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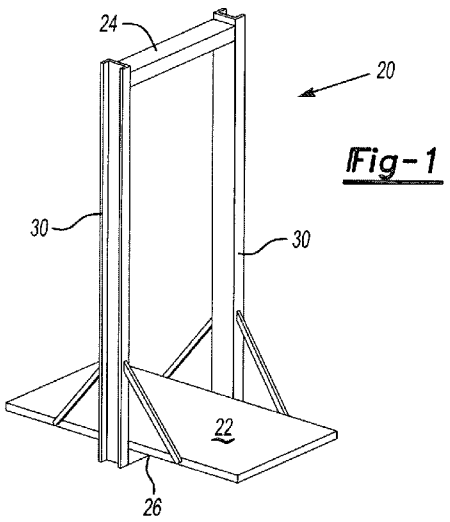



Fig-1

(57) Abstract: An exemplary assembly for use as part of an elevator car includes an upright member having a channel along substantially an entire length of the upright member. A plurality of guide rollers are supported by the upright member. At least part of each of the guide rollers is received within the channel. The guide rollers are each situated to engage a surface on a guide rail that is at least partially received within the channel.

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# ELEVATOR CAR ASSEMBLY

## BACKGROUND

[0001] Elevator systems include a car that carries passengers between various levels of a building. There are a variety of styles of elevator cars but most of them include several basic components. A car frame supports a cabin. The car frame includes structural members for supporting the load of the cabin and any passengers within the cabin. Typical car frames include a platform, a lower cross beam, an upper cross beam and uprights between ends of the cross beams. In a frameless car arrangement, the car does not have a separate car frame and cabin. Components of the cabin act as structural members for supporting the load.

[0002] Elevator cars include various components necessary for desired elevator system performance. For example, an elevator car includes guides for facilitating movement of the elevator car along guide rails. Guides may include sliding guide members or guide rollers. Guide roller arrangements are typically secured above the upper cross beam and below the lower cross beam.

[0003] Safeties are typically supported on an elevator car to provide a braking function when needed. Elevator safeties are typically mounted to the car frame structure below the lower cross beam.

[0004] While conventional elevator car arrangements have proven effective, they are not without drawbacks. The typical mounting location for roller guide assemblies and elevator safeties increases the amount of space occupied by the elevator car within a hoistway. Any increase in the amount of space required by the elevator car necessitates a correspondingly larger amount of space within a hoistway, which is contrary to the desire to minimize the amount of building space an elevator hoistway occupies. There also tends to be a considerable amount of labor and expense involved with mounting the roller assemblies and safeties onto an elevator car to achieve desired alignment of the components, which is necessary to ensure proper operation.

## SUMMARY

[0005] An exemplary assembly for use as part of an elevator car includes an upright member having a channel along substantially an entire length of the upright member. A plurality of guide rollers are supported by the upright frame member. At least part of each of the guide rollers is received within the channel. The guide rollers are each situated to engage a surface on a guide rail that is at least partially received within the channel.

[0006] In one embodiment including one or more features of the preceding paragraph, a first one of the guide rollers has a first outside diameter and rotates about a first axis; a second one of the guide rollers has a second outside diameter and rotates about a second axis; the first and second axes are parallel; a third one of the guide rollers rotates about a third axis; the third axis is perpendicular to the first and second axes; the channel has a width that is perpendicular to the length; and the first and second diameters combined are less than the width of the channel.

[0007] In one embodiment including one or more features of any of the preceding paragraphs, the plurality of guide rollers comprises a first set of the first, second and third guide rollers and a second set of first, second and third guide rollers; the first set of guide rollers is near one end of the upright member; and the second set of guide rollers is near an opposite end of the upright member.

[0008] In one embodiment including one or more features of any of the preceding paragraphs, the upright member has a width and the length is greater than the width; and the first, second and third guide rollers are situated relative to the width to engage the surface on the guiderail in a position that is centered in the channel in the width direction.

[0009] In one embodiment including one or more features of any of the preceding paragraphs, an elevator safety braking device is supported at least partially within the channel in a position to selectively engage a guiderail that is at least partially received within the channel.

[00010] In one embodiment including one or more features of any of the preceding paragraphs, at least one sheave is at least partially within the channel and supported by the upright member.

