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(54) **TRAFFIC LIGHT SYSTEMS, MOVEABLE BASE UNITS AND ASSOCIATED METHODS**

(57) A traffic light system comprises one or more temporary moveable base units, each having a support pole for supporting a traffic light signal head; each one of said base units comprising a socket for receiving a connector for removably connecting to one or more wires for transporting traffic light signals from an external control hub to said base unit; said base unit being self-standing and moveable to a chosen site for temporary deployment; said system comprising one or more permanent grounded traffic light poles in the vicinity of said temporary base unit comprising a socket for receiving a connector for removably connecting to one or more wires for transporting traffic light signals to said traffic light poles; and an underground tunnel leading to said permanently erected traffic light pole and which may house, in use, one or more wires to said external control hub; wherein said socket of said temporary moveable base unit and said socket from said permanent grounded traffic light poles are connectable in sequence with the same connector which is connected to one or more wires for connection to said external control hub; whereby traffic light signals may be rapidly switched from a temporary base unit to said permanently erected traffic light pole.

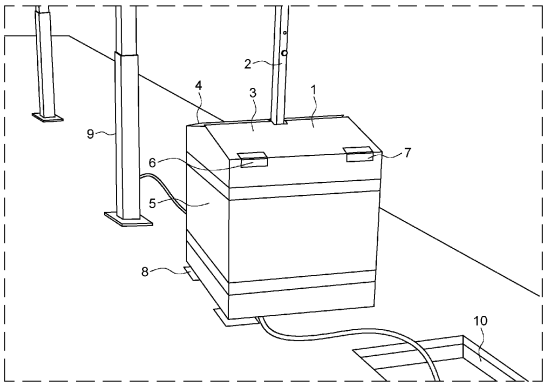

FIG. 1

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Description

Technical Field

[0001] Aspects of the invention generally relate to moveable signalling systems and methods relating to their deployment and removal. Other aspects include methods of installing traffic light poles.

Background and prior art known to the applicant

[0002] The closest prior art is published in GB2585689 where a moveable (or self-standing) base unit for supporting a traffic signal apparatus is described. The prior art base unit comprises a housing for housing both a removable ballast and a control or junction unit with at least one input or receiver for receiving at least one telecom connection for traffic light signalling and at least one output for outputting traffic light signalling to said traffic signal apparatus. The prior art control unit had a plurality of distinct Ethernet ports for receiving a plurality of ethernet connections (i.e. telecommunications or telecoms cables).

[0003] This prior art device allows for semi-permanent traffic lights to be located for example in complex traffic junctions, particularly when junction modernisations are being conducted where the existing traffic lights would need to be removed.

[0004] In certain embodiments, the present invention provides further improvements to the apparatus and introduces a system for improving the transition from temporary traffic lights to grounded pole based so called permanent traffic light systems.

Summary

[0005] Aspects of the invention relate to moveable traffic signal apparatus for use in controlling the movements of traffic or people on a temporary basis. Further aspects of the invention relate to methods of deploying temporary traffic light systems and methods of switching from a temporary traffic light system to a so called permanent system.

[0006] In a first broad independent aspect, the invention provides a traffic light system comprising one or more temporary moveable base units, each having a support pole for supporting a traffic light signal head; each one of said base units comprising a socket for receiving a connector for removably connecting to one or more wires for transporting traffic light signals from an external control hub to said base unit; said base unit being self-standing and moveable to a chosen site for temporary deployment; said system comprising one or more permanent grounded traffic light poles in the vicinity of said temporary base unit comprising a socket for receiving a connector for removably connecting to one or more wires for transporting traffic light signals to said traffic light poles; and an underground tunnel leading to said permanently erected traffic light pole and which may house, in use, one or more wires to said external control hub; wherein said socket of said temporary moveable base unit and said socket from said permanent grounded traffic light poles are connectable in sequence with the same connector which is connected to one or more wires for connection to said external control hub; whereby traffic light signals may be rapidly switched from a temporary base unit to said permanently erected traffic light pole.

[0007] In a subsidiary aspect, said support pole incorporates a hinge whereby the pole may be folded into a collapsed position during transportation; said pole further comprising a lock for locking said pole in its erected position.

[0008] In a further subsidiary aspect, the base unit comprises a cavity for receiving one or more ballasts; said ballasts being equipped with a handle; whereby said one or more ballasts are removeable from said base unit for transportation.

[0009] In a further subsidiary aspect, said base unit has a perimetral wall with an inner surface and the socket of said base unit is secured to said inner surface of said base unit; whereby said socket is spaced from a centrally disposed support pole in order to accommodate one or a plurality of ballasts therebetween.

[0010] In a further subsidiary aspect, said connector is a pluggable rail connector.

[0011] In a further subsidiary aspect, said connector comprises a protective pocket for threading said connector through said tunnel.

[0012] In a further subsidiary aspect, said socket is enclosed in a housing which is secured solely to the inside surface of said base unit.

[0013] In a further subsidiary aspect, wires exit said base unit via an aperture in the floor of said base unit.

[0014] In a further broad independent aspect, the invention provides a moveable base unit for supporting a traffic signal apparatus, the base unit further comprising a housing for housing both a removable ballast and an internal control unit with at least one socket for receiving a connector; said base unit comprising a perimetral wall with an inner surface onto which said socket is secured.

[0015] In a further subsidiary aspect, the moveable base unit further comprises a support pole with a hinge; whereby said support pole may be collapsed; said pole further comprising a lock for locking said pole in its erected position.

[0016] In a further subsidiary aspect, said ballast comprises handles.

[0017] In a further subsidiary aspect, a pluggable rail connector is at least partially insertable into said socket.

[0018] In a further broad independent aspect, a method of installing one or more permanently erected grounded traffic light poles, comprises the steps of providing a moveable base unit in accordance with any one of the preceding aspects and employing a system in accordance with any one of the preceding aspects.

[0019] In a further subsidiary aspect, the method com-

prises the steps of deploying a plurality of base units of the kind defined in any preceding claim and erecting a plurality of permanent grounded traffic light poles adjacent to said base units and sequentially switching the connectors of said base units to said permanently grounded traffic light poles.

[0020] In a further broad independent aspect, the invention provides a method of installing one or more permanently erected grounded traffic light poles, comprising the steps of providing a moveable base unit and a support pole for supporting a traffic light signal head, said base unit being provided with a receiver for receiving a connector for removably connecting to one or more wires for transporting traffic light signals to the base unit; the base unit being self-standing and moveable to a chosen site for temporary deployment; the method further comprising the steps of connecting the wires via a connector to the base unit; operating the temporary traffic light signal head; erecting a permanent grounded traffic light pole in the vicinity of the temporary base unit; providing an underground tunnel from said permanently erected traffic light pole; disconnecting the connector from the base unit; removing the connector via an aperture in the base unit; threading the connector and the wires through the tunnel to arrive through the base of the permanently erected traffic light pole and connecting the connector to a further receiver for receiving the connector, the receiver being provided in the traffic light pole; whereby traffic light signals may be rapidly switched from a temporary base unit to the permanently erected traffic light pole.

