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(54) Vehicle window raising and lowering mechanism.

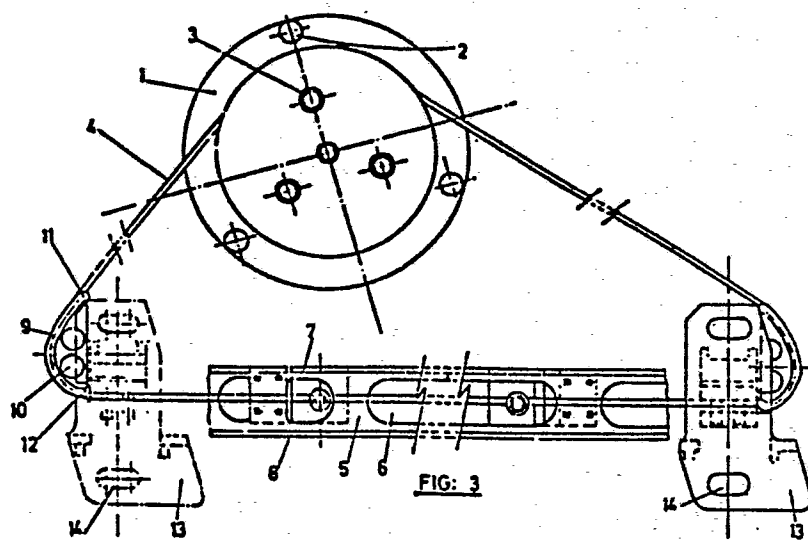
(57) Device constituted by a motor set or unit operated by a crank or an electric motor, which effects the rotation of a drum or disk (20) provided with an external set of teeth (22), a perforated belt or band (4) of a plastic type which engages said teeth, (22) a cover (1) of the ensemble with openings through which the terminal ends of the band which engages the drum (20) gain access to outside, a support (13) for the window with means which are suitable to receive the window and the terminal ends of said band and some sliding guides (9) of said perforated band, (4) fixed to the vehicle door, between which the abovementioned support (13) is positioned and which act as stops for the displacements of the same support, (13) between the motor unit and the sliding guides (9) a triangle being constituted which is liable to variation for altering the positioning of any one of its three apex elements, between which the band (4) travels in the air.

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"Vehicle window raising and lowering mechanism"

The invention refers to devices for operating windows on motor vehicles and similar.

At the present moment, devices are known in which, through the action of a crank which operates a system of gear wheels, a movement is transmitted to a drum connected to a hoist, which raises and lowers the hoist or winch according to the movement imparted to the main hoist. Such an arrangement is perfectly described in the British patent no. 733,941, in the name of WILMOT.

Devices are also known in which the operation of the crank moves a drum on which a metal cable is wound. A branch of said cable, substantially corresponding to the traveling run of the window, is suitably led along a path which in a certain way follows the path of the window. Precisely in this branch of the cable, an element or support is fixed which displaces itself together with the said cable and to which, on the other hand, the window is connected.

Among these devices operated by cables, some of them did guide the cable not only for the run or stroke of the window, but also for the whole path of the



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same, which was arranged in an open circuit or loop. A device of this type is manufactured under the trade name of GOLDE.

Other devices, operated by cable, were realized according to a closed circuit and were connected to different rolls which were arranged within the door of the vehicle.

More recently , the German application G.72.41.280.7 in the name of KUESTER has been known, relating to another device: this also is realized by means of a metal cable in a closed loop, wherein the cable ran within hoses or jackets connected to the operating system and to the guide of the window.

Finally, another window-operating system is known, similar in a certain way to the GOLDE system, in which, in the place of a metal cable, a perforated belt or band in open loop was utilized, which ran within a guide in one direction or in the opposite direction, according to the fact that the window was open or closed.

The devices of the mentioned WILMOT type presented the drawbacks of arms having a remarkable weight and being exceedingly long, besides other drawbacks which render them unpractical today , given the present trend to reduce the weight of the motor vehicles

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owing to the direct relation of the weight with gasoline consumption.

The devices which utilized a metal cable present in general problems of excessive weight, of loosening of the metal cable periodically, and of being rather noisy, besides their uneasy assembling within the doors of the vehicles, in which they occupied too much a room.

Among these, the devices of the GOLDE type, in which the cable in open loop was guided by a guide along its whole way, raised furthermore some drawbacks deriving from the introduction of dirt into the guide within a certain time, so causing difficulties to the normal operation. On the other hand, the devices which employed a metal cable in the form of a closed ring or loop, by themselves, must be suitably passed along each roll which is arranged on the door of the vehicle.

The devices of the type claimed by the German application G.72.41.280.7, in the name of KUESTER, although they solved in part some of the abovementioned problems, presented as well the disadvantage of the loosening of the metal cable and presupposed a consumption in the room to be occupied within the door of the vehicle, owing to the rigidity of the hoses within

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which the cable ran. Equally, and precisely owing to the necessary rigidity of said hoses, adjusting problems presented themselves, it being necessary to provide specific devices for each type of door, with the drawbacks which consequently show in a series production. Besides all this, the noise level was unacceptable.

Finally, the open loop devices, which utilized a perforated band, presented, as the GOLDE devices, problems of dirt accumulation in the guiding device of the band, and did not fulfil the requirements of a quick assembling, since they must be adapted and adjusted for each type of door, besides the fact of occupying a remarkable amount of room inside the door.

