Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2467675 C 2011/07/12

(11)(21) 2 467 675

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2004/05/19

(41) Mise à la disp. pub./Open to Public Insp.: 2004/11/21

(45) Date de délivrance/Issue Date: 2011/07/12

(30) Priorité/Priority: 2003/05/21 (EP03 405 351.2)

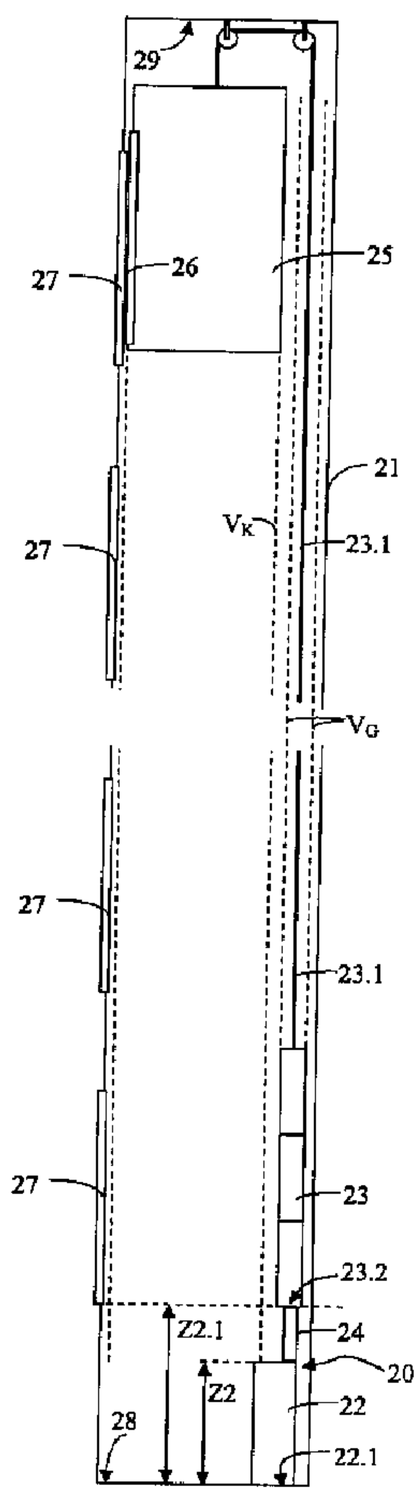
(51) Cl.Int./Int.Cl. *B66B 5/28* (2006.01),
B66B 5/00 (2006.01)

(72) Inventeurs/Inventors:
HUBER, MARCEL, CH;
KOCHER, JOHANNES, CH

(73) Propriétaire/Owner:
INVENTIO AG, CH

(74) Agent: RICHES, MCKENZIE & HERBERT LLP

(54) Titre : PATIN ET ASCENSEUR EQUIPE DE CE PATIN
(54) Title: BUFFER AND LIFT INSTALLATION WITH SUCH A BUFFER



(57) Abrégé/Abstract:
The buffer (20) serves for supporting a lift cage (25) and/or a counterweight (23) for the lift cage (25), wherein the lift cage (25) and the counterweight (23) are each movable along a path (V_K, V_G). The buffer (20) is so constructed that it partly projects into the path

CA 2467675 C 2011/07/12

(11)(21) 2 467 675

(13) C

(57) Abrégé(suite)/Abstract(continued):
(V_K) of the lift cage (25) and the path (V_G) of the counterweight (23). It produces a mechanical contact with the lift cage (25) when the lift cage (25) falls below a spacing (Z2) with respect to a floor (28). The buffer additionally produces a mechanical contact with the counterweight when the counterweight falls below a distance (Z2.1) with respect to the floor (28).

Abstract:

The buffer (20) serves for supporting a lift cage (25) and/or a counterweight (23) for the lift cage (25), wherein the lift cage (25) and the counterweight (23) are each movable along a path (V_K, V_G). The buffer (20) is so constructed that it partly projects into the path (V_K) of the lift cage (25) and the path (V_G) of the counterweight (23). It produces a mechanical contact with the lift cage (25) when the lift cage (25) falls below a spacing (Z2) with respect to a floor (28). The buffer additionally produces a mechanical contact with the counterweight when the counterweight falls below a distance (Z2.1) with respect to the floor (28).

Buffer and lift installation with such a buffer

The subject of the invention is a buffer for supporting a lift cage and/or for supporting a counterweight for the lift cage, and a lift installation with such a buffer.

Lift installations are usually provided with one or more buffers which are arranged at the shaft floor of a lift shaft in order to stop the lift cage when overrunning the lowermost stopping position in the lift shaft in downward direction and/or when overrunning the uppermost stopping position in the lift shaft in upward direction after transit of a predetermined travel path. This buffer is usually seated below the lift cage and/or the counterweight.

In order to prevent overrunning of an uppermost stopping position in the lift shaft in upward direction at the latest after transiting a predetermined travel path, buffers can also be arranged at the shaft head above the lift cage. Due to the fact that such buffers have to be arranged at the shaft floor and shaft head directly below or above the lift cage, a specific space requirement results. The shaft head or the shaft floor can therefore only be conditionally utilised for other purposes. In the case of lift installations without a shaft pit, such a standard arrangement of a buffer is not possible, since little space is present underneath the lift cage.

A lift installation with a lift shaft, a vertically movable lift cage with counterweight and with buffers is described from PCT Patent Application WO 00/64798-A1, wherein the buffer is disposed not below the lift cage, but near the lift cage at the shaft floor. The lift cage is provided with brackets which impinge on the buffer if an overrun situation arises, i.e. if the lift cage goes beyond the lowermost stopping position at the lowermost storey in downward direction. The lift cage is thereby braked and stopped in a short distance above the shaft floor. An overrun protection against overrunning the uppermost stopping position of the lift cage in upward direction is not proposed in this PCT patent application. The lift installation has a shaft without a pit. A possibility of creating temporary zones of protection for carrying out of maintenance and repair operations in the lift shaft at the shaft floor and/or at the shaft head is not disclosed.

The present invention is based on the object of providing a solution which makes it possible to ensure an overrun protection against overrunning a lowermost stopping

position of the lift cage in downward direction and against overrunning an uppermost stopping position of the lift cage in upward direction.

According to the present invention, this object is met.

