



(11)

EP 2 378 052 A2

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.10.2011 Bulletin 2011/42

(51) Int Cl.:
E06C 1/383 (2006.01)

(21) Application number: **11382109.4**

(22) Date of filing: **13.04.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(30) Priority: **15.04.2010 ES 201030550**

(54) **Folding stepladder**

(57) This comprises at least one pair of lateral stile posts (2) holding a set of rungs (7). Each of these rungs is subdivided into a pair of half-rungs (9), articulated in respect of one of said stile posts (2, 3), with each of said half-rungs (9) being in the same shape and thickness as the other half-rung (9). These half-rungs are articulated to at least one plate (10) for connecting these together, the plates (10) for each of the rungs (10) not having any kind of joining stay between them. Each half-rung (9) has multiple supports and at least one of these has a securing device; this comprises a hook (20) for locking in the folded position, and a handle (22) for transporting this.

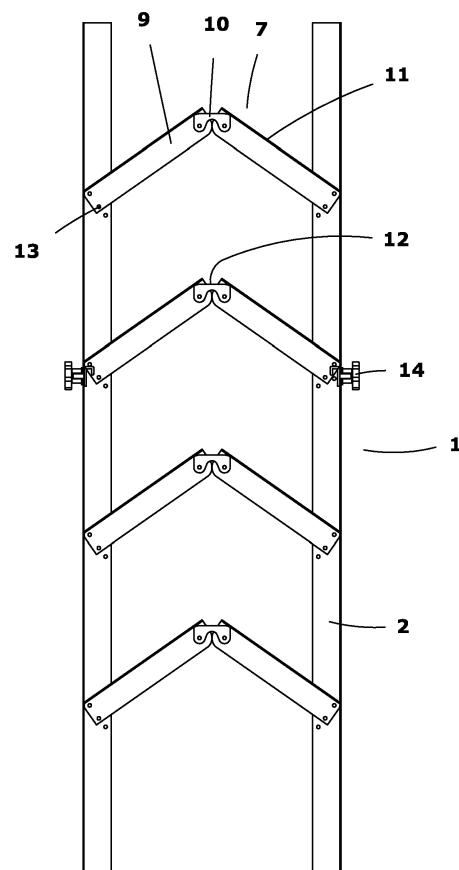


Fig. 5

Description

[0001] This invention covers an enhanced folding trestle stepladder which can be folded on two planes in respect of an upper axis, and whose rungs or treads can also be folded, meaning that after being folded this forms a slim compact structure.

State of the art

[0002] Different folding stepladders have been made over time. ES 284515 U discloses a folding portable stepladder in a single section, whose rungs are divided into two halves articulated with each other at the centre, and articulated to two lateral structures in a "U" shape. The set of rungs has a central stay connecting all the rungs. It needs a lower bracket for supporting the lowest rung and the central stay.

[0003] ES 290028 U discloses a folding stepladder similar to the previous one, but which is provided with two planes folding with each other, each of these having a layout similar to the one in the utility model described above.

[0004] ES 291090 U discloses a folding stepladder, similar to the previous ones, but in which the central stay also constitutes a support leg for standing on the ground.

[0005] ES 293776 U discloses a folding stepladder with an upper support base that is also foldable.

[0006] ES 294026 U discloses a folding stepladder similar to the previous ones in which there is a bush for limiting the movement of the central stay.

[0007] ES 295824 U describes a folding stepladder similar to the previous ones, but in which the rear part is provided with a pair of support props articulated together half way up their height and to the rear side of the ladder structure.

[0008] In all these stepladders the articulation of one of the parts of the rungs is inside the other part of said rungs. Furthermore none of said stepladders has any safety device preventing any total or partial unwanted folding of the rungs, for example when the stepladder has to be moved a few metres to go on with a particular job.

[0009] ES 1047652 U describes a folding stepladder in which the rungs are not divided into articulated halves.

Description of the invention

[0010] This invention covers a folding stepladder which has the following advantages over the preceding ones:

- Each half-rung or tread is identical to the complementary half-rung;
- It does not require a central stay for securing the half-rungs, thus increasing the useful surface area of the relevant rung;
- The join between the half-rungs prevents any excess

movement in the unfolding and prevents the stepladder from swaying in its unfolded position;

- The stepladder comprises an anti-folding safety device;
- The stepladder comprises an anti-unfolding safety device;
- The stepladder is fitted with a transport handle;
- It provides perfect adjustment and fixing of the upper articulation, thanks to a plate with a double articulation in respect of each of the planes of the stepladder;
- It comprises an unfolding base on each of its sides for better stability in its support on the ground.

[0011] The stepladder consists of one or two pairs of stile posts formed of "C" shaped profiles, with the gaps in these facing each other; each of the pairs constitutes one of the two planes forming the stepladder, forming an acute angle in respect of each other when this is in its open position. In stepladders with two pairs of stile posts, at least one of the pairs comprises a set of rungs divided into two halves, each of said halves being formed of profiles in an inverted "U" shape, with the gap open downwards (in its open position). According to one embodiment, the upper edges of said profiles comprise a lateral projection; the two halves are in turn connected to at least one central plate which constitutes an intermediate part for connection and articulation with a straight upper edge, so that when the rungs are opened up, the upper edge of the articulation piece rests on the upper edges of the profiles forming the step, preventing them from exceeding the predetermined position in their rotation. Optionally and alternatively, the central plate surrounds the top of the connection of the pair of half-rungs, which will similarly limit the degree of rotation of said half-rungs. The central plate does not have any kind of connecting stay.

