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Description

The present invention relates to a winding device for covering wall openings or windows with the features of claim 1.

Vertically windable and unwindable winding devices are already known from prior art. Winding devices of this kind are used, for example, for the variable screening of premises, for the variable ventilation and/or partitioning of animal housing, glasshouses or the like. Winding devices of this kind usually have flexibly designed fabrics for covering. Winding spools on which the flexible fabric can be wound are also known from prior art.

A winding device of this kind is disclosed, for example, in DE 201 17 865 U1. Here a flexible fabric 2 can be wound on a lower shaft 4 which is driven by a motor. During winding the shaft 40, which is turnable about a horizontal axis D, is moved vertically upwards. At its upper end the flexible fabric 2 is fixed by cords 25 to a second shaft, a so-called spool 24. This serves to define a fixed gap opening between second shaft 24 and fabric 2. In this known winding device the fabric 2 has to bear the weight of the shaft 4 when winding up. This subjects the fabric 2 to tensile stress. Under adverse circumstances the fabric 2 may be damaged due to the load. Furthermore, during winding the diameter of the shaft 4 increases with the fabric 2 gradually being wound thereon. At a constant speed of rotation of the rotating shaft 4 this results in an accelerated movement of the fabric 2 during the winding process.

Over time various efforts have been made to compensate for the increasing diameter between shaft and fabric and the accompanying increase in speed during winding. DE 202 14 076 U1, for example, discloses a device for screening a room with an upper and a lower roller system. The difference in diameter between upper and lower winding element is offset by fixing means. In practice it is desirable to have winding devices in which additional elements, such as fixing means to offset the increasing diameter, are unnecessary.

Another winding device is described in GB 2 431 190 A. Here the fabric material 1 is arranged between two shafts 2 and 3, each of which is able to perform a translational and rotational movement. The adjustment of the size and position of the fabric 1 is effected by corresponding movement of the two shafts 2 and 3.

The object of the invention is to provide a cost-effective and universally applicable winding device of the simplest possible design for covering wall openings or windows, in which fabric is wound and unwound.

The above object is achieved by the device and a method which comprise the features of claims 1 and 11.

The winding device according to the invention comprises a roll-up cover element, a deflecting element of shaft-type design or formed only by a lower hem or lower fabric edge or longitudinal edge, and at least one raising and lowering device. The cover element additionally has an upper longitudinal edge, preferably provided parallel to the deflecting element. The lower longitudinal edge is either connected to the deflecting element or formed by it, so that the cover element can be rolled up or unrolled by a rotation of the deflecting element or the lower fabric edge or longitudinal edge about a horizontal axis. The raising and lowering device comprises at least one cord, wherein at least one free end of the cord is connected to the raising and lowering device. The cord is arranged so that it surrounds the cover element, so that the deflecting element or lower longitudinal edge is guided in the bend of the cord. The at least one cord can be guided in two opposite directions of movement relative to one another. According to one embodiment the cord can be connected to the upper longitudinal edge of the cover element.

In the context the term cord must be broadly interpreted in terms of its conceptual definition, as, for example, a chain-type structure or other deflectable connecting elements of elongated design may also be selected for the cord. Bands, tapes or even relatively wide sections of fabric may also be used for this purpose and should therefore be included in the selected term of cord.

As the deflecting element or lower longitudinal edge is arranged at the lowest point and is guided and suspended in a cord bend, the lower longitudinal edge or deflecting element is set in rotation by movement of the cord, thereby automatically rolling up the fabric or hanging. The deflecting element or lower longitudinal edge is set in rotation by the movement of the at least one cord in two opposite directions of movement relative to one another.

The at least one cord can thereby be guided at least approximately in parallel in two opposite directions of movement relative to one another, and simultaneously guides the

deflecting element or lower longitudinal edge and hence the rolling or unrolling cover element. The cover element is therefore set in rotation by the cord and the fabric or hanging is rolled up and down in the process. Optionally the cords may also run diagonally without compromising the functioning of the invention or otherwise limiting it. Thus in an advantageous alternative version of the invention the cords may optionally also be arranged in a V-shape, which for example can have advantages in terms of rolling up the cords and the space required for this. The variant selected will depend primarily on the installation conditions and available space as well as possibly the preferred winding speed ratio.

The winding device according to the invention for covering wall openings or windows may, for example, be applied to and effectively used in animal housing or greenhouses. The roll-up cover element can, for example, be formed by a fabric or by interconnected plastic slats or the like.

The deflecting element designed in shaft form could optionally have guide grooves or radial depressions or the like for the initial guidance of the cords. Since after a short rotation the rolled up cover element already surrounds the deflecting element or hem of the cover element, the cord no longer touches these grooves or radial depressions, so that they are unnecessary and may optionally be omitted. There is provision for numerous possible variations as regards the length and diameter of the deflecting element.

The width of the cover element and hence the length of the deflecting element are preferably defined by the width of the opening to be covered. Due to the arrangement of a plurality of adjacent cords spaced apart in parallel over the whole width of the cover element, widths of several metres can easily be covered without the deflection element sagging or bending. In any case there is no risk of such bending, as the lower longitudinal edge can be very light in weight. It is preferably not connected to a shaft and need not have any load-bearing properties, so there is no necessity for a robust and hence heavy design.

As already stated, at least at one of its free ends the at least one cord can be provided on the lifting and lowering device and in certain embodiments of the invention can be connected to the upper longitudinal edge of the cover element. The upper fabric edge or longitudinal edge of the cover element can be lowered or raised by releasing or raising the at least one cord.

During one winding or raising of the cord there takes place a relative movement of the two portions running in parallel, by which means is effected the winding of the winding element or deflection element and hence the rolling up and down of the cover element. At the same time the relative movement of the deflecting element or lower fabric edge or longitudinal edge is produced by an opposite movement of both sides of the cord.

The cover element has an upper and a lower longitudinal edge, preferably provided parallel to the deflecting element or forming the deflecting element. The longitudinal edges may additionally be provided with reinforcements for the purpose of stabilisation.

As already mentioned several times, the lower longitudinal edge of the cover element is connected to the deflecting element or itself forms the deflecting element, so that by a rotation of the deflecting element or lower longitudinal edge about a horizontal rotational axis the cover element can be rolled up at the deflecting element or lower longitudinal edge. The horizontally arranged axis thereby runs through the deflecting element. The connection between deflecting element (if present) and lower longitudinal edge of the cover element can be subject to numerous variations in design. For example, the connection may be affected by rivets, screw connections or adhesive bonding.

In a first of two design variants the raising and lowering device is a shaft. In this embodiment at least one free end of the cord is therefore provided at the shaft. If the shaft is now set into a rotating movement, in a first step the cord, and hence also the cover element, is released and the cover element is simultaneously rolled up at the deflecting element. When the cover element is completely rolled up, the movement of the deflecting element in a vertically upward direction is effected in a second step. In the context of the invention no limits are imposed on the user as regards the number of cords used. For example, a plurality of cords may be used with relatively long cover elements.

According to the second embodiment a cord pull is provided instead of a shaft. In this design variant guide rollers may be present to deflect the cord, for example from its vertical direction of movement to a horizontal direction of movement.

In the winding device according to the invention the synchronous speed of the winding speed with the releasing and raising speed of the fabric has proved advantageous. When at least one free end of at least one cord is fastened to a shaft provided above the cover element, for example, the winding speed of the cover element depends on the rolling-up

speed of the at least one cord which is necessary for winding the cover element and for producing the winding up and down rotation thereof.

The drive of the raising and lowering device, in particular the rotational movement of the shaft or the horizontal movement of a cord pull can optionally be produced by manual operation. On the shaft, for example, may be arranged a crank by means of which the user can effect the rotation of the shaft the horizontal movement of the cord pull.

Provision is further made for embodiments in which the drive of the raising and lowering device is produced by a drive unit. The drive unit may be a motor, for example an electric motor.

In the context of the invention there is the option of providing a plurality of cords with different functions. For example, at least a first cord and at least a second cord may be provided. Here the second cord may be provided for the raising and lowering of the upper longitudinal edge, while the first cord is provided for winding the cover element or for winding and raising or lowering the cover element. The cords may also be strength-optimised in terms of number, material and diameter. In this context as well particularly the term cord must be broadly interpreted in terms of its conceptual definition.

The first free end the second cord may, for example, be provided at the raising and lowering device, for example on a shaft, and its second free end at the upper longitudinal edge of the cover element. Both free ends of the first cord may, for example, be provided at the raising and lowering device, for example on a shaft.

Embodiments are also conceivable in which one free end of the first cord is provided at the raising and lowering device, for example on a shaft, and the second free end thereof at the upper longitudinal edge of the cover element, with the first cord surrounding the cover element. In addition in this embodiment one free end of the second cord is provided at the raising and lowering device, for example on a shaft, and the second free end thereof at the upper longitudinal edge of the cover element.

This therefore means that in the winding device the cover element can by rotation of the deflecting element or lower longitudinal edge of the cover element be wound up on the latter. In particular a largely complete winding up is effected. By raising the at least one first cord and / or the at least one second cord the rolled up cover element can be raised in addition.

At this point it should again be expressly emphasized that the deflecting element need not necessarily mean a rigid part or even a separate part of the winding device according to the invention. The deflecting element may also, for example, be formed by the bottom fabric hem or by the bottom edge of the fabric which, due to the linkage of the windable cords, rotates with the latter in a defined direction and in a loose winding, thereby winding or unwinding.

A particular advantage of the winding device according to the invention is its very safe handling, as the forces exerted are significantly less than in the winding devices previously known. Thus, for example, a hand accidentally caught in the winding device would not result in any injury, as the cords would slip through and the fabric would not be wound up further. In known systems a far greater winding force must be applied to the winding shaft, as this force can only be applied at one axial end and as otherwise the fabric cannot be wound to a length of, for example, up to 80 m or more. By contrast, the winding force in the winding device according to the invention is applied over the full width of the fabric or hanging.

For stabilising the winding device and / or cover element provision may furthermore be made for the at least one first cord to have a fixing or an additional guide by means of which the winding device or cover element is additionally stabilised in the event of a load on the cover element (for example due to wind or suction). This so-called wind safety device results in the higher operational safety of the device. This involves, for example, a connection between the lower deflection point of the cord and the ground or substrate, which limits the lateral deflection of the cover element. In particular the at least one cord is guided and / or fixed by a tensioning device. In this embodiment if necessary it is impossible to raise the rolled up cover element, or only after releasing the wind protection device. Additional devices for wind stabilisation can be reduced or done away with completely.

