(19) Octrooicentrum Nederland

(11) **2012085**

(12)C **OCTROOI**

(21) Aanvraagnummer: **2012085**

(22) Aanvraag ingediend: **14.01.2014**

(51) Int.Cl.:
B66F 7/16 (2006.01) ***B66F 7/28*** (2006.01)

(43) Aanvraag gepubliceerd:
-

(47) Octrooi verleend:
16.07.2015

(45) Octrooischrift uitgegeven:
22.07.2015

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(54) **Inground lifting system with a modular structure for lifting a vehicle, and method there fore.**

(57) The present invention relates to an inground lifting system for lifting a vehicle and a method for configuring an inground lifting system. The lifting system according to the invention comprises:
- a pit provided with one moveable first lifting device, the pit comprising a pit frame;
- a second lifting device; and
- a cover configured for covering the pit,
wherein the pit frame comprises a modular cover guidance structure configured for guiding the cover.

NL C 2012085

Inground lifting system with a modular structure for lifting a vehicle, and method there fore

The invention relates to an inground lifting system and more specifically to a system comprising one or more moveable lifting devices. These inground lifting systems are specifically used for lifting trucks, busses and/or vehicles.

Conventional inground vehicle lifting systems comprise a moveable lifting device that is maneuvered under an axle of the vehicle, like a bus or truck, in accordance with the specific axle distance of the vehicle. To deal with different axle distances the moveable lifting device is moved in a pit. A cover is provided to cover the opening of the pit and to provide a safe working place when performing service or maintenance operations such as tire or brake replacement, or other tasks that require access to the under side of the vehicle. Every time the lifting device repositions the cover moves accordingly. These conventional inground lifting systems are custom made, thereby resulting in complex and relatively expensive lifting systems.

An objective of the present invention is to obviate or at least to reduce the above problems and to provide a lifting system that is economically more feasible.

This objective is achieved with an inground lifting system for lifting a vehicle according to the invention, the inground lifting system comprising:

- a pit provided with one moveable first lifting device, the pit comprising a pit frame;
- a second lifting device; and
- a cover configured for covering the pit,

wherein the pit frame comprises a modular cover guidance structure configured for guiding the cover.

The invention relates to a so-called inground lifting system. Such vehicle lifting system preferably comprises a first lifting device with a stationary position that is used for lifting the front, or alternatively the rear, of the vehicle to be lifted. The inground lifting system further comprises one or more moveable lifting devices for lifting the other part(s) of the vehicle. The one or more moveable lifting devices are provided in a pit to enable a translational movement of the moveable lifting devices. In use this movement is substantially in a lengthwise direction of the vehicle to be lifted. By enabling such translational movement for one or more moveable lifting devices a wide range of vehicle dimensions can be dealt with in the lifting system according to the present invention.

The inground lifting system is provided with a pit cover. Preferably, the moveable lifting device is connected to the pit cover such that the pit remains covered during the operation, and more specifically remains covered during translational movement of the moveable lifting device.

Preferably, the vehicle is lifted by the lifting device engaging one of the wheel axles of the vehicle. The one or more moveable lifting devices are positioned relative to the different

vehicle axles. This achieves an effective and efficient positioning of the moveable lifting devices and enables lifting of a vehicle. Optionally a vehicle wheel base distance measuring system is used for determining the desired location(s) for the one or more moveable lifting devices.

The inground lifting system preferably comprises a drive that is configured for driving the moveable lifting device or devices. In a presently preferred embodiment, this drive involves a toothed gear-rack to move the inground lifting devices in a conventional manner, or, alternatively, the drive enables moving of the moveable lifting device by pulling the pit cover that preferably is connected to the carriage of the moveably lifting device. Such cover drive that is provided in such alternative embodiment would be capable of driving the cover such that the cover moves the carriage and the moveable lifting device can be moved between different positions within the range of travel of the lifting device in the pit. In such an alternative embodiment movement of the cover is preferably achieved by applying pulling forces only. By pulling the cover, the cover can be moved jointly and locking and/or undesired upward folding of the cover or cover part thereof, is substantially prevented.

The inground lifting system according to the present invention comprises a modular cover guidance structure that is configured for guiding the cover. This modular guidance structure provides a modular means that can be applied to a wide range of inground lifting systems. This significantly reduces the amount of labour and costs associated with materials for lifting systems that are customer specific designed. This modular cover guidance structure enables an inground lifting system that is more economically feasible.

A further advantage of the inground lifting system according to the present invention is the possibility to incorporate the system in existing pits. This would only require removal of relevant parts of the old lift. The pit does not require any significant modifications as guiding of covers and cable carriers are directly attached to the new system. This provides a cost effective system for upgrading any existing pit.

Preferably, the pit of the inground lifting system according to the present invention comprises a number of modular pit structures that together define the pit. When designing a specific inground lifting system use can be made of a number of these modular pit structures. Preferably these modular pit structures are available having a different length as seen in the lengthwise direction of the vehicle to be lifted when in use. Especially the combination of modular cover guidance structures and modular pit structures results in an effective inground lifting system that can be designed cost effectively as compared to conventional lifting systems. In a presently preferred embodiment the dimensions of the modular pit structures have been chosen that such pit structures can be easily transported involving a standard type container, for example. For example, the use of about five different dimensions for separate modular pit structures already appears to enable providing a large variation of inground lifting system dimensions that would be capable of

dealing with wheel base distances varying in the range of 1.2 to 12 m, for example. It will be understood that also other dimensions would be available within the range of the present invention.

In a presently preferred embodiment according to the present invention the guidance structure is releasable connected with a connection to the pit frame.

By releasable connecting the modular guidance structure to the pit frame with a releasable connection an easy implementation of the cover and guidance structure is provided. This results in an effective mounting or installation operation for the inground lifting system according to the present invention.

Preferably, the connection comprises a snap connection using a so-called snap profile. More specifically, the snap profile according to a preferred embodiment is arranged at or close to the modular guidance structure or profiles thereof, and a corresponding snap rod is preferably arranged on a pit frame or attached thereto. In an alternative embodiment the snap profile may be arranged on or close to the pit frame and the snap rod be attached to the modular guidance structure. The releasable connection provides an easy to implement modular guidance structure when installing an inground lifting system according to the present invention.

In a presently preferred embodiment according to the present invention the snap rod comprises a number of rod elements that are arranged in a lengthwise direction of the pit. Providing a number of rod element as an alternative to a snap rod extending over substantially the entire pit length installation is made more convenient.

In a presently preferred embodiment according to the present invention the cover comprises a rolling cover.

By providing a rolling cover a flexible element covering the pit opening is provided resulting in a safe working environment. Although the cover itself may relate to a conventional cover, such cover in the inground lifting system according to the present invention is guided by a modular cover guidance structure. In a presently preferred embodiment the pit guidance structure comprises a continuous guiding structure for the rolling cover. This means that the guidance structure runs continuous from both sides of the moveable lifting device through the pit structure. Possibly, however not necessarily, the cover elements that are provided on opposite sides of the moveable lifting device are connected to each other with their ends. Alternatively, the ends remain free and unconnected. Obviously, this may typically depend on the dimensions of the pit and inground lifting system.

In a presently preferred embodiment according to the present invention the cover of the inground lifting system comprises a number of plate covers.

The plate covers itself may relate to conventional plate covers. However, the plate covers are arranged such that they are capable of being guided by the modular cover guidance

structure of the inground lifting system according to the present invention. The use of such plate covers provides a cost effective alternative to the use of rolling covers.

In a presently preferred embodiment the plate covers comprise interacting contact elements that enable joint movement of the plate covers. Only one plate cover needs to be driven by preferably the moveable lifting device as this cover may drive one ore more of the other plate covers, if required. Obviously, this depends on the actual location of the moveable lifting device in the pit.

With the modular cover guidance structure according to the present invention it would typically be possible to provide the modular cover guidance structure arranged for guiding a cover of one type, for example plate covers. Whenever applicable, the modular cover guidance structure can easily be replaced by a modular cover guidance structure configured for another type, for example for guiding a rolling cover. This provides flexible means to amend or change the inground lifting system according to the present invention. This change may relate by replacing the plate covers by the rolling cover. This provides additional flexibility to the user of the inground lifting system according to the present invention. Such change with the inground lifting system according to the present invention would not require any further amendment to the lifting system or pit structure besides a change of the modular cover guidance structures, or a profile thereof, and the desired cover type. In addition, through the use of modular pit structures it would be possible to redesign or even relocate the entire lifting system according to the invention. This provides a cost effective alternative to installing a new pit and lifting device.

In an alternative embodiment according to the present invention the cover of the inground lifting system may comprise at least one rolling cover and one set of plate covers. This provides additional flexibility for the user of the inground lifting system.

In a presently preferred embodiment according to the present invention the inground lifting system further comprises a spacer module that is arranged between the first and second lifting system.

By providing a spacer module, preferably a modular spacer module, the distance between two lifting devices of the lifting system according to the invention can be designed in accordance with the desired specifications. In a presently preferred embodiment according to the present invention, a spacer module is provided between a moveable first lifting device in a pit and a second lifting device provided in a stationary position. The spacer module is provided between the two lifting devices thereby defining the minimal distance between the two lifting devices and the according minimal wheel base distance or distance between the two axles of a vehicle to be lifted.

Preferably, the spacer module comprises a top plate and the spacer module is configured for receiving one or more plate covers. By providing a top plate the spacer module provides a safe working environment. Preferably, the plate covers provided on one side of the moveable lifting

device can be received by the spacer module and preferably be stored underneath the top plate of the spacer module. Preferably, the size of the plate covers is determined by the size of the top plate of the spacer module. This provides an effective cover of the pit that provides a safe working environment. Optionally, a spacer or end module is also provided on the other side of a moveable lifting device in a similar manner.

In a further preferred embodiment according to the present invention at least one of the lifting devices comprises a piston type lifting device.

A (telescopic) piston type lifting device is preferably applied when a sufficient depth of the pit is available.

In an alternative embodiment of the inground lifting system according to the present invention at least one of the lifting devices comprises a scissor type lifting device. Such scissor type lifting device has the additional advantage that a relatively shallow pit construction can be used or applied. This would be beneficially in situations with bedrock, water table or unstable soil conditions.

