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71 Applicant: **OKAMURA CORPORATION**
7-18 Kitasaiwai 2-chome Nishi-ku
Yokohama-shi Kanagawa-ken (JP)

72 Inventor: **Mitsumoto, Takayasu**
1-26-5 Take
Yokosuka-shi Kanagawa-ken (JP)

Katayose, Kazunobu
935-5 Mutsuura-cho Kanazawa-ku
Yokohama-shi Kanagawa-ken (JP)

Shimomura, Tsuneo
45-6 Nokendai-dori Kanazawa-ku
Yokohama-shi Kanagawa-ken (JP)

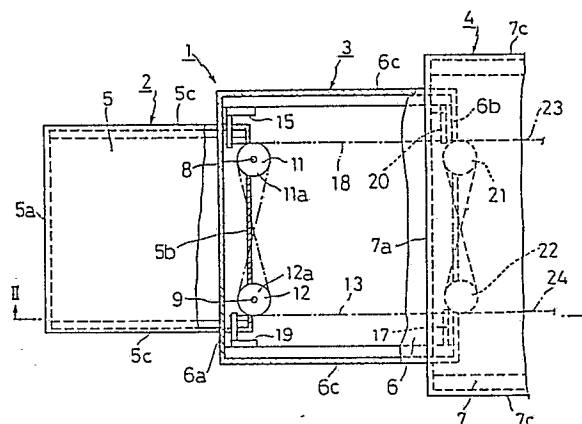
Sato, Junnosuke
3-1-10 Tomioka-Nishi Kanazawa-ku
Yokohama-shi Kanagawa-ken (JP)

74 Representative: **Harrison, Michael Robert et al**
Urquhart-Dykes & Lord 91 Wimpole Street
London W1M 8AH (GB)

54 **Apparatus for causing straight movement of a stand section in a movable stand.**

57 A movable stand comprising a plurality of sections and capable of being contracted, when not used, to a state with each section held right under the section immediately behind in use and also being elongated, when used, to a staircase-like form with each stair constituted by each section, is disclosed. The invention concerns an apparatus for causing straight movement of each section of the movable stand, which comprises a pair of, i.e., left and right, horizontal sprocket assemblies (11, 12) provided on the rear end of the foremost section in use, and a pair of chains (13, 18) having front end portions (13a, 18a) secured to the opposite inner side walls of the section immediately behind the foremost section in use, intermediate portions (13b, 18b) passed round the pair sprocket assemblies such as to cross each other between the sprocket assemblies and rear end portions (13c, 18c) secured. The sprocket assemblies and chains function in combination as a parallel rule to ensure straight movement of the section.

FIG. 1



Description**APPARATUS FOR CAUSING STRAIGHT MOVEMENT OF A STAND SECTION IN A MOVABLE STAND****BACKGROUND OF THE INVENTION****Field of the Invention**

The present invention relates to an apparatus for causing straight movement of a section of a movable stand having a plurality of sections and capable of being elongated and contracted.

Prior Art

Movable stands used for multi-purpose halls are well-known in the art. Such a moveable stand comprises a plurality of sections. When it is not used, it is contracted to a state, in which each section is held under the adjacent section immediately behind. When used, it is elongated to a staircase-like form with each stair constituted by each section, and folded seats on each section are unfolded.

To move the sections of such a movable stand into and out of one another, there is a mechanism disclosed in Japanese Patent Application No. 61-121000 filed earlier by the applicant and entitled "Movable Stand". As shown in Fig. 6, in this movable stand, the individual section other than the rearmost section (d) is accommodated in the section (d) by taking up wires (c) secured to the foremost section (a) and wound on take-up drums (b). To elongate the stand to the staircase-like form with each stair constituted by each section, the sections other than the rearmost section (d) are moved forwardly by taking up wires (g) secured to the foremost section, passed round pulleys (e) and (g) mounted in the intermediate sections and wound on the drums (b).

In this movable stand, the individual section is moved with wheels along the floor (i), and the opposite sides of a rear portion of each section are guided by the section immediately behind. Therefore, when the stand is elongated, the sections are liable to draw a meandering trace as they are moved.

