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(54) **Signalling device for displaying warnings or traffic signs, and vehicle carrying such a signalling device**

Signalisierungsvorrichtung zur Anzeige von Warnungen oder Verkehrsschildern sowie Fahrzeug mit solch einer Signalisierungsvorrichtung

Dispositif de signalisation permettant d'afficher des avertissements ou de panneaux de signalisation routière et véhicule portant un tel dispositif de signalisation

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Description

[0001] The invention relates to a signalling device for displaying warnings or traffic signs or for other temporary uses, arranged for attaching on a vehicle or trailer, wherein the signalling device comprises a screen with a display surface for a graphical indication, the screen extending between a lower cross beam and an upper cross beam. Furthermore, the invention relates to a vehicle or a trailer provided with a signalling device.

[0002] Vehicles carrying a framed or rigid fold-away warning sign on a roof or a rear side are known. Setting up such rigid warning signs is laborious, and the vehicle must be customized to the transportation and deployment of such signs. The costs for vehicle refitting are considerable, and the resulting vehicle becomes unsuitable for other purposes.

[0003] International patent application WO92/01838 discloses a vehicle mountable road sign and information display apparatus for displaying traffic signs on a rollable screen that is spanned between two horizontal cross-bars. The bars are extendable and retractable in a substantially vertical direction by a pair of spring biased laterally pivotable vertically extendable folding arms, so as to alter the device between a collapsed state in which the signalling screen is rolled up, and a folded out state in which the screen is unfolded and the screen is fully shown.

[0004] International patent application WO2010/054380 describes a portable screen which comprises unroll means, the unroll means being a lever arrangement, powered by hydraulic, pneumatic, or electronic actuators positioned between and outside upper and lower arms of the unroll means.

[0005] Patent document US6191886 describes a video projection screen assembly comprising a support frame with extendable arms, and connected to a viewing screen that is selectively positionable between collapsed and expanded positions. Gas springs are provided between pivotable upper and lower arm segments. These gas springs are adapted to exert an outwardly extending force on the upper arm segments, and are connected to outer sides of the arm segments.

[0006] It is an object to provide an improved signalling device for displaying warnings or traffic signs, or for other temporary uses like advertising, which can be rapidly deployed and transported by a vehicle or trailer, without the need of refitting the vehicle or trailer for this purpose.

This object is achieved by providing according to an aspect, a signalling device according to the preamble of claim 1, wherein the screen is rollable, and the signalling device comprises a pair of vertical arms connecting the lower cross beam and the upper cross beam, wherein the vertical arms are extendible and retractable in a vertical direction, so as to alter the signalling device between a collapsed state in which the screen is rolled up and the display surface is hidden, and a folded out state in which the screen is unfolded and the display surface is fully

shown.

Advantageously, the signalling device with a roll-up screen and a pair of vertically extendible and retractable arms for rolling up and unfolding the screen is compact and readily transportable in the collapsed state. Various arm configurations may be implemented. For example, the arms may be provided with telescoping or hingeable arm segments connecting the upper and lower cross beams, with arms and joints that are movable mainly in the lateral plane (i.e. parallel to the plane spanned by the screen). For the screen in the collapsed state, the arms and elbow joints may be mutually separated, adjacent, or at least partially overlapping. The configuration of the arms and cross beams may be laterally symmetric or asymmetric. Overlapping arm configurations may require additional connection segments for bridging a longitudinal spacing between an arm and its connection point to a cross beam, the arm being longitudinally displaced with respect to the other arm as a result of the overlapping configuration. In any case, the folding out is easily achieved by extension of the vertical arms in the vertical direction, pushing the upper cross beam upward with respect to the lower cross beam, and thereby unfolding the screen with graphical indication. The compactness of the signalling device in the collapsed state allows it to be carried on the rear side or in the trunk of various vehicle types.

According to this aspect, each vertical arm of the signalling device comprises a lower arm segment that is laterally pivotably interconnected with an upper arm segment, and wherein the vertical arm is extendible and retractable between a retracted state and an extended state. The configuration of vertical arms with laterally pivotable arm segments provides a mechanically robust implementation of an extendible and retractable screen.

Also according to this aspect, each vertical arm of the signalling device is provided with a biasing mechanism, arranged for exerting an upward total force in the vertical direction on the upper cross beam. By providing the vertical arms with biasing mechanisms exerting a sufficient vertical force for counteracting the combined gravitational pull on the screen, the cross beams, and the vertical arms, the folding out of the screen will not require manual force. Thus, folding out of the screen may be effectuated automatically and quickly.

[0007] Furthermore according to this aspect, the biasing mechanism of the signalling device is provided on inner sides of the lower arm segment and/or upper arm segment, the biasing mechanism comprising a cable connected to one of the lower arm segment and the upper arm segment, and comprising a gas spring in the other one of the lower arm segment and the upper arm segment, the gas spring being arranged for exerting a tensile force on the strain cable, thereby forcing the vertical arm in the extended state.

By providing the biasing mechanisms on the inner sides of the lower and/or upper arm segments, the susceptibility for damage and wear from external conditions (e.g.

the weather) is reduced. Gas springs can be made sufficiently strong, while only occupying a relatively small volume. By using gas springs mounted on the inside of the arm segments, it is possible to generate a force that is sufficiently large for lifting the upper beam with both vertical arms, while having only a limited inner arm space for harbouring the biasing mechanism. Furthermore, gas springs are not as prone to plastic deformation as for example metal helical springs are. Consequently, the biasing mechanism with gas spring is robust and requires little readjustment and maintenance. According to an embodiment of the signalling device, the screen has a width along the lateral direction in the range of 1.0 to 1.5 m. A rollable screen that has a width in the range between 1.0m and 1.5m is sufficiently broad to present a graphical indication that is discernible for traffic approaching from the rear, while keeping air resistance to a minimum. Additionally, such signalling device in the collapsed state is small enough to fit in the trunk or on the back seat of a regular car. The relatively small width allows the signalling device to be transported by and used in combination with practically any type of vehicle, rendering the use of customized sign carrying vehicles obsolete. Apart from displaying warnings or traffic signs, the reduced width of the screen is particularly suitable for advertising purposes. Furthermore, the reduced width limits the amount of building material required, resulting in a signalling device with a weight that will not exceed the statutory maximum carrying weight under working conditions.

According to an embodiment of the signalling device, each lower arm segment is connected to the lower cross beam in a respective lower beam corner; each upper arm segment is connected to the upper cross beam in a respective upper beam corner; each lower arm segment is connected to the respective upper arm segment by means of an elbow joint, and the elbow joints of the respective vertical arms are movable toward each other in the lateral direction, and are adjoining or non-overlapping for the signalling device in the collapsed state. Longer arms imply the possibility of providing larger means for biasing the arms, which may in principle result in larger upward forces exerted by the vertical arm on the upper cross beam and screen. Nevertheless, notably long vertical arms are required to overlap in the collapsed state. In an overlapping arm configuration, one of the vertical arms will be at least partially displaced in the longitudinal direction with respect to the other vertical arm, requiring longitudinally aligned connection segments for connecting the furthest vertical arm with the cross beams. This results in a laterally asymmetric arm configuration for which the upward force of both vertical arms in the folded out state is difficult to balance, especially if large drag forces are acting on the unfolded screen during transport. By providing lower and upper arm segments that are connected in corresponding upper and lower cross beam corners, combined with the elbow joints that are configured to laterally adjoin (i.e. to be very close or abutting, but not overlapping) in the collapsed state, the

length of and exertable force by the foldable vertical arms is maximized for a laterally symmetric configuration.

