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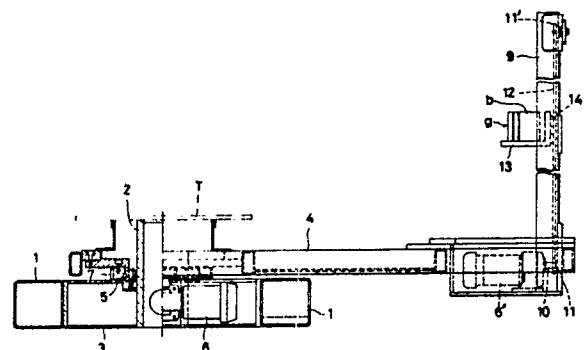
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⑤④ **FILM STRETCHING AND WIND-WRAPPING APPARATUS.**

⑤⑦ A rotary frame (4) provided with a vertical support post (9) at the front end portion thereof is supported on a vertical fixed shaft (2) so that the rotary frame (4) can be turned therearound, and a film stretching roller unit (g) used to stretch a plastic film which is to be wound in a stretched state around a cargo (C) is provided on the support post (9). A stretched film (e) is wound around the cargo (C) by turning the rotary frame (4) around the axis of the vertical fixed shaft (2). Since the cargo (C) is not turned during the winding of the film therearound, it does not fall in the absence of the centrifugal force.

FIG. 3



DESCRIPTION

WRAPPING APPARATUS

5 BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a wrapping apparatus capable of wrapping a plurality of loads with a plastic
10 film by stretching and winding the plastic film, which has been drawn out from a film roll, around the loads.

Description of the Prior Art

The wrapping loads with cases, that is, the packing loads in boxes is a usual method for transporting a large
15 quantity of sole type products. In general, a large quantity of sole type products are stacked in corrugated cardboards or wrapped with craft paper before the end portions of the craft paper are glued up or fastened by tape. There is another method of transporting the products
20 of the type described above. With this method, the products can be formed into an integrated shape by winding the products with a stretchable film while stretching the film before the film is contracted, such a method being disclosed in, for example, Japanese Patent Unexamined
25 Publication No. 59-52087, and entitled "Wrapping Method and

Apparatus". According to the disclosure above, a method and an apparatus have been disclosed in which a plurality of loads are placed on the upper surface of a support frame which can be rotated by a motor or the like, the

5 stretchable plastic film wound in the form of a roll is mounted on a film supply device disposed next to the above-described support frame, an end portion of the above-described stretchable plastic film is secured to the load placed on the above-described support frame, the above-
10 described stretchable plastic film is supplied at a speed lower than the rotational speed of the support frame, and the stretchable tape is wound around the stacked loads with the stretchable tape stretched.

However, according to this method, a large output
15 motor is necessary to be provided since the support frame on which the loads are arranged to be placed must be rotated. Another problem arises in that the size of the apparatus becomes too large or the structure of the same becomes too complicated since a plate capable of downward
20 pressing the loads is necessary for the purpose of protecting the loads from the falling down caused by a centrifugal force, the falling down being taken place depending upon the type of the loads. In order to overcome the above-described problems, a wrapping apparatus has been
25 developed which comprises a stationary gate-shaped frame,

and a rotatable arm capable of rounding the load and
suspended from the stationary gate-like frame. However, the
height of the apparatus becomes excessive, causing the
height of a building in which the apparatus is accommodated
5 to also become excessive inevitably. Therefore, the
apparatus of the type described above has not been put to
practical use because of the involved heavy weight and
large size thereof.

10 SUMMARY OF THE INVENTION

An object of the present invention is to provide a
wrapping apparatus capable of wrapping loads with
stretchable plastic film without any necessity of rotating
15 the stacked loads only with the reduced weight and the
size.

The object of the present invention can be achieved by
a wrapping apparatus comprising: a stationary base; a
hollow stationary shaft secured to the stationary base and
20 provided with a portion on which a load is placed at the
upper end portion thereof; a rotary frame fastened so as to
rotate around the stationary shaft and having a vertical
support post at the front portion thereof; a film
stretching roller device disposed to the support post and
25 capable of stretching a stretchable plastic film to be

wound to the load; and a device capable of rotating the rotary frame centering the axis of the vertical stationary shaft for the purpose of winding the stretched film around the load.

5 The wrapping apparatus according the present invention further comprises a device for vertically reciprocating the film stretching roller device along the support post. The reciprocating device comprises: a sprocket wheel of an electric motor disposed at the front portion of the rotary
10 frame; a sprocket wheel rotatably borne at the front portion of the support post; and an endless chain arranged between the sprocket wheels, wherein the film stretching roller device is disposed in a carriage, and the carriage is connected to the endless chain so as to be moved in the
15 vertical direction along the support post when the endless chain runs.

