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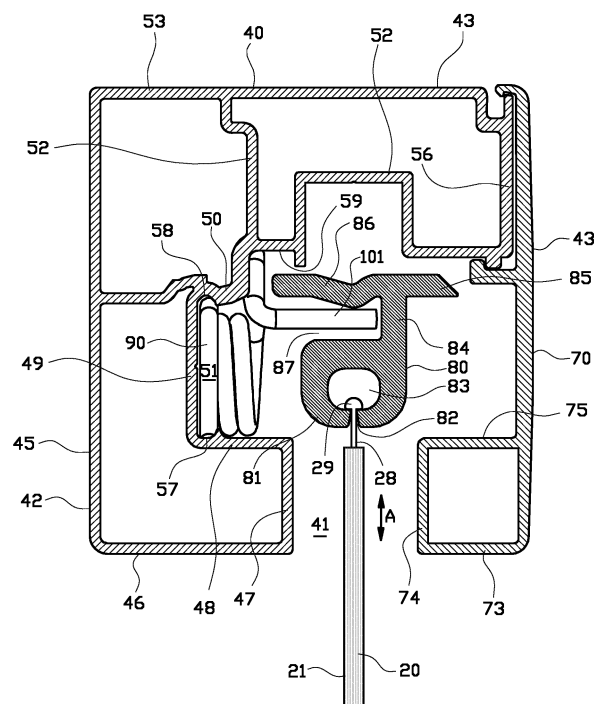
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(54) **RETRACTABLE SCREEN**

(57) Retractable screen (1) comprising an elongated casing and two elongated posts (40) extending parallel from the casing, wherein the casing has been provided with a housing in which an elongated roll (7) has been bearing mounted so as to be rotatable about its longitudinal axis, wherein a screen (20) has been attached to the roll (7), which screen (20) can be rolled up around the roll (7), wherein the posts (40) have been provided with an elongated base profile (40, 42) and an elongated screen guiding profile (80) that can be moved relative to the base profile (40, 42), wherein the movement of the screen guiding profile (80) in its transverse direction, is guided parallel to the main plane of the screen (20), wherein the screen guiding profile (80) has been provided with a mouth (81) defining an elongated slit (24, 82) in which a longitudinal side of the screen (20) has been accommodated so as to be guided down from the housing, wherein torsion springs (80, 90) distributed all along the length of the screen guiding profile (80) connect the latter to the base profile (40, 42) under tension, wherein the torsion springs (80, 90) comprise a metal wire in which several spring windings (91) have been formed that merge into a first spring arm (92) engaging onto the screen guiding profile (80).



**FIG. 3A**

## Description

### BACKGROUND OF THE INVENTION

**[0001]** The invention relates to a retractable screen comprising an upper casing and posts extending parallel therefrom. The posts comprise a post profile in which screen guides have been accommodated. They guide the screen that can be lowered from and rolled up into the upper casing. The screen guides keep the screen in contact with the posts and are slightly movable in order to keep the screen taut.

**[0002]** In a known retractable screen, the movement of the screen guides in the posts is ensured by means of rubber foam strips which, distributed all along the length, have been glued to the screen guides and which abut the post profile. However, they provide a very limited spring track. As a consequence, the cloth production and the positioning of the posts has to take place most accurately. Too little space will result in the screen cloth getting jammed when moving downwards, slightly too much space will result in the screen cloth not being taut and the wind may cause it to flap. Arranging the foam strips is laborious and sometimes they get detached, as a consequence of which they obstruct the operation of the retractable screen. The resilience itself depends on the thickness and composition of the foam and the length of the foam strips, therefore it will be difficult to gear it to for instance the width of the screen between the posts.

**[0003]** It is an object of the invention to provide a retractable screen having movable screen guides with which the wanted tautness of the screen can be durably retained, whereas on the other hand the production thereof becomes a lot simpler.

### SUMMARY OF THE INVENTION

**[0004]** The invention provides a retractable screen comprising an elongated casing and two elongated posts extending parallel from the casing, wherein the casing has been provided with a housing in which an elongated roll has been bearing mounted so as to be rotatable about its longitudinal axis, wherein a screen has been attached to the roll, which screen can be rolled up around the roll, wherein the posts have been provided with an elongated base profile and an elongated screen guiding profile that can be moved relative to the base profile, wherein the movement of the screen guiding profile in its transverse direction, is guided parallel to the main plane of the screen, wherein the screen guiding profile has been provided with a mouth defining an elongated slit in which a longitudinal side of the screen has been accommodated so as to be guided down from the housing, wherein torsion springs distributed all along the length of the screen guiding profile connect the latter to the base profile under tension, wherein the torsion springs comprise a metal wire in which several spring windings have been formed that merge into a first spring arm engaging onto the

screen guiding profile.

**[0005]** The retractable screen according to the invention has been provided with screen guiding profiles for guiding and tautening the screen. The screen guiding profiles have been connected to the base profile by means of the torsion springs. Torsion springs have a large spring track and retain their reversible spring properties for a long time as a result of which the screen can durably be kept taut. The spring force provided by the first spring arm is largely provided by the spring windings. This enables a large spring stroke for the first spring arm and as a consequence for the screen guiding profiles connected thereto.

**[0006]** In one embodiment the screen guiding profile makes a guided spring stroke relative to the base profile between a first position and a second position that is further retracted into the post, wherein the screen guiding profile is pre-biased to the second position by means of the torsion springs. The pre-bias keeps the screen taut as from the first position, wherein a course of the spring force arises all along the spring track due to the structure of the torsion spring. In a preferred embodiment, due to the pre-bias, this course is limited to for instance a decrease by 30% from the second position to the first position. As a result, the wanted minimum cloth tension is present all along a large spring track.

**[0007]** In one embodiment thereof the torsion springs have initially been pre-biased in the second position. Depending on the spring constant and the degree of pre-bias the strength of the spring force can be set and be practically constant during operation.

**[0008]** When the torsion springs of the two posts have been symmetrically pre-biased, this ensures the centring of the screen between the posts.