The buffer according to the invention projects at least partly into the path of the lift cage and into the path of the counterweight. It is thereby achieved that, with a single buffer, selectably the cage or the counterweight can each be supported at a predetermined spacing above the shaft floor. The respective predetermined spacing can be different for the cage and the counterweight depending on the respective arrangement and form of the buffer. Thus, solely through the selection of the arrangement of a single buffer the lift cage can be prevented from overrunning the lowermost stopping position in the lift shaft in downward direction and the uppermost stopping position in the lift shaft in upward direction.

A further form of embodiment of a buffer can be provided with movable means which can be brought into the path of the lift cage and/or into the path of the counterweight in order to support the lift cage and/or the counterweight in each instance at a second predetermined spacing above the floor of the shaft. This form of embodiment is accompanied by the advantage that, with a single buffer, the lift cage and/or the counterweight can - depending on the respective setting of the movable means - each be supported at at least two different spacings above the shaft floor. Such a buffer can - suitably dimensioned - ensure, in a lift installation without a pit, an overrun protection against overrunning a lowermost stopping position of the lift cage in downward direction and against overrunning an uppermost stopping position of the lift cage in upward direction and additionally enables, in the case of a suitable setting of removable means, creation of temporary protection spaces at the shaft floor and at the shaft head.

In one aspect, the present invention provides a buffer for supporting an elevator car and a counterweight for the elevator car, wherein the elevator car and the counterweight are movable along paths in an elevator shaft, comprising: a buffer adapted to be mounted in an elevator shaft and having mechanical contact means whereby when said buffer is mounted in the elevator shaft, said mechanical contact means projects at least partly into the path of the elevator car and the path of the counterweight.

In a further aspect, the present invention provides an elevator installation having an elevator shaft comprising: an elevator car positioned in an elevator shaft; a counterweight connected to the elevator car, said elevator car and said counterweight being movable along paths in the elevator shaft; and a buffer mounted in the elevator shaft and having mechanical contact means projecting at least partly into the path of the elevator car and the path of the counterweight.

Details and advantages of the invention are described in the following on the basis of examples of embodiment and with reference to the schematic drawings, in which:

Fig. 1A shows a schematic plan view of a first form of embodiment of a buffer according to the invention;

Fig. 1B shows a schematic side view of the first form of embodiment of a buffer according to the invention, wherein a lift cage makes an orderly stop at the level of a lowermost storey;

Fig. 1C shows a schematic side view of the first form of embodiment of a buffer according to the invention, wherein the lift cage is shown in an overrun situation and seated on the buffer;

Fig. 1D shows a schematic side view of an entire lift shaft with the first form of embodiment of a buffer according to the invention, wherein the lift cage is shown in an overrun situation at the top and a counterweight is seated on the buffer;

Fig. 2A shows a schematic plan view of the second form of embodiment of a buffer according to the invention, in a normal state;

Fig. 2B shows a schematic side view of the second form of embodiment of a buffer according to the invention, in the normal state, wherein the lift cage moved downwardly beyond the lowermost stopping position is stopped;

Fig. 2C shows a schematic plan view of the second form of embodiment of a buffer according to the invention, in a use state; and

Fig. 2D shows a schematic side view of the second form of embodiment of a buffer according to the invention, in a use state, wherein a temporary zone of protection is ensured.

Figures 1A to 1D show a first form of embodiment of a buffer 20, according to the invention, in different schematic views and in different states. The illustrated buffer 20 is a buffer for supporting a lift cage 25 above the floor 28 of a lift shaft 21. The lift cage 25 is so connected with the counterweight 23 that the lift cage 25 and the counterweight 23 are movable upwardly and downwardly along paths V_K and V_G in the lift shaft 21. The

counterweight 23 and a part of a support cage 23.1 for the lift cage 25 and the counterweight 23 is shown in Fig. 1D, whereagainst the drive pulley for the support cable 23.1, the guide rails and the other usual elements of a lift installation are not shown in Figures 1A to 1D. The buffer 20 has a longitudinal extent parallel to the paths V_K and V_G of the lift cage 25 and the counterweight 23. The buffer 20 is so constructed and arranged that it projects at least partly into the path V_K of the lift cage and the path V_G of the counterweight.

The buffer 20 comprises a lower base element 22 and a more slender upper part 24. The upper part 24 is seated asymmetrically on the base element 22. The buffer 20 is shown in Figures 1C and 1D in a so-termed operative state.

The buffer 20 is disposed at least partly between the path V_K of the lift cage and the path V_G of the counterweight. These paths V_K and V_G are indicated in Fig. 1D by dashed lines. For clarification, there is shown in Figure 1A the projection K2 of the floor 25.1 of the lift cage 25 and the projection G2 of the underside 23.2 of the counterweight 23 respectively projected onto the shaft floor. The projections K2 and G2 are illustrated by dashed lines in the regions in which they overlap with the base surface 22.1 of the base element 22 at the shaft floor 28.

In the normal case, i.e. in the case in which the lift cage 25 moves upwardly and downwardly in the region provided for that purpose, the buffer 20 does not come into use. As shown in Fig. 1B, the lift cage 25 can move to the lowermost storey and enables boarding and disembarkation via the cage door 26 and the shaft door 27.

If, now, overrunning of the lowermost stopping position of the lift cage 25 in downward direction (use state in Fig. 1C) takes place, a mechanical contact of the lift cage 25 with the base element 22 of the buffer 20 occurs as soon as the lift cage 25 falls below a predetermined spacing Z2 with respect to the floor 28. In the case of the illustrated form of embodiment the lift cage 25 is seated by a lower edge on the base element 22, as shown in Fig. 1C. The lift cage 25 can thereby be braked and stopped in the "emergency case". The base element 22 of the buffer 20 is somewhat compressed in this state.

The form of embodiment of Figures 1A to 1D is distinguished by the fact that it not only prevents overrunning of the lowermost stopping position of the lift cage 25 in downward

direction, but overrunning of the uppermost stopping position of the lift cage 25 in upward direction is arrested. This "emergency case" is illustrated in Fig. 1D. A schematic longitudinal section through the entire lift shaft 21 is shown in this figure. The lift shaft 21 has four or more than four storeys. A shaft door 27 is indicated at the level of each of the storeys. The counterweight 23 moves in the lift shaft 21 in opposite sense to the lift cage 25. If the lift cage is located at the upper shaft end, then the counterweight is located at the lower shaft end. An overrunning of the uppermost stopping position of the lift cage 25 in upward direction is now stopped in accordance with the invention in that the counterweight 23 comes into mechanical interaction with the upper part 24 of the buffer 20. Through braking and stopping the counterweight 23 by the buffer 20, the lift cage 25 is prevented from travelling further upwards.

A zone of protection can also be defined at the upper shaft end depending on the respective total extent H2.1 of the buffer 20.

