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(54) **Scissor-like attic stairs**

Scherenartige Dachbodenleiter

Escaliers de comble élévateurs

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(73) Proprietor: **Fakro PP Spolka Z O.O.**

33-300 Nowy Sacz (PL)

(72) Inventors:

- **Kasinski, Bogdan**
34-601, Limanowa (PL)
- **Musial, Henryk**
32-020, Wieliczka (PL)

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Description

[0001] The invention applies to attic stairs with a scissor-like ladder with such a mechanism locking the ladder in retracted position, that it prevents self-acting expansion of the ladder from its retracted state, but at the same time, it enables easy, effortless release from the locks when the user expands it.

[0002] Known are attic stairs with a scissor-like ladder of the companies JAP or Minka, consisting of a stairframe and a ceiling flap closing the hatch underside joined by hinges with the hatch frame, comprising a scissor-like ladder connected at one end with the flap near the hinges. The flap is provided with a balancing system, which eases operation of the stairs and pulls the flap to the frame in closed position and in open position protects the stairs from unintentional closing. The side parts of the scissor ladder consist of two parallel pantographs with ladder steps set between them. The free ends of the pantographs are fitted with runners or sliding elements supporting the ladder on the floor when extended. On the upper surface of the flap, at a suitable distance from the connection with the ladder, are set one long or two short sill elements arranged along one line together with the abutment surface of the flap at the hinge side and the sliding surface on the opposite side. The abutment side constitutes an obtuse angle with the surface of the flap. The divergence of the obtuse angle is such that the runners or the sliding elements resting on the abutment surface keep the ladder in retracted position, but move without much resistance beyond the sill element when pulled by the user.

[0003] In order to expand the scissors-like ladder, the flap is to be opened and the ladder pulled down, then the runners or the sliding elements move along the abutment surface and slide beyond the sill element. The ladder being pulled by the user unfolds to an adequate length and comes to rest on the floor. When ending stairs use, the ladder is to be collapsed and the runners or sliding elements led beyond the sill element, moving them over the abutment surface; then, the flap is to be closed.

[0004] US2050593 discloses scissor-like attic stairs which have hatch frame closed underneath by flap connected with the hatch frame by hinges. The upper surface of the flap close to the hinges is connected with one end of a scissor-like ladder in form of two parallel pantograph with steps set between them. The lower joints of the ladder are provided with sliding or rolling elements which cooperate with track means provided on the flap. The ladder is also being provided with at least one catching element which locks the ladder in retracted position and at least one sill element with an abutting surface being fixed to the flap in suitable distance from the fixture of the ladder of the flap.

[0005] In order to expand the scissor-like ladder the flap is to be opened and the ladder pulled down. The sliding elements ride upon rollers and the ladder being pulled by the user unfolds to an adequate length and

comes to rest on the floor. This is also supported by the counterbalancing device mounted within upper floor structure. This solution requires lot of space in the upper floor and also does not provide sufficient safety during unfolding and can endanger the user.

[0006] Known are also attic stairs of the company Columbus Treppen consisting of a hatch frame and a ceiling flap closing the hatch underside connected to the frame with hinges, and of a scissor-like ladder, which at one end is connected with the flap, close to the hinges. The flap is provided with a balancing system, which eases operation and pulls the flap to the frame when in closed position and protects it from unintentional closing when open. The side elements of the scissor-like ladder consist of two parallel pantographs with the ladder steps being set between them. A bar parallel to the ladder steps interconnects the free ends of the pantographs. The bar ends are provided with runners and between there is an so axially arranged cylindrical element. On the flap surface, at an adequate distance from its connection with the ladder, there is a sill element with an abutting surface on the side of the hinges and a sliding surface on the opposite side. The abutting surface of the sill element constitutes an obtuse angle with the surface of the flap. The cylindrical element mates with the sill element. The divergence of the angle between the abutting surface and the surface of the flap is adjusted so that the cylindrical element resting at the abutting surface of the sill element keeps the ladder in retracted position, but it moves without much resistance beyond the sill element when the user pulls the ladder down.

[0007] In order to extend the scissor-like ladder, the flap is to be opened and the ladder pulled down. The cylindrical element moves then over the abutment surface and rises beyond the sill element, and then, the ladder being pulled by the user, extends to the proper length and comes to rest on the floor. When ending usage of the stairs, the ladder is to be collapsed and the cylindrical element inserted by moving it along the sliding surface and beyond the sill element; then, the flap is to be closed.

