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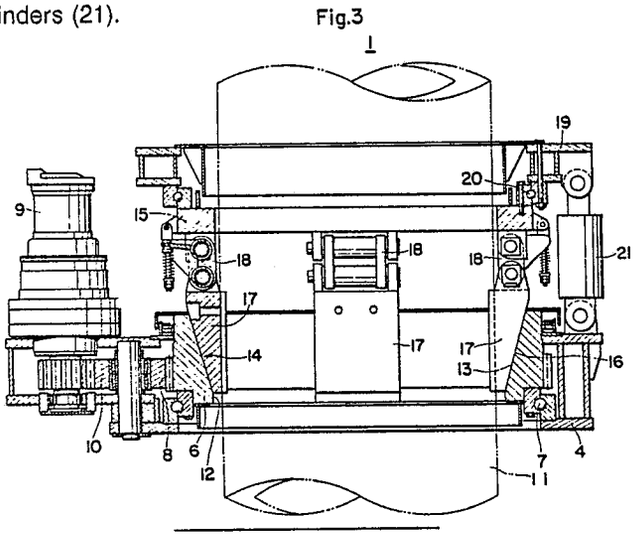
(54) Casing driver.

(57) The apparatus comprises a casing insertion hole (12) having a tapered surface convergent (13) towards the casing and formed in a rotational body (6) that is rotatably supported on a thrust frame (4) of a casing driver. Wedge-shaped chuck members, (17)-,which slide on the tapered surfaces to be pushed between the rotational body (6) and casing to chuck the casing, are rotatably supported by chuck cylinders (21) provided on the thrust frame (4). Therefore, the casing can be rotated in chucked manner without rotating the chuck cylinders (21).

Fig.3



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CASING DRIVER

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a casing driver for thrusting/retracting of a steel pile or casing of a large diameter during the foundation work of building or civil engineering projects.

Description of the Related Art

There are two types of casing drivers: the oscillating type which oscillates a casing to thrust and retract the casing and the rotary type which rotates the casing for the thrusting/retracting thereof.

As disclosed in, for example, Japanese Patent Disclosure No. 61-270418, the rotary type casing driver has a chuck device provided on a rotational body to hold the casing with a split ring compressed by a hydraulic cylinder. While this rotational body is being rotated by a hydraulic motor, a thrust frame which rotatably supports the rotational body is lowered or raised to thrust or retract the casing. This type, as compared with the oscillating type, can be driven into a harder layer of the ground, and allows a high degree of perpendicularity because of the unidirectional load applied to the casing.

With the above arrangement, however, the chuck device rotates together with the rotational body, requiring frequent attachment/detachment of hydraulic hoses for supplying oil to the hydraulic cylinder. This has been an obstruction to efficient work.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to improve the efficiency in thrusting and retracting the casing by eliminating the attachment/detachment of the hydraulic hoses.

To achieve the object, there is provided a casing driver having a rotational body for rotating a casing, a thrust frame for rotatably supporting the rotational body and an elevating device for moving the thrust frame up and down for thrusting/retracting of the casing, characterized by comprising:

a casing insertion hole formed in the rotational body and having a tapered surface convergent toward the casing;

a support frame;

a rotational frame so provided as to face the rotational body and rotatably supported on the support frame;

a plurality of wedge-shaped chuck members formed on the rotational frame and each having a tapered surface for sliding on the tapered surface of the casing insertion hole; and

a chuck cylinder, provided on the thrust frame, for moving the support frame up and down.

With the above arrangement, when the chuck cylinder is actuated, the chuck members slide on the tapered surface of the casing insertion hole and are pushed in between the casing and rotational body, thus holding the casing so that it allows free rotation of the casing together with the rotational body. This ensures the thrusting/retracting of the casing without rotating the chuck cylinder.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view of a casing driver according to one embodiment of this invention;

Fig. 2 is a plan view of the casing driver;

Fig. 3 is a cross-sectional view of a chuck mechanism; and

Fig. 4 is a front view illustrating the casing driver in use.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of this invention will be described below with reference to the accompanying drawings.

In a casing driver 1, three thrust cylinders 5, serving as elevating devices to move a thrust frame 4 up and down, are mounted at equal intervals on a base frame 3 which is supported horizontally by four jacks 2.

A ring-shaped rotational body 6 is rotatably supported on the thrust frame 4 by a bearing 7. Around the periphery of this rotational body 6 is a gear 8 formed which is engaged through an idler 10 with two hydraulic motors 9 mounted on the thrust frame 4.

