(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 205 929 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.07.2023 Bulletin 2023/27

(21) Application number: **22212967.8**

(22) Date of filing: **12.12.2022**

(51) International Patent Classification (IPC):
B27L 7/00 *(2006.01)* ***B27L 7/06*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B27L 7/00; B27L 7/005; B27L 7/06

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **20.12.2021 SI 202100227**

(71) Applicant: **Rafko Znidaric s.p.**
9252 Radenci (SI)

(72) Inventor: **Rafko Znidaric s.p.**
9252 Radenci (SI)

(74) Representative: **Patentni Biro AF d.o.o.**
Kotnikova 32, p.p. 2706
1001 Ljubljana (SI)

(54) **A VERTICAL LOG SPLITTER WITH A ROTATABLE SUPPORT TABLE**

(57) A vertical log splitter is provided with a rotatable support table designed as a work surface installed on a support leg, wherein:
- the support leg is with at least one, preferably two connecting elements movably or rotatably, respectively, mounted on a vertical rod,
- said rod or shaft is installed at one side of the vertical pillar and is mounted into the floor with a bushing or any other suitable mounting, and is preferably also mounted to the vertical pillar or any other part of the log splitter for ensuring better stability,
- the connection between the support leg and the rod is achieved via connecting rods, levers, handles, or similar one-piece or multi-piece elements equipped with a rotational mechanism, preferably with bushings, bearings, ball bearings or other suitable elements that allow rotation, so that the support table can be rotated from an active (working) position, in which the support table is in the area of the splitting axe, into an inactive position, in which the support table is outside the area of the splitting axe, and vice-versa,
- the position of the table (4) is locked with two pins for locking rotation around the rod and for locking position on the base plate.

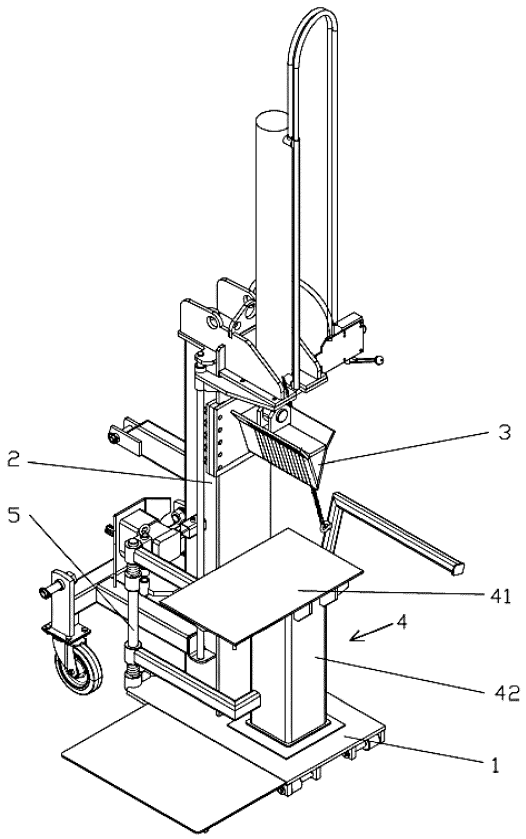

Figure 1

EP 4 205 929 A1

Description

Field of the invention

[0001] The present invention belongs to the field of forestry machines, more precisely to the field of devices for splitting and chopping wood, and is particularly related to accessories for easier splitting of wood logs. The invention relates to a vertical log splitter with a rotatable support table.

Background of the invention and the technical problem

[0002] Known splitting devices have different splitting or cutting means that are configured to split wood into smaller parts. For this purpose, vertical log splitters have splitting axes attached on a plate that slides along a vertical guide upwards and downwards, wherein the wood placed below the splitting axe is split during the downward movement. Said log part may be placed directly on the bottom plate of the log splitter or on a support table, depending on the size of the log to be split. Some known solutions do not have the support table, for example log splitters according to documents FR2466323, US4905746, and US2016136839. Utility model CN212266116 discloses a vertical log splitter that does not have a support table, but ensures fixation of the log to be split with a special enclosing mechanism. Patent AT398928 discloses a fixation mechanism, however, this solution grips the log from the sides in order to prevent its movement. Similarly, patent application US2020269375 does not describe a support table, but has a rotatable mechanism installed on the bottom of the log splitter, wherein said rotatable mechanism enables log rotation.

[0003] A problem of known vertical log splitters equipped with the support table is in that these tables are separate units that have to be separately transported and installed, which complicated and prolongs work. Applicable standards prohibit use of the support table for shorter logs, in case the table does not have an ergonomic height for multi-hour work, wherein the ergonomic height is 90 cm. Consequently, if the support table has a working height of at least 90 cm, the table may be sold together with the log splitter and not as an accessory.

[0004] The technical problem, which is solved by the present invention, is a constructional solution of the vertical log splitter and the support table that will fulfil requirements of standards and will enable simple installation and use.

Prior art

[0005] Utility model CN210551944 discloses a device with a base plate on which a vertical support is provided, wherein a splitting axes is movable along said vertical support. In the middle of the vertical support a support plate is provided in a fixed manner. Said support plate cannot be removed due to the fixed mounting, which means that only logs of a particular length can be split.

[0006] Utility model CN208543591 describes a vertical log splitter with a support table, which is enclosed from two sides with protections that prevent the logs from slipping from the table. The surface of the table has anti-slip layers that additionally restrict movement of the log. This document does not disclose how the table is attached to the log splitter.

[0007] Patent application BE896055 discloses to a splitting device with a frame comprising a holder in which a splitting axe is installed on the bottom of the device. The splitting axe is movable along the height with a lifting mechanism.

[0008] Patent SI25215 relates to a vertical log splitter with a wedge and a table, which is attached to the vertical guide, wherein the height of the table is adjustable. The table consists of an upper part and a lower part, the latter being guided in a movable manner in the upper part to the installed edge on the lower part. One side of the lower part to the middle of the edge has height A and the opposite side to the middle of the edge has height B, which is the height A increased for the desired height difference for two table heights.

[0009] Described solutions differ from the present invention in that none of them allows temporary removal of the table from the working area of the log splitter.

