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(54) **Takarószerkezet egy szerelő- és javítógödörhöz**

COVERING DEVICE FOR AN ASSEMBLY AND REPAIR WELL

Description

The invention relates to a covering device for an assembly and repair well according to the protection claim 1.

Assembly and repair wells of the type mentioned here are known. They are used by workshops or manufacturing operations for assembling or repairing motor vehicles or machines and machine parts. The personnel can thereby work underneath the corresponding vehicles and machines whilst standing up in a comfortable position. Assembly and repair wells are conventionally made in situ. For this first the outer and inner shuttering walls are erected which are then cast with filler material, preferably with concrete. Erecting these shutterings or producing the conventional assembly and repair wells thus requires in some circumstances a large number of in part different manual workers employed onsite so that high production costs are incurred and long building times arise. It is therefore preferred to use prefabricated assembly and repair wells such as are known by way of example from DE 43 45 415 C2 which are designed as cassettes and can be used as prefabricated cassettes on site in corresponding recesses in the ground. Cassettes of this kind have two longitudinal side walls, end side walls arranged at the ends, and a base. The longitudinal side walls can in each case comprise an internal wall and an exterior wall arranged at a distance therefrom to define a hollow cavity which can be filled with a hardening filler material.

The assembly and repair wells described above normally have a roller shutter type cover, also called a "support beam strip" which in the unused position of the well covers the latter and can preferably be moved into a storage unit when the well is to be used for assembly or repair purposes. An electrically operated roller shutter type covering of this type for assembly wells of the type mentioned at the

beginning is known by way of example from DE 26 46 395. The cover prevents people from falling into the well and becoming injured. Furthermore the amount of dirt falling into the well is also reduced or completely prevented. Assembly and repair wells of this kind can also have other movable parts such as by way of example hydraulic pit jacks, or similar auxiliary means which can be moved along from the support beam in the inside of the well. At least one lifting device is preferably hung from the guide rails arranged on the longitudinal side walls of the receiving cassette and is provided with its own drive so that the lifting device can be moved to and fro inside the well. Furthermore assembly and repair wells can be provided with bus hatches, i.e. side extensions of the well, through which parts can be moved in or out from the well. Such bus hatches can likewise have movable coverings.

So that a person who is located in the well is not injured by a well cover as it moves a safety device is normally provided which can bring the apparatus to a standstill. The safety device has a contact or safety edge of plastics with an electronic inner life which in the event of contact by a user of the well triggers a corresponding signal whereby the "apparatus", i.e. all the drives of the well are switched off and the movable parts of the well consequently come to a stop. Safety devices known from the prior art, more particularly the safety edge, have to be supplied with current via cables. It can thereby happen that cables become torn or crushed by the moving parts of the well. The safety devices of the known type are thus susceptible and unreliable and thus do not represent an optimum solution.

The object of the present invention is thus to provide a covering device which by means of a suitable safety device reliably prevents collision of an operator who is standing inside the well, with a moving well cover.

The aforementioned object is achieved by a covering device for an assembly and repair well having the features of the protection claim 1.

The covering device has a cover mounted displaceable in guide profiles, and a safety device for preventing the movable parts becoming crushed or torn in the region of the closing edges in the assembly and repair well, wherein the safety device comprises: a primary circuit with a transmitting antenna and a switching device connected therewith, wherein the transmitting antenna is arranged along at least one of the guide profiles; a secondary circuit with a transponder antenna and a safety edge connected therewith wherein the safety edge is arranged in the region of a transverse edge of the cover, and wherein the transmitting antenna and the transponder antenna are arranged relative to one another so that during a displacement of the cover in the guide profiles the transponder antenna has a substantially constant distance from the transmitting antenna which is measured so that the transponder antenna can transmit a signal state of the safety edge to the transmitting antenna.

An essential point of the invention thus lies in the fact that energy and signal states during a movement of the cover can be transmitted cable-free between the transmitting antenna and the transponder antenna so that a direct cable connection between the switching device and the safety edge is obsolete. The safety device thus works substantially more reliably since the risk of torn or crushed cables is avoided.

Preferably in the case of a covering device according to the invention the transmitting antenna extends over the entire displacement path of the cover along the guide profile. The safety edge on the other hand preferably extends over the entire width of the transverse edge of the cover. The cover can furthermore have girder profiles. The distance between the transmitting antenna and the transponder antenna is preferably still selected so that the transmitting antenna can transmit energy in the form of electromagnetic rays wirelessly to the transponder antenna. The covering device can be part of a prefabricated assembly and repair well already described. The switching device is preferably connected to a well control unit.