According to an embodiment, the signalling device comprises an elongated cylinder for rolling up the screen around the elongated cylinder into the collapsed state, and a rotary actuator for rotating the elongated cylinder. The elongated cylinder with rotary actuator provides a means for controlled rolling up and unrolling of the screen around the elongated cylinder. The rolling up of the screen around the elongated cylinder may be achieved by the rotary actuator exerting a force on the screen that at least compensates for the combined upward total force of all biasing mechanisms. If the counteracting force exerted on the screen by the rotary actuator becomes smaller than the combined upward force F_z , then the signalling device will automatically unfold.

According to an embodiment, the signalling device comprises a coupling adaptor at or near the lower cross beam, for attaching the signalling device to a trailer coupling at the rear side of the vehicle during use.

The coupling adaptor provides an efficient means of attaching the signalling device to the trailer coupling of the vehicle. The coupling adaptor is mounted at or near the lower cross beam of the signalling device, in order for the screen to be upwardly movable in the vertical direction from the collapsed state toward the folded out state. By fixing the lower cross beam to the vehicle, any collision between the signalling device - in particular the upper cross beam - and the roadway below is avoided, circumventing the need for a complicated frame and means for mounting the frame to the vehicle. Furthermore, the provision of the coupling adaptor for connecting to the trailer coupling yields a signalling device that is connectable to any vehicle with a trailer coupling. In addition, the single joint connection type offered by the trailer coupling renders the orientation of the signalling device easily adjustable with respect to the vehicle.

According to an embodiment, the signalling device comprises lower warning lights located at lower edge regions of the lower cross beam, upper warning lights located at upper edge regions of the upper cross beam, and a power source for supplying power to the warning lights.

The warning lights will enable the signalling device in the folded out state to be quickly noticed by approaching traffic.

According to a further embodiment of the signalling device, each lower edge region is substantially aligned in the vertical direction with a corresponding upper edge region, each lower edge region being displaced in a longitudinal direction with respect to the corresponding upper edge region, presenting a saving for overlappingly accommodating the lower and upper warning lights in the collapsed state.

The rigid warning lights cannot be rolled up together with the screen into the collapsed state. By arranging the warning light carrying edge regions in a longitudinally displaced manner, savings are provided for accommodating a lower and upper warning light pair in an overlapping

manner. As a result, the height of the signalling device in the collapsed state is reduced to mainly the height of the lower edge region or the upper edge region, whichever is the largest. The reduced height of the signalling device in the collapsed state lowers air resistance while the vehicle with the signalling device is driving.

According to an embodiment of the signalling device, the screen comprises: a substratum comprising meshed Polyester fabric; a retro reflective foil carrying the graphical indication, and a protective layer covering the retro reflective foil.

A screen comprising a Polyester textile substratum can be made sufficiently strong for enduring the tensile stresses induced by the vertical arms and the air resistance, while providing a suitable surface to which the retro reflective foil can be adhered. According to another aspect and in correspondence with the advantages and effects described above, a vehicle or a trailer is provided that comprises on a rear side a signalling device as described in the preceding claims.

[0008] Embodiments will now be described, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, and in which:

FIGs. 1a and 1b schematically show perspective views of a signalling device in the folded out state according to an embodiment;

FIG. 2 presents a cross sectional view of a vertical arm of the signalling device according to an embodiment;

FIG. 3 shows a rear view of the signalling device in the collapsed state according to an embodiment;

FIG. 4 shows a schematic cross section of a screen of the signalling device according to an embodiment;

The figures are only meant for illustrative purposes, and do not serve as restriction of the scope or the protection as laid down by the claims.

FIGs. 1a and 1b schematically show perspective views of a folded out signalling device 102 for displaying warnings or traffic signs, e.g. indicating road works. In FIG. 1a, a display side of the signalling device 102 is shown, the signalling device 102 being attached on a rear side of a vehicle 100. The signalling device 102 comprises a screen 104 with a display surface carrying a graphical indication 132. The graphical indication 132 shown in FIG. 1 schematically displays a triangular warning sign for traffic. In other embodiments, the signalling device 102 may also be used for other purposes like advertising, in which case the graphical indication 132 will be different. The screen 104 is rollable and extends between a lower cross beam 120 and an upper cross beam 122. The signalling device 102 comprises a pair of vertical arms 106 connecting the lower cross beam 120 and the upper cross beam 122 (see FIG. 1b). The vertical arms 106 are extendible and retractable in a vertical direction Z, so as to alter the signalling device 102 between a collapsed state

and a folded out state. In the collapsed state (shown in FIG. 3) the screen 104 is rolled up and the display surface is hidden, while in the folded out state (shown in FIGs. 1a and 1b) the screen 104 is unfolded and the display surface is fully shown. The vertical arms 106 are largely or completely made of aluminium or other suitable strong and lightweight materials, and assembled from profiles and cast and/or forged components.

The signalling device 102 shown in FIG. 1b has an elongated cylinder 128 and a rotary actuator 130 for rotating the elongated cylinder 128 about its cylinder axis. The rotary actuator 130 may comprise a 12 V or 24 V tubular electromotor with an auto-braking and locking mechanism for blocking further rotation once the electromotor is stopped or switched off. An exemplary value for the maximum couple exertable by the electromotor on the elongated cylinder 128 is about 35 Nm, which in turn may result in a tensioning force of approximately 900 - 1100 N exerted on the screen 104, with 1000 N being a typical value.

A rotation of the elongated cylinder 128 in one direction causes rolling up of the screen 104 around the elongated cylinder 128 into the collapsed state, and a rotation of the elongated cylinder 128 in a reverse direction unrolls the screen 104 toward the folded out state. The folding out is achieved by extension of the vertical arms 106 in the vertical direction Z, pushing the upper cross beam 122 upward with respect to the lower cross beam 120, and thereby unfolding the screen 104 and displaying the graphical indication 132. For this purpose, the vertical arms 106 are provided with biasing mechanisms arranged for exerting on the upper cross beam 122 an upward total force F_z in the vertical direction Z, which will be explained hereafter with reference to FIG. 2. The upward force that is persistently exerted by the vertical arms 106 is counteracted by the tensile force exerted on the screen 104 by the rotary actuator 130 and the elongated cylinder 128.

The rotary actuator 130 receives its power for rolling and unrolling of the screen 104 from a control unit 138 with a power source provided on or inside of the lower cross beam 120. This power source may comprise a converter for converting power received from an accumulator on or in the vehicle 100, through a power lead 140 and plug 141 connected to a coupling outlet located at the rear side 146 of the vehicle 100. The control unit 138 and rotary actuator 130 may be remotely controllable, by means of a remote control device (not shown) and/or by control signals received through the coupling outlet, for example in response to activation of the vehicle's direction indicators or fog lamp. By configuring the signalling device to be operable by means of a remote control device and/or via the coupling outlet, operation time is reduced and operation becomes safer, for road work personnel is no longer required to get out of the vehicle.

Alternatively, the screen 104 may be manually driven by rotating a crank (not shown) configured for actuating the elongated cylinder 128.

