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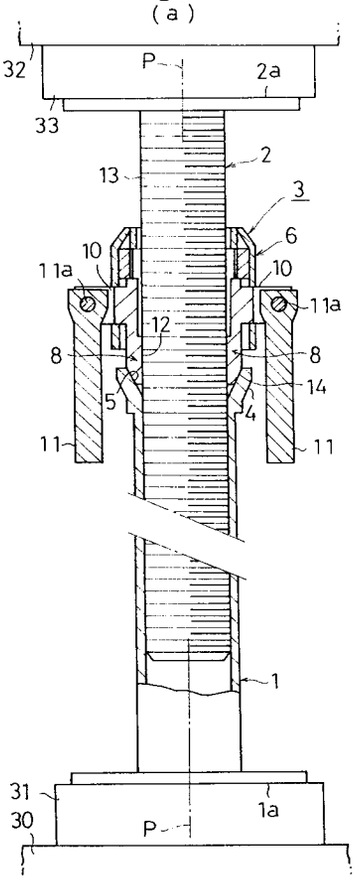
(54) Jack for supporting construction works.

(57) A jack for supporting a load is disclosed that includes a tubular cylinder (1) that receives a threaded piston (2). The cylinder (1) has an opening at its upper end and the piston (2) protrudes from the opening such that the overall length of the jack may be adjusted by varying the length of the piston (2) that protrudes from the cylinder (1). A connector housing (6) is provided adjacent the cylinder opening. At least one clamp member (8) is supported by the connector housing (6). The clamp member (8) has a female threaded portion (12) suitable for threadably engaging the threaded piston (2). With this arrangement, the height of the piston (2) extending from the cylinder (1) can be finely adjusted by rotating the clamp member (8) in a condition where the clamp member (8) threadably engages the piston (2) and the height of the piston (2) can be coarsely adjusted by laterally disengaging the clamp arm (8) from the piston and sliding the piston relative to the cylinder.

Fig.1
(a)



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The present invention relates to a jack used to support various types of temporary construction frames including flooring forms.

When a concrete floor is built on the foundation of a house, a form is provided at a position generally above the foundation. Often, a jack or pipe support such as the device shown in Fig. 6 is used to support the concrete form.

The conventional jack shown in Fig. 6 has a tubular cylinder 21 with a base plate 21a welded at its bottom end. A tubular piston 22 with a piston plate 22a welded at its top end, is inserted into the cylinder 21 so that it can move axially therein. A ring 15 is journaled about the cylinder 21 and is provided with female thread formed on its inner surface. A male thread 16 is formed on the outer periphery at the top end of the cylinder 21. The ring 15 is mated to the threads 16 of cylinder 21 so that it can rotate about an axis P. A plurality of support holes 17 are provided on the outer periphery of the piston 22 along the axis. An elongated axially extending slot 18 is formed on the outer periphery of the cylinder 21 and each support hole 17 of the piston 22 is exposed through the slot 18. A pin 19 is selectively inserted into one of the support holes 17 through the slot 18 and is supported on the ring 15.

Therefore, when the pin 19 is removed, the height of the piston 22 can be adjusted by moving the piston 22 along the axis. Then, the pin 19 is inserted into one of the support holes 17 through the slot 18. The ring is then rotated until it is arranged immediately under the pin 19. Thus, the total weight carried by the piston 22 is supported only by the pin 19.

With the described jack, it is difficult to adjust the height of the piston 22 or the overall length of the jack. This is because the pin 19 must be inserted into or removed from the support hole 17 and the ring 15 must be rotated to facilitate height adjustment.

Accordingly, it is a primary object of the present invention to provide a jack whose length may be more easily adjusted.

To achieve the above object, a jack for supporting a load is provided that includes a tubular cylinder that receives a threaded piston. The cylinder has an opening at its upper end and the piston protrudes from the opening such that the overall length of the jack may be adjusted by varying the length of the piston that protrudes from the cylinder. A connector housing is provided adjacent the cylinder opening. At least one clamp member is supported by the connector housing. The clamp member has a female threaded portion suitable for threadably engaging the threaded piston. With this arrangement, the height of the piston extending from the cylinder can be finely adjusted by rotating the clamp member in a condition where the clamp member threadably engages the piston and the height of the piston can be coarsely adjusted by laterally disengaging the clamp arm from the piston and sliding the piston relative to the cylinder.

