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(54) **LIFTING DEVICE FOR INDUSTRIAL EQUIPMENT**

HEBEVORRICHTUNG FÜR INDUSTRIEANLAGE

DISPOSITIF DE LEVAGE D'ÉQUIPEMENTS INDUSTRIELS

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Description

SUBJECT MATTER OF THE INVENTION

[0001] The present invention relates to a lifting device for industrial equipment, as an element to replace traditional hooks.

[0002] The purpose of the invention is to provide a device which makes it possible to automate, weigh and remotely control the action of coupling and uncoupling equipment and similar items, which, with a conventional hook, it is necessary to perform manually.

BACKGROUND OF THE INVENTION

[0003] As mentioned, to be able to couple and uncouple a hook to and from industrial equipment or similar items to be lifted, intermediate elements such as shackles, slings, rings or other lifting items need to be used. This manoeuvre needs to be carried out manually, with the limitations and disadvantages that entails. DE2728528 A discloses a lifting device consisting of an inverted U-shaped bridge with facing orifices through which passes a pin driven by a pneumatic piston.

DESCRIPTION OF THE INVENTION

[0004] The device advocated makes it possible to automate, and control remotely, the action of coupling and uncoupling the equipment in question, which has lugs for lifting, in addition to offering additional features, such as being able to weigh the supported load.

[0005] To do this, more specifically, the device of the invention consists of a bridge or inverted U-shaped profile of considerable thickness, the arms of which have facing holes through which a pin passes.

[0006] The space defined between the vertical arms of the "U" defines the zone for housing the lug of the equipment to be lifted, such that a mechanism for driving a pin is established laterally to the bridge. Said pin is driven by a pneumatic piston which is powered by a standalone compressor integrated into the device itself, where said mechanism is associated with a control circuit to actuate it via radio or manually by means of the corresponding safety push buttons placed on the device.

[0007] A spring is provided and integrated into the pin which performs its shock absorbing effect with three main functions, to guarantee that the movement of the pneumatic piston is always complete, making it impossible for the pin to remain mid-travel between the two support points on the structural bridge. This spring can be replaced by ring-type shock absorbers or any other type of commercial shock absorber.

[0008] This shock absorbing system also has the function of ensuring and aiding alignment of the bridge and the part to be coupled and to protect against faults due to impact by the pin, and as a system for thrust and alignment, both longitudinally and for support on the structural

bridge, of said pin.

[0009] Once closed, the entire system works to receive any possible return movement of the pin, reacting and correcting its position always on a closure order.

5 [0010] Arranged opposite the pin drive mechanism is provided a handlebar that allows for easy and convenient handling of the device if necessary.

[0011] Solidly attached, emerging from the middle arm of the bridge is a suspension shaft with a load cell, such that said element passes through a housing in which the electronics for device control are housed.

10 [0012] More specifically, housed in said housing are electronic boards for safety management, Wi-Fi, Bluetooth, weighing machine management boards, radio emission and reception boards, compressor, pressure switch and other compressor protection systems, 24 W batteries, structural washers for load suspension, load cell, electrical connections, pneumatic connections, pneumatic solenoid valves and other elements necessary for proper operation of the device.

20 [0013] The device includes a load safety system for closing and opening, with it being impossible to open said device if it is coupled to a suspended load.

[0014] It also includes electrical systems for power control which register prohibited operations, giving rise to electrical blocking of the device, which is only reset by means of encrypted codes via radio.

25 [0015] The device incorporates a "dead man" safety system, which prevents any risk of trapping. For operator safety and convenience, said operator will need to use both hands to actuate manual closure.

30 [0016] The device includes indicator lights on its front to notify of open/closed states and battery status.

[0017] In turn, the electronics, mechanisation, batteries and control are isolated and protected in impact-resistant steel bodies.

35 [0018] As regards the coupling pin, this is treated by means of double induction hardening to guarantee long service life.

40 [0019] Similarly, the opening and closing mechanism has a high-performance, intelligent cushioning system.

[0020] For automatic control, the device includes limit switches, and open and closed sensors, as well as load presence sensors.

45 [0021] As mentioned previously, the equipment makes it possible to offer real-time weighing of the load by including strain gauges in the structural zones with maximum concentration of tensile stresses, such that the weighing signal obtained is sent to a remote control for viewing by the operator, although existing means can be used, such as mobile phones, tablets and similar, which communicate with the device by radio frequencies.