[0012] The two profiles constituting each rung have the same thickness, and are articulated on the inside to the respective "C" profiles constituting the stiles. At least one of the half-rungs comprises a securing rod, in parallel and below its articulation axis, with the corresponding "C" profile which forms the relevant stile post. From the outer side of the stile there is a securing device for the rod of the half-rung, which comprises a slide that can be operated by an exterior body, which has an inverted "U" profile on the inside, and which allows the rung to rotate freely when moved up, and when moved down confines and secures the rod of the half-rung, preventing its movement. The slides of the half-rungs of each stile can be joined together, meaning that the movement of one of these necessarily forces the movement of the others.

[0013] The stile can similarly comprise support rods for the half-rungs.

[0014] In one option, the lower legs for support on the ground are set in the interior on each of the stile posts, and are able to articulate. When they have to open, said leg rotates inwards, then downwards and finally outwards, crossing a slot made in the outer lower end of each stile, and thus constituting an extension of the sup-

port base of the stepladder.

[0015] The opening of the two planes on stepladders with two planes takes place by means of articulation plates which join the stile posts on each of the sides. This articulation plate will enable the two stiles to be placed in a parallel position after being folded. At the top end the profile of one of the sides will form an angle equal to that of the stepladder opening, thus enabling perfect adjustment in the opening position between the support. The opening angle of the two planes is limited by at least one safety strap, cable or chain. In the closed position, it has at least one closing hook, which articulates on one of the stile posts and is able to engage with a boss placed on the other, when the stepladder is folded.

[0016] At least one of the stiles is provided with a handle, which will be close to the centre of gravity of the stepladder in the folded position.

Brief description of the figures

[0017] In order to illustrate the following explanation, we are enclosing six sheets of drawings with this descriptive report, in which the essence of this invention is represented in nine figures, and in which:

- Figure 1 shows a side view of the stepladder according to the invention in the folded position;
- Figure 2 shows a front view of the same stepladder in the folded position;
- Figure 3 shows a front view of the stepladder according to the invention in the unfolded position;
- Figure 4 shows a side view of the stepladder as seen in Figure 3;
- Figure 5 shows a front view of the stepladder according to the invention in an intermediate stage of folding/unfolding;
- Figure 6 shows a view of the stepladder of the invention, in which a pair of legs, folded away, can be seen from the rear of one of the planes or of the plane which constitutes this;
- Figure 7 shows a view of the stepladder as seen in Figure 6, in which the legs have been folded down to form a broader support base than that of the stepladder stiles;
- Figure 8 shows a schematic view of the inside of one of the stile posts for holding the rungs, in which one can observe a part for securing the rungs in the unlocking position; and
- Figure 9 shows a view similar to the one in Figure 8, but with the securing item in the position for

locking the rung.

Description of the forms of embodying the invention

[0018] As already stated, this invention consists of a folding stepladder (1) which in a first embodiment is fitted with a pair of stile posts (2) holding a set of rungs (7) folding to form a single plane.

[0019] According to a second embodiment, the stepladder (1) is formed from two pairs of stile posts (2, 3), able to articulate with each other at the top, and preferentially both in respect of a connection and articulation piece (4), so that in the unfolded position said stile posts are located on two planes, one forward and one rear, which together form an acute angle. In accordance with a preferential option, the rear stile posts (3) have a top end (6) which is cut with a bevelled edge, so that these form an acute angle (5) at said top end (6). This means that the upper oblique plane acts as a support base on the front stiles when the stepladder (1) is unfolded, so that this forms a safety element preventing any excessive opening. At least one of the pairs of stile posts (2) holds a set of rungs (7).

[0020] In any of the aforementioned embodiments, the stiles (2) holding the rungs (7) are made in a "C" shape, whose gaps are facing each other. Each of the gaps comprises a set of hinge pins (8) for articulation of the rungs. Each of the rungs (7) is divided into two half-rungs (9) which are identical in shape and thickness. Each of the two half-rungs (9) forming a rung or tread (7) is joined to at least one central plate (10) which constitutes an intermediate part for joining and articulating said half-rungs (9) together. The half-rungs (9) are formed of different profiles which have an inverted "U"-shaped section, and are articulated on the inside to the respective "C" profiles forming the stiles (2, 3). According to a preferential option, the half-rungs have a lateral projection (11) on at least one portion of their upper edges; the central plate has in turn a substantially straight upper edge (12), and in the unfolded position of the rung (7) said upper edge (12) of said plate is able to rest on the lateral projection (11) of the half-rungs, thus establishing a rotation limit in the unfolding operation.

[0021] In an alternative option, less preferable but similarly included within the scope of this invention, the central plate (10) surrounds the central portion of each of the two half-rungs (9) at the top and on both sides, so that the extent of rotation of said half-rungs (9) will similarly be limited.