A further advantage of the winding device according to the invention arises when installations are interrupted, particularly when several adjacently arranged openings are to be covered. Such interruptions may be necessary in side walls, for example, due to exits, extensions or similar. In previous winding devices, because of lateral power transmission a new drive unit has to be placed after each interruption or a separate new winding device

provided after each interruption. In the winding device according to the invention the rotary action of the deflecting element or lower longitudinal edge is effected via the cover element, so this can be interrupted as often as desired without an additional drive unit being necessary.

The functions described are especially advantageous and economically feasible by using the device according to the invention with an optimised cord length. The optimum cord length varies depending on the affixing of the cord ends.

According to a preferred embodiment the optimum length of a first cord fastened by both ends to the raising and lowering system preferably corresponds to approximately three times the height of the cover element plus twice the distance between the upper longitudinal edge of the cover element in the fully unrolled state and the raising and lowering device. The raising and lowering device may, for example be a shaft or a deflection roller.

According to a further embodiment, in which the first cord is fastened by the first end to the raising

and lowering device and by the second end to the upper longitudinal edge of the cover element, the optimum cord length in a run of the cable around the deflection element is roughly twice the height of the cover element plus once the distance between the upper longitudinal edge of the cover element in the fully unrolled state and the raising and lowering device (e.g. shaft / deflection roller).

The length of the second cord can also be optimised. According to a preferred embodiment, the at least one second cord has a length corresponding to approximately the sum of once the height of the cover element and once the distance between the upper longitudinal edge of the fully unrolled cover element and the raising and lifting device.

It is further advantageous for operation if in the unrolled state of the cover element in each case the cord end releasing during opening is wound up roughly once corresponding to the height of the cover element (in the case of a shaft) or stretched over the deflection roller (cord pull system), i.e. when the working rope length of the at least one first and / or second cord is approximately equivalent to the height of the cover element when the cover element is fully unrolled.

It is evident to a person skilled in the art that possibly longer or shorter or otherwise

arranged working ropes can result in similar functions or in the partial achievement of the functions. The use of differing cord lengths therefore also falls within the meaning of the invention insofar as these guarantee the functionality of the invention.

The invention further relates to a method for winding up a winding device described above. The deflection element or the lower longitudinal edge of the cover element can be set into rotation by the movement of the at least one first cord in two opposite directions of movement relative to each other, with the cover element being rolled up on this by a rotation of the deflection element or lower longitudinal edge about a horizontally arranged axis. After the first rotation around the deflection element or around the lower longitudinal edge a roll of fabric is formed which is now set into rotation. The speed of this fabric roll is affected by the external diameter (circumference) thereof and the speed of the cord. As the cord speed is preferably the same as the raising-lowering speed of the upper longitudinal edge, the rotational speed is automatically adjusted to the cord speed.

By rotation of the deflection element in one direction of movement the cover element is fully wound onto this and is raised by raising the at least one first cord and / or the at least one second cord.

In the method according to the invention the winding up and down of the cover element is effected solely at the deflection element or at the lower longitudinal edge of the cover element. By contrast with traditionally known winding devices, therefore, no winding up of the cover element over the upper longitudinal edge takes place.

The functioning of the winding device according to the invention can therefore be summarised as follows: The upper fabric edge is lowered or raised by at least one cord or band. Here the at least one cord or band is provided on a raising and lowering device, for example a driven winding shaft.

The lower fabric edge or longitudinal edge, which if appropriate is provided with a stiffening element, is set into a rotating motion by at least a first circumferential cord or band. In particular the cords are so arranged that on one fabric side of the cover element they are released and on the other side are raised, so that the lowest point constitutes a bend.

The lowering of the fabric edge or longitudinal edge and the production of the rotary motion preferably occur at the same or a similar constant speed. Provision may further be

made for the wound up fabric to be raised by the cords with an appropriate length of the cords. The winding and unwinding of the fabric and the raising of the wound up fabric can therefore be effected using a single drive.

In the winding device according to the invention the power transmission for rotation, i.e. for the winding and unwinding of the fabric, is effected from outside on the fabric or on the lower fabric edge or longitudinal edge. The winding and unwinding speed of the fabric of the cover element is therefore generally always the same.

In the traditionally known winding devices, however, the power transmission for rotation is effected at one or both ends of the winding elements. The power must be transmitted over the full length, so that greater power is necessary. There is also the risk of twisting. At a constant speed of rotation the winding and unwinding speed of the fabric therefore keeps accelerating as the diameter increases. This produces a tension of the upper fabric edge, as this is lowered at constant speed. For this reason either two drive elements are needed - at the upper and at the lower fabric edge - or a compensating element must be used. Furthermore, when winding and unwinding these devices always show a height offset of the lower fabric edge.

By contrast with the traditionally know winding devices, the particular advantages of the winding device according to the invention are that no twisting of the shaft occurs. The winding device is largely unrestricted in the length and width of fabric used. Moreover no height offset occurs - i.e. due to the winding bend the lower longitudinal edge of the cover element is always at the same height when the upper longitudinal edge is lowered - and no bending of the shaft takes place. The weight is also irrelevant, since this can be regulated by the use of a higher number of cords or by the use of stronger cords.

Exemplary embodiments of the invention and the advantages thereof will be explained in more detail below with the aid of the attached figures. Other features, objectives and advantages of the present invention result from the following detailed description of a preferred embodiment of the invention, which serves as a non-restrictive example and makes reference to the attached drawings.

Figures 1a to 1d show in diagrammatic form the operating mode of an embodiment of the claimed winding device.

Figures 2a to 2d show in diagrammatic form the operating mode of a further embodiment

of the claimed winding device with shaft.

Figure 2e shows an embodiment of the claimed winding device with an additional wind protection device.

Fig. 2f shows an alternative version of a winding device with cords guided in a V-shape.

Figure 2g shows the alternative embodiment of the claimed winding device according to Figure 2f with an additional wind protection device.

Figures 3a to 3d show in diagrammatic form the operating mode of a further embodiment of the claimed winding device with cord pull.

Figures 4a to 4d show in diagrammatic form the operating mode of a further embodiment of the claimed winding device with first and second cords.

Figures 5a to 5d show in diagrammatic form the operating mode of a further embodiment of the claimed winding device with first and second cords.

Figure 6 shows the use of a winding device according to the invention for covering an interrupted opening.

Figures 7a to 7d show in diagrammatic form various embodiments of the winding device according to the invention with optimised cord lengths.

Identical reference numerals are used for identical or identically acting elements of the invention. For the sake of clarity, moreover, only reference numerals in the individual figures are shown which are necessary for the description of the relevant figure. The embodiments illustrated are simply examples of how the device according to the invention can be formed and do not constitute any conclusive restriction.

Figures 1a to 1d show in diagrammatic form the operating mode of a first embodiment of the claimed winding device.

Figure 1a shows a winding device 1 of the kind claimed. A side view A and a front view B are illustrated. The winding device 1 comprises a cover element 3 with an upper longitudinal edge 5 and a lower longitudinal edge 7. In terms of length the cover element 3 is designed so that when not rolled up on a deflecting element 9 it can partially or optionally fully cover the wall opening 11. The longitudinal edges 5 and 7 of the cover element 3 may have additional reinforcements. The lower longitudinal edge 7 is firmly connected to the deflecting element 9. The deflecting element 9 hangs between the cord portions 13 and 13' and is rolled up and unrolled in the cord bend of the portions 13 and

13' which move in opposite directions. A bend is formed at the lower deflection point of the cord portions, so that the cord 13 brings about the rotational movement of the deflecting element 9. The cord 13 or 13' is guided in parallel to a vertically running axis Z. The direction of movement of the cord 13 during downward guidance is indicated by the arrow direction Y in Figure 1a. The cord 13 or 13' is connected to a connection point 17 by the upper longitudinal edge 5 of the cover element 3.

Figures 1b to 1c show successively the process of transferring the winding device 1 from the open position shown in Figure 1a, in which the wall opening is covered by the fully unrolled cover element 3, to a home position corresponding to Fig. 1c. In the home position according to Fig. 1c the cover element 3 is in the rolled-up state, so that the wall opening is open and hence air exchange can take place between the inside of the building and the outside air.

In Figure 1b the winding device 1 is only partially opened. The cover element 3 is already partially rolled up at the deflection element 9. In Figure 1b the wall opening 11 is still only covered by the cover element 3 in the lower region. The upper longitudinal edge 5 is guided in parallel to a horizontally positioned axis (not shown) in the direction of movement indicated by the arrow Y in Figure 1a.

The rotational speed of the deflection element 9 does not necessarily remain constant during the movement of the upper longitudinal edge 5 in the direction of movement indicated by the arrow Y in Figure 1a, but possibly becomes slower due to the increasing diameter of the deflection element 9 with the cover element 3 wound thereupon.

The design according to the invention causes an automatic adjustment of the rotational speed of the deflecting element 9 to the diameter of the deflecting element 9 with cover element 3, even if this is changed, for example by dirt, creasing or cold.

Figure 1c shows the cover element 3 in the fully rolled up state on the deflecting element 9. The wall opening 11 is fully uncovered. Starting from this state the directions of movement of the cords 13 and 13' can now be guided against the previous direction of movement, by means of which the open state of the winding device 1 can be restored, as shown in Figure 1. In order to transfer the winding device from the home position shown in Fig. 1c to the position shown in Fig. 1d, the direction of movement of the cords is not retained, but the releasing cord becomes the raising cord. As a result of this the deflecting

element with the cover element is raised in the rolled-up state. It is conceivable that the transfer into the position shown in Fig. 1d can also be effected from another position of the winding device, for example from a half- opened position according to Fig. 1b.

Figures 2a to 2d show in diagrammatic form the operating mode of a further embodiment of the claimed winding device 1 with a shaft 19.

