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(54) **LIFTING POSITIONING STRUCTURE FOR LADDER TOOL PLATFORM**

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| ***E06C 7/18*** | (2006.01) |
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See application file for complete search history.

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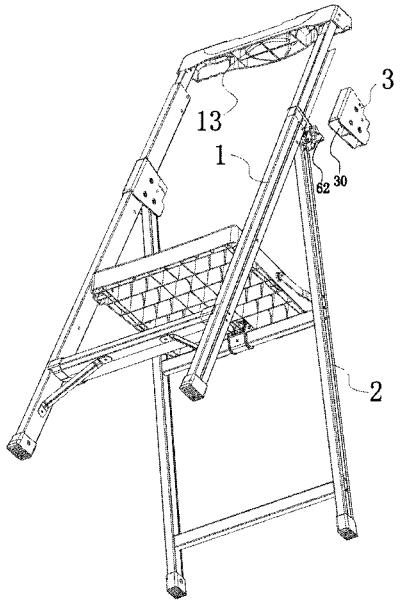
(57) **ABSTRACT**

A lifting positioning structure for a ladder tool platform comprises a ladder. The ladder comprises front supporting legs, rear supporting legs, connectors fixedly connected to the front supporting legs, plug pins, and elastic parts, wherein each front supporting leg includes a big tube and a small tube which are able to relatively move in an extension direction. The connectors are formed with vertically-through installation cavities which allow the big tubes to be inserted therein. The big tubes are arranged in the installation cavities and are fixedly connected to the connectors which extend to form connection parts rotationally connected to the rear supporting legs. The small tubes are connected to a tool platform. The plug pins are movably arranged on the connectors or the big tubes.

**11 Claims, 4 Drawing Sheets**



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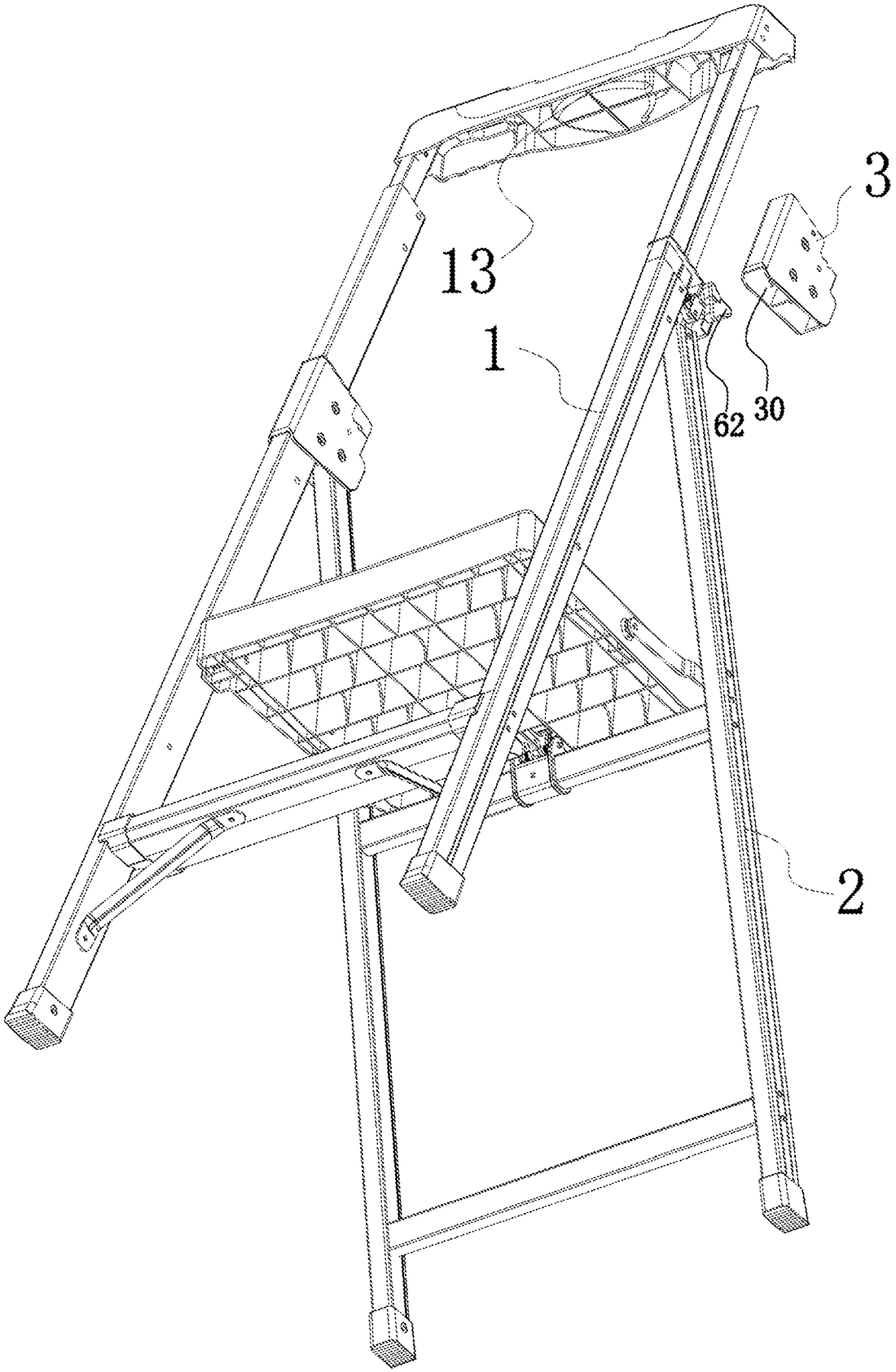