[0008] The sill elements with abutting surfaces made along the solutions described above keep the scissor-like ladder in retracted position when the flap is being opened gently, but when lowering the flap violently, the runners or the sliding elements can accidentally move over the abutment surface and get beyond the sill element. The ladder starts then to expand under its own weight, which can endanger the users.

[0009] Known are also stairs in form of a scissor-like ladder set on a supporting structure consisting of two parallel rails, which at one end are connected by hinges with the hatch frame and at the opposite end are interconnected by a flat bar. The flat bar is provided with two sill elements having an abutment surface on the side of the hinges and a sliding surface on the opposite side. The abutting surface constitutes an acute angle with the surface of the flat bar and plays the role of a catch.

[0010] The side elements of the scissor-like ladder

consist of two parallel pantographs with the ladder steps set between them. The pantographs are connected at one end with the supporting structure consisting of rails close to the flap hinges, and a bar parallel to the ladder steps interconnects the free ends of the pantographs. The bar ends are provided with runners, which move along the rail structure. The bar interconnecting the ends of the side elements of the scissor-like ladder is being inserted under the catches of the sill elements. It firmly keeps the ladder in retracted position, preventing accidental disengagement when moving the rail structure.

[0011] In order to unfold the scissor-like ladder, the supporting structure with the ladder shall be lowered. Then the free end of the ladder is to be released from under the catches by pushing the bar up, moving it over the sill elements and pulling it down. The ladder extends then to the proper length and the runners come to rest on the floor. Upon ending usage of the stairs, the ladder is to be collapsed pushing the bar over the sliding sill elements until it comes under the catches, which locks the ladder in retracted position. Such a solution prevents self-acting accidental release of the ladder even in case of rapid lowering of the supporting structure, but requires application of a great force by the user when releasing the ladder from the lock.

[0012] The essence of the invention consists in providing the scissor-like ladder attic stairs with such a mechanism locking the ladder in retracted position, that it prevents self-acting expansion of the ladder from its retracted state, but at the same time, it enables easy, effortless release from the locks when the user expands it.

[0013] The scissor-like attic stairs according to the invention consist of a hatch frame with a flap closing the flap from underside and of a scissor-like ladder with a bar, which facilitates stretching the stairs. The flap is connected with the hatch frame by means of hinges. The stairs are provided with a balancing system, limiting the flap opening angle, which eases operation of the stairs and protects the flap from unintentional opening or closing.

[0014] The scissor-like ladder is at one end connected with the upper surface of the flap, close to the hinges. At least one sill element is located on the surface of the flap at a suitable distance from the place where the ladder is attached. On the bottom surface of the flap there is a grip making it possible to operate the flap using an operating rod.

[0015] The scissor-like ladder consists of two parallel pantographs interconnected by the ladder steps. On the side of their free end, the pantographs are connected by a bar, which is cranked in its central part. On the bar, there is fixed at least one catching element, which mates with a suitable sill element on the flap. Besides, the end elements of the pantographs are fitted with runners resting on the floor when the ladder is expanded.

[0016] In order to expand the scissor-like ladder, the flap with the ladder is to be opened and the operating rod shall be hooked on the cranked bar and pulled down,

which causes the bar to turn about its axis. Together with the bar, turn also all catching elements attached to it. The catching element and the sill element are shaped so that the catching element rises over the sill element when the bar is being turned, and then slides along the sliding surface beyond the sill element, unlocking the ladder.

[0017] In order to collapse the scissor-like ladder, the operating rod shall be hooked at the crank of the bar and pushed up; the bar turns then round, and all catching elements fitted to it move into a position, which enables easy putting them beyond the sill element.

[0018] The scissor-like stairs according to the invention are presented as an example of execution in the drawing, in which Fig. 1 shows in axonometric view the attic stairs with the flap opened and the scissor-like ladder in locked, closed position, Fig. 2 shows in side view the attic stairs with the flap opened and the scissor-like ladder in locked, closed position, Fig. 3 shows in side view the details B1, B2, and B3 presenting the stages of releasing the scissor-like ladder, and Fig. 4 presents the detail C of the ladder in side view when it is being collapsed.

[0019] The scissor-like attic stairs have a hatch frame 1 connected by hinges with the flap 2 closing access to the attic from the underside. The scissor-like ladder 3 is connected at one end with the upper side of the flap 2. The flap is provided with a balancing system 4 limiting the opening angle of the flap 2 and easing operation of the stairs, as well as protecting them against unintentional opening or closing. The flap 2 is provided with a grip 5, serving to operate the stairs using the operating rod 6.

