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(54) **LADDER**

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Description

[0001] The present patent concerns ladders, and more specifically it concerns a new ladder suited to be used also as a step irons structure, a safety cage for ladders and a ladder with safety cage.

[0002] Ladders are known which are constituted by two generally parallel upright elements or rails joined by a series of parallel crosspieces called rungs.

[0003] The ladder is arranged with the two rails along the surface to be climbed, for example with one end resting on the ground and the other end resting on a wall, and the operator can rest his/her feet alternately on the rungs one after the other to reach the desired height.

[0004] Ladders are used, for example, for performing maintenance activities on lighting columns or streetlights or for maintenance and picking activities on fruit trees.

[0005] The so-called step irons are fixed ladders suited to allow quick and safe access to structures and places which, due to their height, are not easy to reach.

[0006] More specifically, step irons are used to access the roof of industrial and civil buildings, the roof of sheds, terraces, vertical structures of any kind, lighting systems, underground or above ground tanks, wells and underground silos, sewage systems, underground parking spaces, machines.

[0007] Step irons are usually arranged vertically but can also be tilted with an inclination of no less than 75 degrees.

[0008] Step irons, due precisely to their structural characteristics, pose the risk of the user falling accidentally and therefore must be provided with a protection cage.

[0009] Said protection cage is compulsory, according to the regulations currently in force, for all ladders exceeding 2 meters in height.

[0010] Furthermore, according to the regulations currently in force, the distance between the side of the cage opposite the plane defined by the rungs and the rungs themselves cannot exceed sixty centimeters and there must be a distance of at least 15 centimeters between the rungs and the wall where they are applied or where the ladder is applied.

[0011] The ladders and the step irons structures currently in use are constituted by single elements, rails and rungs, which are joined in a stable manner during the production stage. The elements constituting ladders are made of wood or metal, while step irons structures are made of metal.

[0012] More specifically, metal ladders or step irons structures are constructed using metal section bars joined together by means of fixing elements such as, for example, bolts or through a welding operation.

[0013] To make metal ladders or step irons structures it is necessary to cut the metal section bars to size, shape their ends, make any needed holes for bolts, assemble the various parts and finally join them by means of bolts or through a welding operation.

[0014] The production of ladders or step irons structures requires work for the different cutting, shaping, and joining operations, requires the purchase and use of bolts or other connection elements or the use of welding machines for joining the various parts, in addition to producing metal scraps from the metal section bars.

[0015] It should be noted that the tread surfaces of the rungs of ladders or step irons structures obtained from pieces of metal section bar are smooth and consequently may be slippery.

[0016] For said rungs it is possible to use pieces of metal section bar having at least one corrugated surface, but this involves the need to purchase a specific type of metal plate, with the consequent problems in terms of warehouse space and scraps.

[0017] For the tread surfaces of the rungs, it is possible to use additional elements in such a way as to obtain non slip surfaces, but this makes it necessary to purchase and store said additional elements and to consider the cost and time required for the application of said additional elements to each single rung.

[0018] CN 210 013 648 U discloses a ladder according to the preamble of independent claim 1.

[0019] The subject of the present patent is a new ladder or step irons structure, hereinafter referred to only as "ladder" for the sake of description simplicity, obtained from conveniently shaped and bent metal plate.

[0020] The subject of the present patent also includes a ladder with safety cage.

[0021] It is one object of the present invention to limit the number of operations, especially manual operations, which are necessary for making said ladder.

[0022] It is another object of the present invention to limit the number of connection elements necessary for making said ladder.

[0023] It is another object of the present invention to limit the production of scraps from the materials used for making said ladder.

[0024] It is another object of the present invention to provide a new ladder in which the tread surface of the rungs is suited to prevent or in any case limit the risk of slipping. These and other direct and complementary objects are achieved by the new ladder suited to be used both as a step ladder and as a step irons structure.

[0025] According to the invention, the new ladder comprises a series of steps obtained from a bent metal plate element, wherein a partial cut is carried out at the level of the bent parts, so that after the bending operation an edge portion which is raised with respect to the bent part is obtained. Said raised edge serves the function of a non slip surface. Furthermore, according to the invention, the entire ladder can be obtained from a conveniently cut and bent element made of metal plate or metal alloy, so as to obtain both the side rails and the rungs, and to form a ladder.

[0026] Analogously, the new cage is obtained from a single, shaped and press bent metal plate element, which can be successively mounted on a step ladder of the known type or more preferably on a step ladder of the

type described herein.

[0027] The characteristics of the new ladder are highlighted in greater detail in the following description, with reference to the drawings attached hereto by way of non-limiting example.

Figure 1 shows the cut metal plate element (A) before the bending operation, while Figure 1a shows a detail of said element (A).

Figures 2 and 3 respectively show a front view and an axonometric view of the new ladder.

Figure 4a shows a detail axonometric view of the new ladder, in which it is possible to observe a portion of the rung (2) and a portion of the rail (1).

Figure 4b shows a sectional view of a rung (2).

Figure 5 shows an example of a complete ladder.

Figure 6 shows a three-dimensional view of a new cage (6) mounted on the ladder of

Figure 5, wherein said cage (6), differently from the cage (4) shown in Figure 5, is obtained from a single shaped and press bent metal plate element.

[0028] Said element (A) comprises two lateral portions (1) which constitute the rails (1) and various central portions (2) which constitute the rungs (2).

[0029] Each lateral portion (1) has substantially the shape of a band or strip and is formed by three parts (1a, 1b, 1c) that are parallel to one another:

- a first part (1a) arranged towards the opposite lateral portion (1),
- a second part (1b) arranged so that it is adjacent to said first part (1a), constitutes a continuation of the same and faces said opposite lateral portion (1),
- a third part (1c) arranged so that it is adjacent to said second part (1b), constitutes a continuation of the same and faces said opposite lateral portion (1).

[0030] More specifically, said second part (1b) is included between said first part (1a), facing towards the opposite lateral portion (1), and said third part (1c) that is diametrically opposite said opposite lateral portion (1), adheres to the same and constitutes a continuation of them.

[0031] Said three parts (1a, 1b, 1c), which are coplanar and continuous in the element (A) obtained by cutting metal plate or a metal alloy sheet, are bent along two bending lines (v1, v2) indicated by a broken line in Figure 1 and in Figure 1a.

[0032] Said bending lines (v1, v2) are parallel to each other and to the long side of said three parts (1a, 1b, 1c).

[0033] According to the invention, said bending lines (v1, v2) may not be parallel but slightly convergent.

[0034] When said three parts (1a, 1b, 1c) are bent along said bending lines (v1, v2), each of said three parts (1a, 1b, 1c) comes to be arranged so that it is orthogonal to the adjacent part (1c, 1b, 1a) forming a linear, box-shaped element with C-shaped cross section which constitutes the lateral rail (1) of the new ladder.