In order to achieve the object mentioned above an assembly and repair well with a covering device according to the invention is also proposed.

The invention will now be explained in further detail with reference to the drawings. These show:

Figure 1 an assembly and repair device in a view from above;

Figure 2 the assembly and repair device according to Figure 1 in a sectional view along the line II-II in Figure 1;

Figure 3 a diagrammatic illustration of a safety device;

Figure 4 a further diagrammatic illustration of a safety device;

Figure 5 a perspective illustration of a safety device, and

Figure 6 a sectional view of a covering device installed in an assembly and repair well.

Figure 1 shows a finished mounted assembly and repair well 1 in a view from above. The assembly and repair well 1 comprises two longitudinal side walls 3, two end walls 5 arranged at the ends, and a base 7. The assembly and repair well 1 is preferably made from stainless steel or similar corrosion-resistant material and can be provided with anti-corrosive and/or fluid-repellent coatings. A roller shutter type cover 9 with girder profiles, and purely by way of example, a first as well as a second lifting device 11 and 13 are housed in the assembly and repair well 1. The first lifting device 11 as well as the cover 9 are housed movable in the longitudinal direction X of the vehicle (for direction details see Figure 1; the transverse direction of the vehicle is marked by Y). The lifting device 11 is housed movable in separate lifting device guide rails 15 via corresponding guiding rollers 17.

Figure 2 shows the assembly and repair well 1 in a sectional view along the line II-II in Figure 1. The cover 9 and the lifting device 11 can be driven by way of separate drives. It is however also conceivable to drive the lifting device 11 indirectly by the cover 9.

A person who is located in the well could be registered by the cover 9 when the latter is moved in the well. In order to avoid this a safety device is provided in the assembly and repair well 1, which wirelessly ensures that crushing and shearing injuries are avoided. Such crushing injuries could result by way of example when a person finds himself between a closing cover 9 and an end wall 5 of the assembly and repair well 1. Shear injuries are also conceivable which a person can suffer in the contact region between the side walls 3 and a moving cover 9.

Figure 3 shows a diagrammatic illustration of a safety device 19. The safety device 19 comprises a primary circuit 21 and a secondary circuit 23. The primary circuit 21 comprises a switching device 25 and a transmitting antenna 27, whilst the secondary circuit comprises a transponder antenna 29 and a safety edge 31. The switching device 25 communicates with the well control unit 33 which can switch off the installation so that the cover 9 comes to a stop.

Safety edges of the type discussed here normally consist of a rubber profile extruded in one piece as a signal transmitter, and an electronic evaluating system. Two or four electrically conducting rubber layers insulated from one another and having integrated copper wires which serve as switching surfaces are located in the "switching chamber". These copper wires are attached to the electronic evaluating system which continuously monitors the standby current. If the safety edge is actuated by pressure on the rubber profile then the switching faces are contacted inside. The electronic evaluating system recognises the change in the electrical resistance value and immediately stops the movement of

the associated movable machine part. The safety edge can also fundamentally operate on a different functioning principle.

It is only decisive that it reacts to a contact and consequently can "detect" a person located in the region of the safety edge.

If the transmitting antenna 27 and the transponder antenna 29 are positioned at a suitable distance opposite one another then energy from the primary circuit 21 is transferred into the secondary circuit 23 in the manner of the induction principle which is marked by number 34a in Figure 3. The secondary circuit 23 or the transponder is initialized with this energy in its signal transmitter and the signal transmitter state is sent back to the switching device 25 (marked by number 34b) via the transponder antenna 29 and the transmitting antenna 27. Thus on the one hand energy for supplying the safety edge 31 and other parts of the secondary circuit, and on the other hand signal states are exchanged between the transponder antenna 29 and the transmitting antenna 27.

It is thus decisive that the transmitting antenna 27 and the transponder antenna 29 have a substantially constant suitable distance from one another so that an electromagnetic field 35 between the two parts can serve for "communication" or energy transmission.

Figure 4 shows a diagrammatic illustration of the safety device 19 of Figure 3. Again the safety edge 31 can be seen which is connected to the transponder antenna 29 via a terminal box 37 in which a transponder chip 39 is mounted. The terminal box 37 thus consequently serves to wire up the transponder chip 39, the transponder antenna 29 and the safety edge 31. The transponder antenna 29 is connected wirelessly to the transmitting antenna 27 via an electromagnetic field 35. The coils 41 and 43 indicated in the drawing are thus to represent the inductivity of the cables used in the antennae and which produce the electromagnetic field 35. The transmitting antenna is connected via a terminal box 45 to the switching device 35 which is connected on one side to the well

control unit (not illustrated in the figure) and on the other side to a voltage supply (not shown) via connectors 47 and 47'.