[0020] The side elements of the scissor-like ladder 3 consist of two pantographs 3a interconnected by the steps 3b. The pantographs 3a are composed of S-shaped elements. The ends of the last, free elements of the pantographs 3a are connected together by a bar 7, cranked in its central part. On the bar 7, at both sides of the crank, are set the catching elements 7a, the cross-section of which has the shape of the letter 'b' and the bar 7 passing through its oval part. The pantographs 3a are fitted with the runners 8, which rest on the floor when the ladder 3 is expanded. On the surface of the flap 2, at a suitable distance from the connection with scissor-like ladder 3 are located two sill elements 9, having the form of a right-angled triangle in their section parallel to the side elements of the ladder.

[0021] The sill elements 9 on their side facing the hinges connecting the flap with the hatch frame have an abutting surface, which is perpendicular to the surface of the flap and curves towards the adjoining sliding surface. In the abutting surface there is an arched recess 9a, the form of which corresponds with the oval part of the catching element 7a. The recess 9a of the sill element 9 and the catching element 7a mate together.

[0022] When the scissor-like stairs are out of use, the flap 2 adheres to the hatch frame 1, and the scissor-like ladder 3 rests within the hatch frame 1. The oval part of the catching element 7a stays in the recess 9a, and the rounded part protruding out of the oval part of the element

7 adheres to the curved transition between the abutting surface with the recess 9a and the sliding surface of the element 9. In order to expand the stairs, the operating rod 6 is to be hooked on the grip 5 of the flap 2 and pulled down, which forces the bar 6 to turn so as to open the flap 2 completely. The operating rod 6 is then to be hooked on the crank of the bar 7 and pulled down, which forces the bar 7 to turn round together with its catching elements 7a. Since the rounded part of the elements 7a is supported by the arched transition zone between the abutting surface with recess 9a and the sliding surface of the sill element 9, so turning of the bar 7 causes the oval part of elements 7a to raise over the recesses 9a, and the elements 7a to slide along the sliding surface of the sill elements 9. The liberated ladder 3, pulled by the operating rod 6, expands to the required length. In order to collapse the stairs, the scissor-like ladder is to be pushed up by hooking the operating rod 6 on the cranking of the bar 7; the bar 7 turns round and the elements 7a get into a position making it easy to place them into the recesses 9a. The ladder is then locked in closed position and the flap 2 can be closed.

Claims

1. A scissor-like attic stairs having a hatch frame (1) closed underneath by a flap (2) connected with the hatch frame (1) by hinges, and an upper surface of the flap (2), close to the hinges, being connected with one end of a scissor-like ladder (3) in form of two parallel pantographs (3a) with steps set between them, the ladder (3) being provided with at least one catching element (7a) locking the ladder (3) in retracted position and at least one sill element (9) with an abutting surface being fixed to the flap (2) in suitable distance from the fixture of the ladder on the flap (2), the sill element (9) mating with catching element (7a) when the ladder is being collapsed or expanded and the sill element (9) locking the ladder when the stairs are retracted, **characterized in that** the pantographs (3a) at their free end are interconnected by a bar (7), cranked in its central part, which is provided with the at least one catching element (7a) which is fixed on the bar (7), the catching element (7a) cooperating with the at least one sill element (9) set on the flap (2), so that the bar (7) together with the sill element (9) forms such a kinematic system that turning round the bar (7) pulled at its crank forces the catching element (7a) to turn and to move in relation of the sill element (9), releasing by this the ladder (3) from its lock and enabling to expand the ladder (3).
2. Scissor-like attic stairs according to claim 1 **characterized in that** the sill element (9) has in its cross-section parallel to side element of the ladder (3) a triangular profile and has an abutting surface on the

side of the hinges connecting the flap (2) with the hatch frame (1), which surface passes arch wise into an adjoining sliding surface forming an acute angle with the surface of the flap (2).