Description of the solution to the technical problem

[0010] The invention is based on the vertical log splitter, wherein the log or a part of wood for splitting is placed below the axe, which perpendicularly to the floor pushes onto the log with a certain splitting force. The technical problem of the construction of a table having an active (working) and non-active position, in which the support table is not in the working area of the log splitter, and which can be set to an ergonomic height of at least 90 cm, is solved as defined in the independent claim, wherein preferred embodiments are defined in the dependent claims.

[0011] The log splitter has a base plate on which a vertical pillar is mounted, along which a splitting axe is moving downwards (splitting) and upwards (return movement), and other important known parts of the log splitter. The essence of the log splitter according to the invention is in that it is equipped with a rotatable support table, which is designed as a working surface installed on a support leg, wherein:

- the support leg is with at least one, preferably two connecting elements movably or rotatably, respectively, mounted on a vertical rod or shaft,
- said rod or shaft is installed at one side of the vertical pillar or at a distance from said pillar, wherein the rod or shaft is mounted into the floor with a bushing or any other suitable mounting, and is preferably also mounted to the vertical pillar or any other part of the

log splitter for ensuring better stability,

- the connection between the support leg and the rok or shaft is achieved via connecting rods, levers, handles, or similar one-piece or multi-piece elements equipped with a rotational mechanism, preferably with bushings, bearings, ball bearings or other suitable elements that allow rotation, so that the support table can be rotated from an active (working) position, in which the support table is in the area of the splitting axe, into an inactive position, in which the support table is outside the area of the splitting axe, and vice-versa,
- a locking mechanism, which comprises a suitable pin or any other locking element, wherein the preferred embodiment comprises two pins, one for locking rotation around the rod or the shaft and the other for locking position of the table on the base plate.

[0012] The support leg may be a single element or comprises two or more parts, wherein each of the parts is attached to the rod or the shaft in the same manner as the above-described single-piece support leg. The connecting element is one or more, depending on the size of the support leg and its parts. In case shorter logs are to be split, height of the table has to be increased, thus all parts of the support table are rotated. In case of longer logs, only the upper part(s) of the support leg with the work surface are rotated to achieve smaller height. In case of the latter, the upper part(s) of the support leg descend on the rod or the shaft, as the lower part(s) will not be supporting the upper part(s). Each of the parts of the support leg is provided with a suitable locking mechanism for locking rotation and a mounting on the base plate of the log splitter.

[0013] The base plate of the log splitter is preferably provided with a space arranged to receive the support leg of the table, in order to ensure improved installation on or into the base plate, which additionally limits movement of the table during application of the splitting force on the log placed on the support table. An additional role in this has a pin for locking the position of the table, which may be a straight or a curved pin arranged to be installed through an eyelet on a bottom part of the support leg and in a hole in the base plate of the log splitter. This pin prevents movement of the table and also maintains the distance from the pillar. Manipulation of the pin is preferably manual, but it could be automatic in case the pin was installed in the base plate and in case it was designed as a pushing or a sinking pin that is compressed during passage of the support leg and again raised once the pin is positionally corresponding to the hole or the eyelet in the bottom part of the support leg.

[0014] The locking mechanism for locking rotation around the shaft may be any suitable mechanism known to the skilled person. The preferred embodiment of the locking mechanism is designed in the following manner: an upper bushing installed on the shaft for connection with the connecting element a holder with a hole is provided, said hole being arranged to receive the straight pin, while a lower bushing is provided with two cylindrical accessories, wherein the first accessory is arranged to receive the pin in the active position of the table, and the second accessory is arranged to receive the pin in the inactive position of the table. Matching of the pin with one of the cylindrical accessories depends on the position of the table, which affects the position of the lower bushing and consequently the cylindrical accessories.

[0015] The rotatable table is on the shaft or rotational mechanism optionally equipped with springs, which are not essential for operation, but are intended for easier lifting of the table prior to rotation between positions or changing of the position of the table. Instead of springs, obliquely cut bushings arranged to allow lifting of the table along an ascending part and to allow descent along a descending part may be used. This may be further assisted with optional threads on the rod, which prevent excessive or too fast movement.

[0016] Due to the standards defining the height of the support table the log splitter according to the invention is further equipped with an adjustable construction which ensures the log splitter to be lifted and fixed at a height that fulfils standard requirements. Lifting of the log splitter is achieved with the lifting hydraulics of the tractor, which is also used for lifting and transporting the log splitter to a work place or station. Such lifts are thus common. The adjustable construction that enables the height of support table of at least 90 cm may be designed as:

- at least four carrying legs, which are installed in pre-prepared openings (holes) n the base plate of the log splitter, wherein the position of carrying legs is fixed with any suitable attachment element, preferably made in suitable dimensions and from a material that sustains high load,
- a carrying frame comprising a bottom rectangular frame with optional triangular or polygonal reinforcements in at least two corners, and two vertical guides that are perpendicular to the bottom frame, wherein to the vertical guides a connecting leg of the log splitter with a guide is installed, said guide being movable along the vertical guides, and wherein the connections between the bottom frame and the vertical guides are reinforced with approximately triangular, trapezoid or polygonal reinforcements, and wherein the vertical guides are provided with holes, into which a pin can be installed in order to fix the position of the log splitter.

[0017] Said carrying frame may have on the opposite side from the vertical guides an additional supporting element, which is rotatably mounted on the side of the bottom frame and is in its elevated position engaged in a pre-prepared groove in the bottom part of the base plate of the log splitter.

[0018] Setting of the required height of the support table is achieved by lifting the log splitter with a tractor,

then the selected adjustable construction is set to the required height by installation in the holes and installation of pins, followed by descending the log splitter and initiating work with it.

[0019] Use of the log splitter with the rotatable table comprises the steps of removing the pin or opening the locking mechanism, lifting the table slightly and then rotating it in the direction towards the axis, and then setting the table in the required position on the base plate, followed by locking the position with the second pin. When the table has to be returned to the inactive position, the pin and the rotational mechanism pin are unlocked, then the table is slightly lifted and rotated to the inactive position, followed by locking the position with the pin of the rotational mechanism. Prior to use the height of the support table may be selected using the above-described solutions. In the embodiment, in which the rod or the shaft is installed at a distance from the vertical pillar and when the table is not in use, the geometry of the rotational table ensures a storage space for logs, which are temporarily placed or leaned against the shaft. Because the fulcrum for table rotation is not on the pillar of the log splitter and is at a distance form it, this storage space is ensured.