Figures 2A to 2D show a second form of embodiment of a buffer 40, according to the invention, in different schematic views and in different states. The illustrated buffer 40 is a buffer for supporting a lift cage 45 above the floor 48 of a lift shaft 41. The buffer serves as overrun protection and as means for creating a temporary zone of protection in a lift installation without a pit, i.e. in a lift installation in which the lowermost stopping level of the lift cage lies at such a short spacing above the floor that there is no room for a shaft pit. The lift cage 45 is so connected with a counterweight that the lift cage 45 and the counterweight are movable upwardly and downwardly along paths in the lift shaft 41. The counterweight, support cables for the lift cage 45 and the counterweight, the drive pulley for the support cables, the guide rails and the other usual elements of a lift installation are not shown in Figures 2A to 2D. The buffer 40 has a longitudinal extent parallel to the paths of the lift cage 45 and the counterweight. The buffer 40 is so constructed and arranged that depending on the respective state it projects at least partly into the path of the lift cage and the path of the counterweight.

The buffer 40 comprises a lower base element 43, which is designed as a stronger damper, and a movable means 44 which are seated on the base element 43 and can be rotated, as illustrated in Figures 2C and 2D. The movable means 44 are symmetrically constructed in the case of the illustrated form of embodiment, i.e. they project out to the

same extent on both sides beyond the base element 43. The movable means 44 comprise dampers 44.1 which are seated in recesses of the movable means 44.

The buffer 40 is shown in Figures 2A and 2B in a so-termed normal state. In Figures 2C and 2D the buffer 40 is illustrated in a so-termed use state. The buffer 40 is disposed at least partly between the path of the lift cage and the path of the counterweight. For clarification, the projection K4 of the floor 45.2 of the lift cage 45 and the projection G4 of the underside of the counterweight is shown in Figures 2A and 2C.

In the use state a mechanical contact of the lift cage 45 with the damper 44.1 of the buffer 40 takes place as soon as the lift cage 45 falls below a first predetermined spacing Z4 with respect to the floor 48. In the case of the illustrated form of embodiment the lift cage 45 is seated by a lower edge on the damper 44.1, as shown in Fig. 2D. The buffer 40 is thus eccentrically loaded. A temporary zone of protection can thereby be created in the region of the lower shaft end in the case of need.

The buffer 40 together with the movable means 44, 44.1 is so constructed and arranged that in the use state a mechanical contact with the counterweight also takes place if the counterweight falls below the predetermined spacing Z4 with respect to the floor 48. The counterweight is not visible in Figures 2A to 2D, since it is disposed at the upper shaft end when the lift cage 45 is disposed at the lower shaft end.

The buffer 40 is shown in the normal state in Fig. 2B. Since in the normal state the movable means 44, 44.1 of the buffer 40 do not project into the path of the floor 45.2 of the lift cage 45, the lift cage 45 can travel to the shaft door 47 of the lower storey without producing a mechanical contact with the buffer 40. It may be mentioned that in the illustrated state a spacing D between a bracket 45.1 (buffer abutment) fastened to the lift cage 45 and the damper 44.1 exists. In the situation shown in Fig. 2B, boarding and disembarkation can take place via the cage door 46 and the shaft door 47.

If now an overrunning of the lowermost stopping position of the lift cage 45 in downward direction (not shown in Figs. 2A to 2D) happens, then a mechanical contact of the bracket 45.1, which is fastened at the lift cage 45, with the means 44 or with the base element 42, which is designed as a stronger damper, of the buffer 40 takes place. The lift cage 45 can thereby be braked and stopped in the "emergency case". It may be noted that in the case

of overrunning the lowermost stopping position of the lift cage 45 the damper 44.1 does not come into use, since the bracket 45.1 produces direct contact with the means 44 or the base element 43. The buffer 40 is thus centrally loaded in such an "emergency case".

If the buffer 40 is disposed in the normal state, then an overrunning of the uppermost stopping position of the lift cage 45 in upward direction is prevented by the fact that a bracket or another protruding element at the side of the counterweight facing the shaft door 47 produces a contact with the movable means 44 of the buffer 40. This also leads to a central loading of the buffer 40.

A projection K4.1 of the bracket 45.1 and a projection G4.1 of the said bracket or of the protruding element at the counterweight, in each instance projected onto the shaft floor, are respectively illustrated in Figs. 2A and 2C by dashed lines.

For creating a zone of protection the buffer 40 is led over from the normal state to the use state, wherein that takes place in that the movable means 44 are rotated into the paths of the floor 45.2 of the lift cage 45 or the underside of the counterweight (Figs. 2C and 2D). The necessary changeover can be triggered, for example, by a (key-operated) switch or by electronic control. In order to create the temporary zone of protection, the lift cage 45 is moved slowly downwardly until it rests on the damper 44.1. A person can go into and/or leave the zone of protection by opening of the shaft door 47. The spacing Z4 ensures sufficient spacing from the floor 48 in order to enable a safe and problem-free working in the zone of protection.

A temporary zone of protection can also be created in the region of the upper shaft end by the same buffer 40. However, this state is not shown in Figures 2A to 2D. In order to create a zone of protection at the upper shaft end, the counterweight is prevented from falling below the spacing Z4 from the floor 48. As soon as the counterweight sits on the damper 44.1 on the righthand side of the movable means 44, the lift cage 45 is held at a fixedly predetermined spacing from the shaft head. A zone of protection of the upper shaft end thereby results.

As indicated in Figures 1C and 1D, the lift cage and the counterweight do not have to be supported at the same height.

According to the invention the buffer can have a damping characteristic which is specially adapted to the case of use. In the case of the second form of embodiment dampers 44.1 are used which enable a lightly damped settling of the lift cage 35 or the counterweight when a zone of protection is to be created. On overrunning beyond the lowermost or the uppermost stopping position of the lift cage 45, thereagainst, the damping characteristic of the base element 43 comes into play.

The buffers according to the invention can be equipped with special means which allow an asymmetrical loading without the buffer "collapsing" or "deflecting". For this purpose the buffer can be surrounded entirely or partly by a corset-like element or be guided by special means in order to provide compensation for the bending moments occurring due to the eccentric buffer loading.

In the case of a part of the forms of embodiment the buffer is arranged completely between the lift cage and the counterweight (see, for example, Fig. 2A).

The cross-section of the buffer according to the invention can be selected as desired. The buffer 20 has a substantially round cross-section parallel to the floor of the lift shaft. The buffer 40, thereagainst, has, for example, a square cross-section in the lower region 43.