**[0009]** In one embodiment the base profile has been provided with a profiled wall or an assembly of walls defining an attachment chamber for the torsion springs, which chamber extends all along the length, wherein the attachment chamber has been provided with a first attachment channel and a second attachment channel situated straight opposite each other and which with the open side face each other, wherein on the side opposite the first arm the torsion springs have been clamped securely between the first and second attachment channel. While the retractable screen is being mounted, the torsion springs can be snapped between the attachment channels. The type and the number of torsion springs can then be tailored to the specific width of the screen per length unit of the posts.

**[0010]** In one embodiment thereof the attachment chamber extends on one side and opposite the screen guiding profile. The spring windings can then be situated at the level of the screen guiding profile. The first spring arm then extends from there with a directional component in the longitudinal direction of the screen guiding profile in order to change the spring stroke into a practically translatable motion.

**[0011]** In one embodiment, opposite the first arm, the

spring windings of the torsion springs merge into a second arm, wherein down from the spring windings, the second arm comprises a first member merging into a second member via a first buckle, wherein the torsion springs have been accommodated in the first attachment channel by means of the first buckle, and with an end portion of the second arm and with the first contiguous spring winding, the torsion springs have been accommodated in the second attachment channel. The torsion springs can then be secured in the attachment chamber by means of a three-point closure, wherein for instance the spring winding and the first buckle are first placed in the attachment channels and the end portion is last to be popped into them.

**[0012]** In one embodiment the second arm has been pre-biased to keep the torsion spring between the first and second attachment channel. The torsion spring will therefore be confined in the attachment channels, while loaded.

**[0013]** In one embodiment the first attachment channel and the second attachment channel are situated in a notional plane extending parallel to the guided direction of movement of the screen guiding profile.

**[0014]** In one embodiment, down from the spring windings the first arm comprises a third member merging into a fourth member via a second buckle, wherein by means of their second buckle the torsion springs are situated in or above a third attachment channel extending adjacent to the first or second attachment channel. When mounting the retractable screen, the torsion springs, after having been mounted, can be pre-biased between the first and second attachment channel by popping the second buckle into the third attachment channel. In that way the torsion springs are ready to contact the screen guiding profile to be placed.

**[0015]** In one embodiment the first arm ends with a fifth member extending parallel or more or less parallel to the centre line of the spring windings or transverse to the screen guiding profile, wherein the fifth member engages behind the mouth onto the screen guiding profile. The fifth member then pulls the screen guiding profile behind the mouth, as a result of which the mouth remains properly oriented towards the screen.

**[0016]** In one embodiment thereof, in the main plane of the screen, the fifth member engages behind the mouth.

**[0017]** In one embodiment the post comprises an elongated cover profile that has been secured to the base profile, wherein the base profile and the cover profile together bound a longitudinal opening through which the screen extends towards the screen guiding profile. By way of its basic screen, the retractable screen can then be mounted to a window frame, for instance using screws, after which the screws are hidden from view by the cover profile.

**[0018]** In one embodiment the base profile and the cover profile have been provided with a first inner wall and second inner wall, respectively, extending parallel to

each other and straight opposite each other and on the side of the screen merging into the longitudinal opening, wherein the mouth is situated between the first inner wall and the second inner wall for guiding its movement. The freedom of movement of the screen guiding profile will not be restricted until the cover profile is being placed. Up until then, the screen guiding profile can easily be taken out and placed back. This is convenient during mounting the retractable screen to a window frame and when replacing the screen in a later stage of use.

**[0019]** In one embodiment the retractable screen comprises an end piece that has been secured to the end of the screen guiding profile, wherein the end piece comprises a guiding part sitting on the head surface of the screen guiding profile and an insert piece having a straight top edge extending transverse to the longitudinal direction of the screen guiding profile, wherein a screen guiding slot has been formed in the guiding part, which slot is situated in the extension of the elongated slit and an interior space of the mouth. The end piece can be used separately from the torsion springs.

**[0020]** In one embodiment thereof the insert piece with its top edge extends into a catcher in the casing.

**[0021]** The aspects and measures described in this description and the claims of the application and/or shown in the drawings of this application may where possible also be used individually. Said individual aspects may be the subject of divisional patent applications relating thereto. This particularly applies to the measures and aspects that are described per se in the sub claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0022]** The invention will be elucidated on the basis of a number of exemplary embodiments shown in the attached drawings, in which:

Figure 1 shows an isometric rear view of a part of the post and a part of the upper casing of a retractable screen according to an embodiment of the invention; Figure 2 shows the part of the retractable screen according to figure 1, wherein a part of the upper casing has been left out;

Figures 3A and 3B show two ultimate positions of a screen guiding profile in the post according to figures 1 and 2;

Figure 4 shows a detail of the post according to figures 1 and 2, in which an internal torsion spring is shown, in pre-biased condition; and

Figure 5 shows the torsion spring according to figure 4 in relaxed condition.

## DETAILED DESCRIPTION OF THE DRAWINGS

**[0023]** Figure 1 shows one of the vertical longitudinal sides and the contiguous part of the horizontal upper side of a retractable screen 1 according to an embodiment of the invention. The retractable screen 1 comprises an

elongated upper casing 2 of which only a part at the outer end thereof is shown in cross-section in order to show its interior. The upper casing 2 comprises a first aluminium extrusion profile 3 having an L-shaped cross-section, comprising a straight upper wall 10 and a rear wall 4 for the horizontal attachment to the lintel of a window frame. The upper casing 2 further comprises a second aluminium extrusion profile 12 having an L-shaped cross-section forming an insert lid. At the end edges that meet each other, the extrusion profiles 3, 12 have been provided with an insert hinge 11 with which the second extrusion profile 12 has been hooked onto the first extrusion profile. The extrusion profiles 3, 12 inserted into each other have been finished by way of an end cap 5. The retractable screen 1 comprises an elongated roll 7 accommodated in the upper casing 2. The roll 7 is bearing mounted so as to be rotatable about its longitudinal axis. An electric motor 8 has been accommodated in the roll 7 in order to drive the rotation.