[0035] Each central portion (2) has substantially the shape of a strip and is formed by three parts (2a, 2b, 2c) parallel to one another:

- a first part (2a) extending between said first parts (1a) of said two lateral portions (1), said first part (2a) being connected to each of said first parts (1a) of said two lateral portions (1) and constituting a continuation of the same,
- a second part (2b) arranged so that it is adjacent to said first part (2a) and constitutes a continuation of the same,
- a third part (2c) arranged so that it is adjacent to said second part (2b) and constitutes a continuation of the same, in a diametrically opposite position with respect to said first part (2a).

[0036] Said three parts (2a, 2b, 2c), which are coplanar and continuous in the element (A) obtained by cutting metal plate or a metal alloy element, are bent along two bending lines (o1, o2) indicated by a broken line in Figure 1a.

[0037] Said bending lines (o1, o2) are parallel to each other and to the long side of said three parts (2a, 2b, 2c), and orthogonal to the bending lines of the three parts (1a, 1b, 1c) of the lateral portions (1).

[0038] When said three parts (2a, 2b, 2c) are bent along said bending lines (o1, o2), each of said three parts (2a, 2b, 2c) comes to be arranged so that it is orthogonal to the adjacent part (2c, 2b, 2a), forming a linear, box-shaped element with C-shaped cross section which constitutes the rung (2) of the new ladder.

[0039] More specifically, after the bending of said three parts (2a, 2b, 2c), said second part (2b) of each central portion (2) constitutes the tread or foot supporting surface of the rung (2).

[0040] Between said second part (2b) and said first (2a) and third (2c) part of said central portion (2) there are cuts (2d), generically in the shape of a U or in any other open geometrical shape, which are such as to define further parts (2e) of said first part (2a) and third part (2c) extending towards the centre of said second part (2b).

[0041] After the bending of said three parts (2a, 2b, 2c), said further parts (2e) of said first part (2a) and third part (2c) remain respectively coplanar with said first part (2a) and third part (2c), and projecting beyond the surface of said second part (2b), as can be observed in Figures 4a and 4b.

[0042] Said further parts (2e) are facing towards said second parts (2b) and are raised with respect to it.

[0043] Said further parts (2e), arranged as can be seen in said Figures 4a and 4b, constitute non slip elements for the rungs (2).

[0044] When all the parts (1a, 1b, 1c, 2a, 2b, 2c) of the element (A) made of metal plate are bent according to the respective bending lines (v1, v2, o1, o2), two sides

of each third part (2c) of the central portions (2) are parallel and adherent to the third parts (1c) of the lateral portions (1) that make up the rails (1).

[0045] Said sides of each third part (2c) of the central portions (2) can be conveniently joined to said adjacent and adherent third parts (1c) of the lateral portions (1) so that the assembly made up of rungs (2) and rails (1) is sturdier and more stable. According to the invention, said sides of each third part (2c) of the central portions (2) can be joined to the third parts (1c) by means of a welding operation, rivets, or bolts or any other suitable system.

[0046] In the case of joining by means of bolts or rivets, on each third part (2c) of each central portion (2) and on each third part (1c) of each lateral portion (1) there are holes (1f, 2f) suited to allow the passage of said bolts or rivets and to house them, as shown in Figures 1, 1a, 2.

[0047] Said lateral portions (1) are provided with further holes (1g) so that they can be joined to:

- the brackets fixing them to the wall (3),
- the elements making up the safety cage (4, 6) of the new ladder,
- other identical shaped and bent elements (A),
- access and transit steps (5) between the ladder and the starting and landing plane of the ladder itself,

as can be seen in Figure 5.

[0048] According to the invention, the ends of said lateral portions (1) are shaped (1d) or provided with seats or holes for connection to other identical shaped and bent elements (A) or to access and transit steps (5) between the ladder and the starting and landing plane of the ladder itself.

[0049] The new ladder, made up as described above, has considerable advantages.

[0050] The new ladder has rungs (2) provided with non slip projections (2e) obtained directly by bending the metal plate.

[0051] The new ladder is obtained from an element (A) including both the lateral rails (1) and the rungs (2).

[0052] The new ladder is obtained from an element (A) constituted by a cut and shaped flat metal plate element.

[0053] The new ladder does not require the assembly and/or fixing of the rungs (2) on/to the rails (1).

[0054] To make the new ladder it is sufficient to cut the metal plate and bend the various parts (1a, 1b, 1c, 2a, 2b, 2c) in order to obtain a length of ladder complete with already assembled and joined rails (1) and rungs (2).

[0055] The new ladder does not require the purchase and storage of different elements or parts but only of metal plate elements to be cut, shaped and bent.

[0056] The cage (4, 6) to be assembled on the ladder can be of the traditional type, as shown in Figure 5, that is, made up of several shaped pieces constrained to one another, or it can be a cage of the new type, shown in Figure 6.

[0057] In this case the cage (6) is formed starting from a single metal plate element, shaped and provided with openings (61), and bent in such a way as to surround said ladder completely or partially, and furthermore provided with shaped parts (62) suited to be coupled with the rails (1) of the ladder through common fixing means or other means.

[0058] Therefore, with reference to the preceding description and the attached drawings, the following claims are expressed.

Claims

1. Ladder or step iron structure, comprising a shaped and preformed element (A) made of metal plate or metal alloy plate, in turn comprising at least two lateral portions (1) that make up the rails (1) and several central portions (2) that make up the rungs (2) and are orthogonal to said lateral portions (1), and wherein

   each lateral portion (1) has substantially the shape of a band or strip and is made up of three parts (1a, 1b, 1c) parallel to one another, of which:

   - a first part (1a) is arranged so that it faces the opposite lateral portion (1),
   - a second part (1b) is arranged so that it is adjacent to said first part (1a), constitutes a continuation of the same and faces said opposite lateral portion (1),
   - a third part (1c) is arranged so that it is adjacent to said second part (1b), constitutes a continuation of the same and faces said opposite lateral portion (1),

   and wherein said three parts (1a, 1b, 1c), which are coplanar and continuous in the element (A) obtained by cutting metal plate, are bent along two bending lines (v1, v2) substantially parallel to each other and to the long side of said three parts (1a, 1b,
   1c) so as to form a linear element with C-shaped cross section that constitutes the side rail (1) of the new ladder,
   and wherein
   each central portion (2) has substantially the shape of a strip and is made up of three parts (2a, 2b, 2c) parallel to one another, of which:

   - a first part (2a), extending between said first parts (1a) of said two lateral portions (1), is connected with each one of said first parts (1a) of said two lateral portions (1) and constitutes a continuation of the same,
   - a second part (2b) is arranged so that it is adjacent to said first part (2a) and constitutes a continuation of the same,