United States Patent No. 3,400,502 discloses a movable stand, in which each section is provided with means for causing straight movement of it. This means consists of ropes and pulleys arranged such as to form a parallel rule.

More specifically, in the means the swing of the section to the left and right is corrected by stretching the ropes wound on the pulleys. However, straight movement can not always be ensured due to the slip and elongation of the ropes.

SUMMARY OF THE INVENTION

The present invention has an object of providing an apparatus for causing straight movement of a section of a movable stand, which permits each section to be moved straight when the stand is elongated and contracted.

To attain the above object of the invention, there is provided an apparatus for causing straight movement of a stand section in a movable stand

comprising a plurality of stand sections and each of them capable of being contracted telescopically, when not used, to one stand form, and also being elongated, when used, to a staircase-like stand form with each stair constituted by each of said sections, characterized in that a pair of horizontal sprocket assemblies are provided on the rear end of the foremost stand section in use, a pair of chains are provided so that front end portions thereof are secured to the opposite inner side walls of a stand section immediately behind the foremost stand section in use, intermediate portions thereof are passed round said pair of sprocket assemblies such as to cross each other between said sprocket assemblies, and rear end portions are secured to the opposite inner side walls of said stand section behind, whereby said chains and said sprocket assemblies function in combination as a parallel rule.

Since the left and right sprocket assemblies and pair chains are adapted to function in combination as a parallel rule, the sprocket assemblies are rotated in unison and without any slip and provides equal and opposite torques to the section, so that parallel and straight movement of the section can be ensured.

The above and other objects, features and advantages of the present invention will become more apparent from the description of the preferred embodiment of the invention when the same is read with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a plan view, partly broken away, showing an embodiment of the apparatus according to the invention;

Fig. 2 is a sectional view taken along line II-II in Fig. 1;

Fig. 3 is a sectional view, to an enlarged scale and partly broken away, showing a central stand section shown in Fig. 1;

Fig. 4 is fragmentary sectional view, to an enlarged scale, showing a portion shown in Fig. 2;

Fig. 5 is a sectional view taken along line V-V in Fig. 5; and

Fig. 6 is a schematic side view showing a known movable stand.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will now be described with reference to Figs. 1 to 5.

Referring to the Figures, there is shown a movable stand 1, which consists of a plurality of, i.e., three in this embodiment, stages 2 to 4. The sections 2 to 4 are arranged one behind another in the mentioned order, and the section 2 is the foremost section.

Each section has a width and height, which are reduced compared to those of the section immediately behind it.

When the stand 1 is not used, it is held in a contracted state, in which each section is held right

under the section immediately behind it in the state of use. When using the stand, it is extended forwardly to a staircase-like form. At this time, the individual sections are moved in an interlocked relation to one another by drive means (not shown).

The mechanism for moving the sections are the same as for the prior art movable stand shown in Fig. 6, so it will not be described any further. The invention concerns an apparatus for causing straight and parallel movement of sections by using a combination of chains and sprockets as a parallel rule.

The first, i.e., foremost, section 2 is a box-like open at the bottom, that is, it has a floor panel 5 at the top, front and rear panels 5a and 5b depending from the respective front and rear edges of the floor panel, and side panels 5c and depending from the opposite side edges of the floor panel.

The second and third sections 3 and 4, like the first section 2, respectively have floor panels 6 and 7 at the top, front and rear panels 5a, 7a and 6b, 7b and side panels 6c and 7c.

The first section 2 has a pair of vertical shafts 8 and 9 mounted by mounting members on the outer surface of the rear panel 5b adjacent to the opposite sides. The vertical shafts 8 and 9 extend upwardly into the second section 3.

A sprocket assembly 11 consisting of two, i.e., upper and lower, sprockets 11a and 11b integral with each other is rotatably mounted on an upper portion of the left side vertical shaft 8, and another sprocket assembly 12, also consisting of a pair of sprockets 12a and 12b is rotatably mounted on an upper portion of the right side vertical shaft 9.