Both types of lifting devices accommodate vehicles with relatively low ground clearance. It will be understood that also combinations of different types of lifting devices would be possible in the inground lifting system according to the present invention.

Optionally, the inground lifting system according to the present invention is provided as a so-called flush type lifting system wherein a bolster of the lift in a retracted position is more or less flush with a floor of the work place. This has advantages when working with relatively low vehicles having a relatively small distance between the work floor and the vehicle bottom. Such systems could be provided with pockets at a specific locations such that in the retracted position the lifting system has to provide the moveable lift in this specific location. Alternatively, the system is provided with a continuous system wherein the bolster can move over the entire moving distance of the pit and be retracted at any desired position. A non-flush type system provides a bolster that in the retracted position remains above the floor surface. It will be understood that the choice for a specific type of lifting system can be made in accordance with consumer preferences.

The invention further relates to a method for configuring an inground lifting system as described above, the method comprising the steps of:

- defining the dimensions of the lifting system;
- determine the number and type of modular pit structures together defining a pit of the lifting system;
- placing and connecting the pit structures;
- providing a modular cover guidance structure; and
- positioning a cover.

The same effects and advantages apply for the method as described for the system.

Further advantages, features and details of the invention will be elucidated on the basis of preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

- figure 1 shows an overview of the lifting system according to the invention;
- figures 2-4 show a cover plate embodiment of the system according to the invention;
- figure 5 shows a detail of the guidance structure of the embodiment of figures 2-4;
- figure 6 shows an alternative embodiment with a rolling cover according to the invention;
- figures 7-8 show details of the embodiment of figure 6;
- figure 9 shows the guidance structure of the embodiment of figures 6-8;
- figure 10 shows a piston-type lifting system; and
- figure 11 shows a scissor-type lifting system.

The following description is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses. While the disclosure is described as having exemplary attributes and applications, the present disclosure can be further modified. This application is therefore intended to cover any variations, users, or annotations of the disclosure using its general principles. Further, this application is intended to cover such departures from the present disclosure as commonly known or customary practice of the skilled in the art to which this disclosure pertains and which fall within the limits of the appended claims. Accordingly, the following description of certain embodiments and examples should be considered merely exemplary and not in any way limiting.

The lifting system of the present invention is suitable for use with lifting systems comprising any number of lifting devices, including without limitation piston and scissor lifts and systems having one, two or four lifting devices. The lifting devices may achieve lifting and lowering capability by means known to those of skill in the art, including hydraulically, electrically, mechanically, and electromechanically. Lifting systems compatible with the present lifting system may be stationary and/or permanently affixed or attached to a certain location or may be mobile, or capable of being transported. With reference to the figures, alike element numbers refer to the same element between drawings.

An inground lifting system 2 (figure 1) comprises a piston-type fixed lifting device 4 and a movable lifting piston-type lifting device 6. Lifting devices 4, 6 are located on or in the floor of the working environment. The stationary lifting device 4 is provided in cassette or box 8 with a telescopic lifting cylinder 10. On top of cylinder 10 there is provided carrier 12 with axle carriers 14. It will be understood that depending on the dimensions and configurations of the axle of the vehicle different adapters can be provided with carrier 14.

The movable lifting device 6 moves in cassette or box 16 acting as pit frame and defining pit 18. In the illustrated embodiment pit 18 is defined by a first pit structure module 20 and a second pit structure module 22. Between the stationary pit structure 8 and extended pit structure 18 for movable lifting device 6 there is provided spacer module 24 defining the minimal distance between stationary lifting device 4 and movable lifting device 6.

Cover plate embodiment 26 (figures 2-4) of the lifting system according to the invention (figure 2) comprises stationary lifting device 4 and movable lifting device 6. Lifting system 26 comprises spacer module 24 that is provided with a top plate 28 that is in use stationary positioned relative to the stationary lifting column 4. Movable lifting device 6 comprises a moving element or carrier 30 that on both sides is provided with a cover plate 32, 34, respectively. On the side directed towards stationary lifting device 4 cover plate 32 is connected to a second cover plate 36 and a third cover plate 38. It will be understood that the number of cover plates 32, 36, 38 depends on the dimensions of pit 16 and/or spacer module 24. Top plate 28 of spacer module 24 is capable of receiving and covering the movable cover plates 32, 36, 38 in case movable lifting device 6 is moved towards the stationary lifting device 4 such that a minimum distance remains. In the illustrated embodiment cover plate 32 may move underneath the intermediate cover plate 36. Both cover plates 32, 36 may move underneath cover plate 38 and the stack or set of cover plates 32, 36, 38 may move underneath top plate 28 of spacer module 24. On the other side of moveable lifting device 6 a second set of cover plates 34 is provided. This set of cover plates 34 may move underneath end module 40 that comprises a top plate 42 in a similar manner as compared to spacer module 24.

Modular cover guidance structure 44 (figure 5) is provided on beam element 46 of pit structure 16. In the illustrated embodiment guidance structure 44 is also connected to reinforcement plate 48 that is connected to beam 46 and profile 50. On the upper side edge 52 of beam 46 there is provided a number of snap rod elements 54 together defining a snap rod. Guidance structure 44 further comprises snap profile 56 with opening 58. Opening 58 is in use fixed over snap rod 54 such that a releasable connection 60 is achieved. Side edge 62 defines the dimensions in a width direction of pit structure 16. In the illustrated embodiment upper edge 64 substantially corresponds to the upper side of the floor of the work place. In the illustrated embodiment guidance structure 54 comprises four guiding surfaces. First surface 66 will carry top plate 28 while second surface 68, third surface 70 and fourth surface 72 enable guiding of movable cover plates 32, 36, 38. In addition, in the illustrated embodiment toothed gear-rack 74 is provided on carrier profile 76 enabling movement of movable lifting device 6. Contact elements 78 enable join movement of cover plates 32, 36, 38 dependent on the actual movement of the movable lifting device 6.

In an alternative embodiment, rolling cover lifting system 80 (figures 6-8) comprises similar elements as described for plate cover embodiment 26 although rolling cover embodiment 80 comprises a rolling cover 82. In the illustrated embodiment modular cover guidance structure 84 comprises a continuous carrier 86 capable of guiding both sides of rolling cover 82 attached to both sides of moving element 30 of movable lifting device 6. Optionally, the ends of rolling cover 82 remain free or are connected.

Modular covering guidance structure 84 (figure 9) comprises a guiding profile 86 that is provided with snap profile 56 and opening 58 that in use snaps over snap rod 54 providing connection 60. In the illustrated embodiment guidance profile 86 is provided with upper surface 88 that potentially lies substantially flush with edge 64 and the upper surface of the floor of the working place. In the illustrated embodiment guidance structure 86 further comprises edge 90 preventing pulling up of rolling cover elements 82.

Lifting system 2 (figure 10) can be used to lift a vehicle 90 above floor 92 of the working place. In the illustrated embodiment lifting devices 4, 6 comprise piston type lifting devices 94.

Telescopic piston lifting device 94 can be replaced by scissor-type lifting devices 96 (figure 11). It will be understood that operation of lifting devices 94, 96 of the inground type is similar.

When vehicle 90 needs to be lifted lifting system 2 steers movable lifting device 6 to the desired location depended on the wheel base distance of vehicle 90. Lifting devices 4, 6 engage axles of vehicle 90 either directly by carriers 14 or indirectly through other assisting parts. Alternatively, vehicle 90 can be lifted by engaging other parts of the vehicle by lifting devices 4, 6. The number of lifting devices 4, 6 may depend on the size of the vehicle and/or number of axles of vehicle 90. It will be understood that either the front wheel axle or a rear wheel axle can be lifted by a stationary lifting device 4 during a lifting operation. During translational movement of movable lifting device 6 rolling cover 82 and/or sets of cover plates 32, 34, 36, 38 move over guidance structures 44, 84. Through the use of connection 60 a flexible connection for the guidance structures to the pit structure 16 is provided providing flexibility for the choice of cover type to the user. In addition, the releasable connection 60 enables the user to change the cover guidance and bring the cover type in accordance with his changed needs.

When designing a lifting system 2 the user specifies his needs involving the choice for a range of vehicles 90 that needs to be lifted with the lifting system 2. This design operation involves the choice of number and type of modular pit structures 20, 22, type of spacer module 24, end module 40 and stationary module 8. Next a plate-type cover embodiment 26, or rolling cover embodiment 80, or a combination thereof, will be selected and the according modular guidance structures will be defined. After the design operation is completed, the required components of lifting system 2 are manufactured, transported to the desired location, and installed at this desired

location. This provides a flexible and relatively easy to install lifting system 2. Furthermore, the use of a modular structure enables relocating lifting system 2 in a relatively effective manner. The use of modular guidance structures 44, 84 is also applicable to already existing conventional lifting systems that are often custom made based on specific requirements. This provides additional flexibility to such conventional lifting systems.

The present invention is by no means limited to the above-described preferred embodiments thereof. The rights sought are defined with the following claims, within the scope of which many modifications can be envisaged. For example, it is explicitly mentioned that combinations of the illustrated embodiments, including combination of individual features thereof, are possible.

Clauses

1. Inground lifting system for lifting a vehicle, the system comprising:
   - a pit provided with one moveable first lifting device, the pit further comprising a pit frame;
   - a second lifting device; and
   - a cover configured for covering the pit,

   wherein the pit frame comprises a modular cover guidance structure configured for guiding the cover.

2. Inground lifting system according to clause 1, wherein the guidance structure is releasable connected with a connection to the pit frame.

3. Inground lifting system according to clause 2, wherein the connection comprises a snap profile arranged on the guidance structure and a snap rod arranged on the pit frame.

4. Inground lifting system according to clause 1, 2 or 3, wherein the cover comprises a rolling cover.

5. Inground lifting system according to clause 4, wherein the cover guidance structure comprises a continuous guiding structure.

6. Inground lifting system according to one or more of the foregoing clauses, wherein the cover comprises a number of plate covers.

7. Inground lifting system according to clause 6, wherein the plate covers comprise interacting contact elements configured for enabling joint movement of plate covers.

8. Inground lifting system according to one or more of the clauses 4-7, wherein the cover comprises at least one rolling cover and one set of plate covers.