Fig. 1

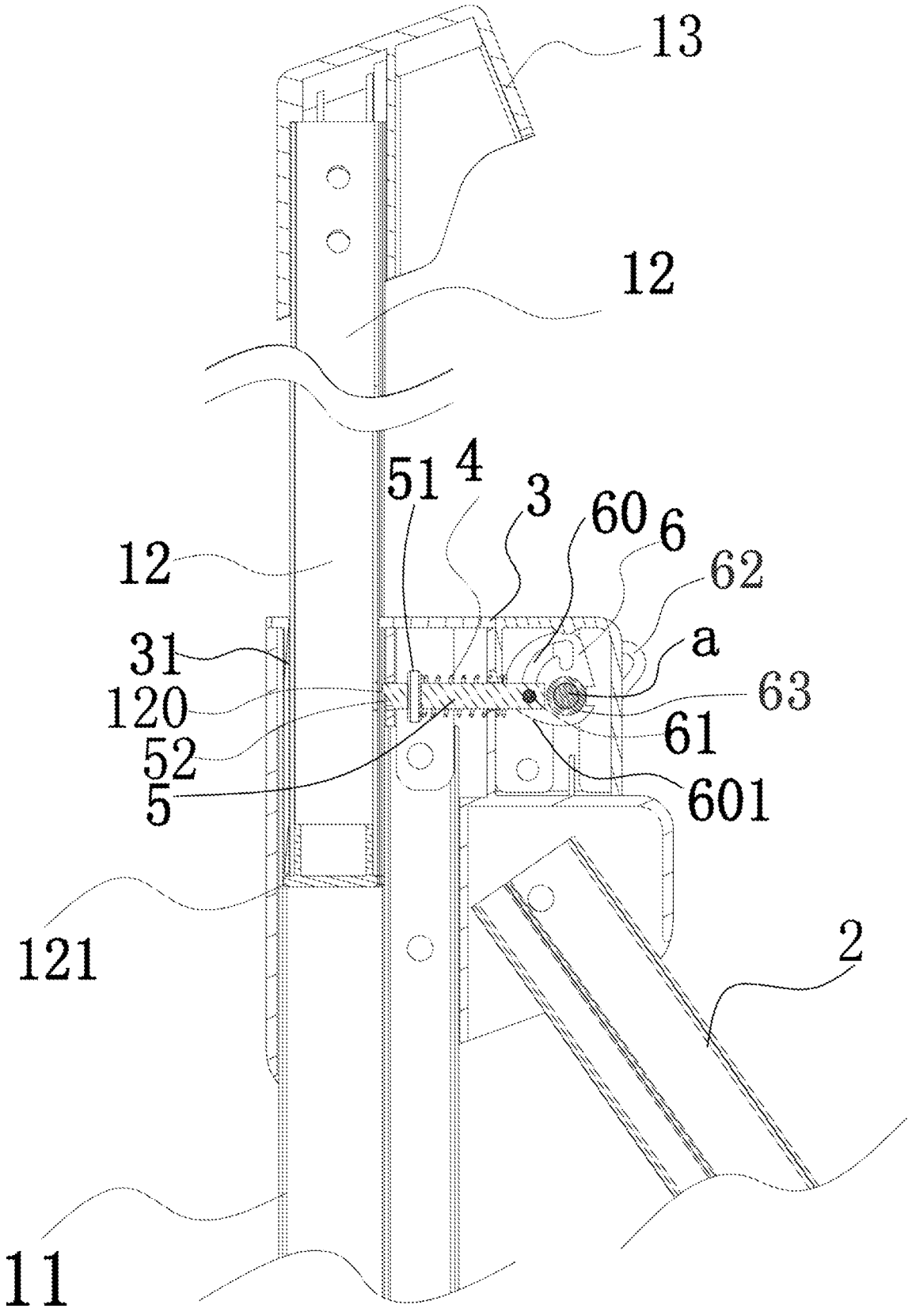


Fig. 2

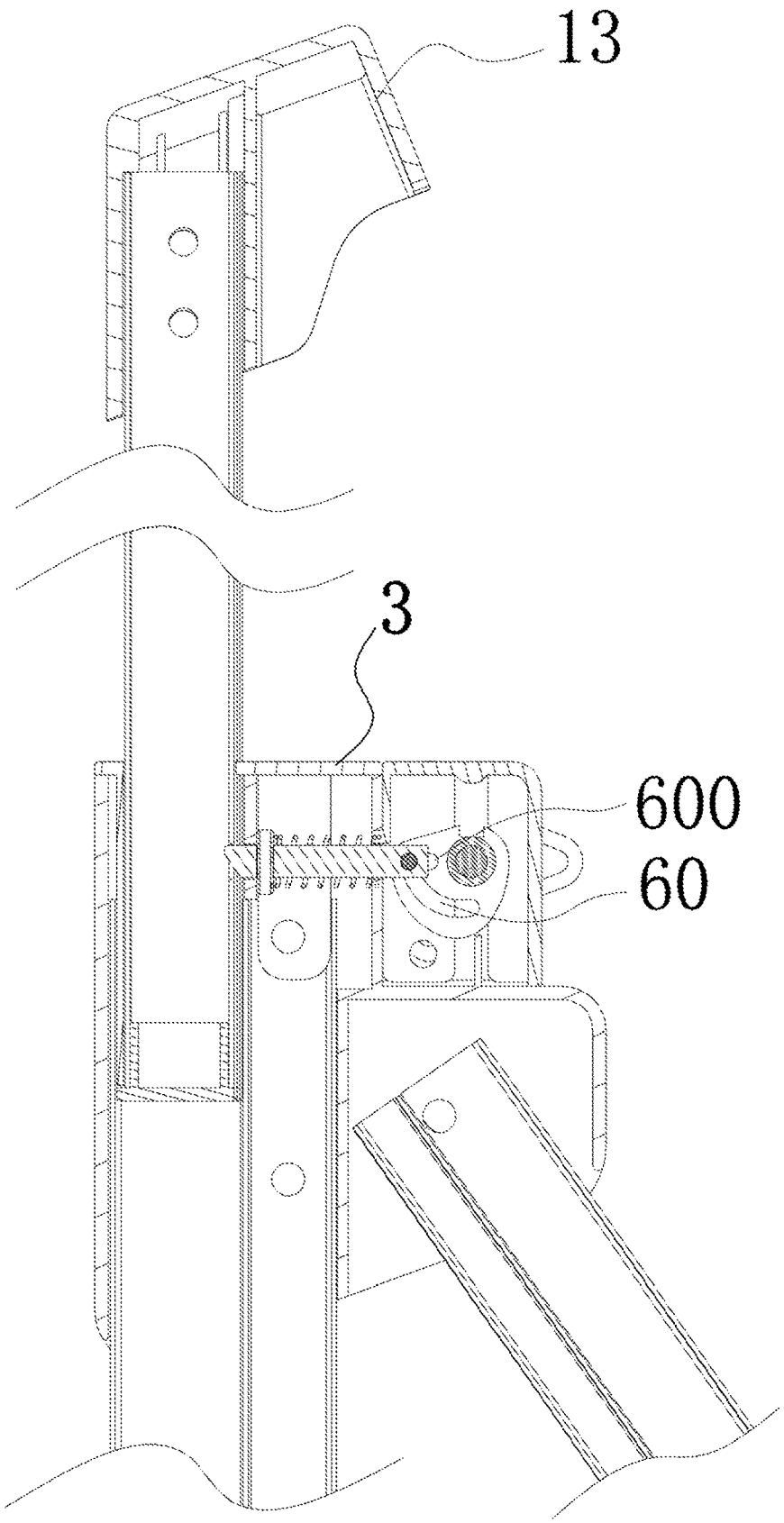


Fig. 3

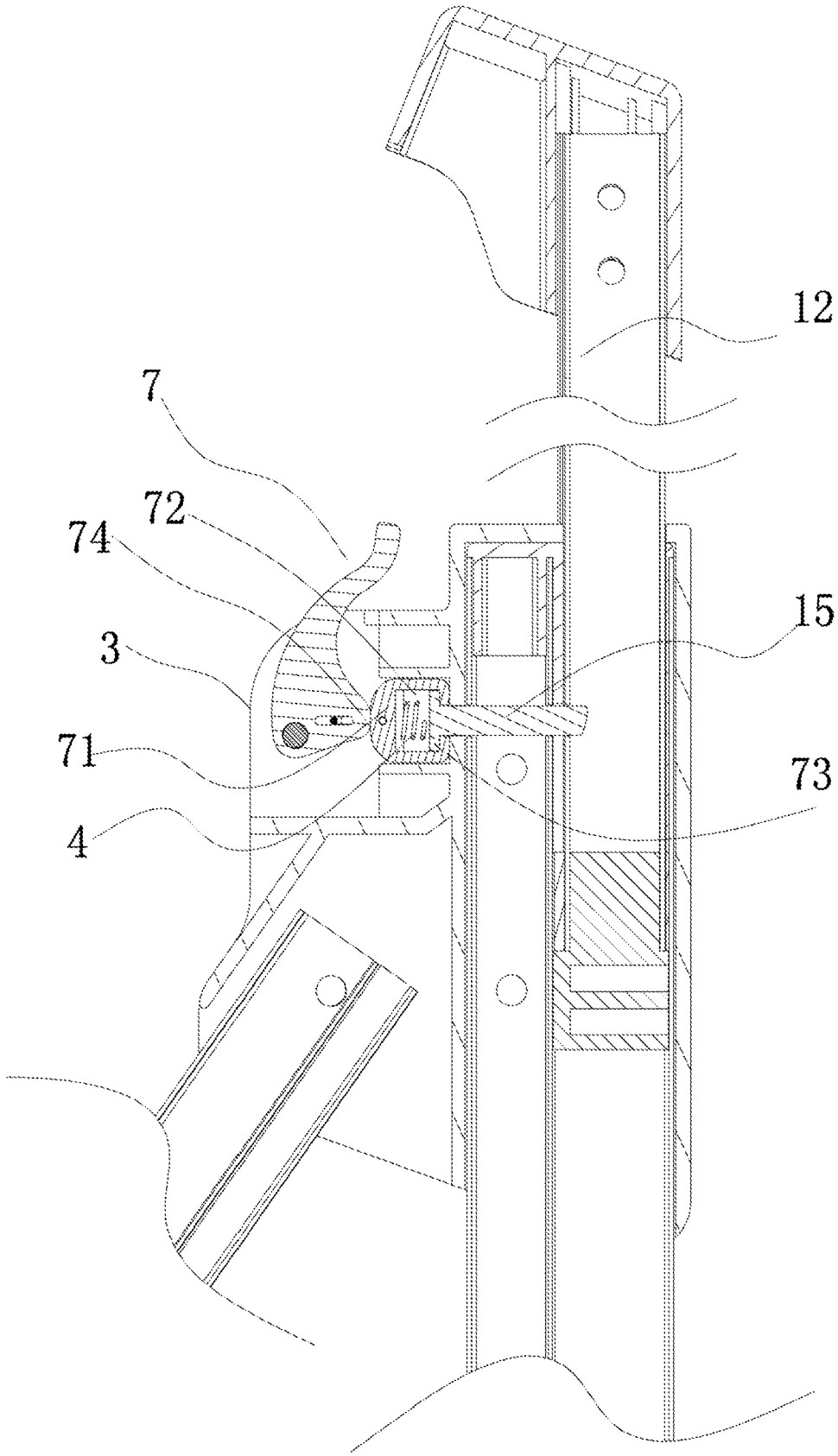


Fig. 4

# LIFTING POSITIONING STRUCTURE FOR LADDER TOOL PLATFORM

## CROSS REFERENCE TO THE RELATED APPLICATIONS

This application is based upon and claims priority to Chinese Patent Application No. 201920132347.X, filed on Jan. 25, 2019, the entire contents of which are incorporated herein by reference.

## TECHNICAL FIELD

The utility model relates to a lifting positioning structure for a ladder tool platform, and belongs to the technical field of home supplies.

## BACKGROUND

A ladder having a stretchable backrest in the prior art comprises a pair of ladder legs and a plurality of pedals installed on the ladder legs, wherein connectors are arranged on the upper parts of the ladder legs, installation parts extend out of the connectors, a tool platform is pivotally connected with the installation parts through pivots, the lower part of the backrest is located between the connectors and the pivots, an elastic cushion block is arranged between the backrest and the pivots, and the tool platform has a cam part pressing against the cushion block. The tool platform can be folded to reduce the logistical size. However, the length of the ladder cannot be changed, and the height of the ladder cannot be adjusted as needed when the ladder is used.