3. Scissor-like attic stairs according to claim 2 **characterized in that** the abutting surface of the sill element (9) forms a right angle with the surface of the flap (2).
4. Scissor-like attic stairs according to claim 2 **characterized in that** the abutting surface of the sill element (9) forms with surface of the flap (2) an angle close to a right one.
5. Scissor-like attic stairs according to claim 2 **characterized in that** the catching element (7a) consists of a single-arm lever supported by the abutting surface, and its free end is directed towards the sliding surface.
6. Scissor-like attic stairs according to claim 5 **characterized in that** the free end of the catching element (7a) protrudes beyond the arched transition between the abutting and the sliding surfaces.
7. Scissor-like attic stairs according to claim 1 **characterized in that** the abutting surface of the sill element (9) has a concave recess (9a), and the bottom surface of the catching element (7a) copies the form of the abutting surface of element (9), to which it adheres.
8. Scissor-like attic stairs according to claim 7 **characterized in that** the catching element (7a) has in its cross-section perpendicular to the bar (7) the outline of the letter 'b', the bar (7) passing through the oval part of the catching element (7a).
9. Scissor-like attic stairs according to claim 1 **characterized in that** the catching element (7a) has in its cross-section perpendicular to the bar (7) the outline of the letter 'b', the bar (7) passing through the oval part of the catching element (7a), while in the abutting surface of the sill element (9) there is a recess (9a), which mates with the oval part of the catching element (7a), and the remaining part of the catching element (7a) mates with the sill element (9) in its part between the abutting surface and the sliding surface.
10. Scissor-like attic stairs according to claim 8 **characterized in that** the part of the catching element (7a) protruding out of the oval part mates with the arched surface of the sill element (9) between its abutting and sliding surfaces.

Patentansprüche

1. Die Dachboden-Scherentreppe verfügt über eine mit der Klappe (2) von unten verschließbare Zarge (1), die mittels Scharniere an die Klappe (2) befestigt ist, wobei eine Scherentreppe (3) in Form von zwei parallelen Pantografen (3a) mit den dazwischen eingesetzten Leiterstufen mit einem Ende an die obere Fläche der Klappe (2) in der Nähe der Scharniere verbunden ist; darüber hinaus verfügt die Leiter (3) über mindestens ein Anhakelement (7a), welches die Leiter (3) in eingeklappter Lage verriegelt; dabei ist mindestens ein Schwellenelement (9) mit einer Anschlagfläche von der Scharnierseite her und einer daran benachbarten Gleitfläche in entsprechendem Abstand von der Befestigung der Leiter an die Klappe (2) eingesetzt, wobei das Schwellenelement (9) während des Ein- und Ausklappens der Leiter mit dem Anhakelement (7a) zusammenwirkt und das Schwellenelement (9) die Leiter in eingeklappter Treppenlage blockiert, **gekennzeichnet dadurch, dass** die Pantografen (3a) von der Seite des freien Endes her über einen Stab (7) mit der Kurbelkröpfung im Mittelbereich verbunden sind, wobei der Stab (7) über mindestens ein am Stab (7) befestigtes Anhakelement (7a) verfügt, wobei das Anhakelement (7a) mit dem an der Klappe (2) befindlichen Schwellenelement (9) so zusammenwirkt, dass der Stab (7) samt dem Schwellenelement (9) ein derartiges kinematisches System bildet, dass eine durch Heranziehen des ausgekröpften Teils des Stabes (7) bewirkte Umdrehung desselben eine Umdrehung und Verlagerung des Anhakelements (7a) gegen das Schwellenelement (9) erzwingt und die Freigabe der Treppe (3) aus der blockierten Lage her sowie deren Ausklappen ermöglicht.
2. Dachboden-Scherentreppe nach Anspruch 1 **gekennzeichnet dadurch, dass** das Schwellenelement (9) eine Dreieckkontur in dem zu den Seitenteilen der Leiter (3) parallelen Querschnitt aufweist und über eine Anschlagfläche von der Seite der die Klappe (2) mit der Zarge (1) verbindenden Scharniere her verfügt, die in einem Bogen in die daran benachbarte Gleitfläche übergeht, die einen spitzen Winkel mit der Oberfläche der Klappe (2) bildet.
3. Dachboden-Scherentreppe nach Anspruch 2 **gekennzeichnet dadurch, dass** die Anschlagfläche des Schwellenelements (9) einen rechten Winkel mit der Oberfläche der Klappe (2) bildet.
4. Dachboden-Scherentreppe nach Anspruch 2 **gekennzeichnet dadurch, dass** die Anschlagfläche des Schwellenelements (9) einen beinahe rechten Winkel mit der Oberfläche der Klappe (2) bildet.
5. Dachboden-Scherentreppe nach Anspruch 2 **gekennzeichnet dadurch, dass** das Anhakelement (7a) einen an der Anschlagfläche abgestützten einarmigen Hebel darstellt, wobei dessen freies Ende in Richtung der Gleitfläche zeigt.
6. Dachboden-Scherentreppe nach Anspruch 5 **gekennzeichnet dadurch, dass** das freie Ende des Anhakelements (7a) über den Bogenübergang zwischen der Anschlag- und der Gleitfläche hinaus heraussteht.
7. Dachboden-Scherentreppe nach Anspruch 1 **gekennzeichnet dadurch, dass** die Anschlagfläche des Schwellenelements (9) eine Bogenaussparung (9a) aufweist, deren Form dem ovalen Bereich der unteren Fläche des Anhakelements (7a) entspricht, die an der Anschlagfläche des Schwellenelements (9) anliegt.
8. Dachboden-Scherentreppe nach Anspruch 7 **gekennzeichnet dadurch, dass** das Anhakelement (7a) die Kontur des Buchstabens 'b' in dem zum Stab (7) parallelen Querschnitt aufweist, wobei der Stab (7) durch den ovalen Teil des Anhakelements (7a) hindurchgeht.
9. Dachboden-Scherentreppe nach Anspruch 1 **gekennzeichnet dadurch, dass** das Anhakelement (7a) die Kontur des Buchstabens 'b' in dem zum Stab (7) parallelen Querschnitt aufweist, wobei der Stab (7) durch den ovalen Teil des Anhakelements (7a) hindurchgeht, und eine Aussparung (9a) in der Anschlagfläche des Schwellenelements (9) vorhanden ist, die mit dem ovalen Bereich des Anhakelements (9) zusammenwirkt, und der sonstige Teil dieses Anhakelements (7a) mit dem Schwellenelement (9) im Bereich zwischen der Anschlagfläche und der Gleitfläche zusammenwirkt.
10. Dachboden-Scherentreppe nach Anspruch 8 **gekennzeichnet dadurch, dass** der aus dem ovalen Bereich herausstehende Teil des Anhakelements (7a) mit der Bogenfläche zwischen der Anschlag- und der Gleitfläche des Elements (9) zusammenwirkt.