[0021] For the avoidance of any doubt, the steps of the method described herein are not listed as a sequence and may be altered in their order. For example, the provision of a tunnel may precede the provision of a grounded traffic light pole.

[0022] The system defined herein and the methods are particularly advantageous because they allow the switching from a temporary base unit to a permanently erected traffic light pole to be carried out in phases or sequences with minimal disruption to traffic light signals. This will significantly reduce disruption in complex systems with a large number of new traffic light poles being installed and whose functionality may be interdependent with other traffic light poles in the vicinity.

[0023] In a subsidiary aspect, the support pole incorporates a hinge whereby the pole may be folded into a collapsed position during transportation and the method comprises the step of erecting the pole by rotating the portion located above the hinge relative to the portion located below the hinge and thereafter locking the pole in its erected position. This provides not only for the rapid deployment and potential removal of temporary traffic light units, this configuration also facilitates improved transportation to and from a site whilst at the same time achieving the benefits of particularly high or full-size deployment of the traffic light heads.

[0024] In a further subsidiary aspect, the base unit comprises a cavity for receiving one or more ballasts; the ballasts being equipped with a handle; whereby the method provides the step of placing one or more ballasts in the cavity and removing the ballasts for transportation of the base unit. This configuration is particularly advantageous in terms of improving the versatility of the installation and removal of temporary traffic light units.

[0025] In a subsidiary aspect, the base unit has a perimetral wall with an inner surface and the receiver of the base unit is secured to the inner surface of the base unit. This allows the receiver to be better protected from potential damage from the insertion and removal of ballasts. It also provides an advantageous position to facilitate a plug and play option for improved insertion/removal of connectors. Preferably, the connectors may function as a plug whilst the receiver may function as a socket. In preferred embodiments, the connector incorporates a housing for receiving multiple wires which may be telecom wires. In preferred embodiments, the connector may be a pluggable rail connector. This may be provided as a plurality of wires being provided side by side in a line so that the wires are provided initially in parallel and are then amalgamated into a single cable. In further embodiments, there may be provided two connectors, each with multiple wires which then are collated into a single cable to communicate traffic signal data to appropriately positioned traffic light signal heads.

[0026] In a further subsidiary aspect, the method further comprises the step of placing the connector into a protective pocket for threading the connector through the tunnel. This configuration is particularly advantageous since the emerging connector or connectors from the tunnel are protected from any dirt or other ingress in order to straightforwardly allow them to be plugged into appropriately sized receivers in a grounded permanent traffic light pole. Preferably, the protective pocket may be sealed on both sides of the connector in such a way as to provide a waterproof protective means to preserve the connectors.

[0027] In a further subsidiary aspect, the method comprises the steps of deploying a plurality of base units of the kind defined in any preceding aspect and erecting a plurality of permanent grounded traffic light poles adjacent to the base units and sequentially switching the connectors of the base units to the permanently grounded traffic light poles.

[0028] In a further broad aspect, the invention provides a moveable base unit for supporting a traffic signal apparatus, the base unit further comprising a housing for housing both a removable ballast and a control unit with at least one receiver for receiving a connector; the base unit comprising a perimetral wall with an inner surface onto which the receiver is secured. This configuration is particularly advantageous, as it provides improved plug and play facility whist at the same time protecting the receiver and any connector from being damaged when inserting and removing ballasts.

[0029] In a subsidiary aspect, the moveable base unit further comprises a support pole with a hinge; whereby

the support pole may be collapsed.

[0030] In a further subsidiary aspect, the ballast comprises handles. This improves the ability of an operator to precisely dispose the ballast within the cavity of the moveable base unit.

[0031] In a subsidiary aspect, the receiver incorporates a socket into which a pluggable rail connector may be at least partially inserted.

[0032] In a further broad aspect, the invention provides a traffic light pole comprising a control unit with a receiver suitable for plugging in a pluggable rail connector.

Brief Description of the Drawings

[0033] Embodiments of the invention will be described with reference to the accompanying figures, in which:

Figure 1 shows a perspective view of a moveable traffic signal apparatus and a grounded permanently disposed traffic light pole.

Figure 2 shows a perspective view of the pole of a temporary traffic light unit in its collapsed configuration.

Figure 3 shows a traffic light pole of a temporary traffic light unit in its erected position.

Figure 4 shows the inside of a traffic signal apparatus with a receiver attached to the inner surfaces of the perimetral wall of the unit.

Figure 5 shows a ballast with a handle disposed within the cavity of a traffic signal apparatus.

Figure 6 shows a perspective view of the traffic signal unit with a receiver in accordance with a further embodiment.

Figure 7 shows two connectors and the receiver in the process of being disconnected.

Figure 8 shows an aperture in the base of the unit through which the connectors and cables may be removed from the unit.

Figure 9 shows a perspective view of an aperture in a pavement where access to a tunnel is provided through which the ends of a cable may be threaded.

Figure 10 shows the ends of a cable incorporating multiple connectors being protected by a protective pocket prior to being thread through the tunnel.

Figure 11 shows the initiation of the insertion phase of the protected cable into the underground tunnel.

Figure 12 shows the emergence of the cable and from the grounded traffic light pole prior to the removal of the protective pocket.

Figure 13 shows the cable and traffic light connectors freed from the protective pocket and the socket provided for receiving them in the base of the grounded permanent traffic light pole.

Figure 14 shows the base of the traffic light pole with the connectors in a protective housing.

Detailed Description

[0034] Figure 1 shows a moveable base unit 1 and a pole 2 which together form a temporary traffic light unit. As in the prior art, traffic light heads will be provided on the pole of the kind that may be seen better in figures 2 and 3. The base unit has two roof portions 3 and 4, which may be shut against the four side walls such as side wall 5 of the unit. The roof portions 3 and 4 are connected to hinges 6 and 7 to allow the top portion of the unit to be opened in order to reveal a cavity for the storage of ballasts and control units for connecting traffic light signalling cables. The unit may incorporate a number of feet, such as foot 8 which may be adjustable in height in order to accommodate potentially uneven surfaces where the temporary traffic light might be deployed. In this embodiment, the temporary traffic light unit is disposed in close proximity to a recently grounded traffic light pole 9. Prior to installing the grounded traffic light pole 9, a tunnel beneath the pavement has been provided to allow the grounded traffic light pole to be connected to appropriate control cabling and powering means. In this instance, the tunnel may be provided through the base of a pole to an accessible inground hole 10. The moveable base unit and the pole are preferably transported together in a ready to be deployed configuration rather than assembled entirely on site. In figure 2 for example, during transportation, the pole may be formed of an upper portion 11 and a lower portion 12 separated by a hinge 13. This allows in transportation for the upper portion to be collapsed onto the moveable base unit and once on site for an operator to readily erect the temporary traffic light unit by rotating the upper portion 11 relative to the lower portion 12 and thereafter bolting the portions together as shown in figure 3 where a bolt 14 is threaded through oppositely disposed ears 15 and 16 whereby any further rotation of the upper portion is prevented and the pole is thus secured in its erected configuration in order to allow the temporary traffic light units to reach the typical heights of the grounded permanent traffic light heads.