The device which are the object of the invention improve remarkably all the characteristics of the previously mentioned systems, on the basis of the following general advantages, i.e.:

- they represent a device of the closed loop type;
- they are completely noiseless;
- they utilize a perforated band of the plastic type for the transmission, which doesn't require a previous tightening nor requires any tightening during the operation;

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- they are perfectly apted for every type or shape of vehicle door;
- they occupy a minimum of space inside the door;
- their weight is very reduced;
- it is possible to eliminate the guiding member which follows the run of the windows of the conventional devices;
- the operating capacity is very remarkable, since, during the tests which have been effected, a number of cycles exceeding 50,000 has been performed without observing any anomaly;
- machine shop rejection is considerably reduced, so favouring the automation of the manufacturing process of the device;
- the faultless adaptation and fitting of an electric motor for its operation is allowed, and this motor can be arranged at the desired location in the door;
- the accumulation spring, and more concretely its positioning, permit to achieve a more quick response of the same when raising the window, besides the fact that no space limitation exists and any desired external diameter can be adopted, with the consequence that lesser turns are required;

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- an auxiliary ensemble is achieved for connecting to the window-raising device when the operation is by hand, with the aim to eliminate the subjection springs of the system, transferring the locking to the appropriate band;
- in the case of operation through a geared motor, a safety system for the window-raising mechanism is achieved, so that the device may be operated by hand.

Basically, the device in object starts at the general driving system, beginning with a crank, which is hand-operated or motor-operated, said crank, through a center pinion gear mounted on its rotation axle, connecting with a planetary system, such as it is shown on the British patent no. 733, 941, the planetary gears in turn engaging within a drum. It is obvious that, as the crank is rotated, the pinion gear of the crank makes the planetary gears to turn, and these, in turn, impart a movement to the drum, whose outside surface, in our case, is "furrowed" by teeth.

It is obvious that this known mechanism may be varied or substituted by any other mechanism, for instance the pinion of the crank directly above the inside of the drum... and so on, the single distinc-

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tive feature, in our case, being that the outside surface of the drum is furrowed by a series of teeth, and that the planetary gears are, preferably, made of a plastic material.

The operating ensemble is mounted upon a connecting base at the door of the vehicle, and the whole is covered by a cap or cover in the way of a basin which presents side windows, one for each side, through which the ends of the perforated band reach outside, the band being mounted in the teeth of the drum. The terminal portions or ends of the perforated band - the band having the suitable length, - are related to each other in one of the faces of the supporting member, the other face of which is directly fixed to the window.

To this end, this supporting member possesses projecting portions which are perpendicular to its surface, and from one of these projecting portions pins depart which are parallel to said surface, in said pins being placed the ends of the band, the introduction of the pins within the perforations of said ends taking place once the ends have been superposed each other in the way of a collar. Successively, and above both terminal ends, a perforated piece or member is placed, which covers said ends and which receives also the end portions of the pins, effecting the

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locking.

The surface of the piece rests upon the side of the window, is smooth and is provided with suitable voids or holes for its fixing to the vehicle window, in such a way that, once the window and the support have been fixed, the traction of the perforated band will cause the raising or the lowering of the window.

We prove, therefore, that a driving or operating system is provided which produces the rotation of an externally toothed drum, which, being related with the perforated band and this with the support, will allow to vary the position of said support according to the direction of rotation which is imparted to the drum through the crank. To the end of achieving the guiding of the support and of the window backed by the support, two small guides are arranged upon which the perforated band will slide. These guides for the band or belt may be well positioned upon the same door of the vehicle directly, by which the band and the support will slide freely between said guides, or as well upon the ends of a guide of the support upon which said support slides, in which case it is the guide which is fixed to the inside of the vehicle door.

Preferably, the perforated band presents a rectangular cross-section and is furrowed by holes along

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its whole length, holes which will coincide, in their general shape, with the teeth of the drum of the driving set, it being precisely due to its main faces that the sliding of the same band takes place, upon the abovementioned guides. To this end, the guides will present a smooth surface having a height sufficient so that the whole height of the band may contact with it to the end of achieving the correct operation of the arrangement, and they are terminated by some projecting, upper and lower, portions which will prevent the fortuitous possibility of the exit of the band from said guides, when the device is being utilized.

These, in their turn, present holes on their base, to the end of being either connected with the door of the vehicle through conventional screws or to the terminal ends of a central guide of the window support, when the device possesses said central guide. In this last case, the proper guide (central guide) will be arranged directly above the door.

In the one case or the other, the perforated band is fixed, by its terminal ends, to the projecting portions of the supporting piece of the window. When the utilization of the central guide is not needed, the supporting piece is freely dragged by the toothed

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drum of the driving arrangement and will occupy the proximity of the one or the other of the side sliding guides, in the positions of open or locked window. The side sliding-guides of the perforated band will arrange themselves in an aligned position in correspondence with the direction in which the window must be displaced, exactly at the point of the support which causes its displacement, so that the lower and upper guides will occupy points of the vehicle door which correspond to the end positions of the path of the mentioned supporting member. In the case that the window has not a flat shape but is curved as it is the case for a great number of modern vehicles, the support of the window when being dragged will execute perfectly a curved path, since said path will be guided by the proper guides of the door frame.

In those cases in which the user of the window doesn't offer safety as to the correct guiding of said window, for not keeping the two guides in their path, one will provide to put into relation the small terminal guides for the sliding with a central guide, which will be straight or curved, according to the cases, by means of said central guide sliding the support on which the window rests, it being then reali-

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zed the mounting of the guides sliding upon the terminal ends of the central guide, while the latter will be mounted upon the vehicle door.

It is to be understood that in the one as the other case, two anchoring points of the device above the door are needed, apart, it is clear, from the set anchoring of the driving group, but with the particularity that, since the connection between all the points is achieved by the flexible member represented by the perforated band, any mounting tolerance can be absorbed, whichever its type may be. Furthermore, and owing to said flexibility and to the fact that the ends of the band may be arranged above the support very easily and may be extracted from the support equally easily, the possibility exists to adapt the device to any size of vehicle door, specially when the device doesn't comprises the guide of the window-support.

The mounting of the device is extremely quick and simple, since it will suffice to place the sliding-guides of the band in the indicated places, to introduce the band with the window-support already included on said sliding-guides, enclosing the same, and to fix the driving unit without the need of effecting a stretching action, previously, upon the band,

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the band stretching itself in an automatic way during the operation, said stretching being independent from said operation, precisely owing to the sliding which the band undergoes upon the sliding guides.

