

(12)

EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(21) Application number: **84902048.2**

(51) Int. Cl.⁴: **B 66 C 23/80**
B 60 S 9/14

(22) Date of filing: **09.05.84**

Data of the international application taken as a basis:

(86) International application number:
PCT/JP84/00236

(87) International publication number:
WO85/05091 (21.11.85 85/25)

(43) Date of publication of application:
21.05.86 Bulletin 86/21

(84) Designated Contracting States:
FR

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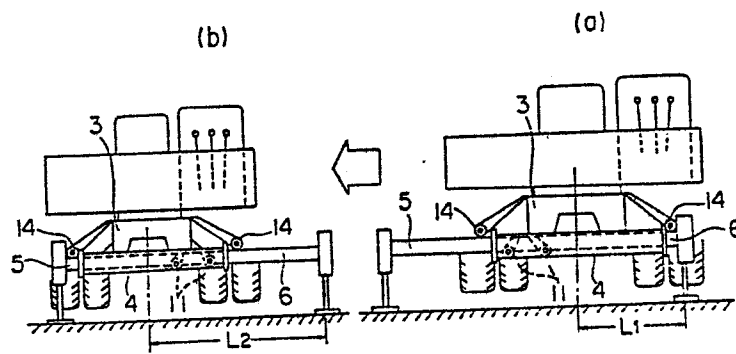
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(54) APPARATUS FOR MOVING CRANE VEHICLE Laterally.

(57) An apparatus laterally moves a crane vehicle which is provided with an outrigger (1) which has a pair of outrigger beams (5,6) which extend and contract within an outrigger box (4) arranged on a vehicle body frame (3). A cylinder (7) used for extending the outrigger beams (5,6) is able to effect simultaneous extending and contracting operations, so that one of the outrigger beams (5,6) can be extended and the other be contracted. The inner end of each of the outrigger beams (5,6) is provided with first rollers (11) which abut against the outrigger box (4). Vehicle body-side reinforcing members provided near each side of the outrigger box (4) are each provided with second rollers (14) which abut against the corresponding outrigger beams (5,6). The outrigger beams (5,6) slide in relation to the outrigger box (4) on the rollers (11,14), so that frictional resistance to sliding is reduced, and the lateral movement ability of the crane vehicle is improved.

FIG. 3



Technical Field

5 The present invention relates to a lateral moving apparatus for a crane car such as a truck crane.

Background Art

10 A modern crane car, especially a truck crane has a problem of moving in a narrow site of construction, with the tendency of its oversizing. In order to dissolve this problem, there has been hitherto proposed such a solution that one of a pair
15 of right and left outrigger beams contained for telescopical movement in an outrigger box provided on the chassis frame of a truck crane is elongated and the other outrigger beam is contracted by elongating and contracting a pair of outrigger extruding
20 cylinders at the same time, whereby the truck crane can be laterally moved. In this conventional solution, however, the bottom surface of the inside end of each outrigger beam in the breadth direction of the car body and the inner top surface of the outside
25 end of the outrigger box in the same breadth direction are contacted with the inner bottom surface of the outrigger box and the top surface of each outrigger beam, respectively, in this lateral movement of the truck crane, and the load of the truck crane is
30 working upon this contact portions. Since the sliding friction resistance between the outrigger box and the outrigger beams is therefore considerably large, it has the disadvantages: the lateral movement of the truck crane can not be smoothly carried out and the
35 outrigger extruding cylinders are required to be large

and strong.

Disclosure of Invention

5 It is an object of this invention to provide a lateral moving apparatus for a crane car in which the abovementioned disadvantages are dissolved and the lateral moving performance of the crane car in a narrow site can be improved.