[0022] At least one of the half-rungs (9), comprises a securing rod (13), set in parallel and under the rung's articulation axis (8) with the relevant "C" profile forming the corresponding stile (2, 3).

[0023] The stepladder also comprises at least one securing device (14) which holds the corresponding half-rung (9) in the unfolded position. This securing device consists of a sliding part that can be manually operated from the outside of each stile post (2, 3) which holds the

rungs (7), by means of an outer body connected with an inner body (15), allowing this to move along an elongated perforation. The inner body (15) is made in the shape of a hook or part in an inverted "U" shape, so that when it is in its retention position (lower position), this prevents the rung from rotating in respect of its axis (8) and thus prevents the stepladder from folding, and in the release position (moved upwards) it will let the rung move freely. The securing devices (14) of each stile could be joined together, so that operating one also moves the others.

[0024] The securing device is fitted with an outer part and an inner part. The outer part of the securing device (14) is screwed onto the inner part, so that said inner part is able to move sideways depending on how far this is screwed on, from a free, unscrewed position, in which said securing device (14) can be freely moved upwards and downwards, to a screwed position (tightened) for securing, in which the inner part is retracted and forced towards the stile (2), so that this firmly holds a rod (16) of the half-rung (9), which will be described below.

[0025] Each of the stiles (2) can also comprise one or more support rods (16) for the half-rungs (9).

[0026] This means that the stepladder is firmly secured simultaneously by means of the lateral support of the half-rungs (9) on the stiles (2), by means of the support of the half-rungs (16) on the central plate (10), by means of the support of the half-rungs (9) against each other and by tightening this securing device through screwing pressure of the securing item (14), which pulls the rod (13) of the corresponding half-rung (9) towards the inner surface of the corresponding stile (2) until its movement is prevented, thus preventing the stepladder from swaying.

[0027] According to one option, lower legs (17) are provided on the stepladder for supporting this on the floor, arranged in the interior of each of the stiles (2), and able to articulate in respect of these. When the stepladder is in use and said lower legs (17) are to be opened, these are moved towards the interior, then downwards and finally outwards, going through a slot (not shown) made in the outer lower end of each stile, and thus constituting an extension of the support base of the stepladder.

[0028] On stepladders with two planes, the opening of the two planes takes place by means of articulation plates (4) which join the stile posts (2, 3) on each of the sides. Said articulation plate (4) will enable the two stiles to be placed in a parallel position after being folded. The opening angle of the two planes will preferentially also be limited by at least one safety strap, cable or chain (20), which articulates in one of the stiles and is able to be secured on a boss (21) set in the other, when the stepladder is folded.

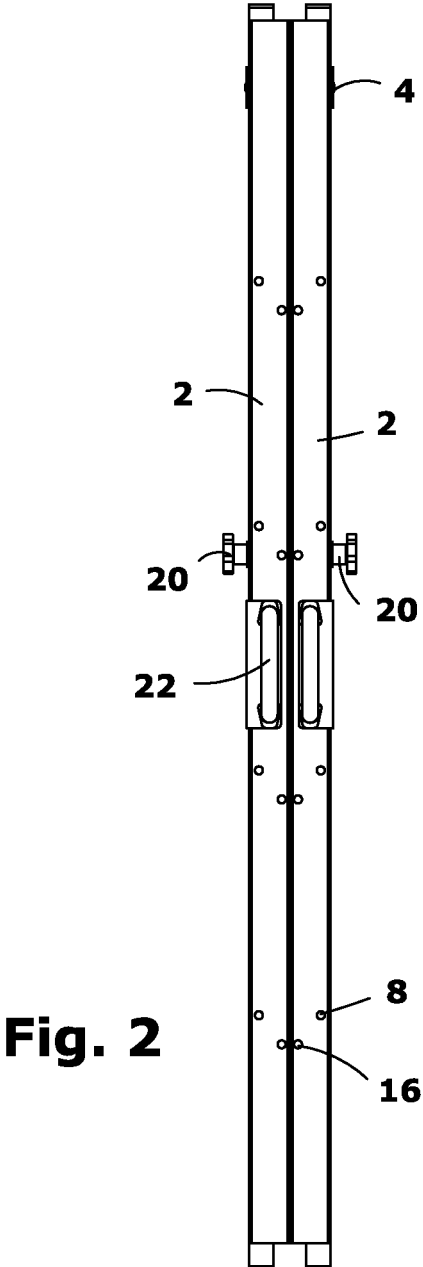
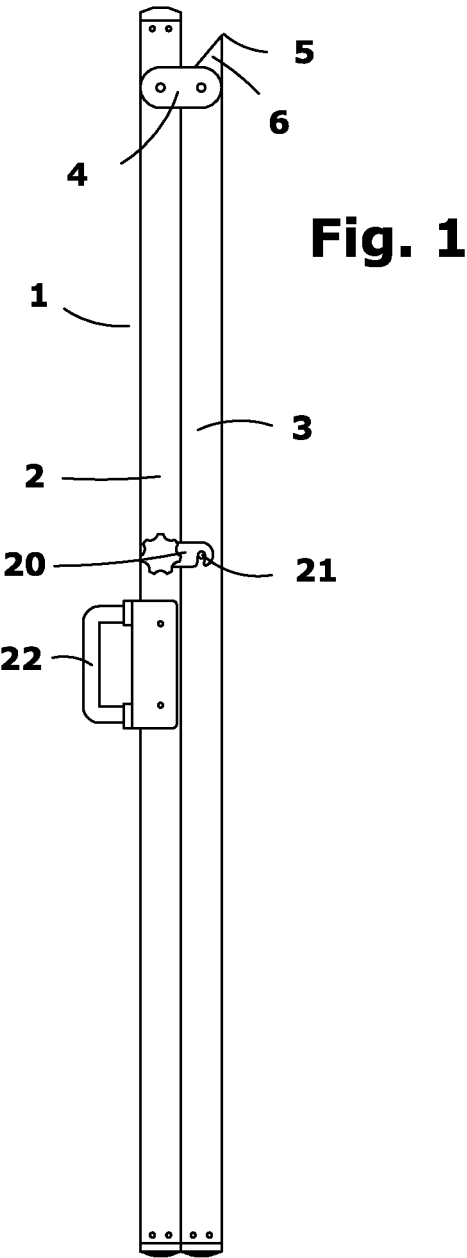
[0029] Furthermore, at least one of the stiles is fitted with a handle (22), which will be close to the centre of gravity of the stepladder in folded position.