50 [0022] The equipment has an electronic starter key to enable energy saving when not in use. Furthermore, the key can be coded, assigning a code that makes it possible to identify the operators responsible and download information relating to use, number of cycles, operations carried out, performance, etc.

[0023] As a clear result, the device described is applicable to a wide range of existing cranes.

[0024] A series of advantages are achieved on the basis of this structuring, among which the following can be highlighted:

- Intermediate systems for connection to the load, such as shackles, slings, steel cables and the like, are eliminated.
- Automatic coupling and uncoupling remotely eliminates the risks to people, as they do not need to manipulate the device physically.
- Management capability making it possible to link more than one device at the same time in opening or closing orders for multiple couplings to the same item to be lifted, which in turn makes it possible to link the various weighing machines integrated into each of the devices to control load levelling in all directions.
- Versatility and ergonomics without the need for adaptations.

DESCRIPTION OF THE DRAWINGS

[0025] To complement the description to be given below and to aid better understanding of the features of the invention, according to a preferred practical example embodiment of same, a set of drawings accompanies said description, in which, with an illustrative, nonlimiting manner, the following are represented:

Figure 1 shows a representation corresponding to a perspective view of a lifting device for industrial equipment according to the subject matter of the present invention.

Figure 2 shows an elevation view of the assembly in figure 1.

Figure 3 shows a profile view of the assembly in the previous figures.

Figure 4 shows a similar view to the previous figure, but duly cross-sectioned along the cut line A-A in figure 2.

[0026] Finally, figure 5 shows a plan view of the device in the previous figures.

PREFERRED EMBODIMENT OF THE INVENTION

[0027] As can be seen in the summarised figures, the device of the invention consists of an inverted U-shaped bridge (1), with facing orifices (2), through which a pin (3) passes, to block the corresponding lug of the equip-

ment to be lifted, said pin (3), driven by a pneumatic piston (4), housed in the corresponding cylindrical housing (7), which is supplied by a standalone compressor (5) integrated in the device itself, specifically in a housing (6) arranged above the bridge (1), where said mechanism is associated with a control circuit for actuation thereof via radio or manually by means of the corresponding safety push buttons placed on the device.

[0028] As mentioned previously, a spring (8) associated with the arm of the pneumatic piston (4) is integrated into the pin (3) which performs its shock absorbing effect with three main functions, to guarantee that the movement of the pneumatic piston is always complete, making it impossible for the pin to remain mid-travel between the two support points on the structural bridge.

[0029] This spring can be replaced by ring-type shock absorbers or any other type of commercial shock absorber.

[0030] This shock absorbing system also has the function of ensuring and aiding alignment of the bridge and the part to be coupled and to protect against faults due to impact by the pin, and a system for thrust and alignment, both longitudinally and for support on the structural bridge, of said pin.

[0031] Opposite the cylindrical housing (7), the bridge (1) has a handlebar (9) that provides for easy and convenient handling of the device if necessary.

[0032] The bridge (1) is solidly connected at the upper end to a suspension shaft (10), with its corresponding lifting means (11), and integrated into which is a load cell (12), such that this element passes through the housing (6) in which the electronics for device control are housed.

[0033] Housed in said housing (6) are at least one battery (12), one wireless communications module (13), and the control circuit (14) itself, in addition to the solenoid valves (15) to supply the pneumatic piston (4).

[0034] In turn, the handlebar (9) includes a pair of push buttons (16) and (17) for the "dead man" system and for manual opening of the device.

[0035] As mentioned previously, the device can be governed from the operator's own mobile phone, thanks to the wireless communications module, or it can have a remote control, which is not represented in the figures.

[0036] Finally, the device includes indicator lamps (18, 19) which indicate open/closed and the battery status.

Claims

1. A lifting device for industrial equipment, which being for lifting any equipment fitted with at least one lifting lug, consists of an inverted U-shaped bridge (1), with facing orifices (2), through which passes a pin (3), driven by a pneumatic piston (4), housed in the corresponding cylindrical housing (7), which is supplied by a standalone compressor (5) established in a housing (6) arranged above the bridge (1), where said mechanism is associated with a control circuit

for actuation thereof via radio or manually by means of the corresponding safety push buttons placed on the device, with the particular feature that the bridge (1) is solidly connected at the upper end to a suspension shaft (10), with its corresponding lifting means (11), and integrated into which is a load cell (12), such that said shaft passes through the housing (6) in which the electronics for device control are housed.