On the other hand, the auxiliary item stands out which refers to the window-raising devices in which the operation is by hand, with the purpose of eliminating pieces of the operating system of the ensemble, while simultaneously transferring the braking of said operation to the window-support, the mentioned braking being effected by the own weight of the window.

According to another arrangement, the sliding-guides of the perforated band are mounted with some spring backing upon the same, said springs imparting to said guides a trend to effect a pressing action upon the perforated band, while in the same time they serve as guides for the band, the whole with the purpose to absorb the possible band deformations in the sense of elongation, if any, due to temperature effects, and so on.

In order to achieve the braking of the system when the same is operated by hand, one will proceed to connect the terminal ends of the perforated band with two different pieces, eliminating from the op-

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erating system the check spring related to each position of the window , transferring the proper braking or checking function to the two pieces which are connected to the terminal ends of the perforated band. To this end, one of these pieces supports the window and in its turn slides upon the sliding-guide related to the path of said window, while the other piece travels inside said guide.

The perforated band is connected to the supporting piece of the window, which presents a wedged-in portion, ending at its larger region by two projecting portions, with a general "T" shape. This portion stands out of the surface of the supporting piece by the face which is opposite to the fixing face of the window, precisely on the guide side.

On the other hand, the other piece related to the other terminal end of the perforated band, presents a general U-shape, its central "void" portion being similar to that of the wedged-in portion of the support of the other terminal end. Equally, it possesses some re-entering portions or recesses within which the projecting portions of the other supporting piece will house.

Both pieces present the means which are suitable for the fixing of the terminal ends to each of

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them, being the thicknesses of both pieces similar in order to facilitate their adjustment through the embracing of one upon the other. When one of the terminal ends of the band is drawn, the traction is produced upon the corresponding supporting-piece, which in turn drags the other piece, owing to the interconnection of the two pieces. When the movement of the raising-device of the windows stops, the support holding the window and which is the member presenting the wedged-in portion, receives the weight of the window and penetrates into the central void of the other piece, opening it and effecting a pressure upon the guide, immobilizing the ensemble in an automatic way, until one begins again to operate the driving device, in which moment the locking is abolished.

The supporting piece holding the window presents itself some regions which arrange themselves on the external side of the guide, for its faultless guiding, this guide presenting an U-shaped section with the ends of its wings doubled parallelly to the base. Upon the inside surfaces of said wings of the guide, parallelly and little spaced, run the side surfaces of the supporting piece connected to the other terminal end, so that when the projection wedged-in of the other support will open its side portions, these

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will approach and will contact the mentioned surfaces of the guide, so effecting the braking action.

This notwithstanding, when the perforated band is operated, through the mechanism, in the one or the other direction, the immediately produced anchoring is undone, since the wedged-in regions, male and female, of each support lose their contact.

According to another arrangement, the small sliding-guides, hold each a spiral spring housed within the fitting axles of said elements to the central guide, the ends of said springs, duly connected, allowing to achieve a stretching action on said pieces sliding upon the perforated band, that is a continuous contact of the sliding-guides against the band.

When the window-raising device is operated by an automatic motor unit, that is, is operated through the action of a geared motor which causes the rotation of the main ensemble, it happens that, when the electric geared motor breaks down, it is impossible to raise or lower the window due to the fact that the user of the vehicle is unable to unblock the mechanical block. This has the consequence that the window remains in the position that it occupied when the failure occurred, until a repair or an overhaul is effected, for instance at a specialized body shop.

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In this relation a mechanism is put into action which allows an easy intervention by the part of the vehicle user upon the device, and, consequently, the raising or the lowering of the window at will, notwithstanding the blocking position.

The achievement of this mechanism requires less effort towards a normal operation and, therefore, renders more smooth the reduction of the various components.

The mechanism in object starts from a central pinion operated by the output axle of the geared motor set, upon the pinion some planetary gears being located, for instance three of them, upon these planetary gears a fixed crown gear being situated, which is toothed externally and internally. When the center pinion rotates, the planetary gears revolve about themselves and about a circular path within the fixed external crown gear.

At the theoretical position of the axles of the planetary gears, holes are arranged within which some projecting portions of a gear wheel will house, the latter wheel being placed in a plane which is parallel to the path of the planetary gears. In this way the gear wheel rotates, driven by said planetary gears, and it receives externally a perforated



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belt or band, which is charged with the task of effecting the movement of the window-raising device, through the intervention of any other mechanism.

All the abovementioned pieces are located inside a suitable casing, in which the corresponding openings are made for the output axle of the geared motor and for the inlet and the outlet of the perforated band.

Under these conditions, when the geared motor is in operation, the center pinion of the ensemble will rotate, and, in its turn, causes the rotation of the idle planetary gears which occupy the circular space between said pinion and the fixed external crown wheel, which, as it has been previously mentioned, is provided internally and externally with teeth. The internal toothing serves, obviously, to effect the circulation of the planetary gears, and the external toothing is that which is utilized in order to actuate the proper safety device.

Such device is constituted by a small stem or axle which is parallel to the output axle of the geared motor, and consequently to the center pinion, planetary gears, and so on; this stem or axle combines together the following features: Its most external portion keeps near to the internal body of the door,



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the access to this portion being gained through an orifice which has been made on said body; this orifice is masked by a piece, having in plan a circular shape, which occupies said void and presents connecting means with the same, this piece being easy to place or remove according to the need. The stem portion to which we have referred presents a characteristic shape, such that it may receive a key or similar, which will allow its rotation.

The terminal end which is opposite to that portion, keeps included within the internal part of the block which receives the rest of the elements and is embraced by a wheelwork which facilitates its rotation. In the proximity of this wheelwork, the stem possesses a projecting or raising portion which is circular and is provided with teeth which engage the fixed crown wheel which houses the planetary gears by its external portion.