 The device capable of rotating the rotary frame centering the axis of the vertical stationary shaft is positioned around the stationary shaft and includes a gear
20 positioned around the stationary shaft and secured to the base portion of the rotary frame and a pinion gear rotated by a motor fastened to the base, the pinion gear being meshed with the gear. A slip ring which is electrically insulated is secured to the hollow vertical stationary
25 shaft, and electric terminals which have been brought into

electrically contact with the slip ring are provided for the rotary frame, one of the electric terminals being electrically connected to the motor of the rotary frame.

5 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a wrapping apparatus embodying the present invention in a state in which a load is being wrapped;

10 Fig. 2 is a plan view of the wrapping apparatus embodying the present invention;

Fig. 3 is a side elevational view of the wrapping apparatus embodying the present invention from which a portion is cut off;

15 Fig. 4 is a plan view of essential portions of the wrapping apparatus shown in Fig. 3;

Fig. 5 is a schematic view of a vertically reciprocating device of a film stretching roller device included in a support post portion of the wrapping
20 apparatus embodying the present invention; and

Fig. 6 is a schematic cross sectional view of an example of a power supply mechanism of the wrapping apparatus embodying the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A wrapping apparatus embodying the present invention will be described with reference to the drawings which
5 illustrate the embodiments thereof.

Referring to Figs. 1 to 4, the wrapping apparatus according to the present invention comprises a stationary base including stationary frames 1 and support frame 3 secured between the frames 1, a vertical stationary shaft 2
10 being secured to the support frame 3. The vertical stationary shaft 2 is formed in a hollow shape and has a table T at the upper end portion thereof, the table T being arranged such that a pallet (a) on which a load (c) is placed thereon. A rotary frame 4 is rotatably fastened to
15 the stationary shaft 2 via a bearing member 5 disposed around the stationary shaft 2. A device for rotating the rotary frame 4 comprises an electric motor 6 secured to the support frame 3. A gear 7 is secured on the lower surface of the base portion of the rotary frame 4, the gear 7 being
20 arranged to be meshed with an operating gear 8 which can be rotated by the electric motor 6. Thus, when the electric motor 6 is rotated, the operating gear 8 which meshes with it is rotated, and the rotary frame 4 is, via the gear 7 mesh with the operating gear 8, rotated centering an axis
25 of the stationary shaft 2.

At the front portion of the rotary frame 4 there is provided an erected support post portion 9, and a motor 6' is accommodated in the front portion of the rotary frame 4. The motor 6' has its rotary shaft 10 having a sprocket wheel 11 secured to the rotary shaft 10. A sprocket wheel 11' is rotatably fastened to the upper end portion of the support post portion 9. An endless chain 12 is arranged between the sprocket wheels 11 and 11' so as to run between the sprockets 11 and 11' when the motor 6' is rotated. A carriage 13 having a film roll stand 5 and a film stretching roller device (g) comprises rollers 14 which mesh with a pair of C-shaped guide members 13a of the support post 9, the C-shaped guide members 13a opposing each other. The carriage 13 is connected to the chain 12 (see Fig. 5). Thus, the carriage 13 can be reciprocated in the vertical direction along the support post 9 by the rotation of the chain 12.

Although the above-described two motors 6 and 6' may be operated by electricity, air, hydraulic pressure, the two motors 6 and 6' are preferably arranged to be electric motors.

As shown in Fig. 6, a power supply mechanism for the electric motor 6' is constituted in such a manner that a slip ring 15 is secured to the outer surface of the stationary shaft 2 in an electrically insulated manner, and

an electric cable is drawn out from the hollow portion of the stationary shaft 2 via the outer surface of the stationary shaft 2 before being connected to the slip ring 15. Electric terminals or brushes 16 which are brought
5 into electrically contact with the slip ring 15 are fastened to the base portion of the rotary frame 4 disposed around the stationary shaft 2. One of the electric terminals 16 is electrically connected to the motor 6' so as to supply power to it.

10 The above-described mechanism supplies energy to a chucking mechanism (omitted from illustration) for holding the end portion of the stretchable film from a film roll (b) secured to the carriage 13 prior to the wining of the same to the load placed on the pallet (a) mounted on the
15 end portion of the table T on the stationary shaft 2. The same mechanism also supplies energy to a cutting mechanism (d) disposed on the rotary frame 4 for cutting the film after the wrapping operation has been completed.

As shown in Figs. 1 and 2, according to the above-
20 described apparatus embodying the present invention, the load (c) placed on the pallet (a) by a conveyance mechanism such as a belt conveyer is then placed on the table T on the stationary shaft 2. Then, the end portion of a stretchable film (e) drawn out from the film roll (b)
25 supported by a stand (f) of the carriage 13 through the

film stretching roller device (g) is pulled and secured at the load (c), or is held by the chucking mechanism (omitted from illustration). When the rotary frame 4 is rotated by the electric motor 6, the support post 9 is rotated,
5 causing the film roll (b) on the carriage 13 and the stretching roller device (g) to be also rotated around the load (c) as shown in Figs. 1 and 2. Thus, the film (e) is wound to the load (c) while stretched. At this time, the carriage 13 is reciprocated vertically along the post 9 by
10 the chain 12 which is rotated by the motor 6'. As a result, the all of the sides of the load (c) is wrapped by the film (e). The film (e) which has wrapped the load is cut by the cutting device (d) on the rotary frame 4 so that the wrapping operation is completed.