Figure 5 shows a perspective illustration of a safety device 19 wherein the primary circuit comprises the transmitting antenna 27, the terminal box 45 and the switching device 25. The secondary circuit 23 comprises according to Figure 4 the safety edge 31, the terminal box 37 and the transponder antenna 29.

The transponder antenna 29 is preferably designed so that it can be fixed on metal. The safety edge 31 preferably comprises a rubber and aluminium profile. The transmitting antenna 27 comprises a coil carrier, an antenna cable and an end cap set. The switching device 25 is preferably operated with a 24 V direct current voltage and is designed with two channels. It advantageously comprises two relay contacts.

Figure 6 shows an end side view of a covering device 51 by way of example for an assembly and repair well 1 illustrated in Figures 1 and 2. The covering device 51 comprises the cover 9 which is illustrated in Figures 1 and 2 and which can comprise by way of example girder profiles or girders 53. The cover 9 is mounted movable by a bearing 54 in guide profiles of which only one guide profile 55 can be seen here. The guide profiles 55 extend along the longitudinal side walls 3 illustrated in Figure 1.

The cover 9 comprises a covering transverse surface or covering transverse edge 57 which is formed so to speak by the end side of the first and/or last girder 53. If the cover 9 is displaced in the guide profile 55 in order to cover the well the danger exists that an operator is registered by the transverse edge 57 of the cover. For this reason the covering device 51 has a safety device shown in Figures 3 to 5.

The safety device is thus connected to the covering device 51 so that the transmitting antenna 27 is arranged along the guide profile 55 and preferably

extends over the entire length of the longitudinal side wall 3 of an assembly well, i.e. with regard to Figure 6 into the plane of the drawing. In the embodiment of the invention illustrated in Figure 6 the elongated transmitting antenna 27 is fastened on a U-profile 59. The elongated safety edge 31 (not shown in Figure 6) is arranged in the region of the transverse edge 57 of the cover and preferably extends over the entire width thereof in the transverse direction Q. The transponder antenna 29 is connected to the safety edge 31 and is fastened on an underneath side 61 of the cover 9, i.e. on the side facing the base 7 of the assembly well 1. As a result of the small size of the transponder antenna 29 it can be housed without problem in a storage device for the cover 9. During movement of the cover 9 the transponder antenna 29 is moved along with same namely in a virtual plane which runs substantially parallel to the transmitting antenna 27.

The primary circuit of the safety device is consequently assigned to the guide profile 55 or the longitudinal side wall 3 whilst the secondary circuit of the safety device is assigned to the cover 9. In this way a position of the safety strip 31 can be transmitted wirelessly to the switching device without cables having to be "dragged along" by the cover 9 in order to ensure a power supply of the safety edge.

Figure 6 makes it clear that the transmitting antenna 27 and the transponder antenna 29 are arranged relative to one another so that during displacement of the cover 9 in the guide profiles 55 the transponder antenna 29 has a substantially constant distance d from the transmitting antenna 27, i.e. preferably along the entire displacement path of the cover 9 so that the transponder antenna 29 can transmit a signal state of the safety edge 31 to the transmitting antenna 27 and at the same the secondary circuit can be supplied with energy by the transmitting antenna 27.

Figure 6 still shows the guide roller 17 of a lifting device mounted in a lifting device guide rail 15.

The method of functioning of the safety device is now as follows. The switching device 25 during movement of the cover 9 continuously forwards the signal of the safety edge 31 and the well control unit 33. The energy supply of the safety edge 31 is generated by electromagnetic waves. The transponder (secondary circuit 23) activated thereby monitors the signal state of the safety edge 31 and forwards the information wirelessly to the transmitting antenna 27. If the safety edge 31 is contacted and pressed in by a user whilst the cover 9 is moving then the transponder antenna 29 sends a corresponding signal to the transponder antenna 27 which is forwarded by the switching device 25 to the well control unit 33 whereupon the well control unit 33 switches off the system and the cover 9 comes to a stop.

The covering device with the safety device of the type discussed here is particularly fail-safe against radio waves as well as being wear-resistant and maintenance-free. The secondary circuit requires no cable-connected energy supply so that its displacement in the assembly and repair well is completely non-problematical.