2. A lifting device for industrial equipment, according to claim 1, **characterised in that** a spring (8) associated with the arm of the pneumatic piston (4) is integrated into the pin (3), serving as a shock absorber.
3. A lifting device for industrial equipment, according to claim 2, **characterised in that** the spring (8) is capable of being replaced by ring-type shock absorbers or by any other type of commercial shock absorber.
4. A lifting device for industrial equipment, according to claim 1, **characterised in that**, opposite the cylindrical housing (7), the bridge (1) has a handlebar (9) for manipulating the device.
5. A lifting device for industrial equipment, according to claim 1, **characterised in that** housed in the core of the housing (6) are at least one battery (12), one wireless communications module (13), and the control circuit (14) itself, in addition to the solenoid valves (15) to supply the pneumatic piston (4).
6. A lifting device for industrial equipment, according to claim 1, **characterised in that** the handlebar (9) includes a pair of push buttons (16) and (17) for the "dead man" system and for manual opening of the device.
7. A lifting device for industrial equipment, according to claim 1, **characterised in that** it includes indicator lamps (18-19) which indicate open/closed and battery status.
8. A lifting device for industrial equipment, according to claim 1, **characterised in that** it includes a load safety system for closing and opening, such that it is impossible to open the device if it is coupled to a suspended load.
9. A lifting device for industrial equipment, according to claim 1, **characterised in that** it includes electrical systems for power control which register prohibited operations, giving rise to electrical blocking of the device, which is only reset by means of encrypted codes via radio.

10. A lifting device for industrial equipment, according to claim 1, **characterised in that** it includes sensors such as limit switches, and open and closed sensors, as well as load presence sensors.

11. A lifting device for industrial equipment, according to claim 1, **characterised in that** it incorporates an electronic starter key to enable energy saving when not in use, which is capable of being encoded.

Patentansprüche

1. Hebevorrichtung für Industrieanlagen, die aus einer umgekehrten U-Förmige Brücke (1) besteht und zum Heben von beliebigen, mit mindestens einer Hebeboße ausgestatteten Gegenständen dient, mit gegenüberliegenden Öffnungen (2), durch die ein Stift (3) tritt, der von einem in einem entsprechenden zylindrischen Gehäuse (7) gelagerten pneumatischen Kolben (4) angetrieben wird, welcher von einem autark arbeitenden, in einem über der Brücke (1) angeordneten Gehäuse (6) befindlichen Kompressor (5) gespeist wird, wobei der genannte Mechanismus mit einer Steuerschaltung zu seiner Betätigung über Funk oder anhand der entsprechenden auf der Vorrichtung angeordneten Sicherheitsdrucktaster von Hand verbunden ist, mit dem besonderen Merkmal, dass die Oberseite der Brücke (1) fest mit einer Aufhängeachse (10) verbunden ist, welche mit entsprechenden Hebemitteln (11) versehen ist und eine integrierte Wägezelle (12) enthält, so dass die genannte Achse durch das Gehäuse (6), in dem die Elektronik zur Gerätesteuerung untergebracht ist, hindurch verläuft.
2. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** eine mit der Stange des pneumatischen Kolbens (4) verbundene, als Stoßdämpfer dienende Feder (8) in den Stift (3) integriert ist.
3. Hebevorrichtung für Industrieanlagen nach Anspruch 2, **dadurch gekennzeichnet, dass** die Feder (8) durch ringförmige Stoßdämpfer oder beliebige andere handelsübliche Stoßdämpfer ersetzt werden kann.
4. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** die Brücke (1) auf der dem zylindrischen Gehäuse (7) gegenüberliegenden Seite eine Griffstange (9) zur Handhabung der Vorrichtung aufweist.
5. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** im Inneren des Gehäuses (6) mindestens eine Batterie (12), ein Drahtloskommunikationsmodul (13) und die

Steuerschaltung (14) selbst, nebst den Magnetventilen (15) zur Versorgung des Pneumatikkolbens (4), untergebracht sind.

6. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** die Griffstange (9) zwei Drucktaster (16) und (17), jeweils einen für die "Totmann"-Funktion und einen zum manuellen Öffnen der Vorrichtung, aufweist. 5
7. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** sie Kontrollleuchten (18-19) aufweist, die den offenen/geschlossenen Zustand und den Batteriestatus anzeigen. 10
8. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** sie ein Öffnungs- und Schließsystem zur Sicherung der Last umfasst, welches ein Öffnen der Vorrichtung bei angehängter Last unmöglich macht. 15
9. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** sie elektrische Systeme zur Leistungssteuerung umfasst, die unzulässige Vorgänge erfassen und eine elektrische Sperrung der Vorrichtung auslösen, die nur durch verschlüsselte Codes über Funk rücksetzbar ist. 20
10. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** sie Sensoren, wie beispielsweise Endschalter und Offen-/Geschlossen-Sensoren, sowie Sensoren für das Vorhandensein von Lasten umfasst. 25
11. Hebevorrichtung für Industrieanlagen nach Anspruch 1, **dadurch gekennzeichnet, dass** sie einen kodierbaren elektronischen Startschalter zur Energieeinsparung bei Nichtgebrauch enthält. 30

Revendications

1. Dispositif de levage pour équipement industriel pour le levage de tout équipement pourvu d'au moins un taquet de levage, consistant en un pont en forme de U inversé (1), 45
ayant des trous (2) se faisant face, à travers lesquels passe une broche (3), entraînée par un piston pneumatique (4), logée dans le carter cylindrique (7) correspondant, qui est pourvu d'un compresseur autonome (5) établi dans un carter (6) aménagé au-dessus du pont (1), où ce mécanisme est associé à un circuit de contrôle pour son actionnement par le biais de radio ou à la main au moyen de boutons poussoirs de sécurité correspondants placés sur le dispositif, ayant la particularité que le pont (1) est solidement 50

connecté à l'extrémité supérieure à un arbre de suspension (10), avec ses moyens de levage (11) correspondants, et intégrés dans lequel se trouve une cellule de charge (12), de sorte que cet arbre passe à travers le carter (6) dans lequel sont logés les éléments électroniques pour le dispositif de contrôle.

2. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce qu'**un ressort (8) associé au bras du piston pneumatique (4) est intégré dans la broche (3) servant comme amortisseur. 10
3. Un dispositif de levage pour équipement industriel, conformément à la revendication 2, **caractérisé en ce que** le ressort (8) est capable d'être remplacé par des amortisseurs type bague ou par tout autre type d'amortisseur commercial. 15
4. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce que**, en face du carter cylindrique (7), le pont (1) possède un guidon (9) pour manipuler le dispositif. 20
5. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce que**, logés au cœur du carter (6), se trouvent au moins une batterie (12), un module de communications sans fils (13) et le propre circuit de contrôle (14), en plus des électrovannes (15) pour alimenter le piston pneumatique (4). 25
6. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce que** le guidon (9) comprend une paire de boutons poussoirs (16) et (17) pour le système « homme-mort » et pour l'ouverture manuelle du dispositif. 30
7. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce qu'**il comprend des lampes témoins (18-19) qui indiquent la situation d'ouverture ou de fermeture de la batterie. 35
8. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce qu'**il comprend un système de sécurité de charge pour fermer et ouvrir, de sorte qu'il est impossible d'ouvrir le dispositif s'il est couplé à une charge suspendue. 40
9. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce qu'**il comprend des systèmes électriques pour le contrôle de l'énergie qui enregistre les opérations interdites, entraînant le blocage électrique du dispositif, qui n'est réinitialisé qu'au moyen de codes cryptés. 45

tés par le biais de la radio.

10. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce qu'il** comprend des capteurs tels que des interrupteurs de fin de course et des capteurs ouverts et fermés ainsi que des capteurs de présence de charge. 5
11. Un dispositif de levage pour équipement industriel, conformément à la revendication 1, **caractérisé en ce qu'il** incorpore une clé de démarrage électronique pour permettre économiser l'énergie lorsqu'il n'est pas utilisé et pouvant être codé. 10