9. Inground lifting system according to one or more of the foregoing clauses, wherein the inground lifting system further comprises a spacer module that is arranged between the first and second lifting devices.

10. Inground lifting system according to clause 9, wherein the spacer module comprises a top plate and is configured for receiving one or more plate covers.

11. Inground lifting system according to one or more of the foregoing clauses, wherein the pit frame comprises a number of modular pit structures together defining the pit.

12. Inground lifting system according to clause 11, wherein at least some of the modular pit structures have a different length.

13. Inground lifting system according to one or more of the foregoing clauses, wherein at least one of the lifting devices comprises a piston type lifting device.

14. Inground lifting system according to one or more of the foregoing clauses, wherein at least one of the lifting devices comprises a scissor type lifting device.

15. Method for configuring an inground lifting system, the method comprising the steps of:
    - defining the dimensions of the lifting system;
    - determine the number and type of modular pit structures together defining a pit of the lifting system;
    - placing and connecting the pit structures;
    - providing a modular cover guidance structure; and
    - positioning a cover.

CONCLUSIES

1. Ondergronds hefsysteem voor het heffen van een voertuig, het systeem omvattende:
   - een put voorzien met één verplaatsbare eerste hefinrichting, waarbij de put een putgestel omvat;
   - een tweede hefinrichting, en
   - een afdekking geconfigureerd voor het afdekken van de put,

   waarin het putgestel een modulair afdekgeleidingsstructuur omvat geconfigureerd voor het geleiden van de afdekking.

2. Ondergronds hefsysteem volgens conclusie 1, waarin de geleidingsstructuur losmaakbaar is verbonden met een verbinding met het putgestel.

3. Ondergronds hefsysteem volgens conclusie 2, waarin de verbinding een klikprofiel omvat voorzien op de geleidingsstructuur en een klikstang voorzien op het pitgestel.

4. Ondergronds hefsysteem volgens conclusie 1,2 of 3, waarin de afdekking een rolafdekking omvat.

5. Ondergronds hefsysteem volgens conclusie 4, waarin de afdekkingsgeleidingsstructuur een continue geleidingsstructuur omvat.

6. Ondergronds hefsysteem volgens één of meer van de voorgaande conclusies, waarin de afdekking een aantal afdekplaten omvat.

7. Ondergronds hefsysteem volgens conclusie 6, waarin de afdekplaten interacterende contactelementen omvatten geconfigureerd voor het mogelijk maken van gezamenlijke beweging van de afdekplaat.

8. Ondergronds hefsysteem volgens één of meer van de conclusies 4-7, waarin de afdekking ten minste één rolafdekking en een stel afdekplaten omvat.

9. Ondergronds hefsysteem volgens één of meer van de voorgaande conclusies, waarin het ondergronds hefsysteem verder een afstandsmodule omvat voorzien tussen de eerste en tweede hefinrichtingen.

10. Ondergronds hefsysteem volgens conclusie 9, waarin de afstandsmodule een bovenplaat omvat en is geconfigureerd voor het ontvangen van één of meer afdekplaten.

11. Ondergronds hefsysteem volgens één of meer van de voorgaande conclusies, waarin het putgestel een aantal modulaire putstructuren omvat tezamen de put definiërend.

12. Ondergronds hefsysteem volgens conclusie 11, waarin ten minste enige van de modulaire putstructuren een verschillende lengte hebben.

13. Ondergronds hefsysteem volgens één of meer van de voorgaande conclusies, waarin ten minste één van de hefinrichtingen een cylindertype hefinrichting omvat.

14. Ondergronds hefsysteem volgens één of meer van de voorgaande conclusies, waarin ten minste één van de hefinrichtingen een schaartype hefinrichting omvat.

15. Werkwijze voor het configureren van een ondergronds hefsysteem, de werkwijze omvattende de stappen:

- het definiëren van de dimensies van het hefsysteem;
- het bepalen van het aantal en type modulaire putstructuren tezamen de put van het hefsysteem definiërend;
- het plaatsen en verbinden van de putstructuren;
- het voorzien van een modulaire afdekgeleidingsstructuur; en
- het positioneren van een afdekking.

