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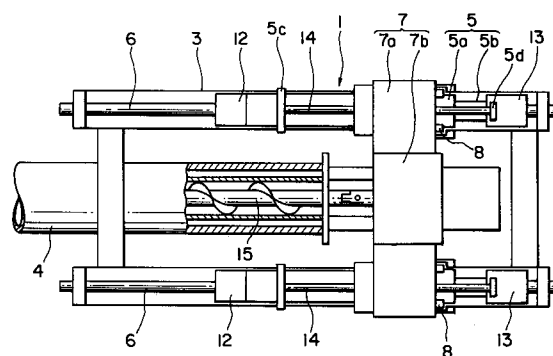
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W-8000 München 40(DE)(54) **PROPELLING SYSTEM IN SMALL DIAMETER PIPE PROPELLER.**

(57) A propelling system in a small diameter pipe propeller, wherein in the small diameter pipe propeller for propelling small diameter pipes (4) into the ground using a main body (1) of the propelling system installed in a launching shaft (2) and burying it, propelling jacks (5) and propelling rods (14) are provided in the direction of propelling the small diameter pipes (4), the forward ends of the propelling rods (14) are movably supported by cylinders (5a) of the propelling jacks (5), the rear ends thereof are fixed to the forward ends of piston rods (5b), a driving device (7) for propelling the small diameter pipes (4) is reciprocally movably provided between the propelling rods (14), connecting means (8), (9) for selectively connecting the driving device (7) with the propelling jacks (5) or propelling rods (14) are interposed therebetween, and connecting means (12), (13) for selectively connecting the both ends of the propelling jacks (5) and reaction receiving means (6) are interposed therebetween. Consequently, the small diameter pipes can be prop-

led into the ground when either the shrinkage or extension of the propelling jacks is effected, and the works can be carried out in a limited space.

FIG. 1



TECHNICAL FIELD

The present invention relates to a propelling system in a small diameter pipe propeller for burying a small diameter pipe.

BACKGROUND TECHNOLOGY

In a conventional propelling system in small diameter pipe propeller for burying small diameter pipes such as sewage pipes, electric wires, such small diameter pipes having leading pipes at the tip ends thereof are propelled into the ground to be buried therein using a propelling system provided in a launching shaft.

The conventional propelling system is provided with propelling jacks having a short stroke or provided with propelling jacks having a long stroke or telescopic cylinders.

In the propelling system provided with the propelling jacks having the short stroke, such jacks are extended and contracted a couple of times for propelling one small diameter pipe.

In the propelling system provided with the propelling jacks having the long stroke or the telescopic cylinders, such jacks or the cylinders are extended and contracted one time for propelling one small diameter pipe into the ground or two times by replacing pins for the same purpose.

However, there is such drawbacks in the propelling system having the propelling jacks, rods of which are extended and contracted a couple of times for propelling one small diameter pipe, that propelling of the small diameter pipe takes much time and is poor in operation efficiency, and that additional operation to fix the propelling jacks to a table with pins is required since the jacks receive reaction force, which further lowers the operation efficiency.

On the contrary, the propelling system provided with the propelling jacks having the long stroke or the telescopic cylinders needs a space which is more than two times the stroke of the propelling jack or the telescopic cylinder in length, thereby causing such a problem that a large launching shaft should be excavated and the small diameter pipe can hardly be propelled from a space which is too narrow to excavate a large launching shaft therein.

The present invention is made to solve the drawbacks set forth above and is to provide a propelling system in a small diameter pipe propeller enabling small diameter pipes to be propelled efficiently in the small space.