Under normal working conditions, the center pinion rotates and causes the rotation of the planetary gears between itself and the external crown, which is fixed. It logically promotes the rotation of the crown, connected, through the stems, to the planetary gears, and the movement of the remaining part of the window-raising device.

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When the geared motor meets a failure, the center pinion keeps immobilized as a consequence of the general blocking action, and then the window will stay at an unchangeable position, since the crown wheel which embraces the planetary gears is fixed, too. This notwithstanding, if we cause the stem to revolve, its toothed portion will oblige the until now fixed crown to rotate, with which the planetary gears will turn and the external crown will cause the perforated band to move. For this, a key may be utilized, once the cover concealing the external access to this stem has been removed.

As we have indicated, the regions of the stem which support the toothed and resting portions in a wheelwork are included within the external body or casing which collects all the remaining pieces. This casing includes a conventional pawl which is connected to the toothed portion, so that once the window has been raised, the position of the letter keeps fixed without any possibility that said window may revert to its initial position.

All these details, and various further details, are perfectly described in the enclosed drawings and plans in which the following is represented:

Figure 1 shows a plan view of the device;

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Figure 2 shows the same device, with the center guide for the window;

Figure 3 is an enlarged plan view, in which both possibilities are realized;

Figure 4 corresponds to a front view related to the previous representation;

Figure 5 is front view of the main driving set or unit which includes the center pinion and the planetary gears;

Figure 6 corresponds to a plan view of the external drum, put into motion with the forward drive;

Figure 7 is a side view corresponding to Figure 6 representation;

Figure 8 corresponds to the center guide for the window;

Figure 9 refers to an upper view corresponding to Figure 8 representation;

Figure 10 shows the plan view of each of the side guiding members;

Figure 11 is a lower view corresponding to Figure 10 representation;

Figure 12 is a part view of the section AA' which is indicated in Figure 10;

Figure 13 shows the connecting cover of the terminal ends of the band above the supporting piece of

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the window;

Figure 14 is a front view of said supporting piece;

Figure 15 is a plan view corresponding to Figure 14 representation;

Figure 16 shows the accumulating spring;

Figure 17 is a side view of the same spring;

Figure 18 is a possible variant or modification of the accumulating spring arrangement;

Figure 19 represents one of the supporting pieces, together with the window and the guide, in the case that the locking is effected at the guide;

Figure 20 shows a perspective view of the other supporting piece;

Figure 21 reflects in a schematic way the relation between the two beforementioned pieces;

Figure 22 is a transversal (cross) section of the ensemble of pieces which are mentioned in the three previous Figures;

Figure 23 corresponds to the arrangement of a spring within the sliding-guides;

Figure 24 is a section front view of the ensemble of mechanisms, when they embody the manually operated releasing (i.e. un-blocking) system;

Figure 25 corresponds to a schematic side view

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of the ensemble of mechanisms represented in Figure 24;

Figure 26 is a plan view of the external crown wheel operating, in this case, the perforated band or belt;

Figure 27 is a front view of the abovementioned crown wheel.

With reference , now, to these Figures, we will say that the driving or operating device comprises basically a motor unit, a perforated band or belt (4), some small guides (9) and a support (13) to which the terminal ends of the band (14) are connected and the window. The motor set or unit (1) comprises an axle (16) which receives the movement from a crank or motor, not represented, said axle being in relation with the inside of a center pinion (18) which engages a system of planetary gears (19), preferably three in number, which are of a plastic material or similar, these planetary gears being in turn housed inside the drum (20). The drum (20) is internally furrowed by teeth (22), and externally the projecting portions (21) raise which totally occupy its side surface, as it appears from Figures 5, 6 and 7. The ensemble is collected by the cover (1), which is substantially located towards the inside of the vehicle door, and which

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presents some small side windows for the outlets of a perforated band (4) with voids (15) in which the teeth (21) of the drum introduce themselves.

The free ends of the perforated band (4), which has preferably a rectangular cross-section, are related to each other in the way of a collar, upon some projecting pins (31) of one of the faces of the supporting piece (13), the locking of this collar being achieved, by means of the cover (27, Fig.13) which, provided with holes (28), receives the most external portions of the abovementioned pins (31), effecting the interconnection of the terminal ends of the band (4) upon the support (13). This support (13) presents, in its turn, means (14) in order to achieve the fixing to the window of the vehicle.

The device, therefore, comprises the motor set, the perforated band and the support for the window, with this support being into relation the terminal ends of said band.

In order to effect the mounting of this ensemble of elements upon the vehicle door, one proceeds to place the guides (9) (Fig. 10 and 11) on whose side portions (26) said band slides. Each guide (9) presents a curved shape with two outlets (11), one of which is on the side of the motor set, while the

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other (12) is on the side of the supporting piece (13), and an upper projection (24), as well as a lower rim (25) (section AA', Fig. 10), which permits an easy access of the band and which, this notwithstanding, prevents the possible exit of the the same band from its contact with the surface (26) during the operation.

When the cornice of the window of the vehicle presents some guides which are suitable for the window, the guides (9) will be fixed to the door through the orifices (10) of the base of the same, this fixing being effected taking into account that both guides must be related to each other according to an alignment corresponding with that of the window, both if the window is straight or curved, under this condition the support running on the path, whichever it be, without any difficulty (Fig. 1).

This notwithstanding, when the cornice of the door has a special configuration, which implies that continuous guides for the window don't present themselves, one proceeds to fix the guides (9) upon the terminal ends of a central guide (5, Fig. 2), which will adapt itself to the straight or curved path of the window, in consequence of which said guide will take a straight or curved shape, obviously. In this

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case, the guide (5) will adopt an U-shaped cross-section, preferably, on whose wings the base will slide of the supporting piece (13), provided with projections (34)-(29) and (32) in which will be restrained the section of the guide (5), which, on the other side will be fixed to the door structure by means of the plungers (17, Fig.4).