In Fig. 3, a reference numeral 13 designates a chain, which has a front end portion 13a secured to a chain support member 15 extending from the front end of a horizontal member 14 extending horizontally inwardly from the left side panel 6c, has an intermediate portion 13b passed round a rear portion of the upper sprocket 11a of the left side sprocket assembly 11 and then round a front portion of the upper sprocket 12a of the right side sprocket assembly 12, and has a rear end portion 13c secured to a chain support member 17 extending from the front end of a horizontal plate 16 extending horizontally inwardly from the right side panel 6c. In this way, the chain 13 is stretched in the form of Figure 2 in plan view.

Another chain 18 is stretched symmetrically with respect to the chain 13. More specifically, it has a front end portion 18a secured to a chain support member 19 provided on the right side panel, has an intermediate portion 18b passed round the sprockets 12b and 11b and has a rear end portion 18c secured to a chain support member 20 provided on the left side panel.

The chains 13 and 18 cross each other between the sprocket assemblies 11 and 12.

As shown in Fig. 1, the second section 3 also has a pair of, i.e., left and right, sprocket assemblies 21 and 22 mounted on the rear panel 6b and has left and right chains 23 and 24 stretched likewise such that they cross each other between the sprocket assemblies 23 and 24.

The operation will now be described typically in conjunction with the first section 2.

In the accommodated state of the section 2 as shown in Fig. 3, the left and right sprocket assemblies 11 and 12 of the first section 2 are in mesh with portions of the chains 13 and 18 of the immediately adjacent section 3 near the rear end thereof.

When the section 2 is moved forwardly by drive means (not shown), the sprocket assemblies 11 and 12 are moved in the direction of arrows (j). At this time, the sprocket 11a is rotated by the chain 13 in the clockwise direction in Fig. 3, so that a front portion of the section 2 is given a leftward torque as shown by arrow (k).

At the same time, the sprocket 12b is rotated by the chain 18 in the counterclockwise direction in Fig. 3, so that the front portion of the section 2 is given a rightward torque as shown by arrow (l). It will be appreciated that since the sprocket assemblies and chains are combined in the form of a parallel rule, there occurs no slip. In addition, the section 2 is evenly biased on the opposite sides. The section 2 is thus moved straight without swinging to the left and right to a state of use as shown in Figs. 1 and 2.

The second section 3 likewise moved straight forwardly with forward movement of the sprocket assemblies 21 and 22 relative to the pair chains 23 and 24 stretched in the third section 4.

Since the chains 13 and 18 have the opposite ends secured to the chain support members 15, 17, 19 and 20, their tension and state of mesh with the sprockets 11 and 12 can be readily adjusted with the chain support members, and also it is possible to effect fine adjustment.

As has been described in the foregoing, according to the invention, chains and sprocket assemblies are provided in combination functioning like a parallel rule to permit straight movement of the stand section. Thus, it is possible to maintain straight movement of the section at the time of the elongation and contraction of the movable stand, to prevent damage to the section at the time of the movement and to permit smooth movement.

Claims

1. An apparatus for causing straight movement of a stand section in a movable stand comprising a plurality of stand sections and each of them capable of being contracted telescopically, when not used, to one stand form, and also being elongated, when used, to a staircase-like stand form with each stair constituted by each of said sections, characterized in that:

a pair of horizontal sprocket assemblies are provided on the rear end of the foremost stand section in use,

a pair of chains are provided so that front end portions thereof are secured to the opposite inner side walls of a stand section immediately

behind the foremost stand section in use, intermediate portions thereof are passed round said pair of sprocket assemblies such as to cross each other between said sprocket assemblies, and rear end portions are secured to the opposite inner side walls of said stand section behind, whereby said chains and said sprocket assemblies function in combination as

a parallel rule.

2. The apparatus according to claim 1, wherein tension of said pair of chains and a state of meshing with each of said pair of sprocket assemblies can be adjusted by chain support members (15, 17, 19 and 20) which secure opposite ends of said chains thereto.

