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**Felvonó**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

## ELEVATOR

The present invention relates to a lift having a drive unit. The present invention further relates to a wind turbine having a lift.

5 In particular with large wind turbines, lifts for transporting persons and material are conventional nowadays. This saves, for example, maintenance technicians who have to carry out work in the pod of the wind turbine from a strenuous and time-consuming climb over the ladders which generally extend vertically upwards in the tower. In wind turbines with hub heights of approximately 140 m which are not unusual nowadays, this would mean a vertical climb (and naturally also a subsequent descent) over that height of 140 m. When it is  
10 further considered that a maintenance team during a working day can be active in a plurality of wind turbines, it quickly becomes clear what an extraordinary physical strain the use of the ladders can be.

In so far as the size of the wind turbines is increasing and the significance of wind energy is increasing, turbines are increasingly being erected of a size in which a lift is at least desirable, if not even necessary. The lifts are thereby also increasingly becoming a cost factor since they no longer appear only occasionally in wind  
15 turbines.

Reference may generally be made at this point to the following documents as prior art: DE 10 2005 009 500 A1, WO 97/11020 A1, DE 101 04 351 A1 and DE 10 2006 034 299 A1.

An object of the present invention is therefore to reduce the costs for the lift and thus to make the lift economically more attractive.

20 To this end, the lift of the type mentioned in the introduction is characterised by a cabinet which is used as a lift cage.

In this instance, the invention is based on the recognition that a cabinet in its basic structure with a base, side walls and a door does not differ from a lift cage which is produced specially for a lift. Naturally, there are differences, for example, in the suspension and operation of the door, but these differences can be overcome, to  
25 the extent that they act counter to a use of a cabinet as a lift cage, so that the complexity is on the whole still less than the complexity for a lift cage which is constructed separately for the lift.

In order to enable a space-saving transport of the lift to the place of use thereof, there are provided at the upper side of the lift cage at opposing sides retention members which are substantially horizontally arranged and carriers of the drive unit which are arranged thereon so as to extend in a substantially vertical manner,  
30 wherein the carriers are releasably connected to the retention members and can be vertically displaced. The drive unit can thereby be pushed into the lift cage for transport so that for the transport only the outer dimensions of the lift cage are relevant and the drive unit requires no additional transport space.

To this end, in the first position the connection between the drive unit and the lift cage in the operating position is produced so that the entire inner space of the lift cage is provided for transporting freight and/or  
35 persons whilst, in the second, vertically displaced position, the drive unit is retained in the lift cage in the lowered position which saves transport space.

In order to change between the transport position and the operating position, only the connection between the drive unit and lift cage is released, the drive unit is moved into the desired position and the connection is produced again or secured in the corresponding other position. Additional operations are not

necessary. It is thereby possible to produce the change between the transport position and the operating position very readily and in a time-saving manner.

In a preferred development of the invention, the lift system is characterised by a drive unit having a continuous winch. No complex rail arrangement is thereby required within the tower, but instead only two adequately sized cables have to be provided, one for normal operation, and one as an arrester cable in order to be able to retain the lift in the event of technical failure.

In a particularly preferred manner, the entire control system is arranged in the drive unit and an operating element which is connected to the control system extends down into the lift cage so that it is possible to change the drive unit between the transport position and the operating position without any intervention in the control system and/or the operating element which is connected thereto.

Another possibility for saving costs is produced when, in place of a specific lift cage, a cabinet which is conventionally used as a switch cabinet is used as a lift cage for a lift. Switch cabinets can be produced in a more cost-effective manner in large batch numbers, can be used as lift cages for lifts and can be adapted in a simple manner to the specific requirements as a lift cage for a lift so that the cost advantage is also thereby not lost.

In a particularly advantageous manner, the lift according to the invention is used in a wind turbine since the lift, apart from the erection, is used only occasionally and therefore, although it has to comply with the basic requirements for a lift, specific comfort is not required.

