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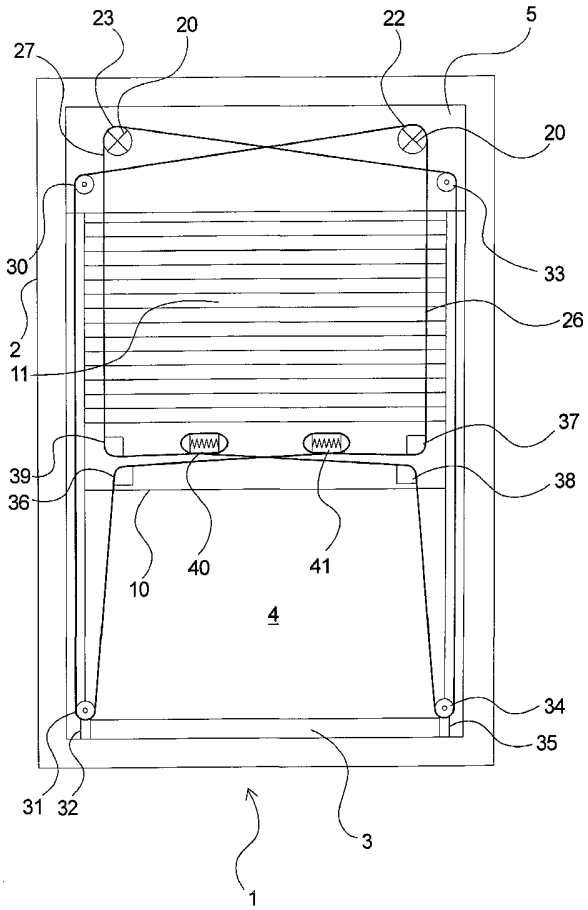
(54) Title: SCREENING DEVICE WITH MOTOR DRIVE AND USE HEREOF



(57) Abstract: Screening device for screening opening in building, window, door or the like, said screening device comprising a screening element (11) which in an inactive position is rolled up, folded together, gathered together or the like at a first position. The screening element is connected at a free end to a movable part such as a bottom bar (10). This bottom bar can be moved in relation to said first position by means of one or more endless driving cords or the like which extend in one or more closed circuits and which can be driven by means of least one driving motor. The movable part (10) is mechanically connected to said at least one driving cord by means of friction-producing means which are of such a kind that the friction can be overcome by a manual operation.

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SCREENING DEVICE WITH MOTOR DRIVE AND USE HEREOF

Field of the invention

The invention relates to a screening device for the screening of an opening in a building, a window a door or the like, said screening device comprising a screening material which in an inactive condition is rolled up, folded together, pleated or the like in a first position, and which at a free end is connected to a movable part such as a bottom bar which can be moved in relation to the said first position by means of at least one endless driving cord or the like which can be driven by means of at least one driving motor, such as disclosed in the preamble to claim 1.

The invention also relates to the uses of such a screening device.

Background of the invention

Screening devices, among other things for the screening against light, heat, noise etc., from openings in buildings, windows, glazed doors or the like, exist in embodiments such as manually operated and as arrangements which, e.g., are driven electrically by means of e.g. an electric motor. The first-mentioned exists in versions, which can be mounted immediately in building openings, windows, doors and so on, also including mounting by non-professional persons. Such a manual arrangement is, e.g., known from WO 98/32944, which describes an arrangement with parallel guidance of a bottom bar, where two guide cords are mounted in a window in such a manner that these guide cords cross through the bottom bar.

The latter arrangements, i.e. motor-driven arrangements, are for the most part of a more complex character and their installation requires the services of a professional.

This is known, e.g., from WO 00/05478, where an electric motor and a battery are built into a bottom bar of a screening device, which can be controlled by means of a remote control. The screening device is guided in a parallel movement using two cords or wires which are led from top to bottom of a window in such a manner that they are led through the bottom bar, where they cross each other, and where by means of driving rollers or the like the electric motor can draw the bottom bar up and down by the cords. With this cord arrangement, it is achieved that the movement of the bottom bar is effected in a parallel manner.

In as much as the electrical drive is built into the bottom bar, which is moved up and down, out of regard for a practical energy supply this can involve a battery supply, which is placed in the bottom bar but, however, other forms of energy supply for the electrical drive can also be envisaged, e.g. via slide contacts or similar means. Under all circumstances, the construction of the bottom bar etc. is complicated by such a building-in of the electrical drive into the bottom bar, as well as the weight of the bottom bar will be increased due to the elements which are built into it.

With such screening devices and with driving arrangements in general which can be driven by some form of automatics, e.g. by means of an electrical drive or driven by other means and which can possibly be operated by means of a remote control, it will often be problematic to be able to operate these in a purely manual manner in the event that this should be desirable. It can thus be the case that, e.g., should attempts be made to push a roller blind upwards, it will at the same time be required to drive the driving mechanism with which the roller blind is normally driven, e.g. an electric motor, a transmission mechanism etc., which in practice can be difficult, inexpedient and in certain cases impossible.

Furthermore, there can be cases where such driving mechanisms are configured as self-locking mechanisms, e.g. to prevent a driving arrangement for a roller blind in rolling downwards under influence of the force of gravity, or upwards under the influence of a spring force, whereby the roller blind is rolled upwards when this is

permitted by the driving arrangement. In these cases it will not be possible to push the adjusting drive in a purely manual manner.

In the above-mentioned WO 00/05478 there is thus described an embodiment in which use is made of a self-locking mechanism in connection with the driving arrangement, and the publication also discloses that it is possible to effect a manual operation by deactivation of a coupling. However, for several reasons such a de-coupling mechanism can be inexpedient, in that it can serve to complicate the construction and make it more expensive, and it can also complicate the operation.

A further example of an electrically-driven device is described in US 5,170,108. This publication concerns a screening device with a single electric motor which, via an endless driving cord and a number of pulleys or the like, can draw a bottom bar up or down in a window. The driving cord is firmly connected to the bottom bar and with this arrangement there is no immediate possibility of carrying out a manual adjustment of the position of the bottom bar.

It is thus an object of the invention to provide a screening device which can be operated by means of a driving arrangement, and which obviates the above-mentioned disadvantages.

It is thus also a desire to be able to provide a screening device with which it is immediately possible to be able to effect a manual adjustment of the position, e.g. in cases where a remote control is not immediately at hand or where a source of energy, e.g. a battery supply, can not supply current for the operation.

It is a further object of the invention to provide such a screening device which can be operated manually without the necessity of having to activate a special coupling or the like, and thus it is also an object to provide such a screening device which does not need to have such a complicated coupling arrangement which needs to be de-activated and which renders the device more expensive.

It is a further object of the invention to provide such a screening device whereby it is also possible to ensure a faultless de-coupling of the device in end positions, i.e. the bottom and top position.

These and other objects of the invention are achieved as will be described in more detail in the following.

The invention

As disclosed in claim 1, the invention concerns a screening device for the screening of an opening in a building, a window, a door or the like, said screening device comprising a screening material which in an inactive position is rolled up, folded together, pleated or the like at a first position, and which at a free end is connected to a movable part such as a bottom bar which can be moved in relation to said first position by means of at least one endless driving cord or the like which can be driven by means of at least one electric driving motor, said device according to the invention being characterised in that the movable part is connected mechanically to said driving cord by means which are friction-producing.

In a relatively simple manner and by relatively simple means, it is hereby achieved that the screening device can be operated by means of the built-in driving means, e.g. by means of an electric motor, while at the same time that the possibility is provided of carrying out a manual adjustment. With the normally occurring motor operation, the movable part, i.e. e.g. the bottom bar, will be moved in relation to the opening in the building by means of the driving cord, in that this will transfer traction force to the bottom bar via the said friction-producing means. With a manual operation, the bottom bar can be moved by it being pushed or drawn in the opening of the building, in that the driving cord will thereby slide e.g. via, over, through or past the said friction-producing means.

The said friction-producing means can be configured in a wide variety of ways, such as will also be described in the following. Generally, these means will be configured such that with normal operation there can be transferred a force which is sufficiently great to be able to move the said movable element, but such that the static friction produced will not be greater than it can be overcome when it is desired to effect a manual operation, such as explained above. The said friction-producing means will thus distinguish themselves by exercising a friction, which will lie between a required minimum value for the specific system and a predetermined maximum value for the specific system. It will be obvious, however, that there will be tolerances associated with both values.

It will be understood that in this connection the designation "driving cord" shall be taken to mean any form of driving means which can transfer traction in the longitudinal direction and which is sufficiently flexible in the transverse direction to be able to pass over a driving roller, pulleys, wheels, pivots etc. In connection with the invention, use can thus be made, e.g., of driving belts, wires, cables, chains or chain-like means etc.

With an expedient embodiment, such as disclosed in claim 2, the said friction-producing means can comprise at least one edge over which the said least one driving cord is led. In a relatively simple manner, there is hereby achieved a suitable friction between the driving cord, which under normal use draws the bottom bar up or down, so that this friction is sufficiently great to ensure the movement of the bottom bar by this operation. At the same time it can be ensured that the friction is not greater than upon manual operation, e.g. a pull or a push on the bottom bar, it will be possible for the driving cord to slide over the said edge, so that the user can effect a manual operation if this is desirable or necessary. A suitable friction can also be brought about by arranging the driving cord in such a manner that an angle is formed between the lead-in of the driving cord towards the edge area and the run-off of the driving cord from the edge area. It will be obvious that this angle can be adapted to suit the specific construction.