10 In order to achieve this object, the present invention proposes a lateral moving apparatus for a crane car having at least one or more outriggers which comprise a pair of outrigger beams provided for telescopical movement to the right and left and close to each other in an outrigger box arranged on a
15 chassis frame so as to lie in the breadth direction of the car body, wherein extruding cylinders for said pair of outrigger beams are made capable of elongating and contracting at the same time so as to elongate one of the outrigger beams and contract the other
20 outrigger beam, first rollers capable of contacting with the inner bottom surface of said outrigger box each are provided on the inside end of said outrigger beams in the breadth direction of the car body, and second rollers capable of contacting with the top
25 surface of said outrigger beams each are provided on a strength member for the car body side which is near the outside upper ends of said outrigger box in the breadth direction, such as the chassis frame, the outrigger box or bracket.

30 According to the abovementioned composition, the sliding friction resistance between the outrigger beams and the outrigger box can be reduced in a large extent, and as a result the lateral movement of the truck crane can be smoothly carried out and the
35 outrigger extruding cylinders can be made small-sized.

Brief Description of Drawings

Fig. 1 is a diagrammatic rear elevation of a truck crane showing the first embodiment of a lateral moving apparatus according to the invention,

5 Fig. 2 is an enlarged sectional view showing the important part of Fig. 1,

Fig. 3 (a) is a rear elevation showing the state of a left outrigger beam elongated and Fig. 3 (b) is a rear elevation showing the state of the truck crane moved laterally by elongating a right outrigger beam,

10 Fig. 4 is a sectional view enlarged in important part showing a modification of the abovementioned first embodiment,

15 Fig. 5 is a sectional view enlarged in important part similar to Fig. 4 showing the outrigger beam at a different position,

Fig. 6 is a diagrammatic rear elevation of a truck crane showing the second embodiment of the invention,

20 Fig. 7 is an enlarged sectional view showing the important part of Fig. 6, and

Fig. 8 is an oil pressure supply circuit diagram.

25

Best Mode for Carrying out the Invention

Embodiments of the invention will be described in detail with reference to the accompanying drawings.

Now referring to Fig. 1 wherein the back side of a truck crane is generally shown, the reference numeral 1 represents a rear outrigger provided behind the rear wheels 2, which is composed of an outrigger box 4 fixed on a chassis frame 3, a pair of right and left outrigger beams 5 and 6 contained for
30 telescopical movement in said box 4, and a pair of
35

outrigger extruding cylinders which are elongated and contracted so as to elongate and contract said beams 5 and 6 (In Fig. 1, there is shown only one cylinder 7 combined with the beam 5, for simplification of the drawings). Jacks 8 and 9 are fixed on the outside ends of the outrigger beams 5 and 6 in the breadth direction of the car body, respectively. The outrigger beam 5 extensible to the left and the outrigger beam 6 extensible to the right are arranged close to each other in the longitudinal direction of the car body. Said outrigger beams 5 and 6 may be arranged so as to be overlapped on each other or be close to each other in the vertical direction of the car body.

In the first embodiment according to this invention, as shown in detail in Fig. 2, a first roller 11 is pivotally supported by way of a bracket 10 on the lower part of the inside end of the left outrigger beam 5 in the breadth direction of the car body and capable of rolling on the inner bottom surface of the outrigger box 4. A bracket 13 is fixed on an angle bar or stay 12 which is a strength member for the car body side provided connectedly to the side of the chassis frame 3 and secured on the upper part of the outside end of the outrigger box 4 in the breadth direction of the car body, and a second roller 14 is pivotally supported on the bracket 13 close to said upper part of the outside end and capable of rolling on the top surface of the outrigger beam 5. Said roller 14 may be attached by way of a bracket to the chassis frame 3, the outrigger box 4, the stay around the outrigger box or the like which constitutes the strength member for the car body side.

As to the right outrigger beam 6, a plurality of rollers 11 and 14 are provided in the same way as

mentioned above.

Although not illustrated, furthermore, a front outrigger with the same structure as the above-mentioned rear outrigger is fixed on the chassis frame 3 between the front wheels and the rear wheels 2.