The vertical arms 106 in FIG.1b each comprise a lower arm segment 108 that is laterally pivotably interconnected with an upper arm segment 110. As a result, the vertical arm 106 is foldably extendible and retractable between a retracted state Q0 and an extended state Q1. The lower arm segment 108 is connected to the respective upper arm segment 110 by means of an elbow joint 114. Each lower arm segment 108 is furthermore connected to the lower cross beam 120 in a respective lower beam corner 124, and each upper arm segment 110 is connected to the upper cross beam 122 in a respective upper beam corner 126.

The signalling device 102 shown in FIGs.1a and 1b has a width B along the lateral direction Y comparable to or smaller than a width of the rear side 146 of the vehicle 100. This width B may be in the range of 1.0 to 1.5 m, preferably 1.2 to 1.4 m, so as to be able to transport the signalling device 102 by and be used in combination with a common vehicle 100 like a passenger car or van.

Also shown in FIG.1b is a coupling adaptor 142 fixed to the signalling device 102 along and/or parallel to the lower cross beam 120. The coupling adaptor 142 is arranged for attaching the signalling device 102 to a trailer coupling (not shown), which is located at the rear side 146 of the vehicle 100. Here, the trailer coupling refers to a towing hook configuration commonly provided with a ball connection at one end, and located at the bottom centre of the rear side 146 of the vehicle 100.

The coupling adaptor 142 is configured for immovably connecting the signalling device 102 to the trailer coupling, i.e. in a manner that does not allow vertical or horizontal movement of the signalling device 102 with respect to the vehicle 100. The relatively low weight of the signalling device 102, resulting from the indicated width B and the light weight foldable arm construction, allows the coupling adaptor 142 to be fixed to only a single connection point on the vehicle 100 i.e. the trailer coupling. By temporarily releasing the coupling adaptor 142, the orientation of the signalling device 102 with respect to the vehicle 100 remains adjustable.

In FIG.1b as well as FIG.3, embodiments are shown of a signalling device 102 for which the coupling adaptor 142 forms a separate unit that is mechanically releasable from the signalling device 102 as well as from the trailer coupling. To achieve this, the coupling adaptor 142 in FIGs.1b and 3 is provided on side ends with slots arranged for attachment to projecting blades (both drawn but not indicated) provided on the lower beam corners 124 of the signalling device 102.

Other known releasable connection types for attaching the coupling adaptor 142 to the signalling device 102 may be implemented.

By providing the signalling device 102 and coupling adaptor 142 as separable parts, their maximum individual weights may be easily kept below statutory maximum carrying and handling weight under working conditions (e.g. 25 kg, depending on the applicable national regulations). In addition, various coupling adaptors 142 may

be provided for coupling the signalling device 102 to different supporting constructions, like vehicle roof mountings, trailer mountings, or stationary supports, yielding a signalling device 102 with many possibilities for deployment.

The signalling device 102 in FIG.1a is provided with four warning lights 134, 136. A pair of lower warning lights 134 is located at lower edge regions 148 of the lower cross beam 120, each lower warning light 134 being located in a respective lower beam corner 124. Furthermore, a pair of upper warning lights 136 is located at upper edge regions 150 of the upper cross beam 122, with each upper warning light 136 being located in a respective upper beam corner 126. The power source is arranged for supplying power to the warning lights 134, 136. The warning lights 134, 136 have sufficient light intensity to allow the signalling device 102 in the folded out state to be quickly noticed by traffic approaching from the rear side of the vehicle 100. The warning lights 134, 136 may for example be made of arrays of white, yellow, and/or orange LEDs in a predetermined configuration. The warning lights 134, 136 may have a diameter of 180 - 200 mm, and may be configured to comply with statutory regulations concerning road works. Other light source types and sizes may be used instead, if preferred.

Each lower edge region 148 with a lower warning light 134 is substantially aligned in the vertical direction Z with a corresponding upper edge region 150 carrying one upper warning light 136. Each lower edge region 148 is displaced in a longitudinal direction X with respect to the corresponding upper edge region 150, presenting a saving 152 suitable for overlappingly accommodating the lower and upper warning lights 134, 136 for the signalling device 102 in the collapsed state. As a result, the height of the signalling device 102 in the collapsed state corresponds mainly to the height of the lower edge region 224.

[0009] FIG. 2 presents a cross sectional view of a vertical arm 106 of the signalling device 102. The vertical arm 106 shown is provided with the biasing mechanism 200, arranged for exerting on the upper cross beam 122 the upward total force F_z in the vertical direction Z. The biasing mechanism 200 shown in FIG.2 is provided on inner sides of the lower arm segment 108 and upper arm segment 110. The biasing mechanism 200 comprises a strain cable 202 that is connected to the upper arm segment 110 by means of a cable attachment 216. In turn, this cable attachment 216 is connected to a treaded rod 206 passing through a threaded sleeve 204 that is fixed with respect to the inner side of the upper arm segment 110. The alongside displacement of the threaded rod 206 and cable attachment 216 with respect to the threaded sleeve 204 may be altered by rotating a nut 207 surrounding the threaded rod 206 and located on a top side of the threaded sleeve 204. The resulting screw mechanism for tensioning the cable 202 is easily adjustable, for example by using a spanner. As an example, both vertical arms 106 may be prestressed with a combined total force in the range of 400 - 600 N, and preferably 500 N.

The strain cable 202 is lead along a guiding wheel 217 provided on an inner side of the lower arm segment 108, and the cable 202 is at another segment connected via a pulley attachment 218 to an end of a cylinder 212 of a gas spring 208. A 2500 N gas spring 208 will provide sufficient resilience for the signalling application described here. The spring piston 210 is fixed with respect to the inner side of the lower arm segment 108. If the cylinder 212 of the gas spring 208 extends in an outward direction with respect to the spring piston 210, a tensile force is exerted on the strain cable 202, thereby forcing the vertical arm 106 toward the extended state Q1.

In an alternative configuration, the locations of the threaded rod and sleeve 204, 206 on the one hand, and the gas spring 208 on the other hand may be inverted with respect to the lower and upper arm segments 108, 110.

[0010] FIG. 3 shows a rear view of the signalling device 102 in the collapsed state. The lower arm segment 108 is connected to the respective upper arm segment 110 by means of the elbow joint 114. The elbow joints 114 of the respective vertical arms 106 are movable toward each other in the lateral direction Y. For the signalling device 102 in the collapsed state, the elbow joints 114 laterally adjoin. Here, "laterally adjoining" implies that the elbow joints 114 are very close or abutting in the lateral direction Y, but are not overlapping. By providing laterally movable lower and upper arm segments with elbow joints 114 that adjoin in the collapsed state, a laterally symmetric vertical arm configuration is obtained with which a sufficient upward total force Fz can be exerted on the upper cross beam 122. Typical values for the upward total force Fz exerted on the upper cross beam 122 by the combined vertical arms 106 in the embodiment of FIG.3 may be 500 N for the arms near the retracted state Q0, and 630 N for the arms 106 in the retracted state Q0.

[0011] FIG. 4 shows a schematic cross section of the screen 104 of the signalling device 102. For road warning and signalling applications, the screen 104 may be provided with a base layer or substratum 402 to which a retro-reflective foil 404 carrying the graphical indication 132 (e.g. by silk screen printing) is adhered. Preferably, a screen 104 for displaying a traffic warning has a high optical reflectivity. Reflection class 3 (a.k.a. "Diamond grade") corresponds to a category of optically retro-reflecting surfaces with the highest reflectivity and a diamond shaped unit cell structure. The retro reflective foil 404 is laminated or covered by a protective layer 406.