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FIG. 1

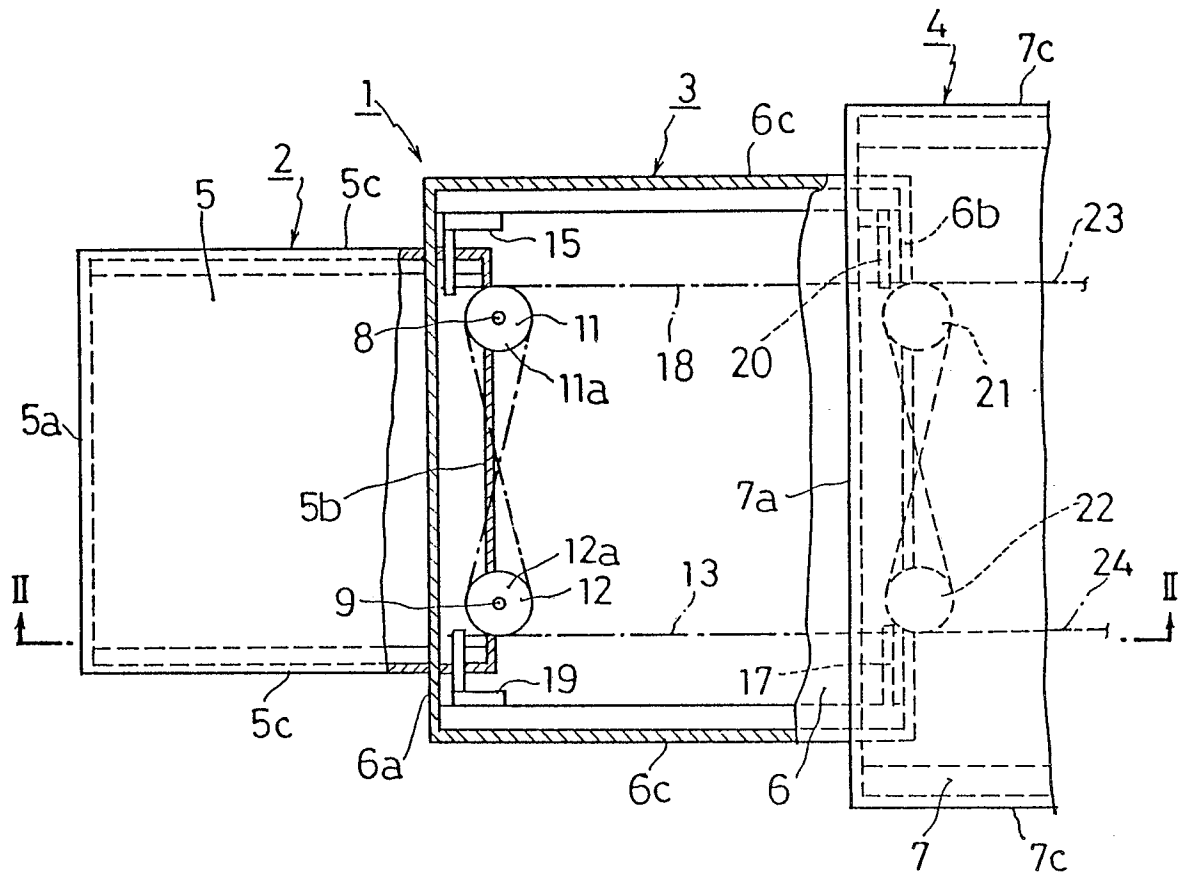


FIG. 2

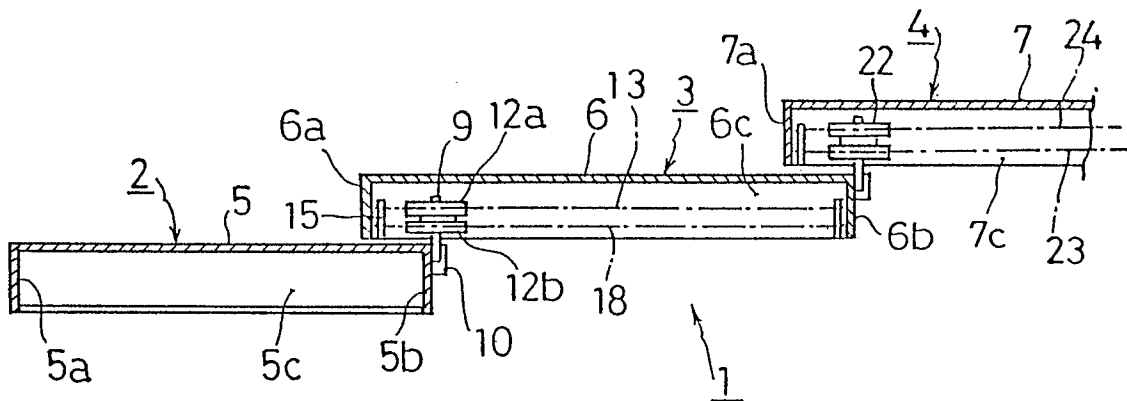


FIG.3

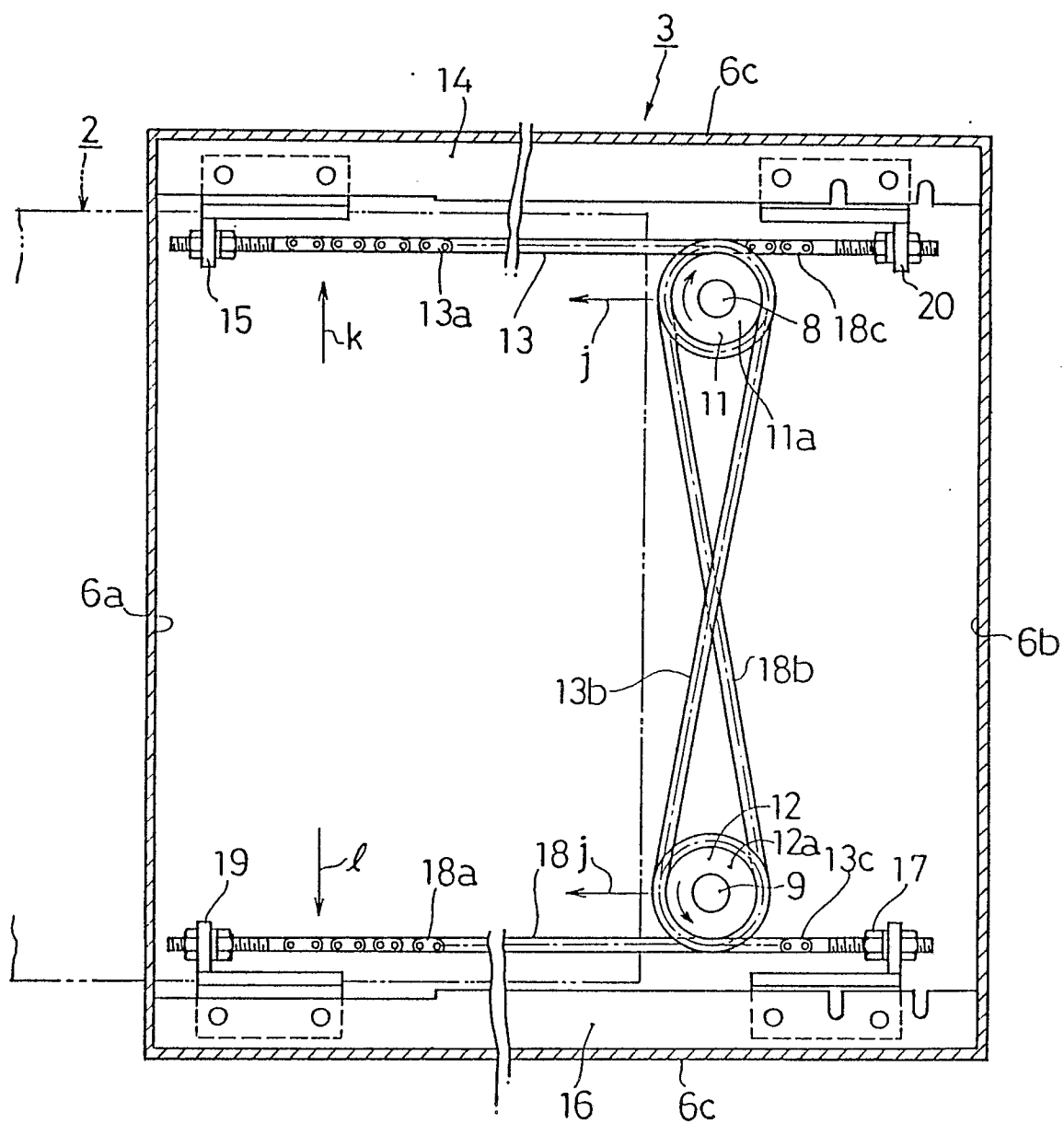


FIG.4

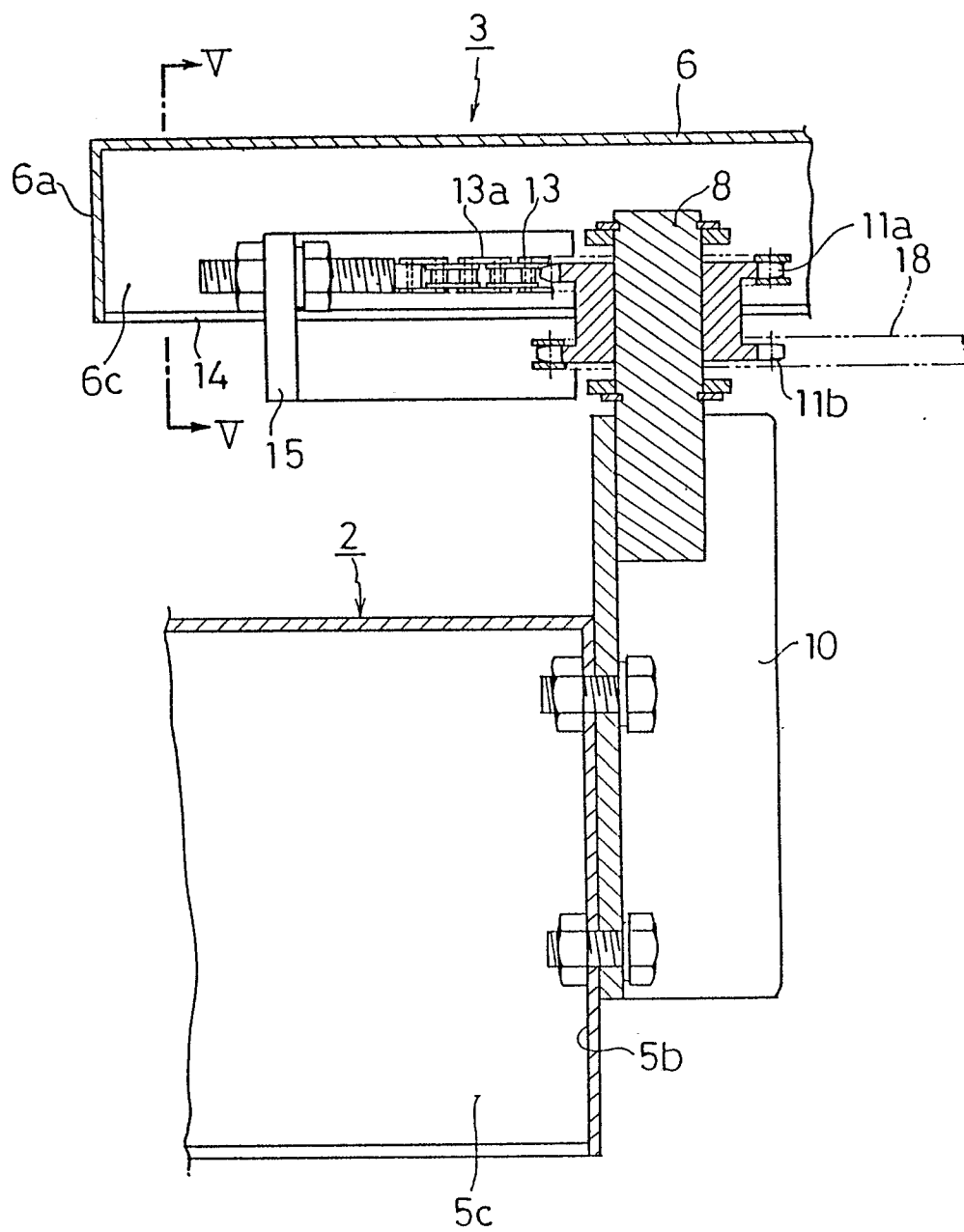


FIG. 5

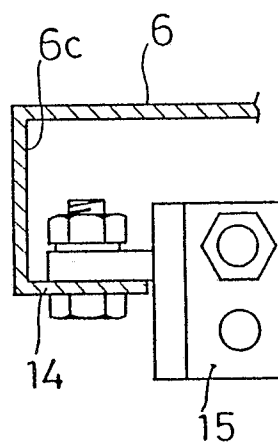