The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Fig. 1(a) is a partially cutaway sectional view of a jack in accordance with a first embodiment of the invention;

Fig. 1(b) is a right side view of the jack under the state shown in Fig. 1(a);

Fig. 2 is a partially enlarged view of the height adjusting mechanism of the jack;

Fig. 3 is a sectional view of the height adjusting mechanism in Fig. 2, taken along the line III-III of Fig. 2;

Fig. 4 is a partially enlarged view of the height adjusting mechanism in a condition suitable for adjusting the height of the jack;

Fig. 5 is a partially cutaway sectional view of the jack with its height adjusted; and

Fig. 6 is a front view of a conventional jack.

A first embodiment of the present invention will be described in reference to Figs. 1 through 5. The jack includes a tubular cylinder 1, a tubular piston 2, and a height adjusting mechanism 3. The piston 2 is inserted into an opening at the top end of cylinder 1 such that the piston can move axially along their axis P. A base plate 1a is welded to the bottom end of the cylinder 1 and a piston plate 2a is welded to the top end of the piston 2.

The height adjusting mechanism 3 includes a stopper 4 formed at the opening at the top end of the cylinder 1. The stopper 4 has a tapered inner receiving surface 5 that is tapered such that it opens towards its top end. A tubular connector housing 6 is journaled about the cylinder 1 at a position above the stopper 4. A pair of legs 7 protrude from opposite sides of the bottom end of the housing 6. The legs 7 are fitted about the outer periphery of the stopper 4 to prevent the housing 6 from separating from the cylinder 1. A gap is provided between the legs 7 and the stopper 4. Therefore, the housing 6 can rotate about the axis P and vertically move a limited distance along the axis P.

A pair of clamp arms 8 face each other on the outer periphery of the piston 2 in the housing 6. Openings 9 are formed at opposite sides of the housing 6. A two pronged bracket 10 is formed at the top end of each clamp arm 8. Each bracket 10 extends through the opening 9 and protrudes from the housing 6. At the outside of the housing 6, a

handle 11 is connected to each bracket 10 by a pin 11a. Each handle 11 can rotate around its associated pin 11a. Thus, the handles usually hang downward from the bracket 10 due to their own weight. The movement of the brackets 10, and thus the clamp arms 8 are restricted by the opening 9. A female thread 12 is formed on the inside surface of the bottom end of each clamp arm 8. A male thread 11 is formed on the outer periphery of the piston 2 along its entire length and the female thread 12 of each clamp arm 8 can be mated with the male thread 13. A tapered supporting surface 14 is formed at the outside of the bottom end of each clamp arm 8 so that it narrows towards the bottom end.

As shown in Figs. 1(a), 1(b), 2 and 3, when the piston 2 is adjusted to a desired height, the female thread 12 of each clamp arm 8 is placed in engagement with the male thread 13 of the piston 2. Also, the supporting surface 14 of each clamp arm 8 contacts the receiving surface 5 of the cylinder 1. The total weight of the piston 2 and the height adjusting mechanism 3 works as the force for pressing the female thread 12 against the male thread 13 due to the interaction between the supporting surfaces 14 and receiving surface 5.

It will be apparent that the same effect would be attained even if only one of the receiving surface 5 and supporting surface 14 is tapered, while the other is untapered.

To build a floor, a temporary concrete form 32 is built on a support plate 31 of a base 30. Therefore, to use the jack of this embodiment, the approximate height of the piston 2 is set before the jack is placed between the base 30 and the concrete form 32. Then, the base plate 1a of the cylinder 1 is mounted on the support plate 31 of the base 30 to secure it with a nail or bolt. Then, as shown in Fig. 4, the handles 11 are lifted to a horizontal position and they are used to rotate the housing about the axis P. Thus, while the supporting surface 14 contacts the receiving surface 5 of the cylinder 1, the clamp arms 8 and the housing 6 rotate, their rotation is transferred from the female thread 12 to the male thread 13, and the piston 2 moves axially relative to the cylinder 1 and the height adjusting mechanism 3. Accordingly, the distance between the base plate 1a and the piston plate 2a is fine-adjusted. This fine adjustment causes the piston plate 2a of the piston 2 to contact the support plate 33 of the concrete frame 32. Therefore, the piston plate 2a can be secured to the support plate 33 with a nail or bolt.