With a further expedient embodiment, as disclosed in claim 3, the said least one edge can be rounded off in order to achieve a contact distance of a predetermined length

In an expedient manner, the necessary and sufficient frictional force can hereby be produced by a suitable configuration of the edge, so that in interaction with the passing of the driving cord, and including the angle at which the cord extends during passage of the edge, a suitable length can be achieved over which the driving cord and the edge material are pressed against each other and can influence each other in achieving the necessary friction.

As disclosed in claim 4, the screening device can be configured in such a manner that the said friction-producing means comprise at least two edges over which the said least one driving cord is led.

In a simple manner it is hereby achieved that the necessary friction between driving cord and the movable part, e.g. the bottom bar, can be suitably distributed over several elements, so that a greater degree of freedom is achieved in the dimensioning of the particular friction-producing elements individually and the bottom bar as a whole.

In accordance with the embodiment as disclosed in claim 5, the said friction-producing means can comprise guiding means in the form of grooves or the like.

There is hereby achieved a further expedient manner in which the necessary friction can be produced, which can be implemented in connection with or instead of other embodiments of the friction-producing means. By allowing the driving cord to pass a groove or the like, an influence will arise over a greater part of the driving cord's periphery – or over a greater part of the periphery of the relevant driving means – so that with this embodiment the friction between driving cord and bottom bar is increased.

As disclosed in claim 6, the screening device can be configured in such a manner that the said friction-producing means comprise clamping means which can possibly be spring-loaded and/or adjustable.

With this embodiment, where direct use can be made of a form of clamping around the driving cord or a corresponding driving medium, a higher friction can be achieved with relatively simple means. When use is made of an adjustable clamping, possibly with the use of a spring force or the like, it can also be achieved that the degree of friction between driving cord and bottom bar can be adjusted to a suitable value, e.g. depending on the type of cord, its surface characteristics etc.

With a particularly expedient embodiment, as disclosed in claim 7, the device can comprise two driving cords which are each led in their individual closed circuits by means of pulleys or similar means, and where for each driving cord there are arranged friction-producing means in, on or at the movable part, e.g. the bottom bar, in as much as the two driving cords cross each other in, at or in the vicinity of the movable part, e.g. the bottom bar.

The invention can hereby be used in connection with a device comprising a parallel guide of the type, which comprises two driving cords in each, their closed circuits, and where these two driving cords are driven in each their direction. It will thus also be achieved that the movement of movable part, e.g. the bottom bar, will be guided in a parallel manner, also during manual adjustment.

With a further alternative embodiment, such as disclosed in claim 8, the device can comprise at least one driving cord which is guided in a closed circuit by means of pulleys or similar means, and where for the closed circuit there are arranged friction-producing means in, on or at each end of the movable part, e.g. the bottom bar.

There is hereby achieved a particularly simple embodiment of the invention, where the said least one driving cord does not need to pass the movable part, e.g. the bottom bar, but can pass or be connected to its ends, in as much as the respective courses of the said driving cord extend at each side of the screening device. However, with this embodiment the at least one driving cord can also be arranged in such a manner that it crosses itself in connection with the passage of the bottom bar, in that the driving cord extends via or at the bottom bar from its one end to the other and vice versa.

As disclosed in claim 9, it can be expedient for the device to comprise at least one driving motor which, possibly via a transmission mechanism and one or more driving rollers or the like, drives the said least one driving cord, where the device comprises a control circuit for stopping the device at predetermined positions, such as an upper and a lower position.

It is hereby achieved that the device can automatically stop operating when it reaches to one of the said positions, without it being necessary to mount sensors, feelers or the like to detect that such a position has been reached.

With a particularly expedient embodiment, such as disclosed in claim 10, the device can be configured in such a way that at one or more of the said predetermined positions, the movable part, e.g. the bottom bar, is brought into contact with guide means, e.g. pulleys or the like, for the at least one driving cord.

It is hereby achieved that in connection with the invention an automatic stopping of the device will safely be able to take place at, e.g., an end-stop, also when for use at such stopping of the device a detection of motor current or corresponding parameters is employed. In that precisely such an embodiment of the invention has been implemented such that a driving cord will be able to be moved over the friction-producing means, e.g. by manual operation, this will also be able to take place when e.g. the bottom bar has reached down to the bottom of a window or the like. In this case the change in motor current will possibly be too small to enable an automatic

stopping to be initiated and in the given case not with certainty. This disadvantage is obviated with the said embodiment of the invention, in that in this or the said positions it will happen that the movable part, e.g. the bottom bar, will come into physical contact with one of the means, e.g. a pulley or the like, over which a driving cord extends, so that this pulley or the like is wholly or partly braked. A braking force will hereby be transferred to the driving cord, so that a distinct change in the operational parameters of the driving motor can be detected, e.g. a change in the motor current, whereby a stopping of the driving mechanism can be initiated.

Expediently, such as disclosed in claim 11, the movable part, e.g. the bottom bar, can have means for effecting a braking of the said guiding means, whereby a suitable increase in the motor load is achieved and herewith a reliable activation of the stopping automatics. The said means can comprise friction-promoting means of various kinds, means for mechanical interaction and so on, as will be obvious to the expert.

By yet a further expedient embodiment, such as disclosed in claim 12, the movable part, e.g. the bottom bar, can have a recess for reception of the said guiding means, e.g. a pulley. Several advantages will be achieved hereby, in that the top or bottom of the bottom bar will be able to come closer to e.g. the top or bottom of an opening in a building before contact is established to e.g. a pulley, and in as much as the said recess will more easily be able to be configured to achieve a suitable braking effect on a pulley.

The concrete configuration of the form of contact between e.g. the bottom bar and a pulley can be effected in many different ways, such as it is exemplified in the following detailed description, and these configurations can similarly be implemented with the use of different materials etc.

As specified in claim 13, the invention also relates to the use of the screening device according to one or more of the preceding claims in connection with a light-

screening means, possibly a blackout curtain, and/or a screening means for screening against outer influences such as, e.g., draught, insects etc.

Finally, as specified in claim 14, the invention relates to the use of the screening device in accordance with one or more of the preceding claims in connection with a screening material in the form of a roller blind, a foldable curtain, a Venetian blind or a shutter arrangement.

The figures

In the following, the invention will be described in more detail with reference to the drawings, in which

fig. 1 shows a window seen from the inside with a screening device according to an embodiment of the invention,

fig. 2 shows a modified embodiment of the screening device which is shown in fig. 1,

fig. 3 shows a schematic illustration of a second modified embodiment of the screening device according to the invention,

fig. 4 shows a corresponding illustration of a further embodiment of the invention,

fig. 5 shows a further embodiment of the invention in which a single, closed driving loop is used,

fig. 6 shows a modification of the embodiment shown in fig. 5,

fig. 7 shows an enlarged illustration of a detail section of an end of a bottom bar in the vicinity of the bottom of a window frame in another embodiment of the invention, and

fig. 8 shows the detail section shown in fig. 7, seen from the end of the bottom bar.

Detailed description

Fig. 1 shows a window, indicated in general by the reference fig. 1, seen from the inside, where said window is provided with a light-screening device, which is configured using an embodiment of the invention.

In a commonly known manner, the window 1 comprises a frame 2, which supports a sash 3. This sash 3 contains a window pane 4, and if the window is of the type which can be opened, the frame 2 and the sash 3 will also have means for use in the opening, such as hinges and handle.

Mounted on or in the sash at the top of the window 1, there is a top box 5, which out of regard for clarity in fig. 1 is shown on an over-dimensioned scale. In practice, the top box 5 will have transverse dimensions, which are substantially comparable with the transverse dimensions of the sash or smaller.

A bottom bar or gripping strip 10 is connected to a screening means in the form of a screening blind or the like 11, which extends between the bottom bar 10 and the top box 5. The screening means can be configured in a wide variety of ways, such as e.g. a pleated blind or as a Venetian blind as shown in fig. 1, but it can also be a curtain which can be rolled up on a spring-loaded element (not shown) which may be placed in the bottom bar 10 or in the top box 5, such as is known from roller blinds. Other configurations can naturally also be used in connection with the invention.

The screening means, e.g. the screening blind 11, can be configured from different materials and may have different characteristics, all depending on the concrete application, e.g. as light-shielding against the incidence of sunlight. The blind can thus be of the type which is completely transparent but it may have a light-filtering effect, and it can also be a blind with less or more screening effect, i.e. with a arbitrary degree of transparency, possibly selected in relation to specific light spectra,

and it could be a blind which serves to shield completely against incoming light, i.e. a blackout curtain.

The bottom bar 10 can be moved between an upper position in the vicinity of the top-box 5 and a lower position in the vicinity of the bottom of the window 1, and the bottom bar may preferably be parked in any arbitrary position between these outer points, in that the bottom bar is moved by means of a driving arrangement which will be described in more detail in the following. It will thus be understood that a greater or smaller part of the window can be screened to a greater or lesser degree by means of the screening means 11.

The driving arrangement comprises at least one driving motor, e.g. an electric motor and preferably a DC-motor, which directly or via a transmission mechanism (not shown) can drive a first driving roller 22 and a second driving roller 23.