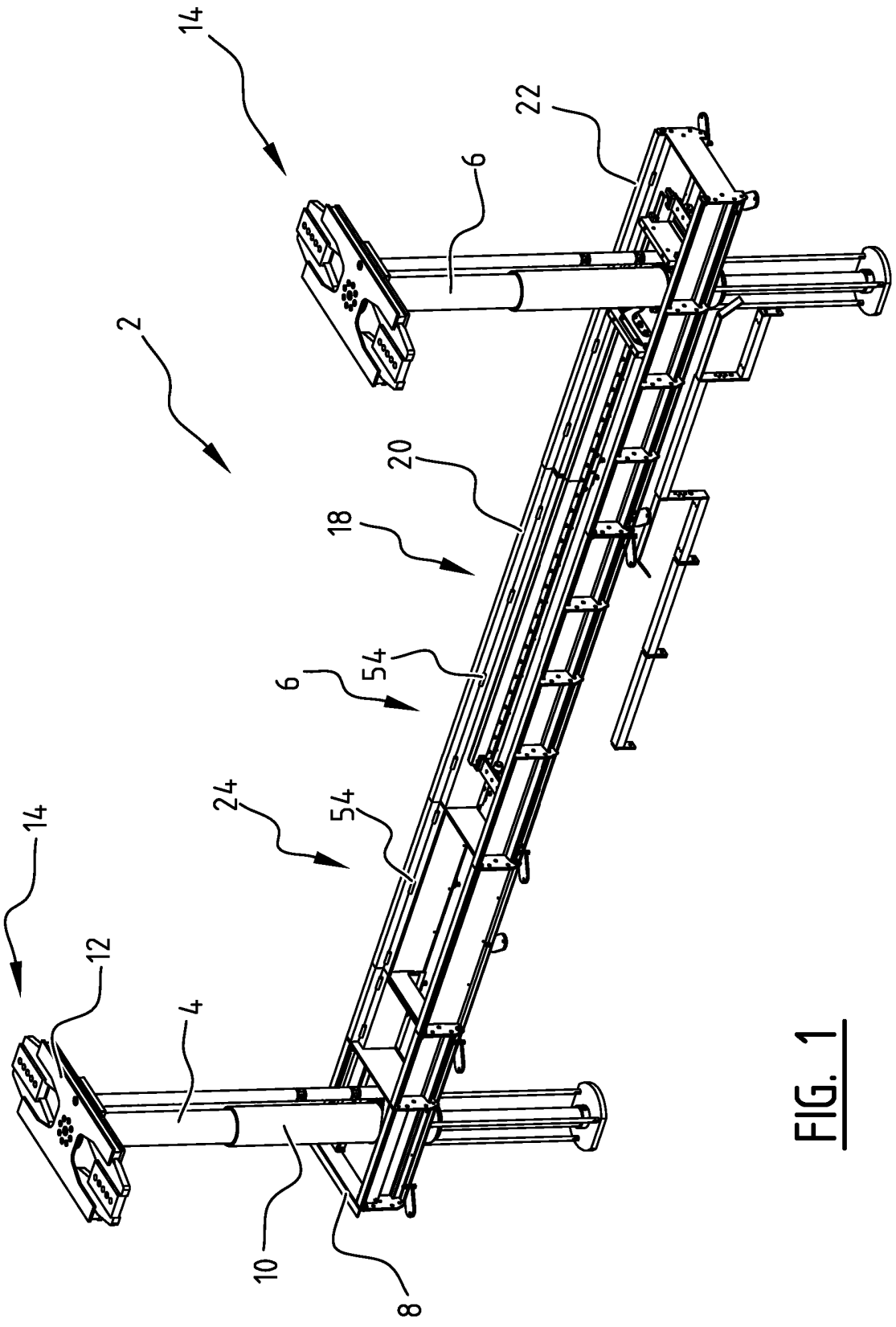

FIG. 1

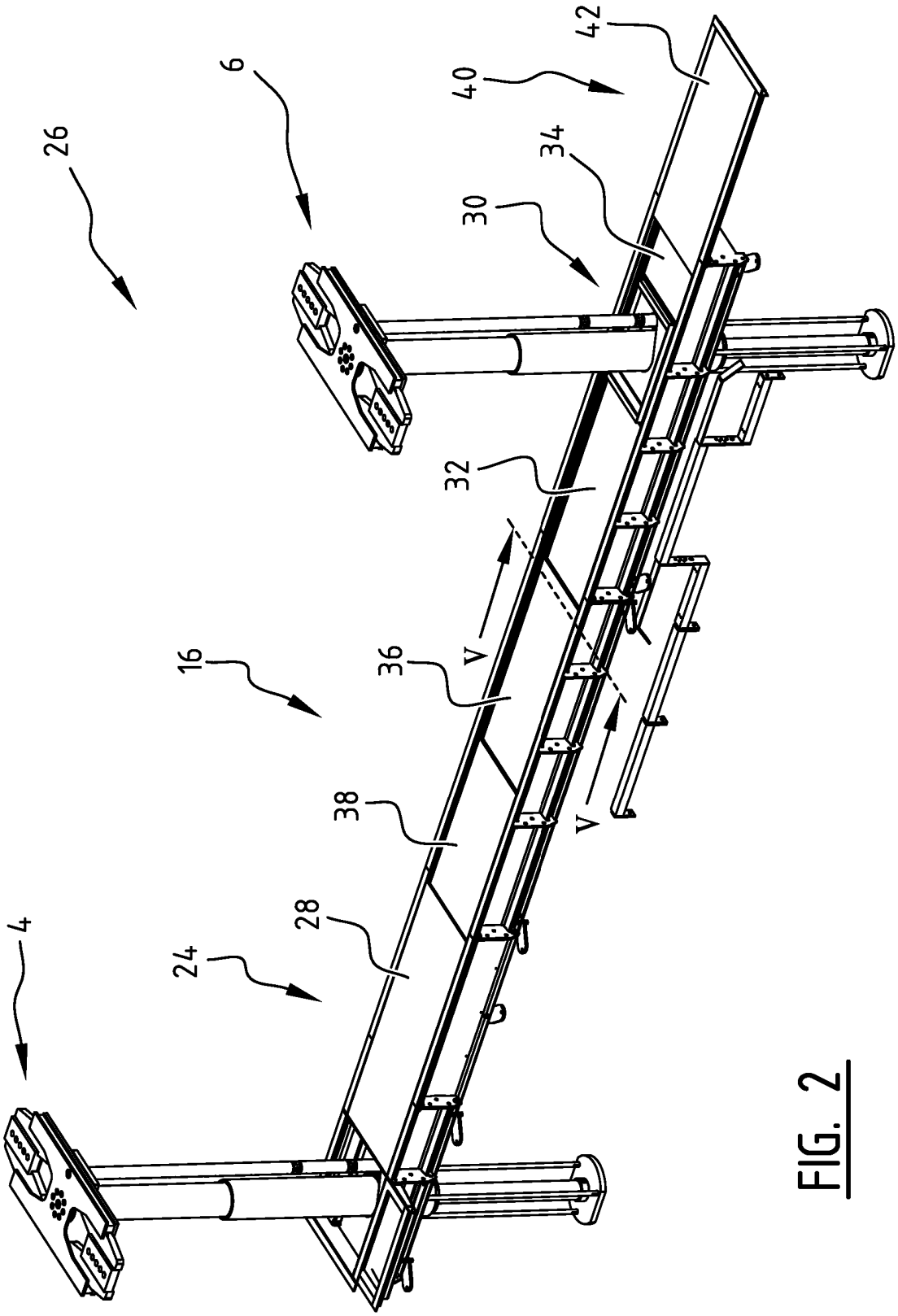

FIG. 2

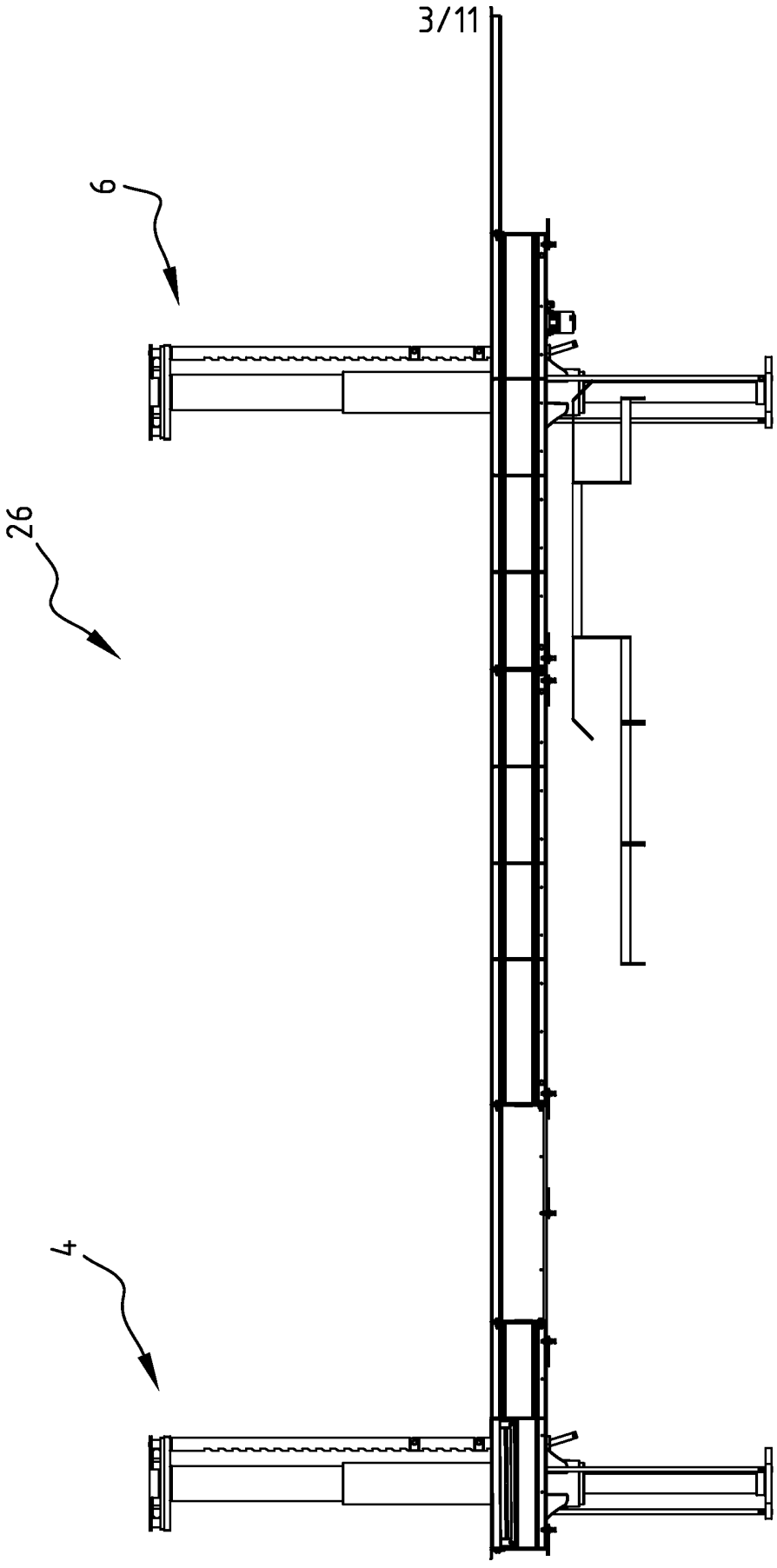

FIG. 3

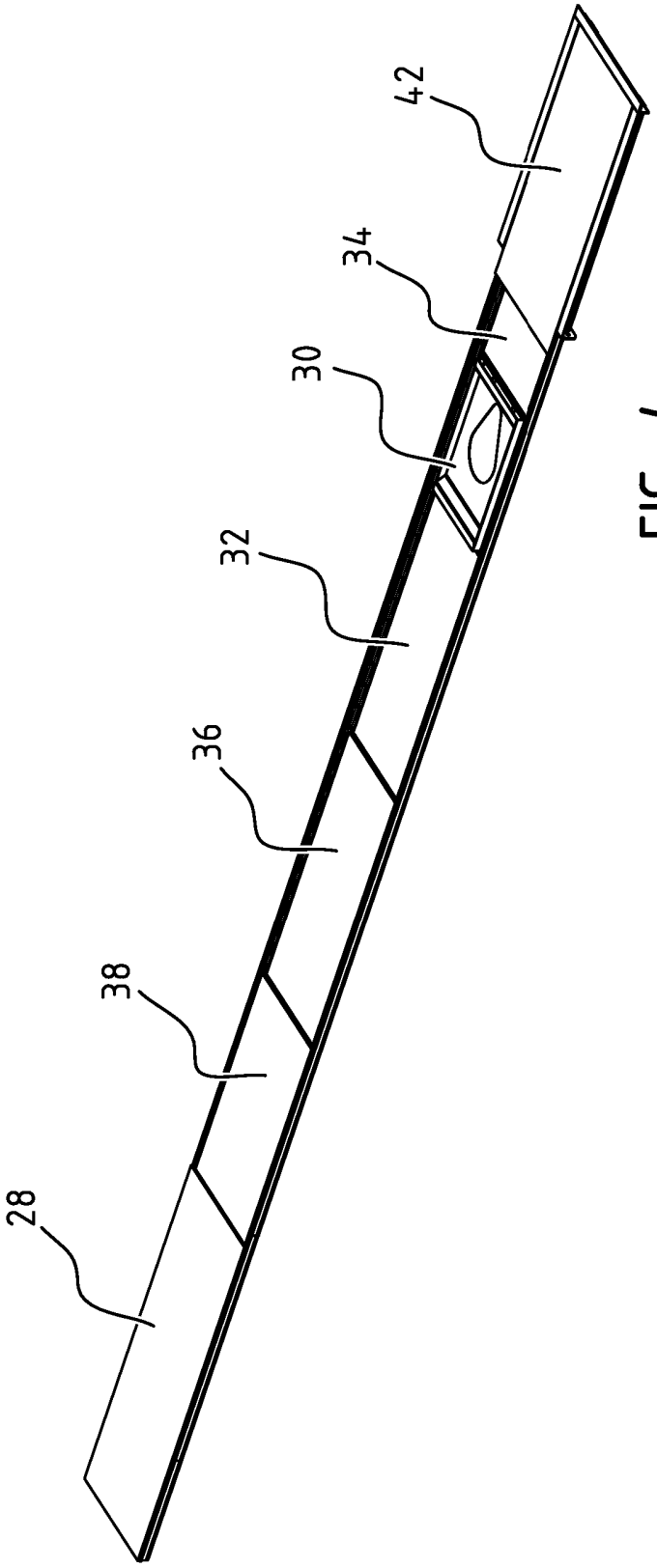

FIG. 4

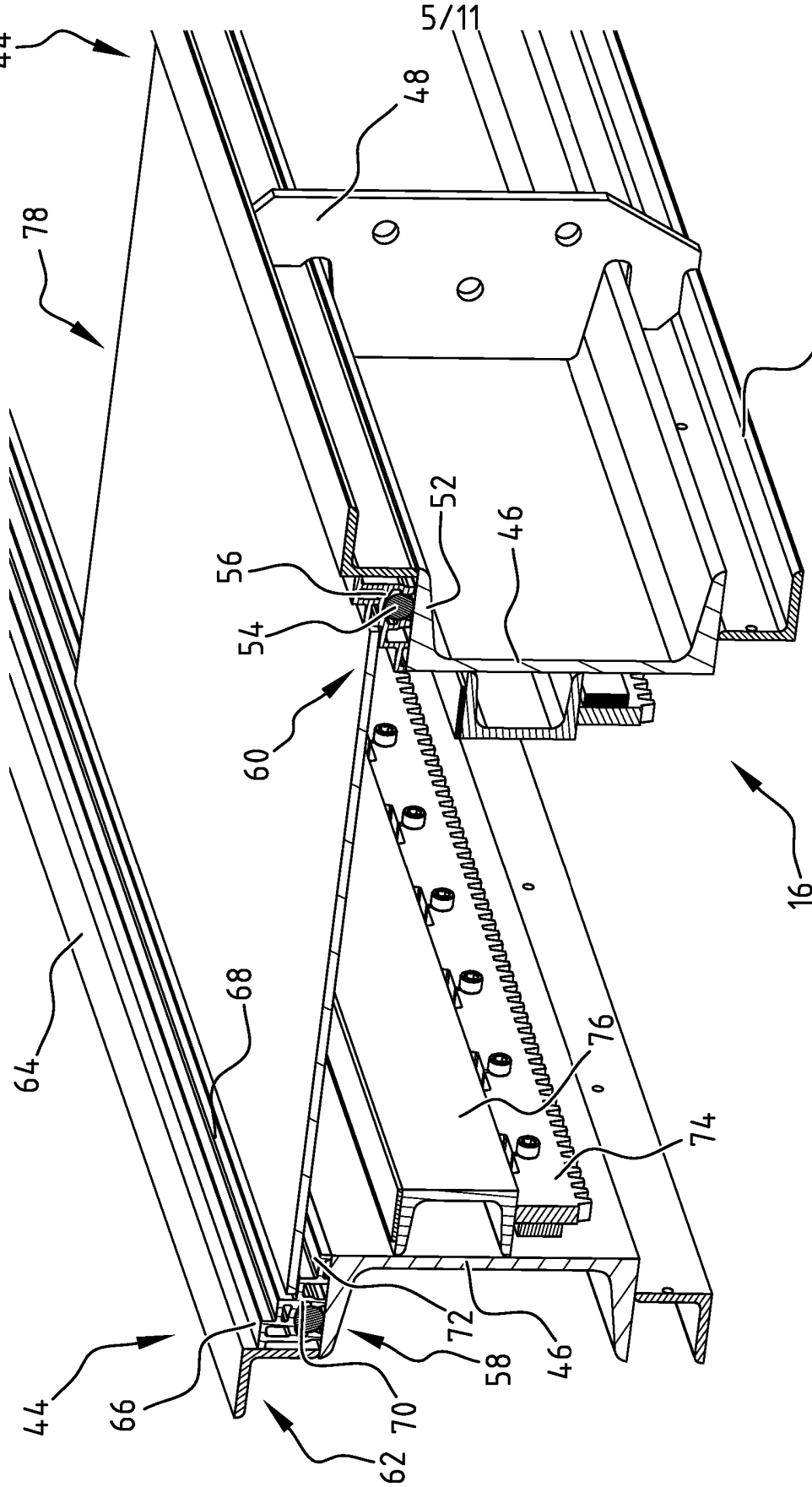

FIG. 5

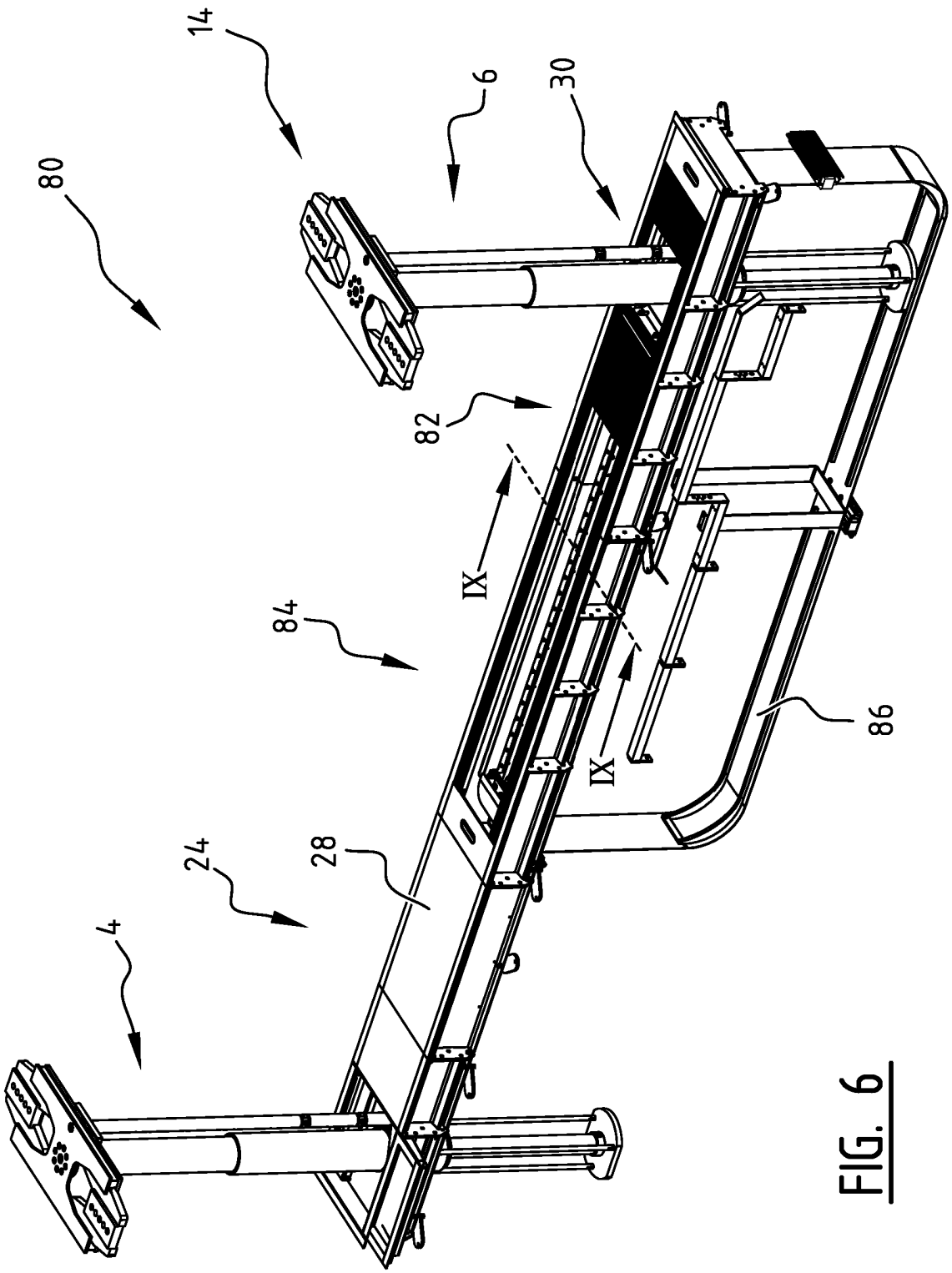

FIG. 6

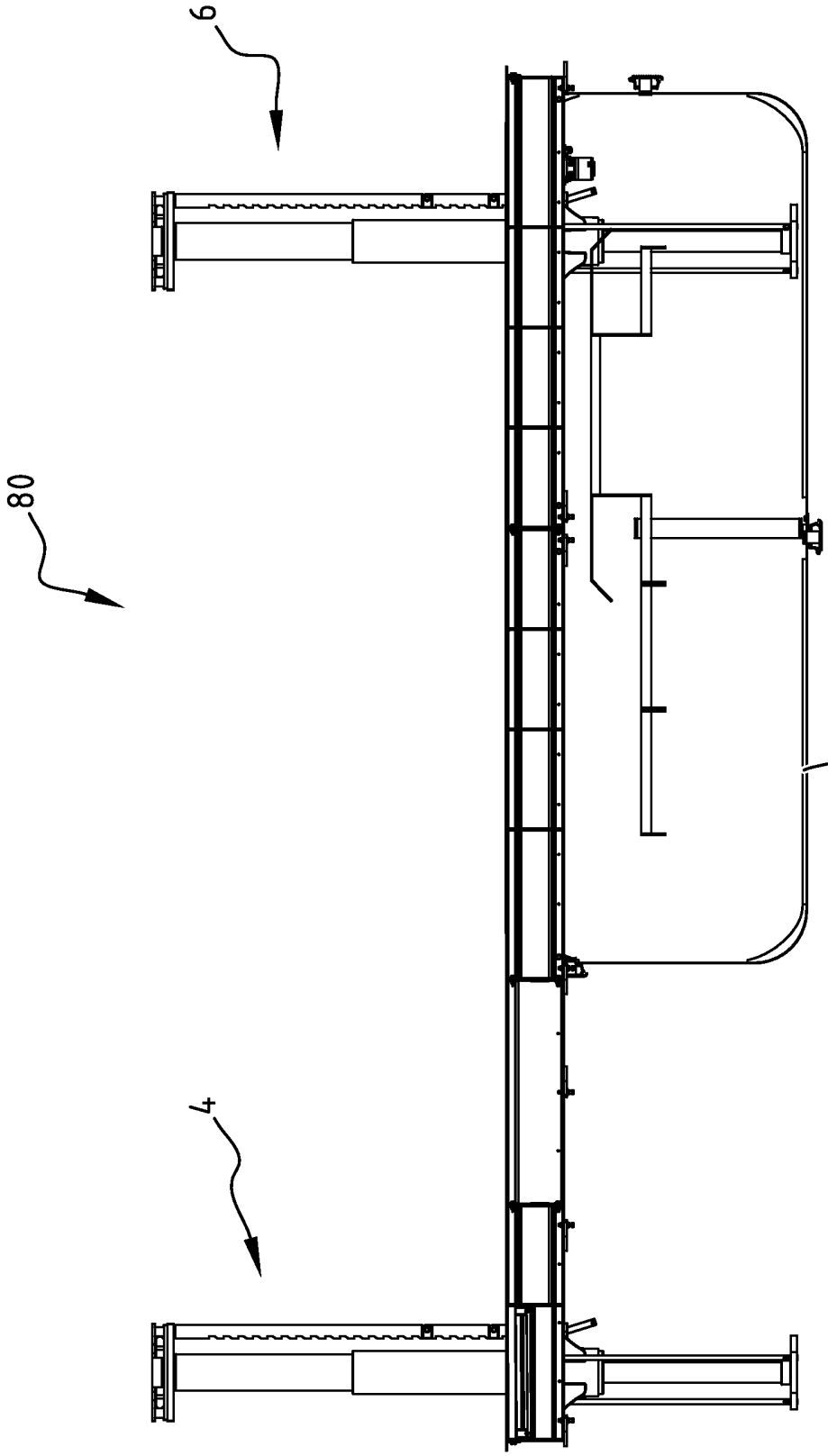

FIG. 7

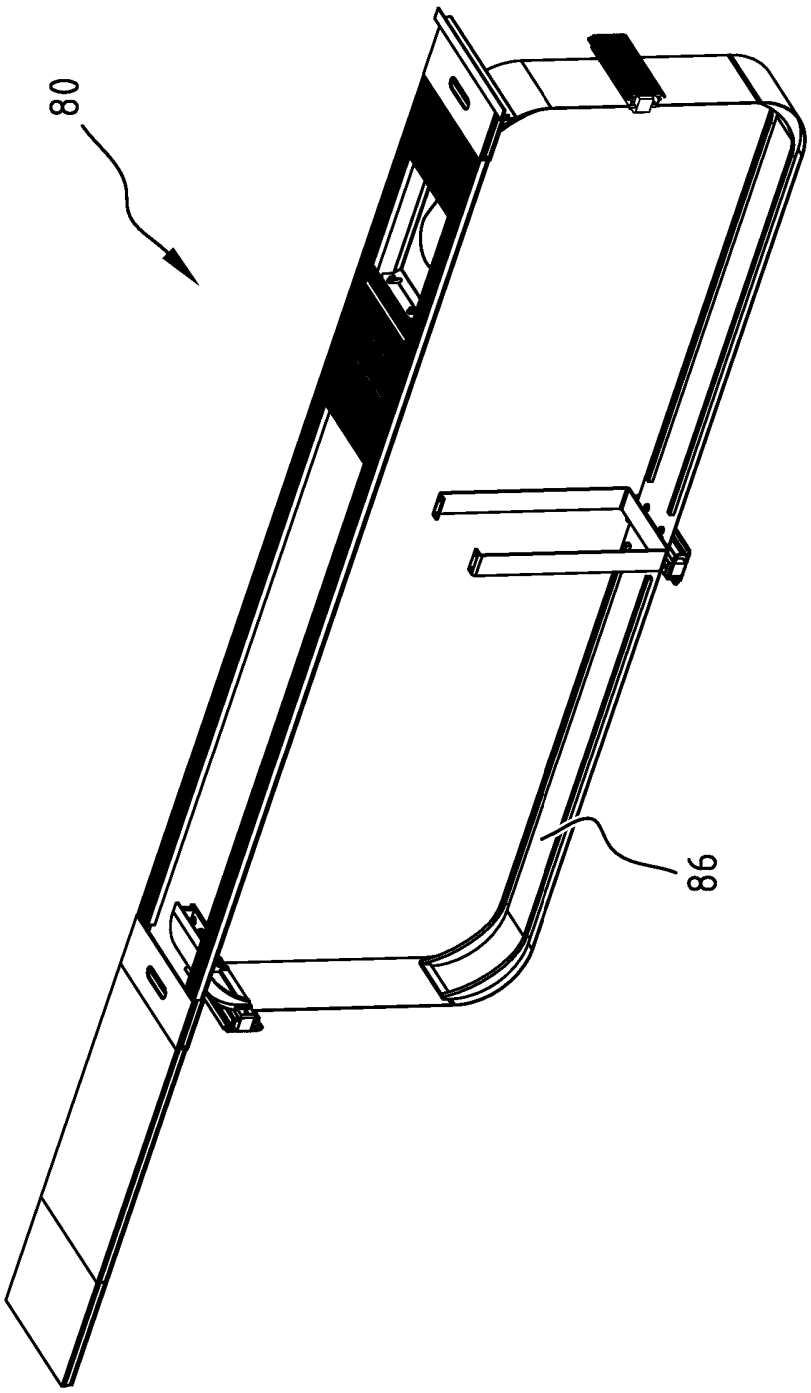

FIG. 8

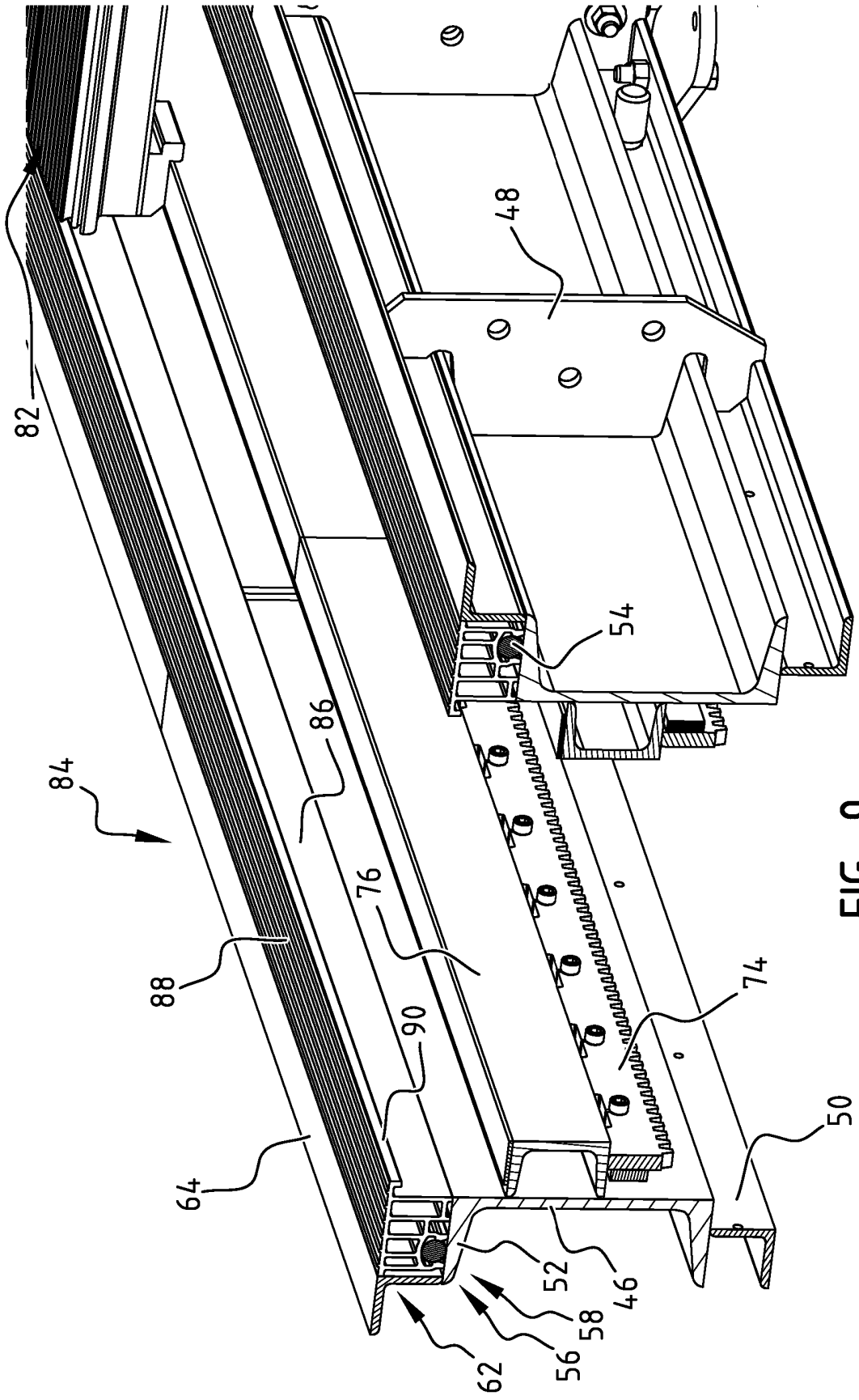

FIG. 9

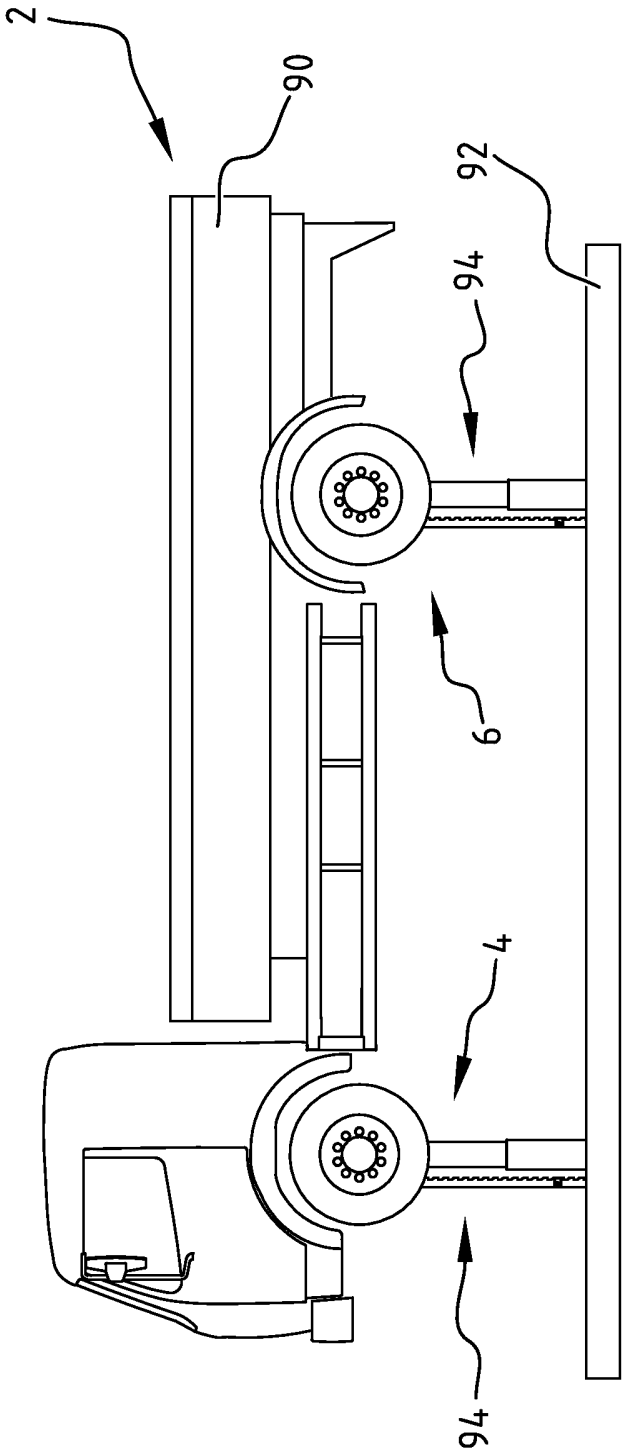

FIG. 10

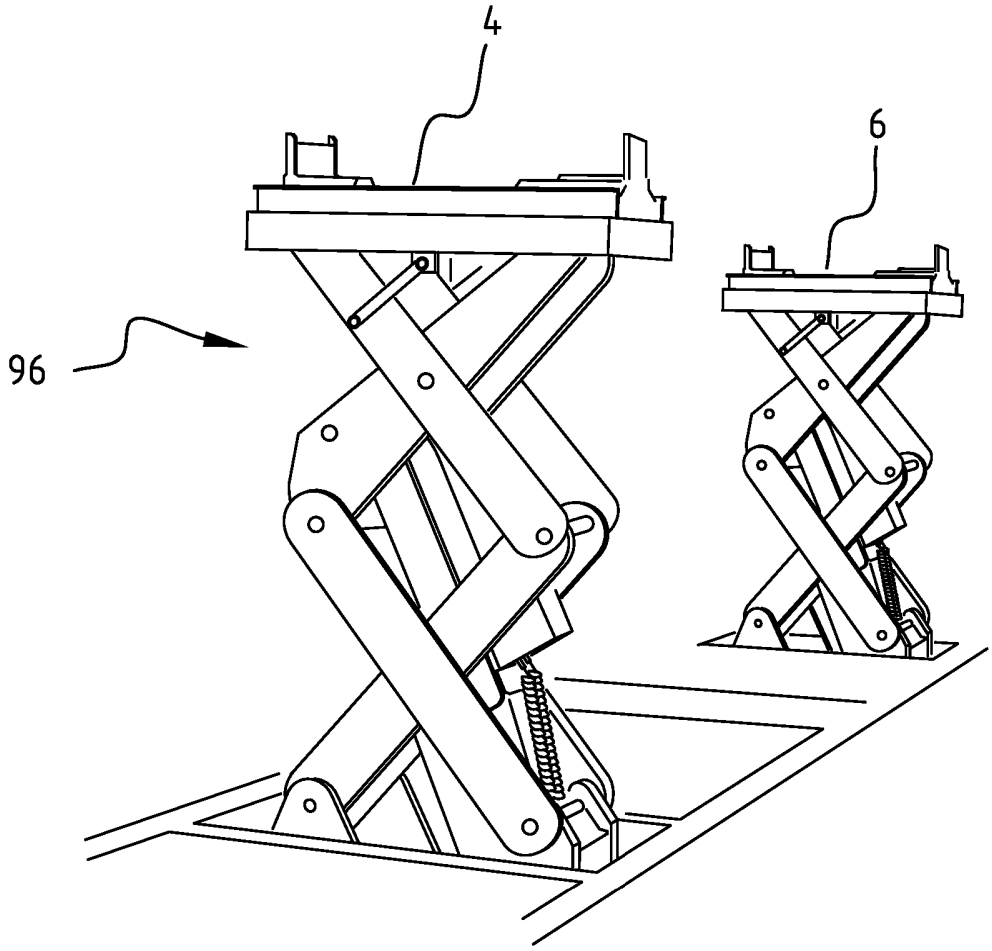

FIG. 11

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	2L/2PA77/ED-57
Nederlands aanvraag nr. **2012085**	Indieningsdatum **14-01-2014**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **Stertil B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **22-03-2014**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN 61724**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

B66F7/16 **B66F7/28**

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**B66F**

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III.	☐	**GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES**	(opmerkingen op aanvullingsblad)
IV.	☐	**GEBREK AAN EENHEID VAN UITVINDING**	(opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2012085

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B66F7/16 B66F7/28
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
B66F

Onderzochte andere documentatie dan de mimimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	WO 2006/112857 A2 (PAVLICK ALLAN [US] PAVLICK ALLAN [US]; POLINS KURT E [US]; FELPEL GLEN) 26 oktober 2006 (2006-10-26) * samenvatting; figuren 16-24, 27 * * bladzijde 4, alinea 4 - bladzijde 33 *	1,4,5, 11-15
X	JP 2002 308072 A (ANZEN MOTOR CAR; SUGIYASU KOGYO KK) 23 oktober 2002 (2002-10-23) Translation in Item V; * samenvatting; figuren *	1,2,4, 6-8,13
X	JP 2005 138698 A (BANZAI IND LTD) 2 juni 2005 (2005-06-02) * samenvatting; figuren *	1,4,13

-/--