[0020] The invention enables that the complete installation of the table from the inactive into the active position is performed by one person without the need for moving or removing elements, as locking is achieved with the suitable locking mechanism. Thus, the rotatable table is safely installed and enables reliable and safe use during log splitting.

[0021] Construction of the rotatable table is suitable for the vertical log splitter as well as any other devices or machines having working tables with active and inactive positions.

[0022] The log splitter with the rotatable support table will be described in further detail based on an exemplary embodiment and figures, which show:

Figure 1 Elevation view of the log splitter with the rotatable table according to a possible embodiment

Figure 2a The support table in the inactive position

Figure 2b The support table in the inactive position with a visible base plate of the log splitter and the hole for receiving the locking pin

Figure 2c A detail of the locking mechanism for locking rotation of the table in the inactive position

Figure 3a The support table in the active position

Figure 3b The support table in the active position with visible both connecting elements between the rod and the rotatable table

Figure 3c A detail of the locking mechanism for locking rotation of the table in the active position

Figure 4a The construction for lifting the support table to an ergonomic height according to a first embodiment, wherein the construction is designed as a carrying frame

Figure 4b The construction for lifting the support table to an ergonomic height according to a second embodiment, wherein the construction is designed as carrying legs

[0023] Figure 1 shows a possible embodiment of the log splitter, wherein the log splitter has a base plate 1 with installed vertical pillar 2 along which a splitting axe 3 is moved downwards (splitting) and upwards (return movement) as well as other important known components of the log splitter known to the skilled person that are not directly related to the present invention.

[0024] The log splitter is equipped with a rotatable table 4, which is designed as a work surface 41 installed on a support leg 42, wherein:

- the support leg 42 is with two connecting elements 5 movably mounted on a vertical rod 6, wherein the connecting elements 5 are designed as connecting rods, the first 51 is straight and the second (lower) 52 is shaped as the letter L,
- said rod 6 is installed at one side of the vertical pillar 2, wherein the rod is mounted into the floor with a bushing 61 and to the vertical pillar 2 of the log splitter,
- the connection between the support leg 42 and the rod 6 is achieved via connecting rods 5 equipped with a rotational mechanism 7 comprising bushings 71, 72, so that the support table 4 can be rotated from an active (working) position, in which the support table is in the area of the splitting axe 3, into an inactive position, in which the support table is outside the working area of the splitting axe 3, and vice-versa,
- a locking mechanism, which comprises a suitable pin 7 arranged for installation through an eyelet 42a on the bottom part of the support leg 42 and into a hole 1a in the base plate 1 of the log splitter, and
- a second locking mechanism 8 for locking rotation around the rod 6 designed in the following manner: an upper bushing 71 installed on the shaft for connection with the connecting element a holder 81 with a hole is provided, said hole being arranged to receive the straight pin 82, while a lower bushing 72 is provided with two cylindrical accessories 83, wherein the first accessory is arranged to receive the pin 82 in the active position of the table 4, and the second accessory is arranged to receive the pin 82 in the inactive position of the table 4. Matching of the pin 82 with one of the cylindrical accessories 83 depends on the position of the table 4, which affects the position of the lower bushing 72 and consequently the cylindrical accessories 83.

[0025] The active and inactive position of the rotatable table of the log splitter are shown in figures 2 and 3 with details. In figure 2a the support table is out of reach of the splitting axe, i.e., outside the base plate 1 of the log

splitter. As shown in figure 2b, the base plate 1 of the log splitter is provided with a space 1b for receiving the support leg 42 of the table, into which the support leg corresponds in the active position of the table, thus ensuring stable position of the table.

[0026] The position of the locking mechanism in inactive position of the table is such that the pin 82 is in the right accessory 83a (figure 2c), while in the active position of the table the pin 82 is in the left accessory 83b (figure 3c). Figure 3c also clearly depicts the shape of connecting elements 5, wherein the upper 51 is shaped as a straight rod attached to the support 41a of the work surface 41, while the lower 52 is shaped as the letter L. Both are mounted on the shaft via bushings.

[0027] The adjustable construction, which enables that the support table has a height of at least 90 cm from the floor may be designed as a carrying frame shown in figure 4a or as carrying legs shown in figure 4b.

[0028] Figure 4a shows a carrying frame 100 comprising a bottom rectangular frame 101 with optional triangular or polygonal reinforcements 102a in at least two corners, and two vertical guides 103 that are perpendicular to the bottom frame 101, wherein a connecting leg of the log splitter with a guide 104 is installed on the vertical guides 103, said guide 104 being movable along the vertical guides 103, and wherein the connections between the bottom frame 101 and the vertical guides 103 are reinforced with approximately triangular, trapezoid or polygonal reinforcements 102b, and wherein the vertical guides 103 are provided with holes 103a, into which a pin 105 can be installed in order to fix the position of the log splitter (figure 4a).

[0029] Said carrying frame 101 may have on the opposite side from the vertical guides 103 an additional supporting element (not shown in the figures), which is rotatably mounted on the side 101a of the bottom frame 101 and is in its elevated position engaged in a pre-prepared groove (not shown in the figures) in the bottom part of the base plate of the log splitter.

[0030] Alternatively, the adjustable construction 110 is designed as four carrying (support) legs 111, which are installed in the pre-prepared openings 112 in the base plate of the log splitter as shown in figure 4b. The position of said carrying legs is fixed with any suitable attachment element, preferably with a pin 113 having suitable dimensions and made from a material that sustains large loads (figure 4b).

[0031] Setting of the required height of the support table is achieved by lifting the log splitter with a tractor, then the chosen adjustable construction, either the frame or legs, are set to the required height by installing them in suitable openings and locking them with pins. This is followed by lowering of the log splitter with the tractor and initiation of work.