An casing insertion hole 12 is formed formed in the inner wall of the rotational body 6, and six

chuck flutes 14 each having a tapered surface 13 convergent toward the casing 11 are provided in the hole 12.

A rotational frame 15 is disposed above the rotational body 16. Six wedge-shaped chuck members 17, which move up and down on the chuck flutes 14 and each have a tapered surface 16 to slide on the tapered surface 13 of the associated chuck flute 14, are hung through a linkage 18 from the rotational frame 15.

The rotational frame 15 is supported rotatable through a bearing 20 on a support frame 19 disposed above the rotational frame 15. The support frame 19 is supported elevatable on four chuck cylinders 21 mounted on the thrust frame 4.

Reference numeral 22 in Fig. 2 is a reaction counterbalancing lug.

The following is a description of thus constituted casing driver 1. In the case where the casing driver 1 is mounted on an earth drill 23 to drive the casing 11, the thrust frame 4 is raised by the thrust cylinders 5 first. The casing 11 is lifted up and then lowered to be fitted in the casing insertion hole 12. When the support frame 19 is pulled down by actuating the chuck cylinders 21, the chuck members 17 are lowered together with the rotational frame 15. The chuck members 17, sliding down at their tapered surfaces 16 on the tapered surfaces 13 of the chuck flutes 14, are pushed in between the rotational body 6 and the casing 11 to chuck the casing 11.

When the rotational body 6 is rotated by the hydraulic motor 9 under this condition, the chuck members 17, rotational frame 15 and casing 11 are rotated together with the rotational body 6. When the thrust frame 4 is lowered by actuating the thrust cylinders 5 while the casing 11 is rotating, the casing 11 will be driven into the ground by one stroke length of the thrust cylinders 5.

Then, the chuck cylinders 21 are actuated to lift up the chuck members 17 to thereby release the chucking of the casing 11, and the thrust cylinders 5 are actuated to lift up the thrust frame 4. The chuck cylinders 21 are actuated again so that the chuck members 17 are forced in between the rotational body 6 and the casing 11 to chuck the casing 11, and the thrust frame 4 is lowered by one stroke length of the thrust cylinders 5 while rotating the casing 11. The above operation is repeated.

In the case of retracting the casing 11, the thrust frame 4 is lifted up by means of the thrust cylinders 5 while rotating the casing 11 in chucked state.

With the above arrangement, at the time the casing 11 is rotated, the rotational body 6, chuck members 17 and rotational frame 15 are rotated; however, the chuck cylinders 21 do not rotate but push the chuck members 17 between the rotational body 6 and the casing 11. Unlike in the prior art, therefore, it is unnecessary to effect the attachment/detachment of hoses for oil supply to, or discharge from, the chuck cylinders, thus significantly improving the work efficiency.

Although the description of the above embodiment has been given with reference to the case where chuck flutes each having a tapered surface convergent downward are formed in the casing insertion hole of a rotational body and chuck members are pushed downward from above the rotational body, the chuck members may each have a tapered surface convergent upward and may be formed in the rotational body instead so that they can be pushed from under the rotational body. Alternately, the casing insertion hole may be formed to have its entire surface tapered.

According to this invention, as described above, a casing insertion hole having a tapered surface convergent toward the casing is formed in a rotational body that is rotatably supported on a thrust frame of a casing driver, and wedge-shaped chuck members, which slide on the tapered surfaces to be pushed between the rotational body and casing to chuck the casing, are rotatably supported by chuck cylinders provided on the thrust frame. Therefore, the casing can be rotated in chucked manner without rotating the chuck cylinders.

Unlike the prior art, therefore, this invention does not require the attachment/detachment of hoses for oil supply to, or discharge from, the chuck cylinders, thus ensuring a significant improvement in work efficiency.

Although this invention has been described with reference to the above particular embodiment, it is in no way restricted to this type but can be modified in various manners within the scope and spirit of the invention.

Claims

1. A casing driver having a rotational body (6) for rotating a casing (11), a thrust frame (4) for rotatably supporting said rotational body and an elevating device (5) for moving said thrust frame up and down for thrusting/retracting of said casing, characterized by comprising:
a casing insertion hole (12) formed in said rotational body (6) and having a tapered surface (13) convergent toward said casing;
a support frame (19);
a rotational frame (15) so provided as to face said rotational body and rotatably supported on said support frame;
a plurality of wedge-shaped chuck members (17)

formed on said rotational frame and each having a tapered surface (16) for sliding on said tapered surface of said casing insertion hole; and
a chuck cylinder (21),provided on said thrust frame (4), for moving said support frame up and down.