- a third part (2c) is arranged so that it is adjacent to said second part (2b) and constitutes a continuation of the same, in a position diametrically opposite said first part (2a),

and wherein said three parts (2a, 2b, 2c), which are coplanar and continuous in the element (A) obtained by cutting metal plate, are bent along two bending lines (o1, o2) which are substantially parallel to each other and to the long side of said three parts (2a, 2b, 2c), and also orthogonal to the bending lines of the three parts (1a, 1b, 1c) of the lateral portions (1), so as to form a linear element with C-shaped cross section that constitutes the rung (2) of the new ladder between said two lateral portions (1),
and wherein
once said three parts (2a, 2b, 2c) have been bent said second part (2b) of each central portion (2) constitutes the tread or surface of the rung (2) where the foot rests,
and wherein when all the parts (1a, 1b, 1c, 2a, 2b, 2c) of the element (A) made of metal plate are bent according to the respective bending lines (v1, v2, o1, o2), two sides of each third part (2c) of the central portions (2) are parallel and adherent to the third parts (1c) of the lateral portions (1) that make up the rails (1), and
the sides of each third part (2c) of the central portions (2) are joined to the third parts (1c) of said lateral portions (1) that constitute the rails (1),
characterized in that between the second part (2b) and the first part (2a) and/or the third part (2c) notches (2d) are provided, which have generically the shape of a U or any other open geometrical shape, in such a way as to define further parts (2e) of said first part (2a) and/or third part (2c) extending towards the centre of said second part (2b), *and wherein* once said two parts (2a, 2c) have been bent said further parts (2e) of said first part (2a) and said third part (2c) are coplanar with said first part (2a) and/or said third part (2c), respectively, and projecting beyond the surface of said second part (2b) so as to constitute non slip elements of the rungs (2), and **in that** the ends of said lateral portions (1) are shaped (1d) or provided with seats or holes for connection to other identical shaped and bent elements (A) or to access and transit steps (5) between the ladder and the starting and landing plane of the ladder itself.

2. Ladder according to claim 1, **characterized in that** it comprises a safety cage (6) comprising a single metal plate element shaped and bent in such a way as to surround a ladder completely or partially, and comprising one or more openings (61) and shaped parts (62) for fixing it to the rails of said ladder.

Patentansprüche

1. Leiter- oder Stufeneisenstruktur, die ein geformtes und vorgeformtes Element (A) aus einer Metallplatte oder Metalllegierungsplatte umfasst, das seinerseits mindestens Folgendes umfasst: zwei seitliche Abschnitte (1), die die Schienen (1) bilden, und mehrere mittlere Abschnitte (2), die die Sprossen (2) bilden und orthogonal zu den besagten seitlichen Abschnitten (1) sind, und wobei

jeder seitliche Abschnitt (1) im Wesentlichen die Form eines Bandes oder Streifens aufweist und aus drei zueinander parallelen Teilen (1a, 1b, 1c) gebildet ist, von denen:

- ein erstes Teil (1a) so angeordnet ist, dass es dem gegenüberliegenden seitlichen Abschnitt (1) zugewandt ist,
- ein zweites Teil (1b) so angeordnet ist, dass es an das besagte erste Teil (1a) angrenzt, eine Fortsetzung davon darstellt und dem besagten gegenüberliegenden seitlichen Abschnitt (1) zugewandt ist,
- ein drittes Teil (1c) so angeordnet ist, dass es an das besagte zweite Teil (1b) angrenzt, eine Fortsetzung davon darstellt und dem besagten gegenüberliegenden seitlichen Abschnitt (1) zugewandt ist,

und wobei die besagten drei Teile (1a, 1b, 1c), die in dem durch Schneiden einer Metallplatte erhaltenen Element (A) koplanar und kontinuierlich sind, entlang zweier Biegelinien (v1, v2), die im Wesentlichen parallel zueinander und zur langen Seite der besagten drei Teile (1a, 1b, 1c) sind, gebogen sind, derart, dass ein lineares Element mit C-förmigem Querschnitt geformt wird, das die Seitenschiene (1) der neuen Leiter bildet,
und wobei
jeder mittlere Abschnitt (2) im Wesentlichen die Form eines Streifens aufweist und aus drei zueinander parallelen Teilen (2a, 2b, 2c) gebildet ist, von denen:

- ein erstes Teil (2a), das sich zwischen den besagten ersten Teilen (1a) der besagten beiden seitlichen Abschnitte (1) erstreckt, mit jedem einzelnen der besagten ersten Teile (1a) der besagten beiden seitlichen Abschnitte (1) verbunden ist und eine Fortsetzung davon darstellt,
- ein zweites Teil (2b) so angeordnet ist,

dass es an das besagte erste Teil (2a) angrenzt und eine Fortsetzung davon darstellt,
- ein drittes Teil (2c) so angeordnet ist, dass es an das besagte zweite Teil (2b) angrenzt und eine Fortsetzung davon darstellt, und zwar in einer Position, die dem besagten ersten Teil (2a) diametral gegenüberliegt,

und wobei die besagten drei Teile (2a, 2b, 2c), die in dem durch Schneiden einer Metallplatte erhaltenen Element (A) koplanar und kontinuierlich sind, entlang zweier Biegelinien (o1, o2), die im Wesentlichen parallel zueinander und zur langen Seite der besagten drei Teile (2a, 2b, 2c) und auch orthogonal zu den Biegelinien der drei Teile (1a, 1b, 1c) der seitlichen Abschnitte (1) sind, gebogen sind, derart, dass ein lineares Element mit C-förmigem Querschnitt geformt wird, das die Sprosse (2) der neuen Leiter zwischen den besagten beiden seitlichen Abschnitten (1) bildet,
und wobei
nach dem Biegen der besagten drei Teile (2a, 2b, 2c) das besagte zweite Teil (2b) jedes mittleren Abschnitts (2) die Trittfläche oder Oberfläche der Sprosse (2), auf der der Fuß aufliegt, bildet,
und wobei, wenn alle Teile (1a, 1b, 1c, 2a, 2b, 2c) des Elements (A) aus einer Metallplatte gemäß den jeweiligen Biegelinien (v1, v2, o1, o2) gebogen sind, zwei Seiten jedes dritten Teils (2c) der mittleren Abschnitte (2) parallel zu den dritten Teilen (1c) der seitlichen Abschnitte (1), die die Schienen (1) bilden, sind und daran anhaften, und
die Seiten jedes dritten Teils (2c) der mittleren Abschnitte (2) mit den dritten Teilen (1c) der besagten seitlichen Abschnitte (1), die die Schienen (1) bilden, verbunden sind,
dadurch gekennzeichnet, dass zwischen dem zweiten Teil (2b) und dem ersten Teil (2a) bzw. dem dritten Teil (2c) Kerben (2d) vorgesehen sind, die im Allgemeinen die Form eines U oder eine beliebige andere offene geometrische Form aufweisen, sodass weitere Teile (2e) des besagten ersten Teils (2a) bzw. dritten Teils (2c) definiert werden, die sich zur Mitte des besagten zweiten Teils (2b) hin erstrecken, *und wobei* nach dem Biegen der besagten beiden Teile (2a, 2c) die besagten weiteren Teile (2e) des besagten ersten Teils (2a) und des besagten dritten Teils (2c) mit dem besagten ersten Teil (2a) bzw. dem besagten dritten Teil (2c) koplanar sind und über die Oberfläche des besagten zweiten Teils (2b) hinausragen, derart, dass rutschfeste Elemente der Sprossen (2) gebildet werden,
und dass die Enden der besagten seitlichen Abschnitte (1) geformt (1d) oder mit Aufnahmen oder Löchern zur Verbindung mit anderen identisch geformten und gebogenen Elementen (A) oder mit Tritt- und Übergangsstufen (5) zwischen der Leiter und der Ausgangs- und Grundfläche der Leiter selbst versehen sind.

