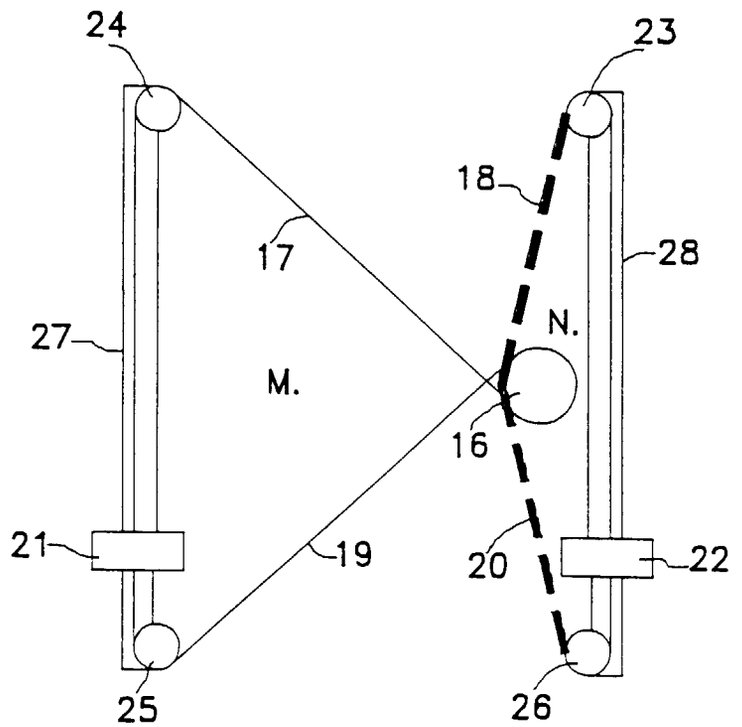

Fig:2

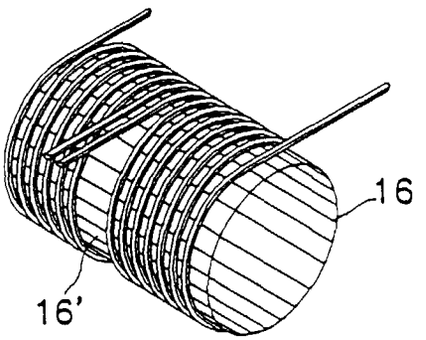

Fig:3

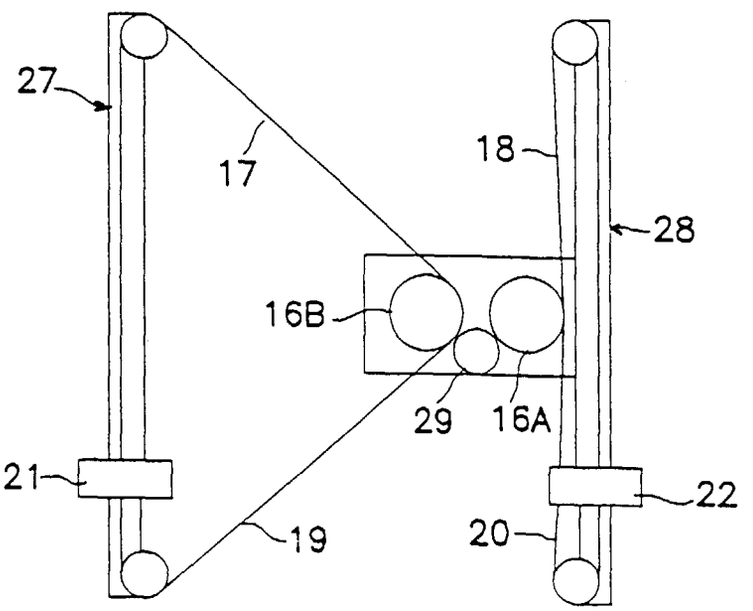

Fig:4

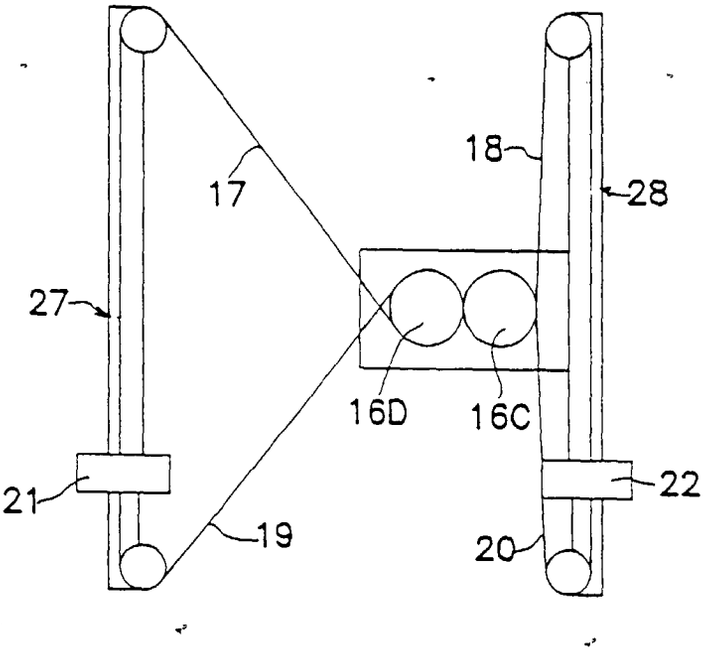

Fig:5

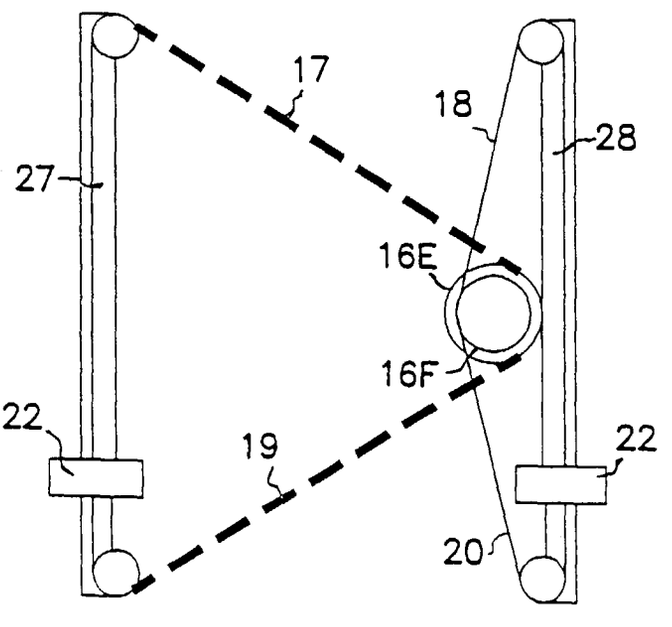

Fig:6

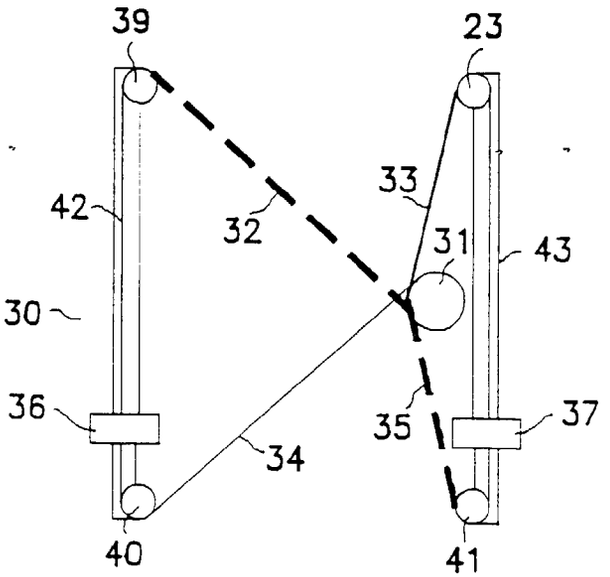

Fig:7

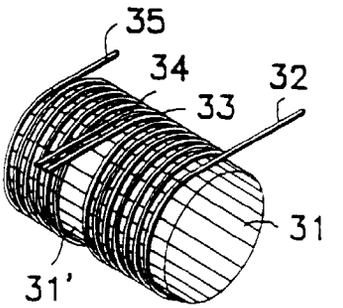

Fig:8

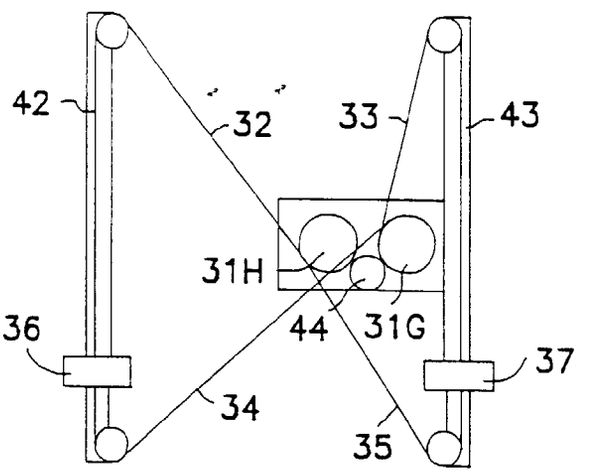

Fig:9

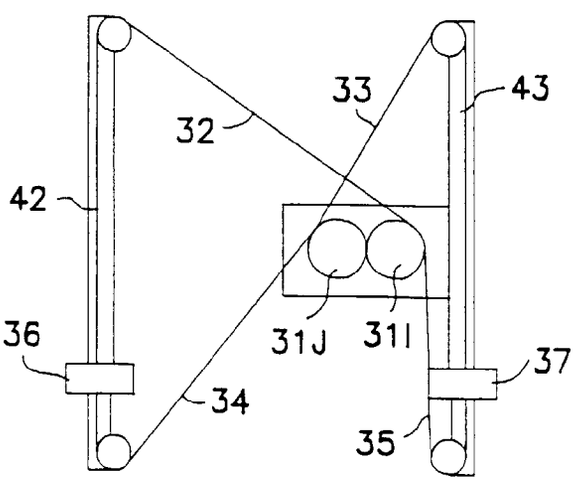

Fig:10

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EUROPEAN SEARCH REPORT

Application Number
EP 97 50 0159

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 23 23 784 A (FA. FRITZ KEIPER) * page 4, line 16 - page 5, line 10; figures 1,3 *	1	E05F1/00 E05F11/48
X A	DE 36 15 578 C (AUDI) * column 2, line 21 - line 24 * * column 2, line 31 - line 34 * * column 3, line 8 - column 4, line 20; claims 1-3; figures 1,2 *	1,2 4	
X Y	DE 40 08 229 A (BROSE FAHRZEUGTEILE & CO.) * column 2, line 65 - column 4, line 12; figures 1-3 *	1-4 7	
X Y	US 4 001 971 A (GOBUSH) * column 2, line 43 - line 45 * * column 2, line 55 - line 57; figures 1,2 *	5,6 7	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 January 1998	Guillaume, G

CATEGORY OF CITED DOCUMENTS

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