LIST OF REFERENCE NUMERALS

1	Assembly and repair well
3	Longitudinal side walls
5	End walls
7	Base
9	Cover
11	Lifting device
13	Lifting device
15	Lifting device guide rails
17	Guide rollers
19	Safety device
21	Primary circuit
23	Secondary circuit
25	Switching device
27	Transmitting antenna
29	Transponder antenna
31	Safety edge
33	Well control unit
34a	Energy
34b	Signal states
35	Electromagnetic field
37	Terminal box
39	Transponder chip
41	Coil
43	Coil
45	Terminal box
47	Voltage connection
47'	Voltage connection
51	Covering device
53	Girder
54	Bearing

55 Guide profile
57 Transverse edge of cover
59 U-profile
61 Underneath side
Q Transverse direction
d Distance

Takarószerkezet egy szerelő- és javítógödörhöz

Szabadalmi igénypontok

1. Takarószerkezet (51) egy szerelő- és javítógödörhöz (1), mely egy vezetőprofilokban (55) eltolhatóan ágyazott fedelet (9) és a szerelő- és javítógödörben záróélek tartományában becsípődési- vagy nyírási veszélyek elkerülésére szolgáló biztonsági berendezést (19) tartalmaz, azzal jellemezve, hogy a biztonsági berendezés (19) tartalmaz:

– egy primer kört (21) adóantennával (27) és azzal összekötött kapcsolókészülékkel (25), ahol az adóantenna (27) a vezetőprofilok (55) egyike mentén van elrendezve;

– egy szekunder kört (23) egy transzponder antennával (29) és egy azzal összekötött kapcsolószegéllyel (31), ahol a kapcsolószegély (31) egy fedélkeresztél (57) tartományában van elrendezve, és ahol az adóantenna (27) és a transzponder antenna (29) egymáshoz képest úgy van elrendezve, hogy a fedél (9) vezetőprofilokban (55) történő eltolódása alatt a transzponder antenna (29) az adóantennához (27) képest lényegében állandó távolságban (d) van, amely úgy van megválasztva, hogy a transzponder antenna (29) a kapcsolóléc (31) jelállapotát át tudja vinni az adóantennára (27).

2. Az 1. igénypont szerinti takarószerkezet, azzal jellemezve, hogy az adóantenna (27) a fedél (9) vezetőprofil (55) mentén teljes eltolási útvonala mentén elnyúlik.

3. Az 1. vagy 2. igénypont szerinti takarószerkezet, azzal jellemezve, hogy a kapcsolóléc (31) a fedélkeresztél (57) teljes szélességében húzódik.

4. Az előző igénypontok bármelyike szerinti takarószerkezet, azzal jellemezve, hogy a fedélnek (9) hordlécprofiljai (53) vannak.

5. Az előző igénypontok bármelyike szerinti takarószerkezet, azzal jellemezve, hogy az adóantenna (27) és a transzponder antenna (29) közötti távolság (d) úgy van megválasztva, hogy az adóantenna (27) elektromágneses sugárzás formájában energiát tud a transzponder antennára (29) vezeték nélkül átvinni.

6. Az előző igénypontok bármelyike szerinti takarószerkezet, azzal jellemezve, hogy a takarószerkezet (51) egy előre gyártott szerelő- és javítógödör (1) részét képezi.

7. Az előző igénypontok bármelyike szerinti takarószerkezet, azzal jellemezve, hogy a kapcsolókészülék (25) egy gödörvezérléssel (33) áll összeköttetésben.