## SUMMARY

The objective of the utility model is to overcome the above shortcomings in the prior art by providing a lifting positioning structure for a ladder tool platform, which is reasonable in structural design and fulfills stable and reliable positioning.

The technical solution adopted by the utility model to fulfill the above-mentioned objective is as follows: a lifting positioning structure for a ladder tool platform is characterized in that a ladder comprises front supporting legs, rear supporting legs, connectors fixedly connected with the front supporting legs, plug pins, and elastic parts, wherein each front supporting leg includes a big tube and a small tube which are able to relatively move in an extension direction; the connectors are formed with vertically-through installation cavities which allow the big tubes to be inserted therein; the big tubes are arranged in the installation cavities and are fixedly connected with the connectors which extend to form connection parts rotationally connected with the rear supporting legs, and the small tubes are connected with a tool platform; the plug pins are movably arranged on the connectors or the big tubes; the elastic parts apply an acting force to the plug pins to make the plug pins tend to position the small tubes, and the small tubes are positioned after abutting against the plug pins; and the plug pins overcome the resistance of the elastic parts under an external force to move away from the small tubes, so that the small tubes are released from being positioned.

Wherein, the plug pins are provided with shield parts to abut against springs, the elastic parts are the springs disposed around the plug pins capable of moving along their axial directions, and the springs have one ends abutting against the shield parts and the other ends abutting against the connectors or derivative parts connected with the connectors.

Wherein, the small tubes arranged in the installation cavities are provided with flanges protruding relative to the external diameters of the small tubes, and covers are arranged over the mounting cavities; and when the small tubes move upwards, the flanges abut against the covers, and the plug pins are located at the lower ends of the small tubes, so that the small tubes are positioned.

Wherein, the small tubes are formed with holes allowing the plug pins to be inserted therein, and when the plug pins are inserted into the holes, the small tubes are positioned.

Wherein, the ladder further comprises rotary parts which are rotationally connected with the connectors and formed with arc grooves, the plug pins are connected with connection shafts arranged in the arc grooves, and a distance between the arc grooves and rotational connection points of the rotary parts and the connectors is variable; and the connection shafts move along the arc grooves by means of rotation of the rotary parts, and when positions of the connection shafts in the arc grooves tend to get close to the rotational connection points, the small tubes tend to be released from being positioned, otherwise, the small tubes tend to be positioned.

Wherein, the arc edges are arranged at the peripheries of the arc grooves and abut against the ends, abutting against the connectors or the derivative parts, of the springs.

Wherein, the number of the arc grooves is two, and the connection shafts are respectively arranged in the two arc grooves.

Wherein, the rotation shafts are arranged at the rotational connection points of the rotary parts and the connectors, are connected with the rotary parts, and extend out of the connectors to be connected with operating parts.

Wherein, when the positions of the connection shafts in the arc grooves are fixed, the arc grooves extend to form idling grooves in the axial direction of the plug pins; and oblique planes are arranged at the ends of the plug pins and incline in a manner that the small tubes abut against the oblique planes when moving upwards to make the plug pins tend to be away from the small tubes.

Wherein, when the small tubes are released from being positioned, the rotary parts are locked with the connectors in an interference fit manner.

According to the utility model, the ladder further comprises triggers rotationally connected with the connectors, and plug pin installation parts are formed with plug pin installation cavities allowing the plug pins to move therein and are linked with the triggers.

Wherein, a linkage structure of the triggers and the plug pin installation parts is as follows: the triggers are provided with cam blocks; after the triggers rotate by a preset angle, the plug pin installation parts abut against the cam blocks and are resisted in the direction away from the small tubes; and after the triggers rotate by another preset angle, the plug pin installation parts are released from being resisted by the cam blocks.

Wherein, a linkage structure of the triggers and the plug pin installation parts is as follows: the triggers are provided with the cam blocks; after the triggers rotate by the preset angle, the plug pin installation parts abut against the cam blocks and are resisted in the direction away from the small tubes; and after the triggers rotate by another preset angle, the plug pin installation parts are released from being resisted by the cam blocks.

Compared with the prior art, the utility model has the following advantages and effects: the tool platform has a stretchable lifting positioning structure, so that the logistical and packaging size can be reduced. When the lifting positioning structure is used, the tool platform moves upwards accordingly when the small tubes move upwards, and a user can climb the ladder more stably by means of the upward movement of the small tubes or the tool platform.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a structural view of the utility model.

FIG. **2** is a structural view of the utility model released from a positioning state.

FIG. **3** is a structural view of the utility model in a positioning state.

FIG. **4** is a structural view of Embodiment 2 of the utility model.