Revendications

1. Escalier escamotable en ciseaux pour grenier est équipé d'un dormant (1) fermé par en-dessous par une trappe (2) reliée à ce dormant (1) au moyen de charnières, et à proximité des charnières une extrémité de l'échelle en ciseaux (3) est reliée à la surface supérieure de la trappe (2) sous forme des pantographes parallèles (3a), entre lesquels sont posées les marches d'échelle, en outre, l'échelle (3) est équipée d'un moins un élément d'attache (7a) ver-

- rouillant l'échelle (3) en position pliée, et, à une distance appropriée au point de fixation de l'échelle, sur la trappe (2) est monté au moins un élément de seuil (9) avec la face d'appui du côté des charnières et avec la surface de glissement contiguë, et, pendant le pliage et le dépliage de l'échelle, l'élément de seuil (9) coopère avec l'élément d'attache (7a), et l'élément de seuil (9) bloque l'échelle lorsque l'escalier est en position plié, **caractérisé en ce que** les pantographes (3a), du côté de l'extrémité libre, sont reliés entre eux au moyen d'une barre (7) ayant une partie coudée dans la zone centrale, et la barre (7) est équipée d'au moins un élément d'attache (7a) fixé sur la barre (7), et l'élément d'attache (7a) coopère avec l'élément de seuil (9) qui se trouve sur la trappe (2), de telle façon que la barre (7) avec l'élément de seuil (9) forment un système cinématique, et la rotation de la barre (7), provoquée en tirant sa partie coudée, force la rotation et le déplacement de l'élément d'attache (7a) par rapport à l'élément de seuil et entraîne le déverrouillage de l'escalier (3) permettant son dépliage.
2. Escalier escamotable en ciseaux pour grenier selon la revendication 1, **caractérisé en ce que** l'élément de seuil (9) se présente, dans un plan parallèle aux éléments latéraux de l'échelle (3), sous la forme d'un triangle et possède la surface d'appui du côté des charnières qui lient la trappe (2) avec le dormant (1), laquelle passe de façon arquée à la surface de glissement contiguë formant avec la surface de la trappe (2) un angle aigu.
3. Escalier escamotable en ciseaux pour grenier selon la revendication 1, **caractérisé en ce que** la face d'appui de l'élément de seuil (9) est sous un angle droit par rapport à la surface de la trappe (2).
4. Escalier escamotable en ciseaux pour grenier selon la revendication 2 **caractérisé en ce que** la face d'appui de l'élément de seuil (9) est sous un angle proche de l'angle droit par rapport à la surface de la trappe (2).
5. Escalier escamotable en ciseaux pour grenier selon la revendication 2 **caractérisé en ce que** l'élément d'attache (7a) est constitué par un levier à un seul bras soutenu par la surface d'appui, et son extrémité libre est orientée vers la surface de glissement.
6. Escalier escamotable en ciseaux pour grenier selon la revendication 5 **caractérisé en ce que** l'extrémité libre de l'élément d'attache (7a) fait saillie hors du passage arqué entre la surface d'appui et la surface de glissement.
7. Escalier escamotable en ciseaux pour grenier selon la revendication 1 **caractérisé en ce que** la surface d'appui de l'élément de seuil (9) possède un évidement arqué (9a) qui se présente sous la forme correspondant à la partie ovale inférieure de surface de l'élément d'attache (7a) contiguë à la surface d'appui de l'élément de seuil (9).
8. Escalier escamotable en ciseaux pour grenier selon la revendication 7 **caractérisé en ce que** l'élément d'attache (7a) se présente, dans un plan perpendiculaire à la barre (7), sous la forme d'une lettre « b », et la barre (7) passe par la partie ovale de l'élément d'attache (7a).
9. Escalier escamotable en ciseaux pour grenier selon la revendication 1 **caractérisé en ce que** l'élément d'attache (7a) se présente, dans un plan perpendiculaire à la barre (7), sous la forme d'une lettre « b », et la barre (7) passe par la partie ovale de l'élément d'attache (7a), et sur la surface d'appui de l'élément de seuil (9) il y a un évidement (9a) qui coopère avec la partie ovale de l'élément d'attache (7a) ; la partie restante de cet élément d'attache (7a) coopère avec l'élément de seuil (9) dans la zone entre la surface d'appui et la surface de glissement.
10. Escalier escamotable en ciseaux pour grenier selon la revendication 8 **caractérisé en ce qu'**une partie de l'élément d'attache (7a) faisant saillie de la partie ovale coopère avec la surface arquée entre la surface d'appui et la surface de glissement de l'élément (9).