Claims

1. A folding stepladder, which comprises at least one pair of lateral stile posts (2) holding a set of rungs or treads (7), each of these rungs being sub-divided into a pair of half-rungs (9), articulated in respect of each of said stile posts (2, 3), **characterised in that** each of said half-rungs (9) is identical in shape and thickness to the other of said half-rungs (9), and **in that** said half-rungs are articulated to at least one plate (10) for connecting these, the plates (10) corresponding to each of the rungs (10) not having any connecting stay fitted between them.
2. A folding stepladder according to claim 1, **characterised in that** this also comprises a pair of rear stile posts (2, 3) both pairs of stile posts (2, 3) being articulated in respect of a connecting and articulating piece (4), so that in the unfolded position said stile posts (2,3) are located on two planes, one forward and one rear, forming an acute angle between them.
3. A folding stepladder according to claim 2, **characterised in that** the rear stile posts (3) have an upper end (6) which is cut in a bevel shape so as to form an acute angle (5) at said upper end (6) with an oblique plane for support on the forward stiles when the stepladder (1) is unfolded.
4. A folding stepladder, according to any of the above claims, **characterised in that** the stile posts (2) holding the rungs (7) are in a "C" shape, with their gaps facing each other, the gaps in said C being provided with a set of hinge pins (8) for articulation of the relevant rungs (7), and **in that** the half-rungs (9) are formed by different profiles which have a section in the shape of an inverted "U".
5. A folding stepladder, according to any of the above claims, **characterised in that** the half-rungs (9) have a lateral projection (11) on at least one portion of their upper edges, and **in that** the plate (10) for connecting said half-rungs (9) has in turn a substantially straight upper edge (12), and in the unfolded position of the rung (7) said upper edge (12) of said plate is able to rest on the lateral projection (11) of the half-rungs.
6. A folding stepladder, according to any of claims 1 to 4, **characterised in that** the central plate (10) surrounds the central part of each of the two half-rungs (9) at the top and on both sides.
7. A folding stepladder, according to any of the above claims, **characterised in that** this also comprises at least one securing device (14) which holds the corresponding half rung (9) in the open position, and because at least one of the half-rungs (9) comprises

a securing rod (13), placed in parallel and under its articulation hinge pin (8) with the corresponding "C" shaped profile forming the corresponding stile post (2) the securing device (14) consisting of a sliding part that can be manually operated from the outside of each stile post (2) which holds the rungs (7) by means of an outer body connected with an inner body (15), able to move through an elongated perforation between an upper position and a lower position.

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8. A folding stepladder according to claim 7 **characterised in that** the interior body (15) is in the shape of a hook or inverted "U" shape, able to interlock with the securing rod (13) of the half-rung (9).
 9. A folding stepladder according to any of claims 6 to 8, **characterised in that** the securing device comprises an outer part and an inner part, provided with a thread for screwing these together, which is operated from the outside of the corresponding stile post (2).
 10. A folding stepladder, according to any of claims 6 to 9, **characterised in that** this comprises, in at least one stile post, several securing devices (14) joined together, so that operating one of these is connected with operating the others.
 11. A folding stepladder, according to any of the previous claims, **characterised in that** the stile posts (2) also comprise support rods (16) for the half-rungs (9).
 12. A folding stepladder, according to any of the above claims, **characterised in that** this comprises lower legs (17) for support on the ground, set in the interior of each of the stile posts (2), and able to articulate in respect of these.
 13. A folding stepladder according to any of claims 2 to 15, **characterised in that** this also comprises a safety strap, cable or chain (19).
 14. A folding stepladder, according to any of claims 2 to 16, **characterised in that** this has at least one locking hook (20), which articulates in one of the stile posts and is able to be secured on a boss (21) set in the other, when the stepladder is folded.
 15. A folding stepladder, according to any of claims 2 to 17, **characterised in that** at least one of the stiles is provided with a handle (22), placed in a position close to the centre of gravity of the stepladder when this is in its folded position.