The structure of the exemplary embodiment can be seen from Figure 2a. The free ends 23 and 25 of the cord 13 or 13' are provided on a shaft 19. The shaft is set into rotation by a motor 21. Both free ends 23 and 25 are firmly connected to the shaft 19. In the region of the first free end 23 working cord 27 is provided at the shaft 19, so that by unrolling the working cord 27 from the shaft 19 a downward movement of the cord 13 can be produced. By analogy with the exemplary embodiment according to Figures 1a to 1d the cord 13 or 13' is connected to a connecting point 17 by the upper longitudinal edge 5 of the cover element 3.

By analogy with Figures 1a to 1c, a rolling up of the cover element 3 is effected at the deflecting element 9, as shown in Figure 2b to 2c.

In Figure 2b the winding device 1 is still only partially opened. The shaft 19 is in the rotating state, so that the working cord 27 is unwound from the region of the first free end 23, is guided further by the deflecting element 9, and subsequently provided in the region of the second free end 25. The rotational direction of the shaft 19 can be changed by the motor 21, so that the working cord 27 can again be provided in the region of the first free end 23. The unwinding of the working cord 27 is accompanied by a movement of the upper longitudinal edge 5 in the direction of the arrow Y indicated in Figure 1a, by means of which the cover element 3 is rolled up at the deflecting element 9.

By analogy with Figures 1c to 1d there follows, as shown in Figure 2c to 2d, the raising of the deflecting element 9 with the help of the power transmission from the motor 21 to the shaft 19.

The fixing of the cord 13 or 13' to the shaft means that a further deflection of the cord 13 from the state shown in Figure 2c is avoided, as at this moment the cord 13 is fully unrolled and is not released further but rolled up by the further rotation of the shaft. By this means the rolled-up cover element 3 is raised upwards when the two cords 13 and 13' are raised.

Figure 2e shows an embodiment according to the invention with additional guidance of

the cord 13, 13'. In particular the cord 13, 13' is stabilised by a tensioning device 30 at the lowest point of the cord 13, 13'. By this means the cord 13, 13', in addition to its previous functions, acts as stabilisation of the winding device or cover element 3 if, for example, wind loads or suction loads should occur.

Figure 2f shows in diagrammatic form the operating mode of a further embodiment of the claimed winding device 1 with shaft 19. The free ends 23 and 25 of the cord 13 or 13' are provided on a shaft 19. The shaft is set into rotation by a motor 21. Both free ends 23 and 25 are firmly connected to the shaft 19. In the region of the first free end 23 the so-called working cord 27 is provided on the shaft 19, so that by unwinding the working cord 27 from the shaft 19 a downward movement of the cord 13 can be brought about. By analogy with Figures 1a to 1c the unrolling of the cover element 3 on the deflecting element 9 is effected, as shown in Figure 2b to 2c.

In this variant the cords 13 and 13' are arranged in a V-shape, clearly illustrating that the cords need not necessarily run in a parallel arrangement which, though appropriate and practical, can just as well follow another pattern.

Figure 2g shows the embodiment of the winding device according to the invention according to Figures 2e to 2f with the additional guidance of the cord 13, 13' by a tensioning device 30' in the cord bend.

Figures 3a to 3d show in diagrammatic form the operating mode of a further embodiment of the claimed winding device 1 with cord pull.

In the embodiment shown the winding and unwinding of the cover element 3 on the deflecting element 9 and the raising and lowering of the deflecting element 9 are controlled via cord pull. The cord pull comprises several deflection rollers 28 and a cord pull 29. The cords 13 and 13' are guided over the deflection rollers 28. In the exemplary embodiment shown the part of the cord 13 which carries out the downward movement is turned anti-clockwise through 270° by the left-hand one of the two deflection rollers 28, and guided further.

In the exemplary embodiment the part of the cord 13' which carries out the upward movement is also guided further by the left-hand one of the two deflection rollers 28. However the further guidance is effected in the opposite direction to the further guidance of the cord 13. The change from the releasing cord to the raising cord, which is necessary

for the change from Fig. 3c to Fig. 3d, is effected by the right-hand deflection roller 28.

As regards the alternative version with cord pull, in practice it is conceivable to have numerous variations which can vary in terms of the number and position of the deflection rollers 28 used and of the cord pull 29. Operation of the cord pull can be manual, but can also be carried out by a motor.

By analogy with Figures 1b and 1c as well as 2b and 2c, Figures 3b to 3c show the step-by-step process in transferring the winding device 1 from an opened position to a home position.

By analogy with Figures 1c to 1d as well as Figures 2c to 2d, Figures 3c to 3d show the raising of the deflection element 9.

Figures 4a to 4d show in diagrammatic form the operating mode of a further embodiment of the claimed winding device 1 with first cords 13 and 13' and second cords 31.

The free ends 23 and 25 of the first cord 13 or 13' are firmly connected to the shaft 19, as shown in Figures 2a to 2d. In addition second cords 31 are present, in which one free end is firmly attached to the shaft 19 and the second free end is firmly attached to the upper longitudinal edge 5 of the cover element 3.

Because of this embodiment according to the invention a connection point 17, as shown for example in the exemplary embodiment in Figures 1a to 1d, can be dispensed with.

By analogy with Figures 1b, 1c and 2b, 2c as well as 3b, 3c, Figures 4b to 4c show the step-by-step process in transferring the winding device 1 from an opened position to a home position.

By analogy with Figures 1c to 1d as well as to Figures 2c to 2d and to Figures 3c to 3d, Figures 4c to 4d show the raising of the deflection element 9.

Figures 5a to 5d show in diagrammatic form the operating mode of a further embodiment of the claimed winding device 1 with first cords 13 and 13' and second cords 31. One free end 23 of the first cord 13' is firmly connected to the shaft 19. The second free end 25 of the first cord 13 is firmly connected to the upper longitudinal edge 5. One free end of the second cord 31 is firmly connected to the shaft 19. The second free end of the second cord 31 is firmly connected to the upper longitudinal edge 5.

By analogy with the previous Figures labelled "b" and "c", Figures 5b to 5c show the step-by-step process in transferring the winding device 1 from an opened position to a home

position.

By analogy with the previous figures labelled "c" and "d", the raising of the deflection element 9 is shown in Figures 5c to 5d.

At this point it should be emphasised that the deflection element 9 need not necessarily mean a rigid part or even a separate part of the winding device 1 according to the invention. The deflection element 9 may, for example, also be formed by the bottom fabric hem or by the bottom edge of the fabric, which by the linkage of the windable cords rotates with these in a defined direction and in a loose winding, thereby winding or unwinding.

Figure 6 shows the use of a winding device 1 according to the invention for covering an interrupted opening. For example, the winding device 1 is interrupted by a door or similar interruption 50 in the region of the cover element 3. With the use of several cords 13, 13' distributed over the cover element 3 the function can, by analogy with Figures 1 and 2, be performed by means of a drive unit despite the interruption 50.

The function of the other reference numerals correspond to the features already described in Figures 1 to 5 and will not therefore be explained again in detail.

Figures 7a to 7d show in diagrammatic form various embodiments of the winding device 1 according to the invention with optimised cord lengths.

In the embodiments shown in Figures 7a and 7b both cord ends of the cords 13, 13' are affixed to the raising / lowering device, for example to a shaft 19 (Fig. 7b) or to a cord pull 29 (Fig. 7a). The optimum cord length of the cord 13, 13' for achieving the functions corresponds approximately to the sum of three times the height H of the cover element 3 and twice the distance M between the upper longitudinal edge 5 of the unrolled cover element 3 and the raising / lowering device.

Fig. 7c shows that one cord end is affixed to the raising / lowering device in the form of a shaft 19 and the other cord end is affixed to the upper longitudinal edge 5 of the cover element 3. Here the cord 13,13' surrounds the cover element 3. By the affixing of one of the cord ends to the upper longitudinal edge 5, an optimised cord length of approximately twice the height H of the cover element 3 plus once the distance M between the upper longitudinal edge 5 of the cover element 3 in the unrolled state and the raising/lowering device is sufficient.

The exemplary embodiment according to Figure 7d shows the optimised cord length of a

second cord 31. Here one cord end is affixed to the shaft 19 of the raising / lowering device and the other cord end is affixed to the upper longitudinal edge 5 of the cover element 3. Here the cord 31 does not surround the cover element 3, but is guided directly to the upper longitudinal edge 5. The optimum cord length of the cord 31 is roughly the sum of once the height H of the cover element 3 and once the distance M between the upper longitudinal edge 5 of the cover element 3 in the unrolled state and the raising / lowering device.

All the representations of Figures 7a to 7d also show the advantageous working cord length 27. The extended (with rope pull system) or rolled-up (with shaft) working cord length 27 in the illustrated state of the winding device 1, in which the cover element 3 is fully unrolled and covers the opening to be covered, should be roughly equivalent to the height H of the cover element 3.

The invention was described with reference to a preferred embodiment. It is, however, conceivable to one skilled in the art that modifications or variations of the invention may be made without departing from the scope of the following claims.

List of reference numerals

1	winding device
3	cover element
5	upper longitudinal edge
7	lower longitudinal edge
9	deflection element
1	wall opening
13	cord in downward movement
13’	cord in upward movement
17	connection point of cord and upper longitudinal edge
19	shaft
21	motor
23	first free end of first cord
25	second free end of second cord
27	working cord
28	deflection roller
29	cord pull
30	tensioning device
30’	tensioning device
31	second cord
50	interruption

A side view winding device

B front view winding device

X first vertical direction of movement

Y second vertical direction of movement

Z vertically running axis

PATENTKRAV

1. Opviklingsindretning (1) til dækning af vægåbninger (11) eller vinduer med et oprulleligt overdækningselement (3), et vendeelement (9) og mindst en løfte- og sænkeindretning, hvor

- overdækningselementet (3) udviser en øvre og en nedre længdekant (5, 7),
- overdækningselementets (3) nedre længdekant (7) er forbundet med vendeelementet (9) eller danner vendeelementet (9), således at overdækningselementet (3) ved en rotation af vendeelementet (9) hhv. den nedre længekant (7) om en horisontalt anbragt akse kan oprulles på vendeelementet (9) hhv. på overdækningselementets (3) nedre længdekant (7),
- opviklingsindretningen (1) omfatter mindst et tov (13, 13'), hvoraf mindst en fri ende (23, 25) er forbundet med løfte- og sænkeindretningen, hvor tovet (13, 13') er anbragt således, at det griber fat om overdækningselementet (3), således at vendeelementet (9) hhv. overdækningselementets (3) nedre længdekant (7) er styret i tovbøjningen,
- hvor løfte- og sænkeindretningen er en aksel eller et tovtræk, og hvor for det første vendeelementet (9) hhv. overdækningselementets (3) nedre længdekant (7) ved en rotation af akslen eller en horisontal bevægelse af tovtrækket sættes i en rotation som følge af bevægelsen af det mindst ene tov (13, 13', 31) i to i forhold til hinanden modsatte bevægelsesretninger, og hvorved for det andet den øvre længdekant samtidigt løftes og/eller sænkes ved sænkning og/eller løftning af mindst et tov (13, 13', 31).

