(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 362 158 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89830412.6**

(51) Int. Cl.5: **E21B 7/24 , E21B 7/20**

(22) Date of filing: **25.09.89**

(30) Priority: **29.09.88 IT 62988**

(43) Date of publication of application:
04.04.90 Bulletin 90/14

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR LI LU NL SE

(71) Applicant: **TRIVELSONDA di ARMANDO TONTI & C. S.n.c.**
Via Flaminia II, 22
I-60027 Osimo (AN)(IT)

(72) Inventor: **Tonti, Armando**
Via Flaminia II, 45
Osimo (AN)(IT)
Inventor: **Tonti, Silvio**
Via Petrarca, 2
Osimo (AN)(IT)

(74) Representative: **Baldi, Claudio**
Piazza Ghislieri, 3
I-60035 Jesi (Ancona)(IT)

(54) Vibrator for installing on drilling machine "rotaries".

(57) This invention concerns a vibrator for installing directly on the "rotary" of drilling machines. The actual vibrator is fitted in a casing with a vertical through hole at the centre, and closed at the bottom by a plate which supports a double vice and at the top by a counter-plate joined elastically, by an annular series of shock absorbers, to an overlying platform which is anchored firmly to the flange of the "rotary" by means of support and fixing U-bolts.

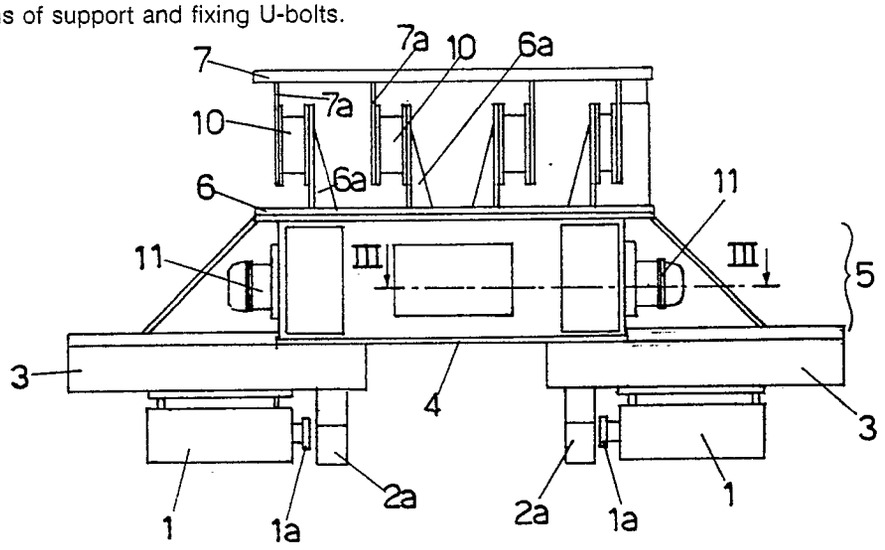

FIG. 2

Vibrator for Installing on Drilling Machine "Rotaries"

This patent application for an industrial design concerns a vibrator for fitting directly on the "rotary" of drilling machines, in order to accelerate and simplify drilling operations in gravely or sandy grounds, which tend to collapse inside the drilling hole in that they are not compact and have little self-supporting capacity.

In order to overcome this problem, currently, before carrying out drilling operations, a metal cylindrical liner is driven in the soil to act as an anti-collapsible support, as the earth is removed from inside by the drilling machine.

In other words, the earth is drilled inside a large pipe which becomes the wall of the hole drilled.

Obviously the drilling operation has to be interrupted when the depth reached is the same as that of the liner so that the same can be driven further down by means of a second liner which is fitted and pushed over the first and the drilling operation can continue inside the first liner buried in the soil.

In fact the wall of the hole drilled consists of a set of superimposed cylindrical liners, suitable for preventing the earth from collapsing, because of its inconsistency, inside the hole.

Each liner is currently driven in the earth by means of special machines consisting essentially of a bearing trellis supporting a vibrator at a certain height capable of supporting the liner in a perfectly vertical position and of hitting it repeatedly down so as to allow the liner to penetrate gradually in the earth.

It becomes immediately evident how drilling in certain types of terrain is penalized both in terms of time and production costs, in that the machine with drill and the machine with the vibrator must be alternated in the hole.

The purpose of this invention is to eliminate all the problems caused by the alternated and repeated use of the above two machines, by designing a vibrator which may be installed directly on the "rotary" of any drilling machine, so that drilling times are minimized considerably.