[00011] In one embodiment including one or more features of any of the preceding paragraphs, at least one sheave is at least partially within the channel and supported by the frame member.

[00012] In one embodiment including one or more features of any of the preceding paragraphs, there are at least two sheaves at least partially within the channel.

[00013] In one embodiment including one or more features of any of the preceding paragraphs, the channel has a depth; and the sheave has an outer diameter that is approximately equal to or less than the channel depth.

[00014] In one embodiment including one or more features of any of the preceding paragraphs, an opening through the upright member near the at least one sheave is configured to allow a tension member to pass through the opening.

[00015] Another exemplary assembly for use as part of an elevator car includes an upright member having a channel along substantially an entire length of the upright member. The upright member includes an opening through the upright member that is configured to allow a tension member to pass through the opening. At least one sheave is supported by the upright member at least partially within the channel near the opening.

[00016] In one embodiment including one or more features of any of the preceding paragraphs, there are at least two sheaves at least partially within the channel; and there is an opening through the upright member near each of the sheaves.

[00017] In one embodiment including one or more features of any of the preceding paragraphs, the channel has a depth; and the sheave has an outer diameter that is approximately equal to or less than the channel depth.

[00018] In one embodiment including one or more features of any of the preceding paragraphs, a second upright member has an opening through the second upright member and the upright members are aligned such that the openings are configured to allow the tension member to pass through the openings in a horizontal direction across an associated elevator car.

[00019] In one embodiment including one or more features of any of the preceding paragraphs, a plurality of guide rollers is supported by the upright member including at least part of each of the guide rollers within the channel where the guide

rollers are each situated to engage a surface on a guiderail that is at least partially received within the channel.

[00020] In one embodiment including one or more features of any of the preceding paragraphs, a first one of the guide rollers has a first outside diameter and rotates about a first axis; a second one of the guide rollers has a second outside diameter and rotates about a second axis; the first and second axes are parallel; a third one of the guide rollers rotates about a third axis; the third axis is perpendicular to the first and second axes; the channel has a width that is perpendicular to the length; and the first and second diameters combined are less than the width of the channel.

[00021] In one embodiment including one or more features of any of the preceding paragraphs, the plurality of guide rollers comprises a first set of the first, second and third guide rollers and a second set of first, second and third guide rollers; the first set of guide rollers is near one end of the upright member; and the second set of guide rollers is near an opposite end of the upright member.

[00022] In one embodiment including one or more features of any of the preceding paragraphs, the upright member has a width and the length is greater than the width; and the first, second and third guide rollers are situated relative to the width to engage the surface on the guiderail in a position that is centered in the channel in the width direction.

[00023] In one embodiment including one or more features of any of the preceding paragraphs, an elevator safety braking device is supported at least partially within the channel in a position to selectively engage a guiderail that is at least partially received within the channel.

[00024] The various features and advantages of a disclosed embodiment will become apparent to those skilled in the art from the following detailed description. The drawings that accompany the detailed description can be briefly described as follows.

## BRIEF DESCRIPTION OF THE DRAWINGS

[00025] Figure 1 diagrammatically illustrates selected portions of an elevator car assembly designed according to an embodiment of this invention.

[00026] Figure 2 is a perspective illustration of an example assembly that is part of the example car assembly of Figure 1.

[00027] Figure 3 is another view of the assembly of Figure 2.

[00028] Figure 4 is an end view of the example of Figure 2 showing selected features of that embodiment.

[00029] Figure 5 illustrates an example roping arrangement useful with the example elevator frame shown in Figure 1.

## DETAILED DESCRIPTION

[00030] Figure 1 illustrates at least selected portions of an elevator car assembly 20. In the illustrated example, the car assembly 20 includes a frame that is separate from the elevator cabin (not illustrated). The frame includes a platform 22 configured to be situated beneath the elevator cabin. The frame includes an upper cross beam 24 and a lower cross beam 26, which is below the platform 22. Upright frame members 30 extend between the upper cross beam 24 and the lower cross beam 26. In a frameless car alternative, the platform 22, upper cross beam 24, lower cross beam 26 and/or uprights 30 could be part of the elevator cabin. This description uses the term "elevator car" to refer to a car frame, a cabin, a combined frame and cabin, or a frameless car.