Fig. 1

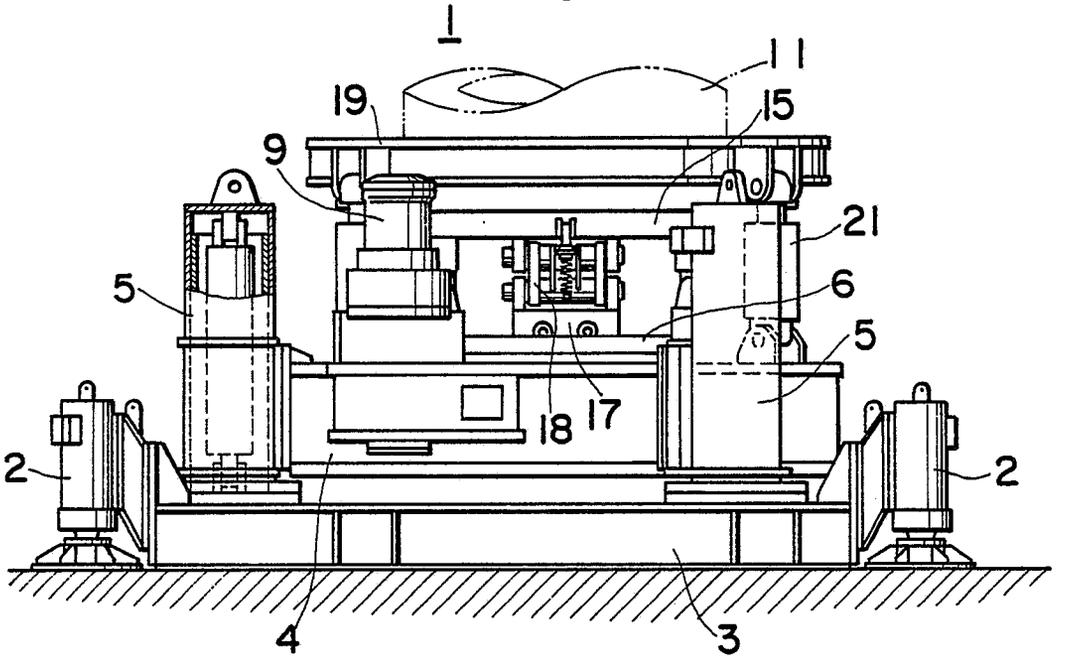
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Fig. 2

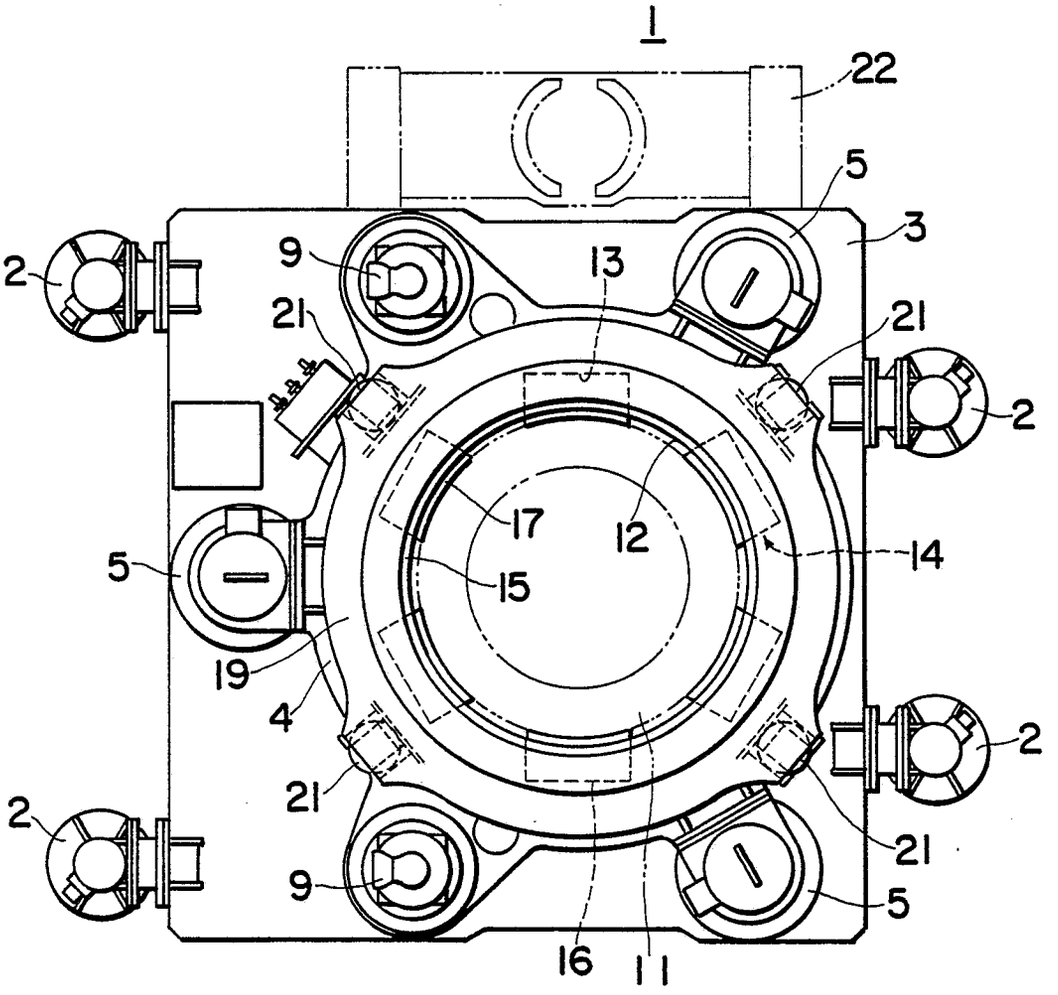
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Fig.3