2. Leiter nach Patentanspruch 1, **dadurch gekennzeichnet, dass** sie einen Sicherheitskäfig (6) umfasst, der ein einziges Metallplattenelement umfasst, das so geformt und gebogen ist, dass es eine Leiter ganz oder teilweise umgibt, sowie eine oder mehrere Öffnungen (61) und Formteile (62) zum Befestigen davon an den Schienen der besagten Leiter.

Revendications

1. Échelle ou structure en fer à échelons, comprenant un élément galbé et préformé (A) en tôle métallique ou en tôle d'alliage métallique, comprenant à son tour au moins deux portions latérales (1) qui constituent les rails (1) et plusieurs parties centrales (2) qui constituent les barreaux (2) et sont orthogonales auxdites portions latérales (1), et où

chaque portion latérale (1) présente essentiellement la forme d'une bande ou d'un ruban et est constituée de trois parties (1a, 1b, 1c) parallèles entre elles, dont :

- une première portion (1a) est disposée de manière à faire face à la partie latérale opposée (1),
- une deuxième partie (1b) est disposée de manière à être adjacente à ladite première partie (1a), à en constituer le prolongement et à faire face à la portion latérale opposée (1),
- une troisième partie (1c) est disposée de manière à être adjacente à ladite deuxième partie (1b), à en constituer le prolongement et à faire face à ladite portion latérale opposée (1),

et où lesdites trois parties (1a, 1b, 1c), qui sont coplanaires et continues dans l'élément (A) obtenu par coupe d'une plaque métallique, sont pliées le long de deux lignes de pliage (v1, v2) essentiellement parallèles l'une par rapport à l'autre et au côté long desdites trois parties (1a, 1b, 1c) de manière à former un élément linéaire avec une section transversale en forme de C qui constitue le rail latéral (1) de la nouvelle échelle, et où
chaque portion centrale (2) présente essentiellement la forme d'une bande et est constituée de trois parties (2a, 2b, 2c) parallèles entre elles,

dont :

- une première partie (2a), s'étendant entre lesdites premières parties (1a) desdites deux portions latérales (1), est reliée à chacune desdites premières parties (1a) desdites deux portions latérales (1) et en constitue le prolongement,
- une deuxième partie (2b) est disposée de manière à être adjacente à la première partie (2a) et à en constituer le prolongement,
- une troisième partie (2c) est disposée de manière à être adjacente à ladite deuxième partie (2b) et à en constituer le prolongement, dans une position diamétralement opposée à ladite première partie (2a),

et où lesdites trois parties (2a, 2b, 2c), qui sont coplanaires et continues dans l'élément (A) obtenu par coupe d'une plaque métallique, sont pliées le long de deux lignes de pliage (o1, o2) qui sont essentiellement parallèles l'une par rapport à l'autre et au côté long desdites trois parties (2a, 2b, 2c), et également orthogonales aux lignes de pliage des trois parties (1a, 1b, 1c) des portions latérales (1), de manière à former un élément linéaire avec une section transversale en forme de C qui constitue le barreau (2) de la nouvelle échelle entre lesdites deux portions latérales (1),
et où
une fois que lesdites trois parties (2a, 2b, 2c) ont été pliées, la deuxième partie (2b) de chaque portion centrale (2) constitue le giron ou la surface du barreau (2) sur lequel le pied repose,
et où, lorsque toutes les parties (1a, 1b, 1c, 2a, 2b, 2c) de l'élément (A) en tôle sont pliées selon les lignes de pliage respectives (v1, v2, o1, o2), deux côtés de chaque troisième partie (2c) des portions centrales (2) sont parallèles et adhèrent aux troisièmes parties (1c) des portions latérales (1) qui constituent les rails (1), et
les côtés de chaque troisième partie (2c) des portions centrales (2) sont reliés aux troisièmes parties (1c) desdites portions latérales (1) qui constituent les rails (1),
caractérisée en ce qu'entre la deuxième partie (2b) et la première partie (2a) et/ou la troisième partie (2c) sont prévues des encoches (2d) qui présentent génériquement la forme d'un U ou toute autre forme géométrique ouverte, de manière à définir d'autres parties (2e) de ladite première partie (2a) et/ou la troisième partie (2c) s'étendant vers le centre de ladite deuxième partie (2b), *et où,* une fois que lesdites deux parties (2a, 2c) ont été pliées, les autres parties (2e) de ladite première partie (2a) et de ladite troisième partie (2c) sont coplanaires avec ladite première partie (2a) et/ou la troisième partie (2c), respectivement, et dépassent la surface de ladite deuxième partie (2b) de manière à constituer des éléments antidérapants des barreaux (2),
et **en ce que** les extrémités desdites portions latérales (1) sont galbées (1d) ou pourvues de sièges ou de trous pour la connexion à d'autres éléments identiques galbés et pliés (A) ou à des marches d'accès et de transit (5) entre l'échelle et le plan de départ et d'arrivée de l'échelle elle-même.

2. Échelle selon la revendication 1, **caractérisée en ce qu'**elle comprend une cage de sécurité (6) comprenant un seul élément en tôle galbé et plié de manière à entourer totalement ou partiellement une échelle, et comprenant une ou plusieurs ouvertures (61) et des parties galbées (62) pour sa fixation aux rails de ladite échelle.