Depending on the respective form of embodiment a movement of the movable means of the buffer can be effected electromagnetically, hydraulically, pneumatically, manually or by means of a setting motor.

In a further form of embodiment a pit set is employed which comprises a drive/frequency-converter unit, a speed limiter, a fastening for the guide rails and the buffer. Mounting in the lift shaft is thereby noticeably simplified.

The present invention is also suitable for use in a lift installation in cantilever disposition.

A reduced requirement for space by comparison with conventional solutions results from the special arrangement and construction of the buffer.

The invention is particularly suitable for use in lift installations which have no, or only a small, shaft pit height size and shaft head height size.

It is an advantage of the invention that regulations for fulfilment of protection of persons can be observed and the constructional costs or installation costs can be substantially reduced depending on the respective form of embodiment.

The movable means 44 and 44.1 can be modified in various ways within the scope of the invention. They can be replaced by means which are foldable, pivotable, slidable and/or rotatable out of a basic setting and are respectively movable in tracks of the lift cage and the counterweight in order to support the lift cage and/or the counterweight at a spacing above the floor. The movable means can also be so designed by a suitable arrangement that the lift cage and the counterweight can be respectively supported at different heights.

We Claim:

1. A buffer for supporting an elevator car and a counterweight for the elevator car, wherein the elevator car and the counterweight are movable along paths in an elevator shaft, comprising:

a buffer adapted to be mounted in an elevator shaft and having mechanical contact means whereby when said buffer is mounted in the elevator shaft, said mechanical contact means projects at least partly into the path of the elevator car and the path of the counterweight.

2. The buffer according to claim 1 wherein said mechanical contact means of said buffer engages in mechanical contact with the elevator car when the elevator car moves below a first predetermined spacing with respect to a floor of the elevator shaft and engages in mechanical contact with the counterweight when the counterweight moves below a second predetermined spacing with respect to the floor.

3. The buffer according to claim 1 wherein an upper part of said buffer is disposed between an area projection of the elevator car and an area projection of the counterweight.

4. The buffer according to claim 1 wherein said buffer provides overrun protection for the elevator car by said mechanical contact means braking and stopping at least one of the elevator car on overrunning a lowermost stopping position in a downward direction and the counterweight on the elevator car overrunning an uppermost stopping position in an upward direction.

5. The buffer according to claim 1 wherein said buffer includes movable means attached to said mechanical contact means for movement into the path of the elevator car in order to produce the mechanical contact with the elevator car and movement out of the path of the elevator car for the elevator travelling past the buffer in a normal state if there is no need for a lower zone of protection.

6. The buffer according to claim 5 wherein said movable means are one of foldable, pivotable, slidable and rotatable for said movement into and out of the path of the elevator car.

7. The buffer according to claim 1 wherein said buffer includes movable means attached to said mechanical contact means for movement into the path of the counterweight in order to produce the mechanical contact with the counterweight and for movement out of the path of the counterweight for the counterweight travelling past the buffer in a normal state if there is no need for an upper zone of protection.

8. The buffer according to claim 7 wherein said movable means are one of foldable, pivotable, slidable and rotatable for said movement into and out of the path of the counterweight.

9. The buffer according to claim 1 wherein said buffer is formed with a damping characteristic suitable for braking and stopping the elevator car or the counterweight.

10. The buffer according to claim 1 wherein said mechanical contact means contacts one of the elevator car and the counterweight for producing at least one of a zone of protection between a floor and the elevator car and a zone of protection above the elevator car.

11. An elevator installation having an elevator shaft comprising:

an elevator car positioned in an elevator shaft;

a counterweight connected to the elevator car, said elevator car and said counterweight being movable along paths in the elevator shaft; and

a buffer mounted in the elevator shaft and having mechanical contact means projecting at least partly into the path of the elevator car and the path of the counterweight.