As shown in fig. 1, each of the driving rollers 22 and 23 can be connected directly to its driving motor 20, e.g. by each driving roller being built together with a driving motor 20. As will appear later, these driving rollers 22 and 23 and/or these driving motors 20 are arranged in such a manner that when the one driving roller is driven to rotate to the left (counter-clockwise), the other roller will be driven to rotate to the right (clockwise) and vice versa. As will be explained in more detail in the following, with the use of this driving arrangement it will not be necessary to have any synchronisation of the driving rollers, e.g. with a mechanical connection or by an electrical/electronic arrangement, in as much as the driving arrangement shown in the figure will ensure a uniform guidance of the two driving cords. For other reasons and/or in certain cases, a synchronisation can, however, be desirable.

The driving rollers 22 and 23 are placed together with the driving motors 20 in the top-box 5, but it will be understood that other arrangements are possible, e.g. with one or more driving motors placed outside the top-box 5. Similarly, it will be

understood that diverse transmission mechanisms, guiding and driving elements etc., should such elements be necessary, can be placed in or outside the top-box.

It will also be understood that the arrangement can exclusively comprise one driving motor, e.g. a driving motor that via a transmission mechanism can transfer driving energy to each driving roller 22 and 23.

With the driving roller 22 there is associated a first driving cord 26, which, as shown, extends in a closed circuit, which is synonymous with the cord being endless. With the driving roller 23 there is associated a second driving cord 27, which is similarly endless and thus extends in a closed circuit. It will be understood that the term "driving cord" shall be taken to mean any form of driving medium which can transfer traction in the longitudinal direction, and which is sufficiently flexible in the transverse direction to be able to pass over a driving roller, pulleys, wheel etc. Use can thus be made of driving cords, driving belts, wires, cables, chains or chain-like means etc. It will also be understood that the driving rollers 22 and 23 will be arranged with regard to the actual type of driving means.

As is seen in fig. 1, the first driving cord 26 extends from the driving roller 22 over to a pulley 30 which is placed in or at the other end of the top-box 5, and from here the first driving cord extends substantially parallel with the frame 2 down towards the bottom of the window, where the driving cord passes over a pulley 31 which is supported by a schematically-shown bracket 32. From here, the first driving cord 26 extends up towards the bottom bar 10, in as much as it extends from the one end of this bottom bar to its other end and from there up towards the first driving roller 22. Where it passes the bottom bar 10, the first driving cord 26 will extend past at least one arrangement for the transfer of frictional forces, so that under normal driving conditions the driving cord can draw the bottom bar up and down. As shown, in extending in at the one end of the bottom bar the driving cord can be led over a rounded edge or the like 36, after which it passes an arrangement 41 for absorption of deviations in cord length and/or for damping of cord traction, and thereafter the

driving cord finally passes a rounded edge or the like 37 at the other end of the bottom bar. The arrangement 41 for the absorption of deviations in cord length and/or for damping of cord traction can, e.g. as illustrated, comprise two end pieces over which the driving cord is wound at least one turn, said end pieces being mutually spring-loaded, but it will be obvious to the expert that use can be made of other configurations.

The second driving cord 27 will extend in a corresponding manner in as much as it from the driving roller 23 extends over to a pulley or the like 33 at the other end of the top-box, from where it extends down to a pulley 34 which is placed by means of a bracket 35 at the bottom of the window. From here, the second driving cord 27 extends up to the bottom bar 10 where it passes the rounded edges or the like 38 and 39 and an arrangement 40 for the absorption of deviations in cord length and/or for damping of cord traction before it extends up to the second driving roller 23.

The function of this configuration will now be explained in more detail. Upon activation of the driving arrangement, e.g. by means of commonly-known operating means, remote control devices, control devices etc., the driving motors will be activated, whereby the driving rollers 22 and 23 will rotate and cause the driving cords 26 and 27 to be moved around in their paths. If, e.g., the screening element is required to be moved upwards, the driving roller 22 will be rotated to the left (counter-clockwise) and the driving roller 23 will be rotated to the right (clockwise). The first driving cord 26 will be moved downwards in the vertical path, which is shown to the left in fig. 1, while the driving cord passes over the rotating pulleys 30 and 31. The bottom bar 10 will thus be drawn upwards by the driving cord 26 due to the friction which will exist between the driving cord and one or more of the elements which the cord passes on its way through and/or via the bottom bar 10, e.g. one or both of the rounded edges 36 and 37 and/or the arrangement 41.

The second driving cord 27 will be moved in a corresponding manner, where it will be the friction between the driving cord and one or more of the means which the cord

passes on its way through and/or via the bottom bar 10, e.g. one or both of the rounded edges 38 and 39 and/or the arrangement 40, which will cause the bottom bar to be drawn upwards by the second driving cord 27. As will be seen, the use of the two driving cords will ensure that the bottom bar 10 is moved by a parallel displacement, i.e. it will not move upwards or downwards in a slantwise manner, but will maintain its parallelism with the top and bottom of the window. It is further seen that the movements of the two driving cords will mutually correspond, so that as already mentioned a synchronisation between the driving motors 20 will not be necessary.

It will be obvious that the total friction between driving cord and bottom bar, or rather the bottom bar's friction means, shall be sufficiently great for the bottom bar to be moved under all normal conditions. With the invention it is also ensured that this friction is of such an extent that a manual adjustment of the position of the bottom bar can be carried out, and herewith of the screening device according to the invention. If it is desired to position the screening device manually, e.g. in the event of a power supply failure, regardless of whether this is caused by mains failure, lack of battery current etc., if a remote control is not immediately at hand or if for other reasons it is necessary or more convenient to effect a manual adjustment, this can be done by gripping around the bottom bar 10 or a handle (not shown) on the bar and leading the bottom bar up or down to the desired position. This is made possible because the total friction or rather static friction between driving cords and the bottom bar is of such a maximum amount that it can be overcome by a suitable operating push or pull, whereby the driving cords will slide over the rounded edges 36, 37, 38 and 39 and over the arrangements 40 and 41, while the bottom bar is moved up or down. It will be understood that the friction between the driving rollers 22 and 23 and the respective driving cords 26 and 27 will normally be of such an amount that the driving force is transferred to the driving cords in any operative situation, and thus also higher than the total friction between driving cords and the bottom bar. Therefore, with this embodiment of the invention it can also be such that in the event of the bottom bar abutting against obstacles during operation, the driving

cords will continue to be moved but will slide over the respective guide means in/at the bottom bar 10.

It is obvious that the rounded edges 36, 37, 38 and 39 as well as the arrangements 40 and 41 can serve to produce the friction that exits in the bottom bar and is applied to the driving cords, but it is also possible to configure the arrangements 40 and 41 in such a manner that the friction arising from said arrangements will be immaterial or of a known lesser amount in relation the friction arising from the rounded edges 36, 37, 38 and 39, so that determination of the friction in the bottom bar will in essence be able to be effected by configuration and/or adjustment of these rounded edges 36, 37, 38 and 39.

Moreover, according to the invention, use will be able to be made of means other than the shown rounded edges to serve as friction-determining means in or at the bottom bar 10. Use can thus be made of pulleys or wheels over which the driving cords are moved, but where these wheels are provided with braking arrangements, e.g. spring-loaded, where said braking arrangements can also be adjustable so that the correct friction can be set, e.g. at production of the arrangement. Moreover, configurations with grooves can be envisaged, where the grooves are configured with such dimensions, cross-sectional shapes and/or curvature radii that the desired friction is achieved.

A further embodiment of the invention, which is a modification of that described above, is shown in fig. 2, which is a schematic illustration shows a window 1 or a similar opening in a building seen from the front, and where as described above there is placed a screening device comprising a top-box 5, a movable bottom bar 10, between which a screening element 11 is arranged. Elements, which correspond to elements shown and described in connection with fig. 1, are provided with the same reference numbers as those used above, and will not be discussed further in connection with fig. 2.

The embodiment shown in fig. 2 differs from that described earlier in that use is made of a single driving motor 20 which, via a schematically-shown transmission mechanism 21, can drive the first driving roller 22 and the second driving roller 23, in as much as these can be coupled together as shown at 24. Corresponding to what has been described above, the driving rollers 22 and 23 are coupled or otherwise arranged in such a manner that when the one is driven to the left, the other will be driven to the right and vice versa. It will be understood that although the driving motor 20 is shown placed at the side of the window 1, this could equally well be placed somewhere else, in or outside the top-box 5, possibly together with various transmission mechanisms, control and driving elements etc. It will also be understood that the arrangement can comprise more than one driving motor, e.g. a driving motor connected to each driving roller 22 and 23 via each its transmission mechanism.

A further embodiment of the invention, which is a further modification of that described above, is shown in fig. 3, which correspondingly shows a window 1 or a similar opening in a building seen from the front, and with a screening device comprising a top-box 5, a movable bottom bar 10, between which there is arranged a screening element which out of regard for clarity is not shown in this figure. Elements, which correspond to elements, which are shown and described in connection with figs. 1 and 2, are provided with the same reference numbers as those used above and will not be discussed further in connection with fig. 3.