Figs. 3 (a) and 3 (b) show the mode of the truck crane where it moves laterally, and Fig. 3 (a) shows such a state that the left outrigger beam 5 is elongated and the right outrigger beam 6 is contracted. By elongating a cylinder (not shown) for the beam 6 and at the same time contracting the cylinder 7 for the beam 5 from this state, the beam 6 is elongated and the beam 5 is contracted, whereby the truck crane is moved left to the position shown in Fig. 3 (b). In the drawings, the designations L_1 and L_2 represent the distances between the center line of the car body of the truck crane and the outside end of the right outrigger beam 6, respectively, and the difference $L_2 - L_1$ means the moving distance of the truck crane.

According to the abovementioned composition of this invention, the outrigger beams 5 and 6 are caused to slide with respect to the outrigger box 4 by utilization of the rolling of the first roller 11 and the second roller 14 in the lateral movement of the truck crane, and the sliding friction resistance between the outrigger beams and box can be reduced in a large extent and the lateral movement of the truck crane can be smoothly carried out. Accordingly, it enables to carry out the lateral movement of a truck crane by use of small-sized outrigger extruding cylinders, to reduce the weight of the outrigger and further to lower the cost.

Fig. 4 and Fig. 5 show a modification of the

abovementioned first embodiment. In Fig. 4, roller supports 15 and 16 are provided on the inner bottom surface of the outrigger box 4 and the top surface of the outrigger beam 5 at the positions where they will confront the rollers 11 and 14 when the beam 5 is in the maximum elongated position, respectively. Each of the roller supports 15 and 16 is made of a material with a large strength so as to form a reinforcing member, and has a touch face 17 with a curvature according with that of each roller 11, 14 and a sloping side 18 for facilitating each roller to get onto the roller support.

In this modification, the area of the contact surfaces between the rollers 11, 14 and the outrigger box 4 and outrigger beams 5, 6 is increased by the touch face 17 of the roller supports. The surface pressure of said contact surfaces onto which a load is being applied when the beams 5, 6 are elongated to the maximum limit in the crane working as shown in Fig. 4 can be therefore lowered, and this enables smaller rollers to be used. Since the sloping side 18 is provided on each of the roller supports 15, 16, furthermore, the rollers 11 and 14 can get easily onto the roller supports 15 and 16, without any obstruction to the lateral movement of the truck crane, when the truck crane is laterally moved as shown in Fig. 5.

The second embodiment of this invention shown in Fig. 6 and Fig. 7 is improved so that the rollers 11 and 14 can be brought into contact with the outrigger box 4 and outrigger beams 5 and 6 only when the outrigger beams are elongated and contracted, instead of their full-time contact. On the outrigger beam 5, as shown in detail in Fig. 7, a first roller 11 is pivotally supported on one end of a first arm 19 substantially shaped in the letter V, the center of

said arm 19 is pivotally secured to the lower part of a bracket 10 by way of a pivot 20, and a hydraulic cylinder 21 which is a first pressure-responsive device is pivotally secured between the other end of the arm and the upper part of said bracket. Similarly, a second roller 14 is pivotally supported on one end of a second arm 22 substantially shaped in the letter V, the center of said arm 22 is pivotally secured to the lower part of a bracket 13 by way of a pivot 23, and a hydraulic cylinder 24 which is a second pressure responsive device is pivotally secured between the other end of the arm and the upper part of said bracket. Although not illustrated in the drawings as to the outrigger beam 6 and also to the front outrigger, in addition, there are provided the rollers, arms and hydraulic cylinders with the same structures as mentioned above.

When the outrigger beams 5, 6 are elongated or contracted in the lateral movement of the truck crane, the respective hydraulic cylinders 21, 24 are supplied with an oil pressure, for example, from an oil pressure supply circuit for feeding and discharging an oil pressure to or from the outrigger extruding cylinders 7 so as to be elongated in the direction of the arrow shown in Fig. 7, whereby the rollers 11, 14 can be brought into contact with the outrigger box 4 and outrigger beams 5, 6, and the sliding of these beams with respect to the box can be smoothly carried out. In the crane working, on the other hand, the hydraulic cylinders 21, 24 are contracted by discharging the oil pressure therefrom, whereby the rollers 11, 14 are alienated from the outrigger box 4 and outrigger beams 5, 6, and the bottom surface of the inside end of the beams in the breadth direction of the car body and the inner top surface of the