[0035] Figure 4 shows roof portion 3 in its opened position to reveal the inner cavity 17 where the side walls are visible and provide an inner surface 18 against which a socket 19 may be provided. A housing 20 may be additionally secured over the socket to protect the interaction between a connector and the socket. The wires may be inserted in a protective sleeve 21. Feet, such as foot

8, have an upper portion which is externally threaded, and which may be placed at a variable height relative to the unit to accommodate changes in the terrain on which the moveable traffic light unit may be positioned. For the avoidance of any doubt, the moveable base unit is designed to be wholly self-standing and is not configured to be inserted into the ground as a permanent fixture. Wires are provided as part of the system between an external system hub which sends appropriate control signals and a connector which is compatible for plugging into a socket of either said moveable unit or a permanent traffic light.

[0036] Figure 5 shows another view of the inner cavity 17, which has now received a ballast 23. The ballast is of a high-density metal and incorporates a handle 24 to allow the beneficial disposition of the ballast within the cavity. It is envisaged that a plurality of such ballasts will be employed in a particular cavity, their size being selected to be suitable to be arranged side by side without resting on the cables which are protected. The cables are protected particularly between the housing 20 and the aperture 25 through which the cables may be threaded into the post of the temporary traffic light. A shelf 26 extends across the base unit in order to space the bottom portion of the post from the floor of the base unit. Floor 27 has one or two circular apertures 28 through which traffic light cabling may be drawn for connection with the control unit 20. The apertures may also alternatively be in the side of the base unit although apertures in the base are advantageous in certain embodiments.

[0037] In figure 6, the housing 20 or a similar housing has been removed in order to show the interaction between a socket 29 and a connector 30. The connector may be a pluggable DIN rail connector. In this embodiment, two connectors are envisaged, each connector providing for a plurality of individual wires to be connected in a single operation.

[0038] In the configuration of figure 6, traffic light signals arrive at the temporary traffic light unit in order to provide appropriate signals. The following sequences of figures illustrate the methodology deployed for the switchover between the temporary traffic light functionality of the base unit to the operation of a newly installed grounded permanent traffic light pole.

[0039] As shown in figure 7, connectors 30 and 31 are removed by an operator which allows the end of the cable 32 and the corresponding connectors to be removed and threaded through the aperture in the floor of the base unit as shown in figure 8.

[0040] Once the end cables and the connectors are freed from the temporary traffic light unit, an operator, as in figure 9, may identify a tunnel in the pavement through which the cables and connectors may be threaded. In figure 10, a protective pocket 34 is disposed around the connectors and the end of the cables. A wire 33 for pulling through the connector and cables may be provided.

[0041] In figure 11, the protective pocket is shown as being inserted through a first extremity of the tunnel whilst in figure 12, it is shown as having exited. An operator can then remove the protective pocket and insert the connectors to appropriate receiving means, such as sockets 35 in figure 13 which are disposed inside the permanent traffic light pole and which provide the connection to the inside wiring to the traffic light head. Once satisfactory operation has been observed, the socket and connectors may thereafter be housed as shown in figure 14. The housing may be of the kind suitable to avoid any ingress of moisture for a durable safe connection in the newly installed grounded permanent traffic light pole. This configuration allows for rapid plug and play installation of a temporary traffic light unit and the rapid unplug and replug and play option for the newly installed traffic light pole. This is particularly advantageous when deploying on a site with multiple temporary traffic light units of this kind, meaning that little or no traffic disruption may occur to the improvements detailed in this application.

[0042] The invention has been described in terms of various specific embodiments. However, it will be appreciated that these are only examples which are used to illustrate the invention without limitation to those specific embodiments. Consequently, modifications can be made to the described embodiments without departing from the scope of the invention.

Claims

1. A traffic light system comprising one or more temporary moveable base units, each having a support pole for supporting a traffic light signal head; each one of said base units comprising a socket for receiving a connector for removably connecting to one or more wires for transporting traffic light signals from an external control hub to said base unit; said base unit being self-standing and moveable to a chosen site for temporary deployment; said system comprising one or more permanent grounded traffic light poles in the vicinity of said temporary base unit comprising a socket for receiving a connector for removably connecting to one or more wires for transporting traffic light signals to said traffic light poles; and an underground tunnel leading to said permanently erected traffic light pole and which may house, in use, one or more wires to said external control hub; wherein said socket of said temporary moveable base unit and said socket from said permanent grounded traffic light poles are connectable in sequence with the same connector which is connected to one or more wires for connection to said external control hub; whereby traffic light signals may be rapidly switched from a temporary base unit to said permanently erected traffic light pole.

2. The traffic light system according to claim 1, wherein said support pole incorporates a hinge whereby the pole may be folded into a collapsed position during

transportation; said pole further comprising a lock for locking said pole in its erected position.

3. The traffic light system according to either claim 1 or claim 2, wherein said base unit comprises a cavity for receiving one or more ballasts; said ballasts being equipped with a handle; whereby said one or more ballasts are removeable from said base unit for transportation.

4. The traffic light system according to any of the preceding claims, wherein said base unit has a perimetral wall with an inner surface and the socket of said base unit is secured to said inner surface of said base unit; whereby said socket is spaced from a centrally disposed support pole in order to accommodate one or a plurality of ballasts therebetween.

5. The traffic light system of any one of the preceding claims, wherein said connector is a pluggable rail connector.

6. The traffic light system of any one of the preceding claims, wherein said connector comprises a protective pocket for threading said connector through said tunnel.

7. The traffic light system of any one of the preceding claims, wherein said socket is enclosed in a housing which is secured solely to the inside surface of said base unit.

8. The traffic light system of any one of the preceding claims, wherein wires exit said base unit via an aperture in the floor of said base unit.

9. A moveable base unit for supporting a traffic signal apparatus, the base unit further comprising a housing for housing both a removable ballast and an internal control unit with at least one socket for receiving a connector; said base unit comprising a perimetral wall with an inner surface onto which said socket is secured.

10. A moveable base unit according to claim 9, further comprising a support pole with a hinge; whereby said support pole may be collapsed; said pole further comprising a lock for locking said pole in its erected position.

11. A moveable base unit according to either claim 9 or claim 10, wherein said ballast comprises handles.

12. A moveable base unit according to any one of claims 9 to 11, wherein a pluggable rail connector is at least partially insertable into said socket.

13. A method of installing one or more permanently erected grounded traffic light poles, comprising the steps of providing a moveable base unit in accordance with any one of claims 9 to 12 and employing a system in accordance with any one of claims 1 to 8.

14. A method according to claim 13, comprising the steps of deploying a plurality of base units of the kind defined in any preceding claim and erecting a plurality of permanent grounded traffic light poles adjacent to said base units and sequentially switching the connectors of said base units to said permanently grounded traffic light poles.