15 As described above, with the apparatus according to the present invention, the support post portion is rotated around the supported load as an alternative to the structure in which the load is rotated. Then, the stretchable film is drawn out from the film roll held by
20 the rotating support post portion through the stretching roller device so as to wrap the load. Therefore, the wrapping operation can be preferably conducted regardless of the weight of the load. Therefore, with the apparatus according to the present invention, energy can be
25 significantly saved with respect to the conventional

mechanism in which the load is rotated. Furthermore, weight and the size of the apparatus according to the present invention can be reduced since operating energy to be supplied thereto is transmitted through energy supply means such as a power transmitting cable or the like which is arranged in the hollow stationary shaft. As a result, the apparatus can be transported to the desired place by, for example, 2-ton track. In addition, since the load itself does not rotate, no centrifugal force is generated.

10 Therefore, no conventional plate for pressing the load downward is necessary. In addition, the loads can be protected from falling down due to the rotation. Therefore, a variety of wrapping operations can be conducted.

Claims

1. A wrapping apparatus comprising:
 - a stationary base;
 - a hollow stationary shaft (2) secured to said
 - 5 stationary base and provided with a portion on which a load (c) is placed at the upper end portion thereof;
 - a rotary frame (4) fastened so as to rotate around said stationary shaft (2) and having a vertical support post (9) at the front portion thereof;
 - 10 a film stretching roller device (g) disposed to said support post (9) and capable of stretching a stretchable plastic film (e) to be wound to said load (c); and
 - a device capable of rotating said rotary frame (4) centering the axis of said vertical stationary shaft (2)
 - 15 for the purpose of winding said stretched film (e) around said load (c).
2. A wrapping apparatus according to Claim 1 further comprising a device for vertically reciprocating said film stretching roller device (g) along said support post (9).
- 20 3. A wrapping apparatus according to Claim 2, wherein said reciprocating device comprises:
 - a sprocket wheel (11) of an electric motor (6') disposed at the front portion of said rotary frame (4);
 - a sprocket wheel (11') rotatably borne at the front
 - 25 portion of said support post (9); and

an endless chain (12) arranged between said sprocket wheels (11) and (11'), wherein said film stretching roller device (g) is disposed in a carriage (13), and said carriage (13) is connected to said endless chain (12) so as
5 to be moved in the vertical direction along said support post (9) when said endless chain (12) runs.

4. A wrapping apparatus according to Claim 1, wherein said device capable of rotating said rotary frame (4) centering the axis of said vertical stationary shaft (2) is
10 positioned around said stationary shaft and includes a gear (7) positioned around said stationary shaft (2) and secured to the base portion of said rotary frame (4) and a pinion gear (8) rotated by a motor (6) fastened to said base, said pinion gear (8) being meshed with said gear (7).

15 5. A wrapping apparatus according to Claim 3, wherein a slip ring (15) which is electrically insulated is secured to said hollow vertical stationary shaft (2), and electric terminals (16) which have been brought into electrically contact with said slip ring (15) are provided for said
20 rotary frame (4), one of said electric terminals (16) being electrically connected to said motor (6') of said rotary frame (4).