outside end of the outrigger box in the breadth direction are contacted with the inner bottom surface of the box and the top surface of the beams, respectively. Accordingly, the area of these contact surfaces can be more increased, with lowering the surface pressure. In addition, this embodiment may be modified to such a structure that when the hydraulic cylinder 21, 24 are contracted, the load in the crane working is not applied to the rollers 11, 14, even if they are contacted with the outrigger box 4 and outrigger beams 5, 6.

In Fig. 8, there is shown an oil pressure supply circuit for controlling the actuation of the outrigger extruding cylinders for the front and rear outriggers, wherein the reference numeral 7 represents a left and rear cylinder; 7' is a right and rear cylinder; 7" is a left and front cylinder; 7'" is a right and front cylinder; 25 is a tank; 26 is a pump; 27 to 27'" are solenoid-actuated control valves for controlling the feed and discharge of the oil pressure to said cylinders 7 to 7'" respectively. Each control valve has an elongating position A, neutral position B, contracting position C and floating position D. At the floating position D, the oil pressure can be freely fed into or discharged from both the chambers of each cylinder.

The oil pressure supply circuit when shown in Fig. 8 provides the state where the front and rear outriggers stop at the position shown in Fig. 3 (b). The lateral movement of the truck crane to the position shown in Fig. 3 (a) is carried out by bringing the control valves 27' and 27'" to the floating position D and the control valves 27 and 27" to the elongating position A.

By providing the floating position D in each

control valve, there is resulted the following advantage. If a part of the control valves is brought into the elongating position A and the other thereof is into the contracting position C in the lateral movement of the truck crane, these operations must be synchronously carried out with accuracy, but the switching operations of these control valves is not always synchronized and the operativeness of this lateral moving apparatus is therefore improved.

Claims

1. A lateral moving apparatus for a crane car having at least one or more outriggers which comprise a pair of outrigger beams provided for telescopical movement to the right and left and close to each other in an outrigger box arranged on a chassis frame so as to lie in the breadth direction of a car body, wherein extruding cylinders for said pair of outrigger beams are made capable of elongating and contracting at the same time so as to elongate one of the outrigger beams and contract the other outrigger beam, first rollers capable of contacting with the inner bottom surface of said outrigger box each are provided on the inside end of said outrigger beams in the breadth direction of the car body, and second rollers capable of contacting with the top surface of said outrigger beams each are provided on a strength member for the car body side which is near the outside upper ends of said outrigger box in the breadth direction, such as the chassis frame, outrigger box or bracket.

2. A lateral moving apparatus, as set forth in Claim 1, in which a reinforcing member is provided on the inner bottom surface of the outrigger box which confronts the first roller when the outrigger beams are elongated, or on the top surface of the outrigger beams which confronts the second roller at that time.

3. A lateral moving apparatus, as set forth in Claim 2, in which the reinforcing member has a concave part almost complementary to the outer circumferential surface of the first roller or second roller.

4. A lateral moving apparatus, as set forth in Claim 1, in which the strength member for the car body side is composed of a stay whose one end is fixed on the chassis frame and whose other end is fixed on the outside upper end of the outrigger box in the breadth

direction of the car body, and a bracket fixed on the stay.

5 5. A lateral moving apparatus, as set forth in Claim 1, which has roller moving means for moving the first roller to a position where it presses the inner bottom surface of the outrigger box and a position where it does not press, or moving the second roller to a position where it presses the top surface of the outrigger beams and a position where it does not press.

10 6. A lateral moving apparatus as set forth in Claim 5, in which the roller moving means has a first pressure-responsive device to whose one end the first roller is attached and whose other end is fixed on the inside end of the outrigger beams in the breadth direction of the car body, and a second pressure-responsive device to whose one end the second roller is attached and whose other end fixed on the strength member for the car body side.