## DETAILED DESCRIPTION OF THE EMBODIMENTS

The utility model is further expounded below in combination with the accompanying drawings and embodiments, and the following embodiments are used for explaining the utility model, and are not intended to limit the utility model.

### Embodiment 1

Referring to FIG. **1** to FIG. **3**, a lifting positioning structure for a ladder tool platform is characterized in that a ladder comprises front supporting legs **1**, rear supporting legs **2**, connectors **3** fixedly connected with the front supporting legs **1**, plug pins **5**, and elastic parts **4**, wherein each front supporting leg **1** includes a big tube **11** and a small tube **12** which are able to relatively move in an extension direction; the connectors **3** are formed with vertically-through installation cavities **30** which allow the big tubes **11** to be inserted therein; the big tubes **11** are arranged in the installation cavities **30** and are fixedly connected with the connectors **3** which extend to form connection parts rotationally connected with the rear supporting legs **2**, and the small tubes **12** are connected with a tool platform **13**; the plug pins **5** are movably arranged on the connectors **3** or the big tubes **11**; the elastic parts **4** apply an acting force to the plug pins **5** to make the plug pins **5** tend to position the small tubes **12**, and the small tubes **12** are positioned after abutting against the plug pins **5**; and the plug pins **5** overcome the resistance of the elastic parts **4** under an external force to move away from the small tubes **12**, so that the small tubes **12** are released from being positioned. The installation cavities **30** of the connectors **3** in this embodiment are open or closed; the open connectors **3** have openings formed in side faces, such as connectors **3** formed by two iron sheets; the closed connectors **3** have encircled side walls, such as plastic connectors formed by injection molding; and the vertically-through installation cavities **30** have closed circumferences. In a specific implementation of this embodiment, the number of the front supporting legs **1** and the number of the rear supporting legs **2** are two, and the tool platform **13** is connected between the two small tubes **12** and is generally located above the small tubes **12**. The plug pins **5** move away from the small tubes **12** under an external force applied by a user, so that the small tubes **12** are released from being positioned. When no external force is applied, the elastic parts **4** apply a force to the plug pins **5** to make the plug pins **5** get close to the small tubes **12** to abut against the small tubes **12**, so that the small tubes **12** are correspondingly positioned.

The plug pins **5** in this embodiment are provided with shield parts **51** to abut against springs, the elastic parts **4** are the springs disposed around the plug pins **5** capable of moving along their axial directions, and the springs have one ends abutting against the shield parts **51** and the other ends abutting against the connectors **3** or derivative parts connected with the connectors **3**. The derivative parts include any supporting parts such as the big tubes **11**, the rear supporting legs **2**, and rotary parts **6**.

In this embodiment, the small tubes **12** arranged in the installation cavities **30** are provided with flanges **121** protruding relative to the external diameters of the small tubes **12**; the flanges **121** are directly formed on the small tubes **12**, or end plugs are fixedly arranged below the small tubes **12**, and the external edges of the end plugs extend out of the external diameters of the small tubes **12** to form the flanges **121**; covers **31** are arranged over the installation cavities **30**; and when the small tubes **12** move upwards, the flanges **121** abut against the covers **31**, and the plug pins **5** are located at the lower ends of the small tubes **12**, so that the small tubes are positioned. In this structure, the covers **31** are fixedly arranged over the installation cavities **30**; and when the small tubes **12** move upwards, the flanges **121** abut against the covers **31**, the plug pins **5** abut against the lower ends of the small tubes **12**, and the big tubes **11** are locked with the small tubes **12**. In this structure, the small tubes **12** are supported by the plug pins **5** and are shielded by the covers **31** to be limited, so that vertical bi-directional positioning is fulfilled.

Preferably, in this embodiment, the small tubes **12** are formed with holes **120** allowing the plug pins **5** to be inserted therein, and when the plug pins **5** are inserted into the holes **120**, the small tubes **12** are positioned.

Preferably, in this embodiment, the ladder further comprises rotary parts **6** which are rotationally connected with the connectors **3** and formed with arc grooves **60**, the plug pins **5** are connected with connection shafts **61** arranged in the arc grooves **60**, and a distance between the arc grooves **60** and rotational connection points a of the rotary parts **6** and the connectors **3** is variable, is preferably varied smoothly and can be increased or decreased by rotation as needed. In this embodiment, the connection shafts **61** move along the arc grooves **60** by means of rotation of the rotary parts **6**, and when the positions of the connection shafts **61** in the arc grooves **60** tend to get close to the rotational connection points a, the distance between the arc grooves **60** and the rotational connection points a of the rotary parts **6** and the connectors **3** is decreased, and the small tubes **12** tend to be released from being positioned. Otherwise, the distance between the arc grooves **60** and the rotational connection points a of the rotary parts **6** and the connectors **3** is increased, and the small tubes **12** tend to be positioned. The rotary parts **6** are plastic parts or metal parts, the arc grooves **60** are grooves, and the bottoms of the arc grooves **60** in this application are opened or not opened. Preferably, when the small tubes **12** are released from being positioned, the rotary parts **6** are locked with the connectors **3** in an interference fit manner, and the small tubes **12** can move freely; and when the tool platform **13** is stored, the ladder can be folded in one step.

