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(71) Applicant: **Steelform Scandinavia AB**
360 30 Lammhult (SE)

(72) Inventor: **BLOMQVIST, Torbjörn**
SE-331 54 Värnamo (SE)

(74) Representative: **Pitkänen, Hannu Alpo Antero**
Patenttitoimisto Pitkänen Oy
P.O. Box 1188
70211 Kuopio (FI)

(54) Locking device for a swinging arm assembly

(57) Locking device for swinging arm assemblies to windows, doors, shutters or the like, where a casement (5), for instance a window casement, is pivotally suspended by two mirror symmetrical similar swinging arm assemblies (6), comprising one in the one frame plate (9) articulately attached blocking device (11), which blocking device comprises a lock recess (12) arranged to cooperate with a protruding holding element (13), and where the blocking device 11 is arranged to block the movement of the casement (5) both outwards and inwards relative the frame (1) an where the holding element (13) is arranged on an outer assembly arm (7), which assembly arm (7) is articulately arranged in the casement (5). By that the blocking device (11) locks principally between frame and casement, whereby a strong blocking function is obtained.

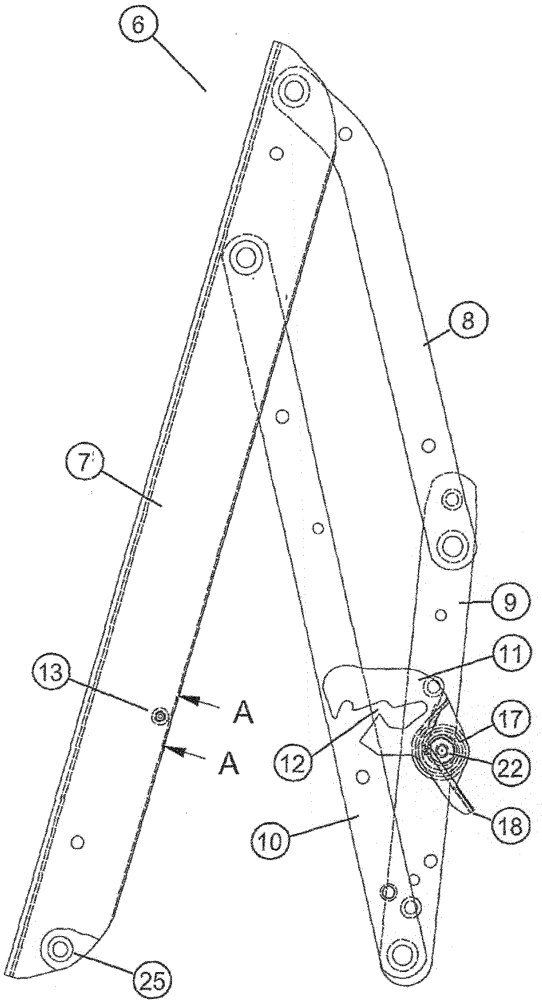

Fig. 2a

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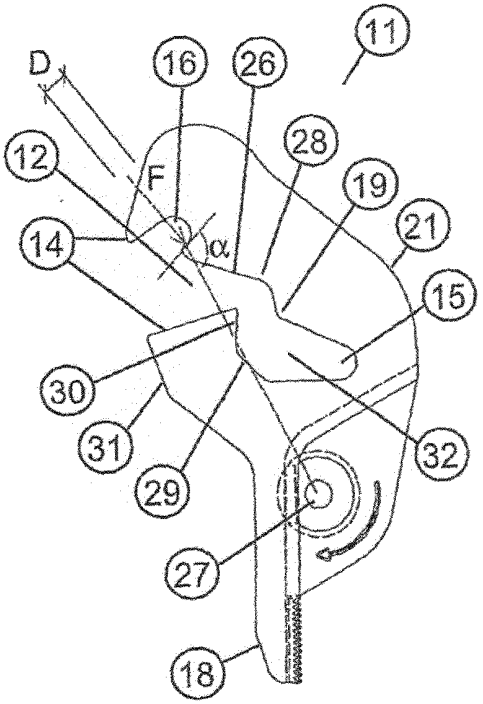
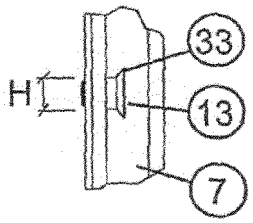


Fig. 2b



A-A

Fig. 2c

Description

Technical field

[0001] Present invention relates to a locking device for first of all swinging arm assemblies for windows, but also for doors or shutters and where one and the same locking device permits a so called childproof lock and at least one or more airing positions, i.e. more or less partly open positions.

Background of the invention

[0002] Swinging arm assemblies are especially used for windows where when the assemblies are mirror symmetrical and paired placed on the respective side of the window, between frame and casement. The swinging arm assembly allows that the window can be pivoted approximately 180 grades, or at least near 180 grades, in a way that the outside of the window easily can be cleaned from within. Principally the respective swinging arm assembly usually consists of an outer assembly arm, whose lower end is articulately fastened near the center of the lateral part of the casement. The upper end is articulately attached with an upper swinging arm, which in turn is articulately attached in its lower part, to one in the frame fixed arranged frame plate, at its upper part. In the lower part of the frame plate another, lower swinging arm is articulately attached and this is additionally in its upper part articulately attached to the outer assembly arm, somewhat below the attachment point of the upper swinging arm. From a security point of view pivotable windows must be provided with a so called childproof lock/child blocking device which foreto see that the window cannot be opened more than is provided by the norms (in Sweden 100 mm) in the lower edge outwards from the frame, without firstly in some way set this safety lock or block and earliest thereafter the window can by further opened. This is a measure of precaution to prevent foremost small children from opening the windows and fall out. Moreover it is usual to provide the swinging arm assembly with some form of airing assembly that prevent an undesired closing of the window, while the same is subjected to for example wind pressure, negative pressure or draught. It is also a risk for injuries caused by squeezing if the window can be closed out of control.

[0003] Known solutions of the above mentioned art is for instance SE 8902843-5 where a swinging arm assembly is provided with a childproof lock and a separate airing blocking device. The childproof lock consists in that case of a plate with a lock recess in the shape of a guiding groove and a nose, which nose guides a holding element in the shape of a stop rivet into the groove and the groove has a rest position for the rivet in the closed position of the window and also a blocking position for the childproof lock of the window. This solution has a separate airing blocking device in the shape of a foldable arm, which in the children blocked position is folded out and is clamped between the casement and the frame whereby the window is prevented from being unintentionally closed. With out-folded airing blocking device the window is locked for movements, both outwards and inwards, relative the frame. The Norwegian NO 320116 is further build on the childproof lock of the Swedish patent but differ from this by that here an additional, deep groove in the childproof lock is introduced together with the position of childproof blocking, whereby a fixed, locked position is obtained where the window is locked in both directions. In that way both the childproof lock and the airing blocking device is obtained with one and the same detail.