A conventional wind turbine, which can be provided with a lift according to the invention comprises in any case a foundation or other base, on which a tower, in particular a tubular steel or concrete tower, is erected, at the upper end of which a wind turbine pod is arranged. There is secured to the pod an aerodynamic rotor which is intended to be moved in rotation by means of wind and which to this end has at least one, generally three, rotor blade(s). The pod additionally comprises some elements for operating the wind turbine, which may generally include the generator which is coupled to the aerodynamic rotor and various other elements, such as a drive unit for rotating the pod to change the azimuth position thereof or, for example, flight illumination in order to make the pod visible to air traffic to a greater extent, to mention just a few examples. The lift according to the invention is intended to be provided in particular in the tower in order to convey one or more persons and/or objects from the tower base to the pod and/or vice versa.

The invention is described below with reference to the Figures. In the drawings:

Figure 1 is a general perspective view of a lift according to the invention;

Figure 2 shows a switch cabinet body;

Figure 3 shows the switch cabinet body with door and lateral portions;

Figure 4 shows a switch cabinet body according to Figure 3 and additionally a drive unit;

Figure 5 shows a switch cabinet body according to Figure 4, but with a drive unit lowered in the lift cage;

Figure 6 is a simplified illustration of the operating portion inside the lift cage;

Figure 7 is a simplified illustration of the operating portion on the lift cage at the outer side; and

Figure 8 is a view of the control cabinet from the side facing the inner side of the lift cage.

In Figure 1, the complete lift is shown with the lift cage 10 and the drive unit 11. The lift cage 10 substantially comprises a switch cabinet body 12 as a carrying structure. In this switch cabinet body 12 there is

installed a sliding door 14, in which a window 16 is in turn constructed. Lateral portions and naturally a rear wall (not illustrated in this Figure) are also installed. The lateral portion 18 with a window 20 can clearly be seen in this Figure.

At the left side which can be seen in this Figure, guiding cable rollers 22 for the guiding cable 74 and a carrier cable guide 24, through which the carrier cable 70 is guided, are further illustrated. Corresponding  
5 guiding cable rollers are located at the opposite side (not shown in this Figure) of the lift cage 10 according to the invention. At this location, there is also an arrester cable guide (also not shown in this Figure) for the arrester cable 72 which retains the lift cage, for example, in the event of failure of the normal travel drive.

At the upper side of the switch cabinet body 12, retention members 30 are fitted and there are in turn  
10 fitted to these retention members 30 carriers 32 which extend vertically upwards. On these carriers 32 there is a roof plate 34 which protects the lift against falling components. There is further fitted to the retention members 32 a continuous winch 36 by means of which the lift can travel upwards or downwards on the carrier cable 70 in the desired direction. There is further provided a control cabinet 38 in which the entire control system is accommodated. It is further possible to see in this Figure an arrester device 50 which as a safety device retains  
15 the lift on an arrester cable 72 if the drive comprising the continuous winch 36 and carrier cable 70 should fail. In addition to the carrier cable 70 and the arrester cable 72, there are further provided guiding cables 74 which guide the lift so that oscillation of the lift is prevented.

For the power supply, there is provided a cable 92 which is guided via a cable guide 90 into the drive unit. Finally, there is illustrated a floor switch 80 which identifies striking on the ground (or on another obstacle)  
20 and can stop the lift.

Figure 2 is a perspective view of a switch cabinet body 12 which according to the invention forms the carrier structure of the lift cage 10. Such a switch cabinet body 12 is nowadays a component which is produced in large batch numbers and which is consequently relatively cost-effective but which has adequate strength and load-bearing capacity to be able to carry out the transport of persons and material.

Figure 3 shows this switch cabinet body 12 with an installed sliding door 14, in which a window 16 is provided. Furthermore, a lateral portion 18 with an additional window 20 can be seen in this Figure and, in the lower region of the lateral portion 18, guiding cable rollers 22 and a carrier cable guide 24 are illustrated.

In this Figure, it can clearly be seen that the switch cabinet body 12, using relatively simple means, can become a lift cage for a lift which complies with all requirements but which is on the whole significantly more  
30 cost-effective than a standard lift cage.