[00031] Figures 2 and 3 show one of the upright frame members 30 and other components that form an assembly, which could be part of the example elevator car assembly 20 or the elevator cabin (in a frameless car arrangement). The upright frame member 30 includes a channel 32 that extends along substantially an entire length L of the upright frame member 30.

[00032] A set of guide rollers 34, 36 and 38 are supported by the frame member 30 near each end of the frame member. The illustrated example includes mounting brackets 40 that are secured to the upright frame member 30. As can best be appreciated from Figure 4, each of the guide rollers is supported by a mounting bracket 40 that is secured to the frame member 30. The brackets 40 that support the guide rollers 34 and 36 are received against a sidewall of the upright frame member 30 inside the channel 32. The bracket 40 that supports the guide roller 38 is received on a flange 42 that is formed as part of the upright frame member 30 in this example. The guide roller 34 rotates about an axis 44. The guide roller 36 rotates about an axis 46, which is parallel to the axis 44. The guide roller 38 rotates about an axis 48, which is perpendicular to the axes 44 and 46.

[00033] As can be appreciated from Figures 3 and 4, each of the guide rollers 34, 36, 38 is at least partially received within the channel 32 of the upright frame

member 30. The guide rollers are situated to engage a guide rail 50 that is at least partially received within the channel 32. The example guide rail 50 includes a base or mounting portion 52 that is configured to be secured to a hoistway wall. A blade area of the guide rail 50 includes surfaces 54, 56 and 58. The guide rollers 34, 36 and 38 respectively engage the surfaces 54, 56 and 58 for purposes of facilitating movement of the elevator car frame 20 along the guide rail 50.

[00034] One feature of the example arrangement is that the blade area of the guide rail 50 can be centered within the channel 32. The guide rollers 34 and 36 can be situated symmetrically about the center of the width W of the channel 32. The width W can be perpendicular to the length L (Figure 3) of the frame member 30. The outer diameter of the guide roller 34 combined with the outer diameter of the guide roller 36 is smaller than the width W of the channel 32. Having a centered arrangement like that shown in Figure 4 allows for balancing the load of the elevator car equally on opposite sides of the upright frame members 30.

[00035] The illustrated example includes an elevator safety braking device 60 supported on the frame member 30 in a position to selectively exchange the guide rail 50, which is at least partially received within the channel 32. The safety braking device 60 is received at least partially within the channel 32. In the illustrated example, the safety braking device 60 can be entirely received within the channel 32 because it has dimensions that are smaller than the width W and depth D of the channel 32.

[00036] With the guide rail 50 at least partially within the channel 32, it is possible to have the frame 20 closer to a hoistway wall. In other words, the illustrated example reduces the horizontal space required within a hoistway. Reducing hoistway dimensions provides building owners with increased rentable space.

[00037] The illustrated example also includes at least one sheave 70 supported by the upright frame members 30. As can best be appreciated in Figures 3 and 4, two sheaves 70 are included in this example. The sheaves 70 can be centered in the widthwise direction of the channel 32. As shown in Figure 4, the sheaves 70 include an outside diameter that is smaller than the depth D of the channel 32. This allows for supporting the sheaves 70 on the frame member 30 and containing them entirely within the channel 32.

[00038] The frame member 30 includes at least one opening 72 through the frame member 30. The opening 72 is configured to allow a load bearing member,

which is part of the elevator roping arrangement, to pass through the opening 72. Figure 5 illustrates an example arrangement in which two load bearing members 74, which comprise flat belts in this example, pass through openings 72 in the upright frame members 30. The load bearing members 74 pass through the openings 72 in a direction that is perpendicular to the width and length directions of the frame member 30. The sheaves 70 are situated near the openings 72 so that the sheaves 70 interact with the load bearing members 74 to facilitate movement of the elevator car frame 20. Having the sheaves 70 symmetrically situated about the center of the width W of the channel 32 allows for the load bearing members 74 to be centered in that direction, also. This centered arrangement provides efficiencies in component placement and space savings. Additionally, having the guide rail 50 centered between the load bearing members 74 enhances ride quality.