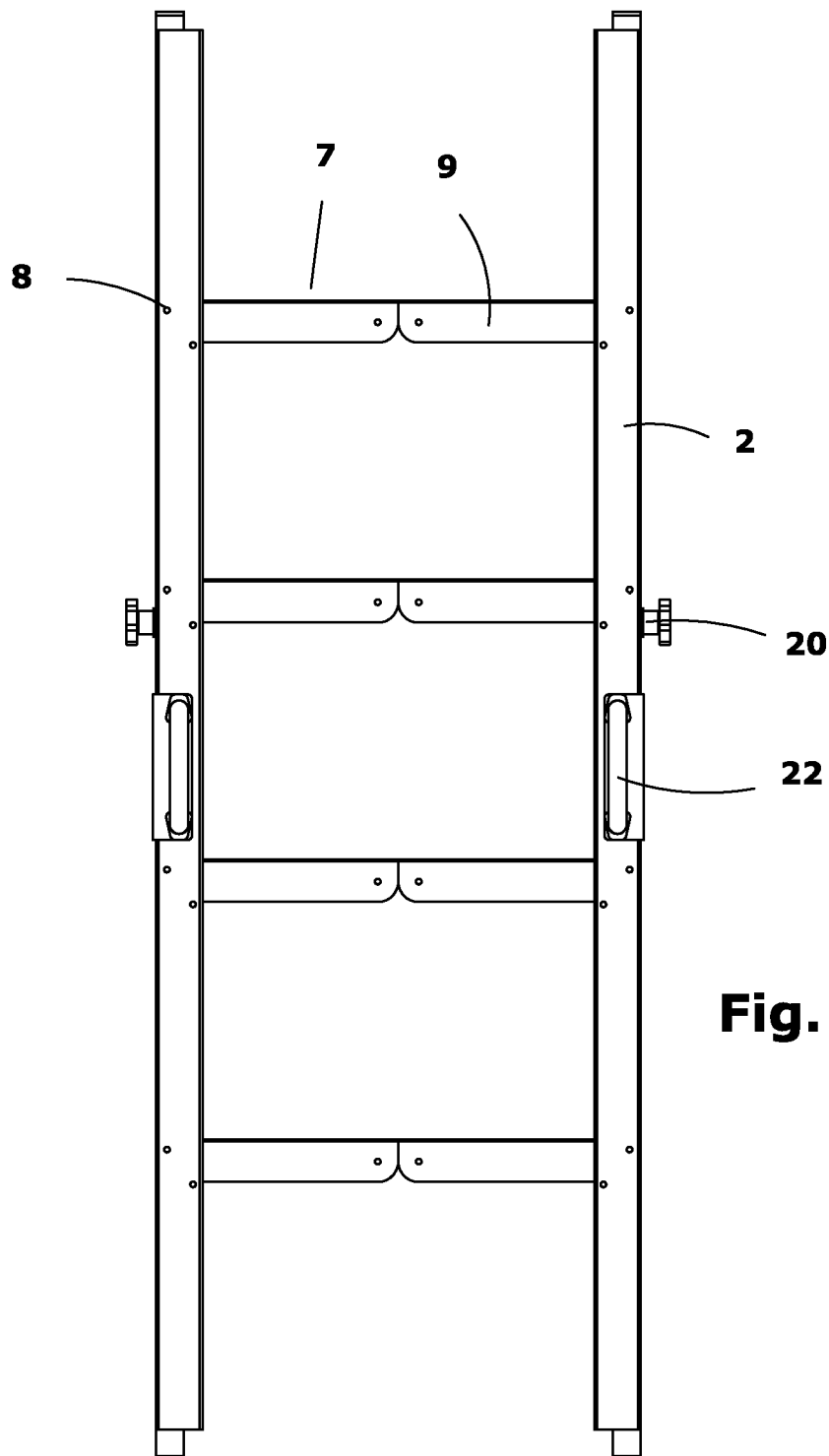


Fig. 3

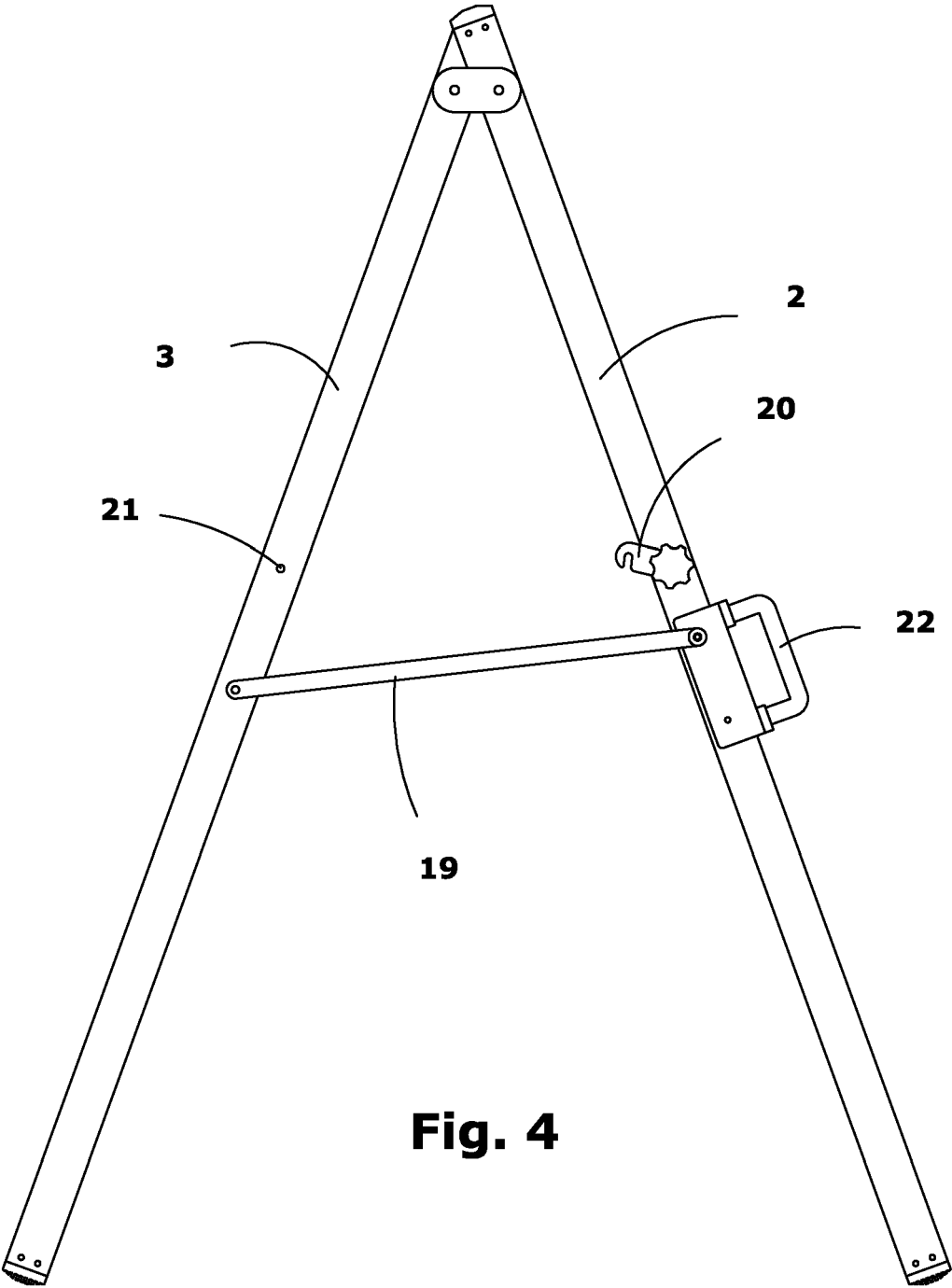


Fig. 4

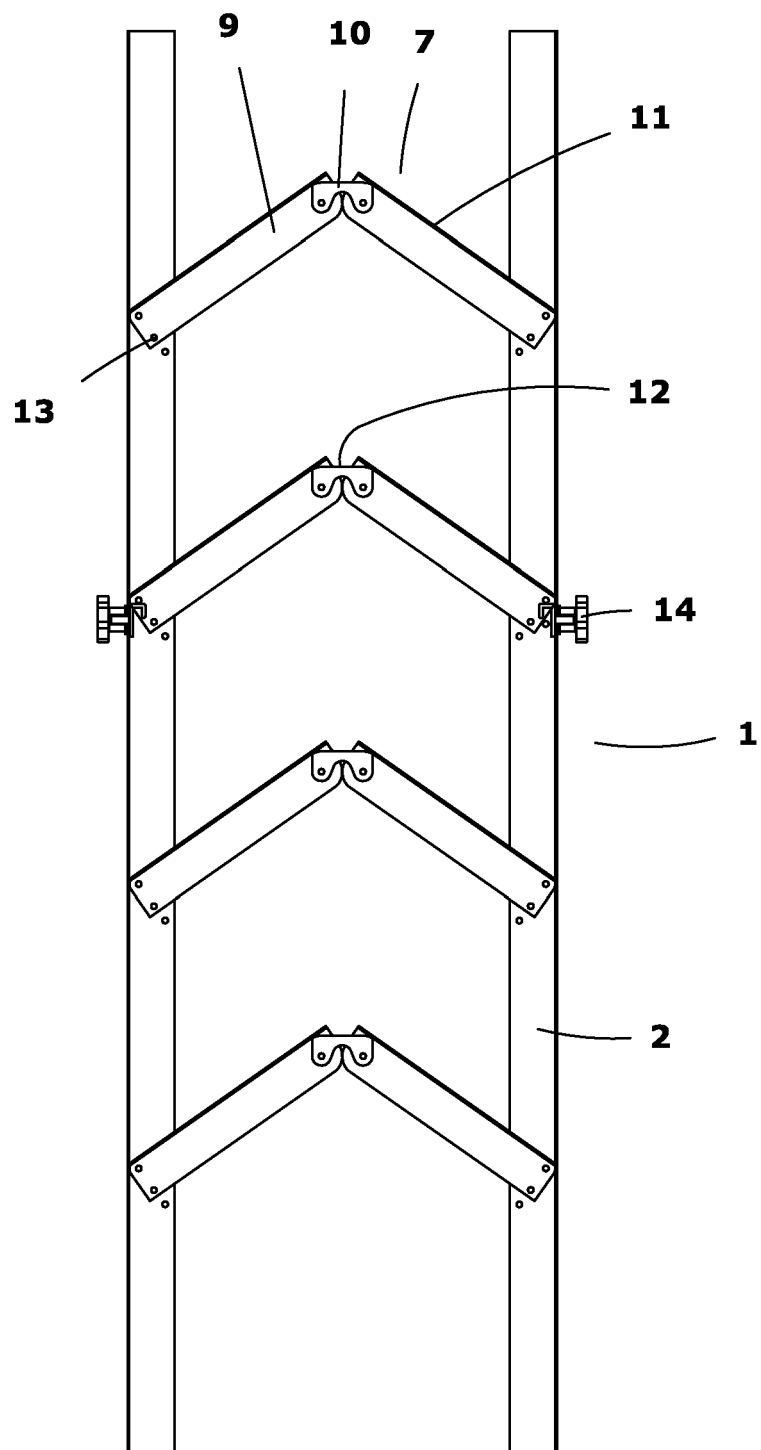