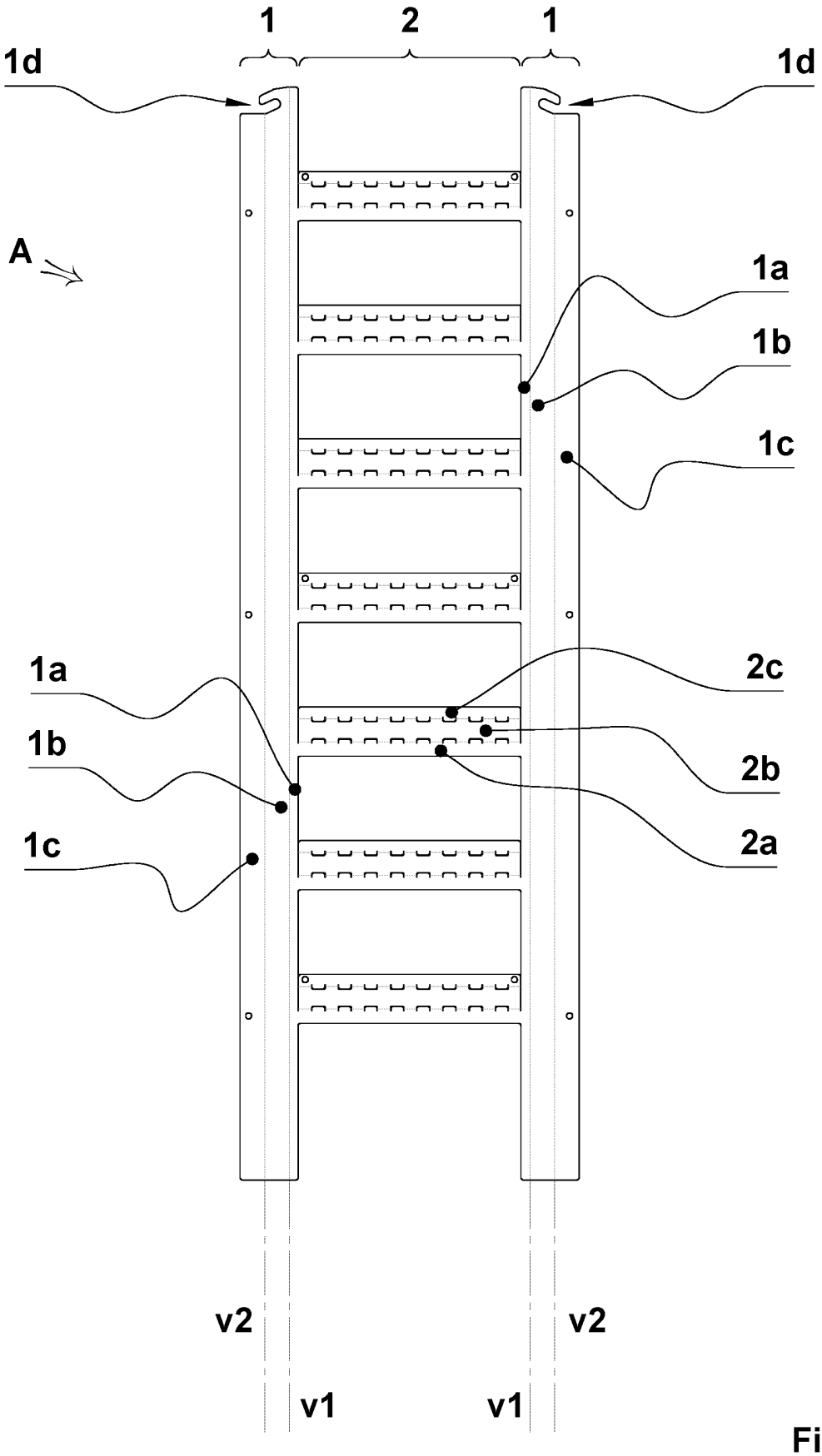

Fig. 1

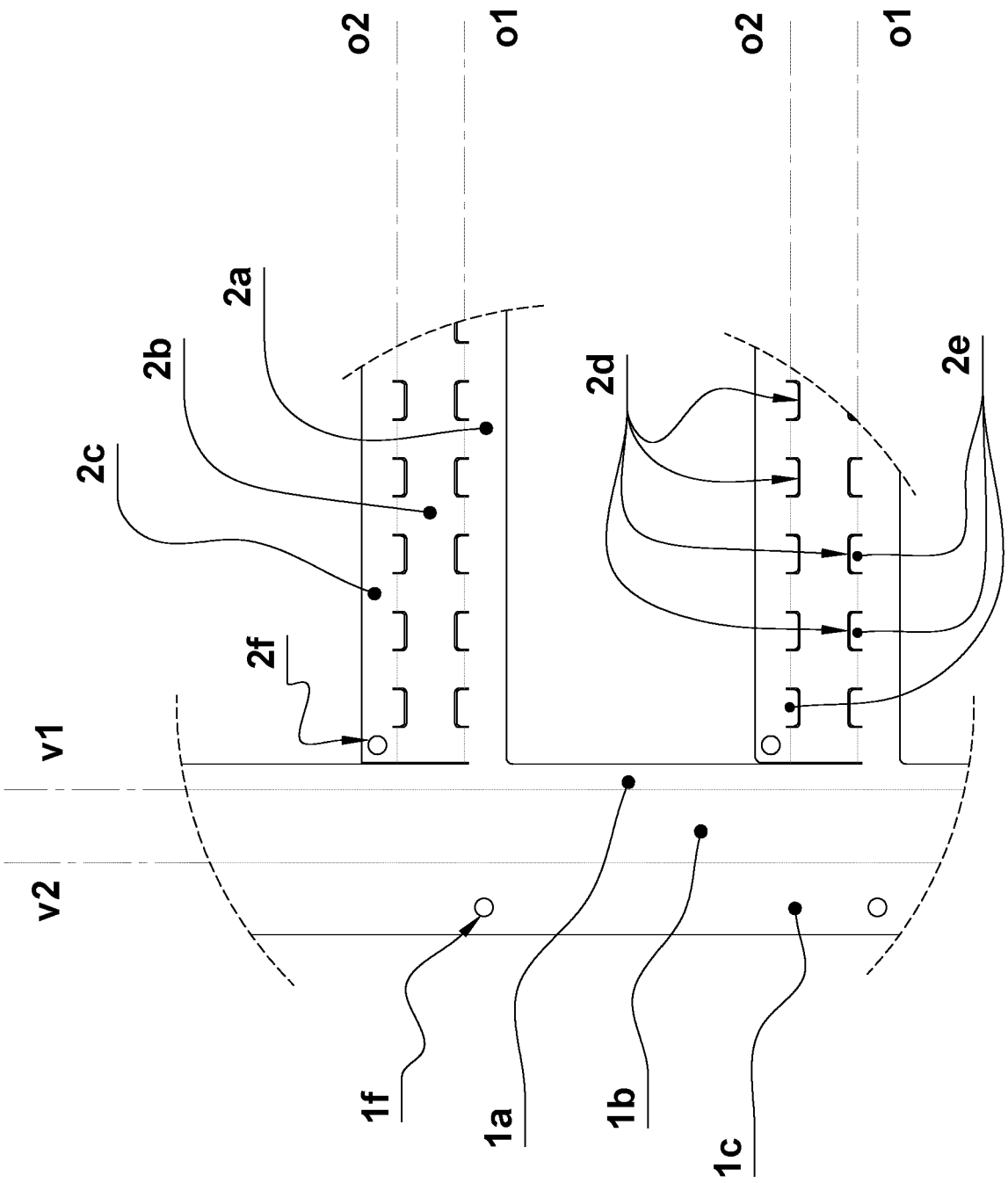

Fig. 1a

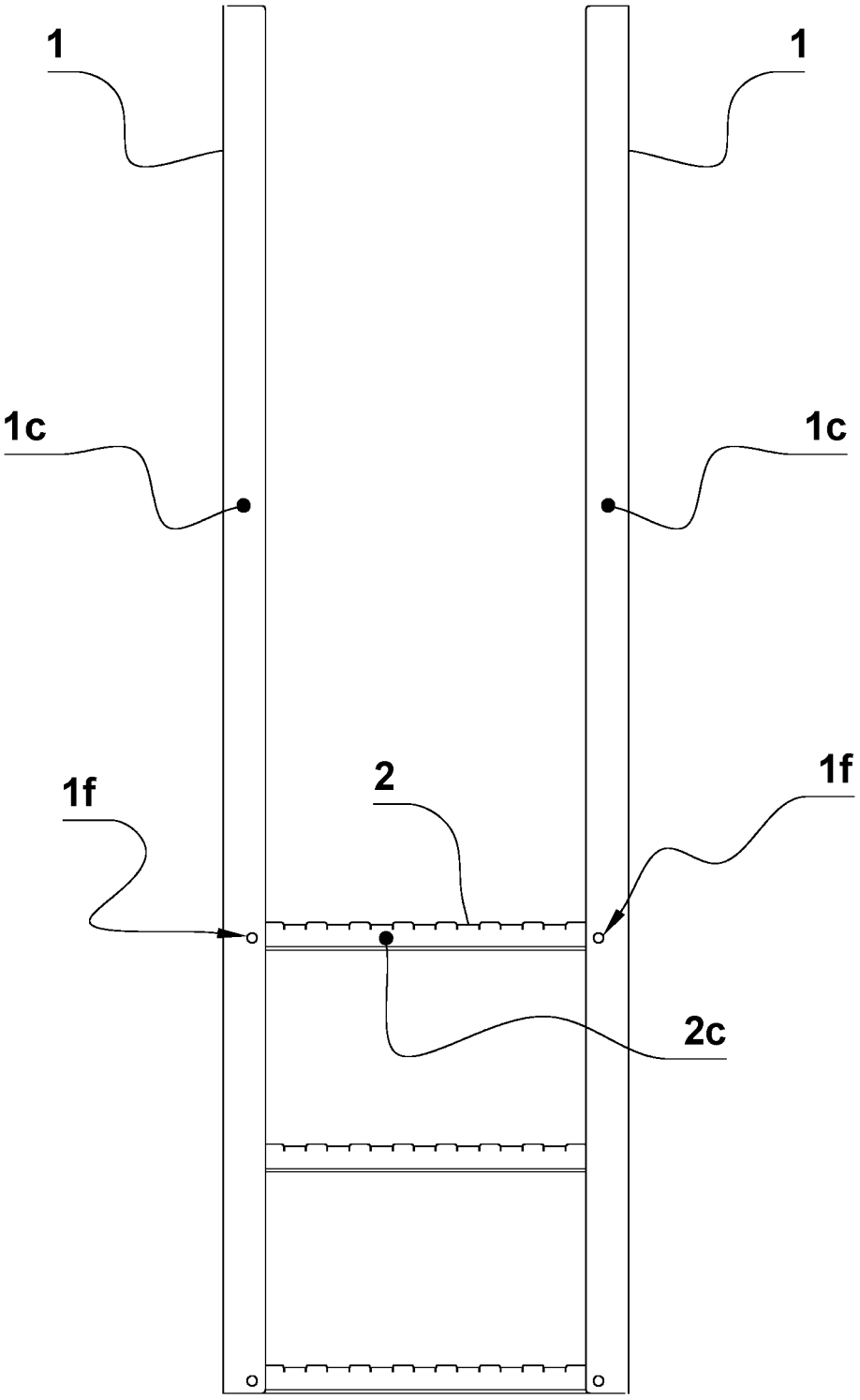