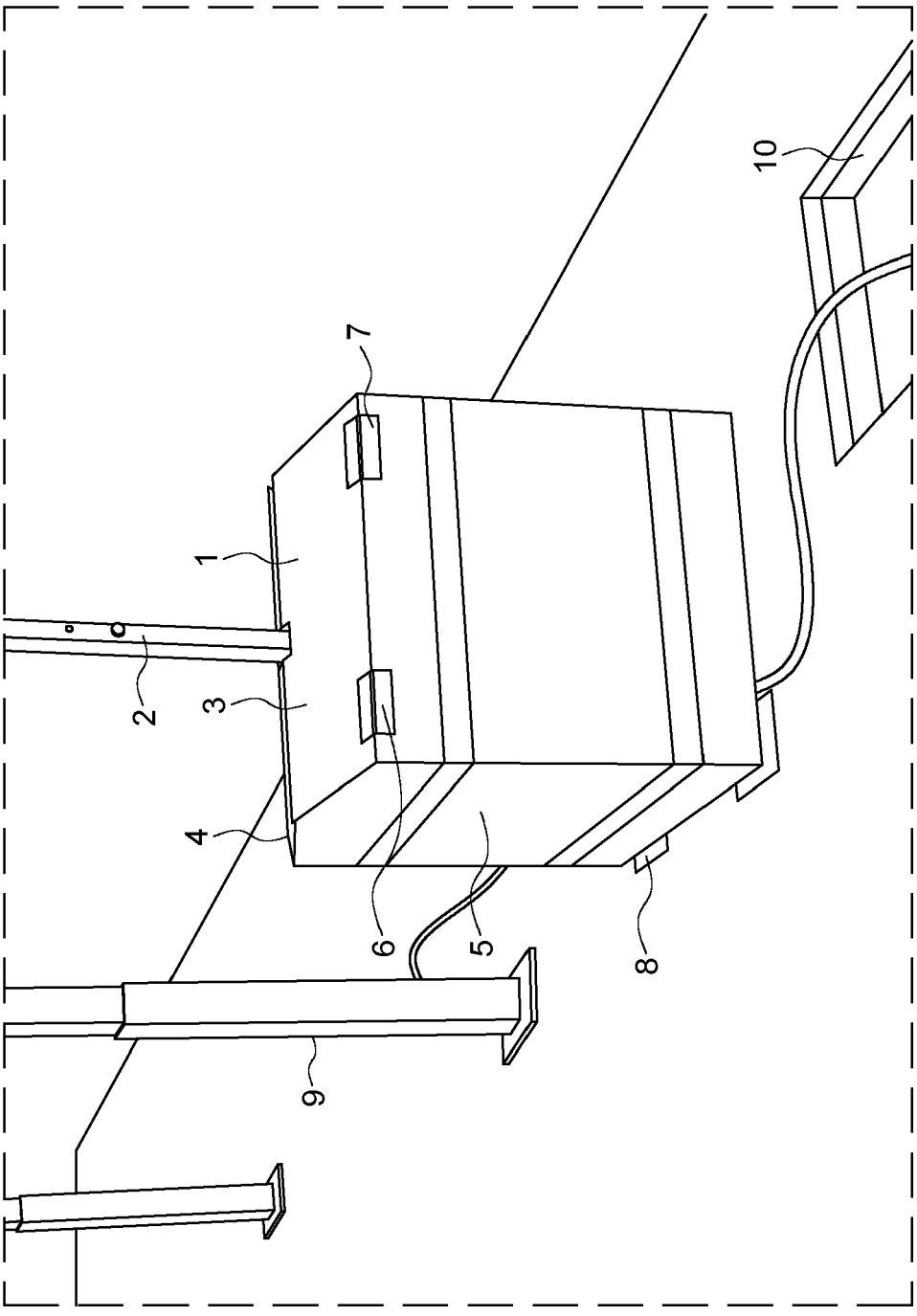

FIG. 1

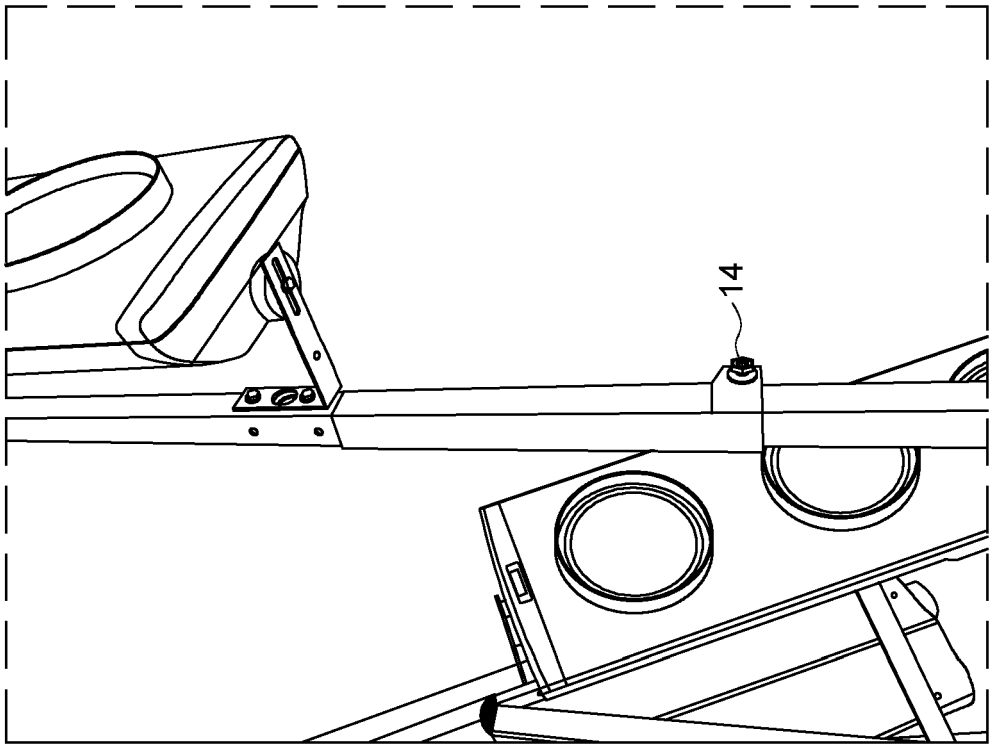

FIG. 3

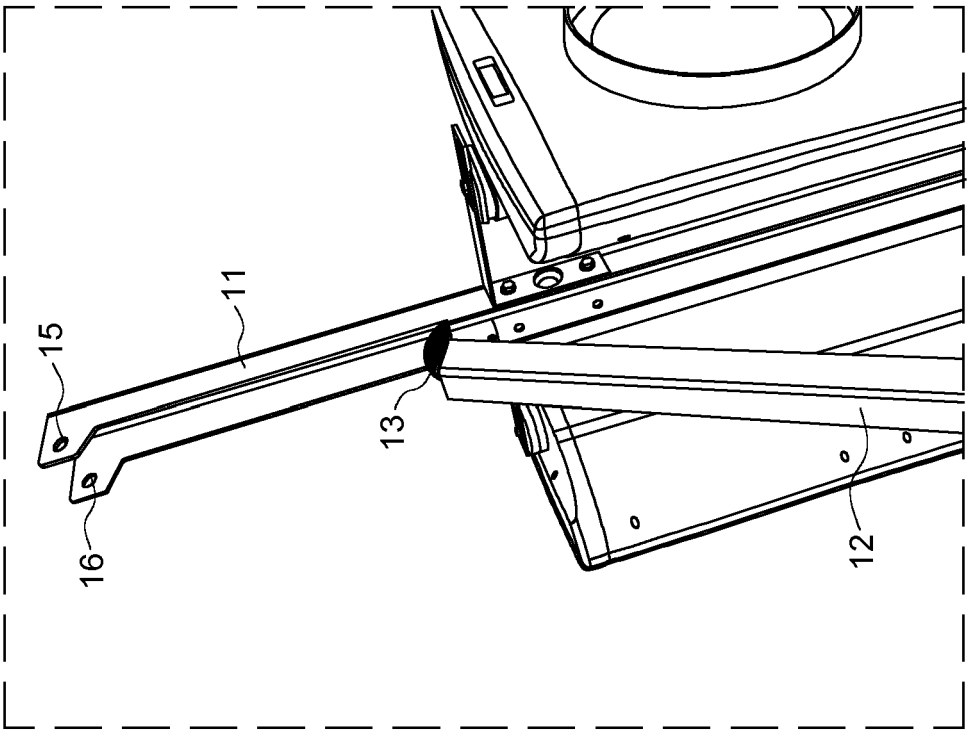

FIG. 2