**[0024]** The retractable screen 1 comprises two posts 40 for vertical mounting to the posts of the window frame. The figure shows only one of the posts 40. The opposite post is symmetrical to the shown post 40. The post 40 extends transversely from the outer end of the upper casing 2. The post 40 has been provided with a longitudinal opening 41 to the interior, which opening extends all along the length, and will be described in detail below.

**[0025]** The retractable screen 1 has been provided with a screen 20 for fully or partially blacking out the window in the window frame. The screen 20 comprises a rectangular screen cloth 21 the upper side of which has been attached to the roll 7. The screen cloth 21 extends downwards from the roll 7 between the posts 40 and along the side extends through the longitudinal opening 41 so as to be guided and kept taut inside it. At the bottom side the screen 20 has been provided with a leading bar 22. The leading bar 22 comprises an aluminium extrusion profile 23 having a slit 24 at the upper side, which slit gives access to a wider attachment chamber 25. At the bottom side the screen cloth 21 has been provided with a turn-up or seam 26 in which a tendon 30 has been accommodated, which is confined in the attachment chamber 25. In the extrusion profile 23 a metal strip 27 has been accommodated providing the leading bar 22 with sufficient weight to roll up and roll down the screen cloth 21 without creasing it.

**[0026]** The post 40 is comprised of a base profile 42, onto which a cover profile 43 has been secured. The base profile 42 and the cover profile 43 are aluminium extrusion parts that together define a rectangular outer contour of the post 40. The base profile 42 and the cover profile 43 bound the two sides of the longitudinal opening 41.

**[0027]** The base profile 42 comprises a straight rear wall 45 for attachment to the post of the window frame, which merges at right angles into a straight sidewall 46 facing the screen cloth 21. The sidewall 46 merges at right angles into a straight first inner wall 47 extending

parallel to the screen cloth. The first inner wall 47 merges at right angles into a straight first engagement wall 48, a straight first attachment wall 49 and a second attachment wall 50, which is shorter relative to the first engagement wall 48, which attachment walls together form a U-shaped attachment chamber 51. In the first engagement wall 48 and the second attachment wall 50 a first attachment channel 57 and a second attachment channel 58 have been formed for instance by an upright edge or a curvature in the wall in question. The attachment channels 57, 58 are straight opposite each other. Via a system of intermediate walls 52, the second attachment wall 50 is connected to the outwardly facing straight sidewall 53. At the front, said sidewall 53 merges into a connection 56 to which the cover profile has been securely snapped. **[0028]** The cover profile 43 comprises a straight or slightly curved front wall 70, which at one longitudinal side merges into a sidewall 73 that is in the extension of the sidewall 46 of the base profile 42. The sidewall 73 merges at right angles into a second inner wall 74 that is straight opposite the first inner wall 47 of the base profile 42 and is parallel thereto.

**[0029]** Accommodated in the post 40 is a screen guiding profile 80 for the screen cloth 21, which profile extends all along the length of the post. The screen guiding profile 80 is an extrusion profile of synthetic material, for instance made of PE or nylon. The screen guiding profile 80 comprises a mouth 81 having symmetrical, rigid jaws which at the outer ends keep a slit 82 open which gives access to a wider interior space 83. On one jaw side the mouth 81 is continued in an intermediate bridge 84 connected to an end wall 85 oriented transverse thereto. The mouth 81, the intermediate bridge 84 and one side of the end wall 85 together bound an insert chamber 87. The end wall 85 has been provided with a curvature 86 facing the mouth 81 and situated straight behind the slit 82. The longitudinal opening 41 bounded by the first inner wall 47 and the second inner wall 74, is a few millimetres wider than the mouth 81 as a result of which it is able to move through the longitudinal opening 41.

**[0030]** At the upper side the screen guiding profile 80 has been coupled to an end piece 110 made of synthetic material. The end piece 110 comprises a guiding member 111 which is sitting on the head surface of the screen guiding profile 80 and legs 112 protruding therefrom that clamp at least the narrow portion behind the mouth 81 in between them. On one side of the guiding member 111, the end piece 110 comprises a plate-shaped insert piece 113. Its main surface is oriented parallel to the longitudinal direction of the screen guiding profile 80 and the straight top edge 115 is oriented transverse thereto. A screen guiding slot 114 with rounded side edges has been formed in the guiding member 111, which side edges are situated in the extension of the slit 82 and the interior space 83 of screen guiding profile 80. The insert piece 113 has been inserted in a U-shaped catcher 9 at the exterior wall 6 of the end cap 5. The catcher 9 thus allows the motion of the screen guiding profile 80 in di-

rection A and prevents that the screen guiding profile 80 is lifted together with the screen 20 when the latter is rolled up.

**[0031]** The screen 20 has been provided with a track 28 extending along the longitudinal sides of the screen cloth 21, which track extends through the slit 82 of the screen guiding profile 80, and a series of wider elements 29 attached along said track 28, which elements have been made of a rigid synthetic material or metal and have been confined in the interior space 83. The screen 20 is guided through the screen guiding profile 80 when raising and lowering the screen 20. Together with the track 28 and the elements 29, the screen 20 is passed through the rounded screen guiding slot 114 so that irrespective of the angle to the roll 7 they end up straight in the slit 82 and the interior space 83. The screen 20 is thus protected. The screen cloth 21 is kept taut by the screen guiding profiles 80 by biasing torsion springs 90 distributed all along the length. Only one torsion spring 90 is shown in the figures. The torsion springs 90 permit a movement stroke of the screen guiding profiles 80 in direction A that is oriented transverse to the longitudinal direction thereof. The torsion springs 80 pre-bias the screen guiding profiles 80 to the position that is retracted into the post.

**[0032]** The torsion spring 90 has been made of a wire of spring steel. The torsion spring 90 comprises several spring windings 91 merging into a first spring arm 92 and a second spring arm 96. The first spring arm 92 comprises straight first member 93 and straight second member 94, which via a first buckle 95 are at an angle of approximately 90 degrees to each other. The first member 93 and the second member 94 are situated in a notional straight plane that is transverse to the centre line of the spring windings 91. The second spring arm 96 comprises a straight third member 97, which via a second buckle 99 merges into a straight fourth member 98. The third member 97 and the fourth member 98 are situated in a notional straight plane that is transverse to the centre line of the spring windings 91. Via a third buckle 100 the fourth member 98 merges into a fifth member 101 that is transverse to the notional plane.