[X] Verdere documenten worden vermeld in het vervolg van vak C.

[X] Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
19 september 2014	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Verheul, Omiros

2

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2012085

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
A	US 5 259 482 A (PROULX ROLAND [CA] ET AL) 9 november 1993 (1993-11-09) * part 40; figuur 1 * -----	1,5,7

Formulier PCT/ISA/201 (vervolg tweede blad) (Januari 2004)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2012085

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
WO 2006112857	A2 26-10-2006	CA 2567386 A1	26-10-2006
		EP 1759291 A2	07-03-2007
		EP 2628704 A1	21-08-2013
		US 2008224107 A1	18-09-2008
		US 2012263570 A1	18-10-2012
		US 2013313498 A1	28-11-2013
		WO 2006112857 A2	26-10-2006
JP 2002308072	A 23-10-2002	JP 4422361 B2	24-02-2010
		JP 2002308072 A	23-10-2002
JP 2005138698	A 02-06-2005	JP 4292053 B2	08-07-2009
		JP 2005138698 A	02-06-2005
US 5259482	A 09-11-1993	CA 2043243 A1	25-11-1992
		US 5259482 A	09-11-1993

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN61724	14.01.2014		NL2012085

International Patent Classification (IPC)
INV. B66F7/16 B66F7/28

Applicant
Stertil B.V.

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

	Examiner
	Verheul, Omiros

Application number

WRITTEN OPINION

NL2012085

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing:

   ☐ contained in the application as filed.

   ☐ filed together with the application in electronic form.

   ☐ furnished subsequently for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	3, 7, 9, 10
	No:	Claims	1, 2, 4-6, 8, 11-15
Inventive step	Yes:	Claims	3, 9, 10
	No:	Claims	1, 2, 4-8, 11-15
Industrial applicability	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Documents

Reference is made to the following documents:

D1: WO 2006/112857 A2 (PAVLICK ALLAN [US] PAVLICK ALLAN [US]; POLINS KURT E [US]; FELPEL GLEN) 26 oktober 2006 (2006-10-26)