The embodiment shown in fig. 3, where use is made of only a single driving motor 20, differs from those described earlier by the connection between driving motor 20 and driving cords 26 and 27 and possibly the positioning and configuration of driving motor and a possible transmission mechanism. As shown in fig. 3, the schematically-shown driving motor 20 and possibly a transmission mechanism are placed in the top-box 5 in such a manner that a driving wheel or the like can move both driving cords 26 and 27 simultaneously, possibly by these driving cords being disposed with one or more windings around the driving wheel of the driving motor, or configured

in traction-transferring connection in another manner. When the driving motor rotates, the two driving cords at the driving motor will be moved in each their direction, so that the arrangement will function as described in connection with fig. 1 and whereby the bottom bar will be moved up or down.

However, it is obvious that with this embodiment use can also be made of two (or more) driving motors, possibly with associated transmission mechanism and possibly with a mechanical or electrical/electronic synchronisation which, however, as explained earlier, will not be necessary with the cord driving arrangement used.

In fig. 4 is shown a further embodiment of the invention which corresponds in general to that shown in fig. 3, but where use is made of only a single driving cord 46, which on the other hand does not cross itself in through or via the bottom bar 10. In the same way as in fig. 3, fig. 4 shows a schematic illustration of a window 1 or a similar opening in a building seen from the front, in which there is placed a screening device comprising a top-box 5 and a movable bottom bar 10, between which there is arranged a screening member, which out of regard for clarity is not shown in this figure. Elements, which correspond to elements that are shown and described in connection with figs. 1-3, are provided with the same reference numbers as those used above and will not be discussed further in connection with fig. 4.

The driving cord is arranged in such a manner that two cords extend in two paths through or at the top-box 5, both of these cords extending substantially from the one end to the other end of the top-box 5, and where traction-transferring connection is established to a single driving motor 20 (or more, e.g. two driving motors), and such that the one cord path will be moved the one way when the other cord path is moved the other way and vice versa.

The upper cord path extends over a pulley 30 and in a substantially vertical manner downwards towards the bottom bar 10, where the driving cord 46 is connected to a friction element 49, the function of which will be described later. From here, the

driving cord leads down to a pulley 31, which by means of a bracket 32 or in a corresponding manner, is placed at or in the vicinity of the bottom of the window. The driving cord then extends substantially upwards again along the vertical window frame to a pulley 43 in or at the top-box, from where the driving cord extends in one of the two cord paths mentioned above via the driving motor 20 over to a corresponding pulley 44 at the other end of the top-box. From here, the driving cord extends vertically downwards to the bottom bar 10, where it is connected to a friction element 48 corresponding to friction element 49. From the bottom bar 10 the driving cord leads down to a pulley 34 which, e.g., is mounted by means of a bracket 35, and from here again substantially vertical along the window frame to a pulley 33 in the top-box, from where the driving cord is led over to the driving motor 20 in said uppermost cord path.

It will be understood that when the driving motor is activated and the two cord paths extending in or at the top-box are moved in each their direction, the bottom bar 10 will be moved up or down, depending on the direction of rotation of the driving motor, in that the two (or more) friction elements 48 and 49 will generate a friction or rather apply static friction to the driving cord, this friction being sufficiently great to ensure that under normal conditions the bottom bar will be moved up or down together with the respective path of the driving cord.

According to the invention, the friction elements 48 and 49 are both configured so that the friction or rather the static friction exercised on the driving cord 46 is not greater than it can be overcome by a suitable influence on the bottom bar 10, so that the bottom bar can be moved manually up or down in the same way as described earlier. When the bottom bar 10 is moved manually up or down in this manner, the driving cord 46 will slide over, through or via the friction elements 48 and 49, depending on the configuration of these elements.

In fig. 4 the friction elements 48 and 49 are shown in a schematic embodiment, but it will be understood that these elements can be configured as grooves or the like

through which the driving cord can pass, and where the driving cord is led over one or more edges at inlet and/or outlet, so that these edges produce the necessary friction. Instead or additionally, the friction can be produced by the clamping of a groove around the driving cord. It will be obvious to an expert that it is possible for these friction elements to be configured in other ways, e.g. comprising spring-loaded mechanisms, pulleys or the like which are influenced by a brake or the like. It will also be obvious that use can be made of more than two such elements in the bottom bar 10 for producing the necessary friction.

Furthermore, it will be obvious that in connection with the embodiment shown in fig. 4, use can be made of two driving systems, each with its separate motor, so that each driving motor transfers traction force to each its cord path and/or each its cord loop.

Fig. 5 shows yet another embodiment of the invention, where use is made of a single driving cord 46. As will be seen from the figure, this embodiment is provided with a single driving motor 20, which, via the transmission mechanism 21, drives two driving rollers 22 and 23, which are connected by a coupling 24. As shown, the driving cord 46 is arranged so that it leads up from the lower pulley 34 on the right-hand side to the driving roller 22, and from here down to the right-hand end of the bottom bar, where is passes the friction-producing edge 37. Hereafter, the driving cord passes through the bottom bar 10 as described earlier towards the left-hand end and down towards the lower pulley 31. From here, the driving cord leads up to the driving roller 23 at the left-hand end of the top-box, from where it is led back towards the left-hand end of the bottom bar. Here, the cord passes the friction-producing edge 39 and extends through the bottom bar as described earlier towards the right-hand end and down towards the lower pulley 34, and the loop is thus concluded.

It will be understood that with this embodiment the bottom bar 10 will be moved upwards when the driving roller 22 rotates to the right (clockwise) and the driving roller 23 rotates to the left (counter-clockwise), and correspondingly that the bottom

bar 10 will be moved downwards when the driving roller 22 rotates to the left and the driving roller 23 rotates to the right. It will thus be understood that the object of the coupling 24 in the configuration shown in fig. 5 is, among other things, to ensure that the two driving rollers are driven in each their direction. However, it will also be understood that use can be made of two driving motors, i.e. one for each driving roller. Further, it will be understood that use can be made of a driving arrangement where both driving rollers are driven the same way around if the two cords are made to cross each other in connection with one of the driving rollers 22 or 23.

In fig. 6 is shown an embodiment which corresponds substantially to that described in connection with fig. 5, but where a particularly expedient configuration of the driving mechanism itself is illustrated, said driving mechanism comprising a driving motor 20, transmission mechanism 21, driving rollers and coupling 24. As will be seen, the driving rollers which in this positioning are designated 22' and 23' are disposed with their axes of rotation extending parallel with or in the plane of the figure, and expediently as shown lying coincident with the axis of rotation of the coupling 24, which can hereby merely be a connecting spindle. When the driving cord at both driving rollers 22' and 23' are moved in the same way, e.g. by the cords extending from the bottom bar up to the driving rollers at both sides being moved on the upwardly-facing or foremost side of the driving rollers (in the shown configuration), the bottom bar will immediately be moved up or down when the driving rollers rotate in the same direction simultaneously. By making use of a spindle or the like as coupling 24, a synchronisation will also be directly achieved, so that the bottom bar is moved up and down in a parallel movement.

It will be obvious that pulleys, driving rollers etc., can be disposed in ways other than those shown in the figures, which illustrate the principles of the invention. It will also be obvious that axes of rotation for driving rollers, pulleys etc., can be arranged in other ways than shown, where the axes of rotation are shown lying in the plane of the figures or at right-angles hereto. Other angles can naturally be envisaged, e.g. out of regard for practical conditions.

In connection with the embodiments shown in figs. 1 to 6, with all embodiments it is illustrated that the driving elements for the driving cord or the driving cords are positioned in connection with the top-box 5, but it will be understood that other positions naturally are possible in connection with the invention. A driving motor can thus be positioned so that traction can be transferred to a driving roller or the like at any place along a path for a driving cord. In particular it can be mentioned that any of the pulleys, rollers, cord-wheels or the like which are shown in the foregoing figures can be arranged as a driving element. It will thus also be possible that a driving motor with associated driving roller or the like can be placed at or in the vicinity of e.g. the bottom of a window opening. If use is made of two driving motors, these can, e.g., both be placed together with associated driving wheels or driving rollers at the bottom of a window opening, or one can be placed in the top, e.g. in the top-box, while the other can be placed at the bottom.

Moreover, it will be obvious that although use is made in the above of the terms "top-box" and "bottom bar", a top-box or an element or group of elements with corresponding functions can be placed in any position in connection with a opening in a building, e.g. also at a bottom or at an end of an opening in a building and it will be obvious that a movable element, e.g. in the form of a bottom bar, can be moved in any manner which is suitable for the actual construction. It will also be obvious that the screening element can be gathered together at the top-box in the inactive position, but that it can just as well be gathered together, e.g. at the bottom bar if it is a roller blind where this can be rolled up in the top-box or can be rolled up in the bottom bar.

In connection with known automated and/or motorised arrangements for operation of screening devices, it is often normal that the motor drive is stopped automatically in an end position and/or at an obstacle, in as much that in certain cases there will occur a deviation in motor current, i.e. a motor current which exceeds a pre-defined amount.

The use of such a system for automatic stopping will be problematic in connection with the invention, the reason being, as will be understood, that when a screening device according to the invention reaches an end position, i.e. e.g. when the bottom bar reaches down to the bottom of the window frame or up to the top-box or the top of the window frame, the driving motor or the driving motors will be able to continue to move the driving cord 46 or the driving cords 26 and 27, in that these will be able to slide over, through or via the friction connections 48 and 49 or the friction-producing means 36-39. It will, of course, hereby be possible to detect a deviating motor current, i.e. a slightly increased motor current, but since it is necessary for a certain tolerance to be built into such a system to avoid erroneous de-couplings, this will not necessarily be sufficient to be able to stop the operation of the motor.