Fig. 5

Fig. 7

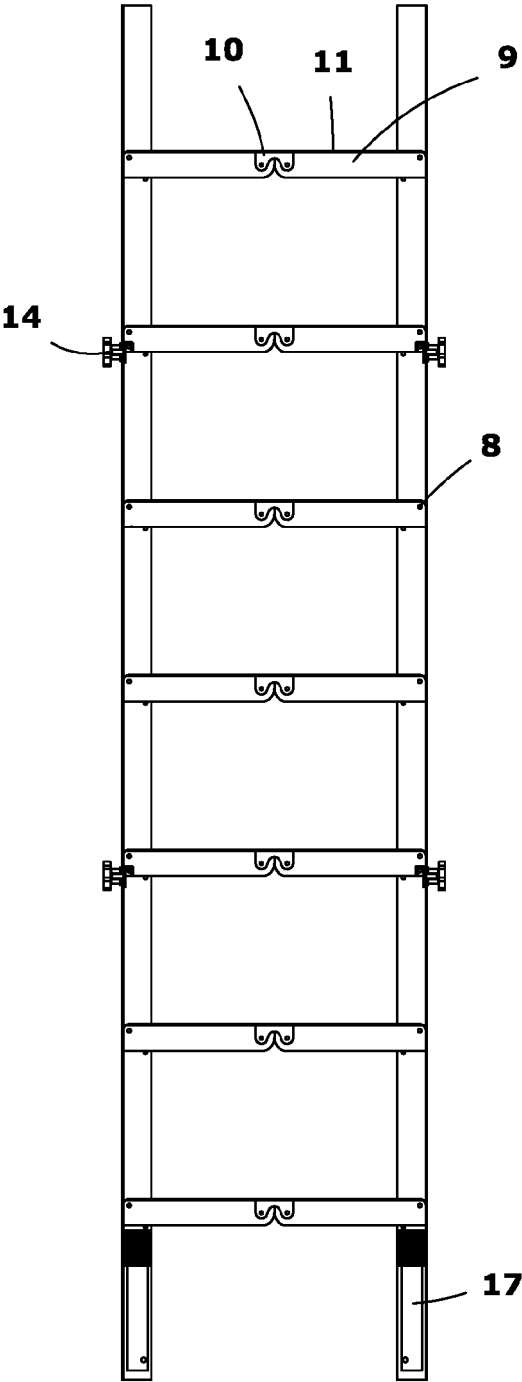


Fig. 6

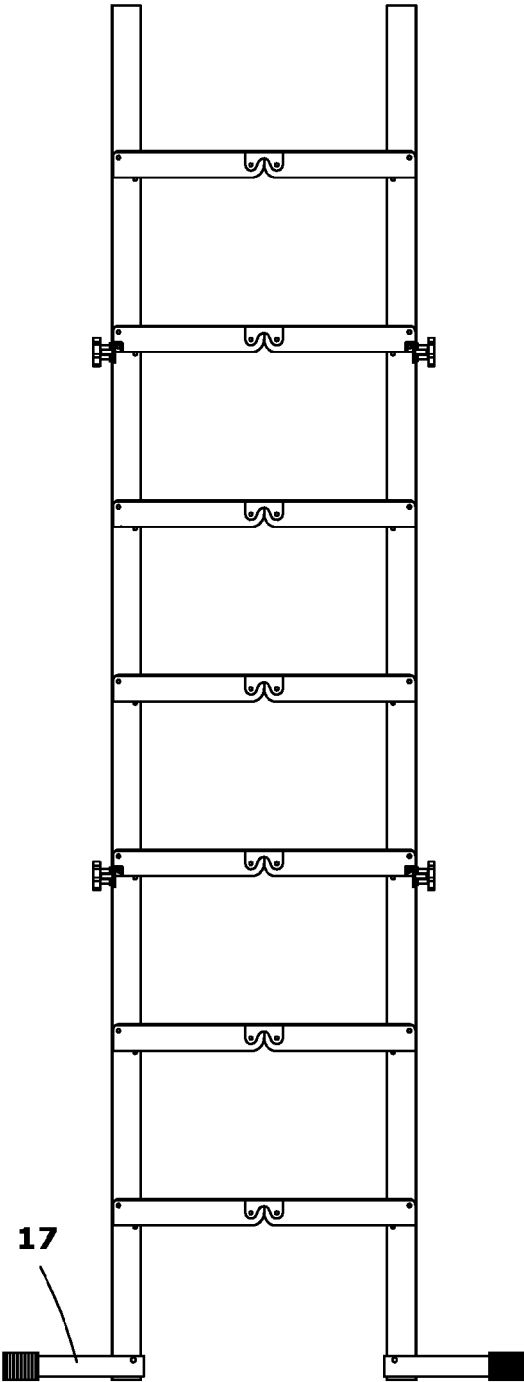


Fig. 8