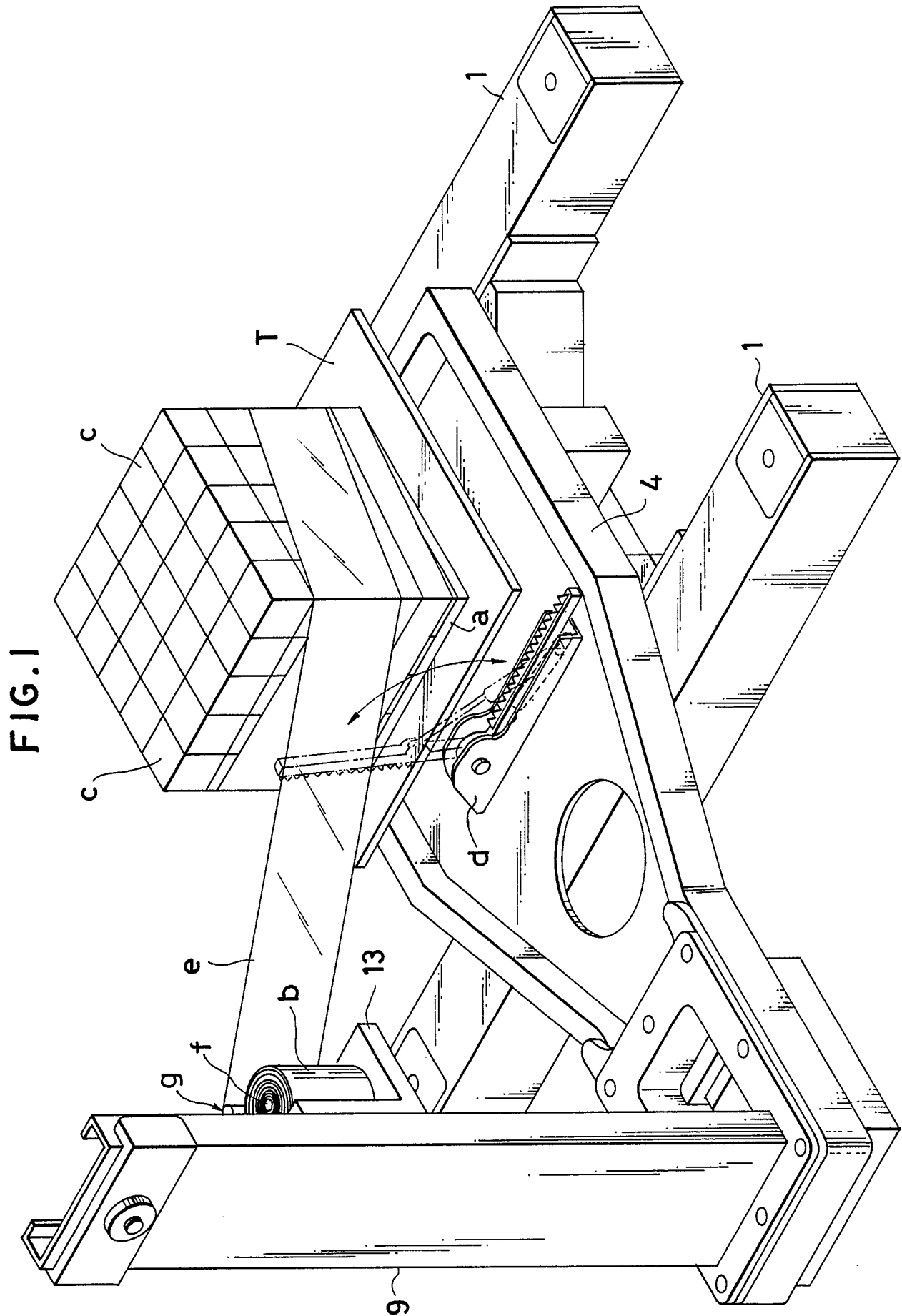


FIG.2

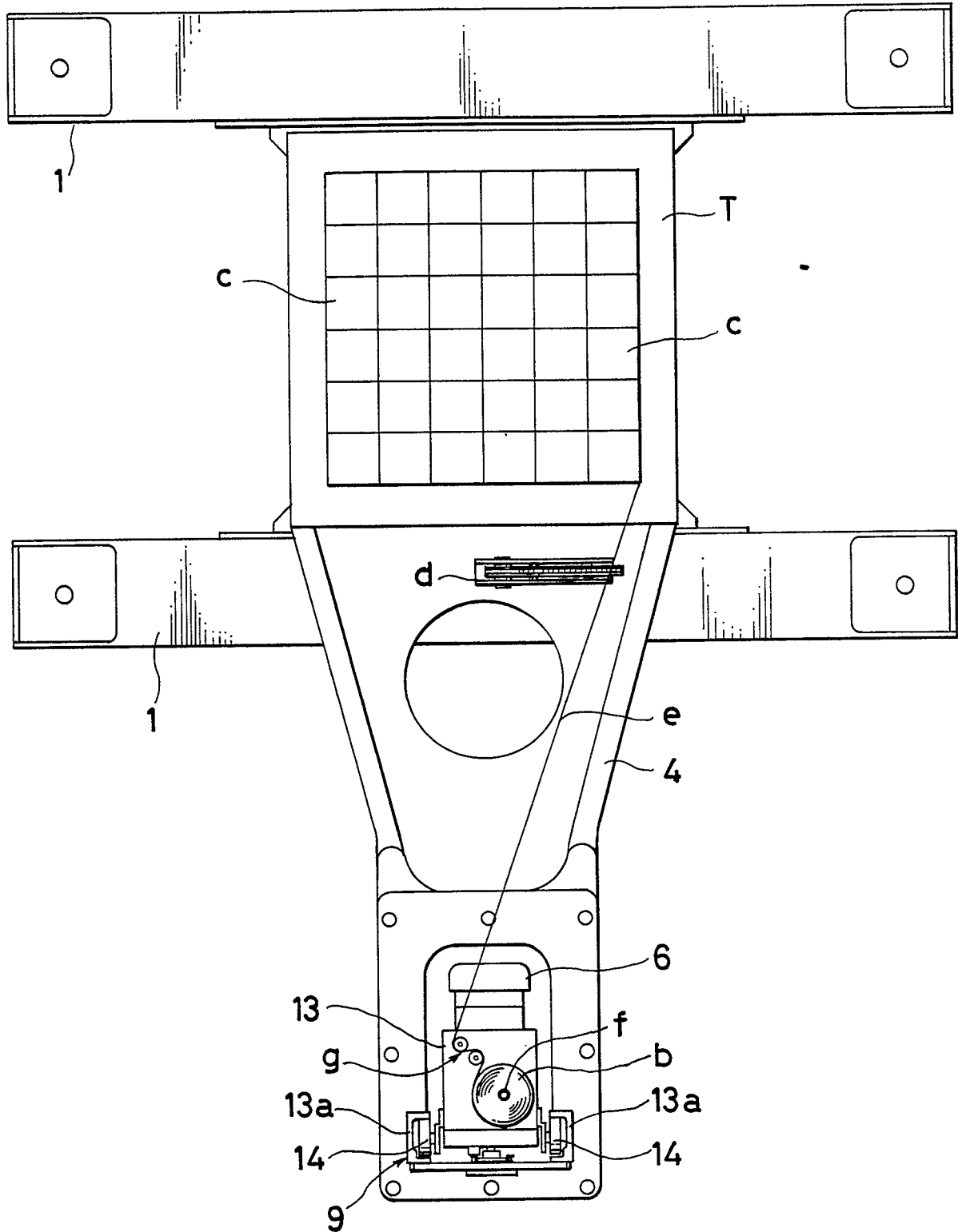