[00039] One feature of allowing the load bearing member 74 to pass through openings 72 in the upright frame members 30 is that it eliminates the need for any additional cross members to be included as part of the elevator car frame 20. As can be appreciated in Figure 5, the load bearing members 74 pass underneath the upper cross beam 24 in the illustrated example. In other examples, the roping arrangement includes an under slung configuration in which the sheaves 70 are located closer to a bottom of the upright frame members 30 and the load bearing members 74 pass beneath the lower cross beam 26. In previous under slung elevator car arrangements, a separate cross beam or channel member was provided to facilitate supporting the sheaves on the elevator car frame and providing an area through which the load bearing members would pass beneath the elevator car. With the illustrated example, it is possible to eliminate such an additional cross beam or channel, which reduces material cost and simplifies the assembly of an elevator car.

[00040] Supporting guide rollers, sheaves and a safety device on an upright frame member 30 allows for assembling all of those components at a manufacturing facility before the assembly is shipped to an installation site. This reduces the amount of labor required at the location of the elevator system. Additionally, such a pre-assembled arrangement allows for accurately positioning the components relative to each other, which facilitates more readily achieving proper alignment of elevator system components at the installation site.

[00041] The illustrated example assembly provides a compact arrangement that reduces the amount of space required by an elevator car assembly in a hoistway.

Reducing the number of cross beams and reducing the number of components that are supported above the upper cross beam or below the lower cross beam (or eliminating such a position of at least some components) reduces the vertical projection of the elevator car. This facilitates more readily achieving desired clearances above and below an elevator car within a hoistway. Additionally, the width of a hoistway can be reduced with the disclosed example.

[00042] The preceding description is exemplary rather than limiting in nature. Variations and modifications to the disclosed examples may become apparent to those skilled in the art that do not necessarily depart from the essence of this invention. The scope of legal protection given to this invention can only be determined by studying the following claims.

## CLAIMS

We claim:

1. An assembly for use as part of an elevator car, comprising:

an upright member having a channel along substantially an entire length of the upright member; and

a plurality of guide rollers supported by the upright member including at least part of each of the guide rollers within the channel where the guide rollers are each situated to engage a surface on a guiderail that is at least partially received within the channel.

2. The assembly of claim 1, wherein

a first one of the guide rollers has a first outside diameter and rotates about a first axis;

a second one of the guide rollers has a second outside diameter and rotates about a second axis;

the first and second axes are parallel;

a third one of the guide rollers rotates about a third axis;

the third axis is perpendicular to the first and second axes;

the channel has a width that is perpendicular to the length; and

the first and second diameters combined are less than the width of the channel.

3. The assembly of claim 2, wherein

the plurality of guide rollers comprises a first set of the first, second and third guide rollers and a second set of first, second and third guide rollers;

the first set of guide rollers is near one end of the upright member; and

the second set of guide rollers is near an opposite end of the upright member.

4. The assembly of claim 2, wherein

the upright member has a width and the length is greater than the width; and

the first, second and third guide rollers are situated relative to the width to engage the surface on the guiderail in a position that is centered in the channel in the width direction.

5. The assembly of claim 1, comprising an elevator safety braking device supported at least partially within the channel in a position to selectively engage a guiderail that is at least partially received within the channel.

6. The assembly of claim 5, comprising at least one sheave at least partially within the channel and supported by the upright member.

7. The assembly of claim 1, comprising at least one sheave at least partially within the channel and supported by the upright member.

8. The assembly of claim 7, wherein there are at least two sheaves at least partially within the channel.

9. The assembly of claim 7, wherein

the channel has a depth; and

the sheave has an outer diameter that is approximately equal to or less than the channel depth.

10. The assembly of claim 7, comprising an opening through the upright member near the at least one sheave, the opening being configured to allow a tension member to pass through the opening.

11. An assembly for use as part of an elevator car, comprising:

an upright member having a channel along substantially an entire length of the upright member, the upright member including an opening through the upright member that is configured to allow a tension member to pass through the opening; and

at least one sheave supported by the upright member at least partially within the channel near the opening.

12. The assembly of claim 11, wherein

there are at least two sheaves at least partially within the channel; and

there is an opening through the upright member near each of the sheaves.

13. The assembly of claim 11, wherein

the channel has a depth; and

the sheave has an outer diameter that is approximately equal to or less than the channel depth.