D2: JP 2002 308072 A (ANZEN MOTOR CAR; SUGIYASU KOGYO KK) 23 oktober 2002 (2002-10-23),

(machine translation copied)

D3: JP 2005 138698 A (BANZAI IND LTD) 2 juni 2005 (2005-06-02)

Dç: US 5 259 482 A (PROULX ROLAND [CA] ET AL) 9 november 1993 (1993-11-09)

1 Novelty

1.1 The present application does not meet the criteria of patentability, because the subject-matter of claims 1, 2, 4-6, 8 and 11-15 is not new.

1.2 The document D1 discloses (the references in parentheses applying to this document):

Pit (234, fig. 18), the moveable first lifting device (109); the pit frame formed by the rail arrangement (as illustrated in fig. 23); second lifting device (106, fig. 18), cover (232), modular guidance structure (see fig. 18).

1.3 Document D2 also discloses the features of claim 1 wherein the pit (1), the moveable first lifting device (9); the pit frame formed by the rail arrangement (13, see fig.3); second lifting device (8), cover (20), modular guidance structure (see fig. 2).

1.4 Document D3 also discloses the features of claim 1: Inground lifting system (see fig. 1) for lifting a vehicle, the system comprising: a pit (10) provided with one moveable first lifting device (2) , the pit (10) further comprising a pit frame

(see fig. 2) a second lifting device (1); and a cover (4) configured for covering the pit, wherein the pit frame comprises a modular cover guidance structure (see fig. 3) configured for guiding the cover.

1.5 - Claim 2: Document D2 discloses a hanging system (28, 29) that guides the cover elements; in figure 2 and 3 its hanging configuration is shown. This system is placed in a rail configuration and as such releasable connected therein;

- the feature of the rolling cover of claim 4 is disclosed the cited document D1-D3 above, all cover elements roll over the side rail frame;

- claim 5, see continuous guiding structure of D1, fig 18;

- claim 6, floor boards 4 and 5 see §10 of translated version below;