FIG. 3

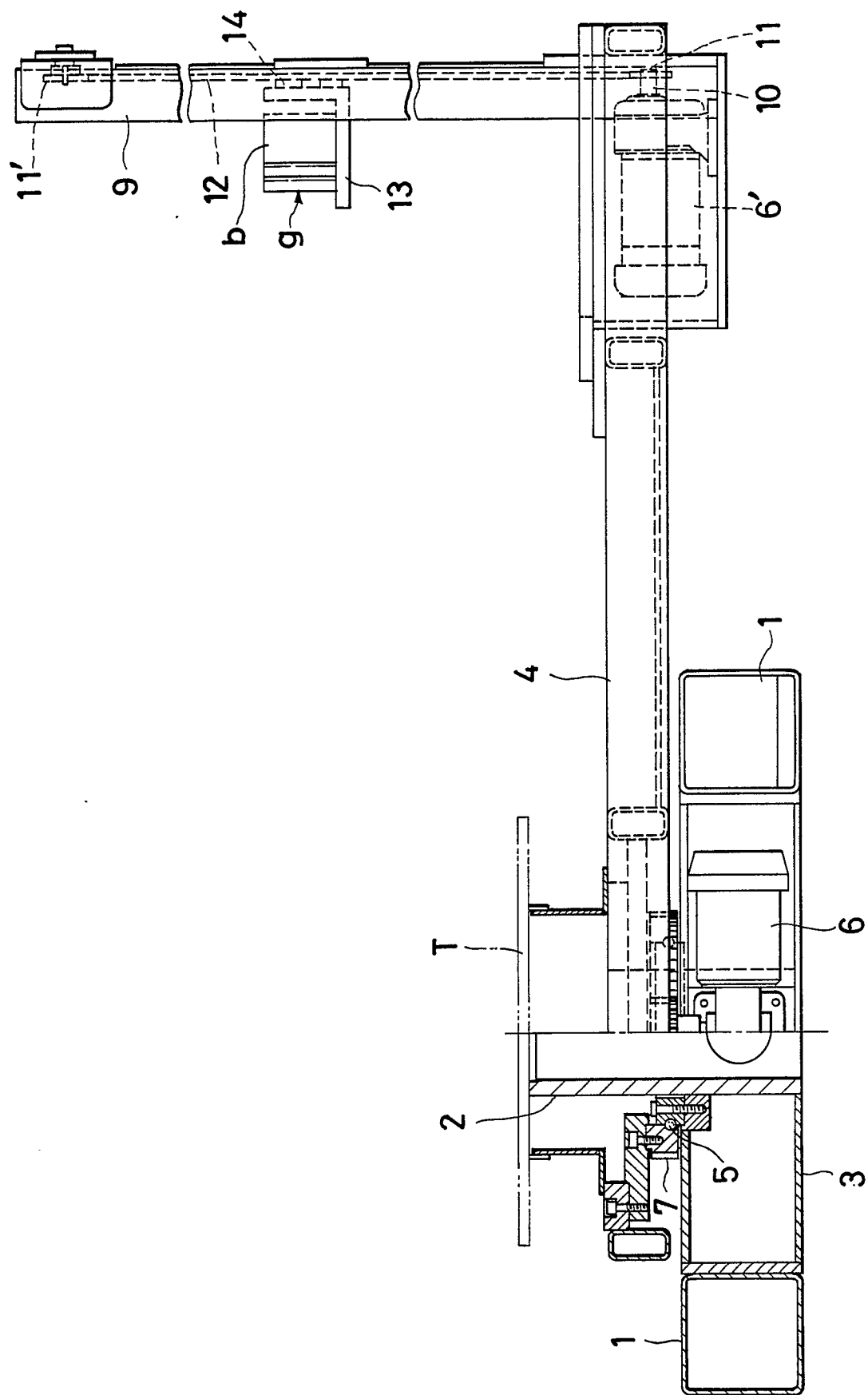