**[0033]** The torsion spring 90 has been securely clamped in the attachment chamber 51 of the base profile 40. The first spring arm 92 then abuts the first attachment wall 49. The contiguous first spring winding and the outer end of the first spring arm 92 have been confined in a first attachment channel 57 formed between the first attachment wall 49 and a first confining edge at the first engagement wall 48. The first buckle 95 has been confined in a second attachment channel 58 formed between the first attachment wall 49 and a second confining edge at the second attachment wall 50. The first spring arm 92 is then pre-biased by slightly resiliently extending it. The first attachment channel 57 and the second attachment channel 58 have a width corresponding with the wire thickness of the torsion spring 90.

**[0034]** With its second buckle 99, the torsion spring 90 has temporarily been popped into an abutting third at-

tachment channel 59 in the inner wall 52 as a result of which the spring windings 91 have been pre-biased. The fifth member 101 extends into the insert chamber 87 of the screen guiding profile 80. In the operational condition the mouth 81 is in the longitudinal opening 41 and the second buckle 99 is free from the attachment channel 59.

**[0035]** The screen guiding profiles 80 have been evenly pre-biased to the inside by the torsion springs 90 that have been distributed all along the length. In that way the screen cloth 21 is evenly tensioned widthwise. For the motion of the mouth 81 through the longitudinal opening 41, the torsion springs 90 permit a stroke of 10-20 millimetres, wherein the tension force on the screen cloth 21 only exhibits a limited variation due to the pre-bias in the torsion springs 90. The tension force can be controlled by using more or fewer torsion springs 90, or by varying the wire thickness or the length of the second spring arm 96.

**[0036]** In the above a retractable screen 1 is elucidated, of which the upper casing 2 is situated at the upper side and the posts 40 are oriented vertically downwards therefrom. It regards relative terms and they should be considered as such. For it is also possible to attach the retractable screen 1 horizontally for example, to the inside of a flat roof, or to a pitched roof. Likewise, it is possible to have the screen 20 move horizontally in and out of the upper casing 2, wherein the upper casing 2 then sits vertically. Furthermore, the end piece 110 coupled to the upper side of the screen guiding profile 80, can be used separately from the torsion springs 90.

**[0037]** The above description has been included to illustrate the operation of preferred embodiments of the invention and not to limit the scope of the invention. Starting from the above explanation many variations that fall within the scope of the present invention will be evident to an expert.

## Claims

1. Retractable screen comprising an elongated casing and two elongated posts extending parallel from the casing, wherein the casing has been provided with a housing in which an elongated roll has been bearing mounted so as to be rotatable about its longitudinal axis, wherein a screen has been attached to the roll, which screen can be rolled up around the roll, wherein the posts have been provided with an elongated base profile and an elongated screen guiding profile that can be moved relative to the base profile, wherein the movement of the screen guiding profile in its transverse direction, is guided parallel to the main plane of the screen, wherein the screen guiding profile has been provided with a mouth defining an elongated slit in which a longitudinal side of the screen has been accommodated so as to be guided down from the housing, wherein torsion springs distributed all along the length of the screen

- guiding profile connect the latter to the base profile under tension, wherein the torsion springs comprise a metal wire in which several spring windings have been formed that merge into a first spring arm engaging onto the screen guiding profile.
2. Retractable screen according to claim 1, wherein the screen guiding profile makes a guided spring stroke relative to the base profile between a first position and a second position that is further retracted into the post, wherein the screen guiding profile is pre-biased to the second position by means of the torsion springs.
  3. Retractable screen according to claim 2, wherein the torsion springs are initially pre-biased in the second position.
  4. Retractable screen according to any one of the preceding claims, wherein the base profile has been provided with a profiled wall or an assembly of walls defining an attachment chamber for the torsion springs, which chamber extends all along the length, wherein the attachment chamber has been provided with a first attachment channel and a second attachment channel situated straight opposite each other and which with the open side face each other, wherein on the side opposite the first arm, the torsion springs have been securely clamped between the first and second attachment channel.
  5. Retractable screen according to claim 4, wherein the attachment chamber extends on one side and opposite the screen guiding profile.
  6. Retractable screen according to claim 4 or 5, wherein opposite the first arm, the spring windings of the torsion springs merge into a second arm, wherein down from the spring windings, the second arm comprises a first member merging into a second member via a first buckle, wherein the torsion springs have been accommodated in the first attachment channel by means of the first buckle, and with an end portion of the second arm and with the first contiguous spring winding, the torsion springs have been accommodated in the second attachment channel.
  7. Retractable screen according to claim 6, wherein the second arm has been pre-biased to keep the torsion spring between the first and second attachment channel.
  8. Retractable screen according to any one of the claims 4-7, wherein the first attachment channel and the second attachment channel are situated in a notional plane extending parallel to the guided direction of movement of the screen guiding profile.
  9. Retractable screen according to any one of the claims 4-8, wherein down from the windings, the first arm comprises a third member merging into a fourth member via a second buckle, wherein by means of their second buckle, the torsion springs are situated in or above a third attachment channel extending adjacent to the first or second attachment channel.
  10. Retractable screen according to any one of the preceding claims, wherein the first arm ends with a fifth member extending parallel to the centre line of the windings or transverse to the screen guiding profile, wherein the fifth member engages behind the mouth onto the screen guiding profile.
  11. Retractable screen according to claim 10, wherein in the main plane of the screen, the fifth member engages behind the mouth.
  12. Retractable screen according to any one of the preceding claims, wherein the post comprises an elongated cover profile that has been secured to the base profile, wherein the base profile and the cover profile together bound a longitudinal opening through which the screen extends towards the screen guiding profile.
  13. Retractable screen according to any one of the preceding claims, wherein the base profile and the cover profile have been provided with a first inner wall and second inner wall, respectively, extending parallel to each other and straight opposite each other and on the side of the screen merging into the longitudinal opening, wherein the mouth is situated between the first inner wall and the second inner wall for guiding its movement.
  14. Retractable screen according to any one of the preceding claims, comprising an end piece that has been secured to the end of the screen guiding profile, wherein the end piece comprises a guiding part sitting on the head surface of the screen guiding profile and an insert piece having a straight top edge extending transverse to the longitudinal direction of the screen guiding profile, wherein a screen guiding slot has been formed in the guiding part, which slot is situated in the extension of the elongated slit and an interior space of the mouth.
  15. Retractable screen according to claim 14, wherein with its top edge the insert piece extends into a catcher in the casing.