2. Opviklingsindretning ifølge krav 1, hvor der er tilvejebragt mindst et første tov (13, 13') og mindst et andet tov (31), hvor det første tov (13, 13') styrer vendeelementet (9) hhv. overdækningselementets (3) nedre længdekant (7) i to i forhold til hinanden modsatte bevægelsesretninger, og

- det første tov (13, 13') er tilvejebragt til opvikling af overdækningselementet (3) hhv. overdækningselementets (3) nedre længdekant (7) eller til opvikling af overdækningselementet (3) hhv. den nedre længdekant (7) og løftning hhv. sænkning af det oprullede overdækningselement (3), og
- det andet tov (31) er tilvejebragt til løftning og sænkning af overdækningselementets (3) øvre længdekant (5).

3. Opviklingsindretning ifølge krav 2, hvor

- det første tov (13, 13') er forbundet med løfte- og sænkeindretningen med begge fri ender (23, 25), og
- det andet tov (31) er forbundet med løfte- og sænkeindretningen med sin første fri ende og med overdækningselementets (3) øvre længdekant (5) med sin anden fri ende.

4. Opviklingsindretning ifølge krav 2, hvor

- det første tov (13, 13') er anbragt på løfte- og sænkeindretningen med sin første fri ende (23) og på overdækningselementets (3) øvre længdekant (5) med sin anden fri ende (25), og
- det andet tov (31) er anbragt på løfte- og sænkeindretningen med sin første fri ende og på overdækningselementets (3) øvre længdekant (5) med sin anden fri ende.

5. Opviklingsindretning ifølge et af de foregående krav, hvor overdækningselementet (3) ved rotation af vendeelementet (9) hhv. overdækningselementets (3) nedre længdekant (7) kan opvikles på dette og ved løftning af det mindst ene første tov (13, 13') og/eller det mindst ene andet tov (31) kan løftes.

6. Opviklingsindretning ifølge et af de foregående krav, hvor det mindst ene tov (13, 13') er styret og/eller fikseret ved hjælp af en spændeindretning (30, 30').

7. Opviklingsindretning ifølge et af de foregående krav, hvor det mindst ene tov (13, 13') har en længde, der svarer til omtrent summen af tre gange overdækningselementets (3) højde (H) og to gange afstanden (M) mellem det fuldstændigt udrullede overdækningselements (3) øvre længdekant (5) og løfte- og sænkeindretningen eller til omtrent summen af to gange overdækningselementets (3) højde og en gange afstanden (M) mellem det fuldstændigt udrullede overdækningselements (3) øvre længdekant (5) og løfte- og sænkeindretningen.

8. Opviklingsindretning ifølge et af kravene 2 til 7, hvor det mindst ene andet tov (31) har en længde, der svarer til omtrent summen af en gange overdækningselementets (3) højde (H) og en gange afstanden (M) mellem det fuldstændigt udrullede overdækningselements (3) øvre længdekant (5) og løfte- og sænkeindretningen.

9. Opviklingsindretning ifølge et af de foregående krav, hvor tovets (13, 31) arbejdstovlængde (27) ved fuldstændigt udrullet overdækningselement (3) svarer til cirka overdækningselementets (3) højde (H).

10. Opviklingsindretning ifølge et af de foregående krav, hvor tovet (13, 13') er forbundet med overdækningselementets (3) øvre længdekant (5).

11. Fremgangsmåde til opvikling af en opviklingsindretning (1) til dækning af vægåbninger (11) eller vinduer med et oprulleligt overdækningselement (3), et vendeelement (9) og mindst en løfte- og sænkeindretning, hvor overdækningselementet (3) udviser en øvre og en nedre længdekant (5, 7), og hvor overdækningselementets (3) nedre længdekant (7) er forbundet med vendeelementet (9) eller danner vendeelementet (9), og hvor opviklingsindretningen (1) omfatter mindst et tov (13, 13'), hvoraf mindst en fri ende (23, 25) er forbundet med løfte- og sænkeindretningen, hvor tovet (13, 13') er anbragt således, at det griber fat om overdækningselementet (3), således at vendeelementet (9) hhv. den nedre længdekant (7) er styret i tovbøjningen, hvor løfte- og sænkeindretningen er en aksel eller et tovtræk, og hvor for det første vendeelementet (9) hhv. den nedre længdekant (7) ved en rotation af akslen eller en horisontal bevægelse af tovtrækket sættes i en rotation som følge

af bevægelsen af det mindst ene tov (13, 13', 31) i to i forhold til hinanden modsatte bevægelsesretninger, hvor overdækningselementet (3) som følge af vendeelementets (9) hhv. den nedre længdekants (7) rotation om en horisontalt anbragt akse oprulles på vendeelementet (9) hhv. på den nedre længdekant (7), og hvorved for det andet den øvre længdekant (7) samtidigt løftes og/eller sænkes ved sænkning og/eller løftning af mindst et tov (13, 13', 31).

12. Fremgangsmåde ifølge krav 11, hvor opviklingsindretningen omfatter et andet tov (31), der er anbragt på løfte- og sænkeindretningen med sin første fri ende og på overdækningselementets (3) øvre længdekant (5) med sin anden fri ende, og hvor det sænkende tov (13, 31) ved en fuldstændig nedrulning hhv. sænkning og ved en videre drejning af akslen eller videre trækning af tovtrækket bliver til tovet, der løfter det opviklede overdækningselement (3).