FIG. 4

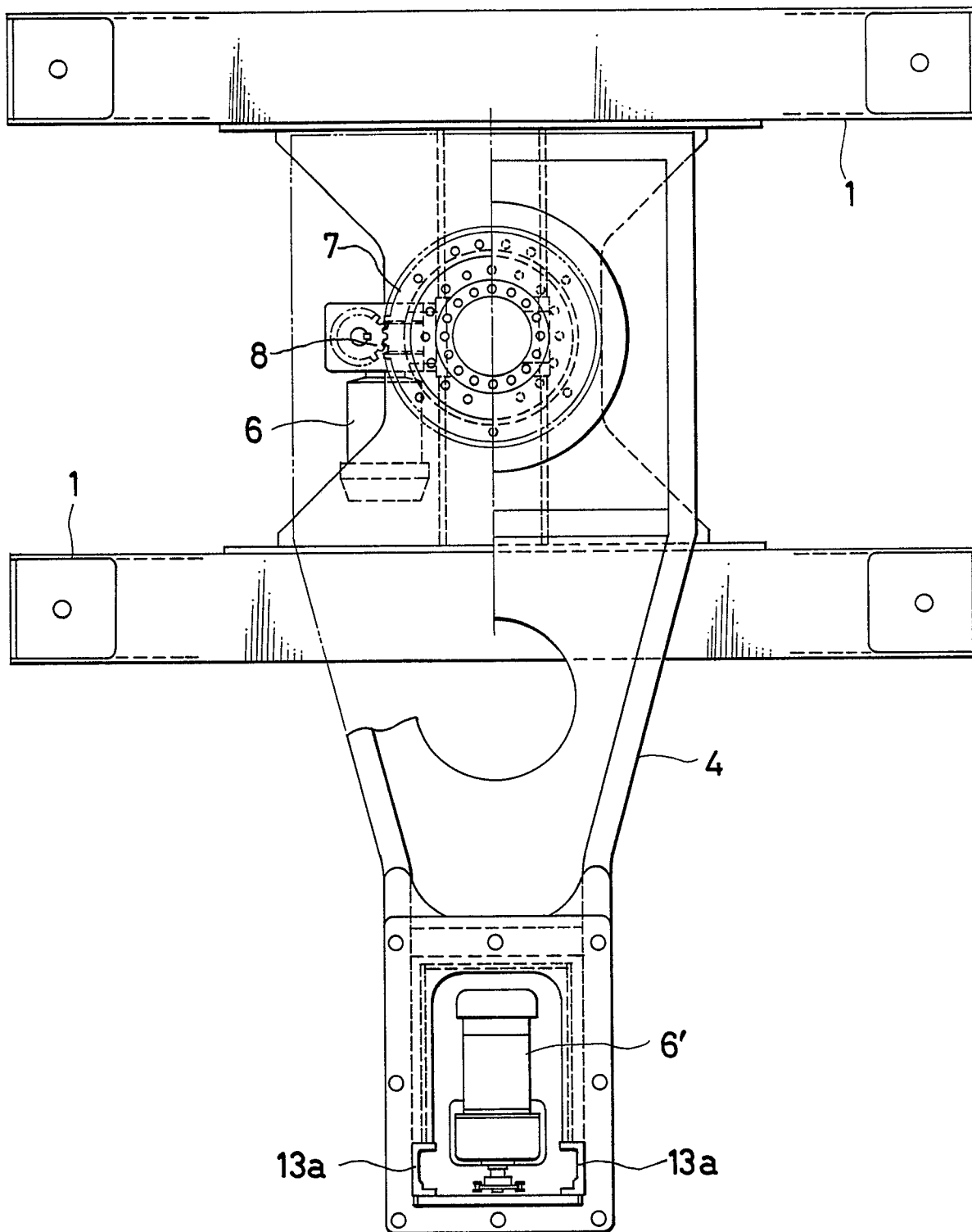


FIG. 5