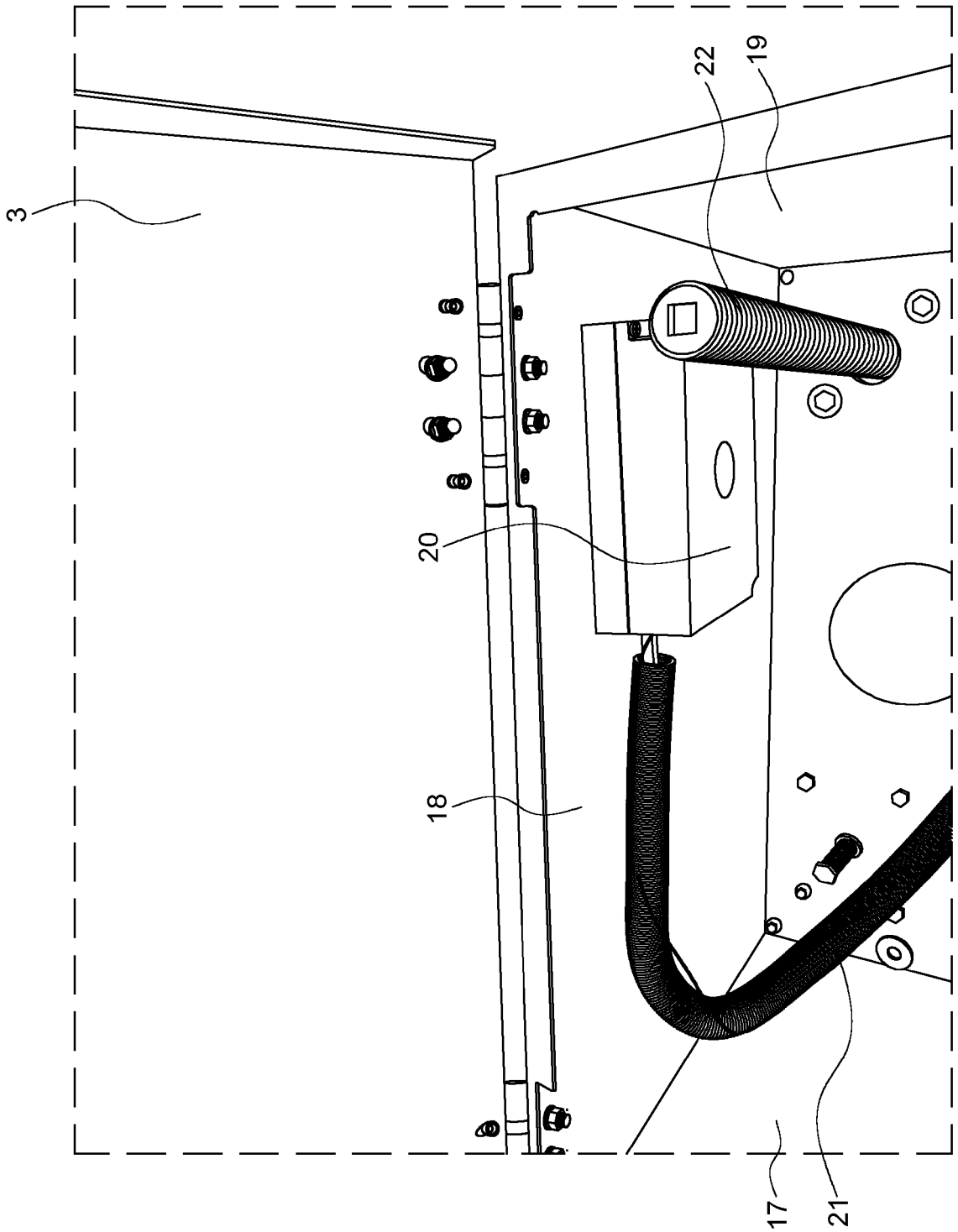

FIG. 4

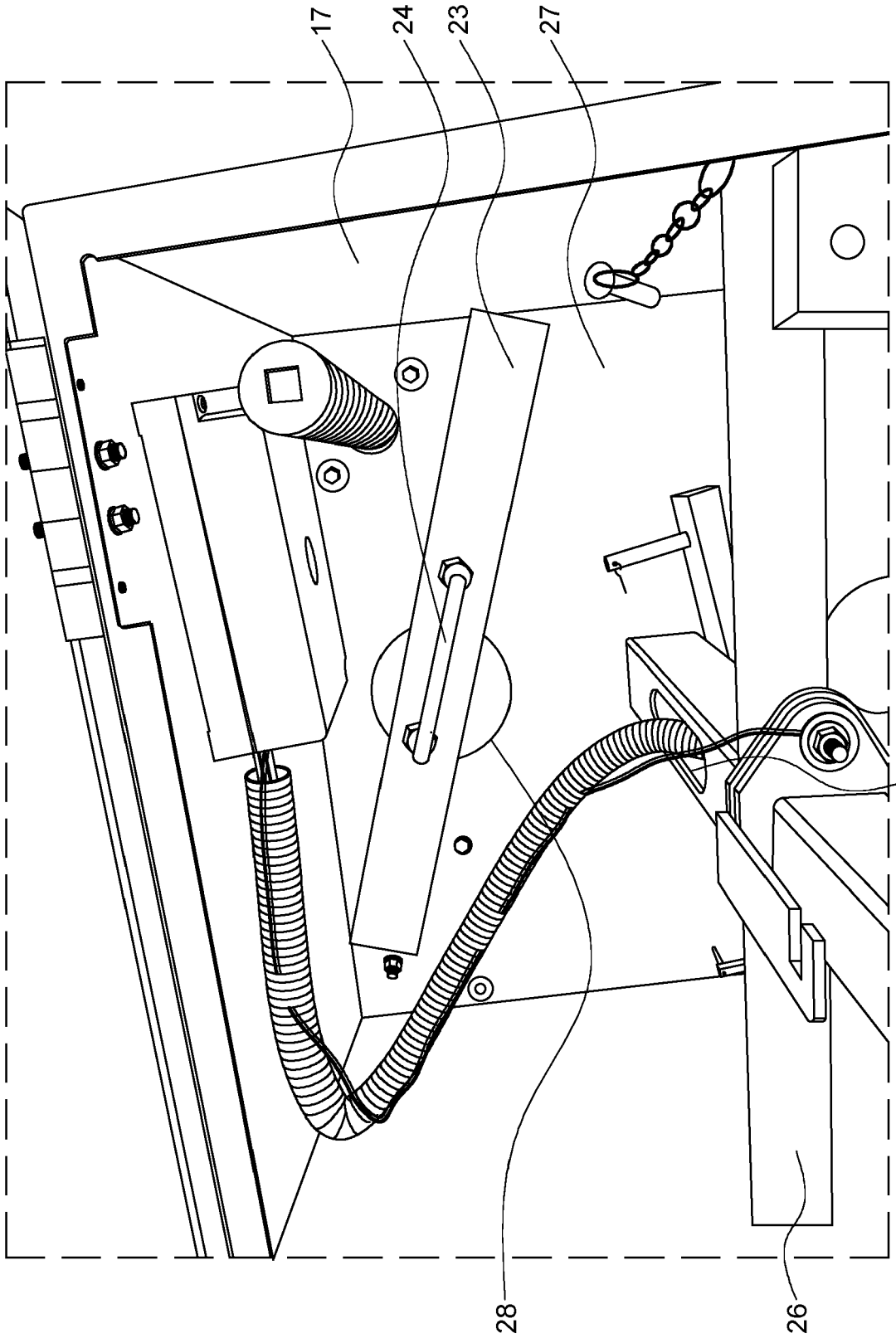

FIG. 5

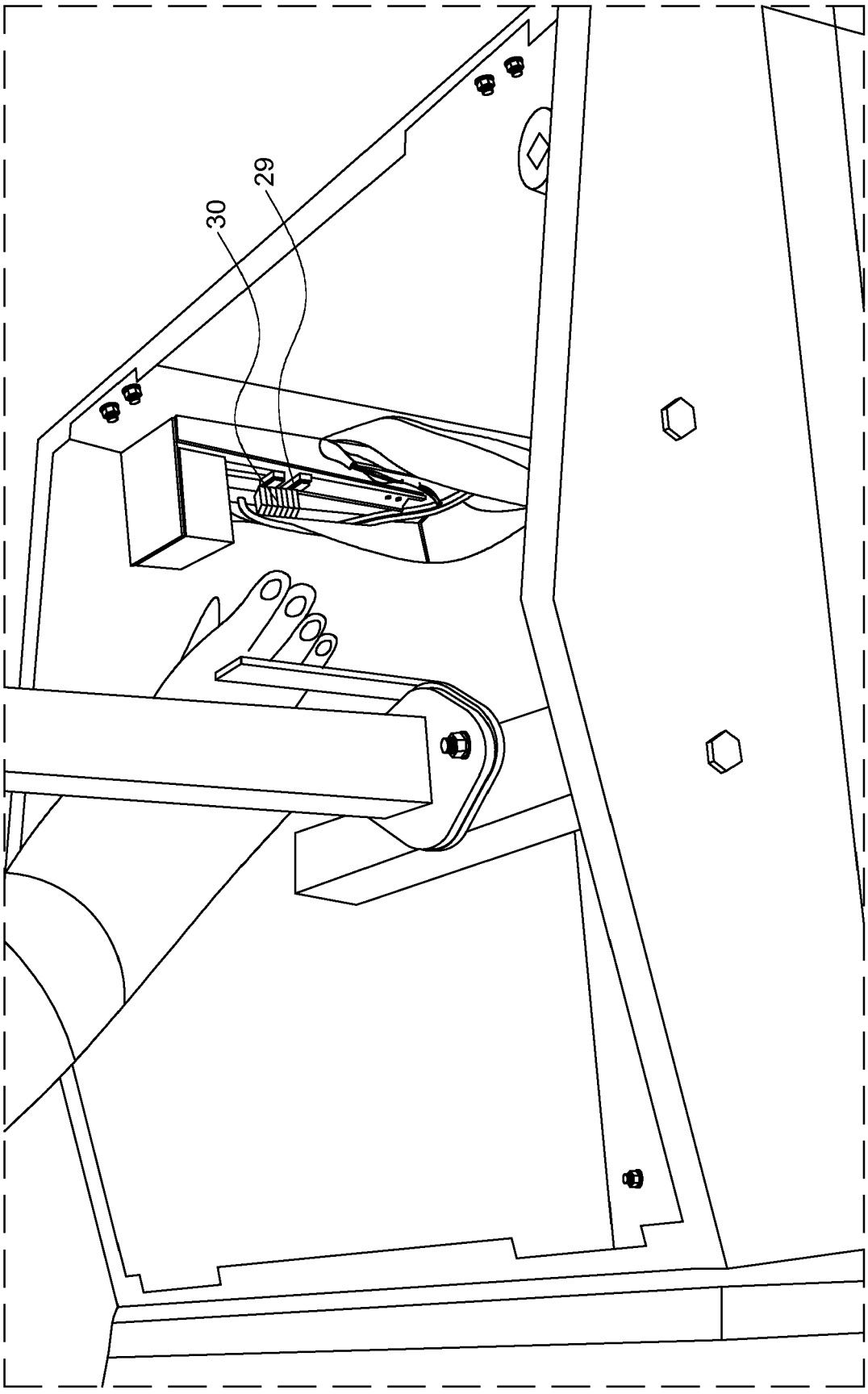

FIG. 6

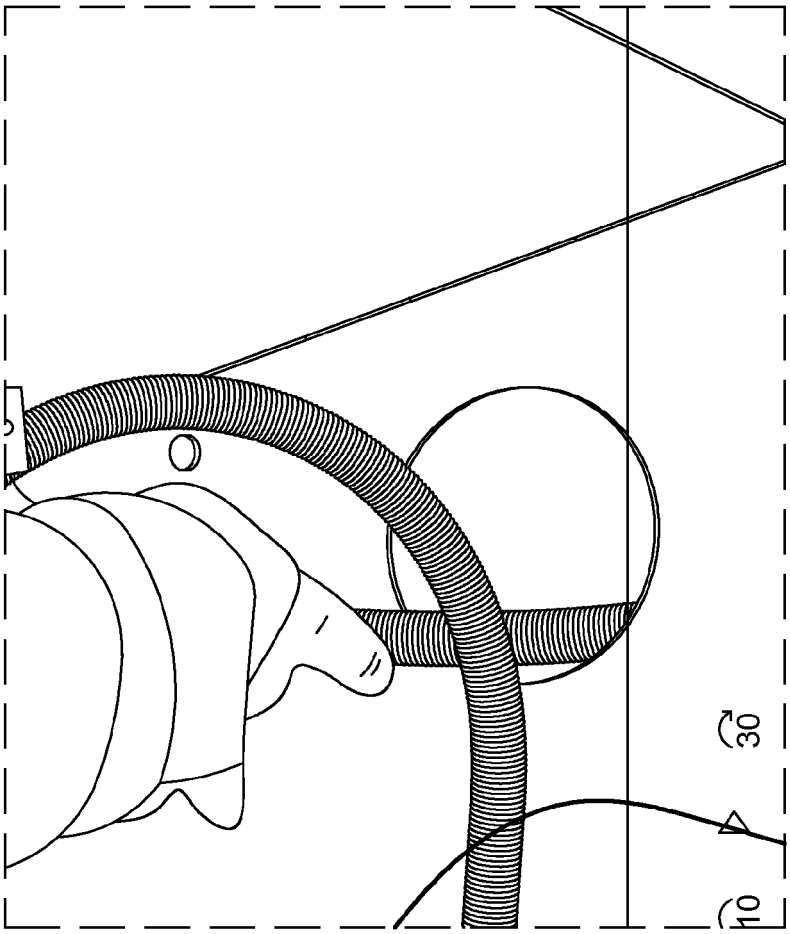