By repeating the above operation, a plurality of jacks are set between the base 30 and the frame 32 at the predetermined intervals. The interval is determined by calculating the floor strength. After fine-adjusting the height of the piston 2 of each jack and setting the piston plate 2a of each jack at a horizontal position together with the frame 32, when concrete slurry is poured into the frame 32, a floor is constructed.

The following is the description of the coarse adjustment of the height of the piston 2 before securing a jack to the base 30 and the frame 32. As shown in Fig. 4, the handles 11 are lifted to the horizontal position and the clamp arms 8 and the housing 6 are raised to remove the supporting surface 14 from the receiving surface 5. Then, the bracket 10 of each clamp arm 8 are pulled radially away from the axis P. This disengages the female thread 12 of each clamp arm 8 from the male thread 13 of the piston 2. Under the above state, the piston 2 is moved relative to the cylinder 1 to adjust the height of the piston 2.

Thereafter, the clamp arms 8 are brought into contact with the receiving surface 5 of the stopper 4. Then, as shown in Fig. 5, the female thread 12 mates with the male thread 13 due to the contact between the supporting surface 14 and the receiving surface 5. By the above operation, the height of the piston is set. Then, the jack is secured to the base 30 and frame 32 by executing the operation previously mentioned.

When the piston 2 is positioned at the predetermined height, the supporting surface 14 and the receiving surface 5 receive the total weight of the piston side including the weights of the piston 2, height adjusting mechanism 3, and frame 32. Because the total weight works as the force for pressing the female thread 12 of each clamp arm 8 against the male thread 13 of the piston 2, the piston 2 does not unexpectedly lower.

Also in this embodiment, the clamp arms 8 on the cylinder 1 and the piston 2 are secured by the female thread 12 and the male thread 13. Therefore, unlike a conventional embodiment, the securing strength is high and a large load can be supported by one jack.

Moreover, a pair of clamp arms 8 are formed so that they can approach to or separate from the piston 2. Also, the female thread 12 screwed to the male thread 13 of the piston 2 is formed on each clamp arm 8. However, when at least one of the clamp arm female threads is securely mated to the male thread, the piston 2 is held at the predetermined height. Therefore, for this embodiment, it is unnecessary to keep the accuracy of the female threads especially high.

It is also possible to use the jack of the present invention by connecting the piston plate 2 of one jack to the base plate 1b of another jack.

The jack described herein has the advantages of requiring only simple movements to adjust the height and permitting fine height adjustments.

Claims

1. A jack for supporting a load, the jack including a tubular cylinder (1) having an opening end and a piston (2) received by the cylinder (1) and protruding from the open end of the cylinder (1), wherein the overall length of the jack is adjustable by varying the length of the piston that protrudes from the cylinder, the jack being characterized in that:

   a male thread (13) is formed on the outer periphery of the piston;

   a connector housing (6) is provided adjacent the open end of said cylinder (1); and

   at least one clamp member (8) is supported by the connector housing (6), the clamp member (8) having a female threaded portion (12) suitable for threadably engaging said male thread (13), wherein the height of the piston (2) extending from the cylinder (1) can be finely adjusted by rotating the clamp member (8) in a condition where the clamp member (8) threadably engages the piston (2) and the height of the piston (2) can be coarsely adjusted by laterally disengaging the clamp arm (8) from the piston (2) and sliding the piston (2) relative to the cylinder (1).

2. A jack according to claim 1, wherein:

   said connector housing (6) is coupled to the cylinder (1) in a manner that permits limited axial movement of the housing (6) relative to the cylinder (1) and permits rotation of the connector housing (6) about an axis of the cylinder (1); and

   the connector housing (6) supports said clamp member (8) in a manner that permits the clamp member to move laterally to engage with and separate from said piston (2).