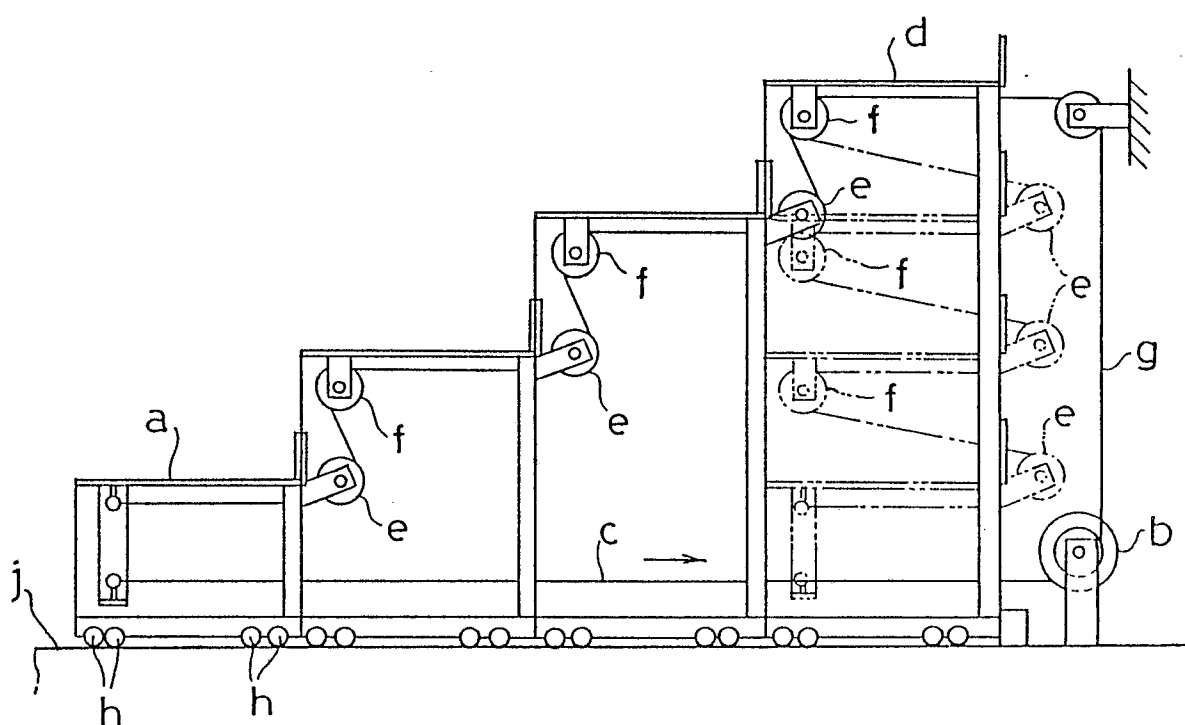


FIG.6





DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)		
Y,D	US-A-3 400 502 (SCAGGS) * Column 3, lines 1-37; figures 1-9 *	1	E 04 H 3/12		
A	---	2			
Y	DE-A-2 935 440 (TELEKON GmbH) * Page 13, line 3 - page 14, line 3; figures 1-5 *	1			
A	---	2			
A	US-A-3 667 171 (McCLELLAND et al.) * Column 2, lines 66-68; column 3, lines 44-60; figure 2 * -----	1			
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)		
			E 04 H E 04 B		
The present search report has been drawn up for all claims					
Place of search THE HAGUE		Date of completion of the search 20-01-1989	Examiner CLASING M.F.		
<table><tr><td>CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</td><td>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</td></tr></table>				CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document
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