FIG. 8

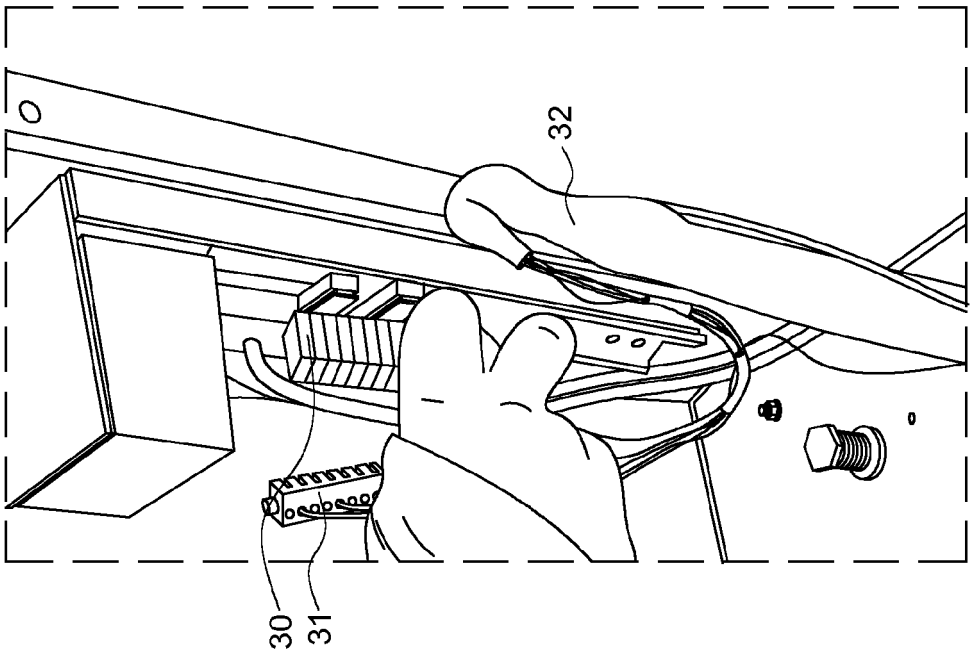

FIG. 7

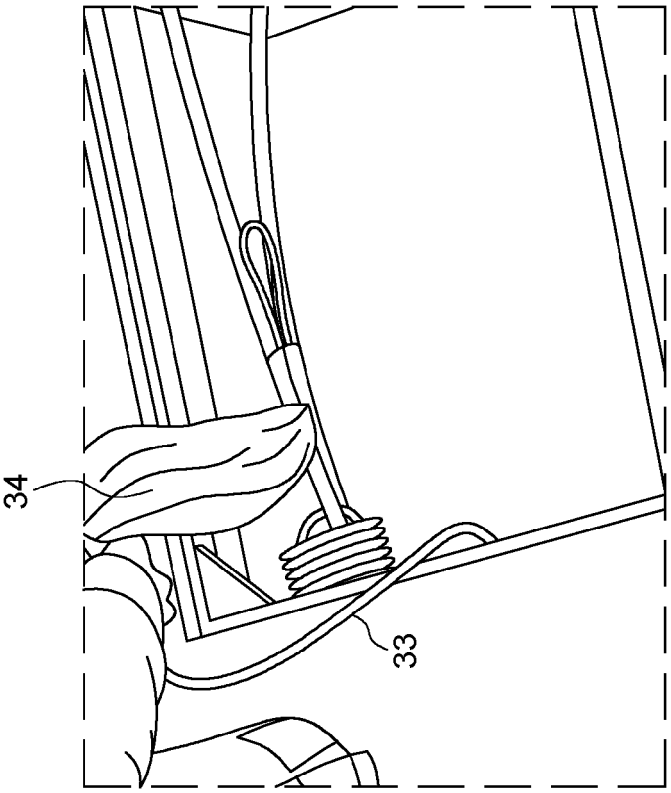

FIG. 10

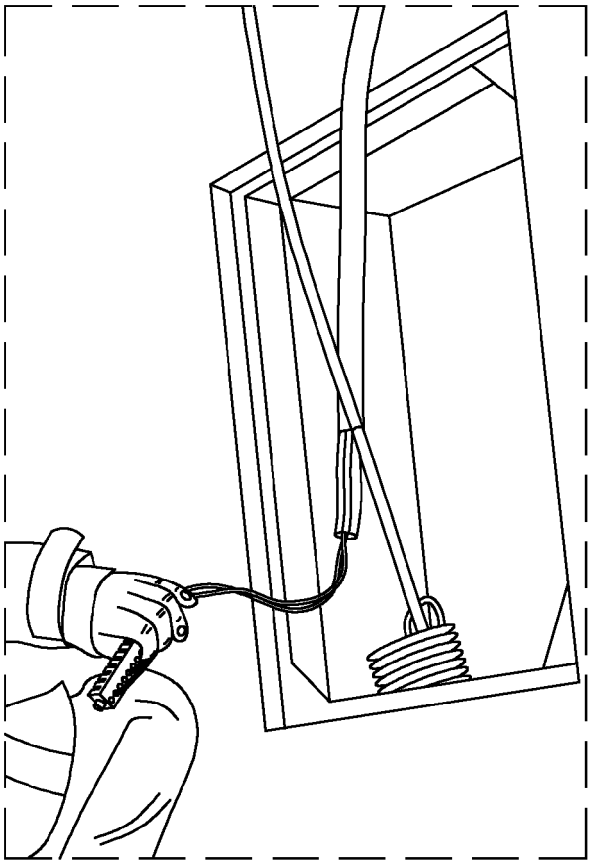