DISCLOSURE OF THE INVENTION

To achieve the above object, the small diam-

eter pipe propeller according to the present invention for propelling a small diameter pipe into the ground to bury it therein using a main body of the propelling system installed in a launching shaft, comprises propelling jacks and propelling rods provided in the direction of propelling the small diameter pipe, the forward ends of the propelling rods being movably supported by cylinders of the propelling jacks and the rear ends thereof being fixed to the forward ends of piston rods, a driving device for propelling the small diameter pipes reciprocally movably provided between the propelling rods, connecting means for selectively connecting the driving device with the propelling jacks or propelling rods interposed there between, and connecting means for selectively connecting the both ends of the propelling jacks and reaction receiving means interposed therebetween. Consequently, the small diameter pipe can be propelled into the ground by extending the driving jacks while the piston rods thereof are fixed, and also by contracting the driving jacks while the cylinders thereof are fixed.

BRIEF DESCRIPTION OF THE DRAWINGS

Drawings show an embodiment of the present invention in which Fig 1 is a partly cut-away plan view, Fig. 2 is a side view, Figs. 3 to 4 are views showing an operation and Figs. 5 and 6 are views showing another embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

An embodiment of the present invention will be described with reference to the drawings.

In the drawings, designated at 1 is a main body of the propelling system installed in a launching shaft 2. Two reaction receiving rods 6 are placed on tables 3 so as to be in parallel with the propelling direction of a small diameter pipe 4.

Designated at 5 are a pair of propelling jacks slidably supported by the two reaction receiving rods 6 and the propelling jacks 5 comprise cylinders 5a and hollow piston rods 5b which protrude rearward from the cylinders 5a. The propelling jacks 5 are supported by the reaction receiving rods 6 in the manner that the reaction receiving rods 6 penetrate the centers of both the hollow piston rods 5b and the cylinder 5a.

Oil pressure chucks 12 and 13 are provided at the front and rear ends of the propelling jacks 5. The cylinders 5a and the piston rods 5b can be fixed to the reaction receiving rods 6 at arbitrary positions thereof by the oil pressure chucks 12 and 13. A pair of propelling rods 14 are provided over and under the propelling jacks 5 so as to be parallel with the propelling jacks 5. The forward

ends of the propelling rods 14 are fixed to sliding plates 5c which are slidably engaged in the outer peripheries of the cylinders 5a and the rearward ends of the propelling rods 14 are fixed to brackets 5d which project from the oil pressure chucks 13 fixed to the tip end of the piston rod 5b wherein the sliding plates 5c can slide along the cylinders 5a accompanied by the extension and contraction of the piston rods 5b. A driving device 7 is provided across the propelling rods 14. The driving device 7 comprises a pipe propelling member 7a which is supported by the propelling rods 14 and the outer peripheries of the cylinders 5a of the propelling jacks 5 at the both end portions thereof and a driving unit 7b provided on the pipe propelling member 7a. Pins 8 are detachably provided between the pipe propelling member 7a and the cylinders 5a while pins 9 are detachably provided between the pipe propelling member 7a and the sliding plates 5c, wherein the pipe propelling member 7a is selectively coupled to the cylinders 5a or the propelling rods 14 by the pins 8 or 9.

The driving unit 7b provided on the pipe propelling member 7a can rotatably drive a screw conveyer 15 (not shown) housed in the small diameter pipe 4 and a pilot head of a leading pipe (not shown) mounted at the tip end of the small diameter pipe 4.

An operation of the propelling system will be described with reference to Figs. 2 to 4. As illustrated in Fig. 2, the pins 8 are inserted into the pipe propelling member 7a of the driving unit 7b and the cylinders 5a of the propelling jacks 5 to thereby fix these members. The oil pressure chucks 13 provided at the tip end of the piston rods 5b are operated to thereby fix the tip ends of the piston rods 5b to the reaction receiving rods 6.

If the propelling jacks 5 are extended at this state, the cylinders 5a of the propelling jacks 5 are advanced together with the driving device 7 as illustrated in Fig. 3 while the small diameter pipe 4 is propelled into the ground by the pipe propelling member 7a. When the propelling jacks 5 are extended to the stroke ends, the pins 8 coupling the pipe propelling member 7a to the cylinders 5a are removed while the pins 9 are inserted into pin holes provided in the pipe propelling member 7a to thereby couple the pipe propelling 7a to the propelling rods 14.