Fig. 1a

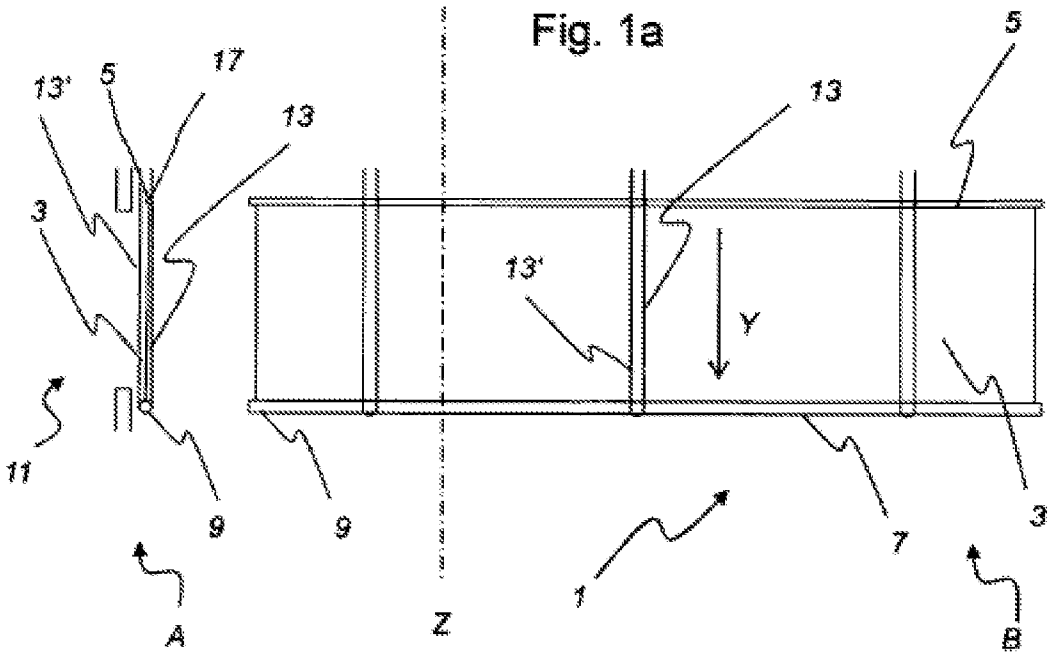

Fig. 1b

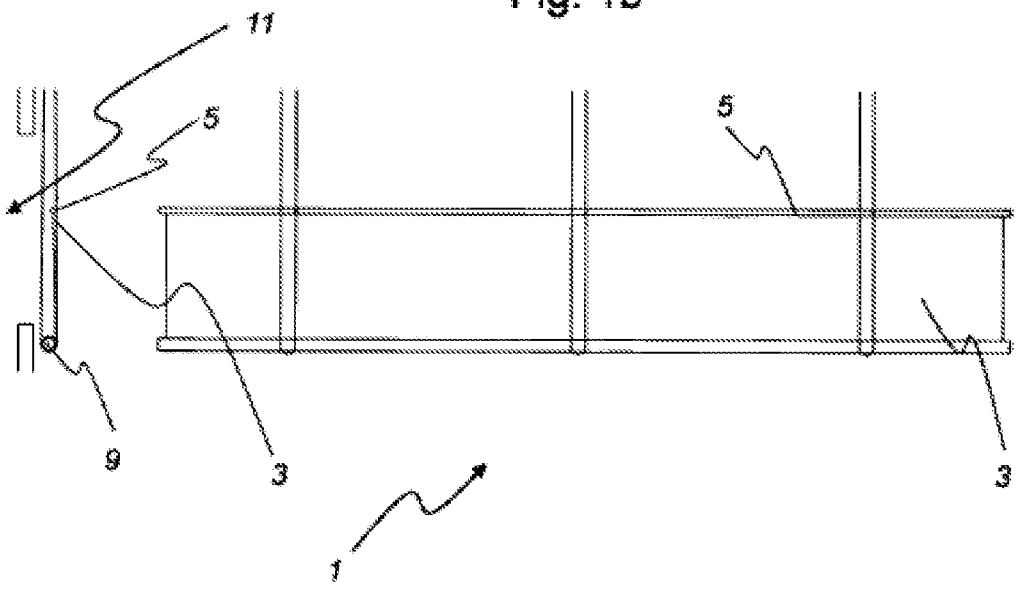

Fig. 1c

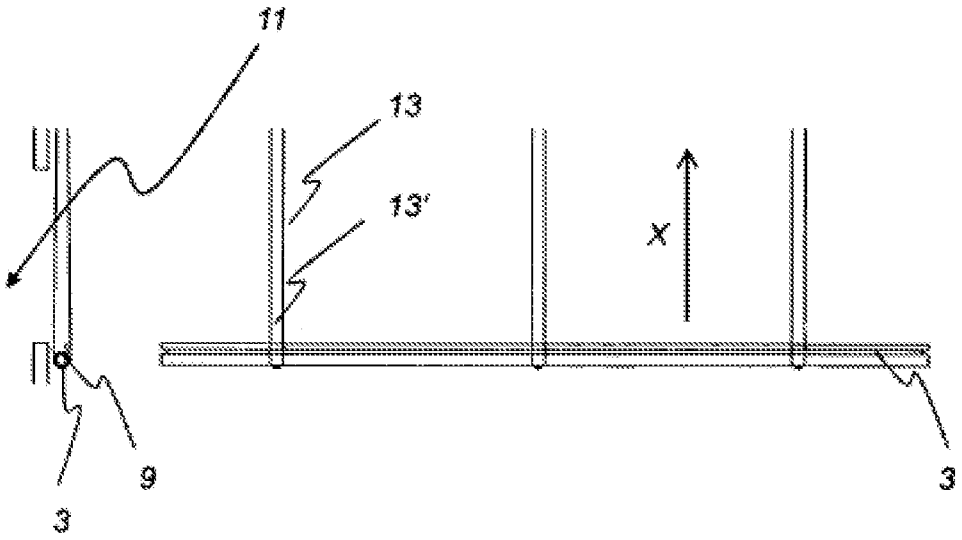

Fig. 1d

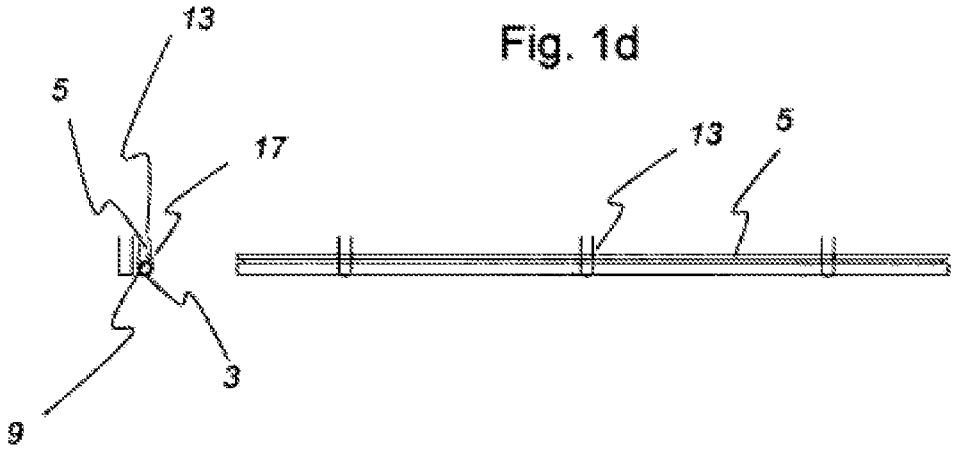

Fig. 2a

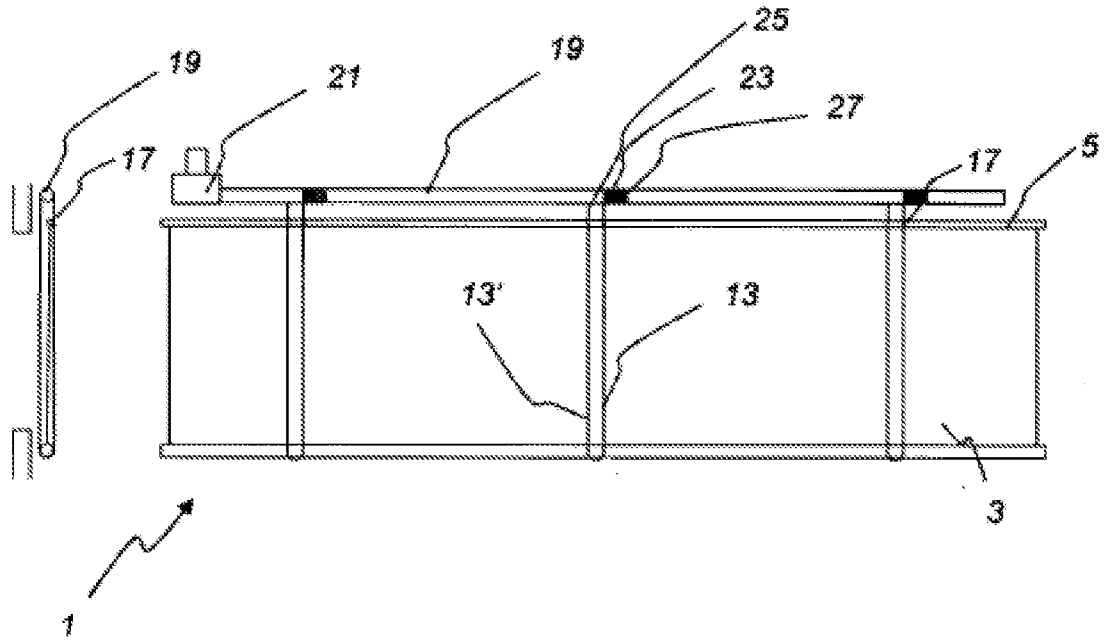

Fig. 2b

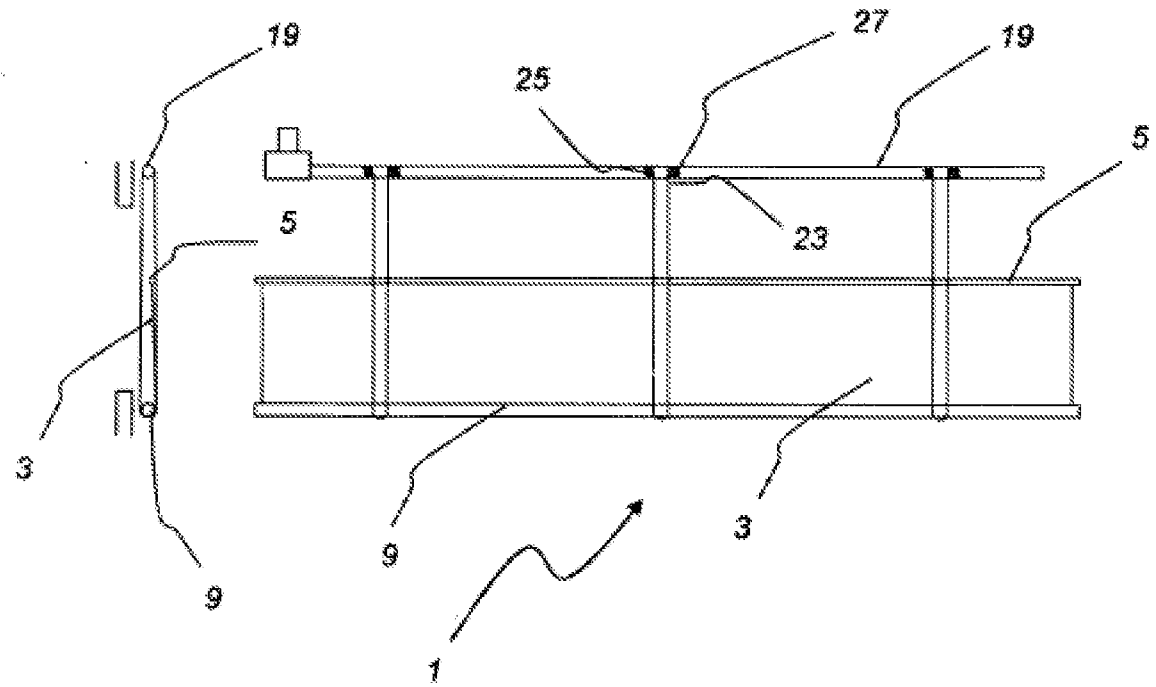

Fig. 2c