[0004] Mentioned solutions, but also other constructions of the above mentioned art are however marred by several imperfections and inconveniences. In several solutions the placement of the blocking device itself is such that it is difficult to handle, i.e. it is to high positioned, for instance articulately attached around the upper point of attachment of the swinging arm against the frame plate. The handling is particularly difficult by some combinations of size of the assembly in combination with the size of the window. It isn't unusual that furniture's such as a writing desk, a sofa or the like is placed in front of the window. It is then often easy to open the window to its blocked position where both the childproof lock and the airing blocking device can be active, but to thereafter at the same time reach and handle this blocking device simultaneously with the window to set the locked position free implies great difficulties. Indeed the handling of the blocking device can be slightly better if it were provided with for instance an extra long control handle or an extra control device in a favorable position, in such a way that the handling movement in one or another way is linked to the blocking device, but this implies a more costly and complicated construction that is more sensitive for clogging and dirt leading to that the mechanism seizes. In the one of above mentioned the airing blocking device is comprised of two details, a blocking arm together with a childproof lock, which is a disadvantage from the point of view of handling and the material. The second solution indeed consists of one detail but has the disadvantage that it always is blocked in airing position, apart from if this is desired or not, resulting in that the blocking device must be handled to make it possible to close the window. Another problem by existing blocking devices is that they do not securely engage when the casement is turned to a position for window cleaning. To secure the blocking position the window has to be turned almost 180 grades, which can be difficult while there are no handles within reach in this position. It is meant that the blocking device in this position will block by its own weight in its blocking position, but often the blocking devices seizes depending on dirt and the like and the casement must principally be rotated to 180 grades relative its closed position to urge the blocking device in locking position. Moreover older solutions exhibits lacks of resistance while for instance a deep groove, that constitutes the stop position, near the nose of the blocking device, impairs the resistance

at the nose part, whereby the blocking device can be broken by a bigger load. However, a break isn't the big problem but rather the resilience that occurs in the entire assembly by application of a force on the bottom piece of the casement. The force is taken up by the blocking device and its stop device, its holding element, that is situated near the middle on the longer assembly arm and this constructive design makes that long levers is obtained which results in that the entire assembly yields by loading. This in turn results in that the opening dimensions of the window in the lower edge and in the blocking position by load, without greater difficulties can be the double compared to its childproof locked and unloaded position, which results in that a good safety margin to the by norm permitted grade of opening must exists to manage the security demands, which so limits the real opening by the airing position.

Summary of the invention

[0005] With the present invention the aim is obtained to solve the above problems in the arrangement of the art that is mentioned in the preamble. Earlier solutions that are mentioned above, has a function of childproof block where a blocking hook/locking hook grips around a holding element, usually a stop rivet or the like. The holding element is in those older solutions placed on one of the swinging arms, usually the lower one of the two swinging arms and by that it is possible to press the casement outwards relative the frame despite of the blocking position, because the swinging arm assembly itself is resilient by the swinging arms. In the present invention a much stronger so called childproof block or opening block is obtained by that the holding element is placed on the outer assembly arm of the swinging arm assembly. In a similar way as in the older solutions the blocking device will be engaged with the holding element by that the holding element is guided into a lock recess, comprising a first end position for the rest position of the holding element and also a second end position arranged to a combined position/assignment for the childproof block and the airing block. By this second end position a blocking position is obtained between the frame plate that is fixed arranged in the frame and the outer assembly arm that is arranged in the casement, without long levers and without that the assembly will be resilient relative the blocking position. The nearer the holding element is placed relative the attachment between the outer assembly arm and the casement, the stronger the construction will be, resulting in a less possibility to resilience relative the blocking position. In addition less resilience in the assembly itself implies that the opening between the bottom piece of the casement and on the frame is not appreciably affected by the applied force whereby the safety margin the opening dimension in the blocked position related to demands and norms can be chosen otherwise. This leads to that a larger opening dimension can be allowed in the blocking or airing position, and/or that the freedom of choice of airing positions increases, i.e. more airing positions are allowed if it is desired. Not least it will be very difficult, not to say impossible for a small child to press up the window and fall out. In addition it will be difficult or almost impossible for a potential burglar to press himself through a blocked window. According to one form of execution the holding element is arranged on the casement and accordingly the blocking force is obtained between the frame plate that is fixed arranged in the frame and the casement, which gives a very strong and inelastic blocking.

[0006] According to a preferred form of execution of the invention the blocking device is articulately attached against the frame plate that is fixed arranged in the frame, between the points of attachment for the upper and lower swinging arms. In this way the blocking device will be lower situated in the construction and can so better be reached for handling, compared to older solutions where the blocking device is articulately attached around the upper point of attachment of the swinging arm against the frame plate. With this new placement of the blocking device is also obtained that the real, opening dimension between the bottom piece and the frame can be increased relative the opening dimension that is permitted by the norm, since the blocking device in that way grips lower on the outer assembly arm and by that also closer to its point of attachment against the casement implying that the lever that occurs between the holding element and the point of attachment against the casement will be shorter. Accordingly the placement is more favorable compared to older solutions where the blocking device is mounted around the upper point of attachment of the swinging arm and to difficult to reach.

[0007] To further increase the ability to reach the articulately attachment of the blocking device is in a preferred form of execution placed closer to the lower attachment of the swinging arm in the frame plate as the attachment of the upper swinging arm in the frame plate. This also results in that the blocking device grips further somewhat lower on the outer assembly arm and accordingly also closer to its point of attachment against the casement implying that the lever that occurs between the holding element and the point of attachment against the casement becomes shorter. Accordingly a stronger childproof blocking is obtained compared to older solutions.