FIG. 9

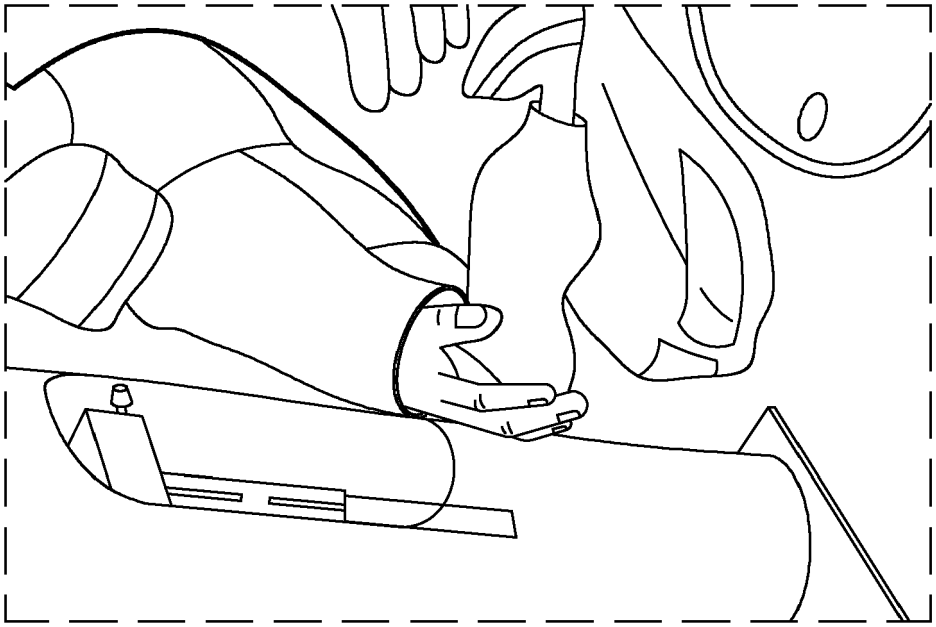

FIG. 12

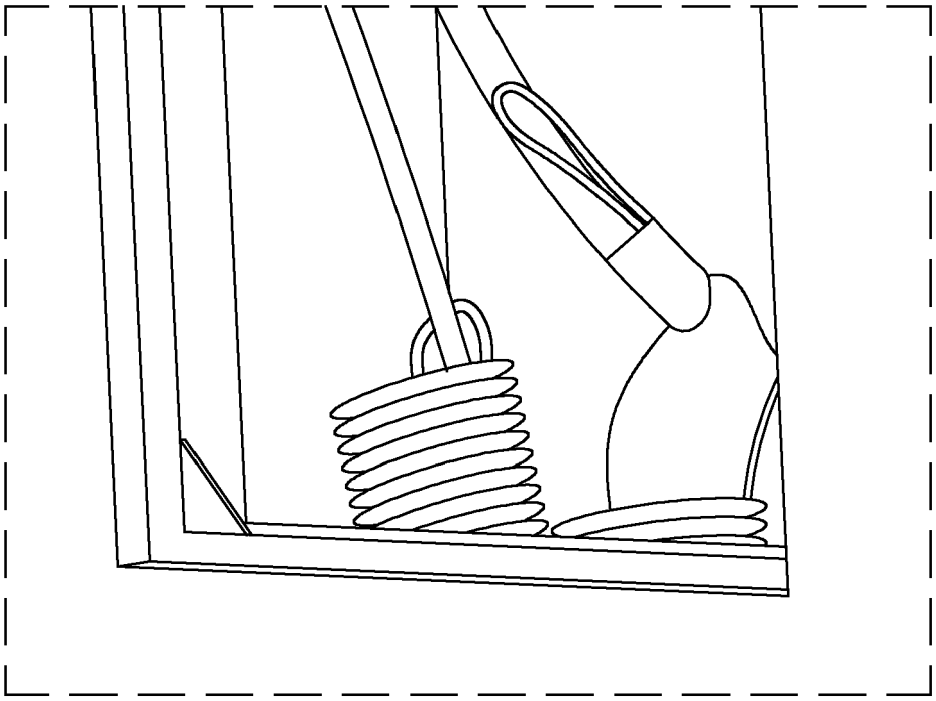

FIG. 11

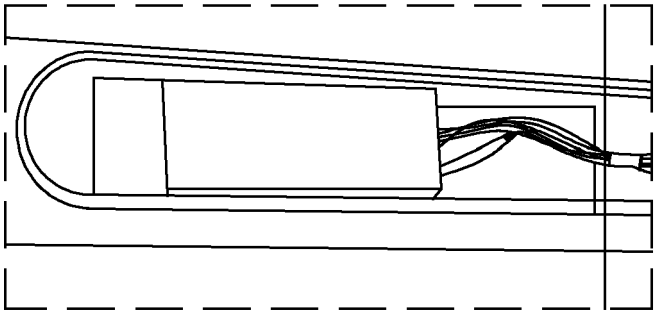