On the other hand, and owing to the arrangement of the accumulating spring which helps in the raising of the window when it is in the lowered position, an accumulating spring (37, Fig. 16) is placed which is compressed and receives a pressure when the window is raised, and is released and yields pressure when said window is raised, providing a force upwards which favours the raising. The accumulation springs are known for themselves in relation to this and to other applications, but the advantage stands out, due to its localization, of being able to introduce a spring's external diameter of any desired amount, preferably a high diameter, by which not only the room for the spring is limited but also a more quick response of the spring itself and a lesser number of turns is required in order to achieve the desired potential pressure.

In effects, and as it appears from the Fig. 17,

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the spring (37) is mounted upon a pin of an auxiliary piece (40) which is moved by some projections (41) of the planetary gear axles (19). The projections (41) drag, for instance by a friction (clutching) action, the piece (40), and the latter is imparting a pressure to the spring (37), one end of which is connected to the pin (42) of the piece (40), while the other end of the spring is connected to a projection (38) existing inside the cover (1'). If one desires to increase the outside diameter of the spring (37), one could proceed according to the description seen in Fig. 18, in which the ends (41) act upon the inside of a piece (43) enclosed by a cover (1'') having a larger diameter, which allows logically to increase at will the size of the spring without any limit.

In order to effect the placement within the vehicle door, one proceeds previously to consider the proper guiding of the window in the cornice, with the purpose of knowing if this guiding arrangement will suffice to allow the sliding of the window itself, and proceeds to locate the driving unit (motor) at the exact place in which the door crank is to stay which allows to raise or lower the window. If the guides of the door cornice are sufficient, the guides (9) are fixed at the alignment which corresponds,

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and the end terminals of the band are connected in the supporting piece (13), once said band has been introduced into the space between the projection (24) and the projection (25) of said guides. A very precise adjustment of the starting tension of the band in this operation is not needed but a manual adjustment will suffice, although the device doesn't require such tension for its normal operation.

In effects, and making reference to Fig. 1, we must point out that, according to the direction of rotation of the motor unit, the ends (A) or (B) of the band (4) will undergo a self-stretching action, although, among other causes, a sliding exists upon the guides (9). The end which is opposed to the stretched end will run freely, with the single proviso which may be observed in Fig. 12, of placing the lower projection (25) which will prevent any risk that the band may exit. This notwithstanding, this projection will not hinder in any way in relation to the previous manual introduction of the band.

When the guides of the window cornice don't offer a directional reliability for the window, the guides (9) will be mounted upon the terminal ends (23) of a central guide, straight or curved according to the window, on which the window support (13)

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will slide, through (34)-(29) and (32). In its turn, this guide (5) is secured upon the door, through some catches (17) which are integral with the same.

In both cases, the ability of the ensemble to adjust to any tolerance is very wide since, being the band flexible, the anchoring points of the motor set end of the guides (9) or catches (17), according to the cases, allow to alter their positions, thus absorbing any type of tolerance of the dimensions of the door. This ability or capacity is furthermore increased since, when the manual mounting is effected of the band on the guides (9) and the support (13), its length can be varied in the desired amount, approaching the desired anchoring points. This has the consequence that when the operation is effected electrically, by a motor or similar, this may occupy in the door the desired place, independently from the features of the device in itself.

Another advantageous feature of the device is the realization of the recesses (35) and (36) of the supporting piece (13), which, as it can be seen from the Figure 3, receive the terminal ends (12) of the guides (9), with the maximum utilization of the interval or distance between the same, which redounds to the possibility of an easier access and into a smaller

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space, to the limit-positions of opening and/or closing of the window.

It is pointed out again the adaptation ability of the device to every possible space available inside a door, with a total independence of the device itself, both owing to the true mobility conferred by the band and the possibility of shortening or clipping said band when this is desired.

Besides this, the device doesn't require any precision in its manufacturing, it being possible to employ materials having lesser cost than the conventional ones; furthermore, the device requires a band section which is smaller than that required by the conventional devices.

On another subject, we want to point out, with reference to the Figures 24, 25, 26 and 27, that by (45) the supporting-piece of the window (50) is indicated, which in its turn is provided with some wings (46) which embrace the side portions of the guide (47). In this piece (45), from whose base the projection (48) comes out, an end terminal of perforated band is embodied which is housed within the longitudinal central groove in a direction which is perpendicular to the surface (45), through the co-operation of a latch. In the projection (48) one can

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verify the existence of the side wedged-in regions (49), as well as of the two projections (55) which end said regions (49).

The other piece (51) presents a central void, coincident with the shape of (49), and is placed upon the piece (45, Fig. 21). This piece (51) receives by itself the other terminal end of the perforated band (56), which, equally as the piece (45), keeps housed within the longitudinal central groove of the piece (45) and in relation with the piece (51) through a catch which is pressure-housed within (52). The side surfaces (53) of (51) keep arranged at a small distance from the internal walls (57) of the guide, as it can be seen from Figure 22.

When the terminal end of the band (56) which is connected to the piece (45) is drawn according to the (M) direction, the projections (55) of the portion (48) will contact at the upper walls of the voids of the piece (51), effecting the dragging of the latter and of its band end. In this moment the window (50), connected with the piece (45), is raised.

If, on the contrary, we will act according to the (P) direction upon the terminal end of the piece which is connected with (51), said piece (51) is drawn, and in identical conditions the projections (5), which a-



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re housed within the recesses of the piece (51) will contact and drag the piece (45), with which operation the window is lowered.

When there is no direct action upon the perforated band, in the one or the other direction, only the weight (N) of the proper window affirms itself, and the contact is removed between the upper ends of the projections (55) and the upper surfaces of the recesses of (51), then falling the piece (45) whose lower walls of (55) will not contact the lower surfaces of (51), by which reason the wedged-in surfaces (49) will "cut" into the corresponding surfaces of the piece (51), opening this piece, so that its surfaces (53) keep pressed against the internal surfaces (57) of the guide (47), so immobilizing the ensemble and fixing the window at the desired position.