[0008] The so called airing block, that prevents the window from closing in an uncontrolled way, isn't in any way "automatic" disengageable in earlier solutions, but the block must in one or another way be handled to be disengaged. In a preferred form of execution of the invention this disadvantage is achieved by that the placement of the holding element together with the design of the assignment in the lock recess of the block in the second end position, which constitutes the combined position for the function of the childproof block and the function of the airing block, makes that the closing force, i.e. usually the hand force, that acts on the casement in a towards the frame inwards movement by the closing, always acts

above the articulately attachment of the block. Accordingly the placement of the holding element and the design of the assignment at the blocking position, makes that the angle, situated in the force direction, and between the tangent to the point of action of the closing force, its center of rotation, and the center of the holding element in its position in the blocking position, is greater than 90°, which results in that the closing force always acts above the center of rotation. By that the blocking device automatically tries, by the closing movement, to be lifted from its blocking position and accordingly the blocking device can automatically be disengaged when a sufficient large force is applied inwards on the bottom piece of the casement. This eliminates the disadvantages that exist in the older solutions, where with a "two-handed grip" the blocking device must be disengaged at the same time as the casement is brought inwards to be closed. It is an advantage with this one-handed grip also from the handicap point of view, while the window can be closed without reaching the blocking device for disengagement of the locking.

[0009] In a preferred form of execution of the invention an blocking device that can be automatic disengaged is obtained by that the assignment in the lock recess in the blocking device, in its second end position, which constitutes the combined position for the function of the childproof block and the function of the airing block, is made sufficient shallow, whereby the closing force, i.e. usually the hand force, that acts on the casement in a towards the frame inwards movement by the closing, always acts above the articulately attachment of the block. This is made possible by adapting the deepness of the groove in this assignment where the deepness of the groove in that case is made smaller than the lateral dimension of the holding element, i.e. the lateral dimension or the height at that part of the holding element that rests in the assignment in the second end position, the combined position for the function of the childproof block and the function of the airing block. The all in all design is however well tested so that an adequate airing block is obtained. Preferable the holding element has a circular cross-section, where in that case the lateral dimension of the holding element in this case is the same as its diameter. Accordingly an airing block is obtained, which don't implies a totally fixed locked position but that is automatically disengaged when a sufficient force is applied inwards on the bottom piece of the casement. This eliminates the earlier mentioned disadvantages that exists in the older solutions, where one with a "two-handed grip" at the same time must disengage the blocking device and bring the casement inwards to close.

[0010] In a preferred form of execution the second end position, the combined position for the function of a childproof block and the function of an airing block has the shape of an open semicircle. Preferable the holding element has a circular cross section, and the shape is preferable coordinated with the semicircle of the second end position. The placement of the holding element and the semicircular shape of the second end position, where in addition the deepness of the second end position is slightly smaller than the diameter of the holding element, makes that the closing force, i.e. usually the hand force, that acts on the casement in a towards the frame inwards movement by the closing, always acts above the articulately attachment of the block, whereby an airing block is obtained that automatically can be disengaged. The all in all design is however well tested so that an adequate airing block is obtained.

[0011] According to a further preferred form of execution of the invention the locking device comprises a spring, mounted and clamped around the center of rotation of the blocking device. The spring is arranged to urge the blocking device to locking by that the clamped spring force will rotate the blocking device in direction to the holding element, and when the holding element, by the movement of the casement, comes to the blocking position the blocking device snaps into the holding element and then partly surrounds the same. In connection with the blocking device there is a stop lug which is fixed arranged in the frame plate, and which stop lug limits the movement of the blocking device to act within a predetermined area. The spring force also provides the advantage, compared to older solutions, that the blocking device locks earlier if the holding element in both the childproof position and the airing block position of the casement and in its reversed position, when the casement is rotated half a turn, for instance by window cleaning. By that the usual problem in older solutions is avoided that the casement, almost has to be rotated totally to its 180 grades position to make the blocking device in engagement with the holding element. It is difficult to grip around the window and to pivoting it to almost totally 180 grades relative its closed position. The blocking device in the new position snaps in an earlier position which means that the window don't has to be pivoted as much to obtain a locking of the casement in its turned position. In addition it is possible by the spring to choose how stiffly it has to be to close the window from its airing position by differently pre-stressing the spring. In addition a distinct snap sound can be heard when the blocking device reach a locked position around the holding element, which also facilitates for the user.

[0012] By that the combined blocking position (childproof block/airing block) don't allow for a appreciable resilience in the assembly itself, it is possible to choose a permitted opening dimension between the bottom piece of the casement and the frame, which is the same as or very close to the permitted, and not as in older solutions with a good margin to the permitted dimension. This also opens the possibility to introduce several airing positions between the outer positions for closed and blocked position. In a preferred form of execution the block the lock recess hence comprises two or more assignments between the outermost combined position for the childproof block or the airing block and the innermost rest position for the holding element. Those assignments are as well

as the outermost combined blocking position shallow, to allow for an automatic disengagement by closing or by opening to a larger desired grade of opening or to the childproof block position. Also here it is advantageous that the blocking device is provided with a spring which acts to hold the block against the holding element in the different positions with a predetermined force, but it isn't necessary for the function. To be able to open the window more than to the childproof block position the blocking device must in one or another way be disengaged from its blocking position at the same time as the casement is brought in a movement outwards relative the frame, whereby the holding element is allowed to leave the lock recess. In a preferred form of execution of the invention the blocking device comprises an actor, which preferable is a lever of optional length that is fixed arranged on the blocking device. The actor is arranged to rotate, by an applied force, the blocking device in a way that the hook/nose is lifted, whereby the blocking device with its blocking assignment leaves the holding element. By touching the casement outwards at the same time the holding element leaves the lock recess and the casement can continue its movement outwards, either to a larger opening or to be rotated circa half a turn to reach, for instance, the position for window cleaning or the like. If it is desired that the position for handling the blocking device has to be lower situated on the side of the frame, it is quite possible to move the actor further down along the frame and via linking devices move the movement at the actor to the blocking device. This can be desirable in some applications, such as handicap adapted applications and the like.

[0013] According to a preferred form of execution the locking device comprises a blocking device and more precise its lock recess, a first guide lug between the first end position/rest position for the holding element and the second end position/blocking position, which first guide lug is arranged to initiate a rotating movement of the blocking device when the casement with its blocking device moves towards the rest position, which is the closed position of the window. When the holding element is moved relative the blocking device in direction from the blocking position to the rest position a rotating rotary motion is initiated at the blocking device in upwards direction, relative the holding element and the window passes, by that the lock recess has an assigned first guide lug that lifts the blocking device, this first guide piece. The rotary motion then continue by that the blocking device has a rounded side which is directed to the frame and when the blocking device is in contact with the frame the rotary motion by the blocking device continue until the rest position for the blocking device, and hence also for the holding element, is occupied. This is advantageous compared to older solutions where the rotary motion is initiated only when the blocking device strikes the frame which increases the friction between assembly and frame leading to an increased wear.