Successively, the oil pressure chucks 13, to which the piston rods 5b and the reaction receiving rods 6 are fixed, are released while the oil pressure chucks 12, to which the cylinders 5a and the reaction receiving rods 6 are fixed, are operated. At this state, when the propelling jacks 5 are contracted, the driving device 7 is advanced by way of the propelling rods 14 as illustrated in Fig. 4, so as to enable the small diameter pipe 4 to be propelled

further into the ground.

When one small diameter pipe 4 is completely propelled into the ground with a series of operations set forth above, the propelling jack 5 and the driving device 7 are returned to the positions which are illustrated in Fig. 2. Thereafter the series of operations set forth above are repeated to thereby enable the small diameter pipe 4 to be propelled successively.

Although according to the embodiment set forth above, the reactive force generated at the propelling time is absorbed by the reaction receiving rods 6 which are provided by penetrating the propelling jacks 5, both ends of the propelling jacks 5 may be respectively fixed to the upper surface of the table 3 by way of an insertable pins 16 so as to perform the same function set forth above instead of the reaction receiving rods 6 and the oil pressure chucks 12 and 13 as illustrated in Figs. 5 and 6.

INDUSTRIAL UTILIZATION

With the arrangement of the present invention set forth above, the small diameter pipe can be propelled into the ground at both the times when the propelling jacks are extended and contracted so that the propelling time is reduced to half compared with the conventional arrangement where the small diameter pipe can be propelled into the ground at one of the times when the propelling jacks are extended and contracted, whereby a term of works can be remarkably reduced and a small diameter pipe can be propelled into the ground in a limited space so that the launching shaft can be small and provided economically.

Claims

1. A propelling system in a small diameter pipe propeller for propelling a small diameter pipe into the ground to bury it therein using a main body of the propelling system installed in a launching shaft, wherein propelling jacks and propelling rods are provided in the direction of propelling the small diameter pipe, the forward ends of the propelling rods are movably supported by cylinders of the propelling jacks, the rear ends thereof are fixed to the forward ends of piston rods, a driving device for propelling the small diameter pipes is reciprocally movably provided between the propelling rods, connecting means for selectively connecting the driving device with the propelling jacks or propelling rods are interposed therebetween, and connecting means for selectively connecting the both ends of the propelling jacks and reaction receiving means are interposed there-

between.