8. Szerelő- és javítógödör (1), amely az 1-7. igénypontok bármelyike szerinti takarószerkezettel (51) rendelkezik.

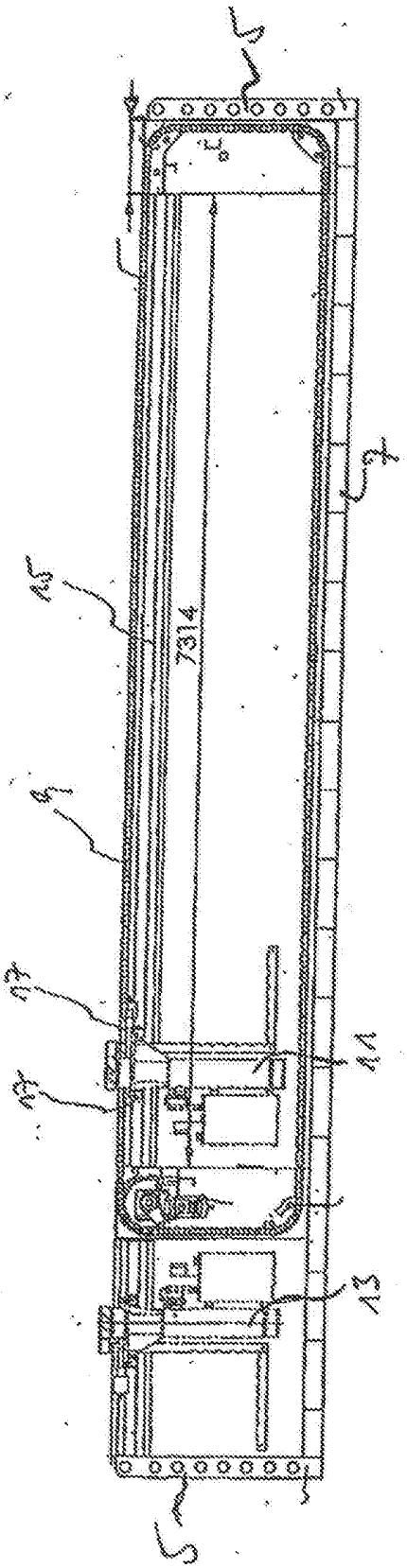


Fig.2

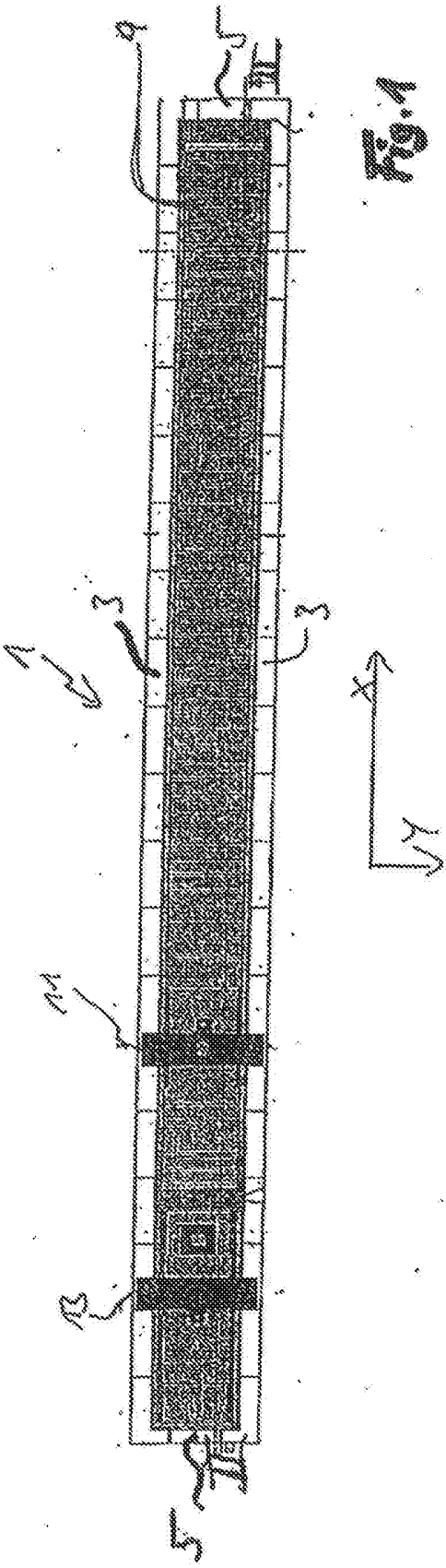


Fig.1

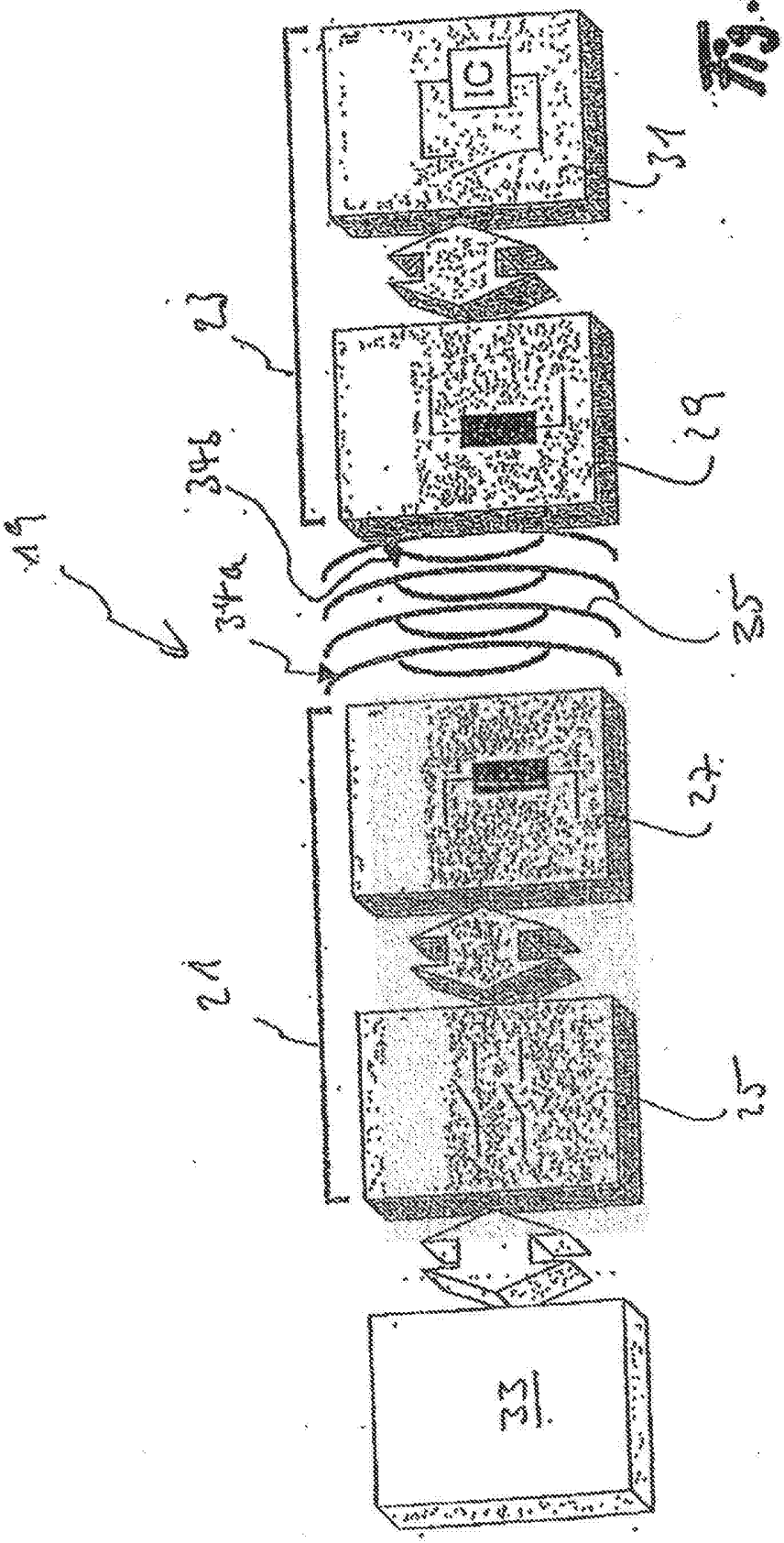