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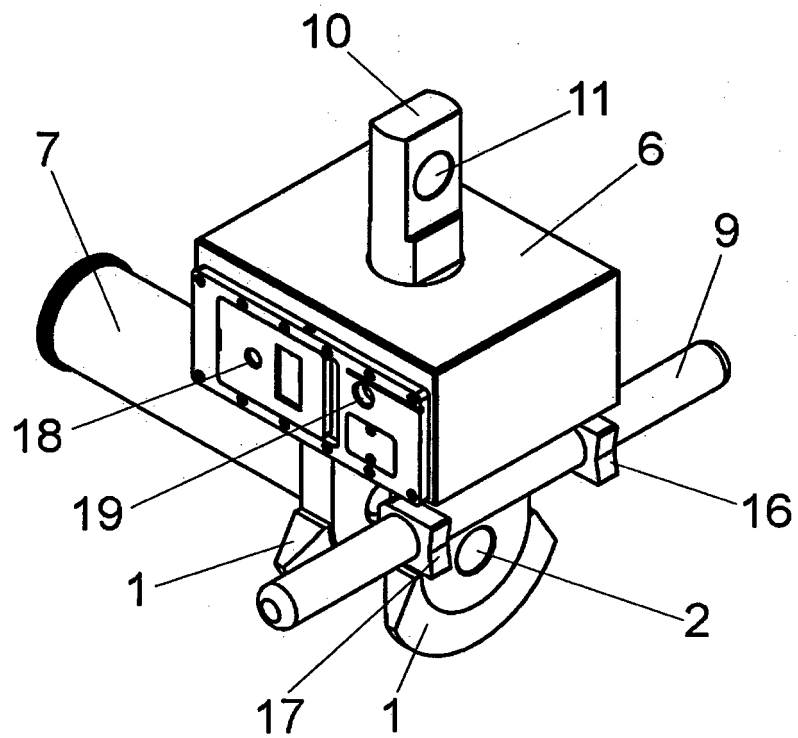