- the features of dependent claim 7 are known from D2, see elements 4 and 5. These elements like parts (40) of D4 interact with the cover plates as they are mounted on the same level and serve the same general idea of creating a more safe operating environment;

- claim 8, see the arrangement of D2 in figure 1 and 2;

- claims 11 and 12 are related to pit modular elements and dimensions thereof that are already disclosed in D1, see fig. 23;

- claim 13 refers to a cylinder type lifting device which is disclosed in D1-D3, see the figures, and

- claim 14 features a scissor type lift arrangement which is also already known from D1, see fig. 27.

1.6 Method claim 15 features 5 steps, of which 3 relate to the modular arrangement of building up the inground lifting system . Document D1, discloses a modular system that can be built up in same step sequence as featured in claim 15 and as such is considered to contain all features of claim 15 (see modular arrangement in fig. 23).

2 Inventive step

2.1 The combination of the features of dependent claims 3, 9 or 10 is neither known from, nor rendered obvious by, the available prior art.

Translation: TXTJPRJP2002308072 A 20021023

Automatically Translated by Thomson Reuters

TECHNICAL FIELD OF THE INVENTION

[0001] This invention relates to the lift apparatus used for maintenance of a motor vehicle.

PRIOR ART

[0002] Conventionally the apparatus which installed the lift under the floor surface is widely used for maintenance of large sized vehicles, such as a bus¦bath and a track¦truck.

As this kind of a lift apparatus, a pit is constructed in Unexamined-Japanese-Patent No. 10-152025 at a floor surface,

An endless chain is provided in a stretched state in the pit of the range in which a movable lift movement is substantially possible,

While connecting a lift with a part of endless chain, the cover element of a pit cover is attached to a chain link, and the technique which stores the excessive part of a pit cover in a pit with a chain is disclosed in the case of position alignment of a lift.