20 7. A lateral moving apparatus, as set forth in Claim 6, in which the roller moving means has a first arm supporting the first roller and pivotally supported at the inside end of the outrigger beams in the breadth direction of the car body so as to be rotated around the pivotal supported point by means of the first pressure-responsive device, and a second arm supporting the second roller and pivotally secured on the strength member for the car body side so as to be rotated around the pivotal secured point by means of the second pressure-responsive device.

30 8. A lateral moving apparatus, as set forth in Claim 1, in which two or more of the outriggers are provided at an interval spaced in the longitudinal direction of the car body.

35 9. A lateral moving apparatus, as set forth in

Claim 8, in which the first of the outriggers is provided on the chassis frame behind the rearmost wheel axis of the car, and the second of the outriggers is provided on the chassis frame between the frontmost wheel axis of the car and the rearmost wheel axis thereof.

10. A lateral moving apparatus, as set forth in Claim 1, in which an oil pressure supply device for supplying an oil pressure to the extruding cylinders of the outrigger beams is provided.

FIG. 1

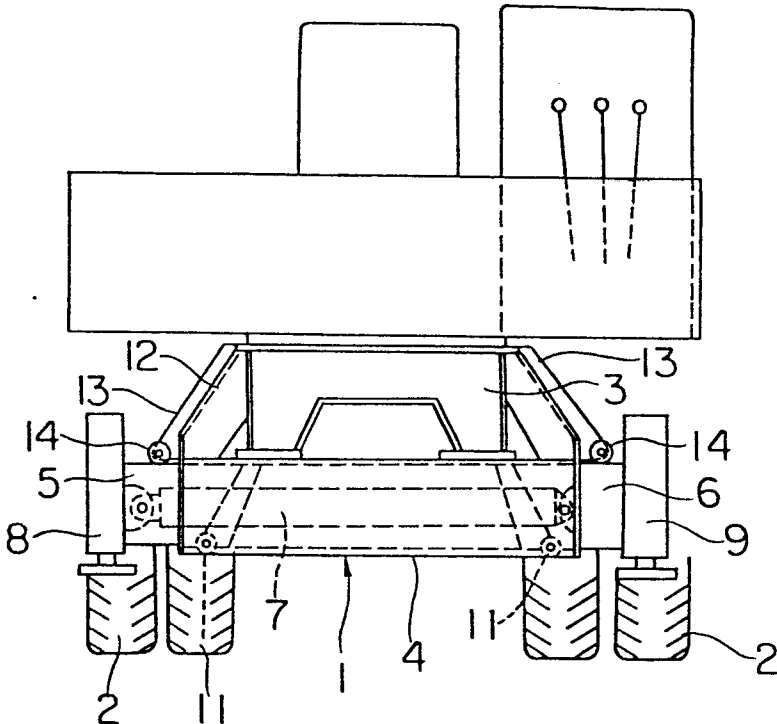


FIG. 2

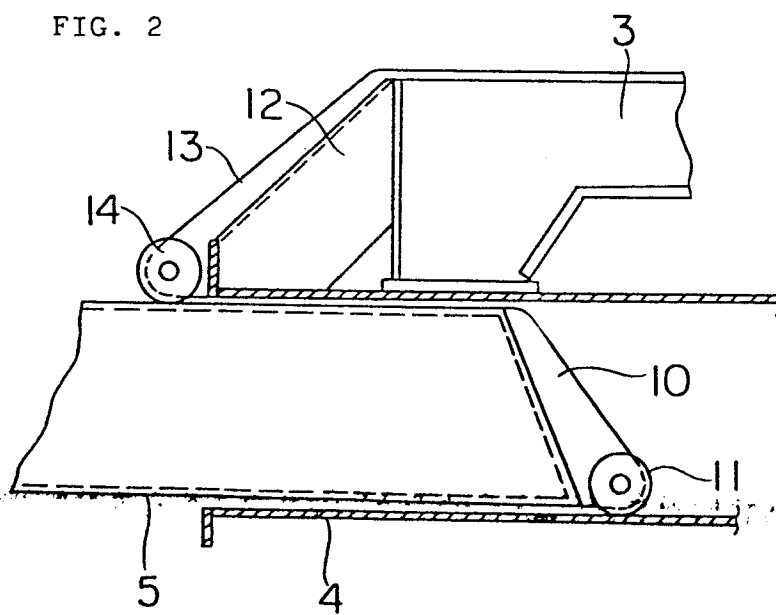
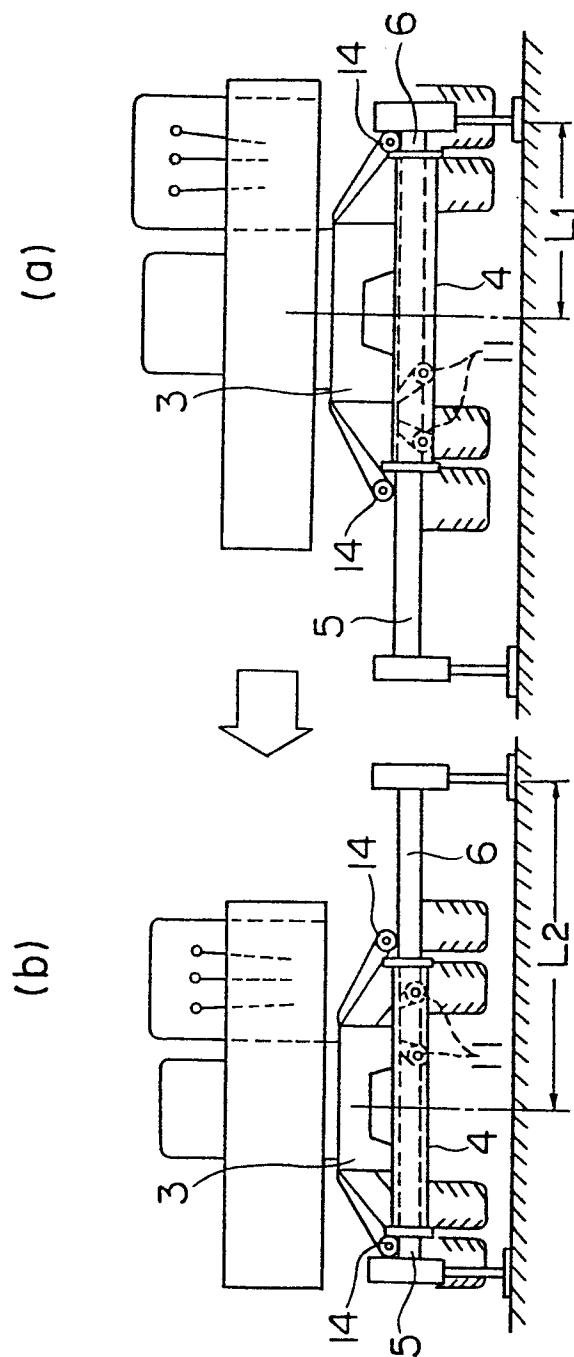