Fig. 2

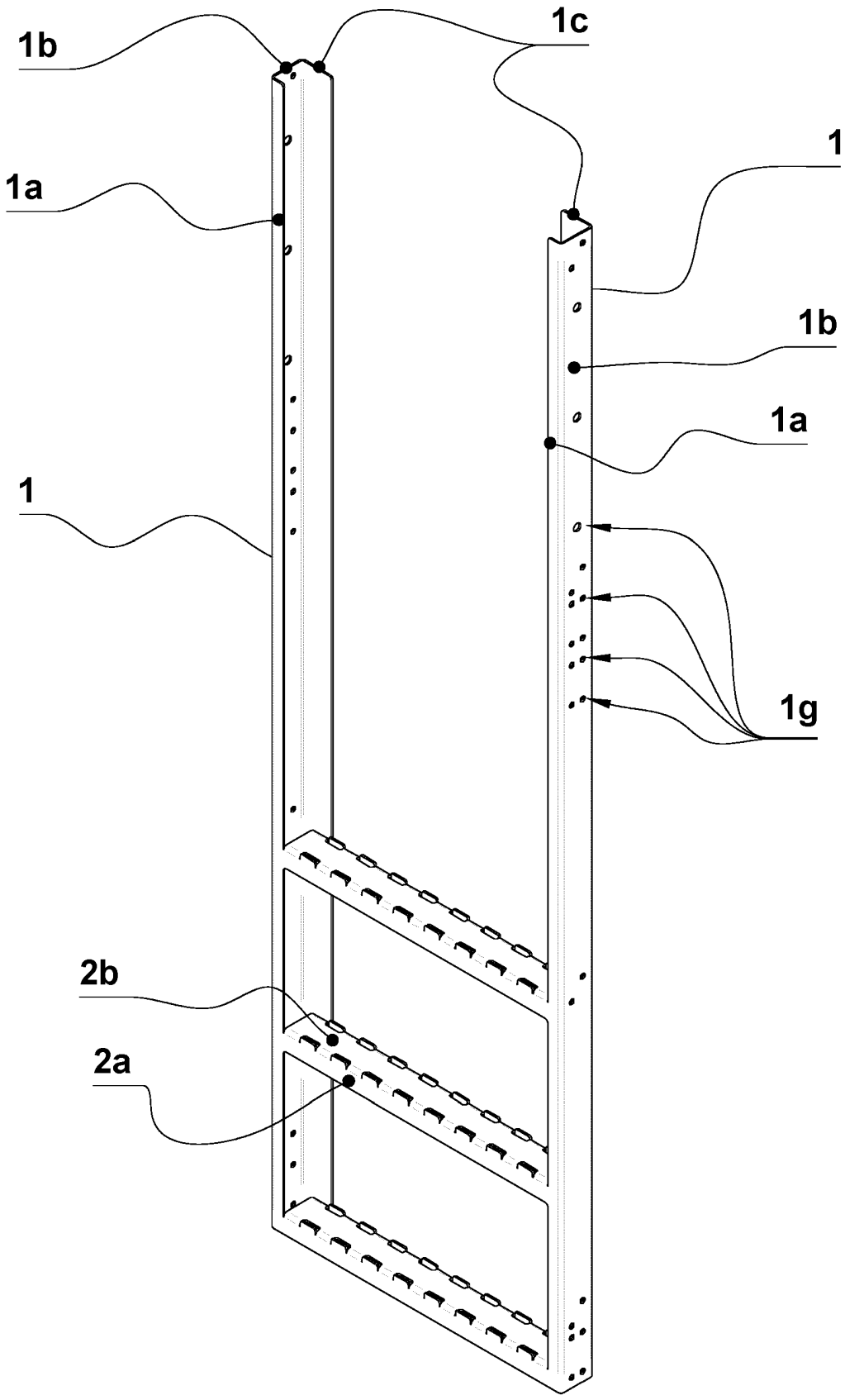

Fig. 3

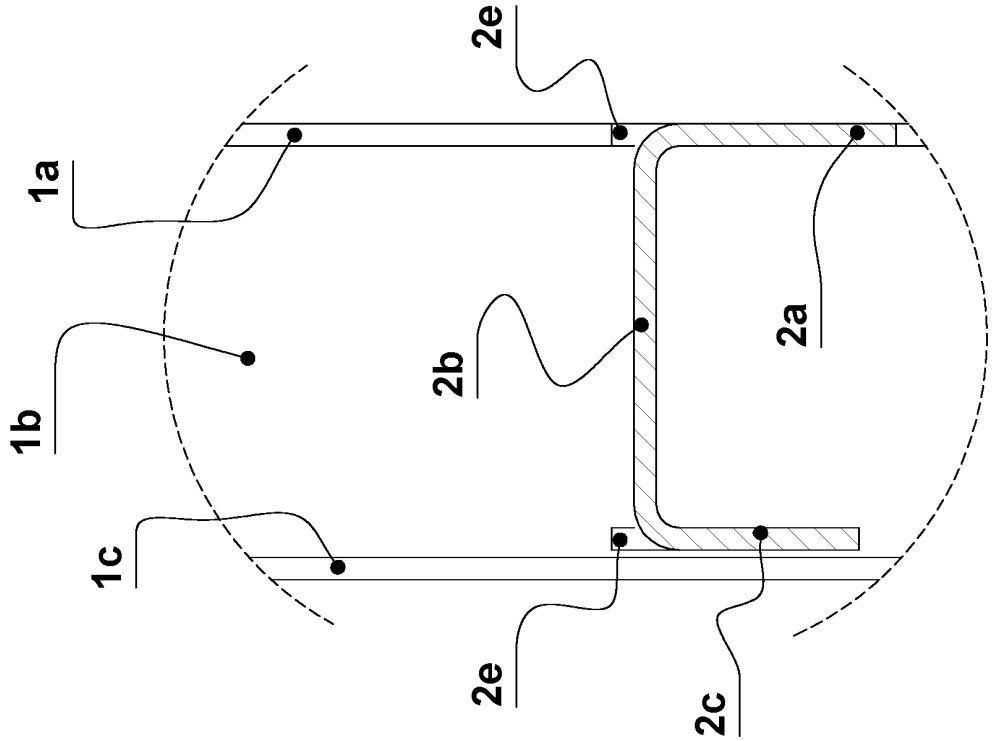

Fig. 4b