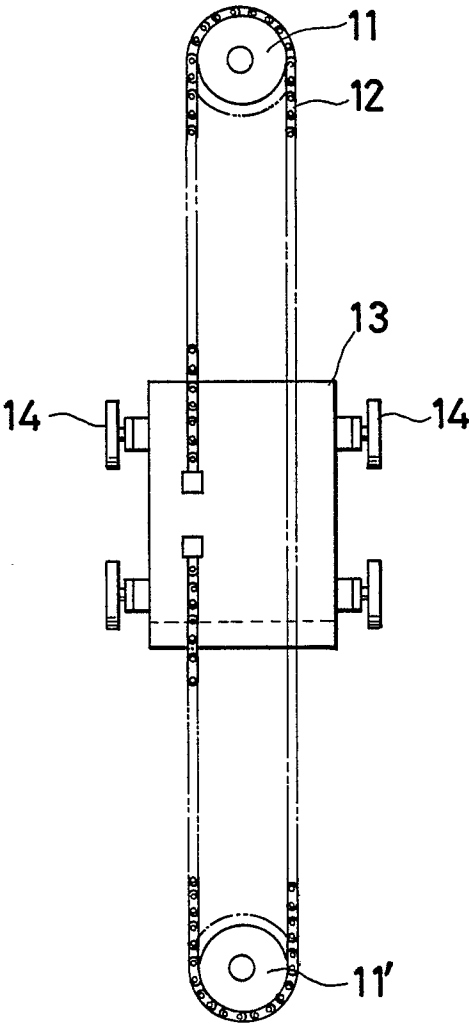
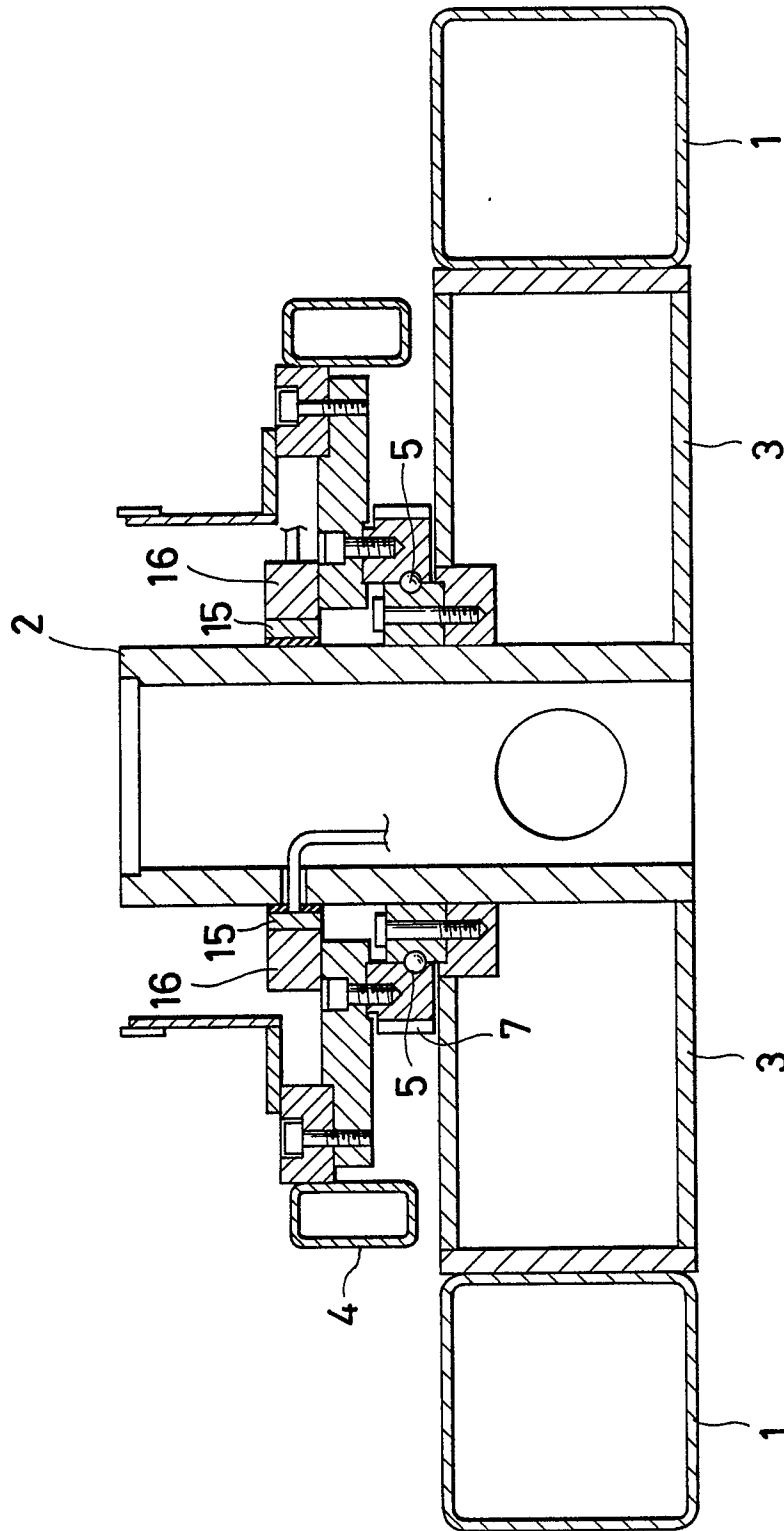