In Figure 4, the illustration from Figure 3 is supplemented by retention members 30 which are secured at the top on the switch cabinet body 12. Carriers 32 are further fitted vertically to these retention members 30. A roof plate 34 is located on the carriers 32. This roof plate 34 prevents components from being able to fall from above into the lift cage or the drive. There are arranged on the carriers a continuous winch 36, a control cabinet 38 and an arrester device 50 by means of which the significant functions of the lift are carried out.  
35 Furthermore, there are provided guiding cable rollers 22 which guide the lift during operation along guiding cables which have been provided and consequently prevent oscillation of the lift. At the lower side of the lift cage 10, there is illustrated a floor switch 80 which identifies that the lift has been placed on the ground or an obstacle and can immediately stop the lift.

The carriers 32 are releasably connected to the retention members 30 and can be displaced in the direction of the vertical axis of the lift. It is thereby possible for the drive unit which is carried by these carriers 32 to be lowered into the lift cage 10 so that the lift takes up less space for transport, that is to say, it substantially occupies the space of the lift cage 10 itself.

5 This is illustrated in Figure 5. In this Figure, the roof plate 34 can be seen above the retention members 30, whilst the remainder of the drive unit is lowered with the carriers 32 (not illustrated in this Figure) into the lift cage 10.

10 The right-hand side of the lift with a right side wall 19 and a right side wall window 21 and an external operating component 60 which is illustrated on the right side wall 19 and guiding cable rollers 26 and an arrester cable guide 28 are illustrated in this perspective illustration.

In order to be able to operate the lift, naturally at least one operating unit is required. Figure 6 shows such an operating unit 62 which is provided inside the lift cage and, in addition to operating buttons for the travel upwards or downwards, comprises a switch for switching on the control system, a reset button, an emergency stop switch and an operation/malfunction light. Consequently, the significant lift functions can be controlled and the operational readiness or a malfunction can be signalled.

15 Figure 7 shows an external operating component 60 by means of which the basic functions can be operated, for example, during material transport. This external operating component 60 is used when transport of persons is not taking place. Then, the lift which is filled with material can, for example, be started using the "up" button in order to transport the material upwards from the base of the turbine. Using the "down" button, automatic travel in the opposite direction, that is to say, in a downward direction, is brought about.

20 Figure 8 shows the side 40 of the control cabinet 38 which faces the inner side of the lift cage. There are fitted to this side of the control cabinet 38 a plurality of lights and switches which signal different operating states or which enable the actuation of specific functions. During normal operation, the lift is operated via the operating component 60 or the operating component 62. However, as soon as a malfunction is indicated on one of these operating components, the operator can obtain further information relating to the type of malfunction by locking upwards, that is to say, towards the lower side 40 of the control cabinet 38 illustrated in Figure 8.

The switch with the inscription "Lights" is used to switch the lights on and off.

The light indicated "Control voltage 24 V OK" indicates whether the required voltage of 24 V is available for the correct operation of the control and the lift can be operated.

30 The light "Error Rotation Field" shows whether or not the rotation field applied across the motor is correct for the desired operation. A light which is switched on indicates an error. This may, for example, be a missing phase in the power supply or an incorrect connection of the rotation field.

The "Door Open" light indicates precisely that situation, that is to say, the door of the lift is not correctly closed. If the door is correctly closed, this notification may also indicate a defective door switch. This is because both lead to the lift not being able to be operated. In this manner, it is ensured that the lift travels only when the door is safely and correctly closed.

The light "End switch lower" indicates an actuation of the lower end switch (of the so-called cage floor switch), for example, when the lower position is reached or the switch is actuated by means of an obstacle. An actuation of the upper end switch or the emergency stop function is signalled by the light "End switch

upper/Emergency stop". Permanent illumination indicates that the upper operating position has been reached, flashing indicates the uppermost emergency stop position.

The light "Overload" indicates an overload of the lift and the light "Arrester device actuated" indicates that the arrester device has secured the lift to the arrester cable so that continued travel is not possible without release of the arrester device.

Since human lives are also dependent on reliable operation of the drive and the safety devices, there is prescribed a maintenance interval within which these components have to be repeatedly examined. In the present example, this is a 200 hour interval. An indicator light is also provided to indicate to the user the expiry of this interval. This light has the inscription "200 hr maintenance".