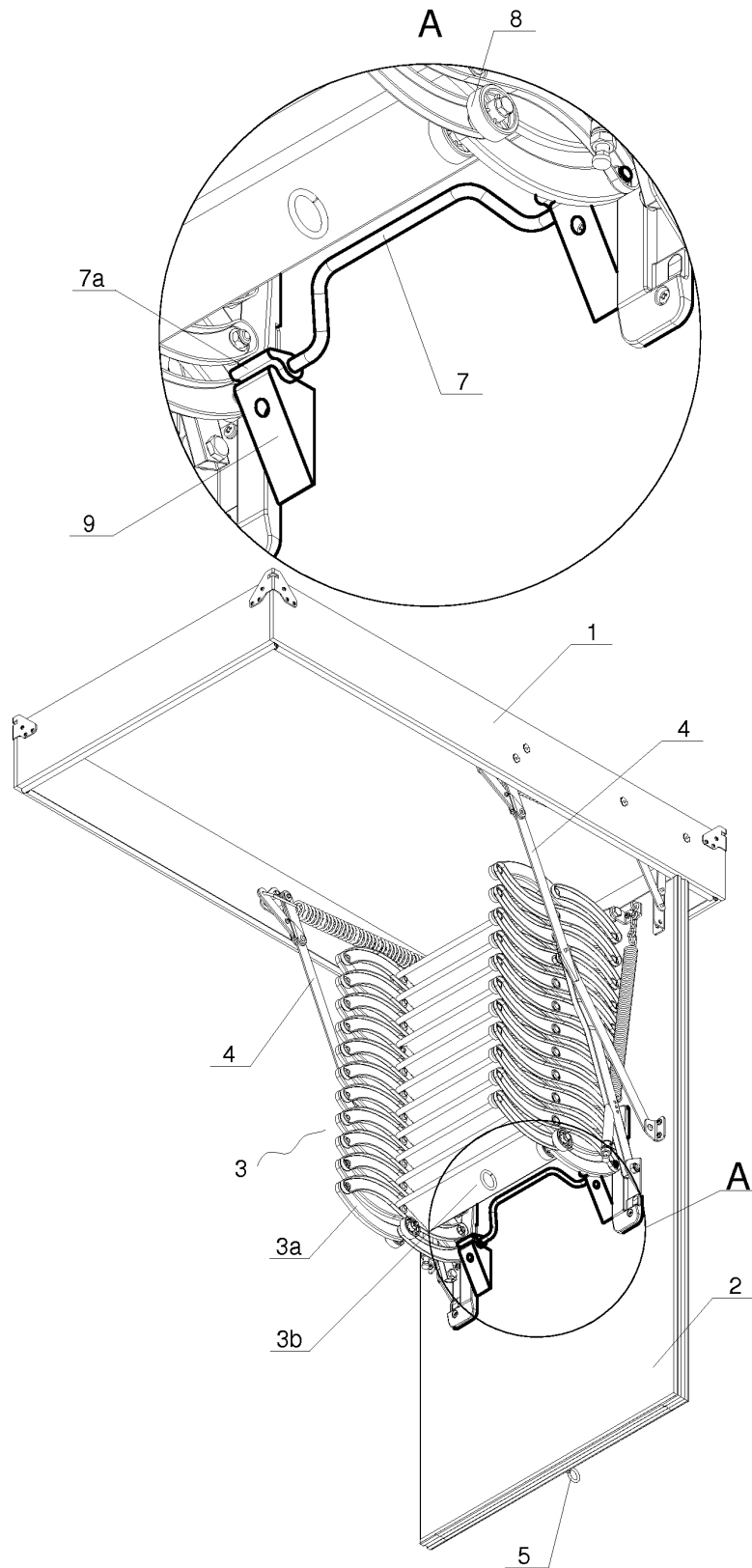


Fig. 1

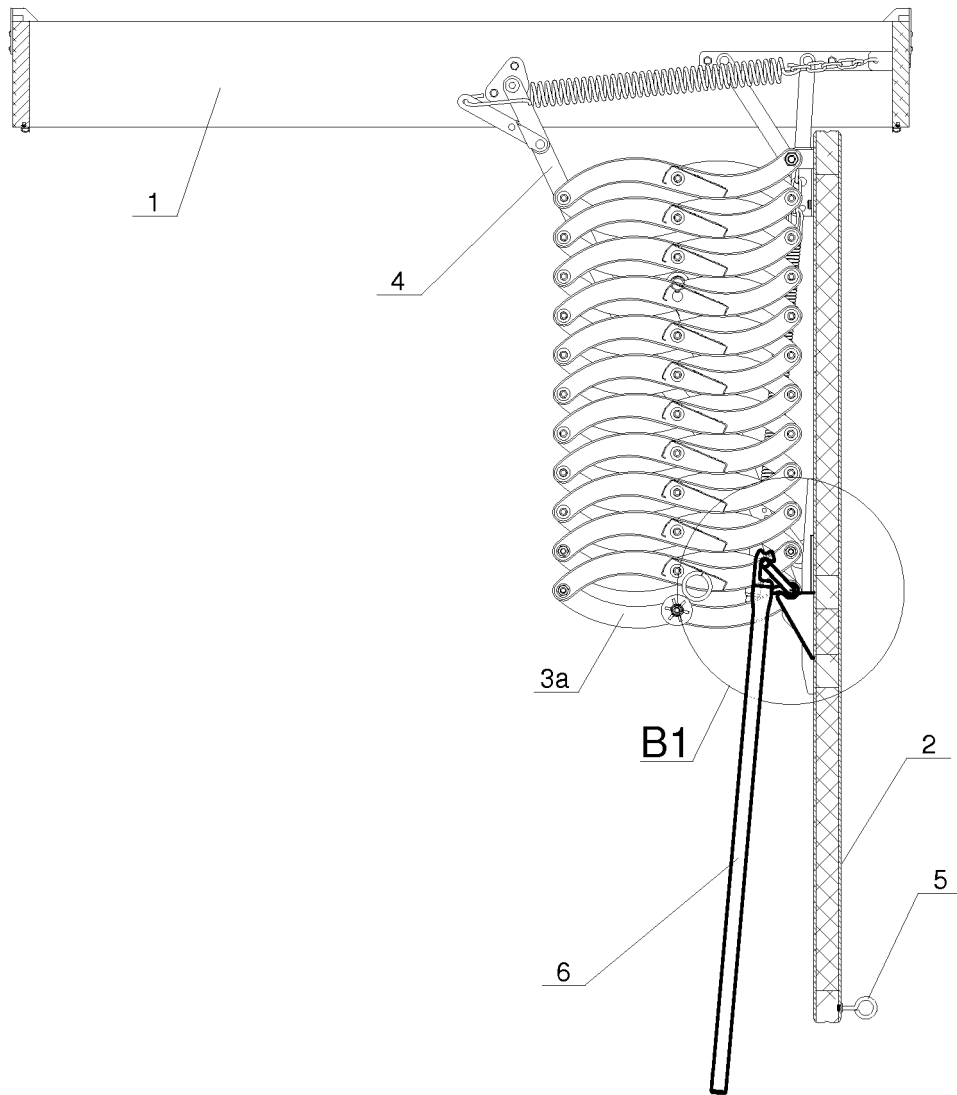