12. The elevator installation according to claim 11 wherein the elevator shaft is without a pit.

13. The elevator installation according to claim 11 including a drive arranged at a floor of the elevator shaft.

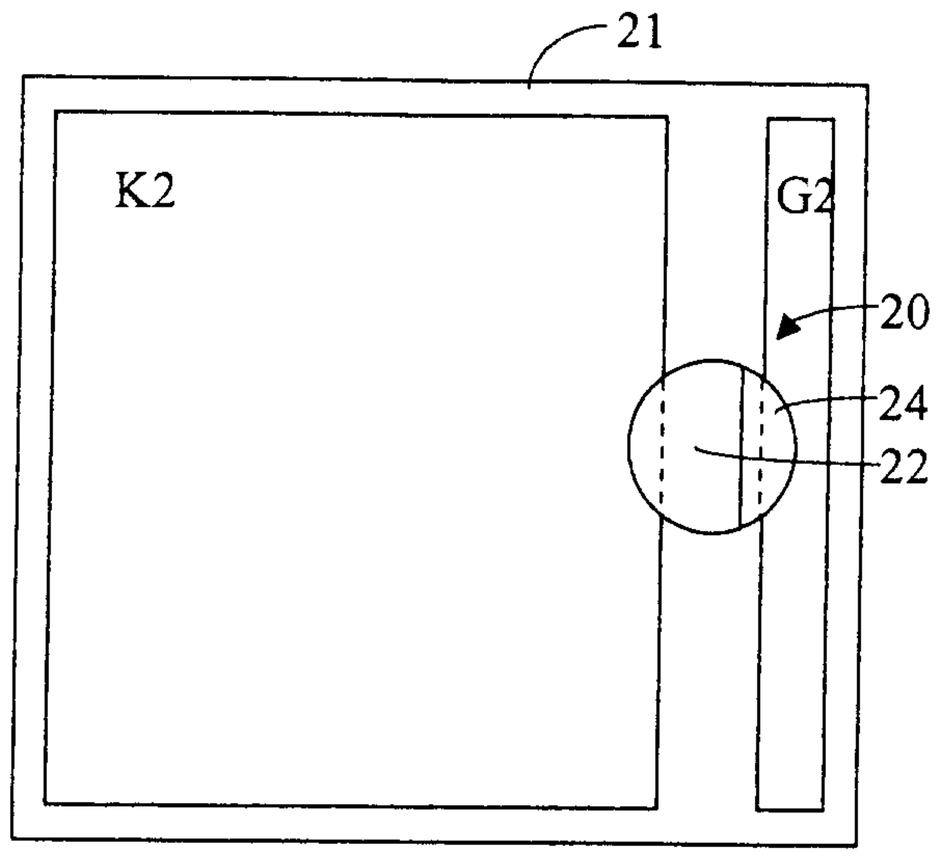


Fig. 1A

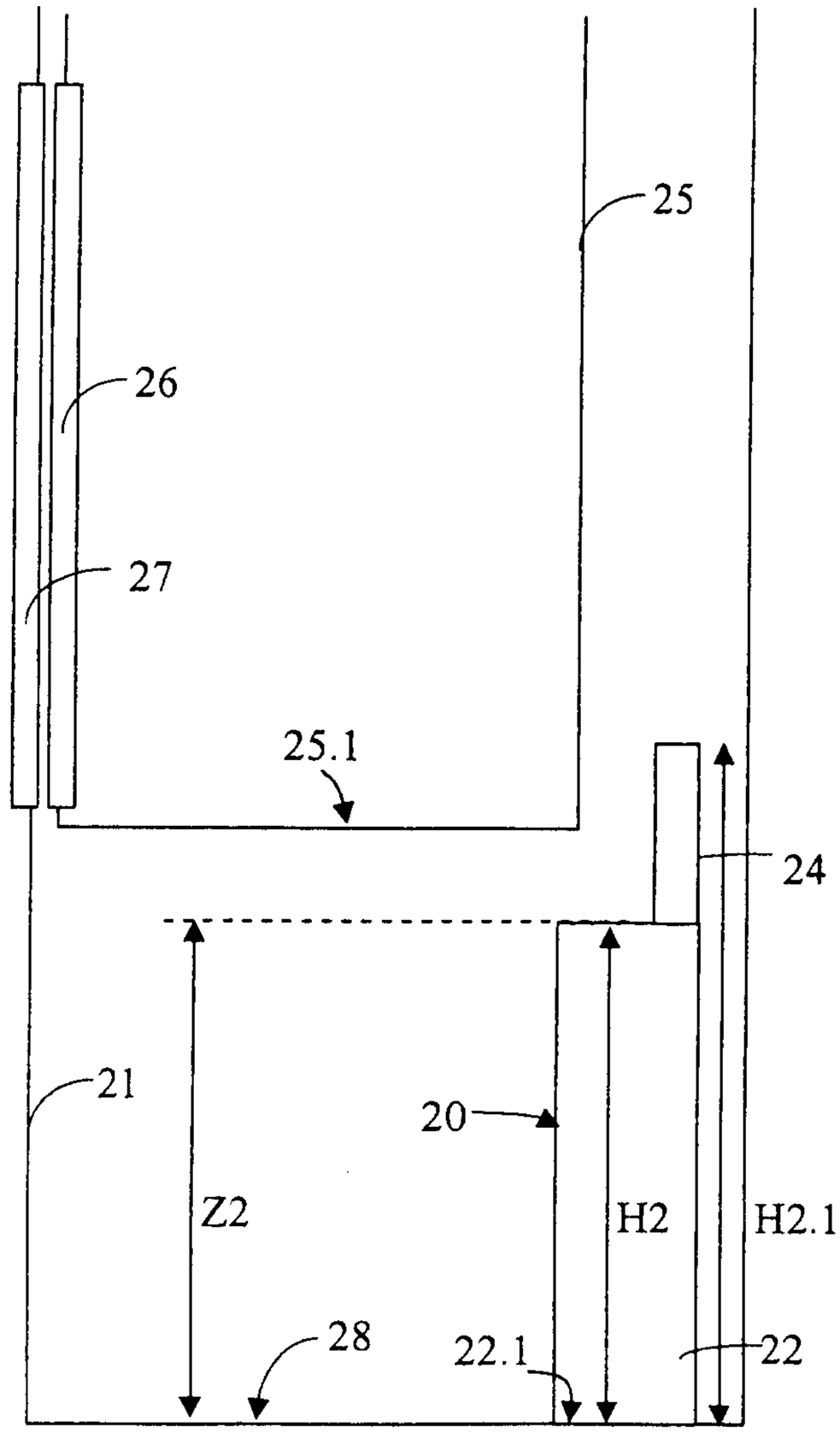


Fig. 1B

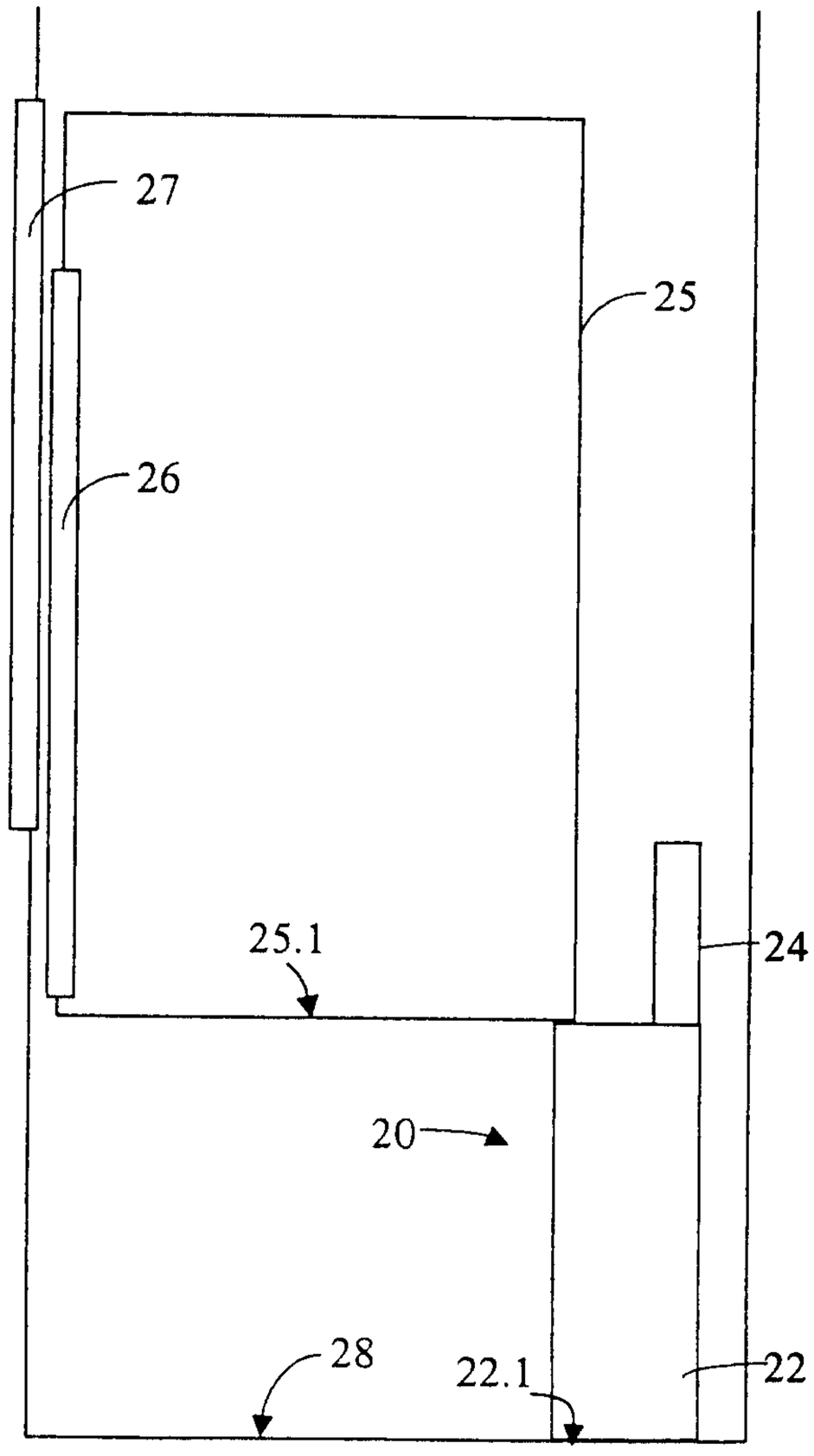


Fig. 1C