The substratum 402 may be a meshed fabric or textile comprising Polyester (PES), to which the class 3 retro-reflective foil 404 can be adhered. As an example, the textile may have warp yarns comprising PES with a linear fibre mass density of 167 dtex and a fibre spatial density of 36.5 per cm, and weft yarns comprising PES with a linear fibre mass density of 37 dtex and a fibre spatial density of 23.5 per cm. The resulting mass density of the textile may be approximately 500 g/m².

The combination of the PES textile substratum 402, the retro reflective foil 404 and the protective layer 406 yields

a screen 104 that is sufficiently strong for enduring tensile stresses induced by the vertical arms 106 and the drag forces acting on the unfolded screen 104 during use. Nevertheless, this combination remains sufficiently flexible for rolling up or folding of the screen 104.

The descriptions above are intended to be illustrative, not limiting. It will be apparent to the person skilled in the art that alternative and equivalent embodiments of the invention can be conceived and reduced to practice, without departing from the scope of the claims set out below.

LIST OF FIGURE ELEMENTS

[0012]

100	vehicle
102	signalling device
104	screen
105	display surface
106	vertical arm
108	lower arm segment
110	upper arm segment
112	lower joint (first pivot connection)
114	elbow joint (second pivot connection)
116	upper joint (third pivot connection)
120	lower cross beam
122	upper cross beam
124	lower beam corner
126	upper beam corner
128	elongated cylinder
129	cylinder axis
130	rotary actuator
132	graphical indication
134	lower warning light
136	upper warning light
138	control unit
139	power source
140	power lead
141	plug
142	coupling adaptor
144	trailer coupling
146	rear side
148	lower edge region
150	upper edge region
152	saving
X	longitudinal direction
Y	lateral direction
Z	vertical direction
Fz1	cross beam gravitational force
Fz2	screen gravitational force
Fz3	vertical arm gravitational force
Fz4	maximum allowed vertical drag force
Fz	total upward force
Q0	retracted state
Q1	extended state
200	biasing mechanism
202	strain cable
204	treaded sleeve

206 treaded rod
 207 nut
 208 gas spring
 210 spring piston
 212 spring cylinder
 214 pulley
 216 cable attachment
 217 guiding wheel
 218 pulley attachment
 220 lower inner side
 222 upper inner side
 402 substratum
 404 retro reflective foil
 406 protective layer

Claims

1. Signalling device (102) for displaying warnings or traffic signs, arranged for attaching on a vehicle (100) or trailer, wherein the signalling device (102) comprises a screen (104) with a display surface for a graphical indication (132), the screen (104) extending between a lower cross beam (120) and an upper cross beam (122), wherein the screen (104) is rollable, and the signalling device (102) comprises a pair of vertical arms (106) connecting the lower cross beam (120) and the upper cross beam (122), wherein the vertical arms (106) are extendible and retractable in a vertical direction (Z), so as to alter the signalling device (102) between a collapsed state in which the screen (104) is rolled up and the display surface is hidden, and a folded out state in which the screen (104) is unfolded and the display surface is fully shown, wherein each vertical arm (106) comprises a lower arm segment (108) laterally pivotably interconnected with an upper arm segment (110), and wherein the vertical arm (106) is extendible and retractable between a retracted state (Q0) and an extended state (Q1), wherein each vertical arm (106) is provided with a biasing mechanism (200), arranged for exerting an upward total force (Fz) in the vertical direction (Z) on the upper cross beam (122), wherein the biasing mechanisms exert a sufficiently large vertical force for counteracting the combined gravitational pull on the screen, the cross beams, and the vertical arms, and sufficiently large for lifting the upper beam with both vertical arms, **characterized in that** the biasing mechanism (200) is provided on inner sides (220, 222) of the lower arm segment (108) and/or upper arm segment (110), the biasing mechanism (200) comprising a strain cable (202) connected to one of the lower arm segment (108) and the upper arm segment (110), and comprising a gas spring (208) in the other one of the lower arm segment (108) and the upper arm segment (110), the gas spring (208) being arranged for exerting a tensile

force on the strain cable (202), thereby forcing the vertical arm (106) in the extended state (Q1).

2. Signalling device (102) according to claim 1, wherein the screen (104) has a width (B) along the lateral direction (Y) in the range of 1.0 to 1.5 m.
3. Signalling device (102) according to claim 1 or 2, wherein:
 - each lower arm segment (108) is connected to the lower cross beam (120) in a respective lower beam corner (124);
 - each upper arm segment (110) is connected to the upper cross beam (122) in a respective upper beam corner (126);
 - each lower arm segment (108) is connected to the respective upper arm segment (110) by means of an elbow joint (114), and
 - the elbow joints (114) of the respective vertical arms (106) are movable toward each other in the lateral direction (Y), and are adjoining or non-overlapping for the signalling device (102) in the collapsed state.
4. Signalling device (102) according to any one of the claims 1 - 3, comprising an elongated cylinder (128) for rolling up the screen (104) around the elongated cylinder (128) into the collapsed state, and a rotary actuator (130) for rotating the elongated cylinder (128).
5. Signalling device (102) according to claim 4, wherein the rotary actuator (130) comprises a 12 V or 24 V tubular electromotor with an auto-braking and locking mechanism for blocking further rotation if the electromotor is stopped or switched off.
6. Signalling device (102) according to any one of the claims 1 - 5, comprising a coupling adaptor (142) at or near the lower cross beam (120), for attaching the signalling device (102) to a trailer coupling at a rear side (146) of the vehicle (100) during use.
7. Signalling device (102) according to any one of the claims 1 - 6, comprising lower warning lights (134) located at lower edge regions (224) of the lower cross beam (120), and upper warning lights (136) at upper edge regions (226) of the upper cross beam (122), and a power source (139) for supplying power to the warning lights (134, 136).
8. Signalling device (102) according to claim 7, wherein each lower edge region (224) is substantially aligned in the vertical direction (Z) with a corresponding upper edge region (226), each lower edge region (224) being displaced in a longitudinal direction (X) with respect to the corresponding upper edge region

(226), presenting a saving (228) for overlappingly accommodating the lower and upper warning lights (134, 136) in the collapsed state.

9. Signalling device (102) according to any one of the claims 1 - 8, wherein the screen (104) comprises:
 - a substratum (402) comprising polyester textile;
 - a retro-reflective foil (404) carrying the graphical indication (132), and
 - a protective layer (406) covering the retroreflective foil (404).
10. Vehicle (100) or trailer provided with a signalling device (102) according to any one of the preceding claims.