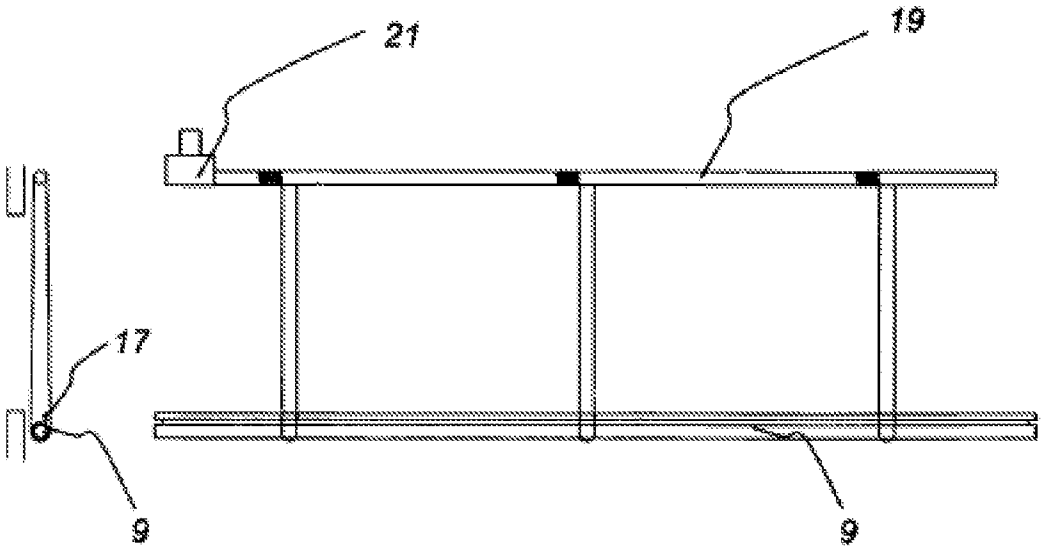

Fig. 2d

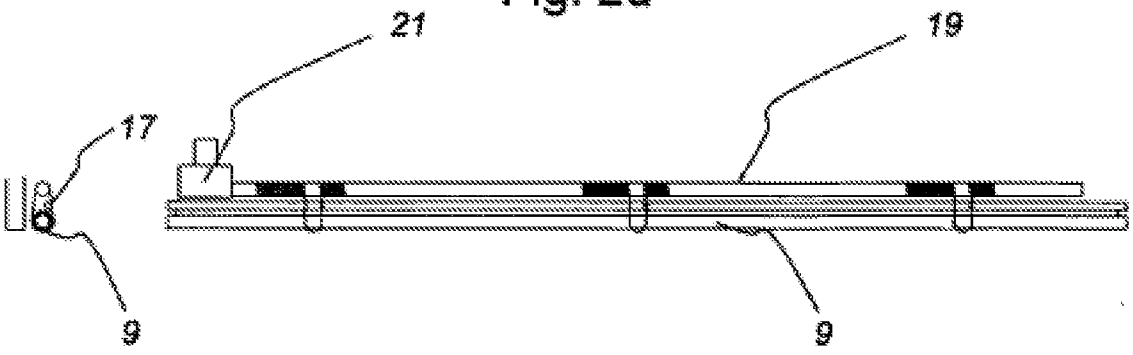

Fig. 2e

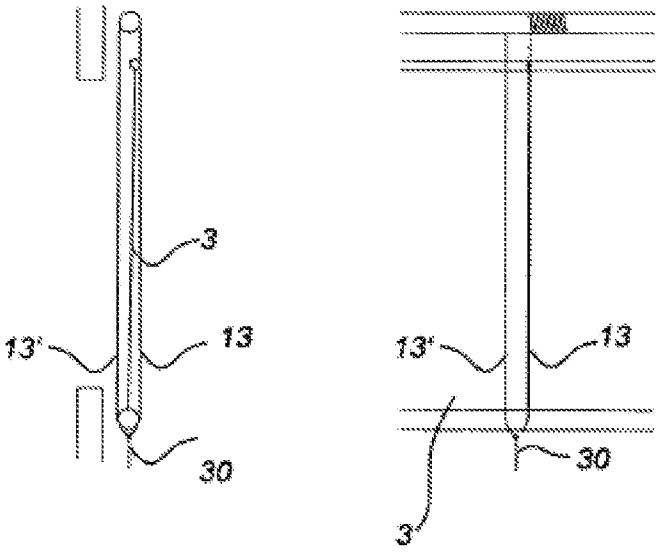

Fig. 2f

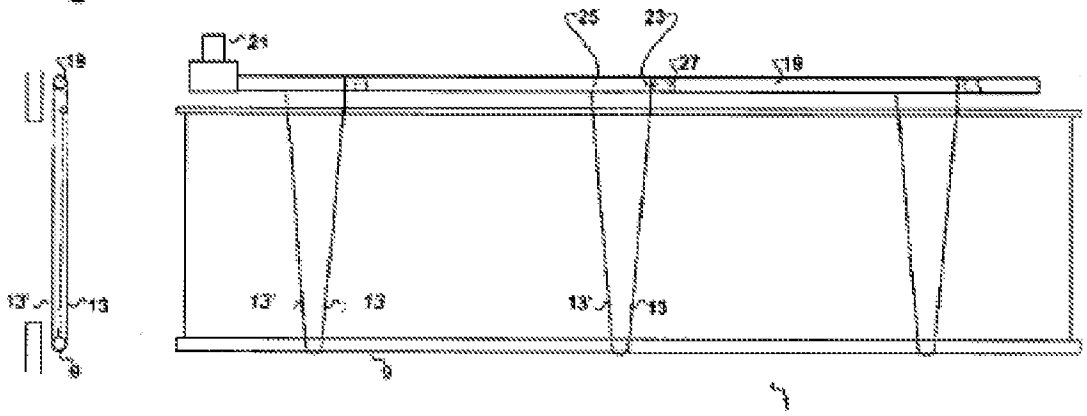
19
21
25
23
27
19
13'
13
13'
13
13'
13
9
7

Fig. 2g

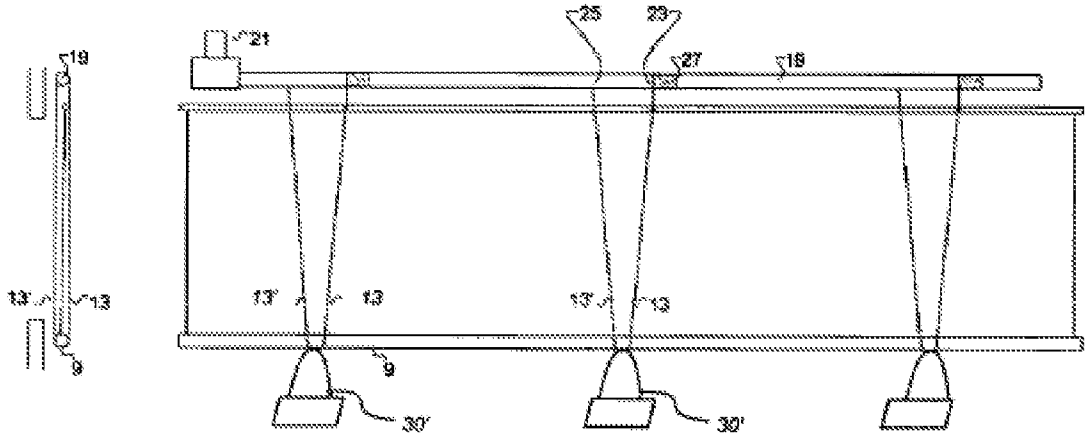
19
21
25
23
27
19
13'
13
13'
13
13'
13
9
30'
30'