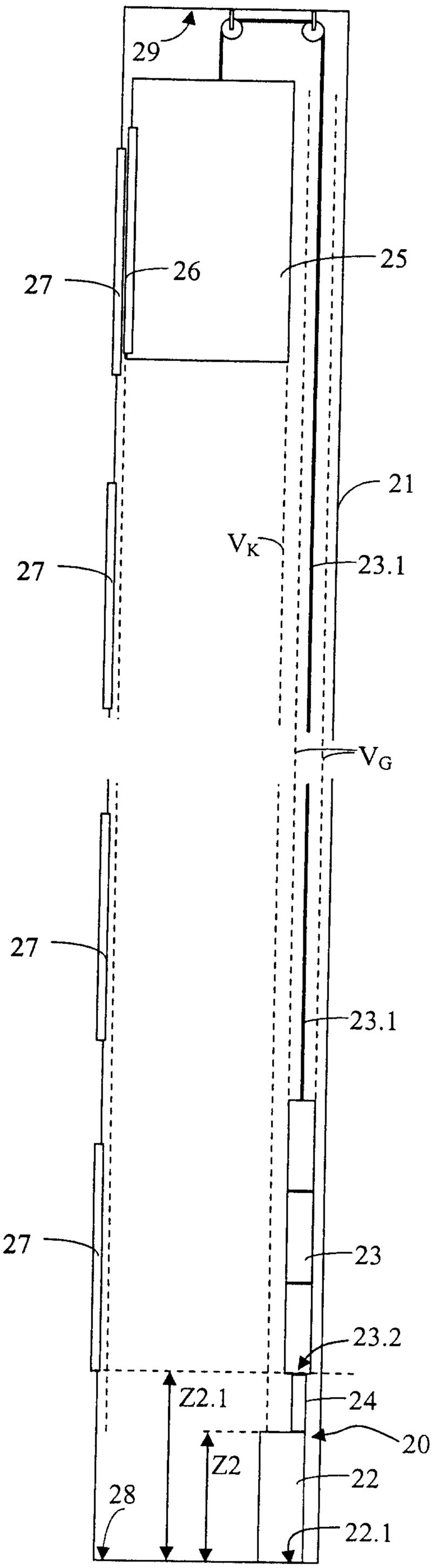


Fig. 1D

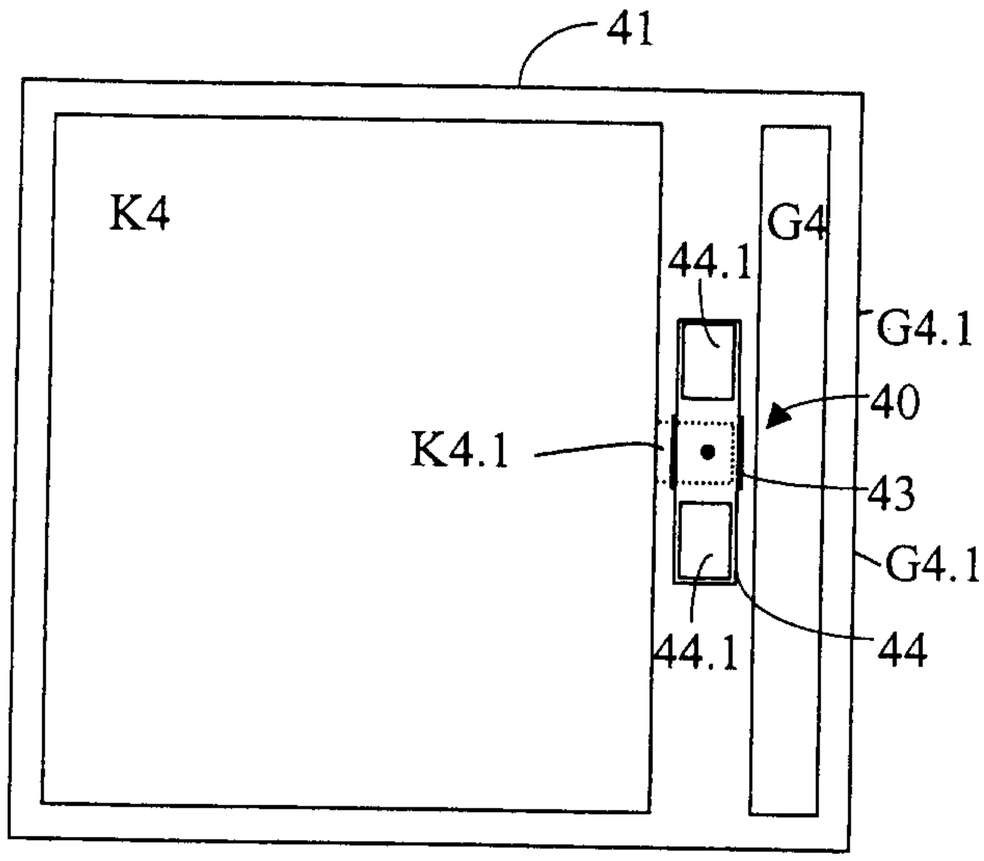


Fig. 2A

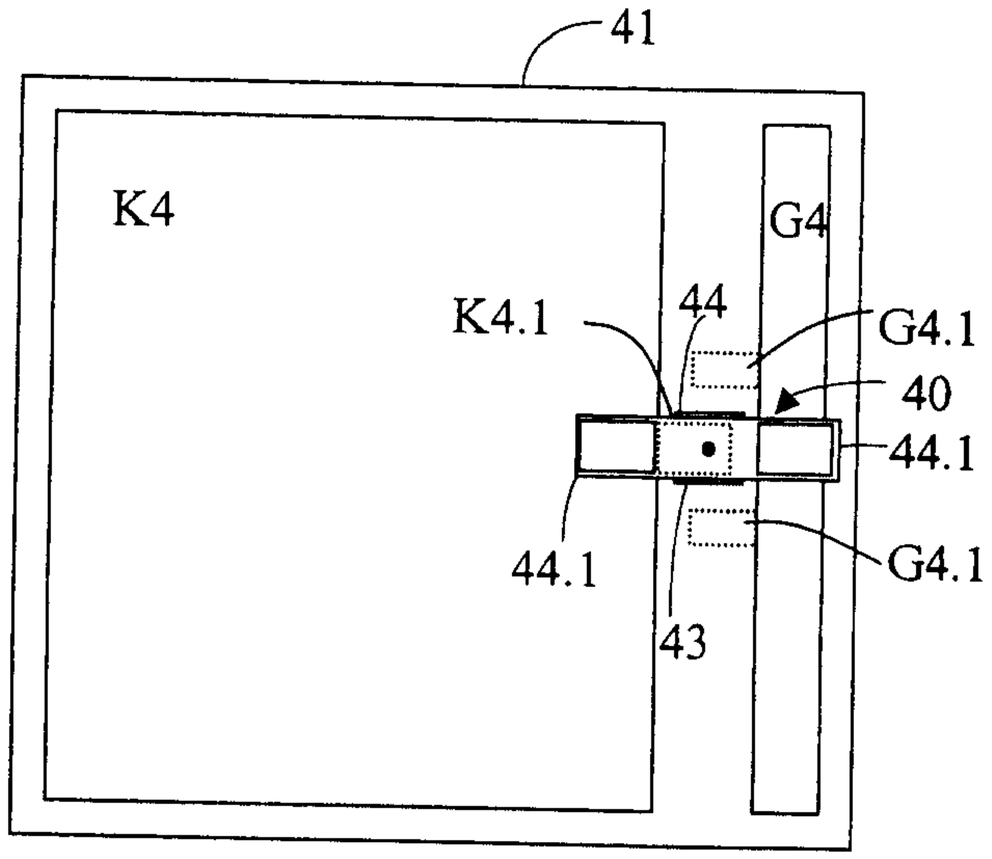


Fig. 2C

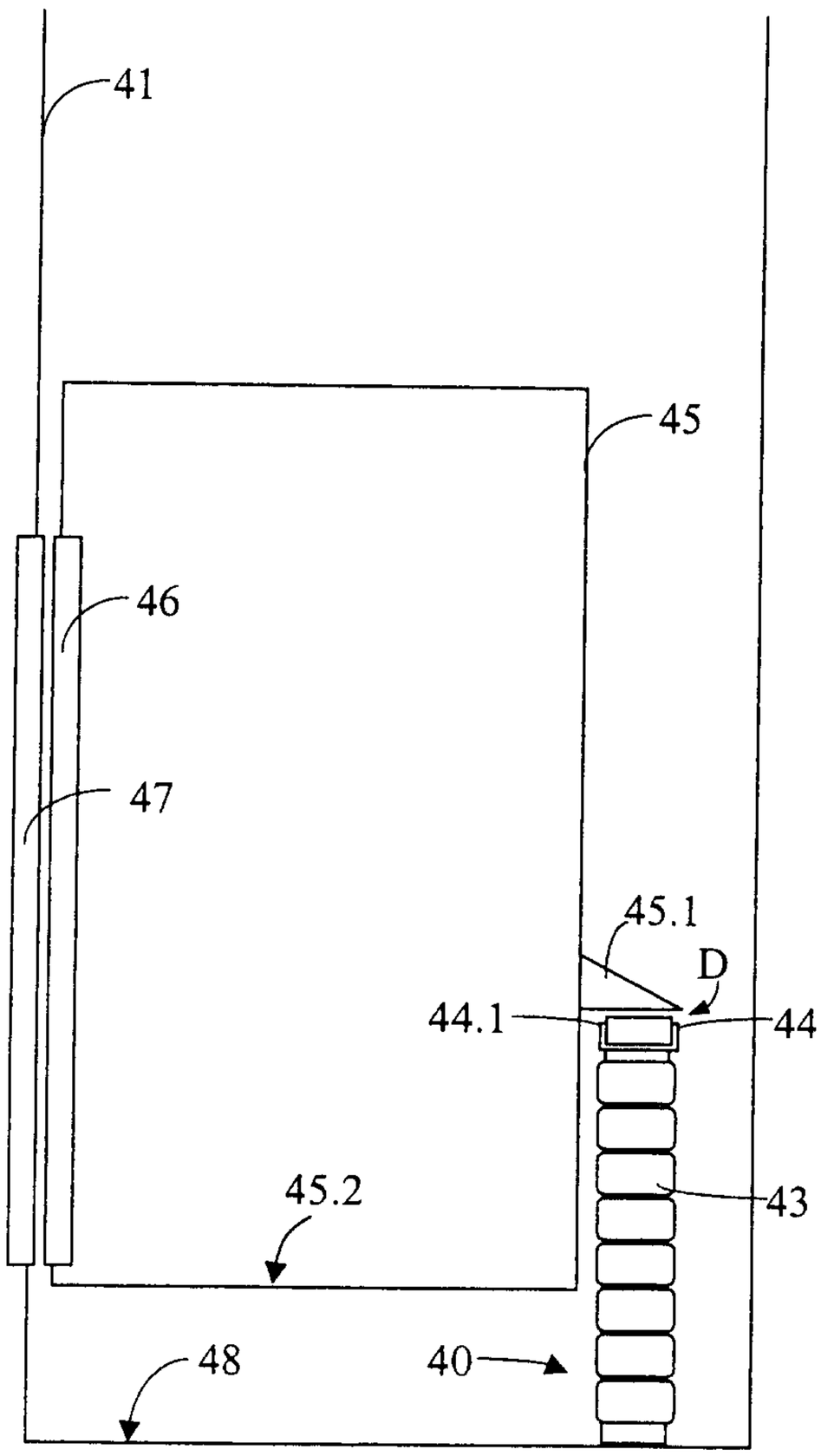