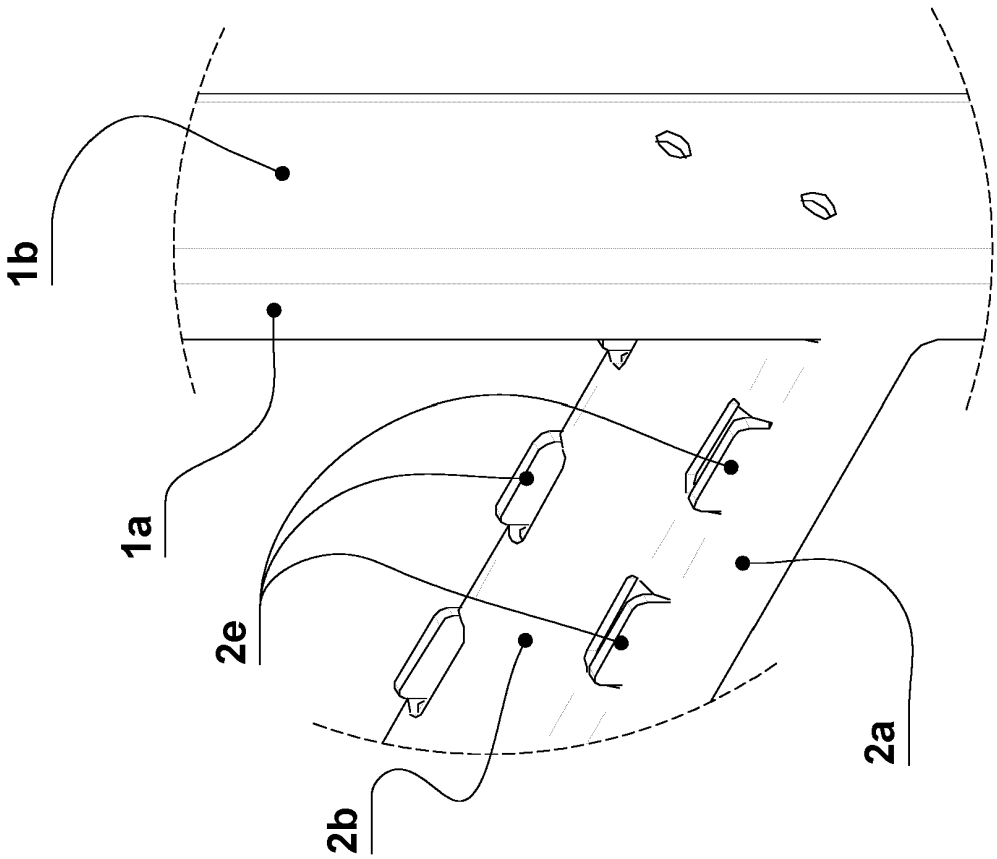

Fig. 4a

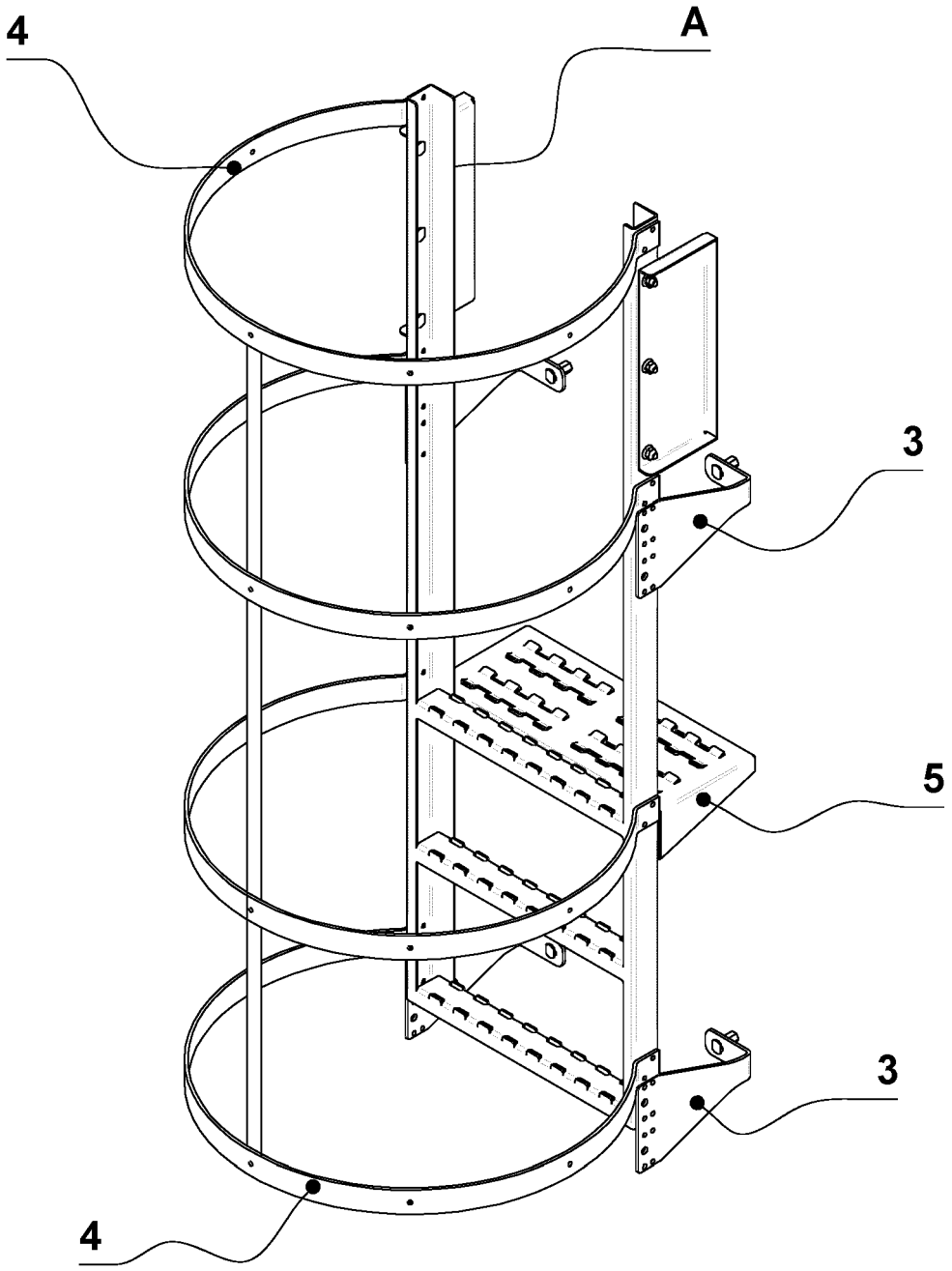

Fig. 5

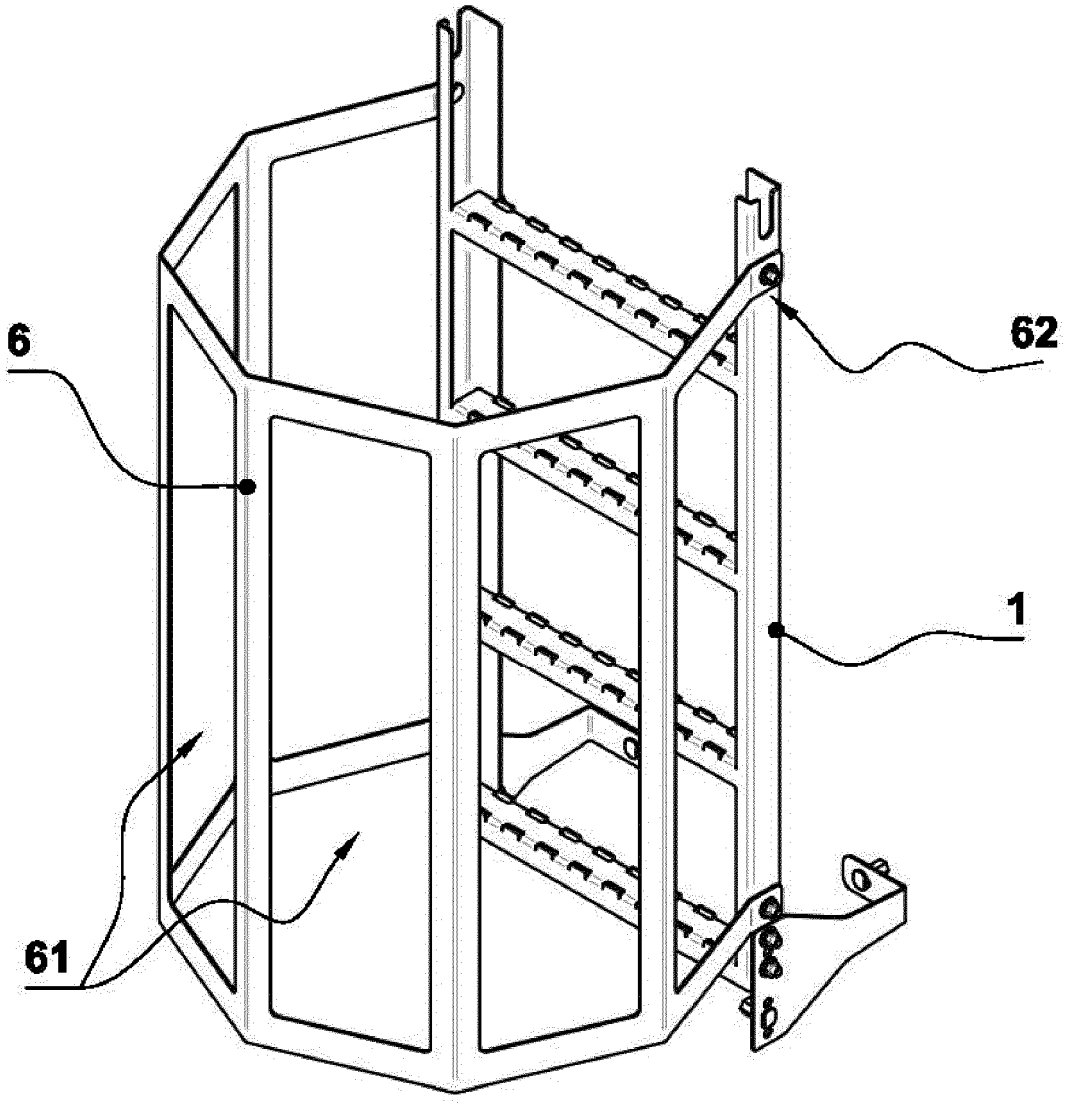

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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