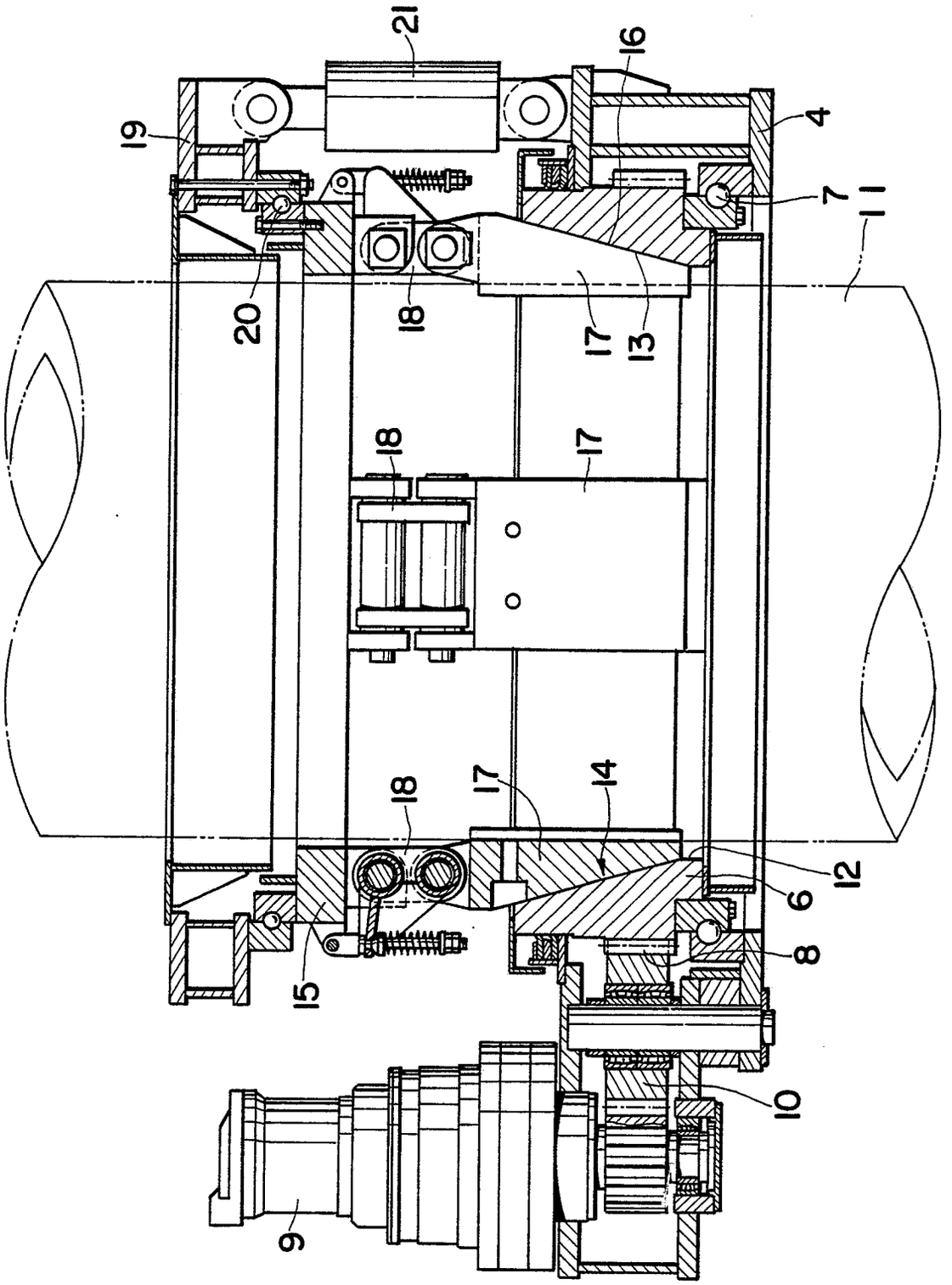
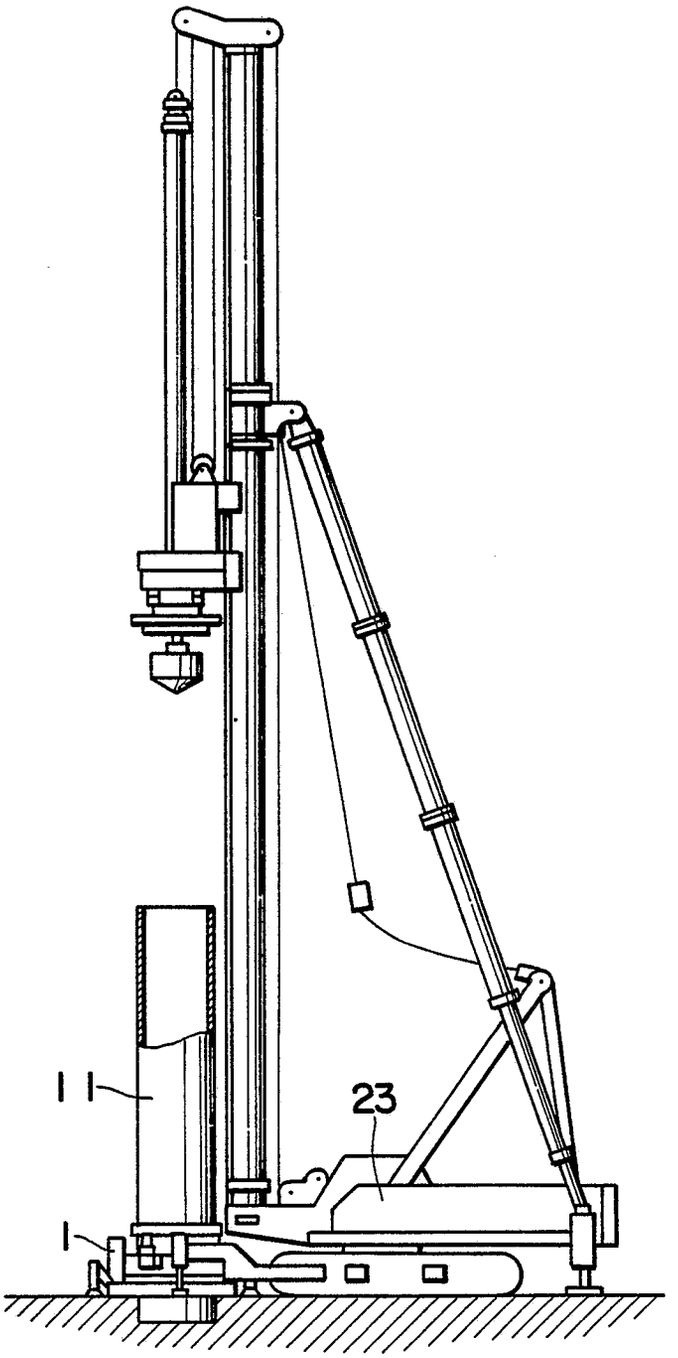


Fig.4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 11 6464

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.3)
X	US-A-3 456 745 (PERI) * Column 2, line 36 - column 3, line 20; column 4, line 51 - column 5, line 58; figures 1,3 *	1	E 02 D 7/20
A	US-A-3 763 654 (MATSUSHITA) * Column 2, line 49 - column 4, line 50; figures 1-5 *	1	
A	US-A-1 555 379 (MOODY)		

TECHNICAL FIELDS SEARCHED (Int. Cl.3)

E 02 D
E 21 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23-05-1989	KERGUENO J.P.D.

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
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L : document cited for other reasons

& : member of the same patent family, corresponding document

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