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FIG. 1

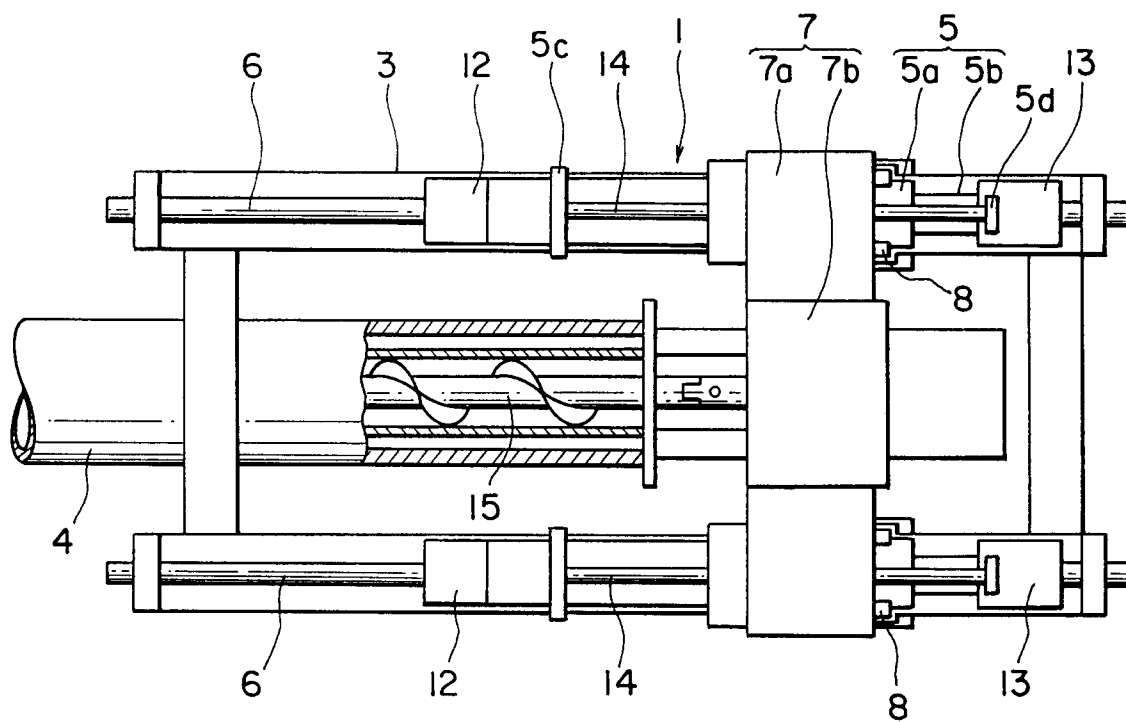


FIG. 2

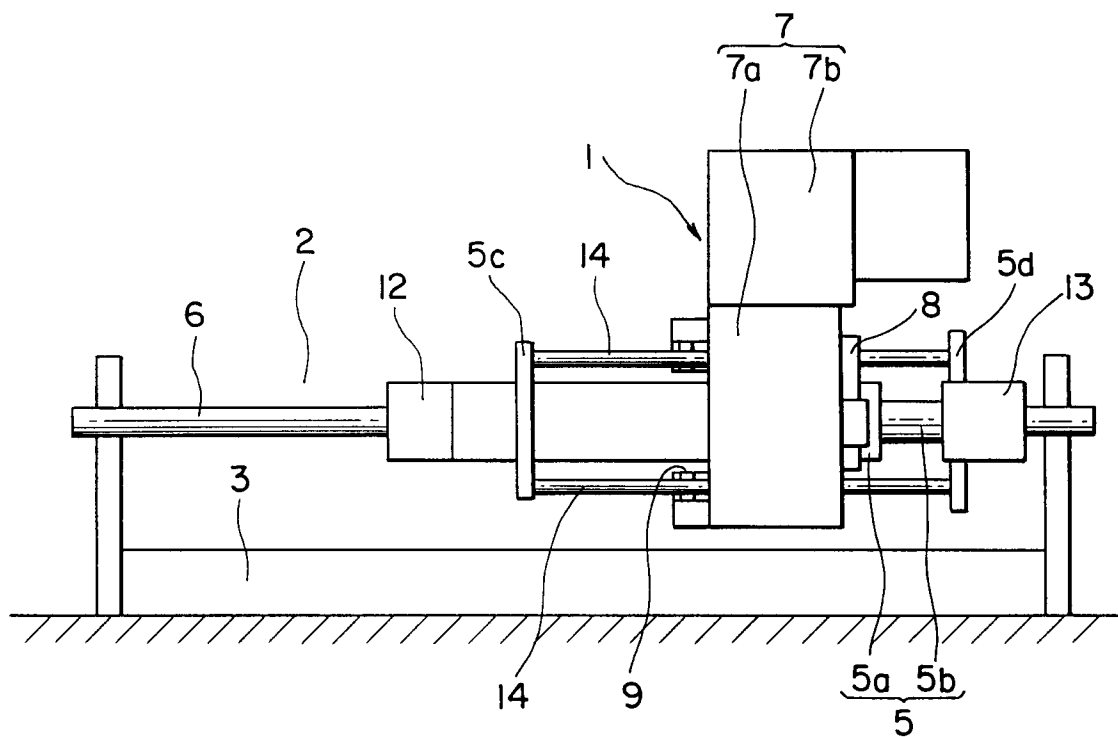


FIG. 3

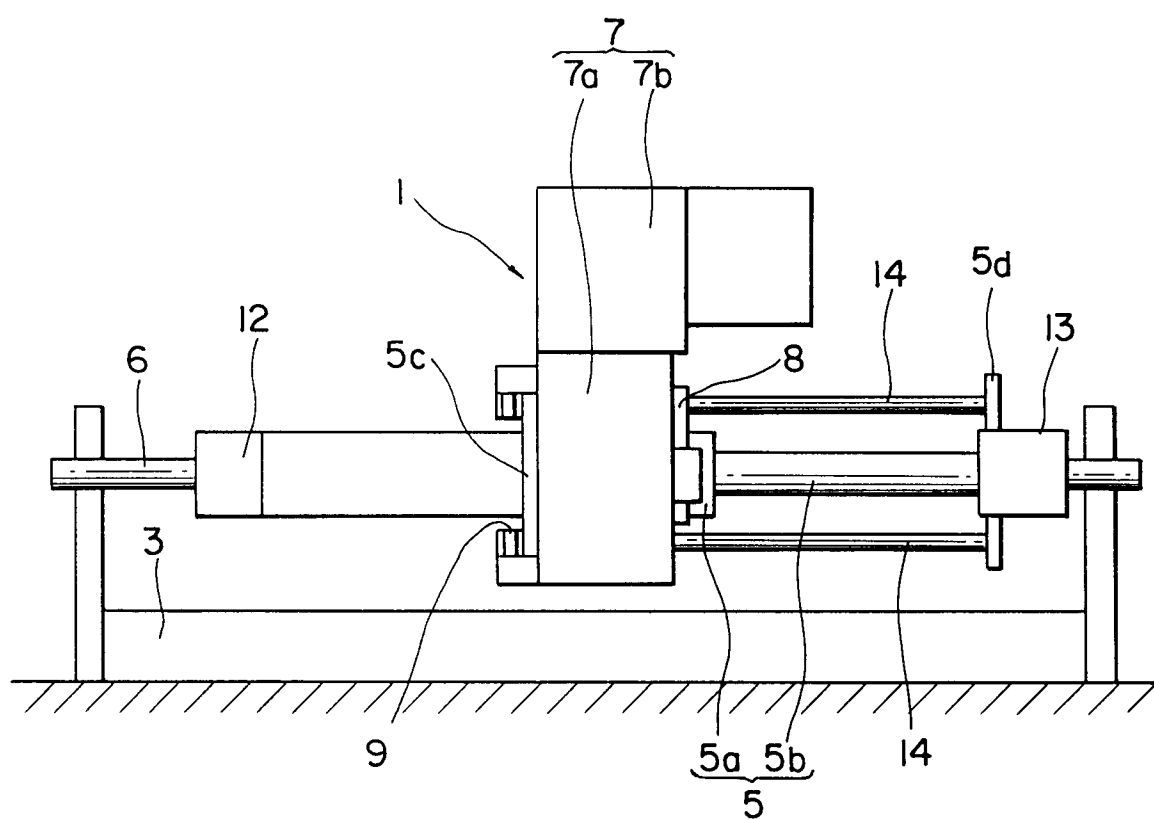


FIG. 4

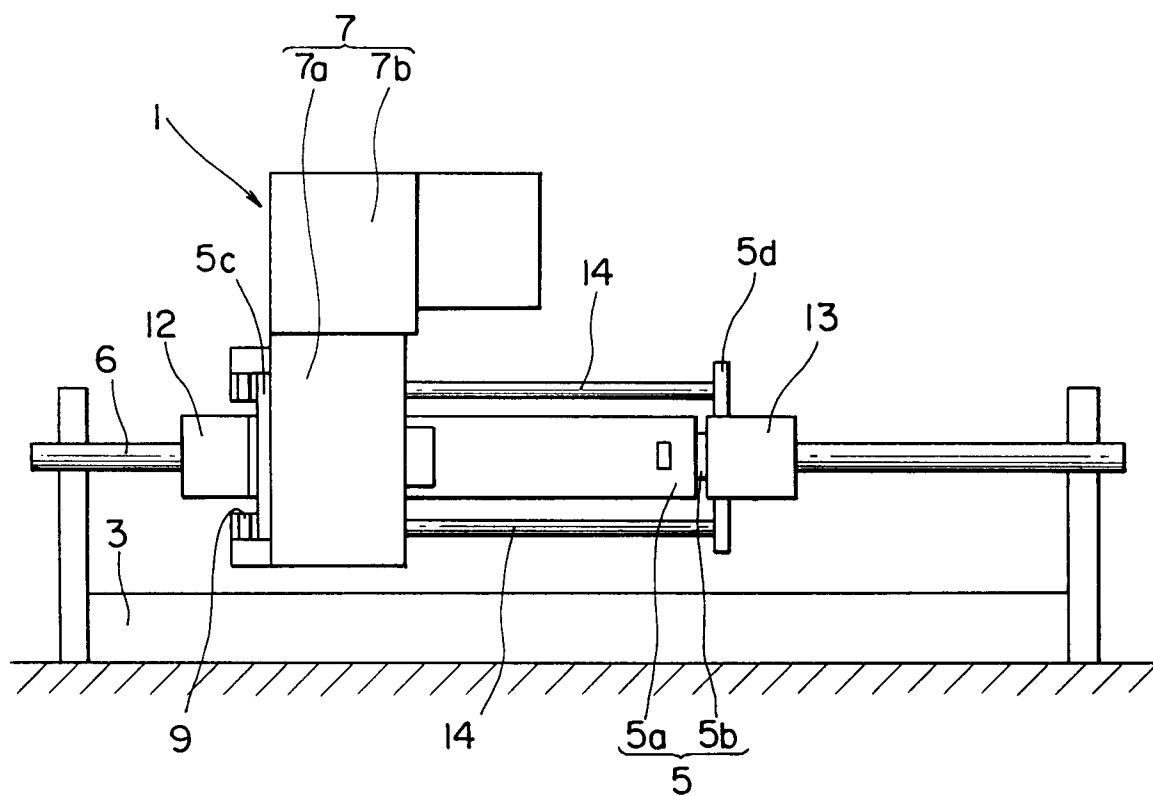


FIG. 5

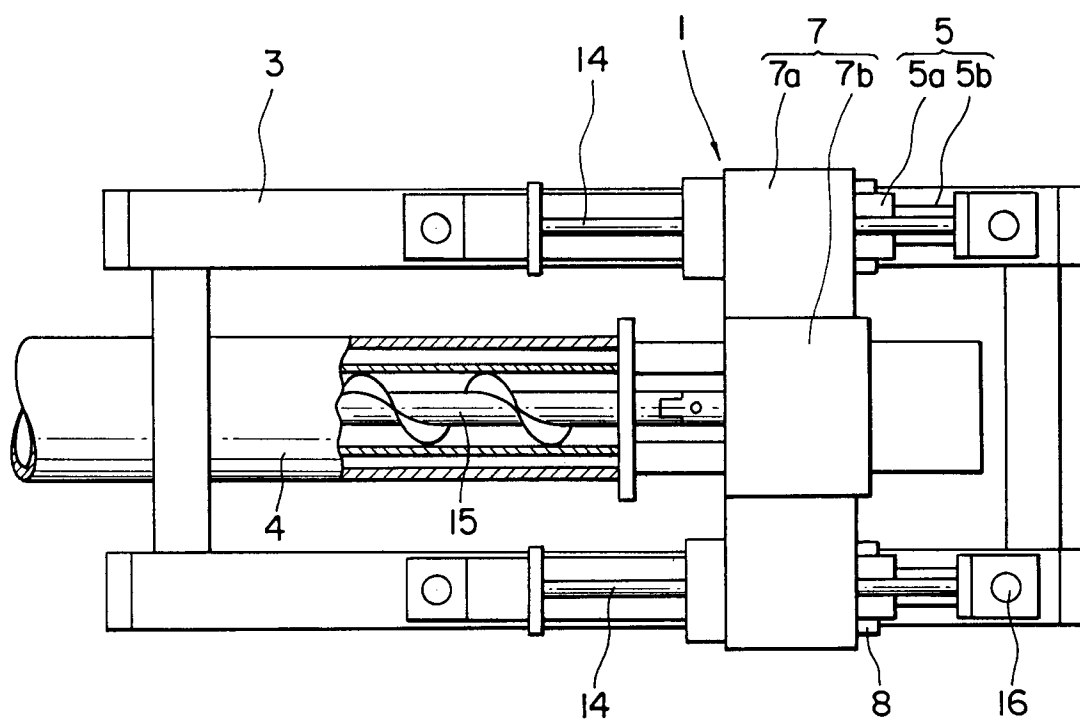