Fig. 3
31
29
34b
34a
25
24
25
31

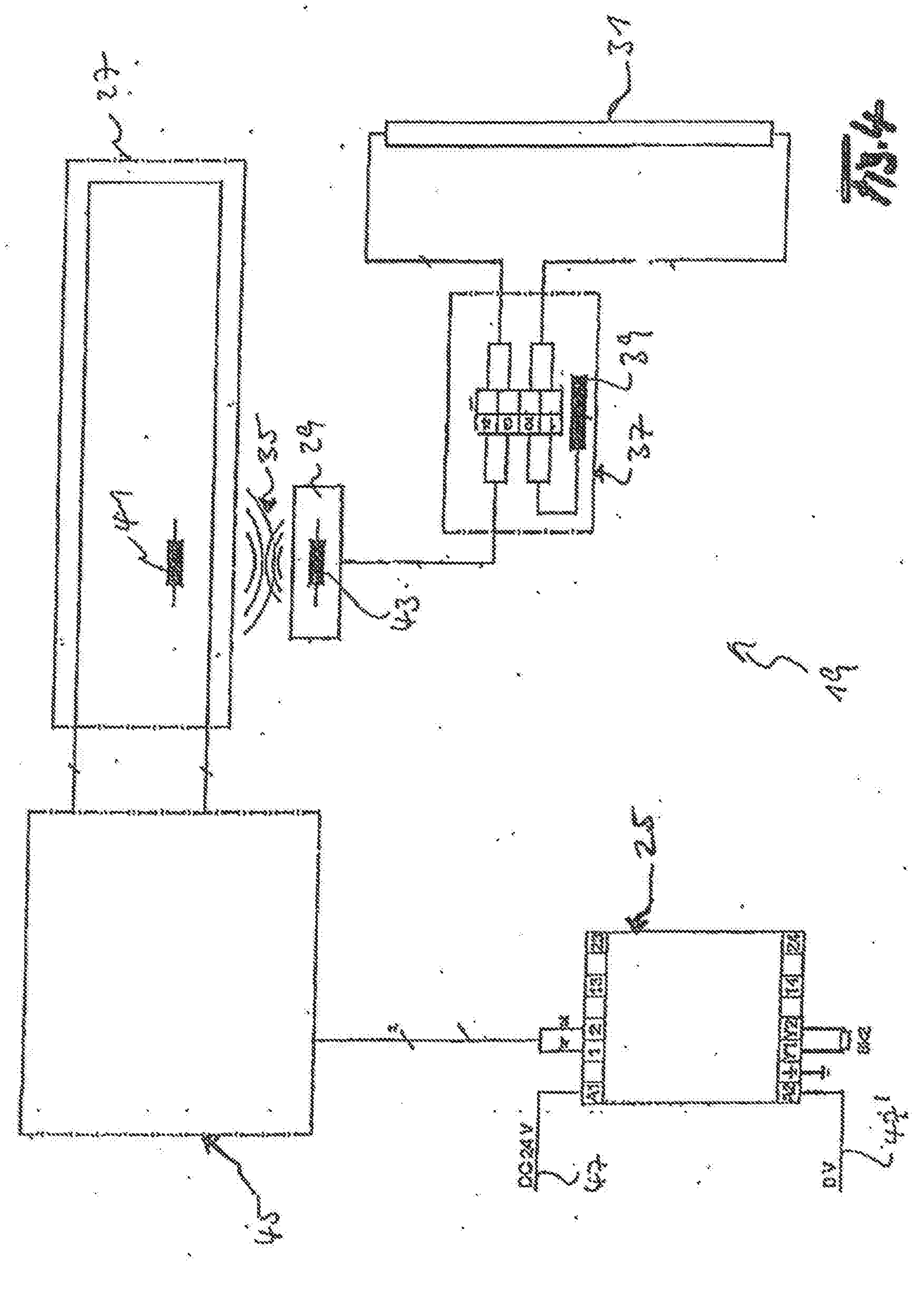
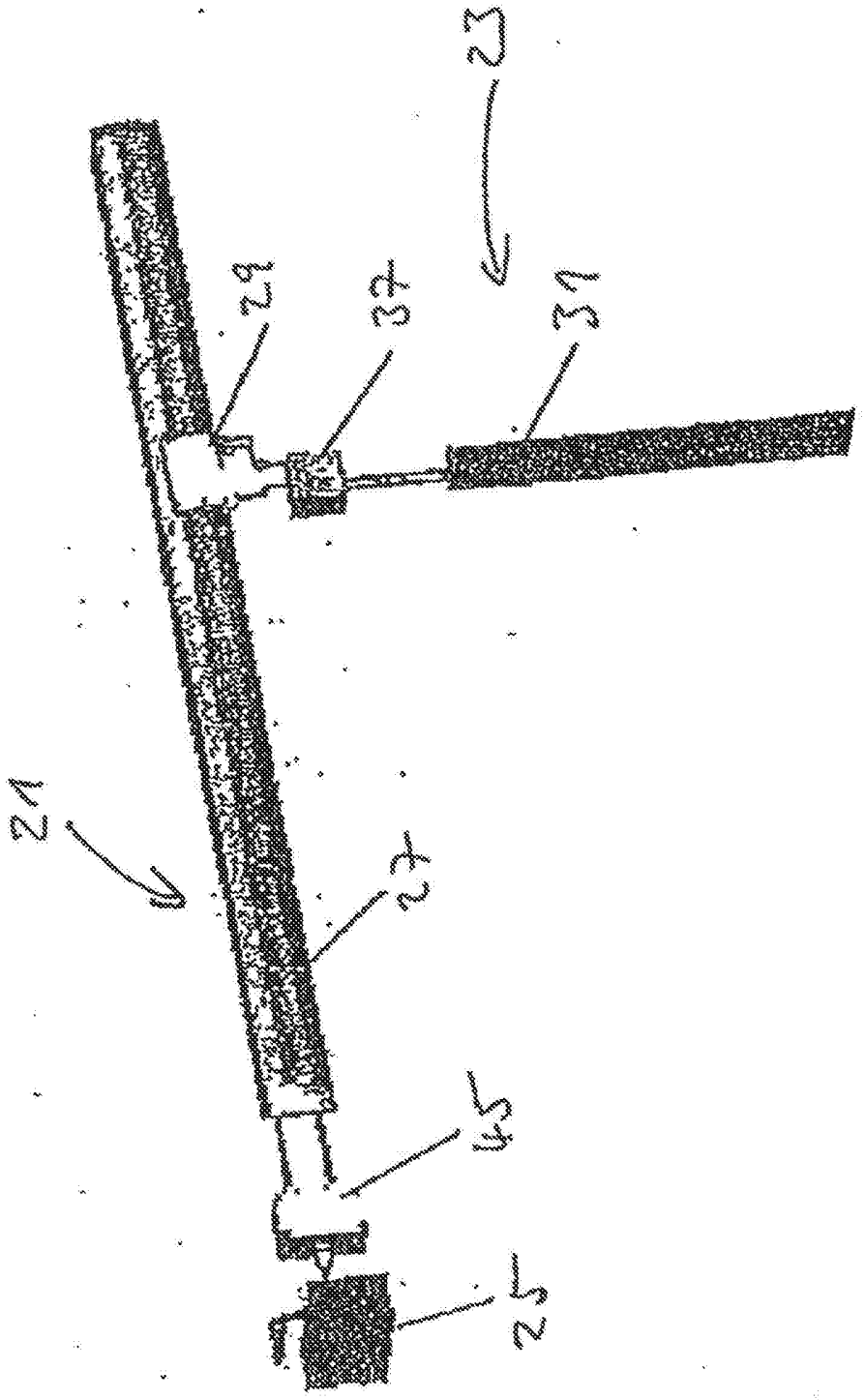