Finally, there is provided a switch "Bridge end switch lower" which enables bridging of the end switch and consequently deactivation of this switch if, for example, required during the installation for restarting or also for replacement of the cables.

## FELVONÓ

### 15 Szabadalmi igénypontok

1. Felvonó emelőkosárral és hajtóegységgel,

azzal jellemezve, hogy emelőkosárként használt szekrénye van, továbbá az emelőkosár (10) felső oldalán a szemközti oldalaknál lényegében vízszintesen elrendezett tartóelemek (30) vannak, továbbá ezek mellett a hajtóegység lényegében függőlegesen terjedő hordozóelemei vannak elrendezve, ahol a hordozóelemek (32) a tartóelemekkel (30) oldhatón vannak csatlakoztatva és függőlegesen elmozdíthatók, továbbá ahol a felvonónak van egy első pozíciója, melyben a hordozóelemek (32) a tartóelemekkel (30) csatlakoztathatók, valamint egy függőleges irányban ettől adotti távolsággal eltolt második pozíciója, melyben a hordozóelemek (32) a tartóelemekkel (30) ugyancsak csatlakoztathatók.

2. Az 1. igénypont szerinti felvonó, azzal jellemezve, hogy az emelőkosár és a hajtóegység csatlakoztatása oldható.

3. Az előző igénypontok bármelyike szerinti felvonó, azzal jellemezve, hogy átfutós csűrölével („Durchlaufwinde”) rendelkező hajtóegysége van.

4. Az előző igénypontok bármelyike szerinti felvonó, azzal jellemezve, hogy a teljes vezérlőrendszer a hajtóegységben van.

5. Az előző igénypontok bármelyike szerinti felvonó, azzal jellemezve, hogy egy a vezérléssel összekapcsolt, emelőkosárba benyúló működtetőjele van.

6. Kapcsolószekrény alkalmazása egy az 1. igénypont szerinti felvonó emelőkosárjaként és/vagy kapcsolószekrény-test alkalmazása egy az 1. igényponi szerinti felvonó emelőkosár-testjeként.