In order to remove this braking action, it will suffice to proceed to realize, i.e. effect, the dragging of (45) or (51), according to the (M) or (P) directions, since, in the one or the other case, the "cutting-in" action of the wedged-in regions will be cleared, in the first case for the raising of the piece (45), and in the second case for the lowering of the piece (51) (Figure 21).

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In any case, the response, in raising, lowering or braking, is automatic and is effected upon the proper guide (47).

From their part, the sliding-pieces (58) for the band, are provided with a single fixing axle (59) upon the guide (47) or upon the vehicle door, in this axle being established the rotation center of a spring, whose one terminal end (60) connects to a fixed point (62), while the other (61) connects to one end, at the exit of the band, of the piece (58), by which the action of the spring according to (R) will act in any moment upon the band, imparting to it the needed tension. This continued action co-operates in order to assure the maintenance of said tension, and in any case would absorb any elongation, which the band would possibly undergo.

The detail relating to the safety operation is represented in the Figures 24, 25, 26 and 27, in which the inside of the vehicle door (65) can be seen, with an axle outlet (64), outlet which obviously will not exist in the case in which the operation would take place automatically through a geared motor. In any case, the axle in object, both in the cases of automatic and manual driving, impresses a rotation movement to the central pinion (67) which, in its turn, transmits the

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movement also to the planetary gears (68), (69) and (70), which are engaged to the fixed crown (71). This crown wheel, obviously, will be toothed externally and internally, and, we repeat it, is fixed. The planetary gears (68), (69) and (70) run idle, and their axles are holed in order to be able to receive the pins (78) of the external crown (76), which is occupied externally by the teeth (77) which will drive a perforated belt or band, not represented.

The axle stem (73) , parallel to the central axle of the abovementioned mechanism, presents a frontal portion (74), which has a suitable shape in order to allow its driving through the action of a key, for instance, this frontal portion (74) being accessible from outside (65) through a hole which exists in the door of the vehicle. The opposed end of the stem (73), is enclosed inside the same casing or body (66) which includes the rest of the various elements , and presents a wheelwork (79) facilitating its rotation, and a cylindrical crown gear (72) engaging with the exterior portion of the crown (71). This portion (72) is actuated according to (S) by a single pawl which permits the rotation of the same in one direction, that is the direction of win-



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dow raising, and prevents the rotation in the opposite direction, that is in the window-lowering direction.

Under normal conditions, the rotation of the pinion (67) promotes that of the planetary gears (68), (69) and (70) within the cornice of the crown wheel (71). The pins (78) of the external crown (76) being housed within the planetary gears (68), (69) and (70), the crown (76) undergoes the suitable movement of rotation. When the geared motor meets a failure, and consequently the pinion (66) doesn't achieve the movement, the driving of the window-raising device becomes impossible, but it can be put into operation if, by means of the region (72) of the stem (73), the rotation is effected of the crown (67) which was previously fixed.

By extracting the external stopper (75), it is possible, by the aid of any tool, to gain the access to the portion (74) of the stem, effecting its rotation and gradually raising the window until it will be possible to repair the failure.

Here, and with reference to the content of the Figures 24, 25, 26 and 27, the possibility is ascertained of achieving really a given mounting with an automatic as well as a manual driving system, without

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more than connecting a handle to the axle (73) in its position (74), the handle having access to the outside of the door (65). The only variation will consist in the substitution of the pawl (S) by a conventional spring, similar to the member (66) which will immobilize the window, both in the window-raising position and in the window-lowering position, by which the mechanism would be prepared for its operation, manual or automatic, as desired.

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C L A I M S

1. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", characterized by that they are constituted by a motor set or unit, operated by a crank or an electric motor, which effects the rotation of a drum or disk provided with an external set of teeth, a perforated belt or band of a plastic type which engages said teeth, a cover of the ensemble with openings through which the terminal ends of the band which engages the drum gain access to outside, a support for the window with means which are suitable to receive the window and the terminal ends of said band and some sliding guides of said perforated band, fixed to the vehicle door, between which the above-mentioned support is positioned and which act as stops for the displacements of the same support, between the motor unit and the sliding guides a triangle being constituted which is liable to variation for altering the positioning of any one of its three apex elements, between which the band travels in the air.

2. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to the previous Claim, characterized by that the sliding guides of the perforated band may be arranged in the terminal ends of a central guide upon which the piece slides which supports

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the window and the terminal ends of the band, effecting the fixing of this central guide upon the door of the vehicle.

3. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to Claims 1 and 2, characterized by that the sliding guides present a curved plan, whose base is provided with holes for the fixing to the central guide or to the door of the vehicle, and whose side curved region which determines the sliding region of the band is superiorly ended by a projection and inferiorly by a rim proceeding from the base, whose upper end remains at a certain distance from the projection, this distance sufficing to permit the manual introduction or extraction of said band into or from the thus achieved void.

4. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to Claim 1, characterized by that the support presents, at the face opposing the face of connection of the window, some projections having a suitable shape in order to facilitate the sliding in its case upon the central guide, and horizontal pins which are superior to one of the projections, in which are introduced the last perforations of the terminal ends of the band, one above the other, which keep integral with the support by

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means of a perforated cover which receives the ends of said pins.

5. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to the previous Claim, characterized by that the support presents, at each of its side portions, recesses which receive one of the ends of said guides, when the window is raised or lowered.

6. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to Claim 1, characterized by that the internal cover of the motor unit houses a spiral accumulating spring, whose most external end is connected to an internal projection of said cover and whose central ends is fixed to a central pin projecting upwards from a circular piece, which is operated by some extensions of the planetary gear axes, this driving action being allowed to be external upon the piece holding the pin or internal upon the side portions of a circular hole of the same piece, with the purpose of being able to regulate the external diameter of the spring according to the desired measure, in consequence of which the cover will assume the suitable diameter.