14. The assembly of claim 11, comprising a second upright member having an opening through the second upright member and wherein the upright members are aligned such that the openings are configured to allow the tension member to pass through the openings in a horizontal direction across an associated elevator car.

15. The assembly of claim 11, comprising a plurality of guide rollers supported by the upright member including at least part of each of the guide rollers within the channel where the guide rollers are each situated to engage a surface on a guiderail that is at least partially received within the channel.

16. The assembly of claim 15, wherein

a first one of the guide rollers has a first outside diameter and rotates about a first axis;

a second one of the guide rollers has a second outside diameter and rotates about a second axis;

the first and second axes are parallel;

a third one of the guide rollers rotates about a third axis;

the third axis is perpendicular to the first and second axes;

the channel has a width that is perpendicular to the length; and

the first and second diameters combined are less than the width of the channel.

17. The assembly of claim 16, wherein

the plurality of guide rollers comprises a first set of the first, second and third guide rollers and a second set of first, second and third guide rollers;

the first set of guide rollers is near one end of the upright member; and

the second set of guide rollers is near an opposite end of the upright member.

18. The assembly of claim 15, wherein

the upright member has a width and the length is greater than the width; and

the first, second and third guide rollers are situated relative to the width to engage the surface on the guiderail in a position that is centered in the channel in the width direction.

19. The assembly of claim 15, comprising an elevator safety braking device supported at least partially within the channel in a position to selectively engage a guiderail that is at least partially received within the channel.

20. The assembly of claim 10, comprising an elevator safety braking device supported at least partially within the channel in a position to selectively engage a guiderail that is at least partially received within the channel.