7. Szélurбина, amelynek egy az 1-5. igénypontok bármelyike szerinti felvonója van.

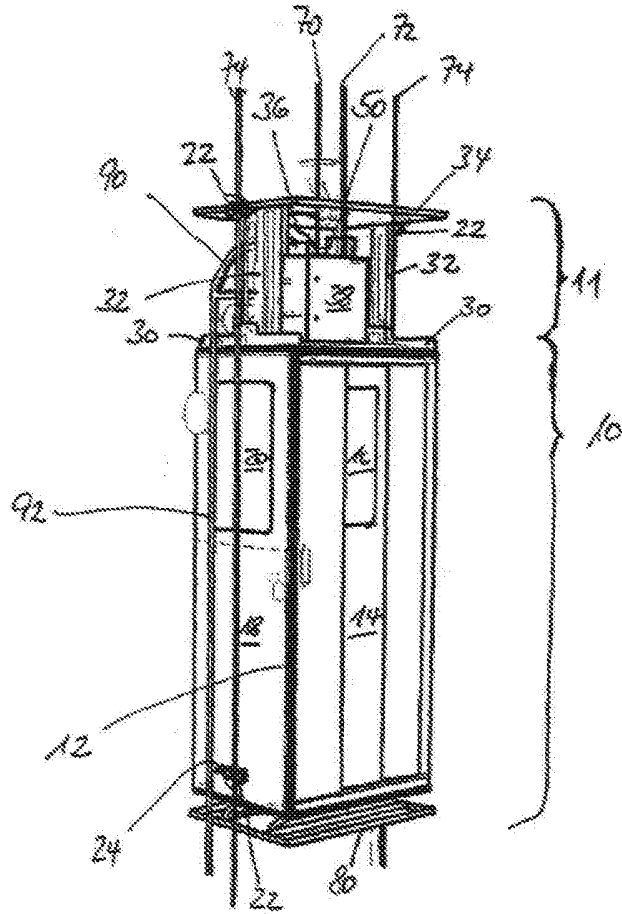


Figure 1

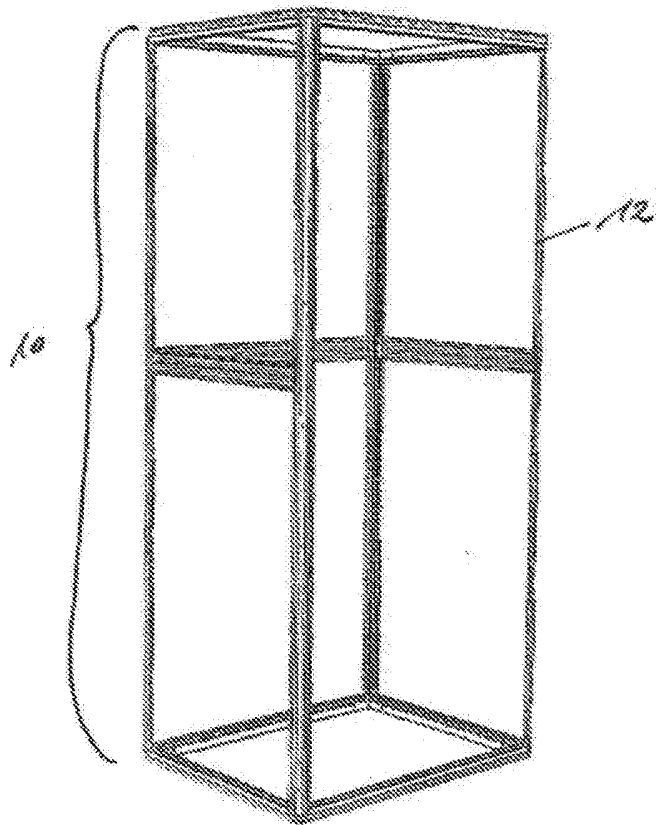


Fig. 2

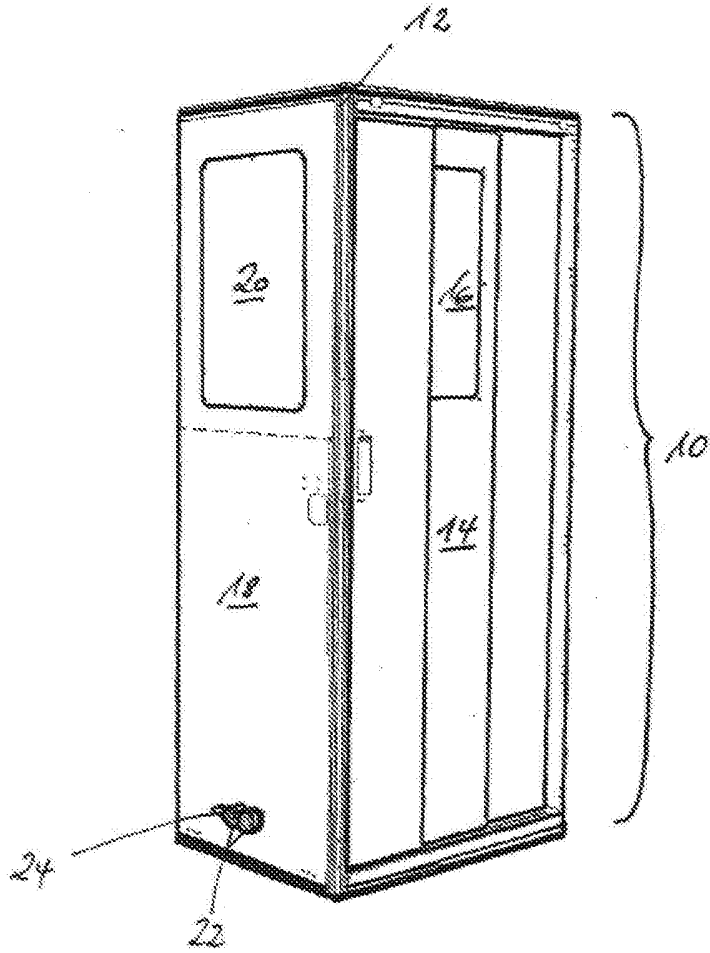