FIG. 3



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FIG. 6

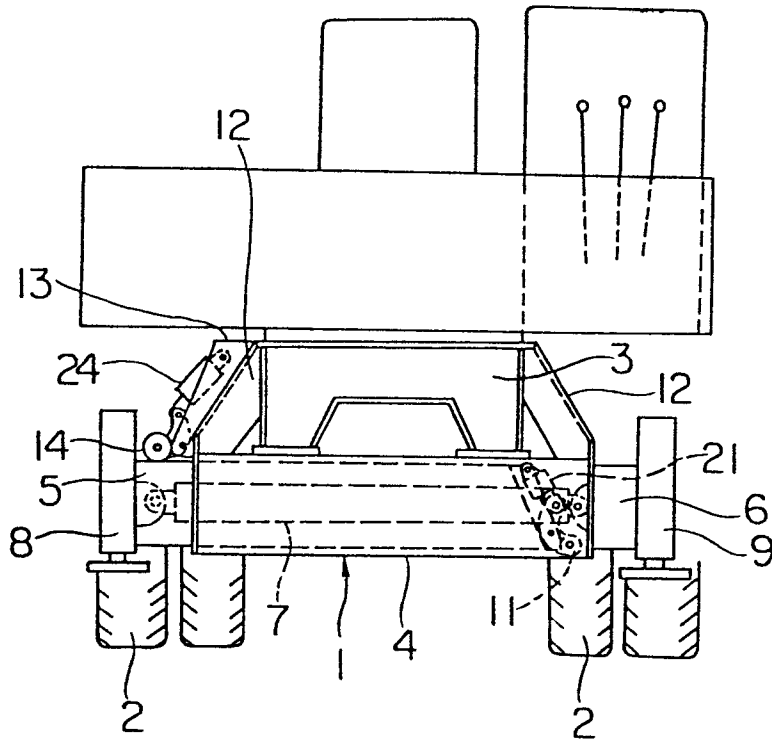