FIG. 6



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP89/00370

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC Int. Cl ⁴ B65B11/02																	
II. FIELDS SEARCHED Minimum Documentation Searched ⁷ <table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: none; padding-top: 10px;">IPC</td> <td style="border: none; padding-top: 10px;">B65B11/00-11/04, H01R39/00</td> </tr> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸ <table style="width: 100%; border: none; margin-top: 5px;"> <tr> <td style="width: 50%; padding: 2px;">Jitsuyo Shinan Koho</td> <td style="width: 50%; padding: 2px;">1926 - 1989</td> </tr> <tr> <td style="padding: 2px;">Kokai Jitsuyo Shinan Koho</td> <td style="padding: 2px;">1971 - 1989</td> </tr> </table>			Classification System	Classification Symbols	IPC	B65B11/00-11/04, H01R39/00	Jitsuyo Shinan Koho	1926 - 1989	Kokai Jitsuyo Shinan Koho	1971 - 1989							
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table style="width: 100%; border: none;"> <tr> <th style="width: 10%; font-size: x-small;">Category ¹⁰</th> <th style="width: 70%; font-size: x-small;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; font-size: x-small;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="vertical-align: top; padding: 5px;">Y</td> <td style="vertical-align: top; padding: 5px;">JP, A, 52-15791 (Ozeki Tekko Kabushiki Kaisha) 5 February 1977 (05. 02. 77) (Family: none)</td> <td style="vertical-align: top; text-align: center; padding: 5px;">1-5</td> </tr> <tr> <td style="vertical-align: top; padding: 5px;">Y</td> <td style="vertical-align: top; padding: 5px;">JP, A, 56-95809 (Patrick R. Lancaster the Third and one other) 3 August 1981 (03. 08. 81) Page 9, lower left column, line 4 to Page 9, lower right column, line 8 (Family: none)</td> <td style="vertical-align: top; text-align: center; padding: 5px;">1-5</td> </tr> <tr> <td style="vertical-align: top; padding: 5px;">Y</td> <td style="vertical-align: top; padding: 5px;">JP, A, 57-133809 (Infra Pak (Dallas), Inc.) 18 August 1982 (18. 08. 82) Page 4, lower left column, line 6 to page 5, upper right column, line 14 (Family: none)</td> <td style="vertical-align: top; text-align: center; padding: 5px;">2, 3</td> </tr> <tr> <td style="vertical-align: top; padding: 5px;">Y</td> <td style="vertical-align: top; padding: 5px;">JP, B2, 54-43957 (Konan Denki Kabushiki Kaisha) 22 December 1979 (22. 12. 79) Column 3, lines 6 to 13 (Family: none)</td> <td style="vertical-align: top; text-align: center; padding: 5px;">4</td> </tr> </table>			Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	Y	JP, A, 52-15791 (Ozeki Tekko Kabushiki Kaisha) 5 February 1977 (05. 02. 77) (Family: none)	1-5	Y	JP, A, 56-95809 (Patrick R. Lancaster the Third and one other) 3 August 1981 (03. 08. 81) Page 9, lower left column, line 4 to Page 9, lower right column, line 8 (Family: none)	1-5	Y	JP, A, 57-133809 (Infra Pak (Dallas), Inc.) 18 August 1982 (18. 08. 82) Page 4, lower left column, line 6 to page 5, upper right column, line 14 (Family: none)	2, 3	Y	JP, B2, 54-43957 (Konan Denki Kabushiki Kaisha) 22 December 1979 (22. 12. 79) Column 3, lines 6 to 13 (Family: none)	4
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IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; padding: 5px;"> Date of the Actual Completion of the International Search June 27, 1989 (27. 06. 89) </td> <td style="width: 50%; border: none; padding: 5px;"> Date of Mailing of this International Search Report July 17, 1989 (17. 07. 89) </td> </tr> <tr> <td style="border: none; padding: 5px;"> International Searching Authority Japanese Patent Office </td> <td style="border: none; padding: 5px;"> Signature of Authorized Officer: </td> </tr> </table>			Date of the Actual Completion of the International Search June 27, 1989 (27. 06. 89)	Date of Mailing of this International Search Report July 17, 1989 (17. 07. 89)	International Searching Authority Japanese Patent Office	Signature of Authorized Officer:											
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International Searching Authority Japanese Patent Office	Signature of Authorized Officer:																

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

Y

JP, A, 61-235393
 (Shimizu Construction Co., Ltd.)
 20 October 1986 (20. 10. 86)
 Page 2, lower left column line 13 to
 page 3, upper left column, line 14
 (Family: none)

5

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers , because they relate to subject matter not required to be searched by this Authority, namely.

2. ☐ Claim numbers , because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically.

3. ☐ Claim numbers , because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest
☐ No protest accompanied the payment of additional search fees