Fig. 3a

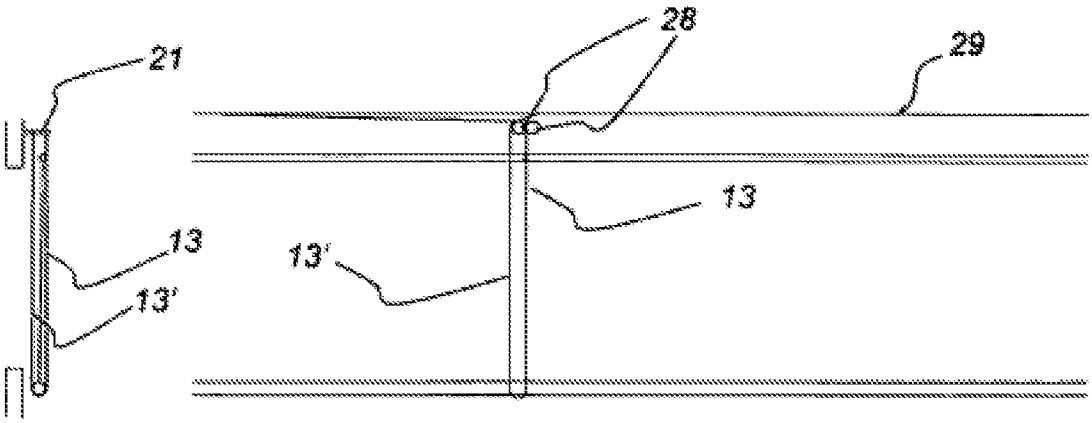

Fig. 3b

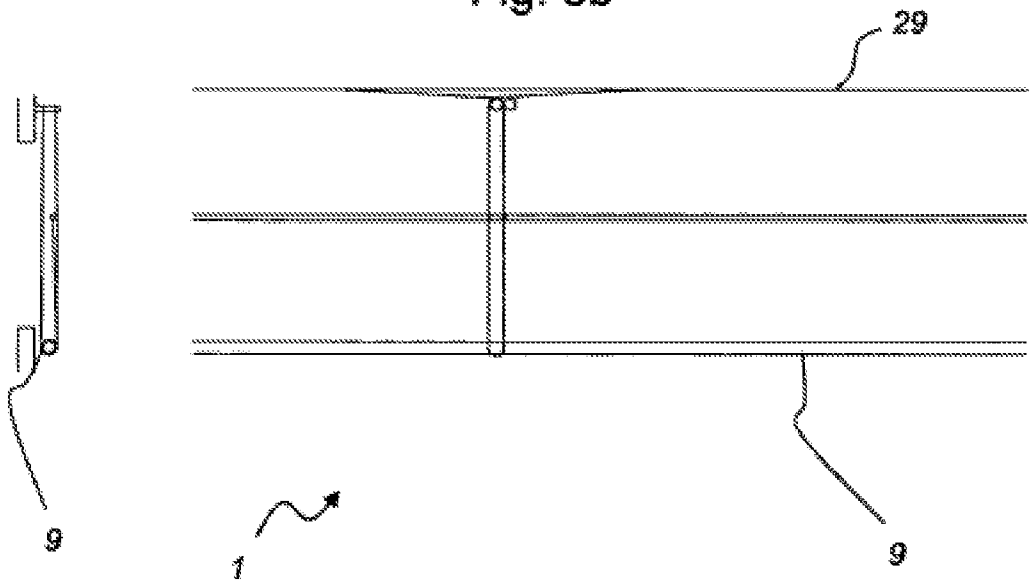

Fig. 3c

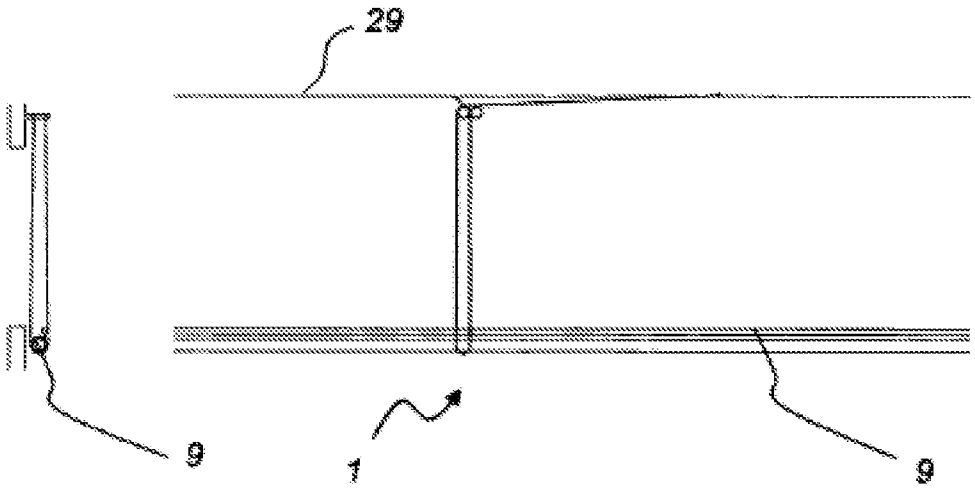

Fig. 3d

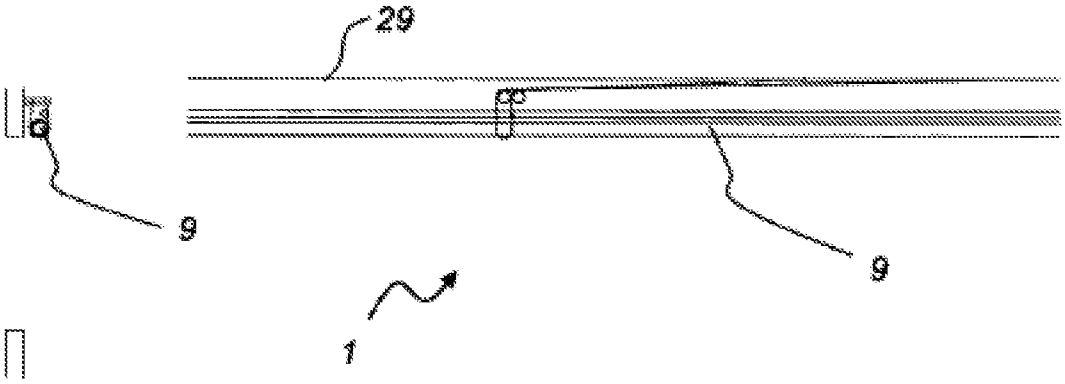

Fig. 4a

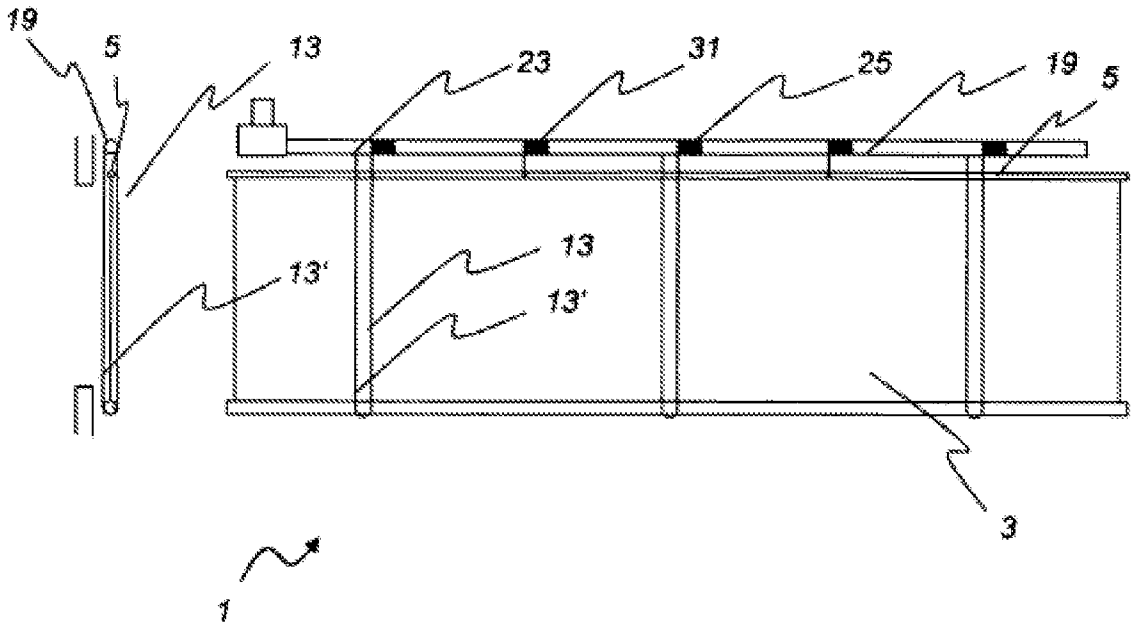

Fig. 4b

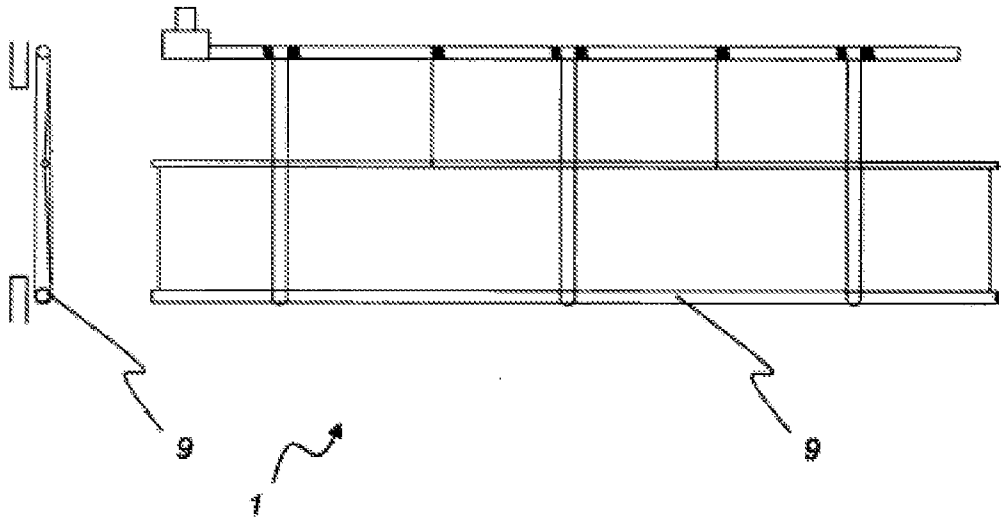

Fig. 4c

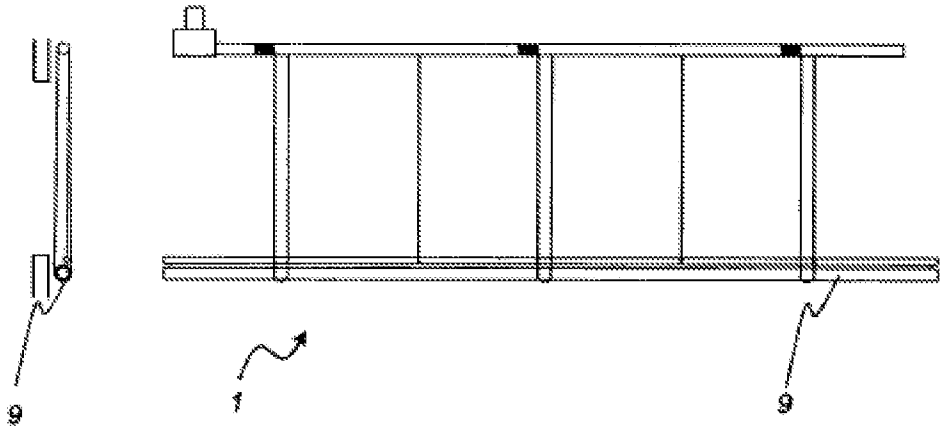

Fig. 4d

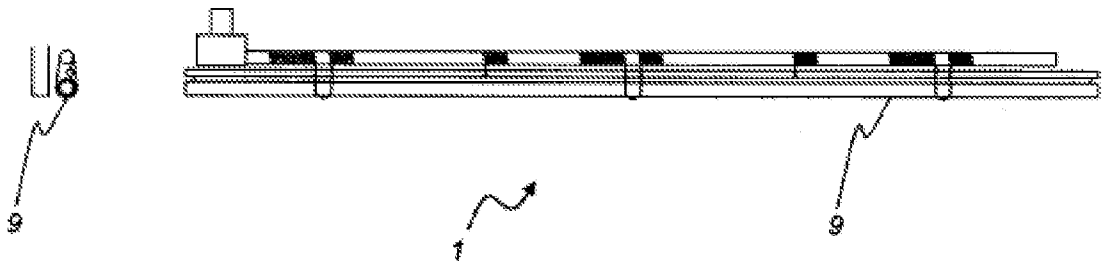