[0014] According to one form of execution the lock recess of the blocking device comprises a second guide lug between the first end position/rest position and the lower of the guiding surfaces to the lock recess. This second guide lug is arranged to turn the blocking device so that the holding element, at its movement from the first end position/rest position to the second end position/blocking position, lands in the second end position/rest position. This is advantageous because the blocking device by this guiding securely will be engaged around the holding element also if the form of execution don't comprises a spring function, which is described above, or if the spring function of some reason would stop to work.

[0015] In a preferred form of execution the blocking device comprises stop side, below the lower guiding surface, i.e. below the opening or the lock recess. When the locking element works appropriate the blocking device is in such a position that the guiding surfaces, that are situated on both sides of the opening of the lock recess, guides the holding element into the lock recess, whereby the combined childproof block or the airing block start to works according to earlier description. To secure that the user notice if the blocking device of some reason don't works, i.e. that the blocking device has reached a position where it cannot start to work, the closing of the casement is prevented if the blocking device is fastened in vertical position, for instance owing to dirt or the like preferable at the articulately attachment of the blocking device. By that the holding element lands on the stop side of the blocking device, i.e. below the lower guiding surface, it's impossible to completely close the window and hence the user is noticed about the problem and has the possibility to do something about the problem if it is possible. This also means that if the window can be closed the blocking device works as is thought which gives an increased reliability.

[0016] In a preferred form of execution the lock recess of the blocking device in an area in which the holding element can be introduced from the side, i.e. approximately perpendicular relative the area of distribution of the blocking device. This is to also guarantee that the blocking device works if the window can be closed. This additionally security works in a way that if the casement of some reason isn't centered in the frame by closing, and this implies that the holding element by its movement inwards to the blocking device, misses the blocking device laterally, i.e. passes beside the blocking device, the holding element will still be brought into the lock recess of the blocking device, but then mainly from the side, i.e. perpendicular inwards top the blocking device and the lock recess. In the almost closed or totally closed position of the casement, there is no other possibility for the blocking device as to enter the lock recess and so the blocking function works also in these cases.

[0017] To secure that the blocking device don't slides off the holding element because of a lateral movement of the casement the holding element comprises in a preferred form of execution a flanging at the free end of the holding element, the opposite end relative that end that

is fixed arranged in the outer assembly arm. This flanging prevents the blocking device from sliding off the holding element in direction outwards to its free end.

[0018] According to a further preferred form of execution the locking device comprises an additional blocking device, i.e. both the mirror symmetrical similar respective frame plate of the swinging arm assembly comprises a blocking device with corresponding holding element placed on respective outer assembly arm. In this form of execution the placement of the holding element and corresponding blocking device, foremost vertically, is different on respective frame plate, whereby the advantage that the totally amount of blocking and airing positions is increased. In the scoop of the invention it is evident that the amount isn't limited to one blocking device per completely window, nor one blocking device/one holding element per frame plate, but the amount blocking devices/holding elements can be increased as required.

[0019] In a preferred form of execution both respective mirror symmetrical similar frame plates of the swinging arm assemblies comprises each a blocking device with corresponding holding element, but where the respective blocking device has different distances between its respective mounting point and the second end position/blocking position. Hence the advantage is obtained that the totally amount of blocking/airing positions is increased and can be varied according to requirements.

Brief description of the drawings

[0020] In detail represents in diametrical, partly schematic cross sections or perspective views:

- Figure 1a and 1b shows sections of a complete window with frame and one casement in opened position and blocked position, respective.
- Figure 2a-2c shows detail figures of the swinging arm assembly, blocking device and the holding element.

[0021] The constructive design of the present invention is described by the subsequent detailed description of examples of execution of the invention referring to the accompanying figures showing a preferred, but not limiting, example of execution of the invention. Moreover the invention brings the prior art in the field further in different respects. This is realized in the present invention by that the arrangement of the below described art mainly is constituted in a way that is evident from the characterized part of claim 1.

Detailed description of the drawings

[0022] Figure 1a shows a section through a complete frame 1 which comprises a lower part 2, an upper part 3 and two lateral parts 4. In the lateral parts a casement 5 is pivotally suspended by means of two mirror symmetrical similar swinging arm assemblies 6 each comprising one outer assembly arm 7, whose lower part is articulately attached, with a pivot pin 25, to the casement 5, near the center of the lateral part of the casement. In addition the swinging arm assembly 6 comprises an upper swinging arm 8 which in its upper end is articulately attached at the upper end of the outer assembly arm 7. The lower end of the upper swinging arm 8 is also articulately attached to a frame plate 9 that is fixed arranged in the frame. Further the swinging arm assembly 6 also comprises a lower swinging arm 10 which also is articulately attached at the upper end of the outer assembly arm 7, but below the upper attachment of the swinging arm 8. Further also the lower swinging arm 10 is articulately attached at the lower end of the frame plate 9. Between the points of attachment of the swinging arms to the frame plate 9 a blocking device 11 is articulately attached and preferable the point of attachment is placed slightly closer to the lower attachment of the swinging arm 10. On the outer assembly arm 7 also a holding element 13 is arranged, preferably below the center of the outer assembly arm 7. This holding element is preferable a stop rivet or the like and the blocking device 11 is arranged to grip around the holding element 13. According to the figure the window is in a position where the blocking device 11 is not in engagement with the holding element 13 but opened to a larger grade of opening. In this position the window is not blocked to movements but pivotal movable around its links either inwards to the frame to a blocked position or further to its closed position, alternatively a continued movement outwards to a larger grade of opening or to a turned around position (180 grades) for window cleaning or the like. Moreover a slipper 23 is found at the upper edge on each of the lateral pieces of the casement which slipper is arranged to slide in a groove 24 by the rotary motion of the casement. Hence the upper part of the casement 5 moves according to a linear movement along the lateral parts 4 of the frame, but the bottom piece of the casement 5 follows a circular orbit between its closed position and its inverted position.