FIG. 7

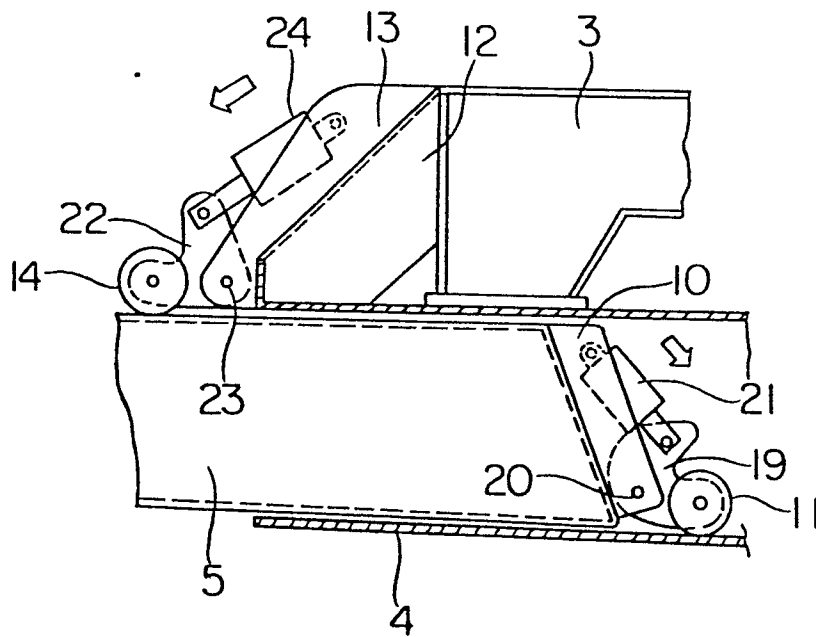
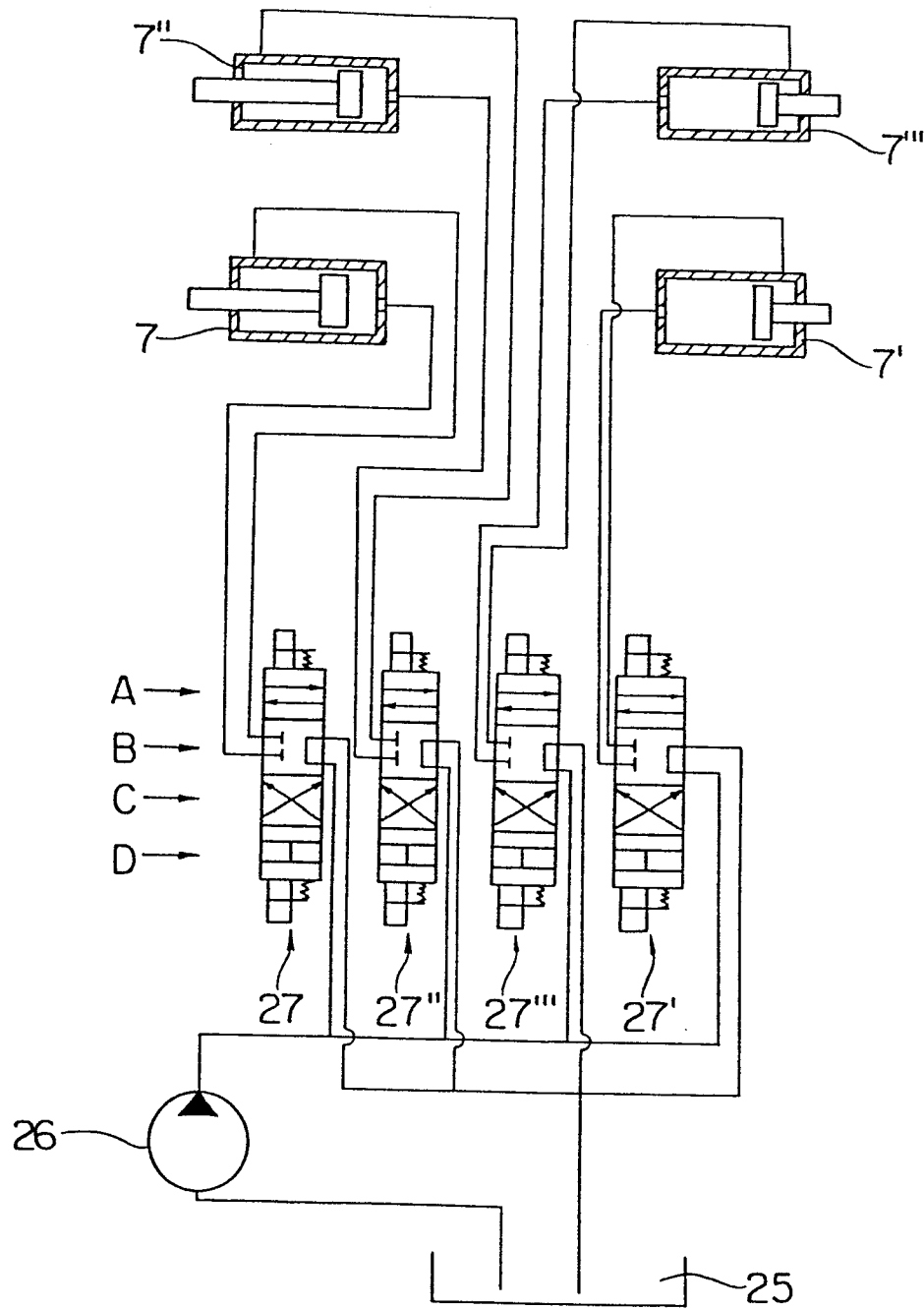