According to a further embodiment of the invention, the possibility of being able to use a system for stopping the screening device has thus been taken into account, the operation of said system following a principle which in itself is commonly known, where detection of motor current or corresponding parameters can be used as or constitute input parameter(s).

An example of such an embodiment is shown in figs. 7 and 8, which in an enlarged illustration show a detail section of an end of a bottom bar 10 in the vicinity of the bottom of a window frame 2 seen from the front and from the end of the bottom bar respectively.

In fig. 7 is thus seen a part of the bottom bar 10 in the vicinity of the frame 2, and there is thus also shown a part of a driving cord 27 which extends down around a pulley 34 which, e.g., can be mounted in the window by means of a bracket 35. As described above in connection with figs. 1, 2, 3, 5 and 6, the driving cord can extend from the pulley 34 and via the bottom bar 10 over to the opposite end of the bottom bar via (not shown) friction-producing elements, and correspondingly the other driving cord 26 can extend from the other end of the bottom bar 10 to the shown end, and as shown in fig. 7 from here further up towards the top-box.

According to this embodiment, the bottom bar 10 and the pulley 34 will make contact with each other when the bottom bar reaches down to a lowermost position, which e.g. can occur as shown in fig. 8, where it is seen that the bottom bar 10 is configured with a recess or the like 50 in which the pulley 34 and possibly parts of the bracket 35 can wholly or partly be accommodated. As shown, the pulley 34 can touch a surface or surfaces in this recess 50 over a greater or smaller part of its surface, which will have an effect such as described in more detail in the following.

When the screening device according to the invention has brought the bottom bar into a lowermost position where it can no longer move, e.g. because the bottom bar abuts against the bottom of the frame, the driving motor or driving motors will continue to run, while the driving cord or cords will slide over, through or via the friction-producing elements, e.g. 36 – 39 or 48 and 49, which as described above will not necessarily give rise to any distinct change in motor current. With the arrangement shown in fig. 7 and 8, the bottom bar 10 and the pulley 34 will, however, come into friction-producing connection which will partly brake the pulley or possibly brake it completely, so that the power which is necessary for the movement of the driving cord or cords will be increased to such a degree that a distinct change in motor current or a corresponding parameter can be detected. A control system will hereby safely be able to detect an end position and will thus be able to bring the driving motor or motors to a standstill.

It is obvious that a similar arrangement can be provided in connection with an upper end position, e.g. by a pulley 33 as shown in fig. 1 being arranged in such a manner that it makes contact with a part of the bottom bar when this is in an upper position, so that the pulley is braked and the traction force is increased to a distinct degree.

Similarly, it will be obvious that such arrangements can be provided at both sides of the screening device, or only at a single side. Similarly any of the pulleys or similar means for moving the driving cord or cords can be used in this connection to increase

the friction and hereby the traction force exercised in an end position for the screening device.

Moreover, it shall be noted that the manner in which the bottom bar and one or more pulleys come into contact with one another can be configured in many different ways, as will be exemplified in the following.

The bottom bar 10 in general can abut against a pulley, e.g. the pulley 34, or as shown in fig. 8 use can be made of a bottom bar with a special configuration in the relevant area. A recess 50 can have a curved surface, which will correspond to a part of the periphery of the pulley, and additionally or instead the recess can have an upwardly tapering shape, so that it will clamp around the sides of the pulley. Additionally or instead, the pulley can be configured with a surface, e.g. at its periphery, which is formed to reinforce a braking effect, e.g. with a rough surface, a surface provided with projections or the like. Similarly, surfaces in the recess 50 or the bottom bar can have similar friction-producing means.

Moreover, it shall be noted that a pulley can be provided with teeth or the like or simply connected to a gear wheel, e.g. placed at the side of the pulley, and that the bottom bar can be configured with an element such as a pointed part, a plate part, a tooth or the like, which will enter into engagement with the teeth on or at the pulley when the bottom bar is in the end position, so that the pulley is effectively braked in this position.

In the foregoing, the invention is described in connection with a concrete example, where a screening device is configured in such a manner that it can be used in connection with a window, but it is obvious that the device can be used in connection with other openings existing in buildings such as doors or the like.

Furthermore, the driving arrangement according to the invention can be used in other connections, where, e.g., it can drive other elements such as light-screens on

transparent roof surfaces, in connection with greenhouses etc., and on the whole where use shall be made of a driving arrangement with parallel guiding arrangement.

As mentioned earlier, it can be envisaged that the driving arrangement can also be used to drive elements other than cloth-like materials. E.g., in connection with windows and doors the elements can be in the form of Venetian blinds, which are drawn up and down by means of the driving arrangement. Further, it can be in the form of folding or pleated blinds, curtains that are gathered together by being "folded-up", insect screens and the like.

It shall also be noted that the elements mentioned such as driving cords, driving rollers, pulleys, pivots, edges, slots etc., can be configured in a wide variety of ways, which will be obvious to the skilled person, and that the said elements are to be understood to be any element which can exercise a friction corresponding to that of the specifically-mentioned element. It will thus be obvious that when a driving wheel is mentioned, it will be possible to use any corresponding element, which can drive or draw a driving cord or a corresponding driving medium in connection with the invention.

List of reference numbers and designations

1	Window
2	Frame
3	Sash
4	Pane
5	Top-box
10	Bottom bar
11	Screening element or screening means
20	Driving motor
21	Transmission mechanism
22, 22', 23, 23'	Driving rollers
24	Coupling
26, 27	Driving cords
30, 31, 33, 34	Pulleys
32, 35	Brackets
36, 37, 38, 39	Friction-producing means
40, 41	Spring arrangements
43, 44	Pulleys
46	Driving cord
48, 49	Friction element
50	Recess

Patent claims

1. Screening device for screening of opening in building, window, door or the like, said screening device comprising a screening material (11) which in an inactive position is rolled-up, folded, gathered together or the like at a first position, and which at a free end is connected to a movable part such as a bottom bar (10) which can be moved in relation to the said first position by means of at least one endless driving cord or the like, which can be driven by means of at least one driving motor, c h a r a c t e r i s e d in that the movable part (10) is mechanically connected to said driving cord by means of friction-producing means.

2. Screening device according to claim 1, c h a r a c t e r i s e d in that the said friction-producing means (36, 37, 38, 39) comprise at least one edge over which said least one driving cord is guided.

3. Screening device according to claim 2, c h a r a c t e r i s e d in that said at least one edge is rounded to provide a predetermined length of a contact surface.

4. Screening device according to claim 2 or 3, c h a r a c t e r i s e d in that said friction-producing means (36, 37, 38, 39) comprise at least two edges over which said least one driving cord (26, 27) is guided.

5. Screening device according to one or more of the claims 1 – 4 c h a r a c t e r i s e d in that the said friction-producing means (36, 37, 38, 39) comprise guiding means in the form of grooves or the like.

6. Screening device according to one or more of the claims 1 – 5, c h a r a c t e r i s e d in that said friction-producing means (36, 37, 38, 39) comprise clamping means which may possibly be spring-loaded and/or adjustable.

7. Screening device according to one or more of the claims 1 – 6, c h a r a c t e r i s e d in that the device comprises two driving cords (26, 27) which are guided in each their closed path by means of pulleys (30, 31, 33, 34) or similar means, and where for each driving cord there are arranged friction-producing means (36, 37, 38, 39) in, on or at the movable part, e.g. the bottom bar, in as much as the two driving cords cross each other in, at or in the vicinity of the movable part, e.g. the bottom bar (10).

8. Screening device according to one or more of the claims 1 – 6, c h a r a c t e r i s e d in that the device comprises at least one driving cord (46) which is guided in a closed path by means of pulleys (43, 44) or similar means, and where for the driving cord there is arranged friction-producing means in, on or at each end of the movable part, e.g. the bottom bar.

9. Screening device according to one or more of the claims 1 – 8, c h a r a c t e r i s e d in that the device comprises at least one driving motor (20) which, possibly via a transmission mechanism (21) and one or more driving rollers (22, 22', 23, 23') or the like, drives the said least one driving cord (26, 27), and where the device comprises a control circuit for stopping the device at predetermined positions, such as an upper and a lower position.

10. Screening device according to claim 9, c h a r a c t e r i s e d in that the device is configured in such a manner that at one or more of the said predetermined positions, the movable part, e.g. the bottom bar (10), is brought into contact with guiding means, e.g. a pulley (30, 31, 33, 34) or the like, for the least one driving cord.

11. Screening device according to claim 9 or 10, c h a r a c t e r i s e d in that the movable part, e.g. the bottom bar (10), has means for effecting a braking of the said guiding means.

12. Screening device according to claim 9, 10 or 11, c h a r a c t e r i s e d in that the movable part, e.g. the bottom bar (10), has a recess (50) for reception of the said guiding means, e.g. a pulley.

13. Use of screening device according to one or more of the foregoing claims in connection with a light-screening element, possibly a blackout curtain, and/or a screening element for screening against other influences, e.g. against draught, insects etc.