PROBLEM TO BE SOLVED BY THE INVENTION

[0003] However, according to the conventional lift apparatus, since the pit cover was attached to the endless chain, the following subjects occurred.

(1) The number of cover elements increases and the structure of a pit cover is complicated.

(2) A foreign material penetrate¦invades between cover elements and it becomes easy to fail.

(3) There are many bending¦flexion parts, a sliding friction becomes large, and motive power increases.

(4) A pit becomes deep, construction expense costs dearly, and a maintenance takes an effort.

(5) In the case of an installation construction, an assembly¦attachment and adjustment take an effort, and a work¦construction schedule becomes long.

[0004] Then, the objective of this invention is that reduce a number of parts, make a pit shallow, can make construction expense inexpensive, and a maintenance provides the lift apparatus for motor vehicle maintenance which becomes easy.

MEANS TO SOLVE THE PROBLEM

[0005] In order to solve said subject, the lift apparatus for motor vehicle maintenance of this invention installs a lift inside a pit so that a movement in the front-back direction of a maintenance vehicle is possible,

The opening part of a pit is covered with a pit cover, and a pit cover is comprised with several cover elements in the front-back direction,

By a coupling member, the adjoining cover element is connected so that folding is possible,

A one part cover element is couple¦bonded with a lift,

The guide member which guides the right-and-left both ends of a cover element to the opening part of a pit is provided, the storage part which stores a cover element in pit back-and-front both ends by a folded state is provided, and it is comprised.

[0006] Here, a link and a hinge can be used as a coupling member.

Moreover, you may provide the hanger which raises a cover element in a storage part.

EMBODIMENT OF THE INVENTION

[0007] Hereafter, embodiment of this invention is described based on drawing.

As shown in FIG. 1, it is constructed by the floor surface of the service station so that the pit 1 may extend long in the front-back direction of the maintenance vehicles (a bus¦bath, a track¦truck, etc.) 2.

The back-and-front both end parts are covered by the floor boards 4 and 5, the remaining part is covered with the pit cover 6, and, as for the opening part 3 of the pit 1, the recessed part 7 which positions the front wheel of the maintenance vehicle 2 to the floor surface of the front side is provided.

Inside the pit 1, the fixed lift 8 and the movable lift 9 which carry out the lift up of the two places before and after the maintenance vehicle 2 are installed, and ZÔ'ÌZó 10 and 11 is each provided in the upper end of each lift 8 and 9.

[0008] Via the roller 14, the movable lift 9 is supported by the base rail 13 (refer FIG. 3) fixed to the both left and right wall of the pit 1 so that a movement in the front-back direction is possible.

The chain 15 is provided in a stretched state between the front wall of the pit 1, and a rear wall, and the motor 18 which drives the sprocket wheels 16 and 17 which mesh¦engage to the chain 15, and one sprocket wheel 16 is provided in the movable lift 9.

And the movable lift 9 is moved to the front-back direction by the motor 18 along the chain 15,

The ZÔ'ÌZó 11 can be positioned now on the lift point (for example, arrow position of FIG. 1) of the rear side of the maintenance vehicle 2.

[0009] As shown in FIG.2 and FIG.3, the pit cover 6 arranges several cover elements 20 in the front-back direction, and is comprised.

Each cover element 20 is formed in a right and left long square¦rectangle¦intersection box shape, and the link 21 and the engaging pin 22 as a coupling member are provided in the both ends.

The adjoining cover element 20 is connected by the link 21 so that folding is possible, and the two cover elements 20 located in the center part of the pit cover 6 are couple¦bonded with the movable lift 9 via the joint pin 23.

The guide rail 24 for floating¦lifting prevention in which the engaging pin 22 fits, and the slide rail 25 which the lower surface of the cover element 20 slidably contacts adhere to the upper surface of the base rail 13,

The guide member which guides the right-and-left both ends of the cover element 20 along the both left and right edge of the pit opening part 3 with each rail 24 and 25 is comprised.

[0010] On the other hand, the storage part 27 which stores the cover element 20 by a folded state is formed in the pit 1 back-and-front both ends.

The hanger 28 which raises the cover element 20 which remove¦deviated from the slide rail 25 via the engaging pin 22, and the inclination part 29 which guides the lower end of the cover element 20 are provided in the storage part 27.

And when the pit cover 6 covers the opening part 3 of the pit 1 in a floor surface and a substantially flush state among the floor boards 4 and 5 of back and front as shown in FIG.1, and the movable lift 9 moves to the front, the cover element 20 is pulled out from the back storage part 27,

The excessive cover element 20 is stored in the front storage part 27,

When the movable lift 9 moves back, the cover element 20 is pulled out from the front storage part 27,

It is comprised so that the excessive cover element 20 may be stored in the back storage part 27.

[0011] The lift apparatus of the said structure exhibits the following effects.

(1) The opening part 3 of the pit 1 can be covered substantially flush with a floor surface with the pit cover 6.

(2) Number of objects of the cover element 20 can be lessened.

(3) The sliding friction of the pit cover 6 is made small, and the motor 18 can be reduced in size.

(4) Cover element 20 which link 21 adjoins is connected without gap by opening part 3,

It is made to mutually space apart by the storage part 27.

Therefore

Even if a foreign material cannot penetrate¦invade into the pit cover 6 easily and penetrate¦invades into it, it is slid down at the time of storing, and a failure is decreased,

Durability can be improved.

(5) Since the hanger 28 was provided in the storage part 27, the cover element 20 can be compactly stored by a standing-up state.

(6) The pit 1 can be shallowly constructed in the depth equivalent to the length of the lifts 8 and 9.

(7) For this reason, the construction expense of the pit 1 sticks at a low price, and a maintenance also becomes easy.

[0012] FIG.4 and FIG.5 shows another Example of the pit cover 6.

In this pit cover 6, two types of hinges 32 and 33 are used as a coupling member of the cover element 20.

One hinge 32 connected the adjoining cover element 20 so that apex¦mountain-folding was possible, and the other hinge 33 has connected the adjoining cover element 20 so that a valley fold is possible.

The roller 34 is provided in the both ends of the cover element 20 coaxially with the hinge 32 by the side of apex¦mountain-folding, and it is located inside the guide rail 24 in the opening part 3,

While preventing floating¦lifting of the cover element 20, the hanger 28 top is rolled in the storage part 27,

The cover element 20 is folded up to erect posture.

[0013] Also by this structure, while being able to reduce the number of objects of the cover element 20, the pit 1 can be constructed shallowly.

Moreover, since the hinges 32 and 33 were used for the coupling member, the connection intensity¦strength of the cover element 20 is raised and there also exists an advantage which can comprise the pit cover 6 strongly.

In addition, the roller 34 is provided in the base rail 13 and the guide rail 24, and the non-contact state so that it may not damage by a vehicle body load.

[0014] This invention is not limited to the said embodiment,

It is also possible to change the shape of each part and a structure into an appropriateness¦suitableness, and to implement them in the range which does not deviate from the meaning of this invention, so that it may illustrate below.

(1) Exclude a fixed lift and comprise a lift apparatus at 1 pillar ceremony.

(2) Move a movable lift according to a rack-and-pinion mechanism.

(3) Incorporate a link in a cover element.

(4) Fold up a cover element horizontally and store in a storage part in a vertical stack state.

(5) Form the both left and right wall of a pit smoothly, and provide the storage part of frame structure in the back-and-front both ends.

(6) Form a cover element by a thick-board steel plate.

(7) Construct a pit in the left-right direction of a maintenance vehicle, in a pit, install an oil extraction apparatus so that a movement is possible, and cover the opening part of a pit with the same pit cover as the said embodiment.

ADVANTAGE OF THE INVENTION

[0015] As described above in detail, according to invention of Claim 1, by a coupling member, the adjoining cover element is connected so that folding is possible,

The storage part which stores a cover element by a folded state was provided before and behind the pit,

Therefore

A number of parts is reduced,

A pit is made shallow,

Construction expense can be made inexpensive and there exists an outstanding effect that a maintenance becomes easy.

[0016] Since the link was used for the coupling member according to invention of Claim 2, the penetration¦invasion of a foreign material is prevented and there exists an effect which can improve durability of a pit cover.

[0017] Since the hinge was used for the coupling member according to invention of Claim 3, the connection intensity¦strength of a cover element is raised and there exists an effect which can comprise a pit cover strongly.

[0018] Since the hanger was provided in the storage part according to invention of Claim 4, there exists an effect which can store a cover element compactly by a standing-up state.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 :It is sectional drawing of the lift apparatus for motor vehicle maintenance which shows one Embodiment of this invention.

FIG. 2 :It is a side view which shows the pit cover of the apparatus of FIG. 1.

FIG. 3 :It is the sectional view on the A-A line of FIG. 2.

FIG. 4 :It is a side view which shows another Example of a pit cover.

FIG. 5 :It is a B-B sectional drawing of FIG. 4.

DESCRIPTION OF SYMBOLS

1.. Pit,

3.. Opening part,

6.. Pit cover,

9.. Movable lift,

13.. Base rail,

15.. Chain,

18.. Motor,

20.. Cover element,

21.. Link,

24.. Guide rail,

25.. Slide rail,

27.. Storage part,

28.. Hanger,

32, 33.. Hinge,

34.. Roller.

[Claims]

1. Inside a pit, a lift is installed so that a movement in the front-back direction of a maintenance vehicle is possible,

The opening part of a pit is covered with a pit cover, and a pit cover is comprised with several cover elements in the front-back direction,

By a coupling member, the adjoining cover element is connected so that folding is possible,

A one part cover element is couple¦bonded with a lift,

The lift apparatus for motor vehicle maintenance which provides the storage part which provides the guide member which guides the right-and-left both ends of a cover element to the opening part of a pit, and stores a cover element in pit back-and-front both ends by a folded state.

2. The lift apparatus for motor vehicle maintenance of Claim 1 which used the link for the said coupling member.

3. The lift apparatus for motor vehicle maintenance of Claim 1 which used the hinge for the said coupling member.

4. The lift apparatus for motor vehicle maintenance of the Claims 1-3 which provided the hanger which raises a cover element in the said storage part