Fig. 6



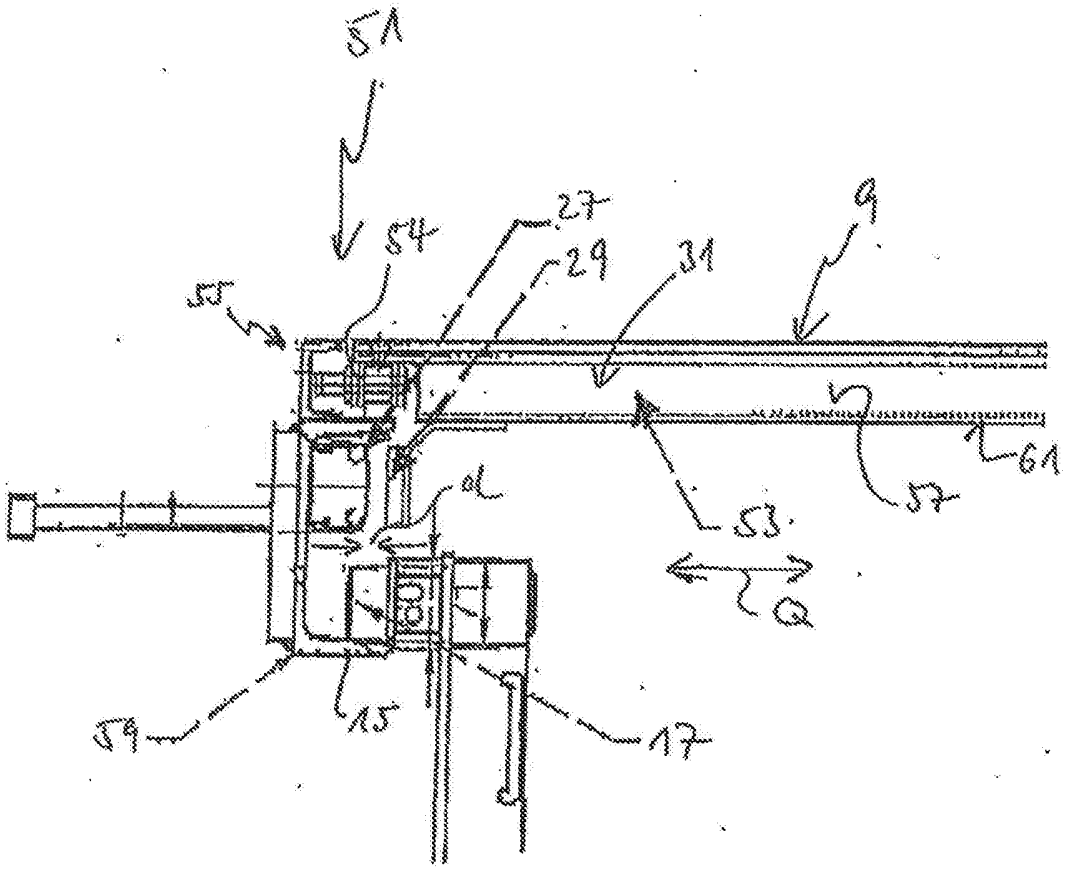


Fig. 6