Claims

1. A vertical log splitter having a base plate (1), on which a vertical pillar (2) is provided, wherein a splitting axe (3) is movable along said vertical pillar downwards for splitting movement and upwards for a return movement, **characterized in that** the log splitter is equipped with a rotatable support table (4), designed as a working surface (41) installed on a support leg (42), wherein:

   - the support leg (42) is with at least one, preferably two connecting elements (5) movably or rotatably, respectively, mounted on a vertical rod or shaft (6),
   - said rod or shaft (6) is installed at one side of the vertical pillar (2) or at a distance from said pillar (2), wherein the rod or shaft (6) is mounted into the base plate (1) with a bushing (61) or any other suitable mounting,
   - the connection between the support leg (42) and the rod or shaft (6) is achieved via connecting rods, levers, handles, or similar one-piece or multi-piece elements (5) equipped with a rotational mechanism (7) enabling rotation, so that the support table (4) can be rotated from an active position, in which the support table (4) is in the area of the splitting axe (3), into an inactive position, in which the support table (4) is outside the area of the splitting axe (3), and vice-versa,
   - the position of the table (4) is locked with a suitable pin or a locking mechanism (8), and
   - wherein the log splitter is provided with an adjustable construction (100, 110) enabling lift of the log splitter to a height, in which the support table (4) has a height of at least 90 cm, wherein said construction (100, 110) is adjustable upon lifting of the log splitter with a tractor and its hydraulics and the construction is designed as:

     ◦ a carrying frame (100) comprising a bottom rectangular frame (101) and two vertical guides (103), which are perpendicular to the bottom frame (101), wherein a connecting leg of the log splitter with a guide (104) is installed on the vertical guide (103), said guide (104) being movable along said vertical guides (103), wherein connections between the bottom frame (101) and vertical guides (103) are reinforced with second preferably triangular, trapezoid or polygonal reinforcements (102b), and wherein the vertical guides (103) are provided with holes (103a), into which a suitable attachment element, preferably a pin (105) can be installed for ensuring fixed position of the log splitter, or
     ◦ as four carrying legs (111), which are in-

stalled in the pre-prepared openings (112) in the base plate (1) of the log splitter, wherein the position of said carrying legs (111) is fixed with any suitable attachment element, preferably with a pin (113).

2. The vertical log splitter with the rotatable table according to claim 1, wherein the support leg (42) is movably or rotatably mounted on the vertical rod or shaft (6) with two connecting elements (5).

3. The vertical log splitter with the rotatable table according to claim 1 or claim 2, wherein said rod or shaft (6) is additionally mounted on the pillar (2) or any other part of the log splitter.

4. The vertical log splitter with the rotatable table according to any of the preceding claims, wherein the rotational mechanism (7) is achieved with bushing, bearings, ball bearings or any other suitable elements arranged to enable rotation of the support table (4) from the active position into the inactive position and vice-versa.

5. The vertical log splitter with the rotatable table according to any of the preceding claims, wherein the base plate (1) of the log splitter is provided with a space arranged to receive the support leg (42) of the table (4).

6. The vertical log splitter with the rotatable table according to any of the preceding claims, wherein two pins are provided, namely, a first pin (82) for locking rotation around the shaft and a locking mechanism with a second pin (42a) for locking the position of the table (4) on the base plate (1).

7. The vertical log splitter with the rotatable table according to claim 6, wherein the second pin (42a) for locking the position of the table (4) is a straight or curved pin arranged to be installed through an eyelet on the bottom part of the support leg (42) and into a hole in the base plate (1) of the log splitter.

8. The vertical log splitter with the rotatable table according to claim 7, wherein the locking mechanism (8) for locking rotation around the shaft is designed in the following manner: an upper bushing (71) installed on the shaft for connection with the connecting element a holder (81) with a hole is provided, said hole being arranged to receive the straight pin (82), while a lower bushing (72) is provided with two cylindrical accessories (83), wherein the first accessory (83) is arranged to receive the pin (82) in the active position of the table (4), and the second accessory (83) is arranged to receive the pin (82) in the inactive position of the table (4), wherein matching of the pin (82) with one of the cylindrical accessories (83) depends on the position of the table (4), which affects the position of the lower bushing (72) and consequently the cylindrical accessories (83).

9. The vertical log splitter with the rotatable table according to any of the preceding claims, wherein the rotatable table (4) on the shaft (6) or the rotational mechanism (7) is equipped with springs for easier lifting of the table prior to rotation between positions or with obliquely cut bushings arranged to allow lifting of the table along an ascending part and to allow descent along a descending part.