Preferably, arc edges **601** are arranged at the peripheries of the arc grooves **60** in this embodiment and abut against the ends, abutting against the connectors or the derivative

parts, of the springs. This structure is compact and effectively adopts the arc edges **601** to abut against the ends of the springs.

Preferably, the number of the arc grooves **60** is two, and the connection shafts **61** are respectively arranged in the two arc grooves **60** which are symmetrically formed in two sides of the plug pins **5** to keep the two sides balanced and stable operation.

Preferably, rotation shafts **63** are arranged at the rotational connection points a of the rotary parts **6** and the connectors **3**, are fixedly connected with the rotary parts **6** and extend out of the connectors **3** to be connected with operating parts **62**. The rotation shafts **63** controls the rotary parts **6** to rotate when the external operating parts **62** rotate, so that operation is convenient.

Preferably, when the positions of the connection shafts **61** in the arc grooves **60** are fixed, the arc grooves **60** extend to form idling grooves **600** in the axial direction of the plug pins **5**; and oblique planes **52** are arranged at the ends, facing the small tubes **12**, of the plug pins **5** and incline in such a manner that the small tubes **12** abut against the oblique planes **52** when moving upwards to make the plug pins **5** tend to be away from the small tubes **12**. In this structure, the plug pins **5** are pushed by the elastic parts **4** to abut against the small tubes **12** to lock the small tubes **12**, the arc grooves **60** extend in the reverse direction of the locking direction to form the idling grooves **600**, and an external force is applied to make the plug pins **5** away from the small tubes **12** to form movable spaces; and the oblique planes **52** are arranged at the ends of the plug pins **5** and incline in such a manner that oblique planes **52** extend upwards from the external sides of the plug pins **5** to a small tubes **12** side, and when the small tubes **12** are pulled by a user to move upwards, the small tubes **12** abut against the oblique planes **52** to make the plug pins **5** tend to be away from the small tubes **12**, so that the small tubes **12** are released from being positioned. The small tubes **12** are positioned again when downwards pulled to the next hole **120**. This oblique structure has no slop to make the plug pins **5** retract when the small tubes **12** move downwards, the small tubes **12** are supported by the plug pins **5** when moving downwards and thus are unable to move downwards, and the tool platform **13** can bear tools. The height of this structure can be conveniently and gradually adjusted by a user as needed.

## Embodiment 2

Embodiment 2 is a substitutive implementation of Embodiment 1 in the aspect of control of the rotary parts **6** over plug pins **15**. As shown in FIG. **4**, in this embodiment, the ladder further comprises triggers **7** rotationally connected with the connectors **3**, and plug pin installation parts **71** are formed with plug pin installation cavities **72** allowing the plug pins **15** to move therein and are linked with the triggers **7**. The plug pin installation cavities **72** are formed with openings, swelled ends of the plug pin installation parts **71** are arranged in the installation cavities via the openings, and the specific implementation is as follows: the ends are connected with shield plates **73** larger than the openings in size, the plug pins **15** are shielded by the shield plates **73** when linearly moving in their axial directions to disengage from the installation cavities, thus being limited in the axial directions in the plug pin installation cavities **72**.

In this embodiment, a linkage structure of the triggers **7** and the plug pin installation parts **71** is as follows: the triggers **7** are provided with cam blocks **74**; after the triggers **7** rotate by a preset angle, the plug pin installation parts **71** abut against the cam blocks **74** and are resisted in the direction away from the small tubes; and after the triggers **7** rotate by another preset angle, the plug pin installation parts **71** are released from being resisted by the cam blocks **74** to be set free, and the original state of the plug pin installation parts **71** can be changed under the external force. In this embodiment, when the cam blocks **74** abut against the plug pin installation parts **71**, the plug pin installation parts **71** cannot retreat, and the plug pins **15** are pushed by the elastic parts **4** to abut against the small tubes, so that the small tubes are positioned; and the plug pin installation parts **71** can retreat under an elastic force of the elastic parts **4** in a free state, so that the small tubes are released from being positioned. The elastic parts **4** are springs.