Fig. 3

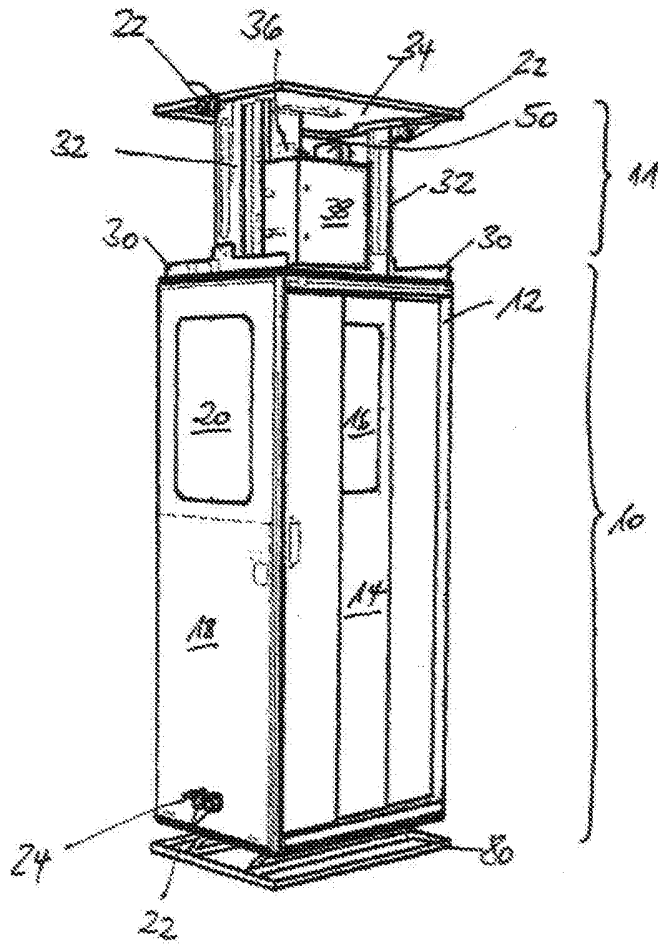


Fig. 4

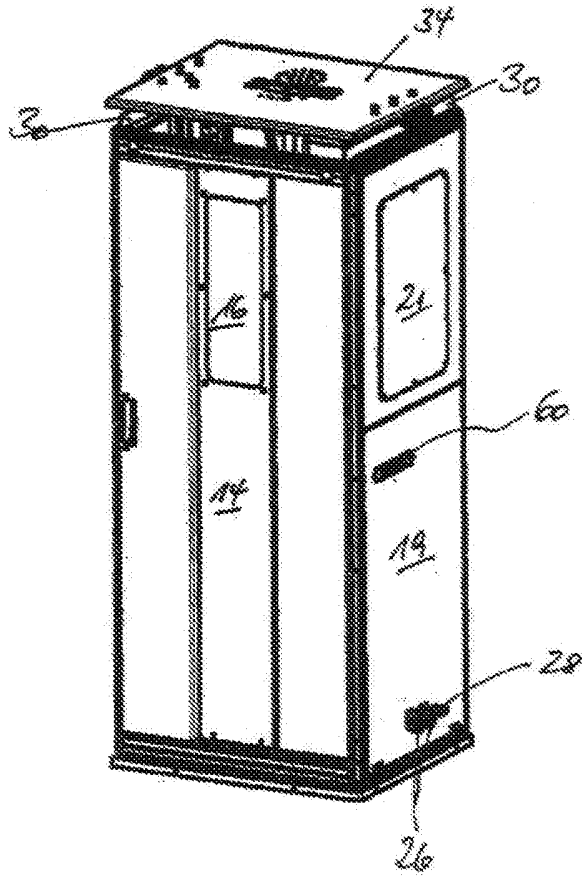


Fig. 5

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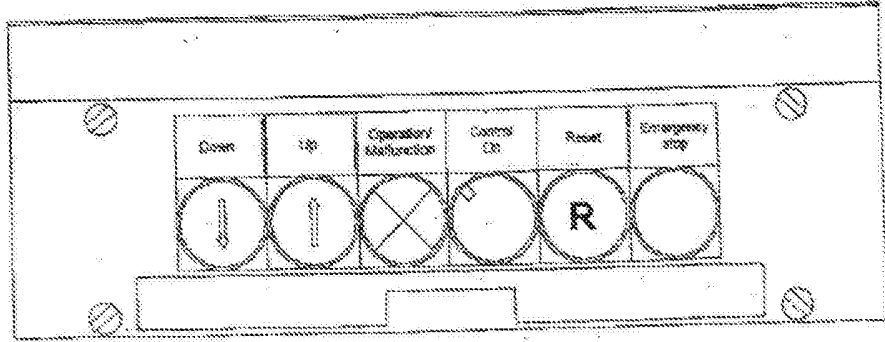