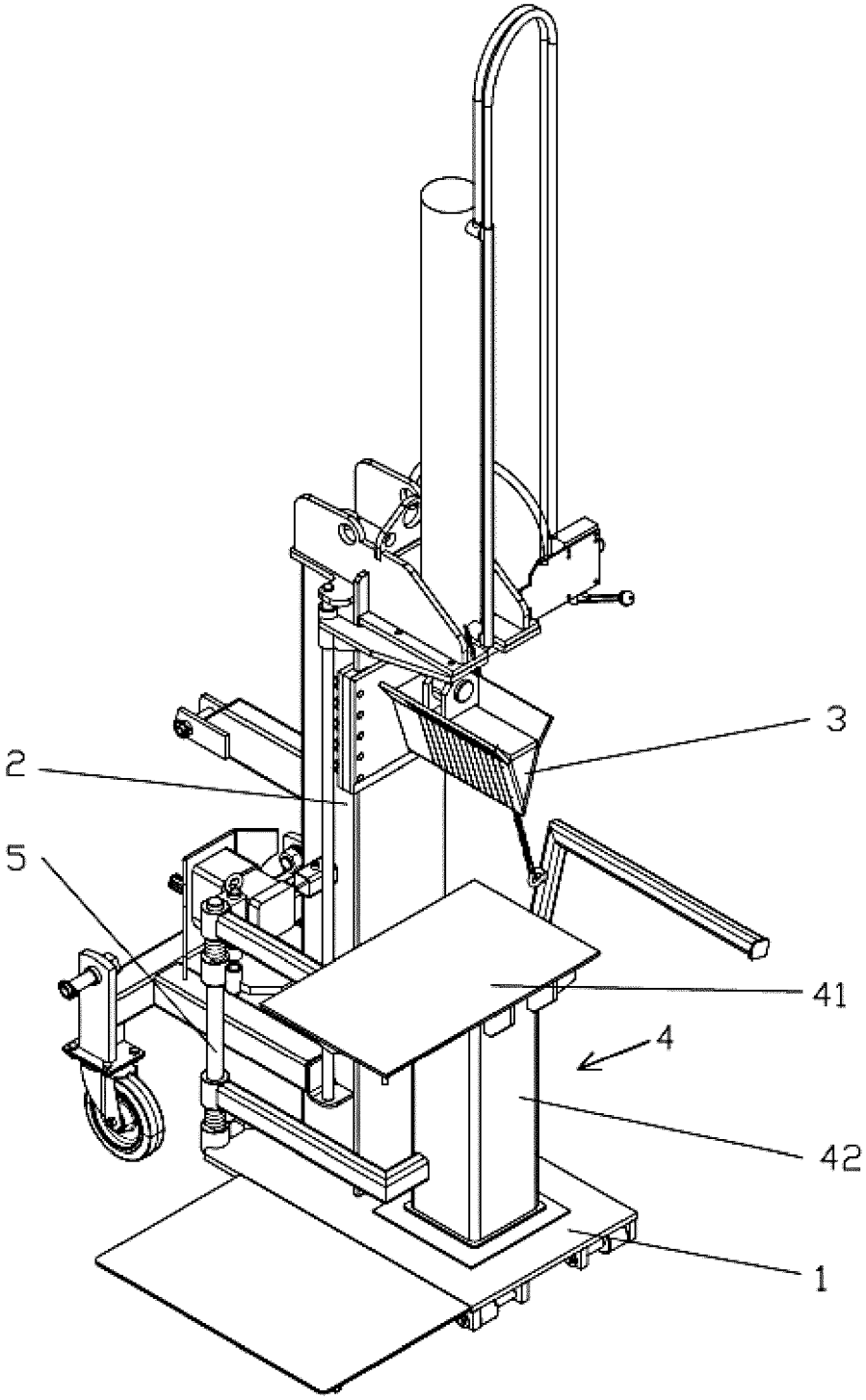

Figure 1

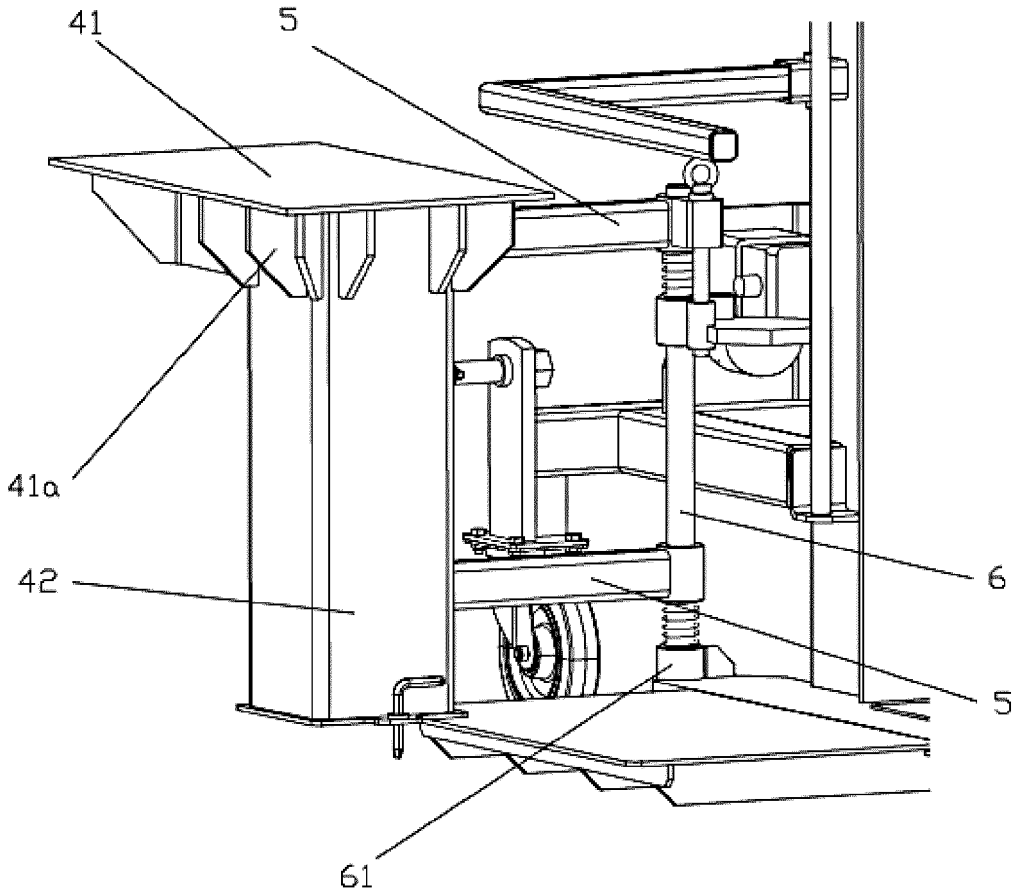

Figure 2a

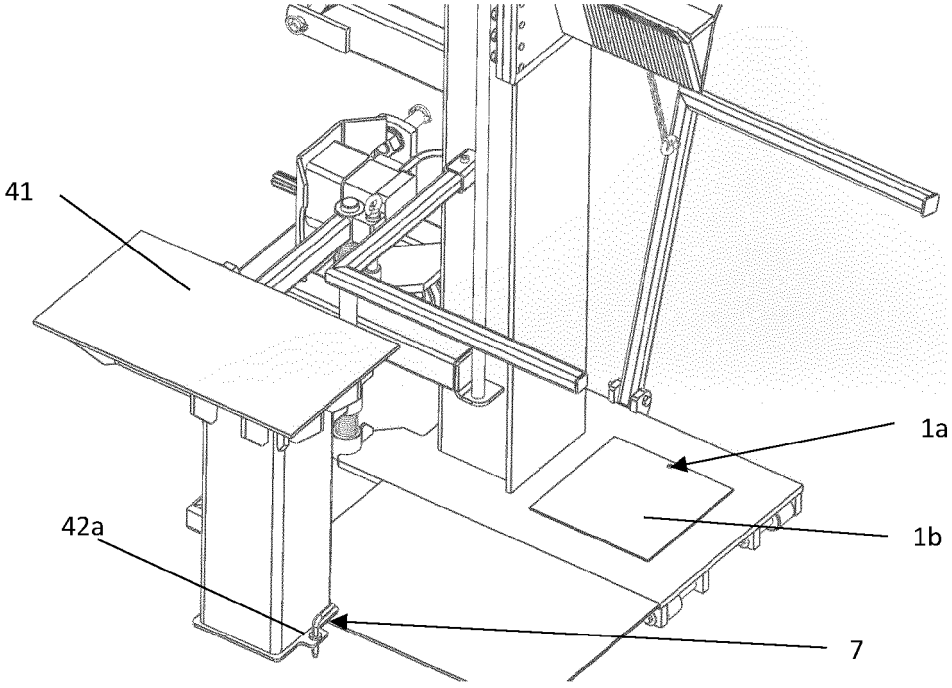

Figure 2b

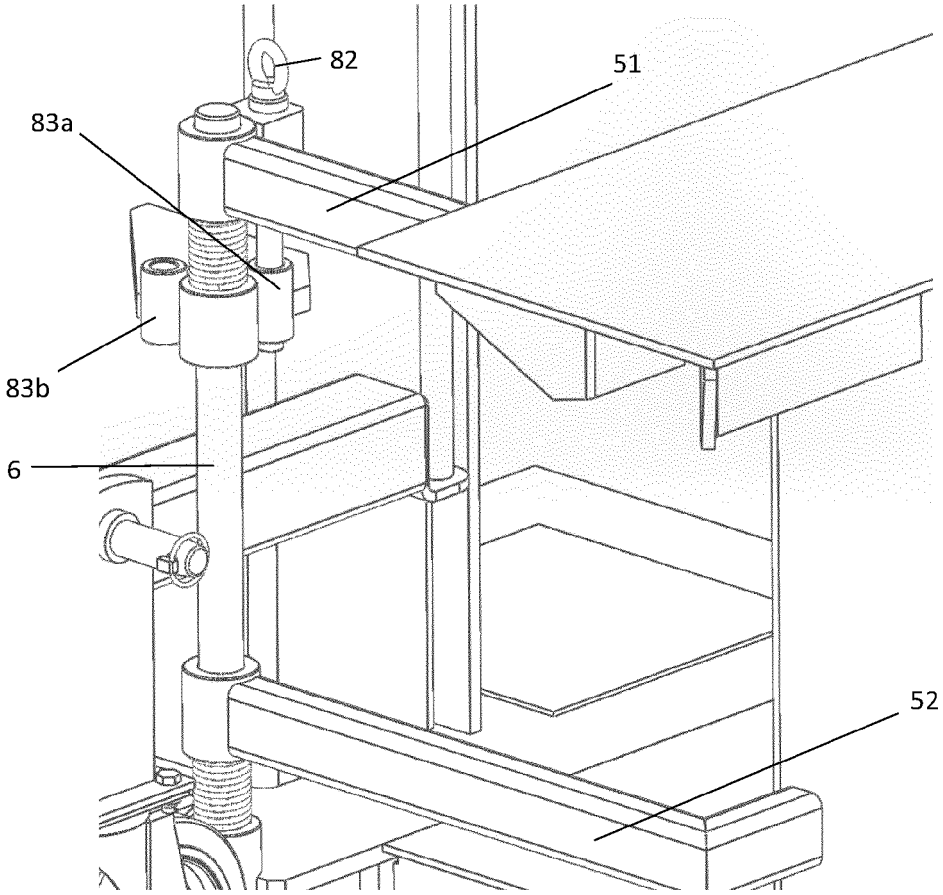

Figure 2c

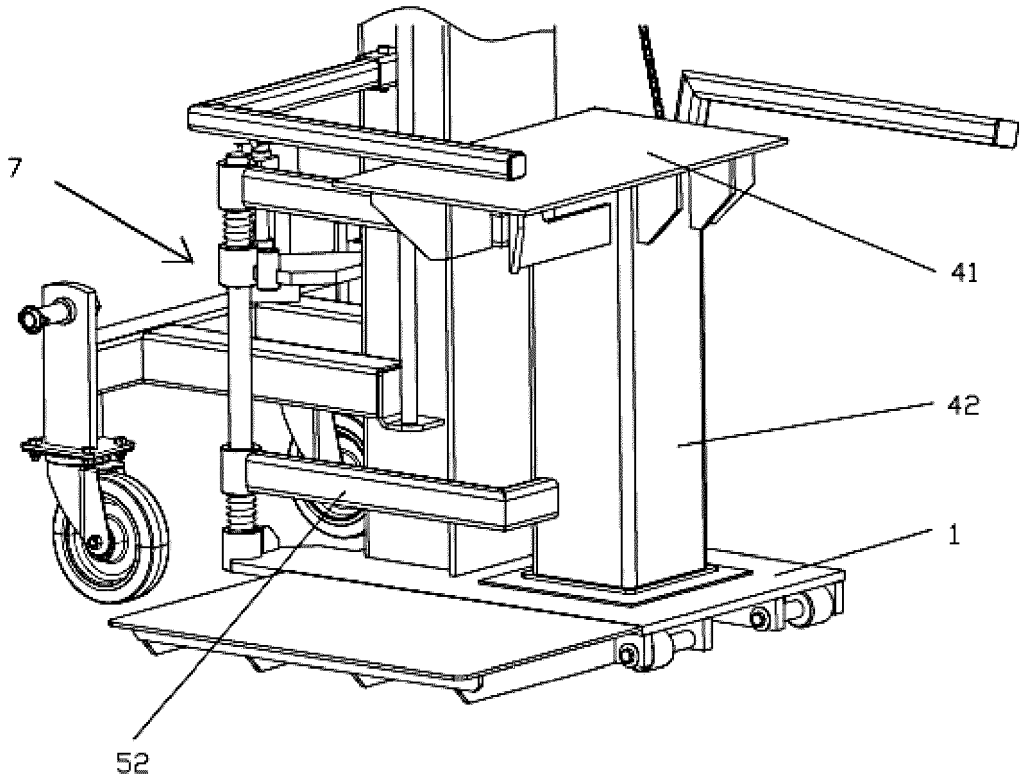

Figure 3a

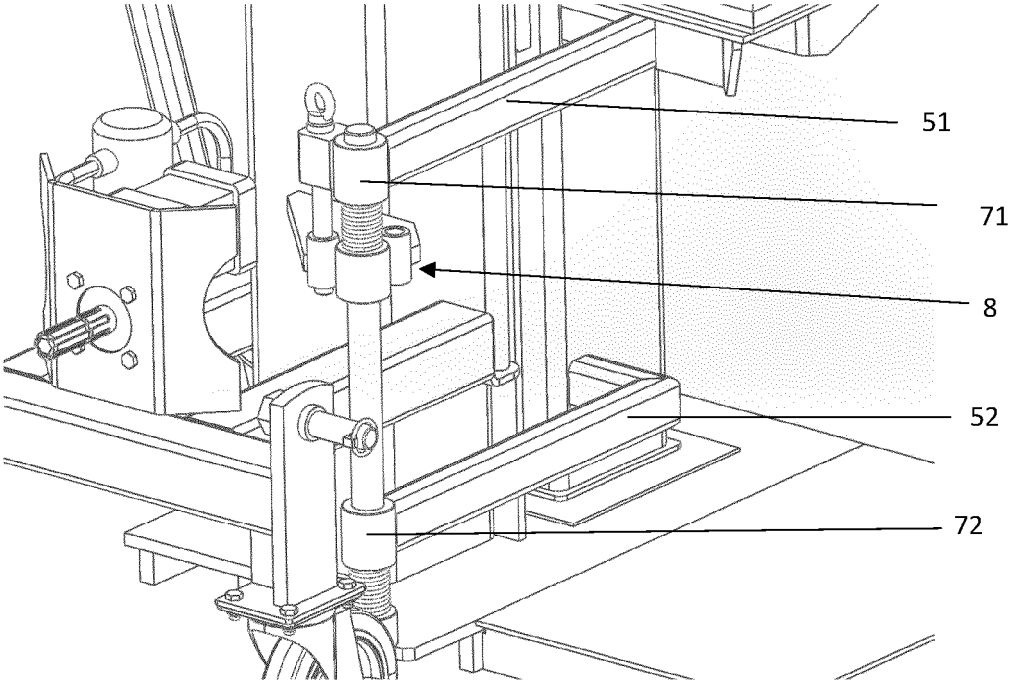

Figure 3b

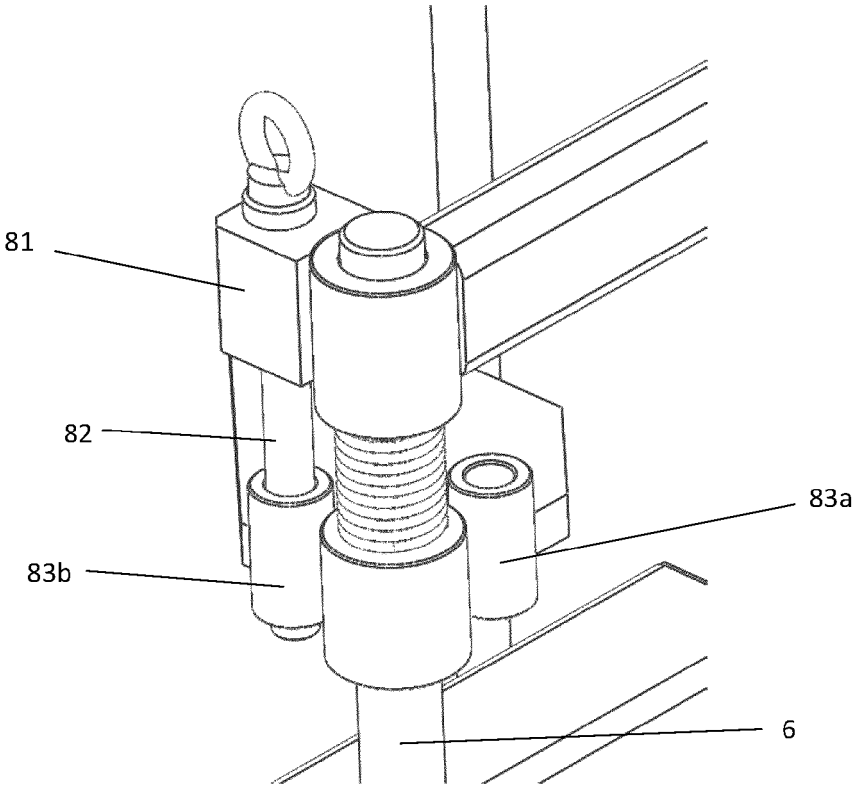

Figure 3c

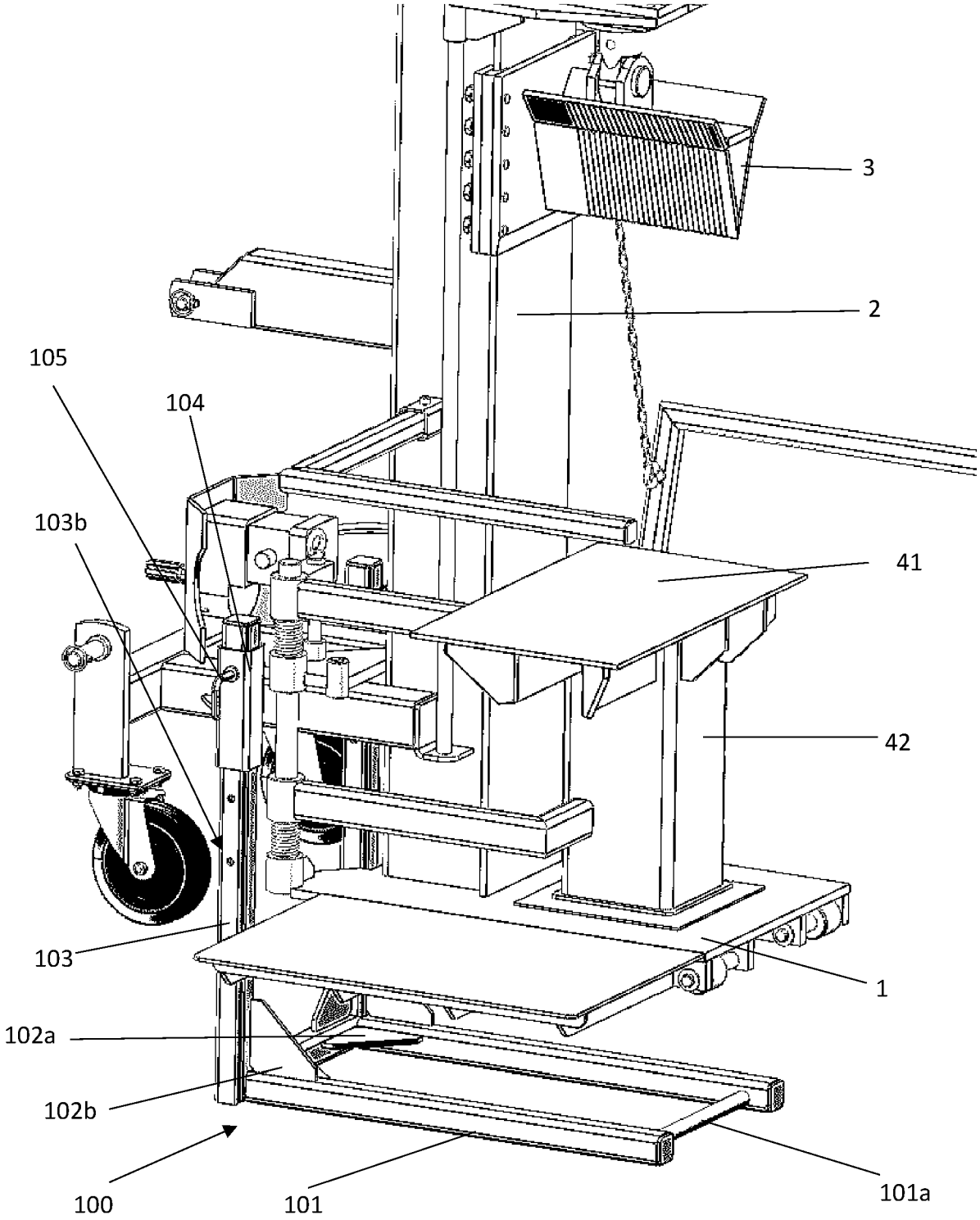

Figure 4a