FIG. 8



INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP84/00236 **0181399**

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ²				
According to International Patent Classification (IPC) or to both National Classification and IPC				
Int. Cl ³ B66C 23/80 B60S 9/14				
II. FIELDS SEARCHED				
Minimum Documentation Searched ⁴				
Classification System	Classification Symbols			
IPC	B66C 23/78 - 23/80, B60S 9/00 - 9/14			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵				
Jitsuyo Shinan Koho		1950 - 1983		
Kokai Jitsuyo Shinan Koho		1970 - 1983		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴				
Category ¹	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸		
Y	JP, U, 51-85962 (Sumitomo Heavy Industries, Ltd.) 9 July 1976 (09. 07. 76)	1, 2, 3, 4		
Y	JP, Y1, 35-541 (Hitachi, Ltd.) 14 January 1960 (14. 01. 60) Column 2, lines 5 to 14, Figs. 2 to 3	1, 2, 3, 4		
¹ Special categories of cited documents: ¹⁵ <table style="width: 100%;"> <tr> <td style="width: 50%;"> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
IV. CERTIFICATION				
Date of the Actual Completion of the International Search ²		Date of Mailing of this International Search Report ²		
July 24, 1984 (24. 07. 84)		July 30, 1984 (30. 07. 84)		
International Searching Authority ¹		Signature of Authorized Officer ²⁰		
Japanese Patent Office				