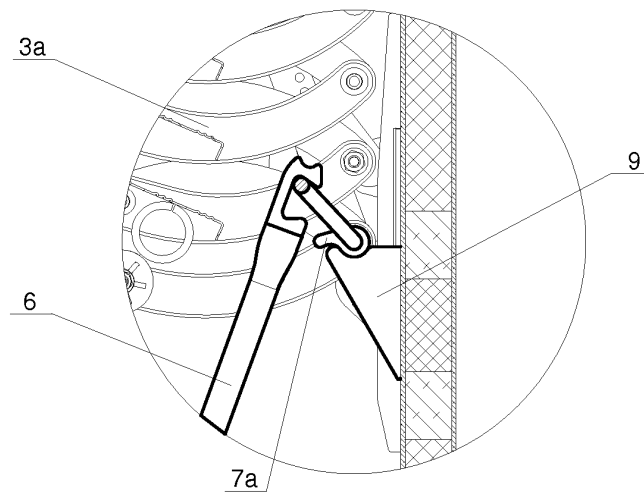
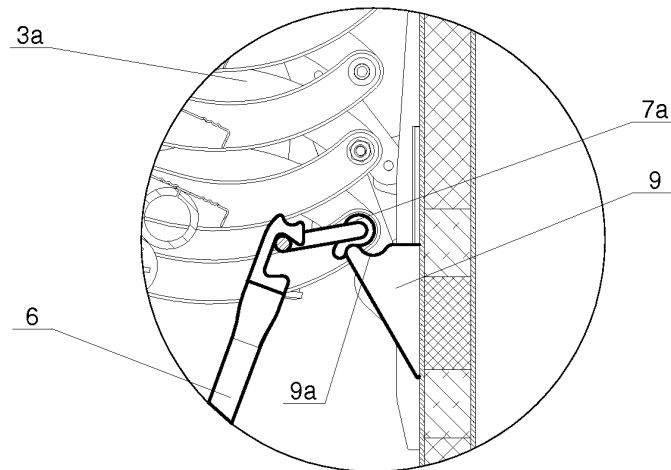