[0023] **Figure 1b** shows the frame 1 with the casement 5 in its blocked position, which is a combined position for childproof blocking and airing. The childproof block position means that the casement 5 is blocked for a movement outwards relative the frame 1 and is a fixed position against a movement outwards, which is a security demand according to existing norms. In this position the blocking device 11 is, via one in the blocking device made recess, the lock recess 12, in engagement with the holding element 13, by that the lock recess 12 comprises an end position, an assignment, arranged for the holding element 13. Details about the blocking device 11 are evident from figure 2b. Safety instructions state a maximal dimension of the distance between the bottom piece of the casement 5 and the frame 1 and according to Swedish norms this dimension is 100 mm.

[0024] According to the preferred form of execution the childproof blocking position is combined with a position for airing, which means that the casement 5 also is more

or less prevented from a movement inwards to the frame 1. This is to prevent the window from to be shut by a wind load, pressure changes or the like, and so cause a risk of an accident or undesired closing of the window. Additional details about this are evident from the description of the blocking device in figures 2a-c.

[0025] Figure 2a shows a complete swinging arm assembly 6 in detail. The swinging arm assembly 6 comprises the outer assembly arm 7 which is articulately attached to the casement 5 (not shown) by means of the pivot pin 25, which is articulately attached on the lower end of the outer assembly arm 7. The outer assembly arm 7 is preferable a plate-like sheet detail with a flanged or bend edge, where the outer surface of the edge is arranged to flush with the outer surface of the casement in the closed position of the window. On this outer assembly arm 7 the holding element 13, preferable a stop rivet, is fixed arranged, preferable on the lower part of the outer assembly arm 7. At the upper end of the outer assembly arm 7 the swinging arms 8, 10 are articulately attached. The upper swinging arm 8 is articulately attached uppermost on the outer assembly arm and just below the upper swinging arm 8 the lower swinging arm 10 is articulately attached. Moreover the swinging arm assembly 6 comprises the frame plate 9 which is fixed arranged at the lateral part 4 of the frame (not shown), and which frame plate 9 at its upper end comprises an articulately attachment of the upper swinging arm 8 and at the lower end of the frame plate 9 the lower swinging arm 10 is articulately attached. Between the attachments in the frame plate the blocking device 11 is articulately attached, and around the attachment of the blocking device a spring 17 is clamped. The spring grips around the blocking device in a way that the clamped spring force tries to rotate the blocking device in direction forwards/downwards relative the placement of the blocking device in the frame and in the casement, to urge the blocking device in this way in engagement around the holding element 13 when this is guided into the lock recess 12 of the blocking device. In the figure the blocking device 11 is not in engagement with the holding element 1, but this is shown in figure 1b. The blocking device 11 also comprises an actor 18, which preferable is a lever that is fixed arranged on the blocking device. In connection with the blocking device 11 there is a stop lug, not visible in the figure, which limits the rotary motion of the blocking device forwards/downwards.

[0026] **Figure 2b** shows the blocking device 11 in detail in the preferred form of execution. The blocking device 11 has a plate-like appearance and is preferable a stamped out sheet detail, but can for that matter also consists of plastic or another suitable material. The blocking device 11 has a rounded side 21, which is directed towards the frame side in the complete frame construction and moreover also a rounded shape at the side that is directed towards the casement 5 or the outer assembly arm 7 with its holding element 13. Moreover this side also comprises guiding surfaces 14 on each side of the, preferable stamped out, lock recess 12 in the blocking device 11. These guiding surfaces 14 are arranged to guide the holding element into the lock recess 12, by a movement of the casement 5 in direction towards the frame 1. The lock recess 12 comprises a first end position 15, which is a rest position for the holding element 13, by the closed position of the window, and a second end position 16, which is a position for the combined childproof blocking position and the airing block. Between the end positions, at the upper side 28 of the lock recess, there is a sliding surface 26 between the end positions. The sliding surface also comprises a first guide piece 19 which make the blocking device to initiate a lifting and rotary motion when the holding element 13 passes the first guide piece 19. Also the opposite, lower side 29 of the lock recess comprises a sliding surface, that is arranged for the sliding/guiding of the holding element and this sliding surface comprises a second guide piece 30, arranged to guide the holding element 13 upwards to the upper sliding surface by that the surface is pivoted in direction to the upper sliding surface 26. The second end position 16 is an assignment, which is shallow regarding to the side that is directed towards the first end position and towards the sliding surface. The assignment has a deepness D relative the sliding surface 26, which deepness is smaller than the lateral dimension H of the holding element 13. This lateral dimension is preferable the same as the diameter of the holding element if the holding element has a circular cross section. The assignment/the second end position 16 can itself also be provided with lateral edges with some inclination instead of as according to the figure b in the shape of a approximate half circular arc. The opposite side relative the shallow edge, the side that is directed towards the guiding surfaces 14, is provided with a high edge that constitutes a "nose" or a hook. The blocking device 11 also comprises a recess 27 for an articulately mounted attachment to the frame plate 9 and the actor 18, arranged to handle the blocking device 11 by pressing towards the casement 5, whereby the blocking device 11 is disengaged relative the holding element 13, and the blocking function is disengaged.

[0027] Fig 2c shows the holding element 13 in detail. The holding element 13 is preferable a stop rivet with a flanging 33 at its outer, free end. The holding element is in its second end fixed arranged on the outer assembly arm 7, preferable on its lower half. The lateral dimension H of the holding element is preferable larger than the deepness D of the second end position and moreover the length of the holding element 13 must be slightly larger than the thickness of the blocking device 11, to permit that the blocking device will grip the holding element 13.

Summary of the function according to the preferred form of execution

[0028] With the casement 5 in its initial position, the closed position of the window, is initiated by opening the movement of the casement outwards, relative the frame

1, after disengagement of the locking by means of the handle of the window (not shown). With this the movement of the holding element 13 is initiated from the first end position 15 in direction towards the second end position 16, whereby the holding element slides along either of the two sliding surfaces to thereafter reach the second end position 16, which is the combined position for childproof block and airing block. By this outward movement is it to begin the childproof block that grips and since the blocking device 11 is provided with a high stop side, a "nose" the movement of the holding element outwards is stopped and so also the movement of the complete casement 5. Because the blocking device 11 is spring loaded, via the spring 17, the blocking device tries to be in engagement with the holding element 13 which in that way occupies the second end position 16. A secure function of the childproof block is hence obtained because the movement of the casement 5 is now prevented to continue its upward directed movement. The spring 17 improves the function and gives a distinct snapping loud by a correct blocking position, but the blocking function also works without the spring depending on mounting and guiding by the shape of the lock recess. If one wish to continue the movement of the casement 5 outwards to open the window further, the blocking device 11 must be disengaged from the holding element 13 by means of the actor 18, which then is pressed in direction towards the casement, whereby the blocking device 11 is lifted by the holding element and the casement can be pressed outwards.