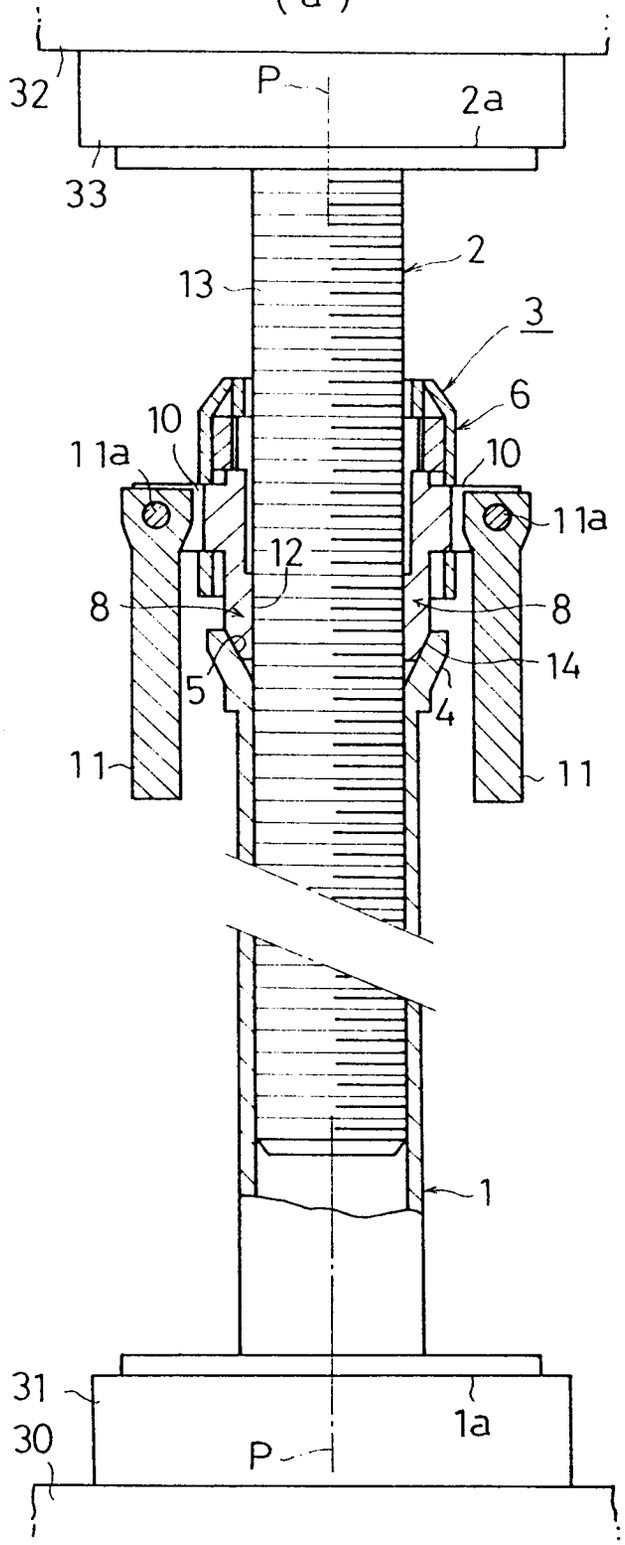
3. A jack according to claim 1 or 2, wherein the open end of the cylinder includes a tapered receiving surface (5) that receives said clamp member (8).

4. A jack according to any one of claims 1, 2 and 3, wherein the clamp member (8) includes a tapered supporting surface (14) for engaging the tapered receiving surface (5) of said cylinder (1).

5. A jack according to any one of claims 1 to 4, wherein a pair of facing clamp members (8) are provided.

6. A jack according to any one of claims 1 to 5, further comprising a handle (11) pivotally mounted on said clamp member (8).