FIG. 1

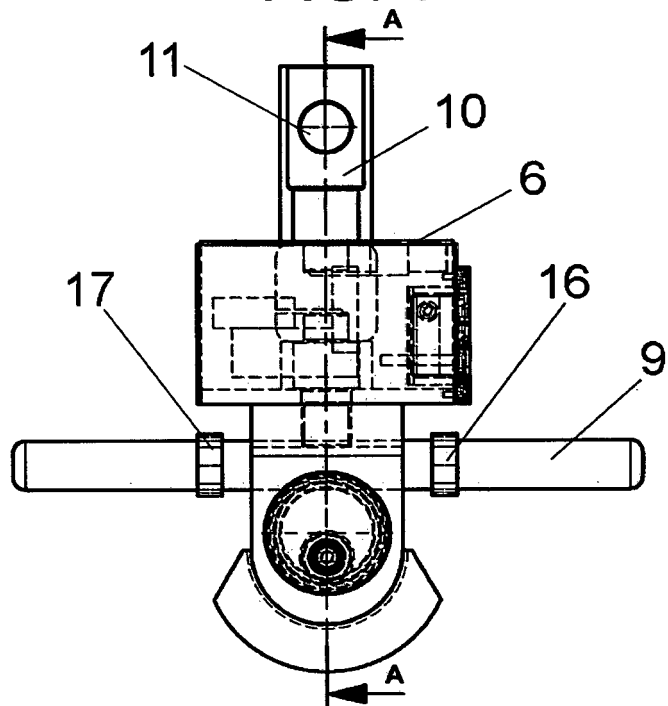


FIG. 2

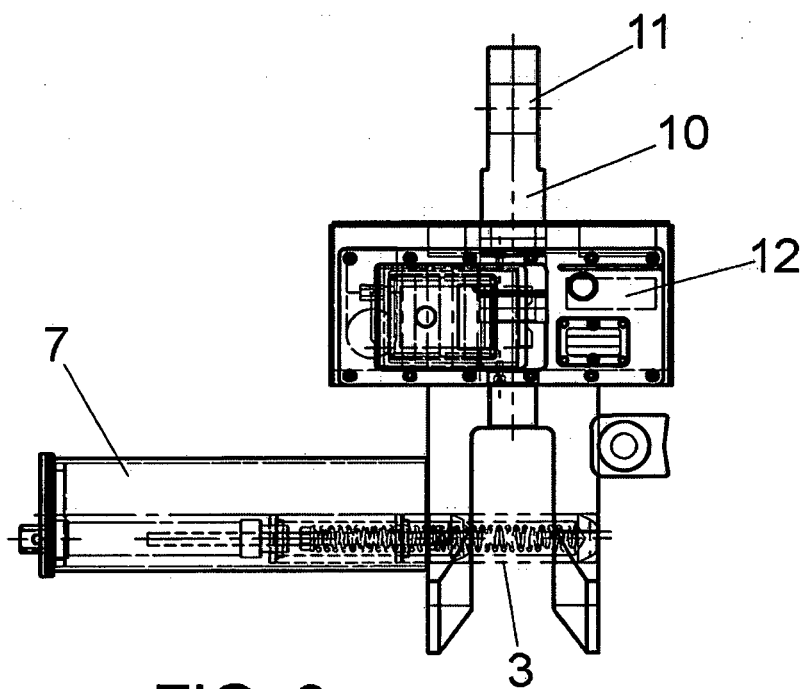


FIG. 3

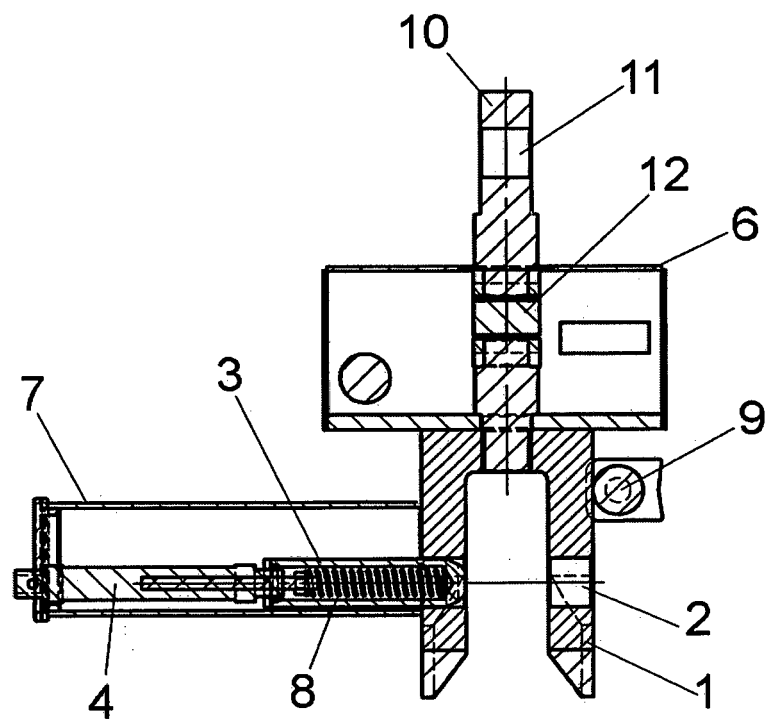


FIG. 4
A-A

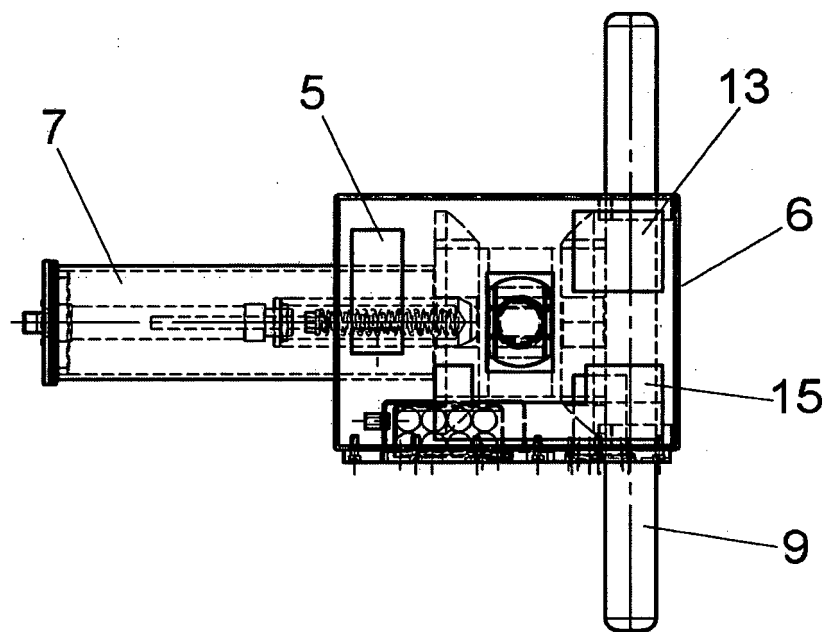


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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