FIG. 14

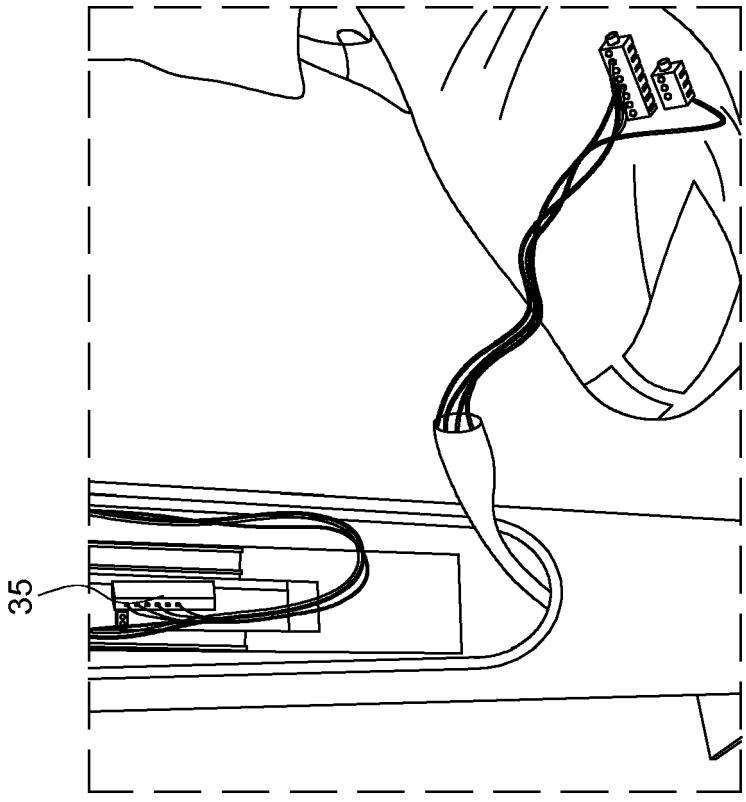

FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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