Fig.1
(a)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2
13
3
6
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10
11a
11a
12
8
8
5
14
4
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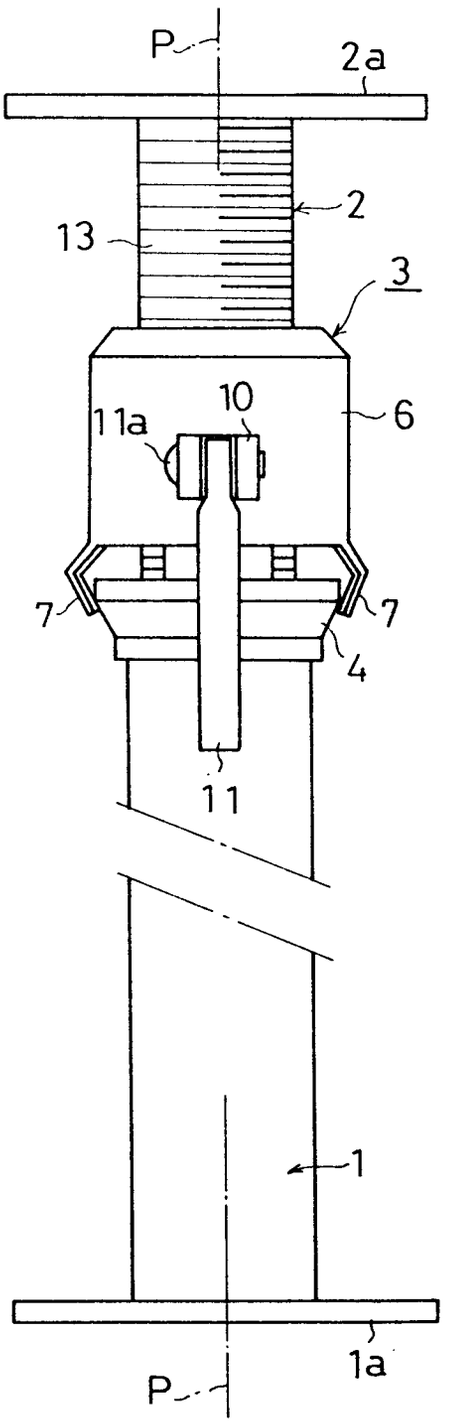
11
1
31
30
1a
P

Fig.1
(b)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1a
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Fig.2