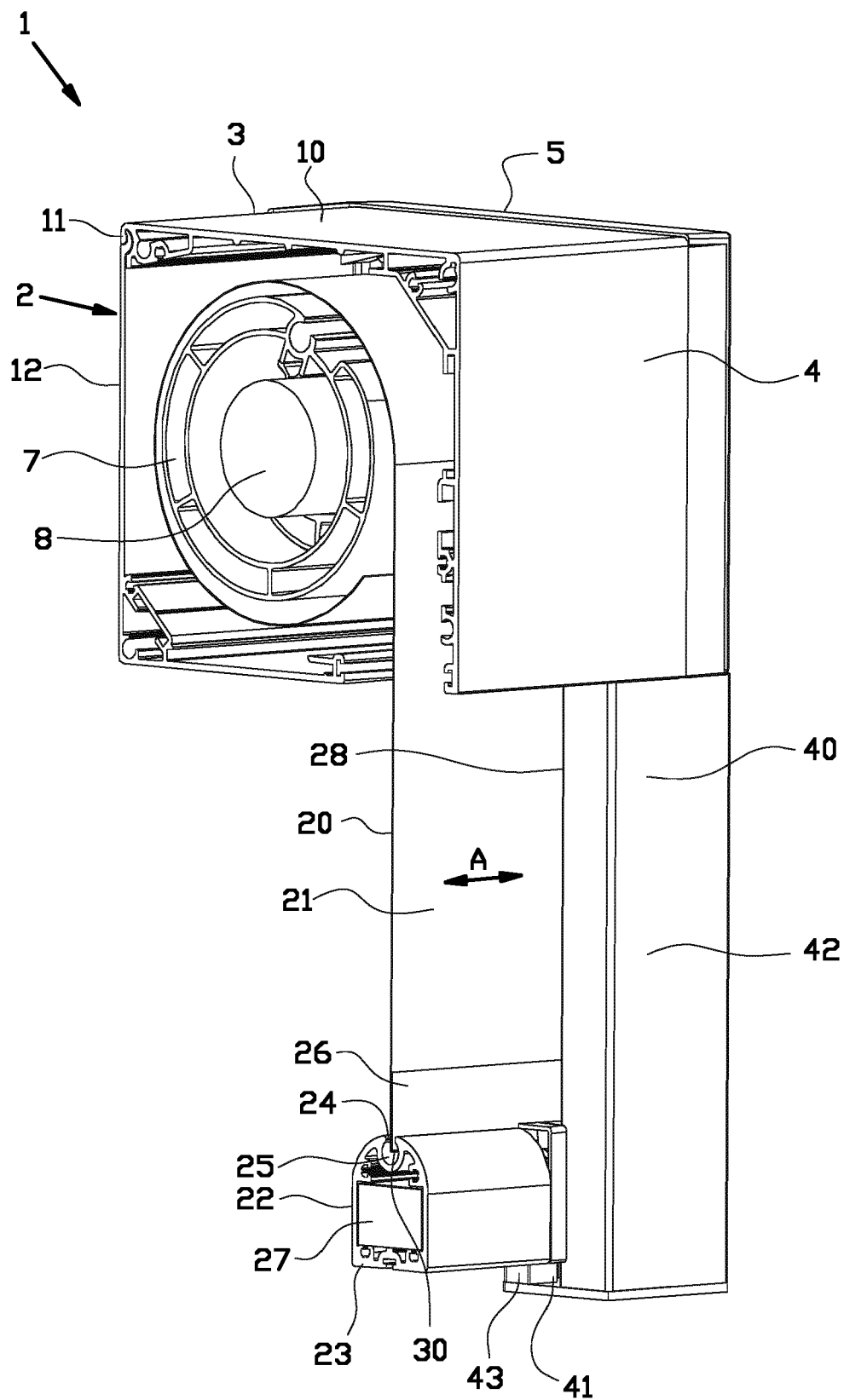


FIG. 1