Patentansprüche

1. Signalisierungsvorrichtung (102) zur Anzeige von Warnungen oder Verkehrszeichen, angeordnet zur Befestigung an einem Fahrzeug (100) oder einem Anhänger, wobei die Signalisierungsvorrichtung (102) einen Bildschirm (104) mit einer Anzeigefläche für eine grafische Angabe (132) umfasst, wobei sich der Bildschirm (104) zwischen einem unteren Querbalken (120) und einem oberen Querbalken (122) erstreckt, wobei der Bildschirm (104) rollbar ist und die Signalisierungsvorrichtung (102) ein Paar von vertikalen Armen (106) umfasst, die den unteren Querbalken (120) und den oberen Querbalken (122) verbinden, wobei die vertikalen Arme (106) in einer vertikalen Richtung (Z) aus- und einziehbar sind, um die Signalisierungsvorrichtung (102) zwischen einem zusammengefalteten Zustand, in dem der Bildschirm (104) aufgerollt ist und die Anzeigefläche versteckt ist, und einem ausgefalteten Zustand, in dem der Bildschirm (104) entfaltet ist und die Anzeigefläche vollständig gezeigt ist, zu ändern, wobei jeder vertikale Arm (106) ein unteres Armsegment (108) umfasst, das seitlich drehbar mit einem oberen Armsegment (110) zwischenverbunden ist, und wobei der vertikale Arm (106) zwischen einem eingezogenen Zustand (Q0) und einem ausgezogenen Zustand (Q1) aus- und einziehbar ist, wobei jeder vertikale Arm (106) mit einem Vorspannmechanismus (200) bereitgestellt ist, der zum Ausüben einer nach oben gerichteten Gesamtkraft (Fz) in der vertikalen Richtung (Z) auf den oberen Querbalken (122) angeordnet ist, wobei der Vorspannmechanismus eine ausreichend große vertikale Kraft, um der kombinierten Schwerkraft auf den Bildschirm, die Querbalken und die vertikalen Arme entgegenzuwirken, und ausreichend groß, um den oberen Balken mit beiden Armen anzuheben, ausübt, **dadurch gekennzeichnet, dass** der Vorspannmechanismus

(200) an Innenseiten (220, 222) des unteren Armsegments (108) und/oder oberen Armsegments (110) bereitgestellt ist, wobei der Vorspannmechanismus (200) ein Zugkabel (202) umfasst, das mit einem des unteren Armsegments (108) und des oberen Armsegments (110) verbunden ist, und eine Gasdruckfeder (208) im anderen des unteren Armsegments (108) und des oberen Armsegments (110) umfasst, wobei die Gasdruckfeder (208) zum Ausüben einer Zugkraft auf das Zugkabel (202) angeordnet ist, wodurch der vertikale Arm (106) in den ausgezogenen Zustand (Q1) gezwungen wird.

2. Signalisierungsvorrichtung (102) nach Anspruch 1, wobei der Bildschirm (104) eine Breite (B) entlang der seitlichen Richtung (Y) in der Spanne von 1,0 bis 1,5 m hat.

3. Signalisierungsvorrichtung (102) nach Anspruch 1 oder 2, wobei:

- jedes untere Armsegment (108) mit dem unteren Querbalken (120) in einer jeweiligen unteren Balkenecke (124) verbunden ist;
- jedes obere Armsegment (110) mit dem oberen Querbalken (122) in einer jeweiligen oberen Balkenecke (126) verbunden ist;
- jedes untere Armsegment (108) mit dem jeweiligen oberen Armsegment (110) mittels eines Ellbogengelenks (114) verbunden ist, und
- die Ellbogengelenke (114) der jeweiligen vertikalen Arme (106) in der seitlichen Richtung (Y) hin zueinander bewegbar sind und für die Signalisierungsvorrichtung (102) im zusammengefalteten Zustand angrenzend oder nicht überlappend sind.

4. Signalisierungsvorrichtung (102) nach einem der Ansprüche 1 - 3, umfassend einen länglichen Zylinder (128) zum Aufrollen des Bildschirms (104) um den länglichen Zylinder (128) in den zusammengefalteten Zustand, und einen Drehantrieb (130) zum Drehen des länglichen Zylinders (128).

5. Signalisierungsvorrichtung (102) nach Anspruch 4, wobei der Drehantrieb (130) einen 12V oder 24V röhrenförmigen Elektromotor mit einem automatischen Brems- und Einrastmechanismus zum Blockieren einer weiteren Drehung umfasst, falls der Elektromotor gestoppt oder ausgeschaltet wird.

6. Signalisierungsvorrichtung (102) nach einem der Ansprüche 1 - 5, umfassend einen Kupplungsadapter (142) bei oder nahe dem unteren Querbalken (120) zum Befestigen der Signalisierungsvorrichtung (102) an einer Anhängerkupplung an eine Heckseite (146) des Fahrzeugs (100) während einer Verwendung.

7. Signalisierungsvorrichtung (102) nach einem der Ansprüche 1- 6, umfassend untere Warnleuchten (24), die bei unteren Kantenbereichen (224) des unteren Querbalkens (120) gelegen sind, und obere Warnleuchten (136) bei oberen Kantenbereichen (226) des oberen Querbalkens (122) und eine Stromquelle (139) zur Stromversorgung der Warnleuchten (134, 136). 5
8. Signalisierungsvorrichtung (102) nach Anspruch 7, wobei jeder untere Kantenbereich (224) im Wesentlichen in der vertikalen Richtung (Z) mit einem entsprechenden oberen Kantenbereich (226) ausgerichtet ist, wobei jeder untere Kantenbereich (224) in einer Längsrichtung (X) in Bezug auf den entsprechenden oberen Kantenbereich (226) versetzt ist, was einen Spielraum (228) zur überlappenden Aufnahme der unteren und oberen Warnleuchten (134, 136) im zusammengefalteten Zustand darstellt. 10 15 20
9. Signalisierungsvorrichtung (102) nach einem der Ansprüche 1 - 8, wobei der Bildschirm (104) umfasst:
 - eine Unterlage (402), die Polyestertextilstoff umfasst; 25
 - eine rückreflektierende Folie (404), die die grafische Angabe (132) trägt, und
 - eine Schutzschicht (406), die die rückreflektierende Folie (404) abdeckt. 30
10. Fahrzeug (100) oder Anhänger, bereitgestellt mit einer Signalisierungsvorrichtung (102) nach einem der vorangehenden Ansprüche. 35

Revendications

1. Dispositif de signalisation (102) pour afficher des avertissements ou des panneaux de signalisation routière, agencé à des fins de fixation sur un véhicule (100) ou une remorque, dans lequel le dispositif de signalisation (104) comprend un écran (104) avec une surface d'affichage d'une indication graphique (132), l'écran (104) s'étendant entre une traverse inférieure (120) et une traverse supérieure (122), dans lequel l'écran (104) peut être enroulé, et le dispositif de signalisation (102) comprend une paire de bras verticaux (106) raccordant la traverse inférieure (120) et la traverse supérieure (122), dans lequel les bras verticaux (106) sont extensibles et rétractables dans une direction verticale (Z), de manière à modifier le dispositif de signalisation (102) entre un état replié dans lequel l'écran (104) est enroulé et la surface d'affichage est cachée, et un état déplié dans lequel l'écran (104) est déplié et la surface d'affichage est totalement montrée, dans lequel chaque bras vertical (106) comprend un segment de bras inférieur (108) interconnecté latéralement de manière pivo- 40 45 50 55

tante avec un segment de bras supérieur (110), et dans lequel le bras vertical (106) est extensible et rétractable entre un état rétracté (Q0) et un état étendu (Q1), dans lequel chaque bras vertical (106) est pourvu d'un mécanisme de sollicitation (200), agencé afin d'exercer une force totale vers le haut (Fz) dans la direction verticale (Z) sur la traverse supérieure (122), dans lequel les mécanismes de sollicitation exercent une force verticale suffisamment grande pour contrebalancer l'attraction gravitationnelle combinée sur l'écran, les traverses et les bras verticaux, et suffisamment grande pour lever la traverse supérieure avec les deux bras verticaux, 5

caractérisé en ce que

le mécanisme de sollicitation (200) est prévu sur des côtés intérieurs (220,222) du segment de bras inférieur (108) et/ou du segment de bras supérieur (110), le mécanisme de sollicitation (200) comprend un câble de tension (202) raccordé à un du segment de bras inférieur (108) et du segment de bras supérieur (110), et comprenant un ressort à gaz (208) dans l'autre du segment de bras inférieur (108) et du segment de bras supérieur (110), le ressort à gaz (208) étant agencé afin d'exercer une force de traction sur le câble de tension (202), en forçant ainsi le bras vertical (106) dans l'état étendu (Q1). 10 15 20 25