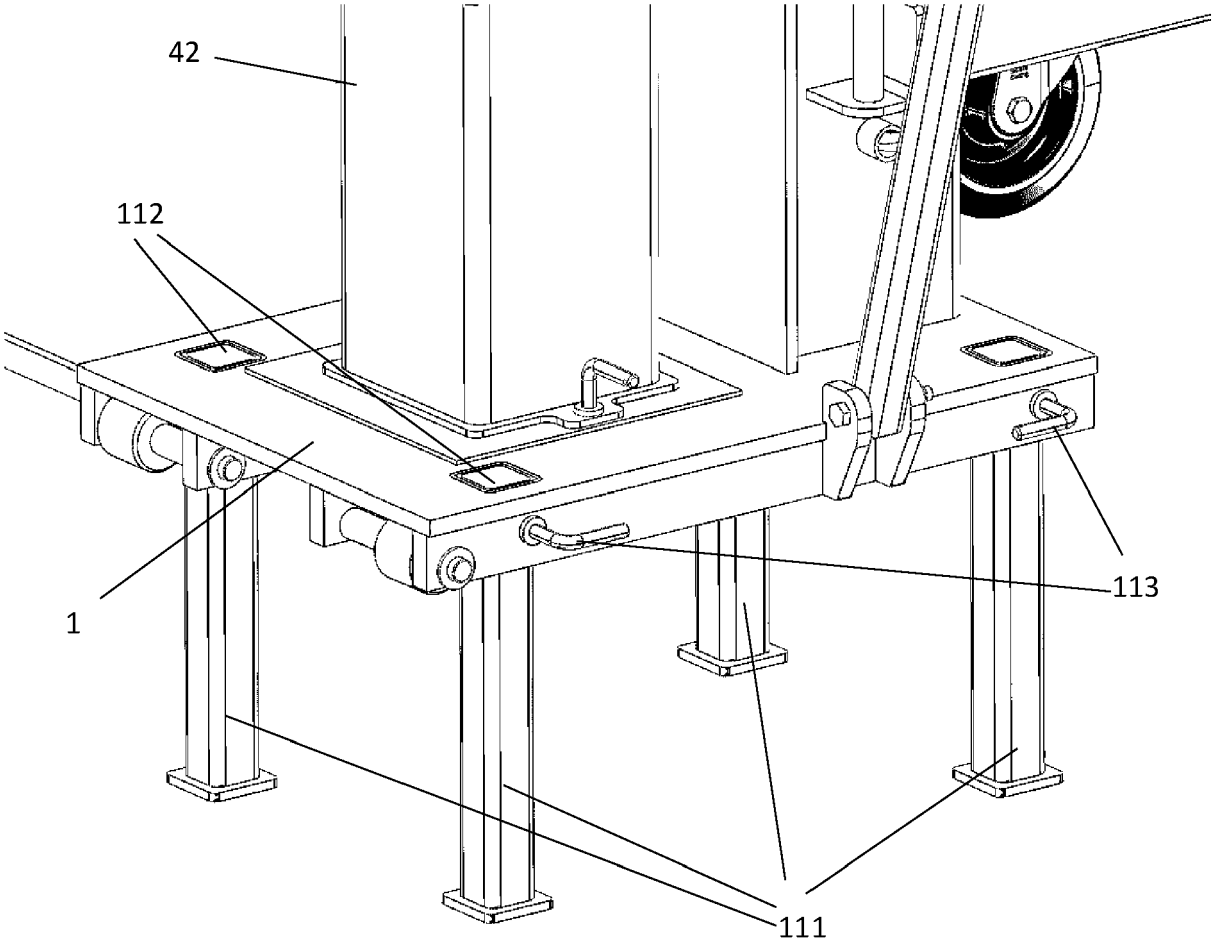

Figure 4b

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 21 2967

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 597 727 A1 (PISEK VITLI KRPAN DOO [SI]) 22 January 2020 (2020-01-22) * abstract * * paragraphs [0015], [0016], [0018] * * figures *	1-9	INV. B27L7/00 B27L7/06
A	DE 20 2015 000697 U1 (BLÜMEL GEORG [DE]) 3 March 2015 (2015-03-03) * figures *	1-9	
A	US 4 561 479 A (BURDINE CHARLES M [US]) 31 December 1985 (1985-12-31) * figures *	1-9	

TECHNICAL FIELDS SEARCHED (IPC)
B27L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 May 2023	Hamel, Pascal

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 21 2967

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-05-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3597727 A1	22-01-2020	EP 3597727 A1	22-01-2020
		SI 25674 A	31-01-2020
DE 202015000697 U1	03-03-2015	DE 102016000447 A1	04-08-2016
		DE 202015000697 U1	03-03-2015
US 4561479 A	31-12-1985	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- FR 2466323 **[0002]**
- US 4905746 A **[0002]**
- US 2016136839 A **[0002]**
- CN 212266116 **[0002]**
- AT 398928 **[0002]**
- US 2020269375 A **[0002]**
- CN 210551944 **[0005]**
- CN 208543591 **[0006]**
- BE 896055 **[0007]**
- SI 25215 **[0008]**