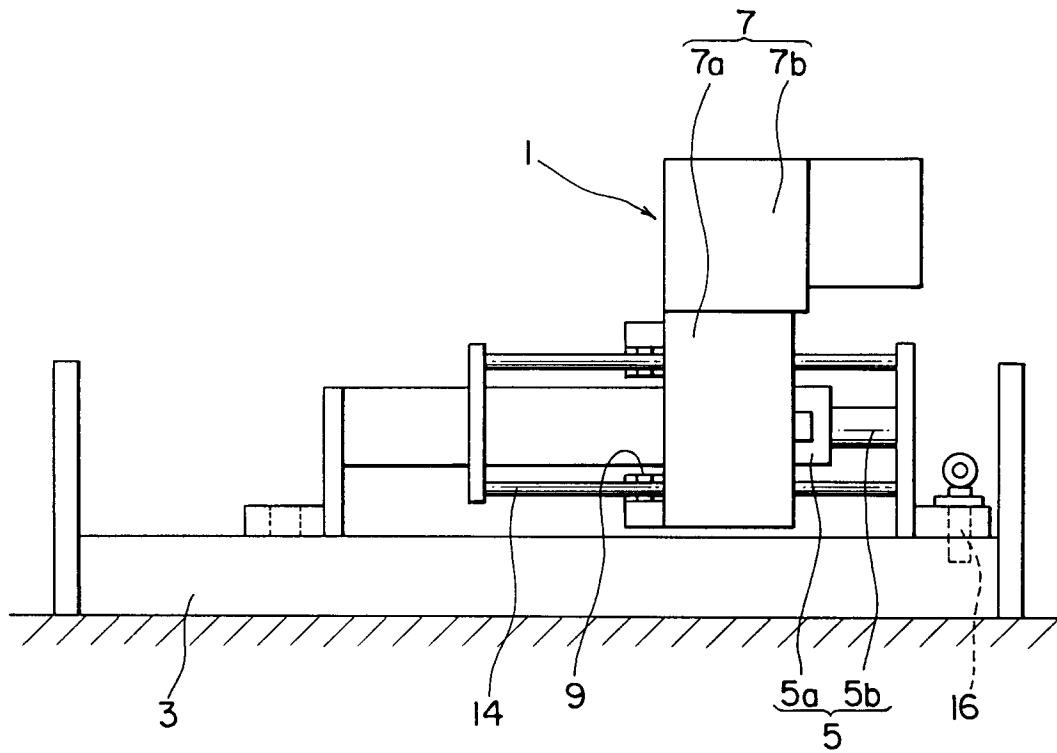


FIG. 6



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP91/00343

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 ⁵ E21D9/06, E21B7/04		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System ¹	Classification Symbols	
IPC	E21D9/06, E21B7/04	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	JP, B2, 2-519 (Sumitomo Electric Industries, Ltd.), January 8, 1990 (08. 01. 90), (Family: none)	1
A	JP, U, 61-169197 (Kubota, Ltd.), October 20, 1986 (20. 10. 86), (Family: none)	1
A	JP, U, 64-10593 (Sanwa Kizai K.K.), January 20, 1989 (20. 01. 89), (Family: none)	1
[*] Special categories of cited documents: ¹⁰ "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		Date of Mailing of this International Search Report
May 31, 1991 (31. 05. 91)		June 17, 1991 (17. 06. 91)
International Searching Authority		Signature of Authorized Officer
Japanese Patent Office		