14. Use of screening device according to one or more of the foregoing claims in connection with a screening element in the form of a roller blind, a foldable curtain, a Venetian blind or a shutter arrangement.

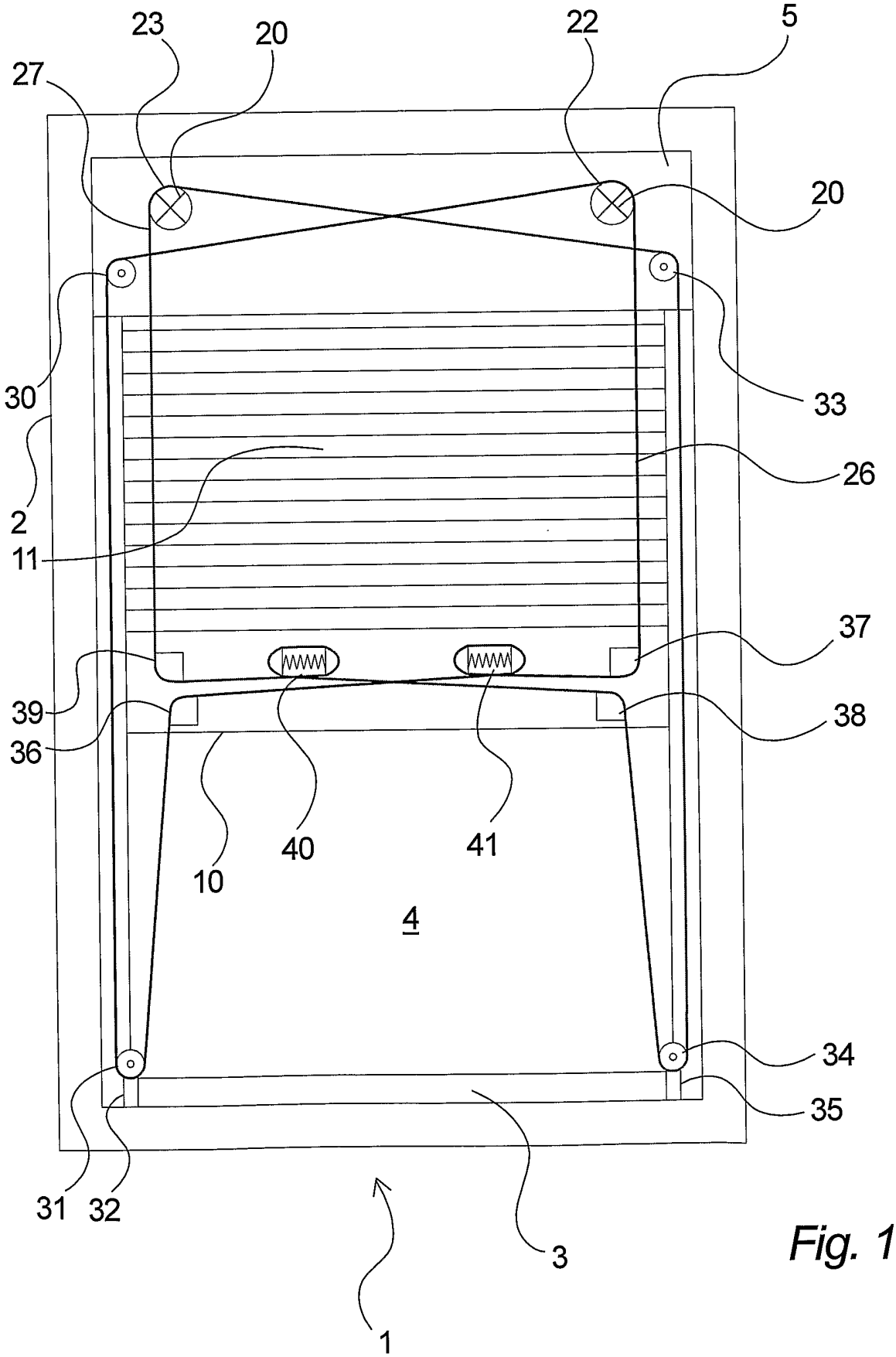

Fig. 1

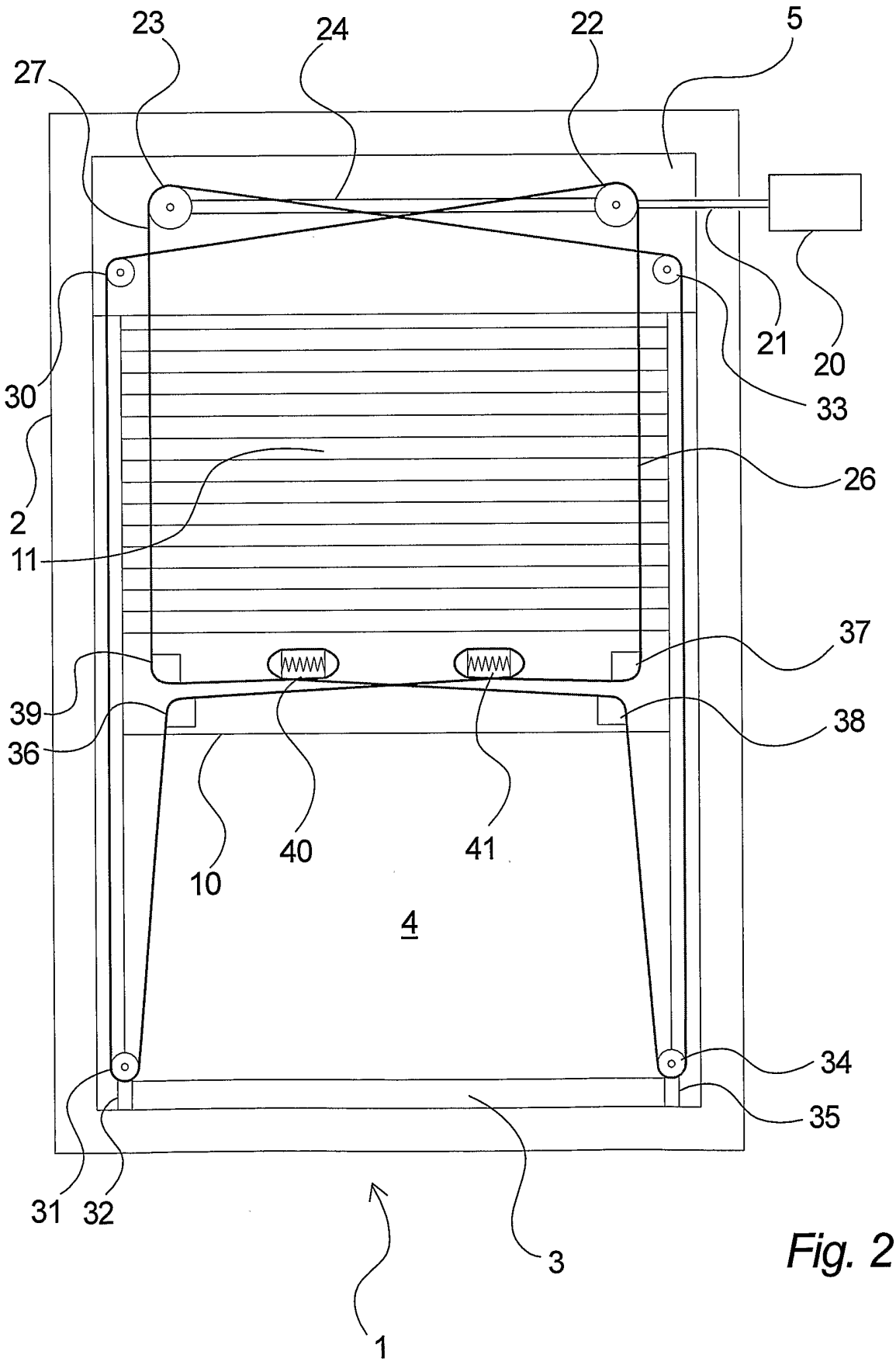

Fig. 2

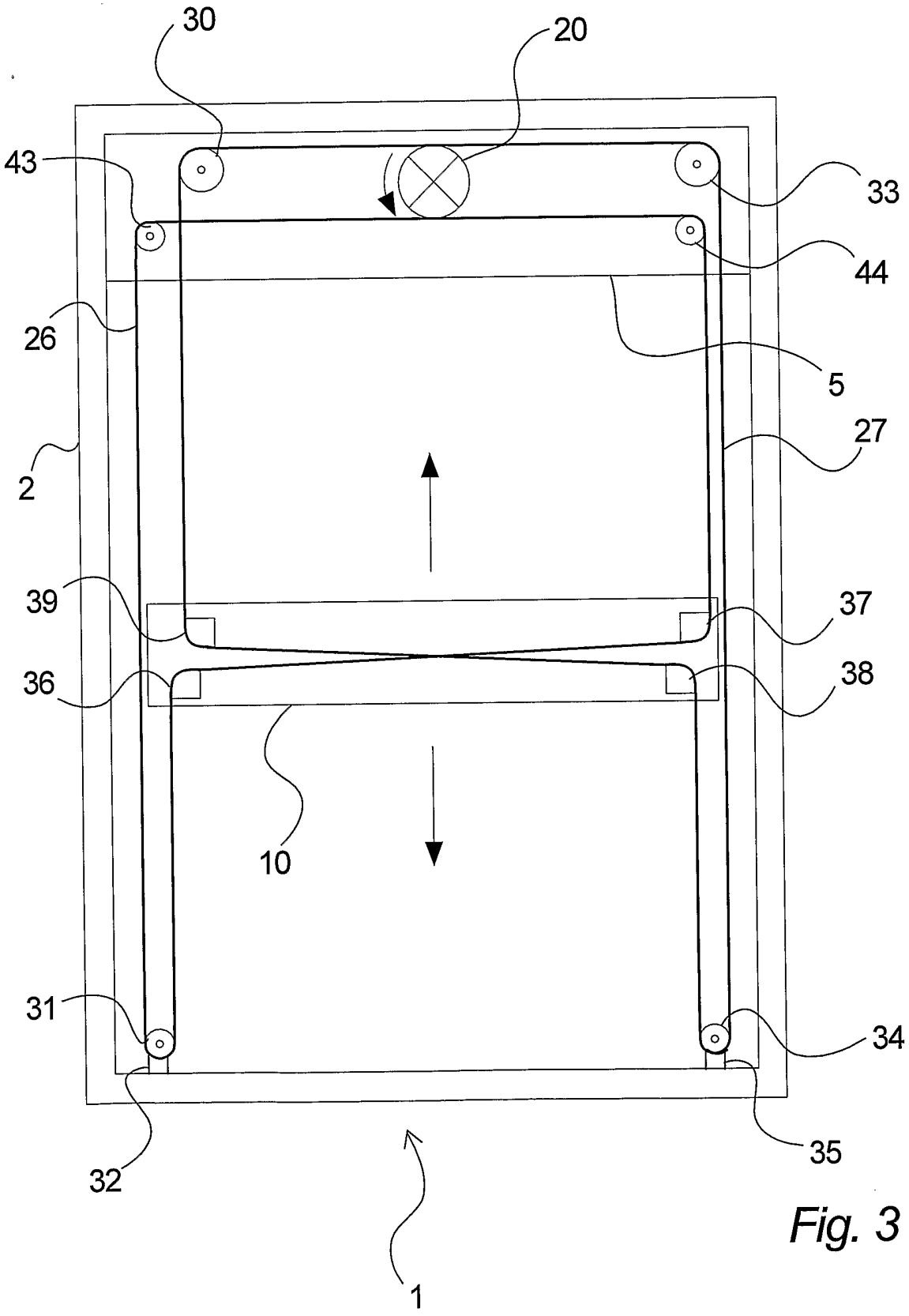

Fig. 3

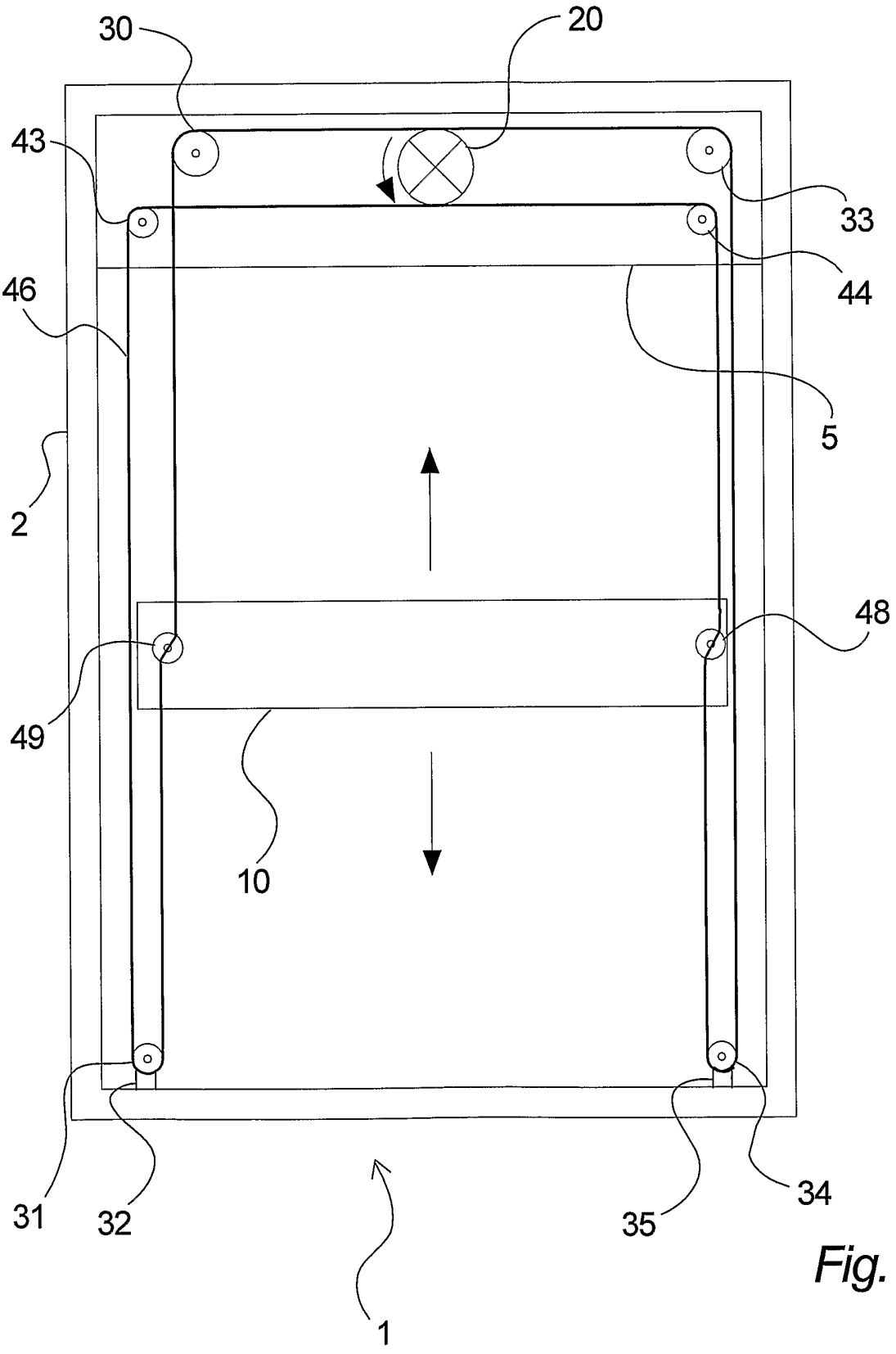

Fig. 4

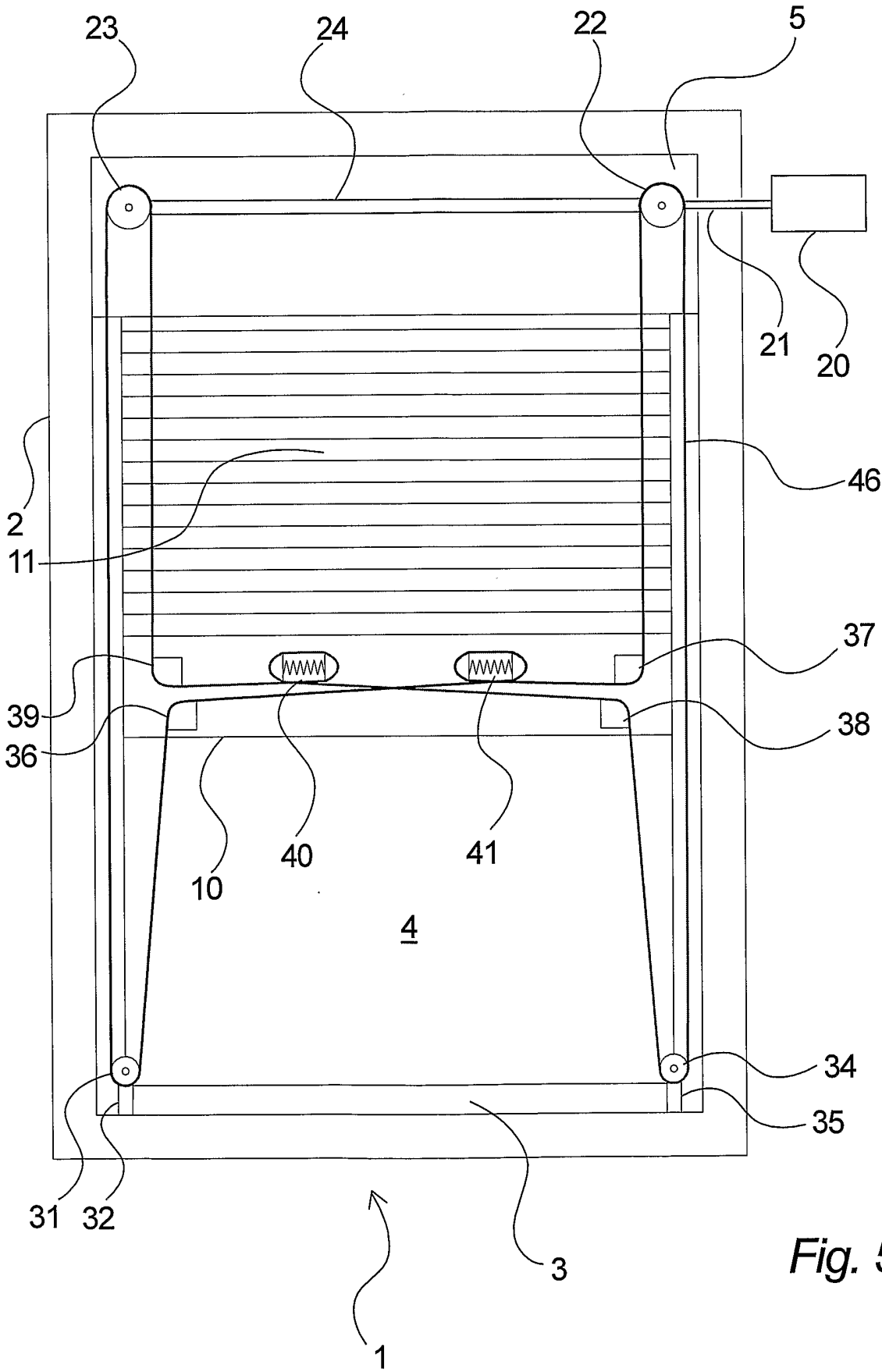

Fig. 5

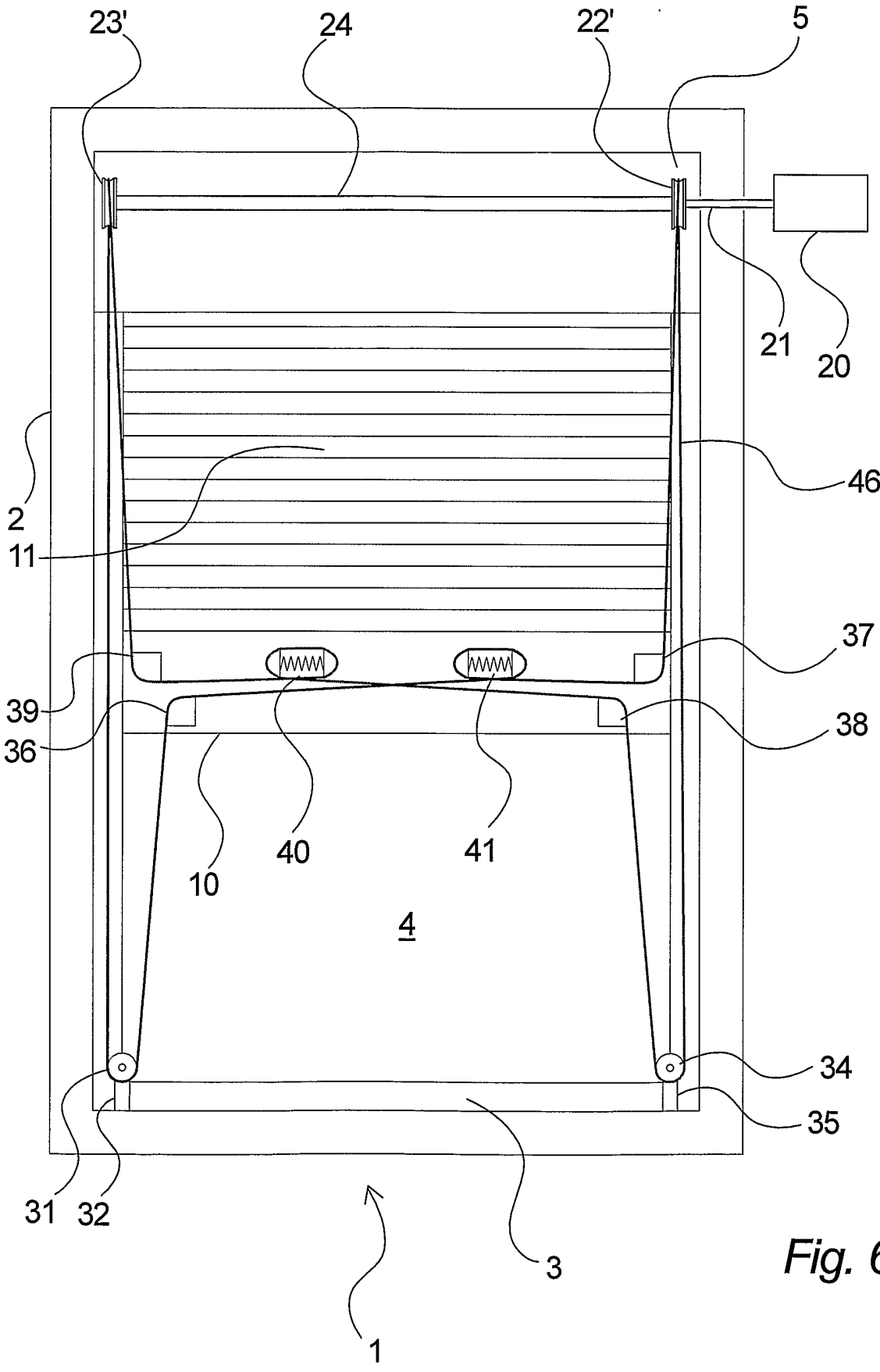

Fig. 6

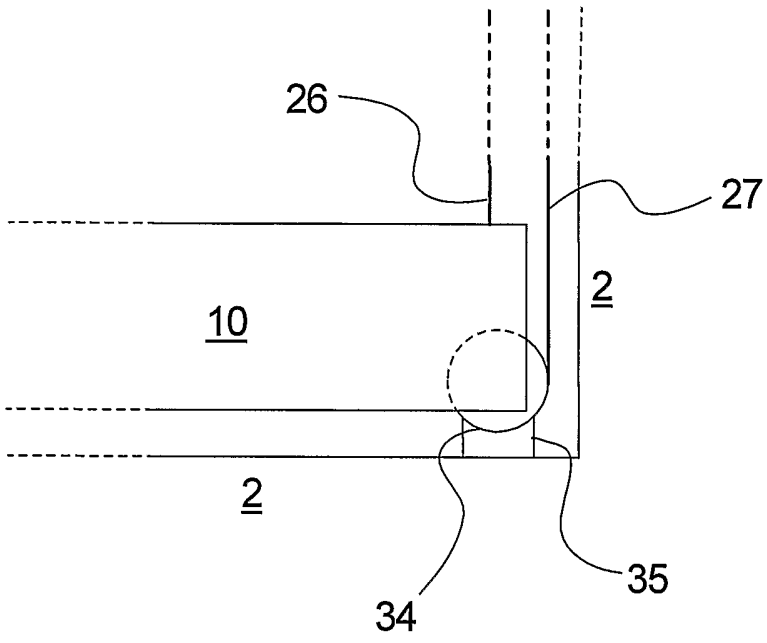

Fig. 7

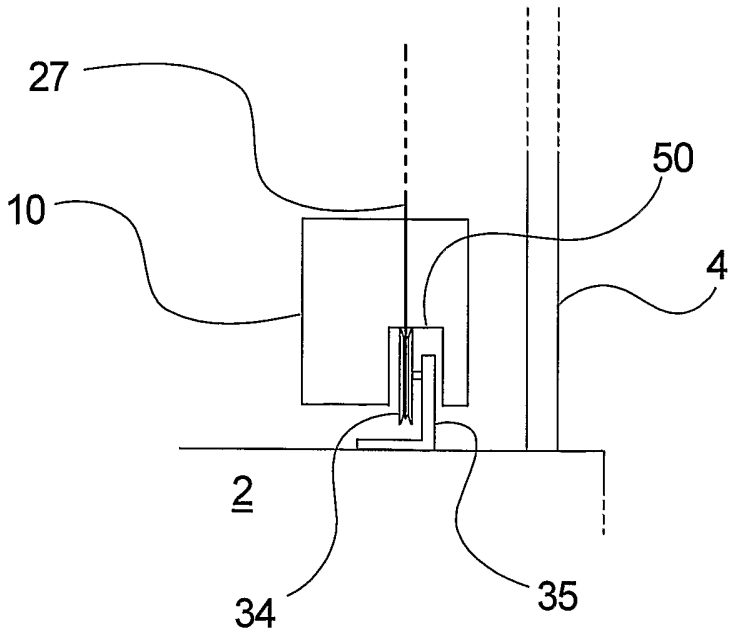

Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 03/00366

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E06B 9/42, E06B 9/56
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 9413204 U1 (HENNING, WOLFGANG), 13 October 1994 (13.10.94) --	1-14
A	WO 9832944 A1 (V. KANN RASMUSSEN INDUSTRI A/S), 30 July 1998 (30.07.98) --	1-14
A	WO 0005478 A1 (VELUX INDUSTRI A/S), 3 February 2000 (03.02.00) --	1-14
A	EP 0549209 A1 (METACO INC.), 30 June 1993 (30.06.93) --	1-14

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 August 2003	25 -08- 2003
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Åke Olofsson / JA A Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 03/00366

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5170108 A (PETERSON ET AL), 8 December 1992 (08.12.92) -- --------	1-14

Form PCT/ISA/210 (continuation of second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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WO 9832944 A1	30/07/98	AT 222992 T	15/09/02
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		BG 63404 B	31/12/01
		BG 103654 A	31/03/00
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		NO 993578 A	22/07/99
		NZ 337037 A	26/01/01
		PL 334923 A	27/03/00
		SK 100199 A	13/03/00
		US 6273173 B	14/08/01
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