2. Dispositif de signalisation (102) selon la revendication 1, dans lequel l'écran (104) a une largeur (B) le long de la direction latérale (Y) dans la plage de 1.0 à 1.5 m. 30
3. Dispositif de signalisation (102) selon la revendication 1 ou 2, dans lequel : 35

- chaque segment de bras inférieur (110) est raccordé à la traverse inférieure (120) dans un coin de traverse inférieure respectif (126) ;
- chaque segment de bras supérieur (108) est raccordé à la traverse supérieure (122) dans un coin de traverse supérieure respective (126) ;
- chaque segment de bras inférieur (108) est raccordé au segment de bras supérieur respectif (110) au moyen d'un joint à articulation (114), et
- les joints à articulation (114) des bras verticaux respectifs (106) sont déplaçables l'un vers l'autre dans la direction latérale (Y) et sont adjacents ou non superposés au dispositif de signalisation (102) dans l'état replié. 40 45 50 55

4. Dispositif de signalisation (102) selon une quelconque des revendications 1-3, comprenant un cylindre allongé (128) pour enrouler l'écran (104) autour du cylindre allongé (128) dans l'état replié, et un actionneur rotatif (130) pour tourner en rotation le cylindre allongé (128). 55

5. Dispositif de signalisation (102) selon la revendication 4, dans lequel l'actionneur rotatif (130) comprend un moteur électrique tubulaire à 12V ou à 24V avec un mécanisme d'auto-freinage et verrouillage pour bloquer une rotation supplémentaire si le moteur électrique est arrêté ou éteint. 5

6. Dispositif de signalisation(102) selon une quelconque des revendications 1-5, comprenant un adaptateur de couplage (142) au niveau de ou à proximité de la traverse inférieure (120) pour fixer le dispositif de signalisation à un accouplement de remorque à un côté arrière (146) du véhicule (100) pendant l'utilisation. 10
15

7. Dispositif de signalisation (102) selon une quelconque des revendications 1-6, comprenant des voyants d'avertissement inférieurs (134) situés au niveau des régions de bord inférieures (224) de la traverse inférieure (120), et des voyants d'avertissement supérieurs (136) au niveau des régions de bord supérieures (226) de la traverse supérieure (122) et une source d'alimentation électrique (139) pour alimenter électriquement les voyants d'avertissement (134, 136). 20
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8. Dispositif de signalisation(102) selon la revendication 7, dans lequel chaque région de bord inférieure (224) est substantiellement alignée dans la direction verticale (Z) avec une région de bord supérieure correspondante (226), chaque région de bord inférieure (224) étant déplacée dans une direction longitudinale (X) par rapport à la région de bord supérieure correspondante (226), présentant un évidement (228) pour renfermer de manière superposée les voyants d'avertissement inférieur et supérieur (134,136) dans l'état replié. 30
35

9. Dispositif de signalisation(102) selon une quelconque des revendications 1-8, dans lequel l'écran (104) comprend : 40
 - un substrat (402) comprenant un textile polyester ;
 - une feuille rétro-réfléchissante (404) portant l'indication graphique (132), et 45
 - une couche protectrice (406) couvrant la feuille rétro-réfléchissante (404).

10. Véhicule (100) ou remorque pourvue d'un dispositif de signalisation (102) selon une quelconque des revendications précédentes. 50
55