[0029] If the movement of the casement 5 begins in the open position of the window where the casement is in a position totally out of the blocking device and the blocking positions and thereafter continues towards the frame 1, until the totally closed position of the window, the following will occur in proper order. The spring loaded blocking device 11 is in this position arranged and in a position to automatic guide the holding element 13 into the lock recess 12, when the blocking device and holding element is in contact with each other. When the holding element 13 enter the lock recess 12 the blocking device 11 snaps, because of the spring 17, down to the holding element 13 and engages around the same and the holding element 13 is hereby in the second end position 16. If one which to continue the movement of the casement until closed position it is only to continue applying the inwards directed force on the bottom piece of the casement 5, whereby the blocking device 11, by sufficient force, is lifted by the holding element 13. This is made possible while the assignment, the second end position 16 is shallow at the side that holds against the force, which is described above. According to the preferred form of execution the spring force is clamped to a tested force for adapting it to a selectable inert resistance. When the holding element 13 thereafter leaves the second end position 16 and is moved towards the first end position 15 the holding element 13 3 passes if necessary additionally one or several shallow assignments, (not shown in this form of execution), which in that case only works as supplementary airing positions. At the continued movement of the holding element 13 the blocking device 11 is rotated towards its rest position to a nearly vertical position and finally the holding element 13 occupies the first end position 15. The rotary motion of the blocking device is provided by a combination of the guiding in the lock recess and in the later part of the rotary motion, the rounded outside of the blocking device 11, which touch the frame and assist to complete the rotary motion.

[0030] In the second end position 16, the combined position for childproof block and airing the airing function is active insofar that either only via the assignment itself or in combination with the spring 17 there is an opposite directed force making the movement of the casement 5 inwards to the frame 1 more difficult. This force is adjustable by means of the spring 17 and since the assignment is shallow the airing block can be automatic disengaged, only by overcome the opposite directed force, in contrast to other solutions, which is an obvious user friendly function. As pointed out before it is completely possible within the scoop of the inventive idea to allow the airing positions to be several in numbers.

[0031] If by one or another reason the blocking device 11 isn't in the right position by closing the window, for instance depending on dirt, so that the blocking device 11 seizes, and the blocking device thereby is in a vertical position the holding element 13 will, at the closing movement of the casement, hit a stop side 31 on the blocking device 11, below the opening to the lock recess 12 and in that case the window cannot be completely closed. In this way it is indicated that the blocking device doesn't work fully, which in this way makes that it will be self regulating for the user to control that the childproof block works. Hence there is an extra security that indicates if the window can be closed then the childproof block works.

[0032] In the inverted position of the window, for instance when window cleaning has to be done, the functions are the same as above. One advantage is in that case that the spring 17 exactly as at the normal position looks for that the blocking device 11 grips principally immediately when the holding element 13 enter the lock recess 12, which makes the locking taking place a bit before a complete rotation of the casement 5 to 180 grades relative the closed position of the casement.

Component list

[0033]

1	frame
2	lower part of the frame
3	upper part of the frame
4	lateral parts of the frame
5	casement
6	swinging arm assembly
7	outer assembly arm

8 upper swinging arm
9 frame plate
10 lower swinging arm
11 blocking device
12 lock recess
13 holding element
14 guiding surfaces
15 first end position
16 second end position
17 spring
18 actor
19 first guide piece
20 stop piece
21 rounded side
22 articulated attachment
23 slipper
24 groove
25 pivot pin
26 sliding surface
27 recess
28 upper side of the lock recess
29 lower side of the lock recess
30 second guide piece
31 stop side
32 area
33 flanging

Claims

1. Locking device for swinging arm assemblies to windows, doors, shutters or the like, where for instance the window consists of a frame (1), with a lower part (2), an upper part (3) and two lateral parts (4) in which the lateral parts a casement (5), for instance a window casement, is pivotally suspended by two mirror symmetrical similar swinging arm assemblies (6), each comprising an outer assembly arm (7), whose lower part is articulately attached to the casement (5) close to the center of the lateral parts of the casement and the upper part of an upper swinging arm (8), which swinging arm in its second, lower end is articulately attached at the upper end of one in the frame fixed arranged frame plate (9), and at the lower end of the frame plate (9) the lower end of a lower swinging arm (10) is articulately attached, and the upper end of the lower swinging arm (10) is articulately attached at the upper part of the outer assembly arm (7), but below the attachment of the upper swinging arm (8) in the outer assembly arm (7), and in addition the locking device comprises at least one in the one frame plate (9) articulately attached blocking device (11), which blocking device comprises a lock recess (12) arranged to cooperate with one preferable perpendicular, to the outer assembly arm (7) and its plane protruding holding element (13), and where the lock recess (12) comprises upper and lower guiding surfaces (14) on both sides of the lock recess (12), arranged to guide in the holding element (13) in the lock recess, and that the lock recess comprises a first inner end position (15), closest to the articulately attachment (22) of the blocking device, for the rest position of the holding element (13), at the closed position of the window, and a second end position (16) for the holding element (13), arranged to block the movement of the casement (5) outwards as well as inwards relative the frame (1), **characterized in that** the holding element (13) is arranged on the outer assembly arm (7).

2. Device according to claim 1, **characterized in that** the blocking device (11) locks between the frame plate (9) and the casement (5), by that the holding element (13) is arranged on the casement (5).

3. Device according to claim 1 or 2, **characterized in that** the articulately attachment (22) of the blocking device (11) on the frame plate (9) is situated between the attachments of the upper swinging arm (8) and the lower swinging arm (10) in the frame plate (9).

4. Device according to claim 3, **characterized in that** the articulately attachment (22) of the blocking device (11) is placed closer to the attachment in the frame plate (9) of the lower swinging arm (10) than the attachment of the upper swinging arm (8) in the frame plate (9).

5. Device according to any of claims 1-4, **characterized in that** the position on attachment point of the holding element (13) on the outer assembly arm (7) together with the design of the groove of the second end position (16), is arranged in a way that the angle (α), situated in the force direction and between the tangent to the point of action of the closing force (F), between the holding element (13) and the groove side of the second end position (16), and a line between the center of the blocking device (11) and the holding element (13) is larger than 90°, when the holding element (13) is in the second end position (16) and closing of the casement (5) is initiated, which implies that the closing force (F) always acts above the articulately attachment (22) of the blocking device (11).