7. "IMPROVEMENTS IN WINDOW-RAISING DEVICES", characterized by that a terminal end of the perforated belt receives a catch, this catch and said termin-

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el end housing within a suitable recess of a supporting piece, which receives the window by one of its faces, while for the other it presents a projection having a wedged-in shape into which the abovesaid projection penetrates, as well as a central longitudinal groove within which the belt rests, of such a shape that when said belt is dragged it causes the said supporting piece to slide along the guide through some wings with which it is provided, the guide having a U-shape with the ends of its wings which are doubled in a direction parallel to its base, simultaneously with this the other terminal of the perforated belt housing itself within the groove of the support and connecting with a flat piece which embraces the projection in the void of the supporting piece, beforementioned.

8. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to the previous Claim, characterized by that the projection of the support presents, on the side of its terminal end, at the end of its wedged-in portion in its major region, some extensions in a direction which is perpendicular to the longitudinal groove, said extensions keeping housed within the corresponding recesses of the piece connected to the other terminal end, in the same time that



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the wedged-in portion of that piece is able to house within a central void of this (piece) realized according to a corresponding shape, and with the end or side portions near to the internal surfaces of the wings of the guide-piece.

9. "IMPROVEMENTS in WINDOW-RAISING DEVICES FOR VEHICLES", according to the Claims 1, 2 and 3, characterized by that the pieces by which the band slides are mobile and possess at their axle a spring, whose one terminal ends keeps housed in a fixed point, while the other is connected to the end of said pieces with the purpose of originating a force against the belt when said end presents a trend to open.

10. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", characterized by that the central pinion, coming from the actuating motor, acts upon some planetary gears placed between said pinion and a crown which embraces the planetary gears themselves, this crown being provided, externally and internally, with teeth, and being fixed, so that the planetary gears revolve about their own axles and in the same time upon a circular path between pinion and crown, the fixing of the latter taking place by its external portion, owing to its connection with the toothed end of a stem which is parallel to that of the pinion,



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this stem reaching up the locking panel of the vehicle door, in whose terminal ends exists a recess for the introduction of a key or similar, liable to impart a movement to the crown fixed by said stem when the actuating motor will meet a failure, a closing piece being placed, external to the mentioned recess, upon the panel of the door, and placing a pawl upon the toothed portion of the stem which fixes said stem and said crown after each actuation of the key upon the end of the stem.

11. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to the previous Claim, characterized by that the centers of the planetary gears are perforated and receive front pins from a crown, furrowed by projections on its periphery, which is in part embraced by the perforated band, so that said crown rotates, moved by said planetary gears.

12. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES", according to Claims 10 and 11, characterized by that the axle outlet, foreseen for the possible actuation by a key, may be permanently utilized, by placing a fixed crank and substituting the pawl by a conventional braking mechanism which blocks the movement ability of the system both when the window is raised and when the window is lowered,



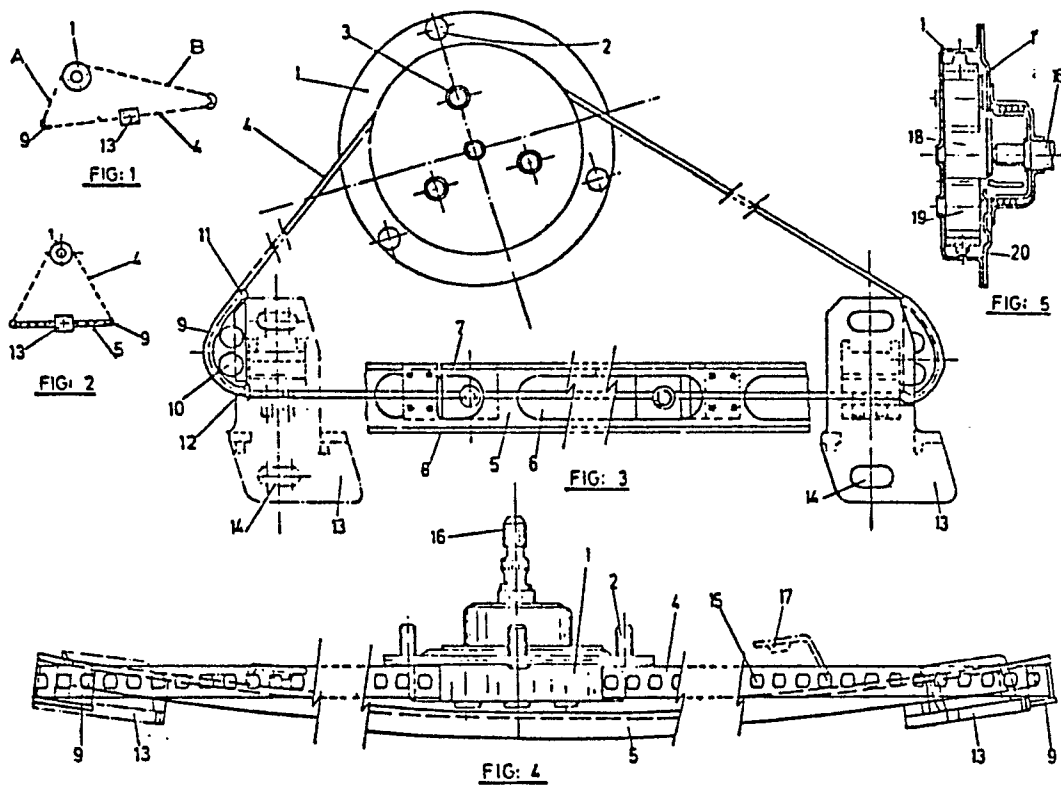
- 42 -

since it can be, in its time, actuated by the automatic mechanism which is driven by the motor.