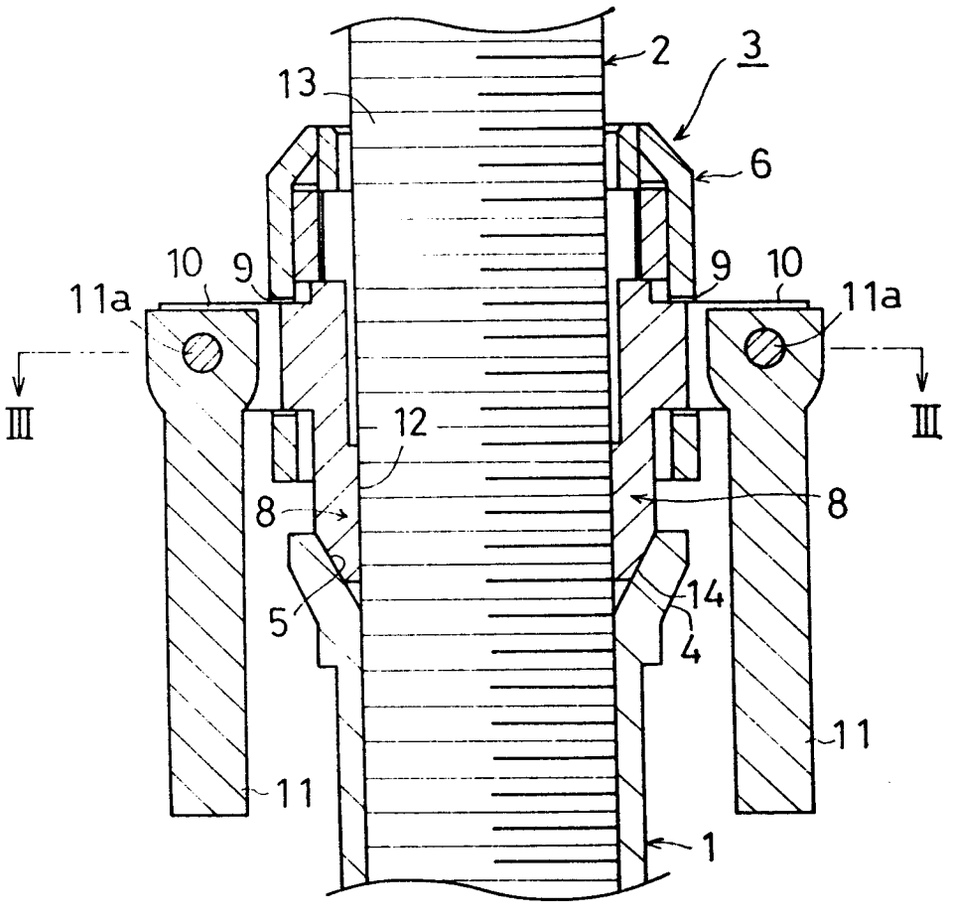
2
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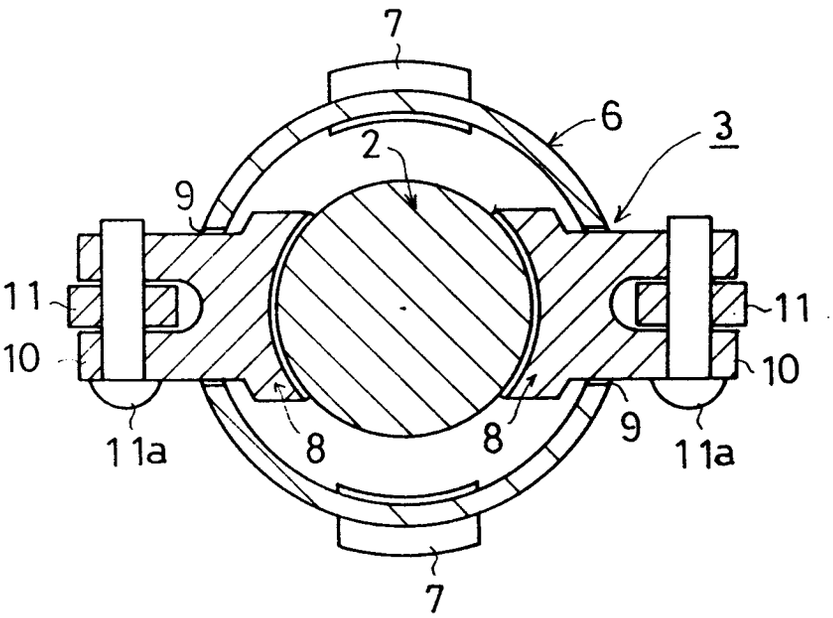