6. Device according to any of claims 1-5, **characterized in that** the groove depth (D) of the second end position (16) is smaller than the lateral dimension (H) of the holding element (13).

7. Device according to any of claims 1-6, **characterized in that** the second end position (16) has the shape of an open semi circle.

8. Device according to any of claims 1-7, **characterized in that** the locking device is provided with a

spring (17), which, by constricted spring force, is arranged to press the blocking device (11) against its locking position relative the holding element (13) whereby the blocking device will be in engagement with the holding element (13).

9. Device according to any of claims 1-8, **characterized in that** the lock recess (12) comprises several end positions/blocking positions arranged between the first end position (15) and the second end position (16).

10. Device according to any of claims 1-9, **characterized in that** the blocking device (11) comprises an actuator (18), that is designed to make the blocking device (11) free from the engagement with the holding element (13).

11. Device according to any of claims 1-10, **characterized in that** the lock recess (12) is arranged with a first guide piece (19) between the first end position (15) and the second end position (16), which first guide piece (19) is arranged to initiate the pivoting movement of the blocking device (11) to the rest position, i.e. the position of the holding element (13) in the first end position (15), when the holding element (13) is moved from the second end position (16) in direction to the first end position (15).

12. Device according to any of claims 1-11, **characterized in that** the lock recess (12) comprises a second guide piece (30) between the first end position (15) and the lower one of the guiding surfaces (14), which second guide piece (30) is arranged to guide the pivoting of the blocking device (11), when the holding element (13) is moved from the first end position (15) in direction to the second end position (16), resulting **in that** the blocking device (11) will be in engagement with the holding element (13) in the second end position (16).

13. Device according to any of claims 1-12, **characterized in that** the blocking device (11) comprises a blocking side (31), below the lower one of the guiding surfaces (14), which blocking side is arranged to prevent the casement (5) to occupy its totally closed position against the frame (1) if the blocking function didn't had a possibility to become operative because the blocking device of some reason is jammed in its rest position, in vertical position, by that the holding element (13) by the closing movement and with the blocking device (11) in this position, meets the blocking side (31), whereby the blocking device prevents a further closing movement of the casement (5).

14. Device according to any of claims 1-13, **characterized in that** the lock recess (12) comprises an area (32), that is arranged between the first guide piece (19), the second guide piece (30) and the first end position (15), which area is combined with the size of the holding element (13) so that the holding element can be brought into this area, from the side, almost perpendicular relative the surface of the blocking device (11).

15. Device according to any of claims 1-14, **characterized in that** the holding element (13) at its outer, free end comprises a flanging (33) that prevents the blocking device (11) from sliding off from the holding element (13) outwards from the holding element.

16. Device according to any of claims 1-15, **characterized in that** the two mirror symmetrical similar swinging arm assemblies (6), each comprises at least one blocking device (11), that is arranged on respective frame plate (9), and that the placement of the respective blocking device (11) and coordinated holding elements (13) is different on each frame plate (9), whereby the entire amount of blocking positions increases.

17. Device according to any of claims 1-15, **characterized in that** the two mirror symmetrical similar swinging arm assemblies (6), each comprises at least one blocking device (11), that is arranged on respective frame plate (9), and that the distance between the respective center of rotation of the blocking devices (11) and the second blocking position (16), is different on the respective blocking device of the frame plate (9), whereby the totally amount of blocking positions increases.