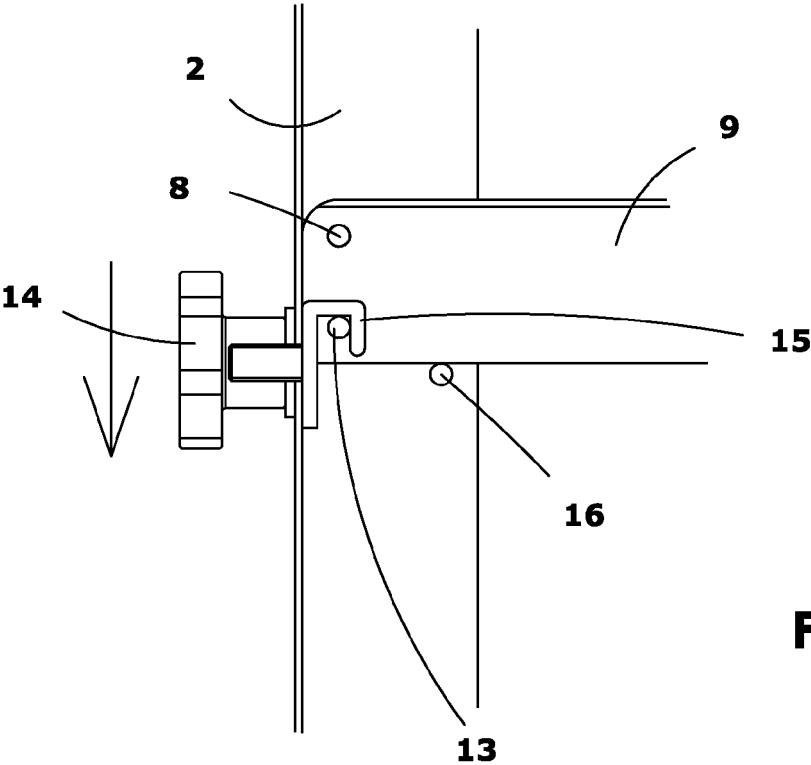
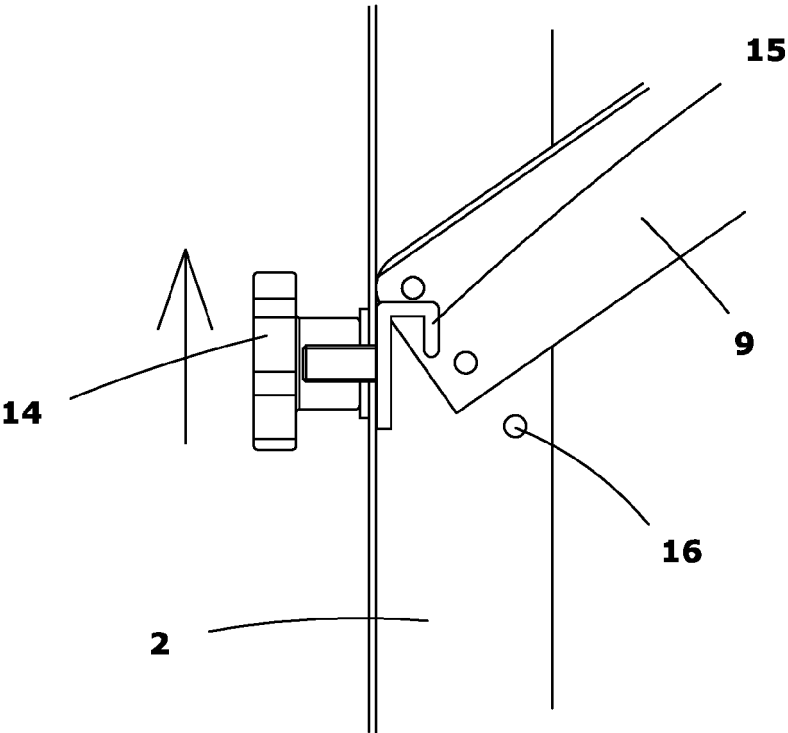


Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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- ES 291090 U [0004]
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