Fig.3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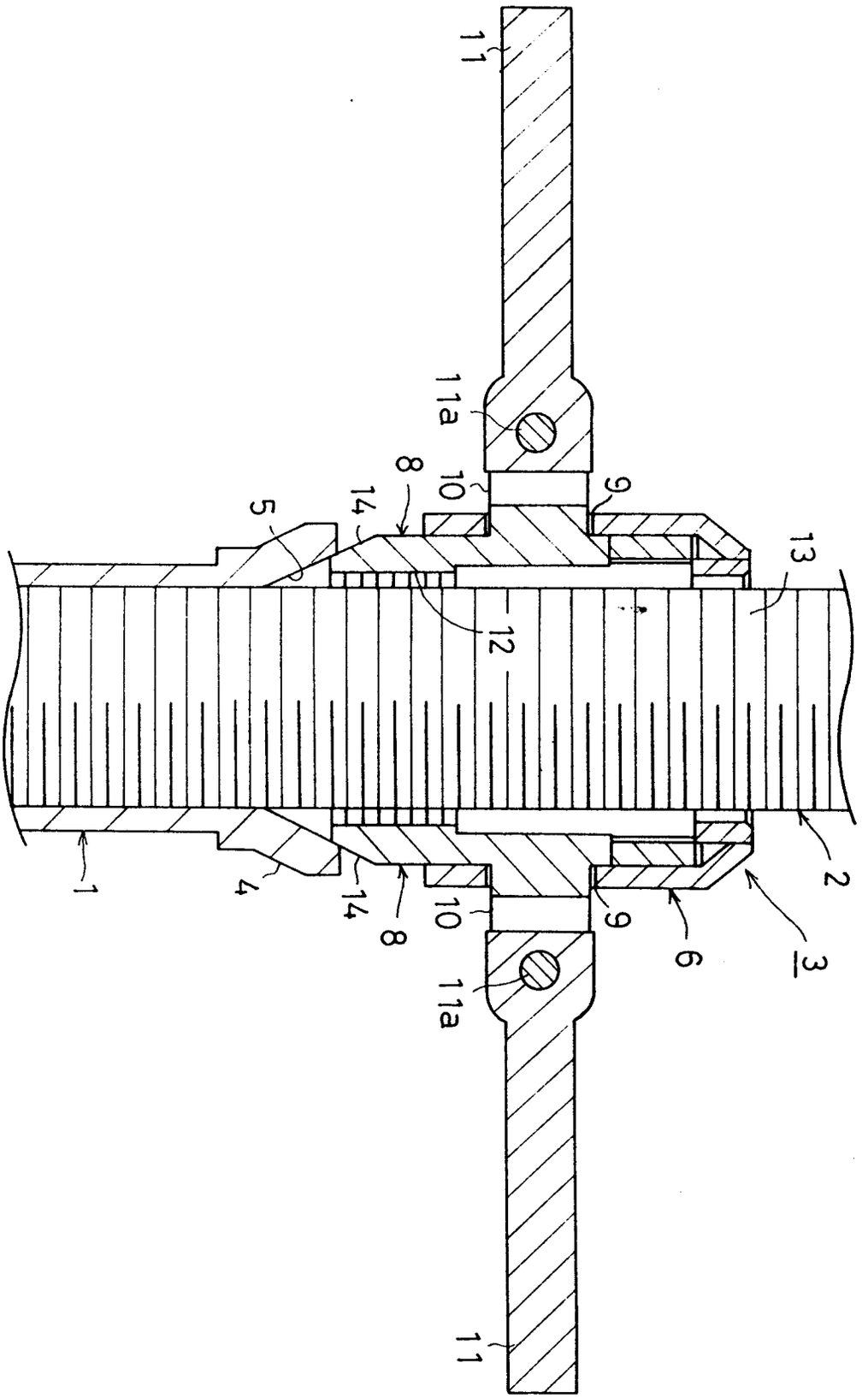


