



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
25.04.2018 Bulletin 2018/17

(51) Int Cl.:
B66C 1/40 (2006.01) B66C 1/34 (2006.01)

(21) Application number: **16813777.6**

(86) International application number:
PCT/ES2016/070306

(22) Date of filing: **26.04.2016**

(87) International publication number:
WO 2016/207457 (29.12.2016 Gazette 2016/52)

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

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(30) Priority: **22.06.2015 ES 201530883**

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

(57) The device 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) placed in a housing (6) arranged above the bridge (1). It also includes a control circuit for actuation thereof via radio or manually by means of the corresponding safety push buttons placed

on the device. 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. In this way, the coupling and uncoupling of the device can be performed automatically, avoiding risks in certain hazardous environments.

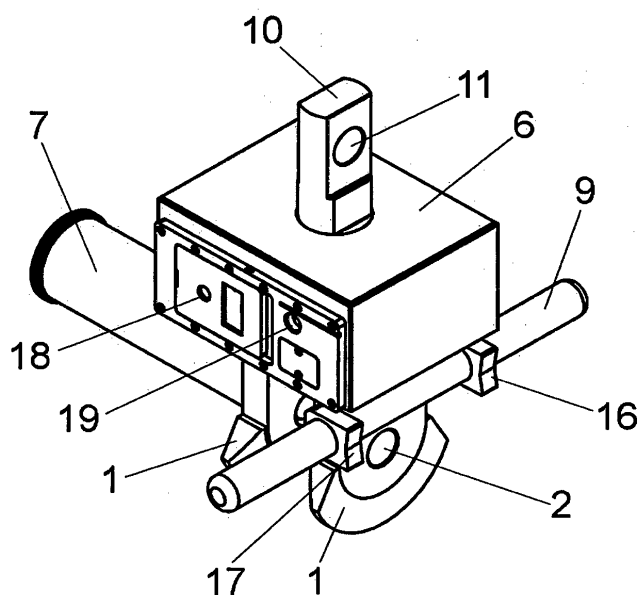


FIG. 1

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.

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.

[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.

[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.

[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.

[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.

[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.

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

[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.

[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.

[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 ba-

sis 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.

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

PREFERRED EMBODIMENT OF THE INVENTION

[0026] 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 equipment 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) inte-

grated 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.

[0027] 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.

[0028] This spring can be replaced by ring-type shock absorbers or any other type of commercial shock absorber.

[0029] 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.

[0030] Opposite the cylindrical housing (7), the bridge (1) has a handlebar (9) that provides for easy and convenient handling of the device if necessary.

[0031] 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.

[0032] 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).

[0033] 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.

[0034] 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.

[0035] 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, is **characterised in that** 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.

as well as load presence sensors.

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. 10
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. 15
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. 20
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). 25 30
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. 35
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. 40
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. 45
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. 50 55
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,
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.