Fig. 6

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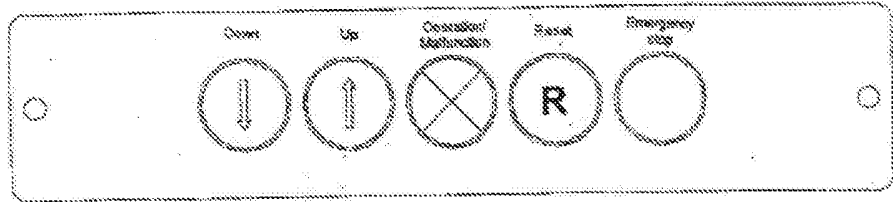
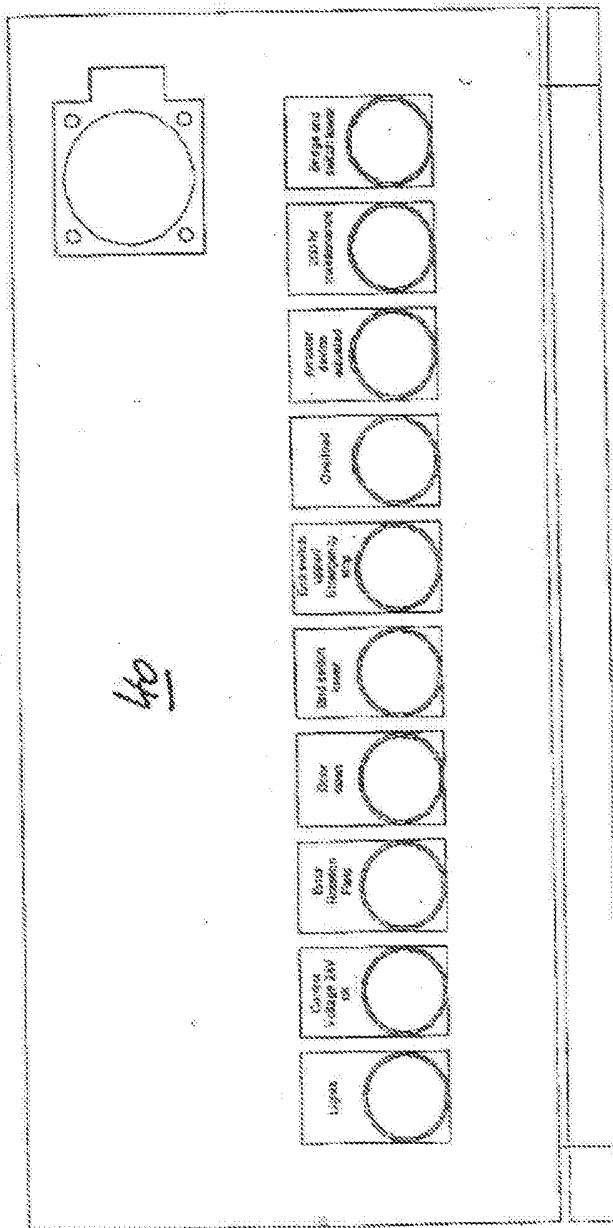


Fig. 7

38  
↓



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Fig. 8