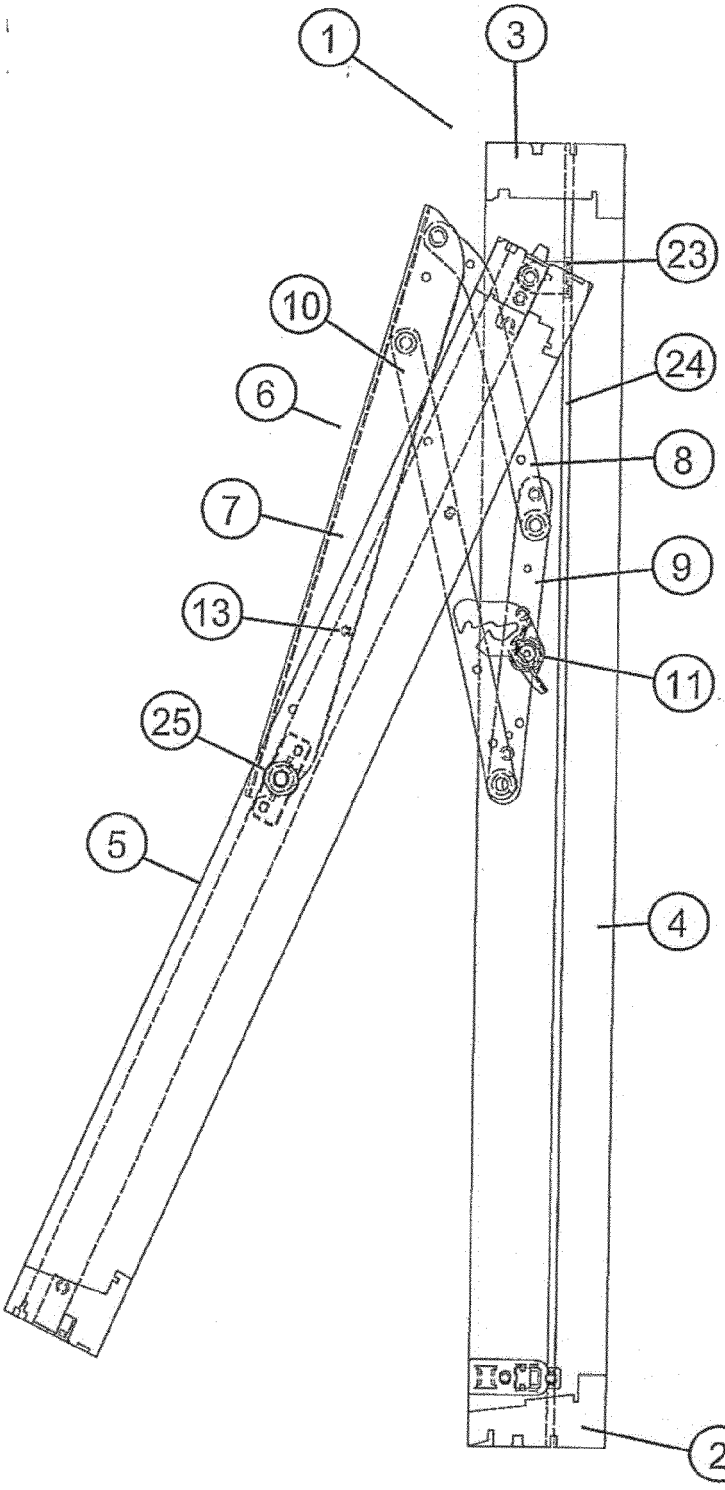


Fig. 1a

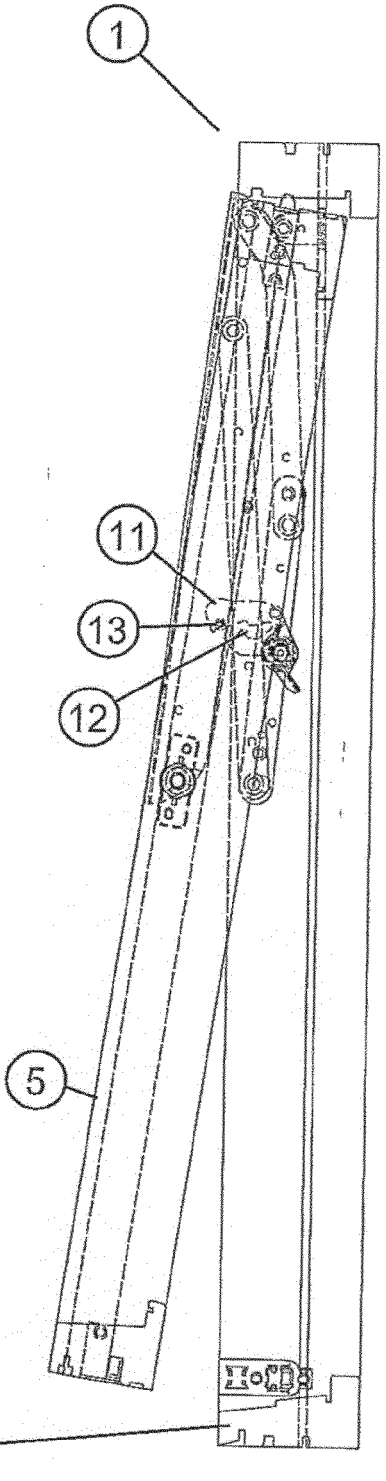


Fig. 1b

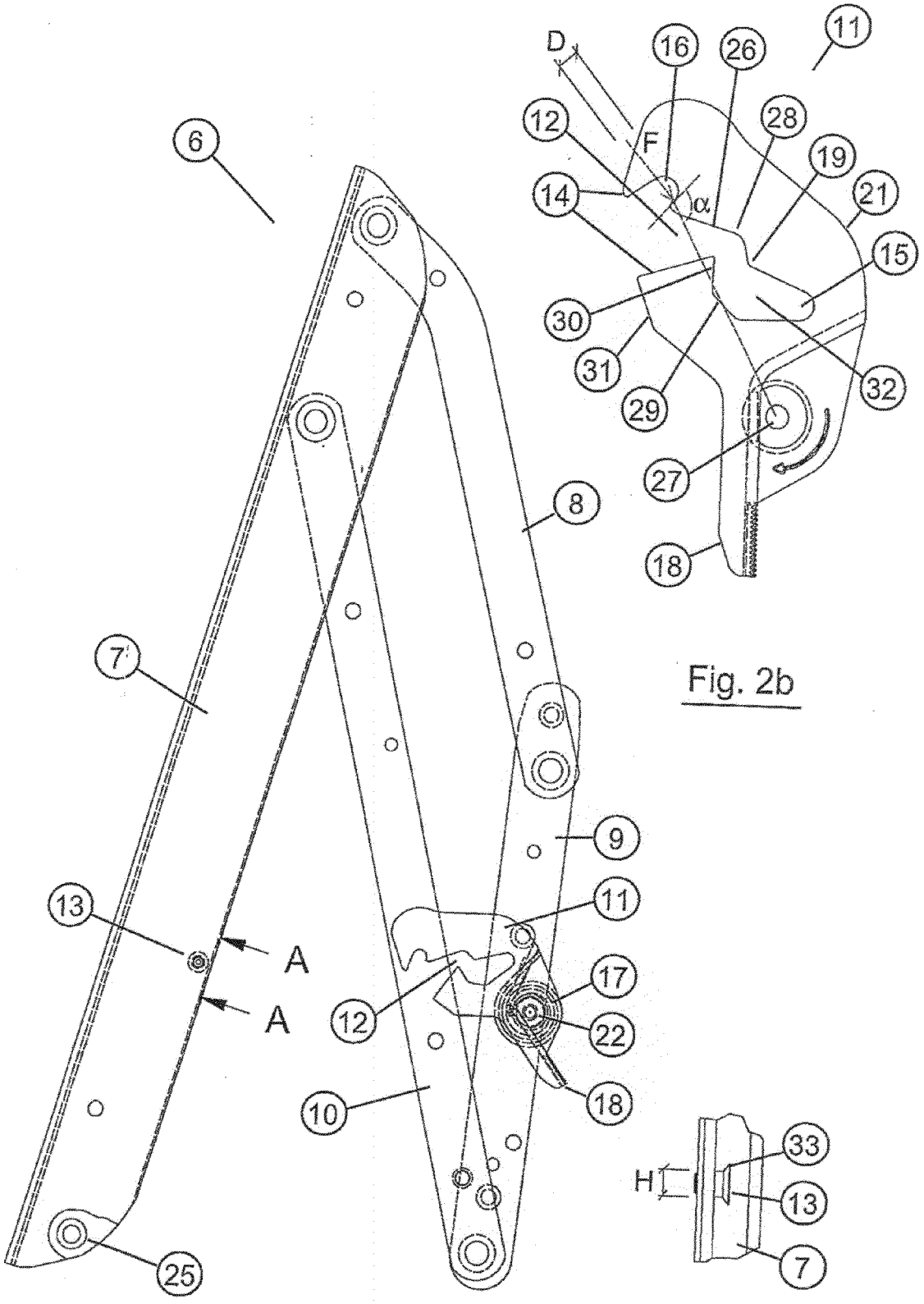


Fig. 2b

Fig. 2a

A-A

Fig. 2c

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- NO 320116 **[0003]**