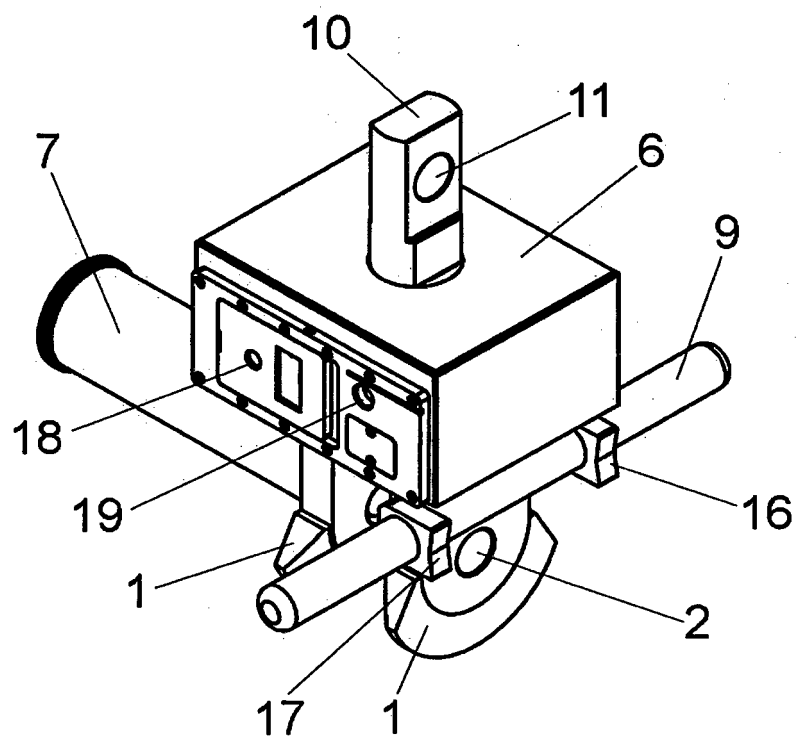


FIG. 1

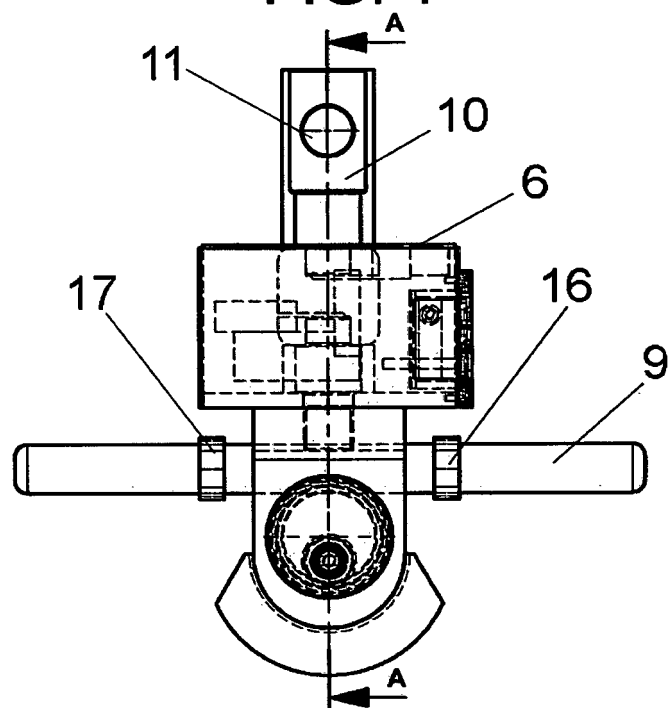


FIG. 2

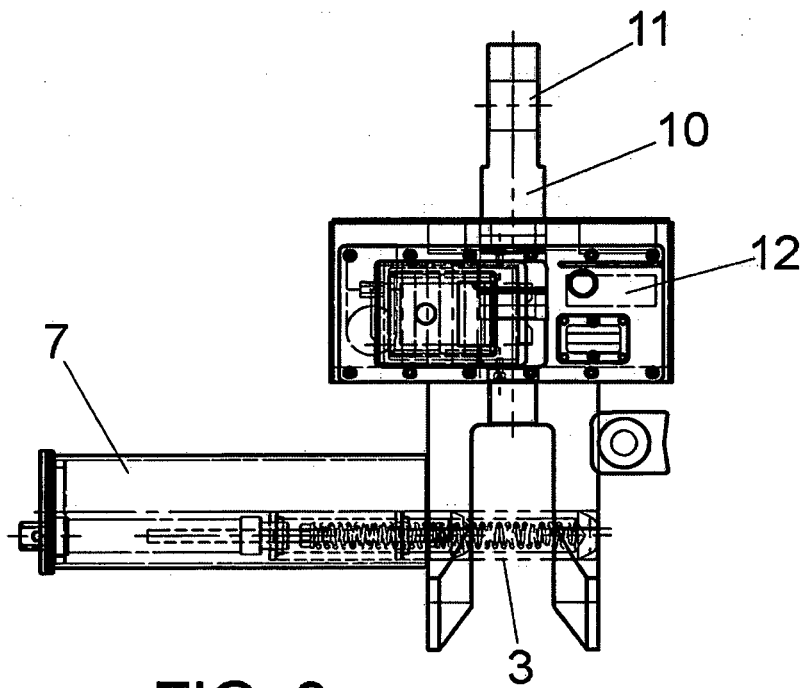


FIG. 3

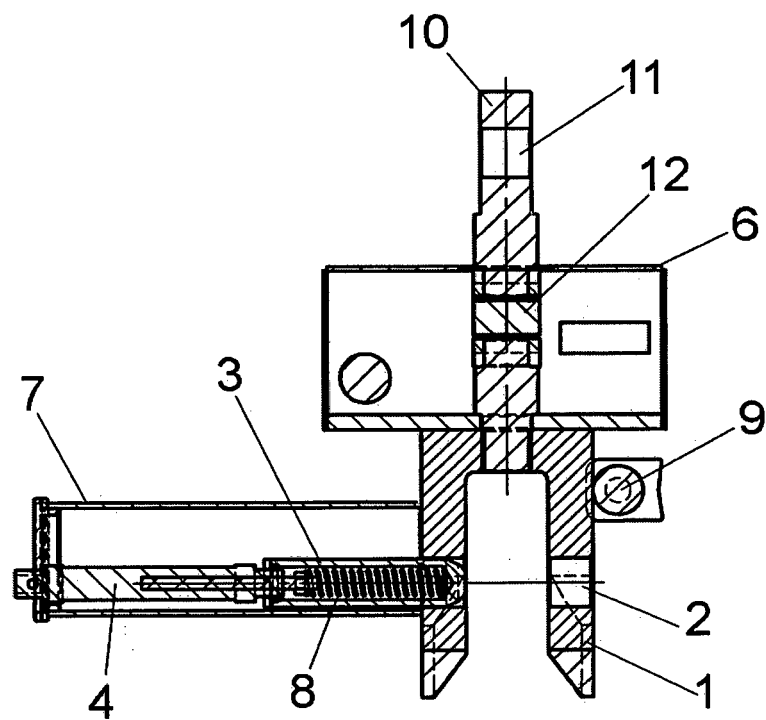


FIG. 4
A-A

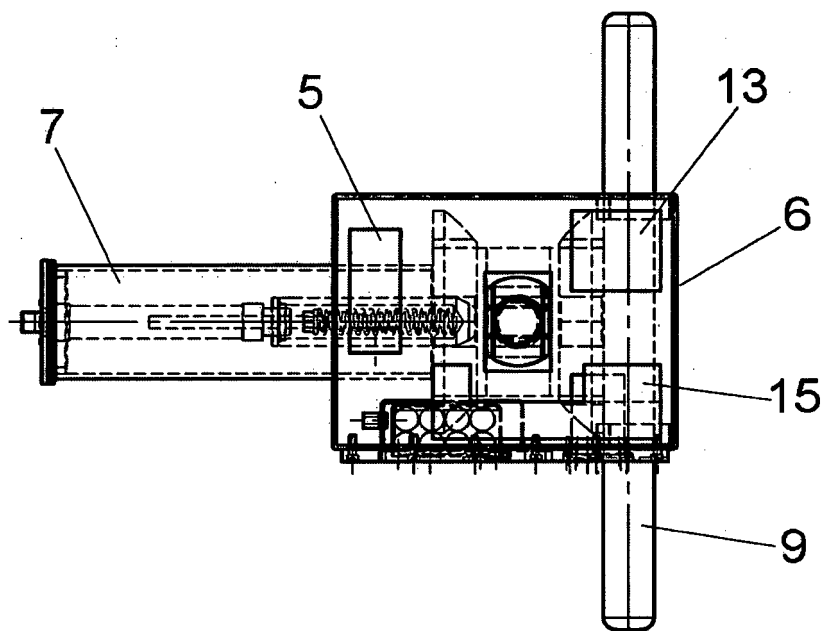


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2016/070306

A. CLASSIFICATION OF SUBJECT MATTER

B66C1/40 (2006.01)

B66C1/34 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B66C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

29/07/2016

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2016/070306

C (continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	
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