Fig. 1a

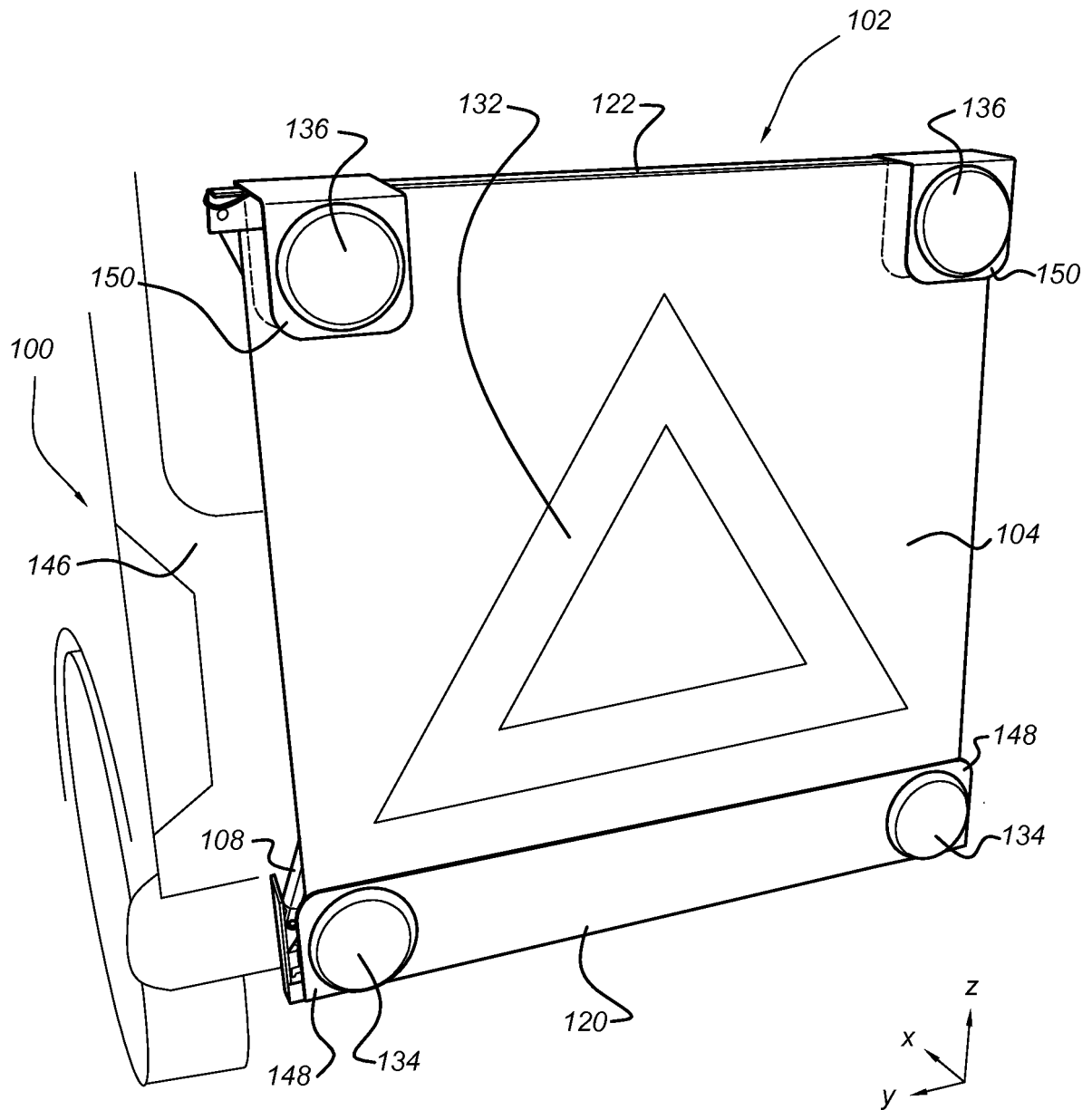


Fig. 1b

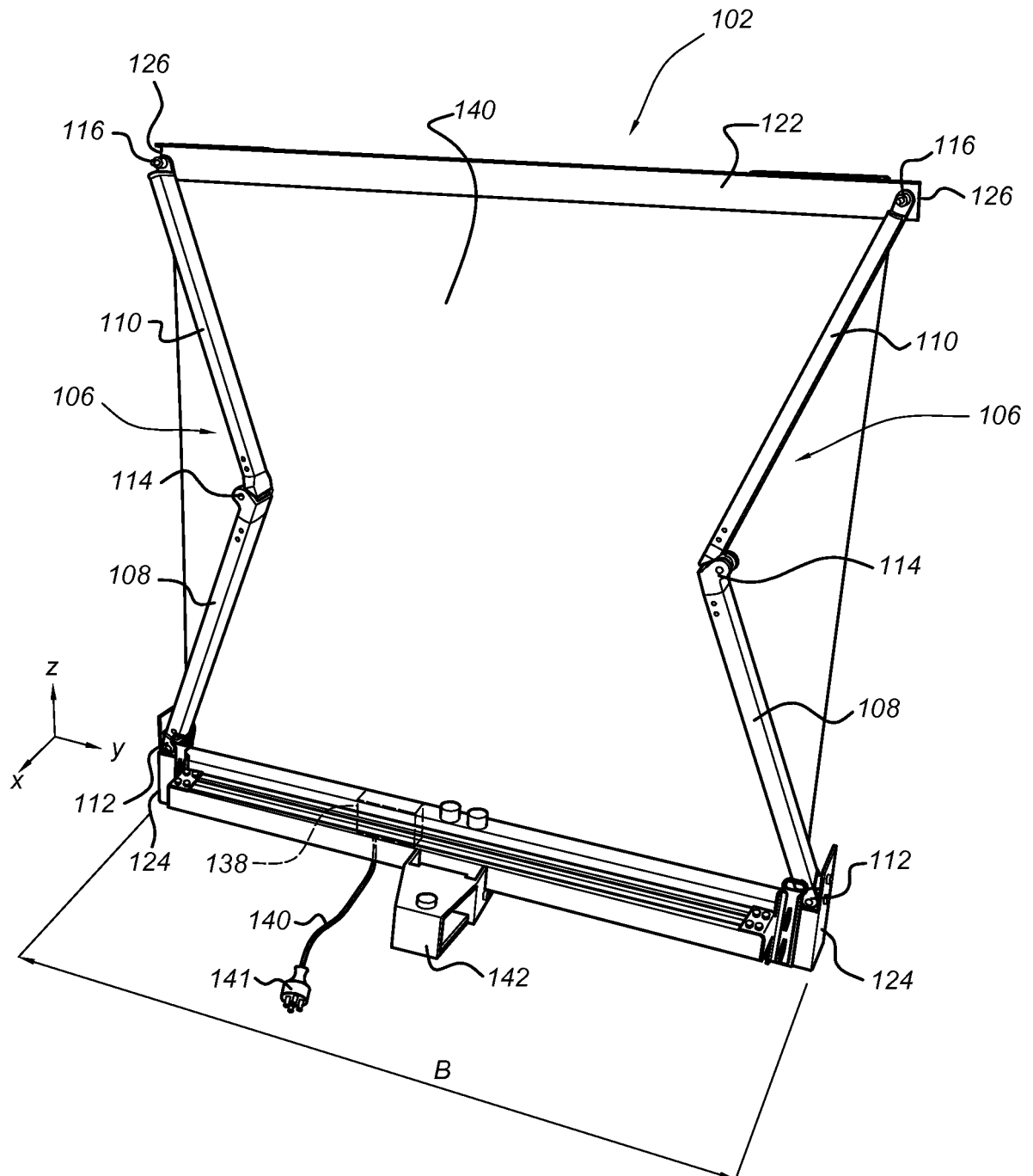


Fig. 2

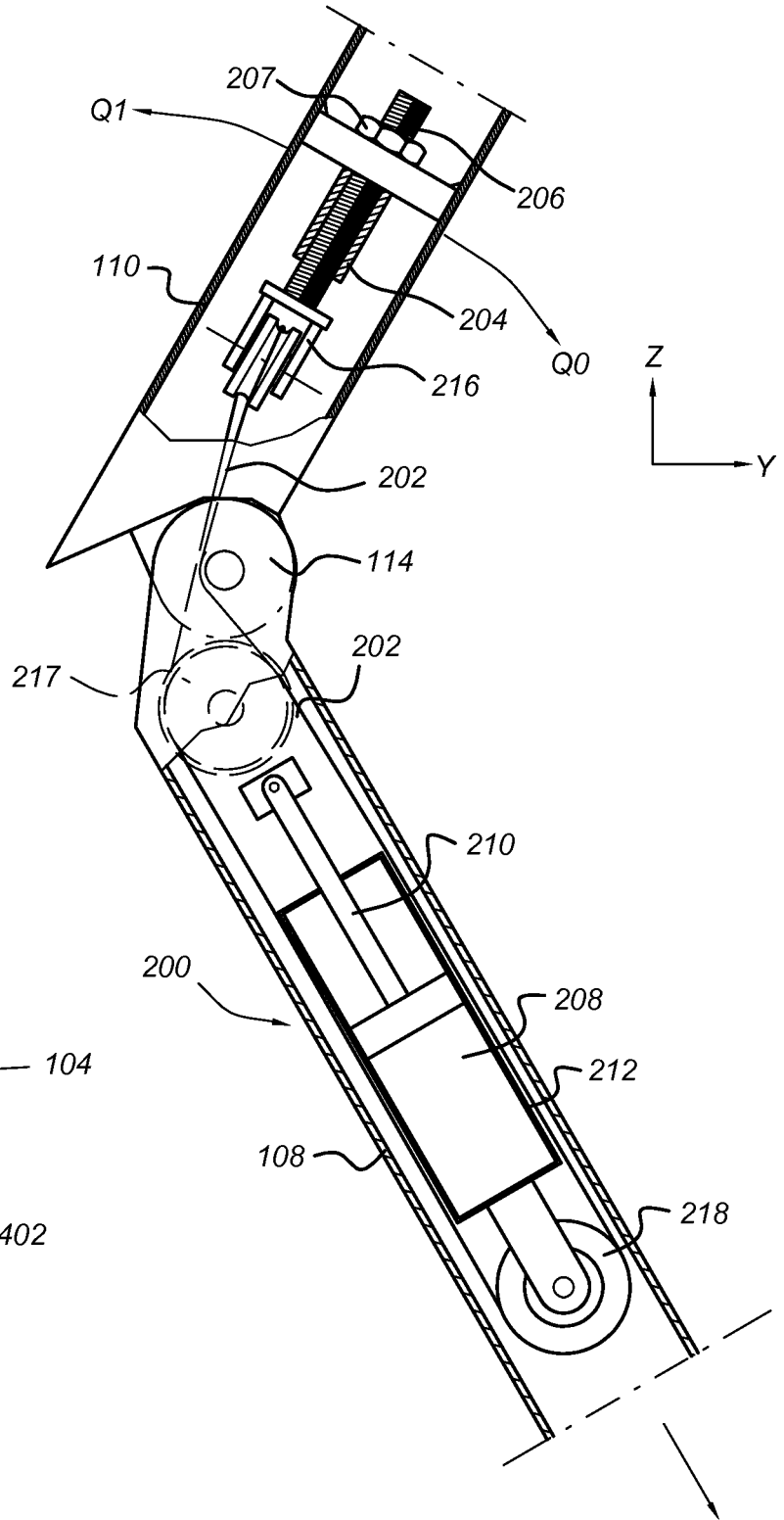