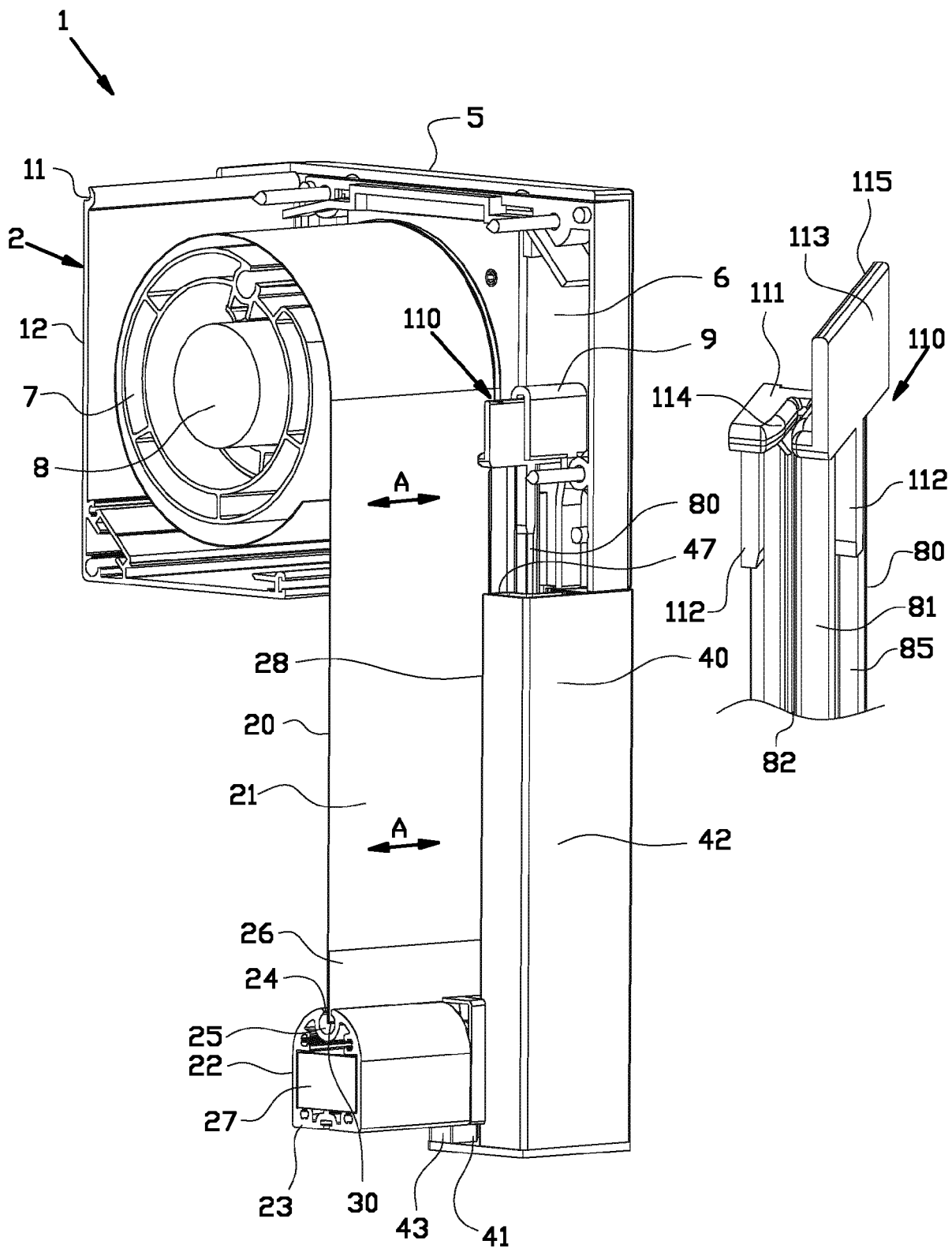


FIG. 2



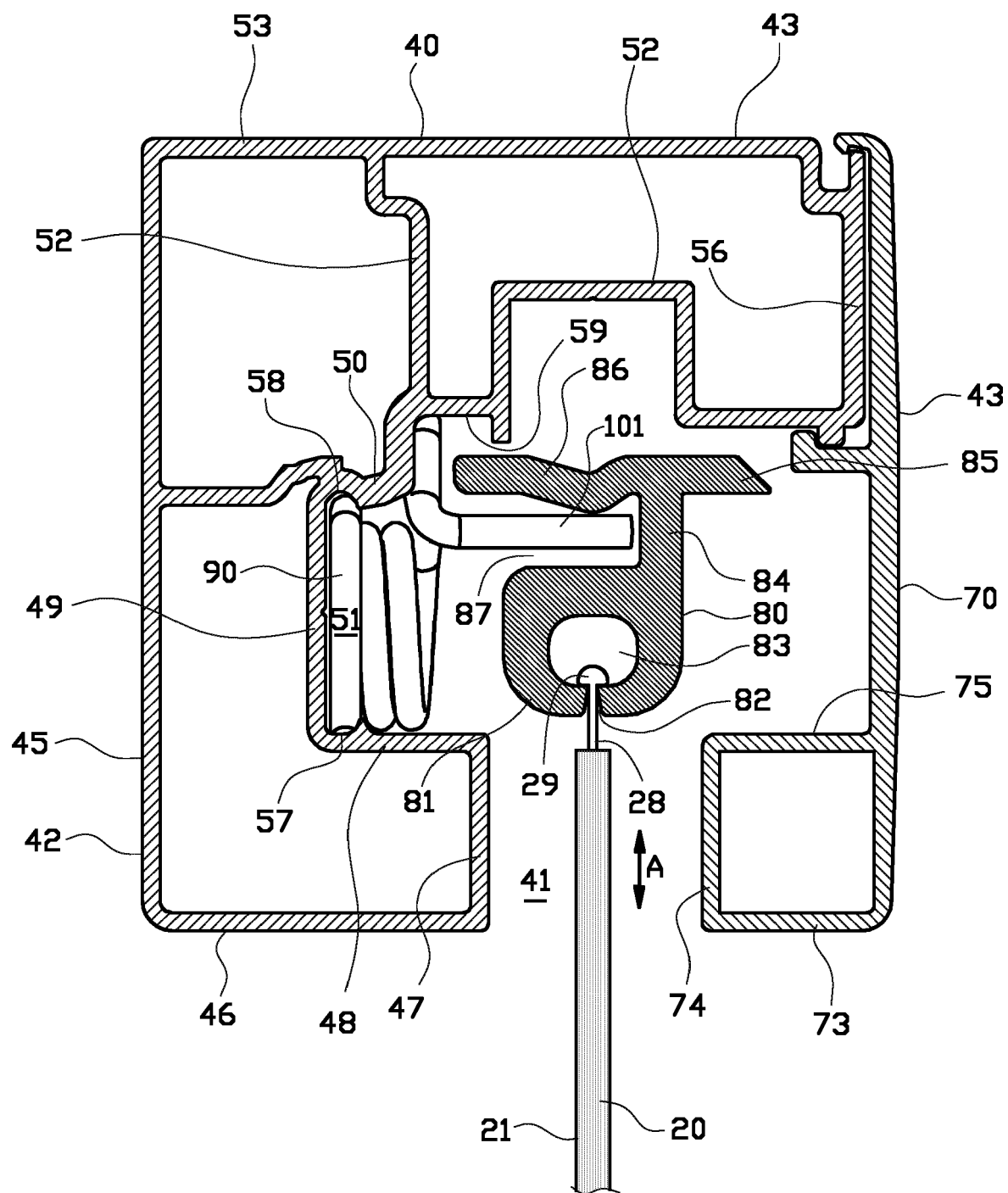