Fig.4

Fig.5

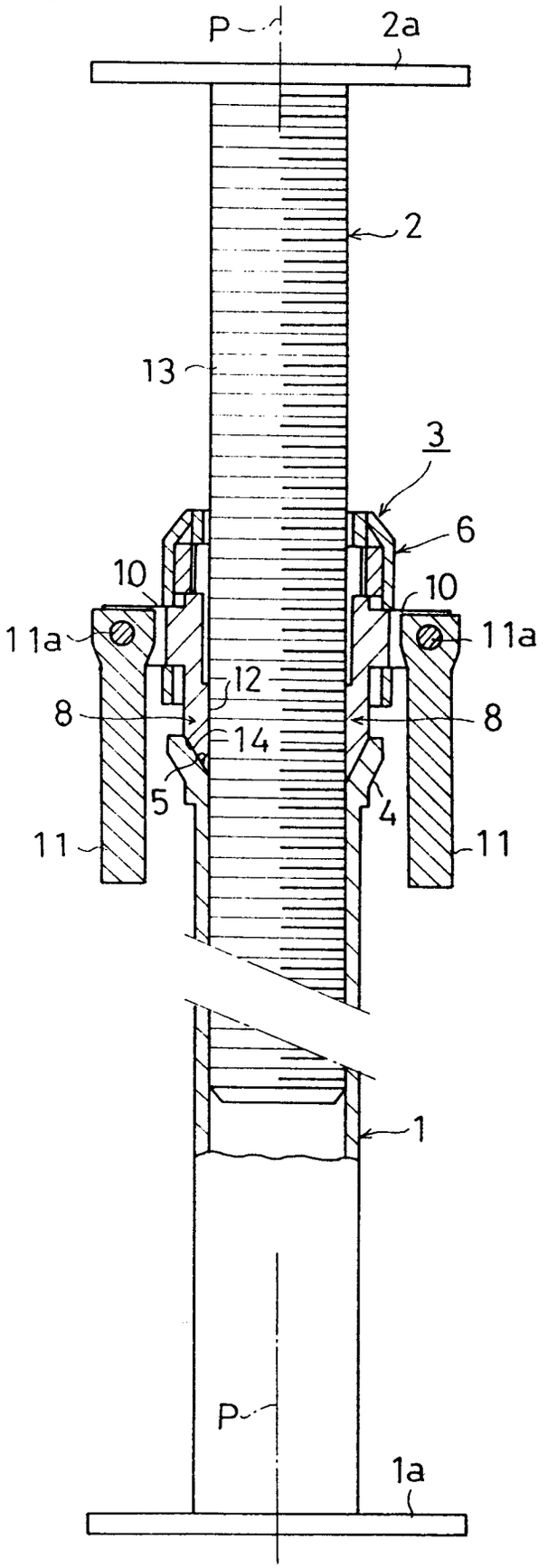
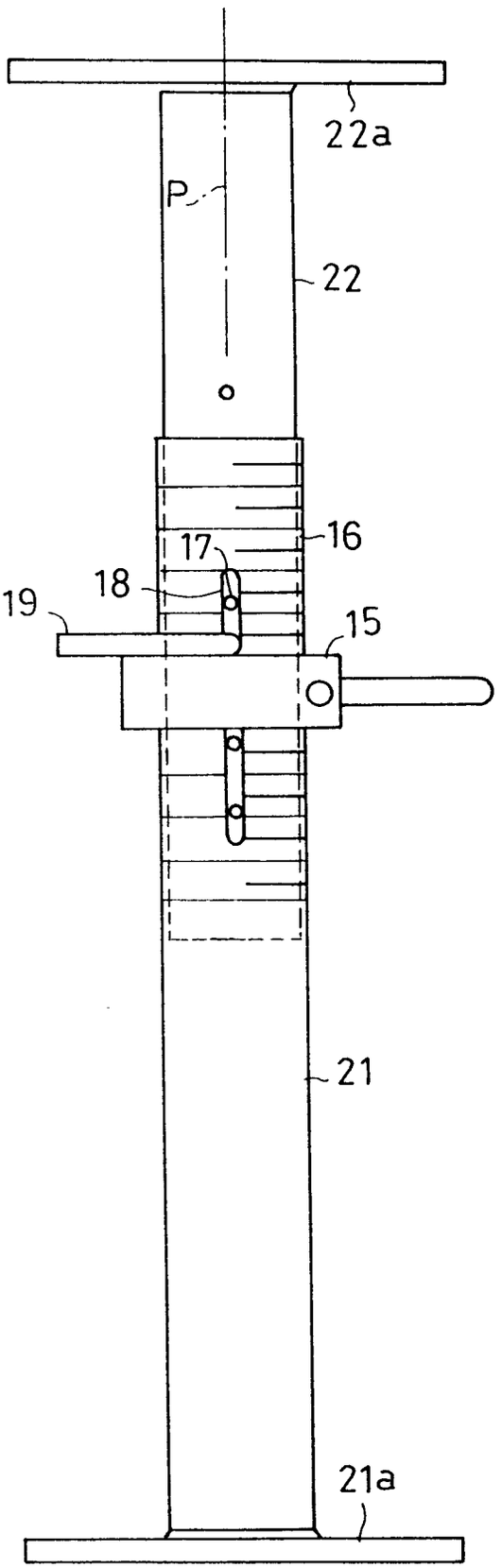


Fig.6 (Prior Art)



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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 1229

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.5)
X	EP-A-0 349 485 (ETS. NANICOBA) * the whole document * ---	1-6	E04G25/06
X	CH-A-321 018 (BEKA ST-AUBIN) * the whole document * -----	1,3-6	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 AUGUST 1992	VIJVERMAN W.C.

CATEGORY OF CITED DOCUMENTS

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