In this embodiment, a linkage structure of the triggers **7** and the plug pin installation parts **71** is as follows: the triggers **7** are provided with the cam blocks **74**; after the triggers **7** rotate by a preset angle, the plug pin installation parts **71** abut against the cam blocks **74** and are resisted in the direction away from the small tubes; and after the triggers **7** rotate by another preset angle, the plug pin installation parts **71** are released from being resisted by the cam blocks **74** and are pulled by the triggers **7** through connection rods to move away from the small tubes. In this embodiment, the triggers **7** rotate to drive the plug pin installation parts **71** to move away, so that the small tubes are released more stably and reliably.

The above embodiments described in the specification are only illustrative ones of the utility model. Various modifications, supplements, or similar substitutions of these specific embodiments can be made by those skilled in the art without deviating from the contents in the specification of the utility model and the scope defined by the appended claims of the utility model, and all these modifications, supplements, or similar substitutions should also fall within the protection scope of the utility model.

What is claimed is:

**1**. A lifting positioning structure for a ladder tool platform, comprising a ladder, wherein the ladder comprises front supporting legs, rear supporting legs, connectors fixedly connected to the front supporting legs, plug pins, and elastic parts;

each front supporting leg includes a big tube and a small tube, and the big tube and the small tube are configured to relatively move in an extension direction;

the connectors are formed with vertically-through installation cavities; the big tubes are inserted in the vertically-through installation cavities; the big tubes are arranged in the vertically-through installation cavities and are fixedly connected to the connectors; the connectors extend to form connection parts rotationally connected to the rear supporting and the small tubes are connected to a tool platform;

the plug pins are movably arranged on the connectors or the big tubes; and

the elastic parts apply an acting force to the plug pins to make the plug pins tend to position the small tubes, and the small tubes are positioned after abutting against the plug pins; and the plug pins overcome a resistance of the elastic parts under an external force to move away from the small tubes, and the small tubes are released from being positioned,

wherein the ladder further comprises rotary parts, the rotary parts are rotationally connected to the connectors and formed with arc grooves; the plug pins are connected to connection shafts arranged in the arc grooves, and a distance between the arc grooves and rotational

connection points of the rotary parts and the connectors is variable; and the connection shafts move along the arc grooves by rotating the rotary parts; when the connection shafts in the arc grooves get close to the rotational connection points, the small tubes are released from being positioned; and when the connection shafts in the arc grooves are not close to the rotational connection points, the small tubes are in position.

**2**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein the plug pins are provided with shield parts to abut against springs; the elastic parts are the springs disposed around the plug pins; the plug pins are configured to move along their axial directions; the springs have ends abutting against the shield parts and ends abutting against the connectors or derivative parts connected to the connectors.

**3**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein the small tubes arranged in the vertically-through installation cavities are provided with flanges protruding relative to external diameters of the small tubes; covers are arranged over the installation cavities; and when the small tubes move upwards, the flanges abut against the covers, the plug pins are located at lower ends of the small tubes, and the small tubes are in position.

**4**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein the small tubes are formed with holes; the plug pins are inserted in the holes; and when the plug pins are inserted into the holes, the small tubes are ire position.

**5**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein arc edges are arranged at peripheries of the arc grooves and abut against the ends, abutting against the connectors or the derivative parts, of the springs.

**6**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein the number of the arc grooves is two, and the connection shafts are respectively arranged in the two arc grooves.

**7**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein rotation shafts are arranged at the rotational connection points of the rotary parts and the connectors, are connected to the rotary parts, and extend out of the connectors to be connected to operating parts.

**8**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein when positions of the connection shafts in the arc grooves are fixed, the arc grooves extend to form idling grooves in an axial direction of the plug pins; and oblique planes are arranged at ends of the plug pins; and the small tubes abut against the oblique planes when moving upwards to make the plug pins tend to be away from the small tubes.

**9**. The lifting positioning structure for the ladder tool platform according to claim **1**, wherein when the small tubes are released from being positioned, the rotary parts are locked with the connectors in an interference fit manner.

**10**. The lifting positioning structure for the ladder tool platform according to claim **2**, wherein the small tubes arranged in the vertically-through installation cavities are provided with flanges protruding relative to external diameters of the small tubes; covers are arranged over the installation cavities; and when the small tubes move upwards, the flanges abut against the covers, the plug pins are located at lower ends of the small tubes, and the small tubes are in position.

**11**. The lifting positioning structure for the ladder tool platform according to claim **2**, wherein the small tubes are formed with holes; the plug pins are inserted in the holes; and when the plug pins are inserted into the holes, the small tubes are in position.

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