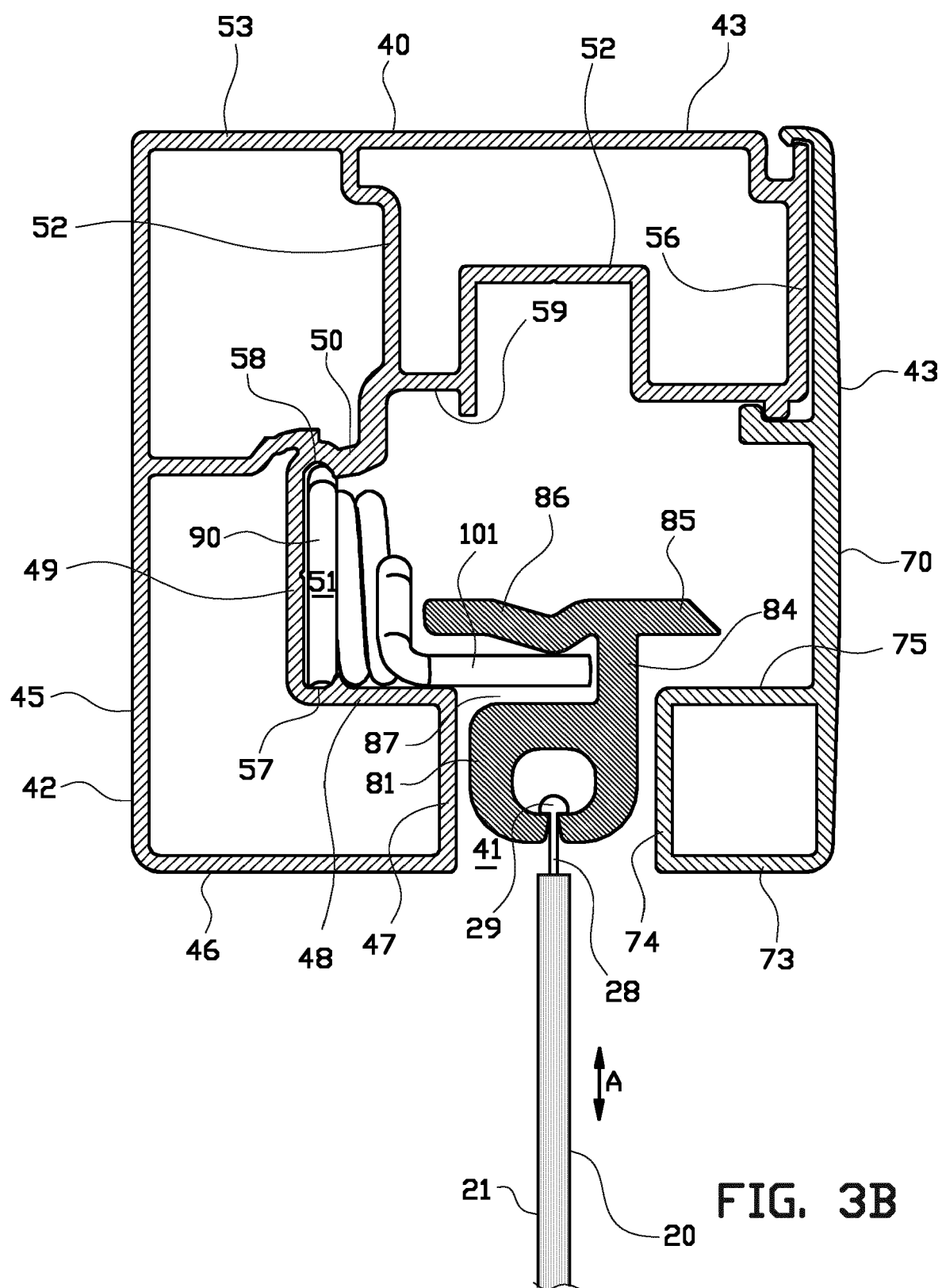