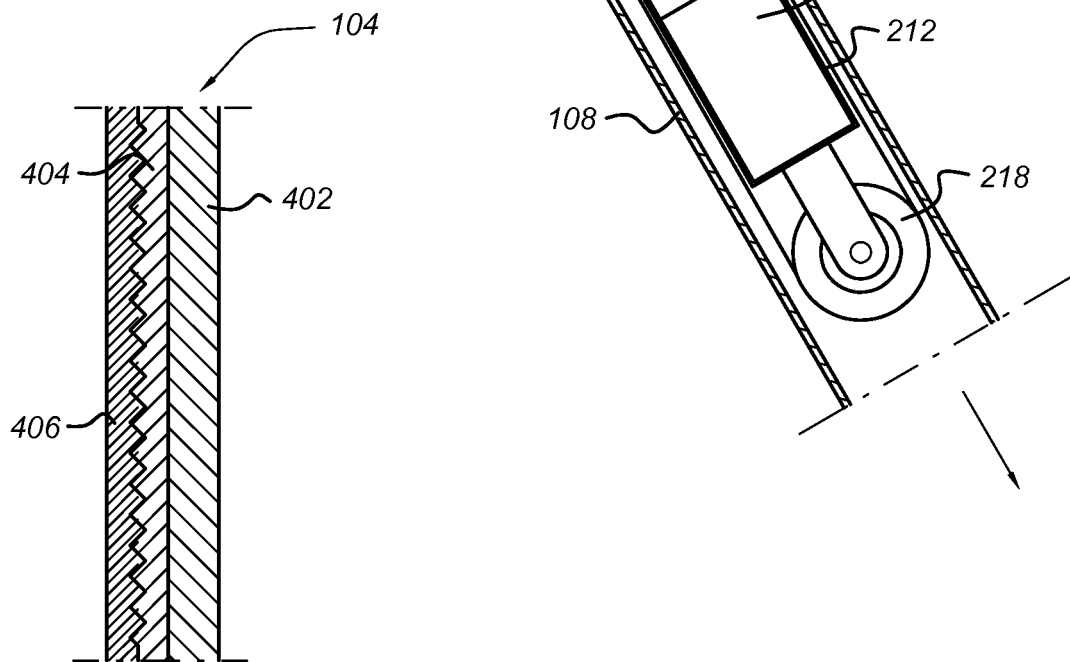
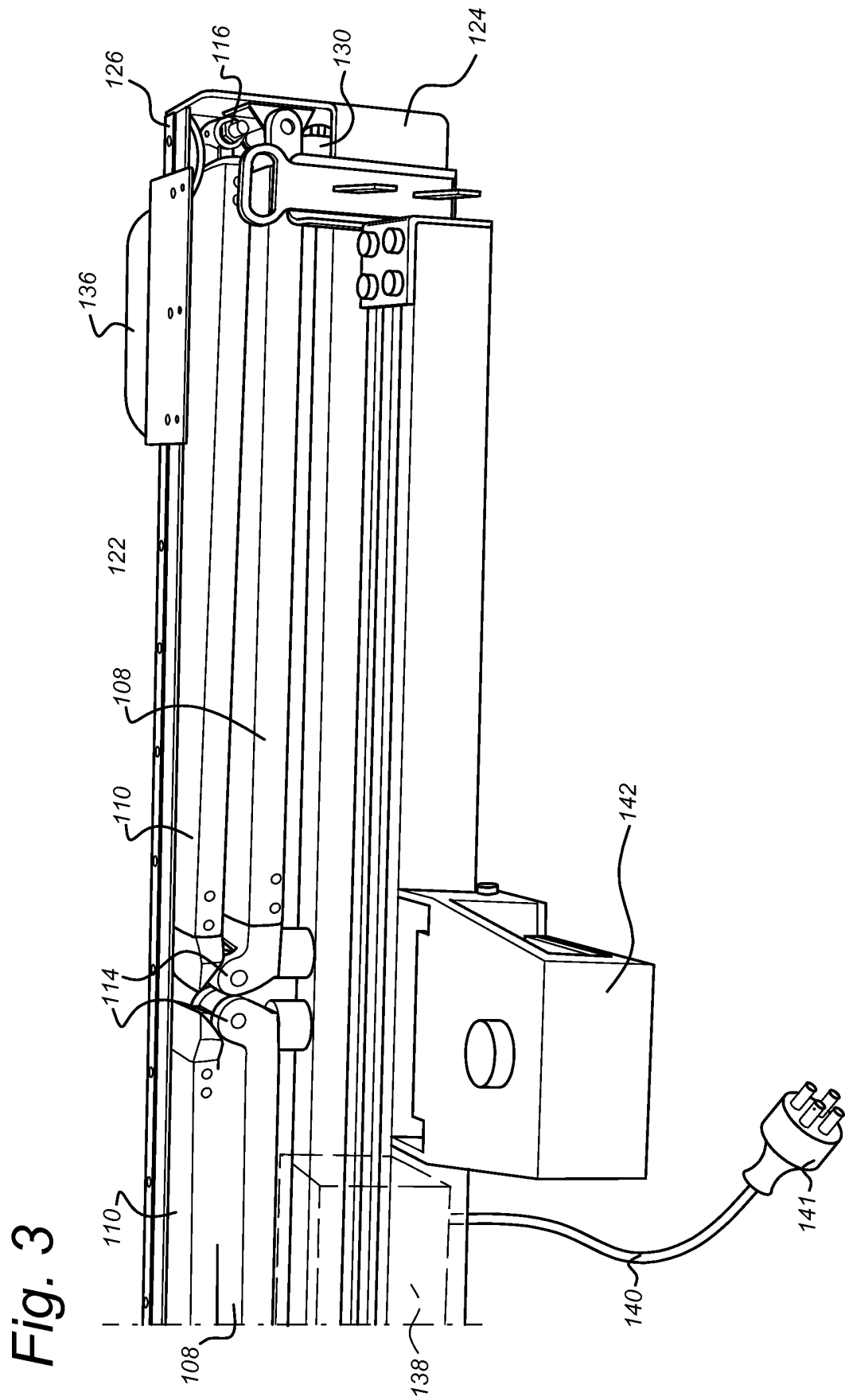


Fig. 4





REFERENCES CITED IN THE DESCRIPTION

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