Fig. 5a

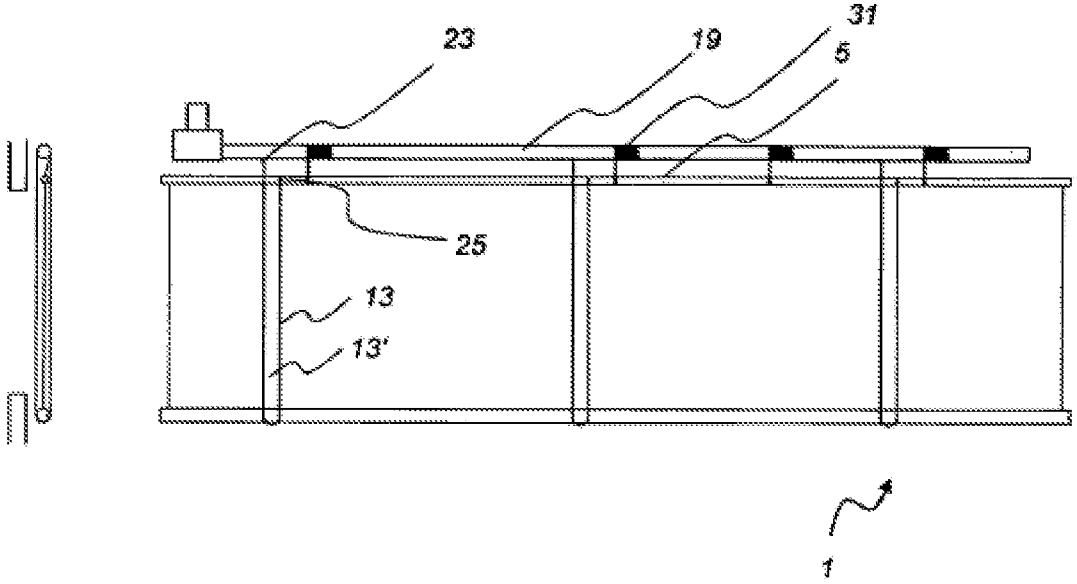

Fig. 5b

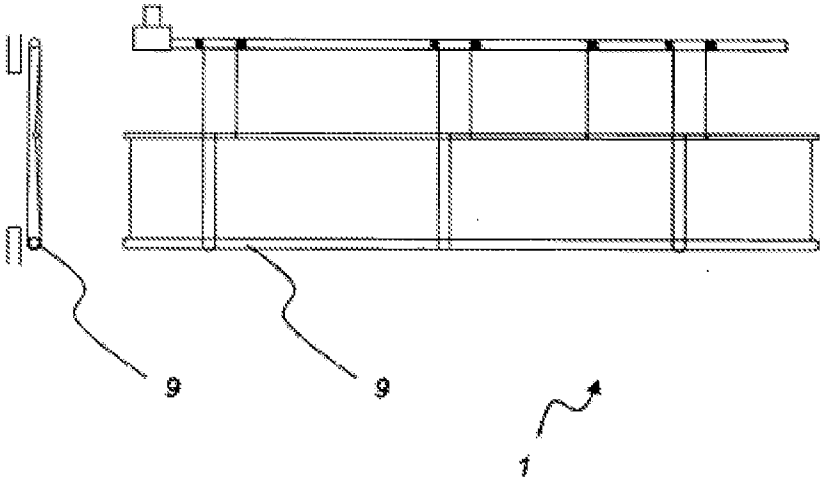

Fig. 5c

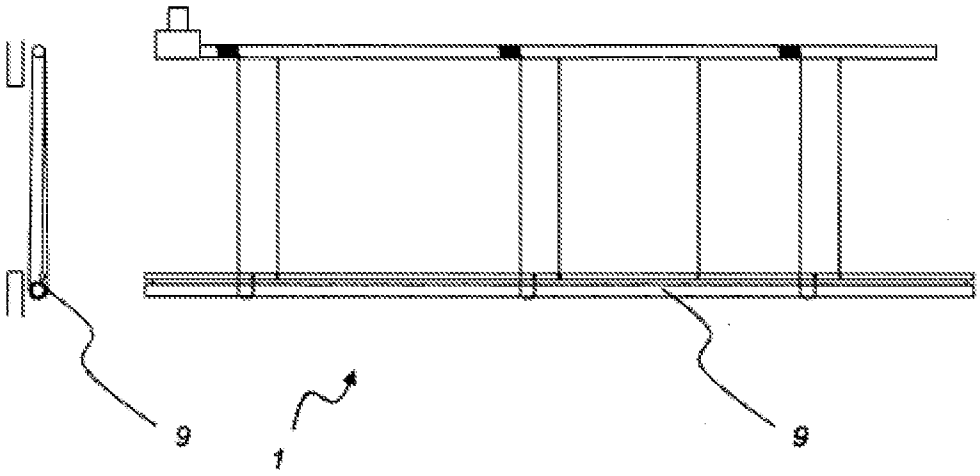

Fig. 5d

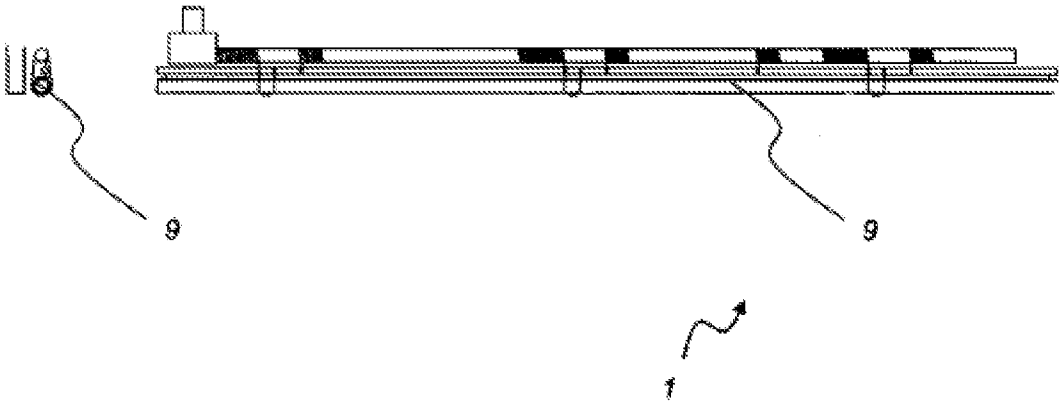

Fig. 6

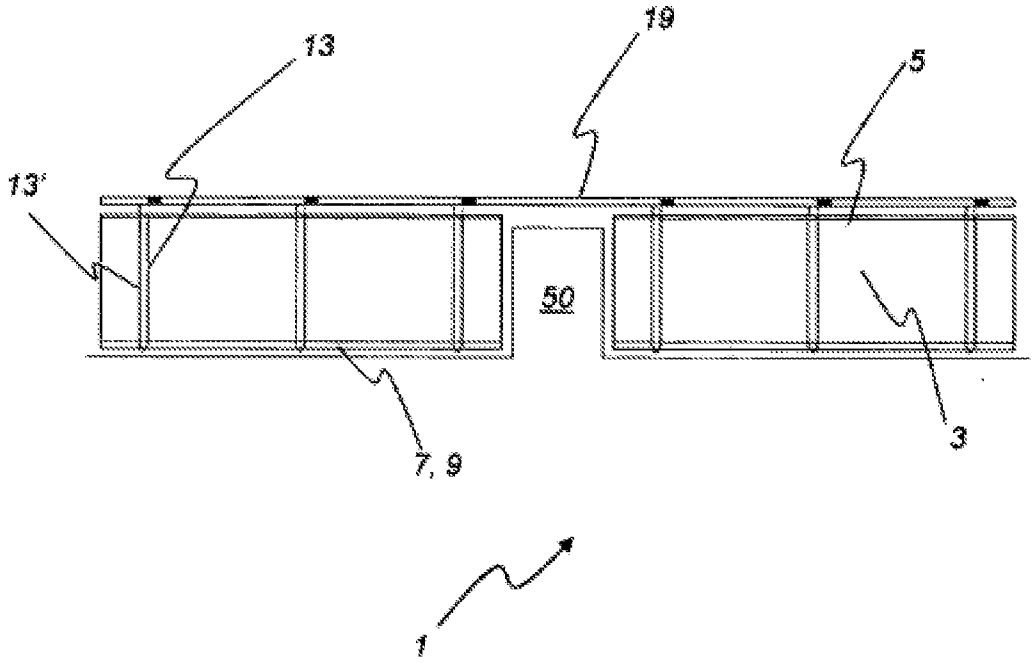

Fig. 7a

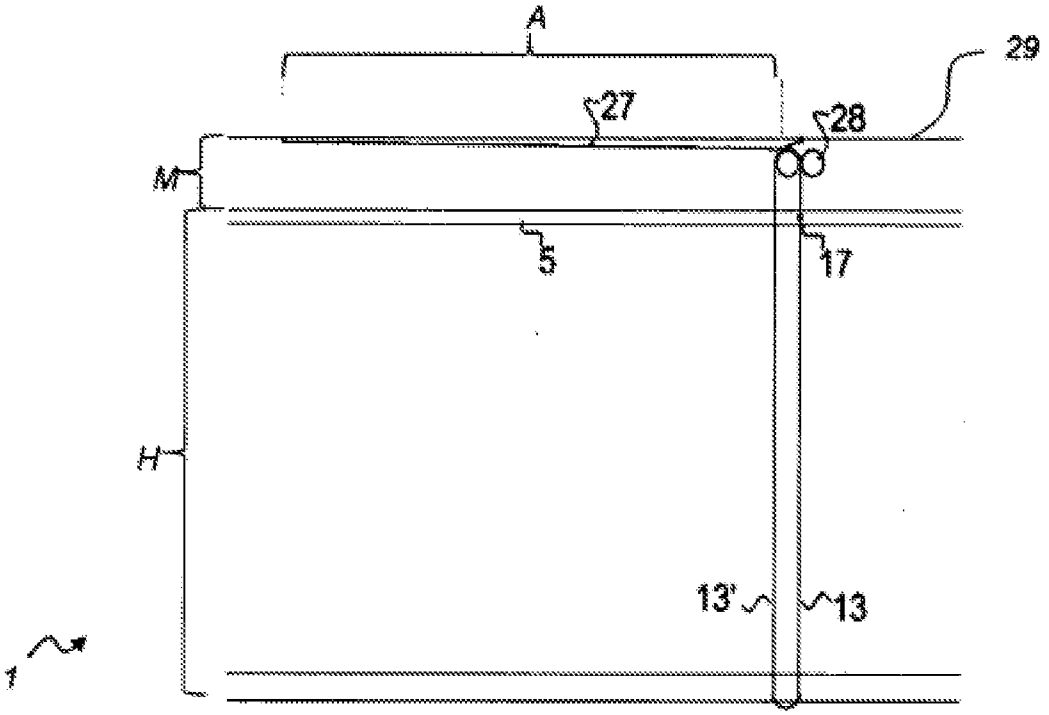

Fig. 7b

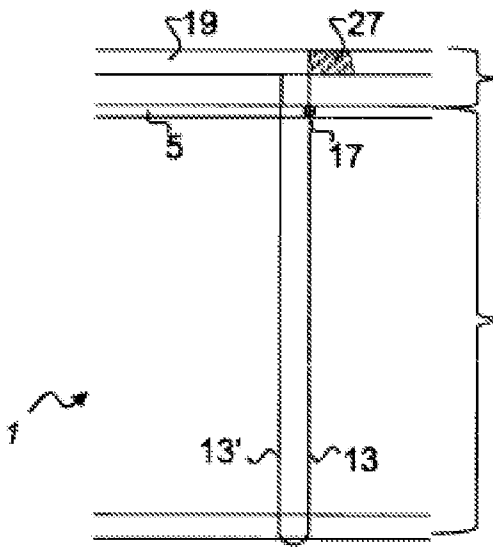

Fig. 7c

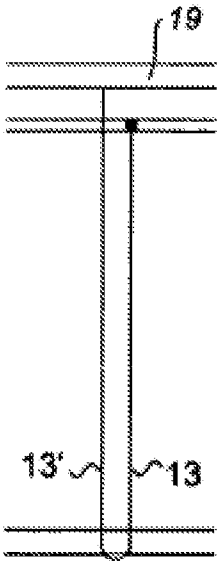

Fig. 7d