FIG. 3A



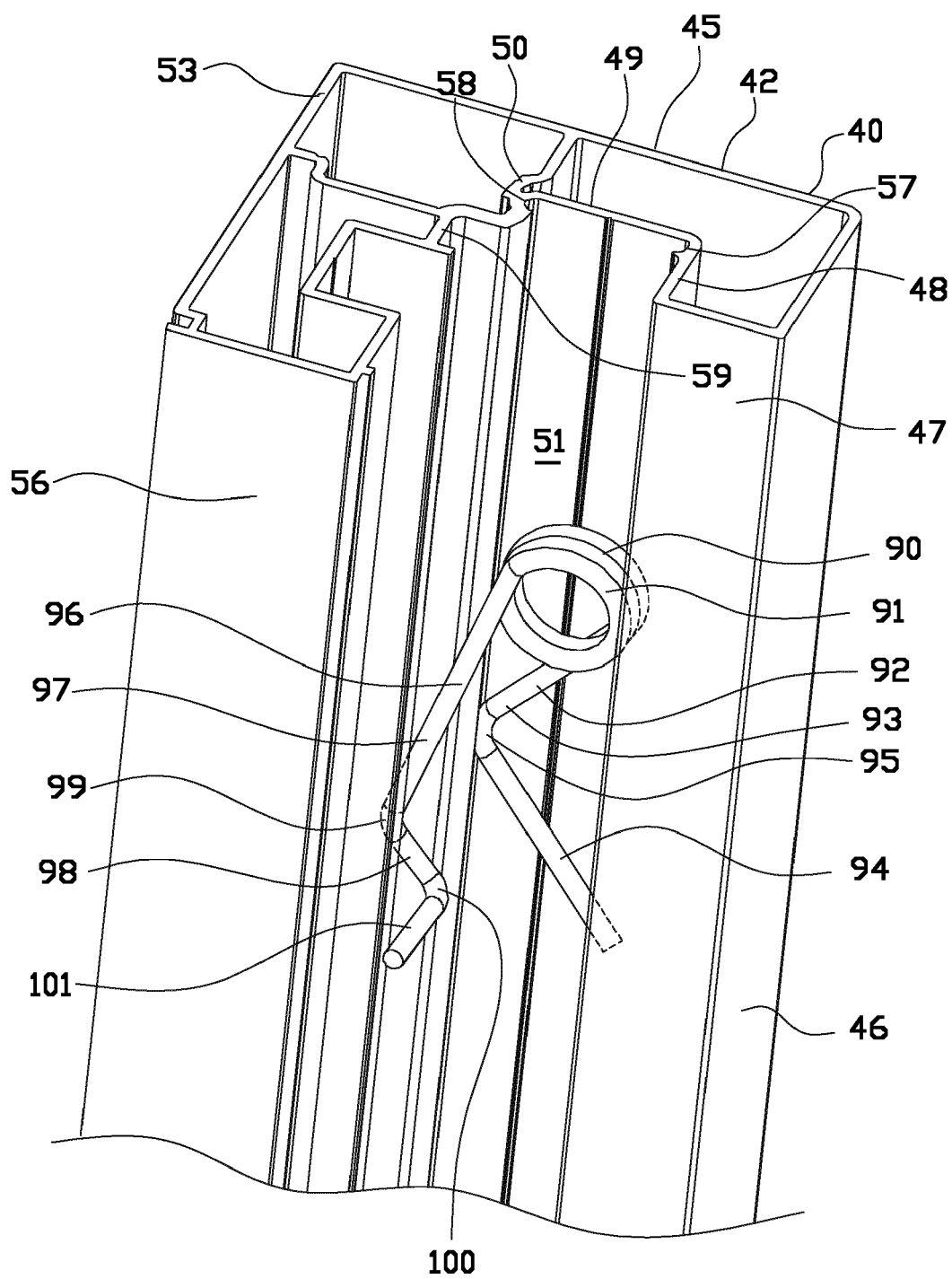


FIG. 4

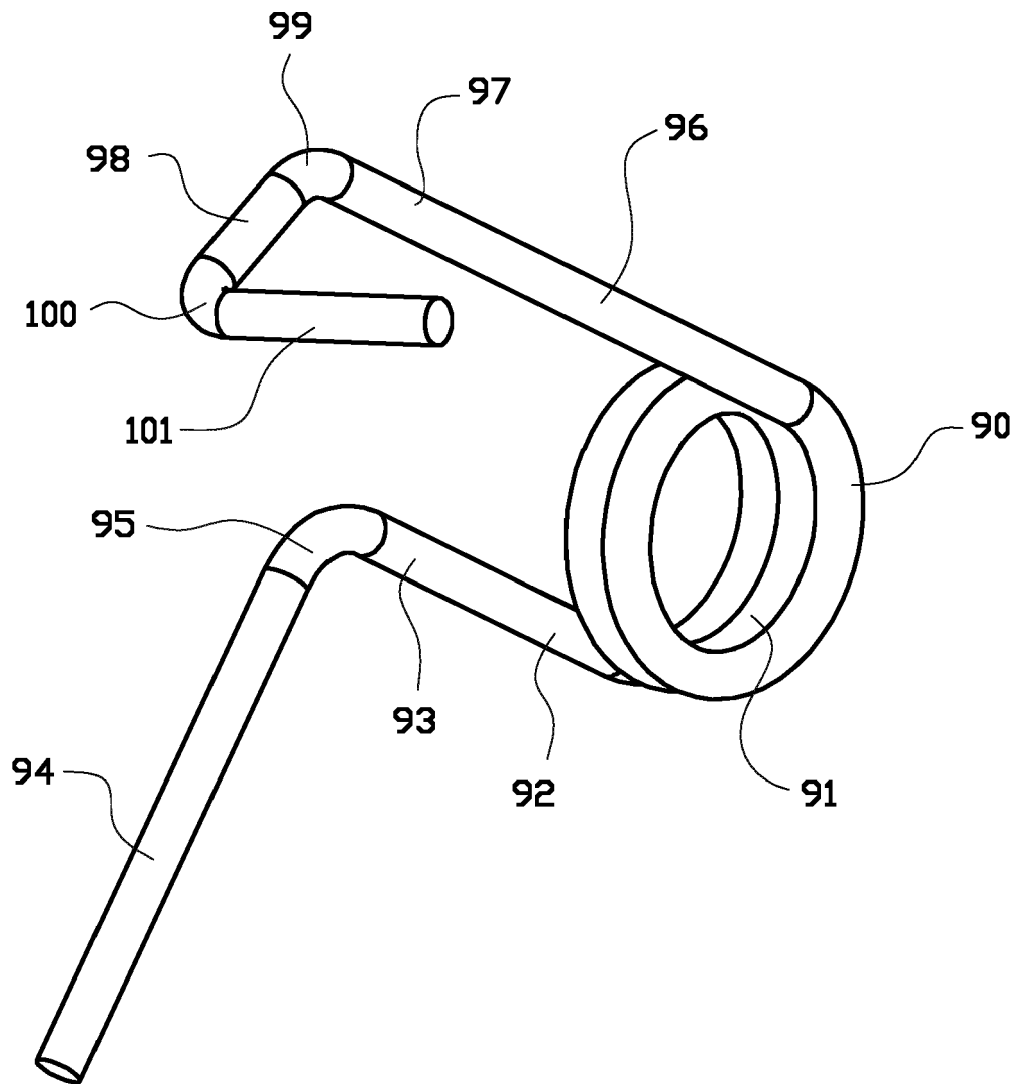


FIG. 5



## EUROPEAN SEARCH REPORT

Application Number  
EP 16 15 4877

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 628 887 A1 (RENSON SUNPROT SCREENS NV [BE]) 21 August 2013 (2013-08-21) * paragraph [0028]; figures 6,7 * -----	1	INV. E06B9/58 E06B9/42 E06B9/54
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>6 July 2016</b>	Examiner <b>Peschel, Gerhard</b>
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 15 4877

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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		ES 2562108 T3	02-03-2016

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