Fig. 2

B1



B2



B3

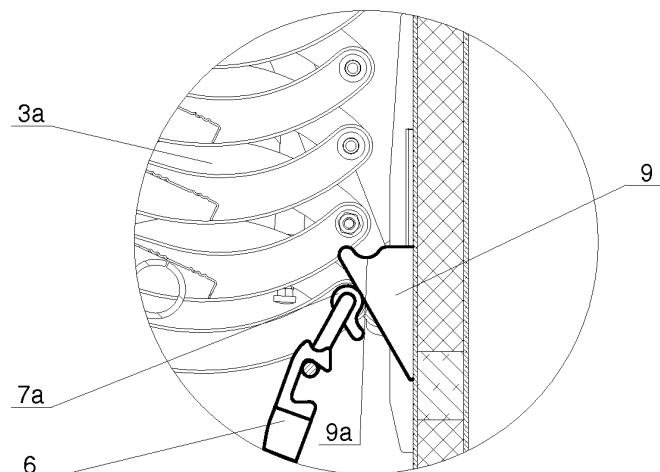


Fig. 3

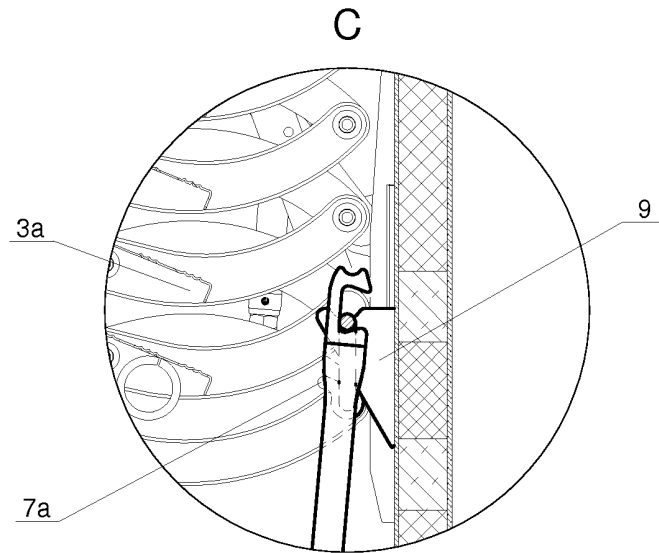


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2050593 A [0004]