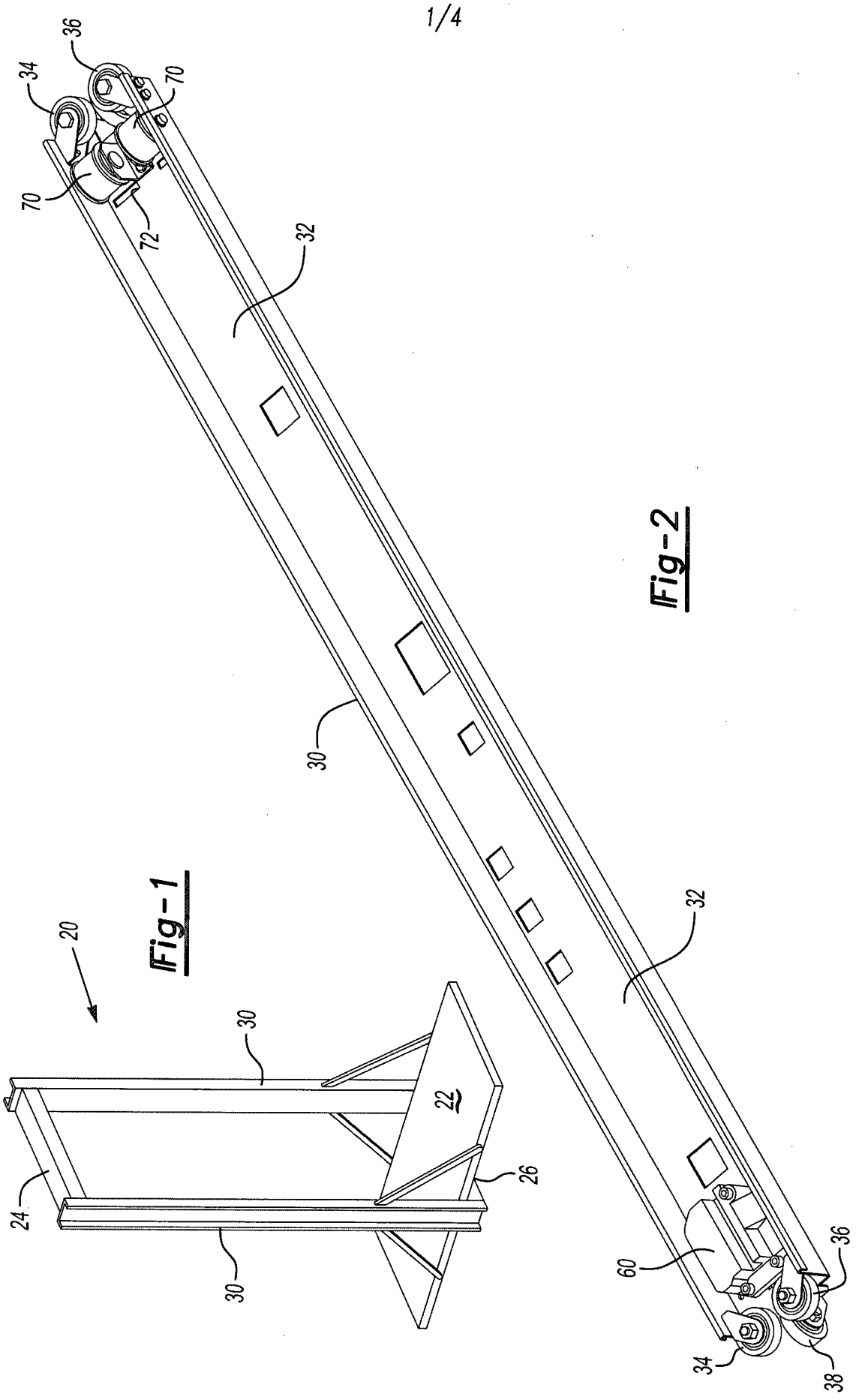



Fig-1

Fig-2

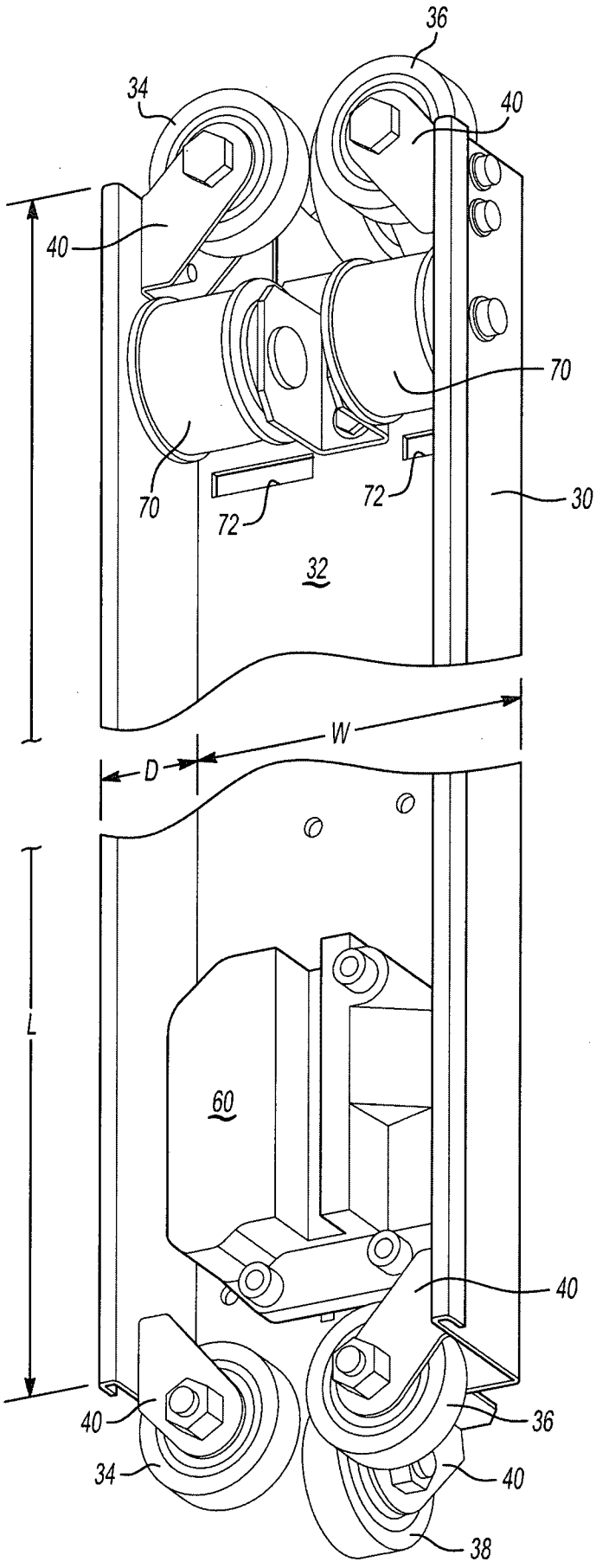



Fig-3

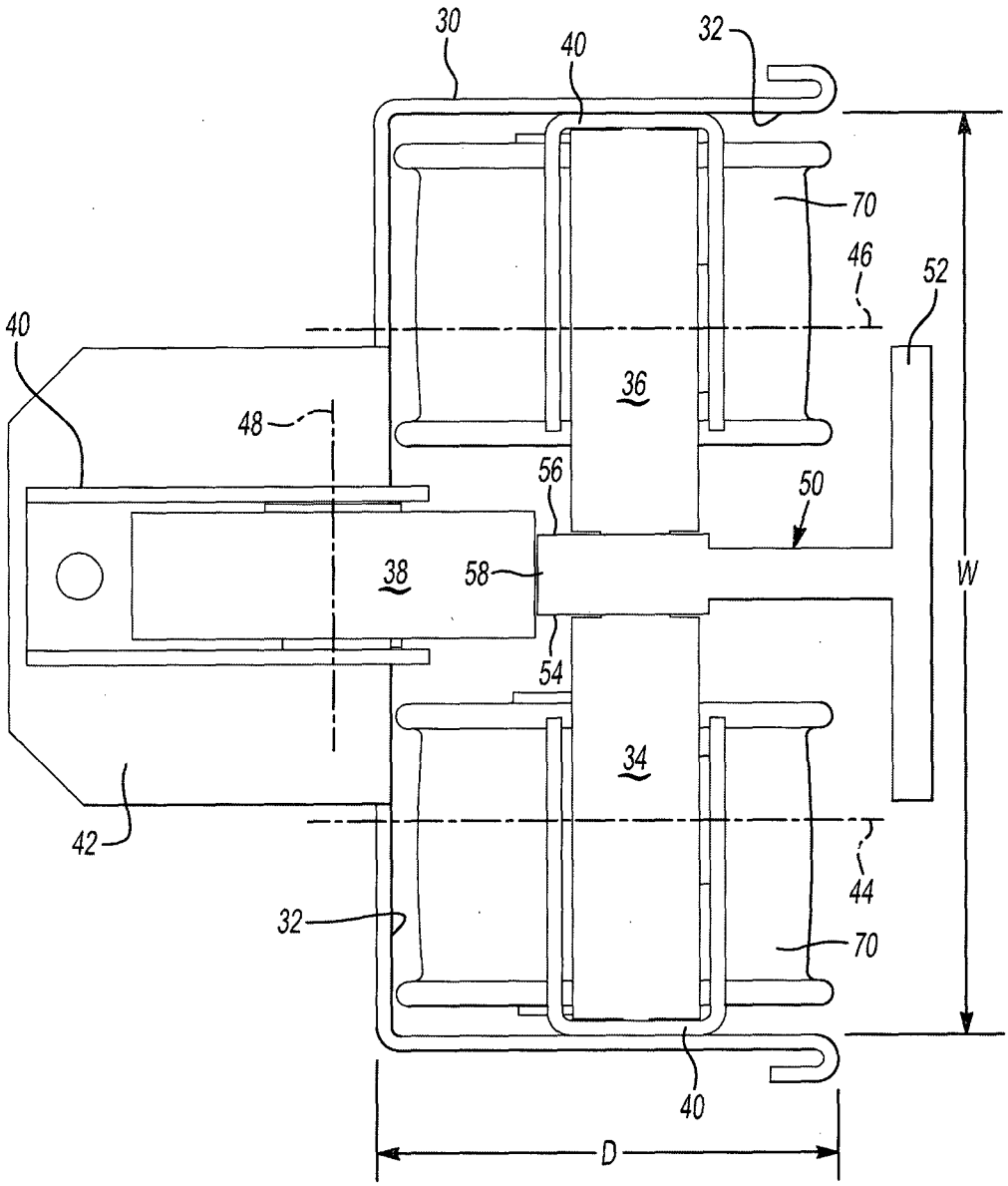



Fig-4

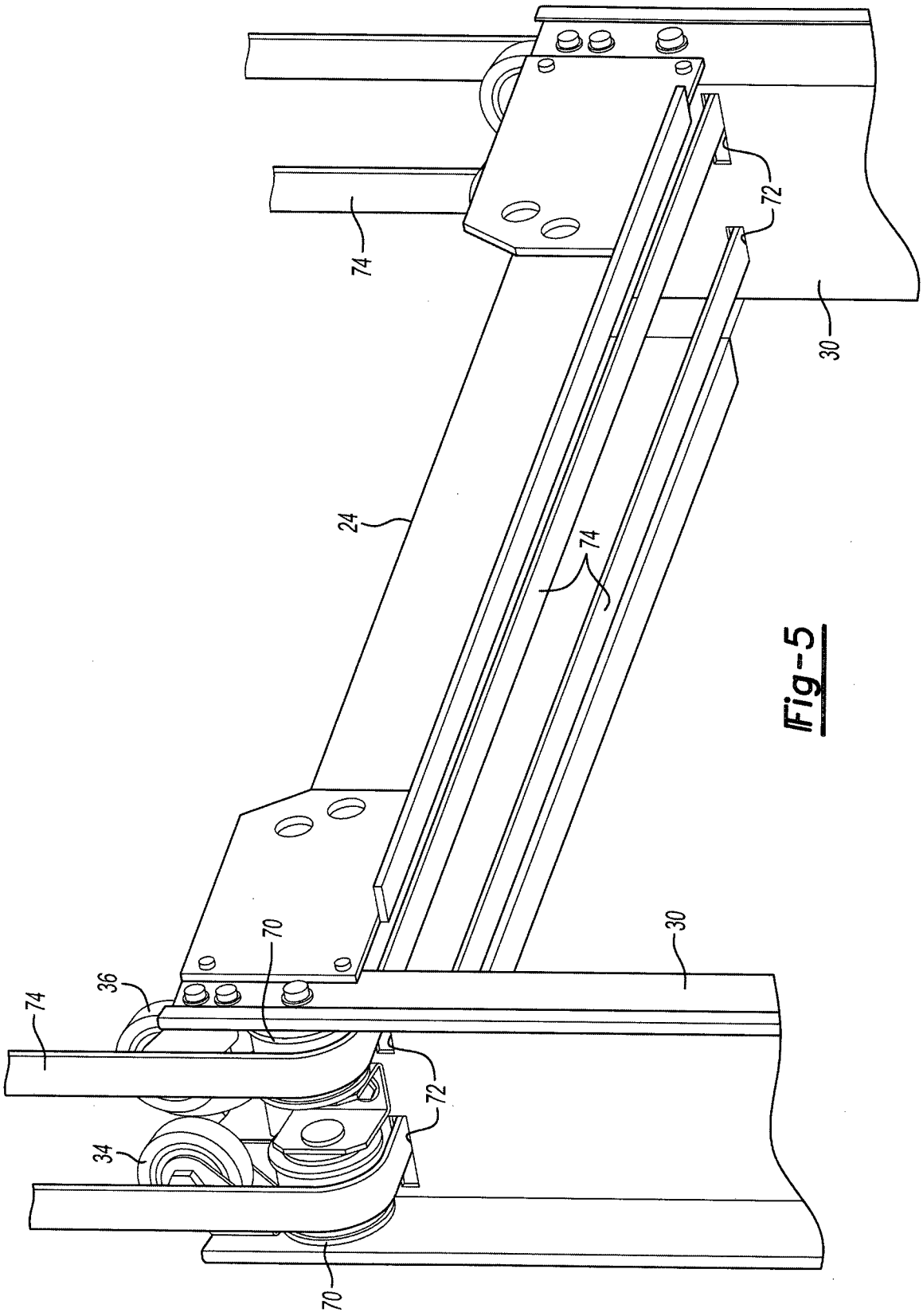



Fig-5

**INTERNATIONAL SEARCH REPORT**

International application No.
**PCT/IB2012/001138**

**A. CLASSIFICATION OF SUBJECT MATTER**

***B66B 7/02(2006.01)i, B66B 11/02(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

B66B 7/02; B66B 5/12; B66B 11/02; B66B 11/00; B66B 5/16; B66B 13/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: elevator, roller, and guide

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/IB2012/001138**

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