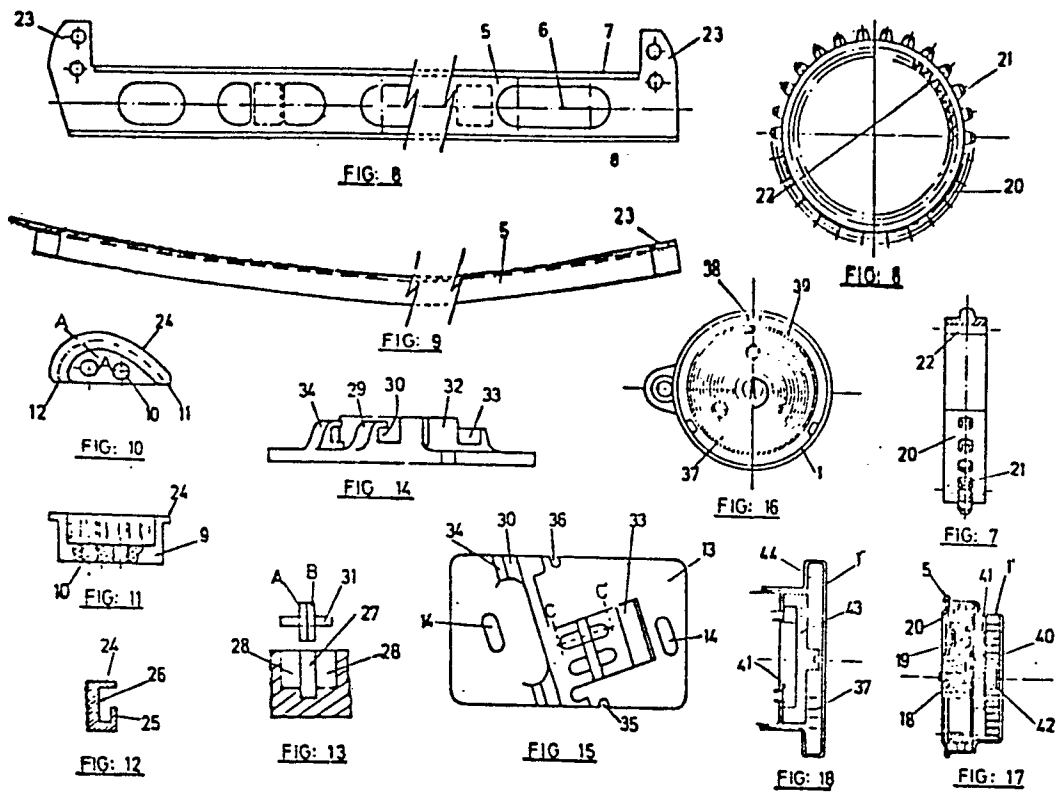
13. "IMPROVEMENTS IN WINDOW-RAISING DEVICES FOR VEHICLES".

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2/3



3/3

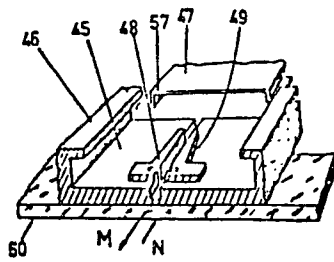


FIG. 19

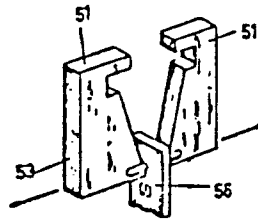


FIG. 20

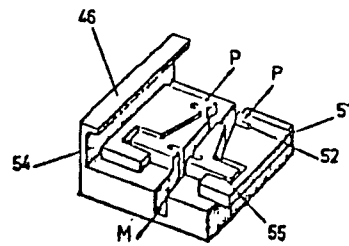


FIG. 21

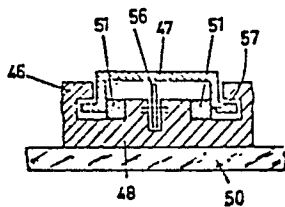


FIG. 22

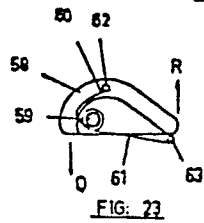


FIG. 23

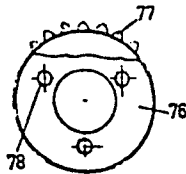


FIG. 26

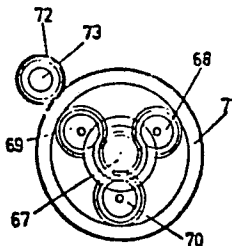


FIG. 25

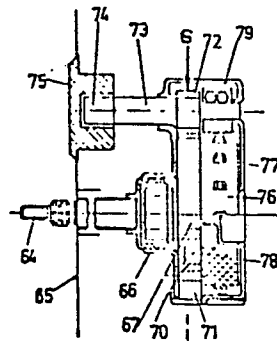


FIG. 24

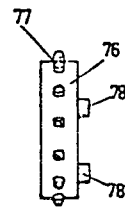


FIG. 27

0023474



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Application number

EP 80 83 0049

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 1 027 940 (PORSCHE)</u> * page 2, lines 61-79; figures 1 and 3 * ---	1,2	E 05 F 11/48 E 05 F 15/16
	<u>FR - A - 2 382 351 (ACIERS ET OUTILLAGE PEUGEOT)</u> * page 4, lines 19-28; figures 5,6 * ---	1,4	
	<u>GB - A - 1 479 281 (FLOYD)</u> * page 2, lines 50-54; figure 4 * ---	1	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
	<u>DE - A - 2 738 672 (BROSE)</u> * figure 1, page 8, paragraph 2; page 9, paragraph 1 * ---	1-3	E 05 F
	<u>DE - A - 2 644 213 (BROSE)</u> * figures 1,4,6 * ---	1-3	
	<u>DE - B - 1 198 705 (BROSE)</u> * figures 1-6 * ---	4	
	<u>FR - A - 2 032 047 (PEUGEOT)</u> * page 4, lines 14-35 * -----	10,12	CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family, corresponding document
☒ The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	22.10.1980	NEYS	