Fig. 2B

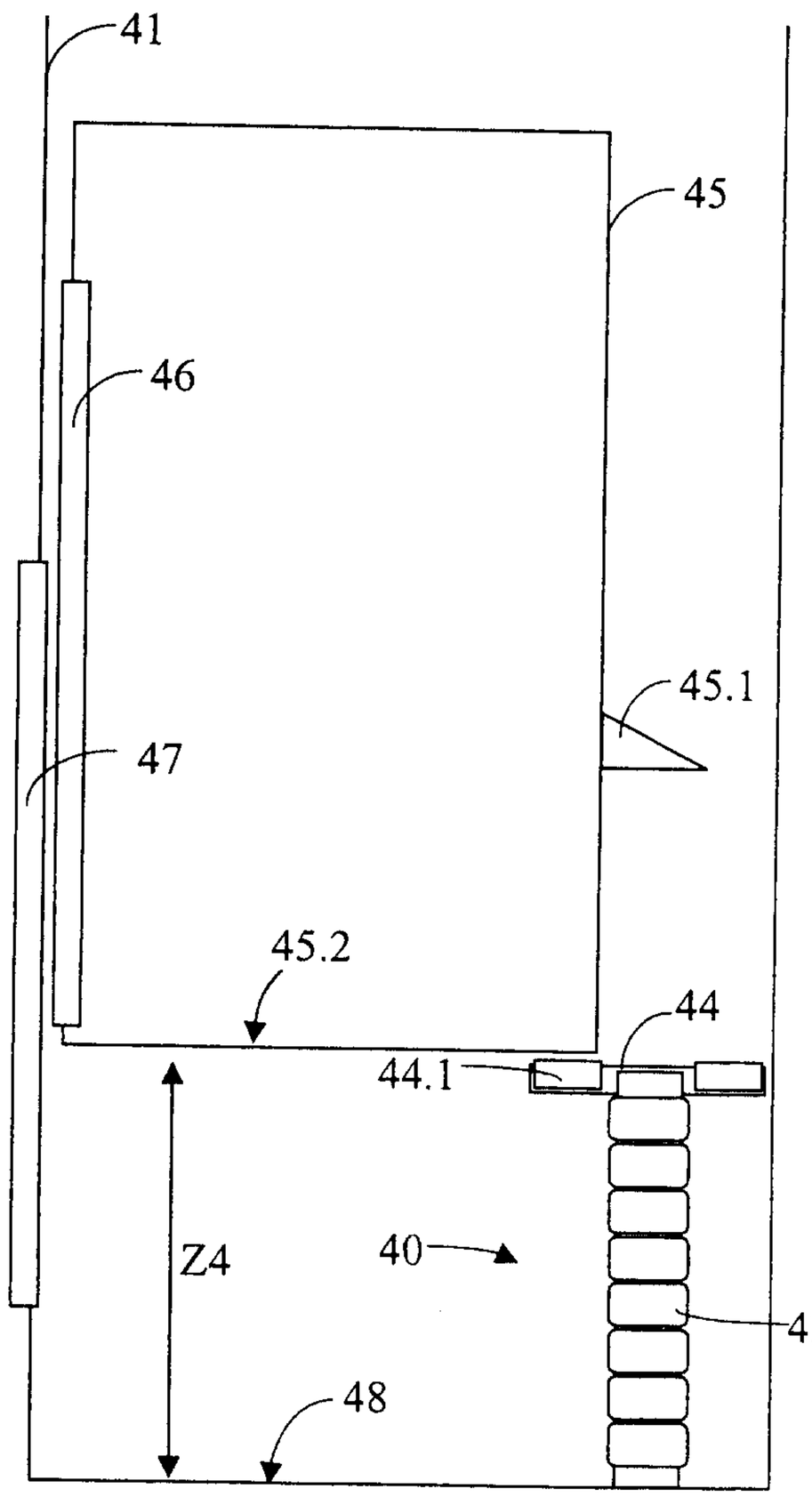
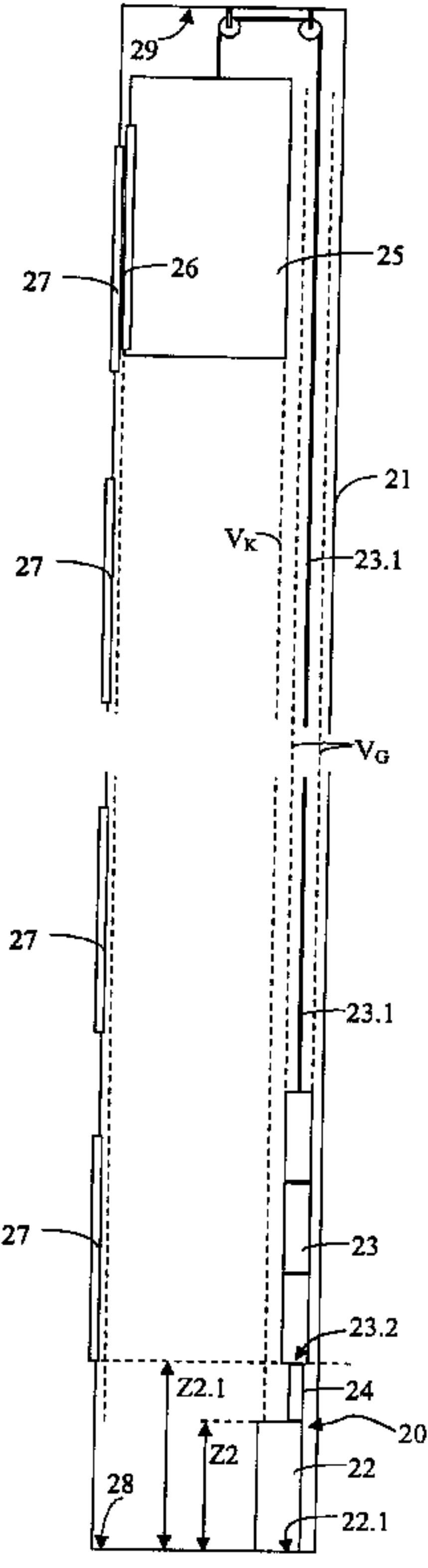


Fig. 2D


29
27
26
25
27
21
V_K
23.1
27
V_G
27
23.1
27
23
23.2
Z2.1
24
20
Z2
22
28
22.1