The device according to the invention includes a vice for gripping the liner at two diametrically opposed points of the edge; the liner being fixed at the bottom to a casing in which the vibrator is housed, consisting of a symmetrical pair of revolving shafts, having the same RPM, on which eccentric masses for creating a vibrating movement are splined.

This casing is suspended from the fixing flange of the "rotary" of the drill by means of a series of annular rubber pads which act as shock absorbers to prevent the vibrations of the casing from being transmitted to the "rotary".

For major clarity the description of the invention continues with reference to the enclosed drawings which are intended for illustrative purposes and not in a limiting sense, in which:

- fig. 1 is a schematic side view of the vibrator according to the invention, installed at the bottom of the "rotary" of a drilling machine.
- fig. 2 is a view from left to right of the vibrator of fig. 1.
- fig. 3 is the cross-section of fig. 2 with plane III-III of fig. 2.
- fig. 4 is a view from bottom to top of the vibrator illustrated in fig. 1.

With reference to the above figures, it can be noted that the vibrator according to the invention includes a double vice for gripping the edge of a liner, in vertical position, at two diametrically opposed points.

This double vice consists of two coaxial and opposing hydraulic cylinders (1), each of which is fixed under a respective support block (2) sliding inside a box-shaped guide (3), fixed firmly under a plate (4), which forms the back wall of the casing containing the actual vibrator.

The rods (1a) of each hydraulic cylinder (1) on being expelled press on the external edge of the liner, whose internal edge touches a vertical tooth (2a) projecting at the bottom of the sliding block (2).

The stop position of the sliding block (2) inside the box-shaped guides (3) can be varied so as to adjust the distance of the teeth (2a) which must fit into the edge of the liner, according to the diameter of the liner to be gripped.

As mentioned, the two box-shaped guides (3) are fixed on diametrically opposite sides, under a plate (4) with a central opening (4a), which closes the casing (5) which contains the vibrator, at the bottom.

This casing is closed at the top by a counter-plate (6) which must have a wide central opening, like the underlying plate (4), for the passage of the set of rods supporting the drilling tool which digs inside the set of overlying liners driven in the ground.

An annular platform (7) which is suspended, by means of a number of support and fixing U-bolts (8), at the bottom of the flange (9) fitted outside any "rotary", is fitted over and spaced from the counter-plate (6).

The counter-plate (6) and the annular platform (7) are connected together by means of an annular series of vertical and opposed pairs of plates (6a and 7a), between which a pad (10) in shock ab-

sorbing elastic material, as for example rubber, is fixed so that the annular platform (7) is not affected by the vibrations of the counter-plate (6).

With particular reference to fig. 3, let us consider the elements fitted in the casing (5).

Two hydraulic motors (11) are fitted outside the two transverse sides of the casing (5) for rotating the respective shafts (12), on each of which a gear (13a) and an eccentric mass (14a) are splined, which creates the vibrating movement of the casing (5), together with another eccentric mass (14b) splined to an intermediate shaft (12a), parallel and fitted next to the main shaft (12), and rotated by the above gear (13a) driven by a geared wheel (13b) splined to the shaft (12a), the gear ratio being equal to one.

A longitudinal connection shaft (15) to whose ends two identical gears (15a) are splined, driven by the above geared idle wheels (13b), is fitted, to ensure that the eccentric masses (14a and 14b) operating on the opposite sides of the casing (5) rotate at the same number of revs per minute.

Claims

1) A vibrator for installing on the "rotary" of drilling machines characterized in that it includes a drilled casing (5), containing the actual vibrator, closed at the bottom by a plate (4) with a central hole (4a), supporting the double vice of the liner, and at the top by a counter-plate (6), drilled at the centre, and which is connected to an overlying annular platform (7) which is fixed firmly to the flange (9) of the "rotary", by means of an annular series of opposing vertical pairs of plates (6a and 7a), fitted next to each other into each of which a pad (10), which acts as a shock absorber, is fixed.

2) A vibrator for installing on the "rotary" of drilling machines characterized in that two shafts (12) are fitted on opposite sides in the casing (5); each shaft being driven by its own hydraulic motor (11), on which an eccentric mass (14a) and a gear (13a) are splined, the latter being engaged with a geared wheel (13b) splined to an intermediate shaft (12b) on which a second eccentric mass (14b) is splined, in that a longitudinal connection shaft (15) is fitted between the two side vibrator units, at the ends of which two gears (15a) are splined, for engaging with the above idle wheels (13b).

3) A vibrator for installing on the "rotary" of drilling machines according to claim 1) characterized in that the double vice for gripping the liner consists of two coaxial and opposing hydraulic cylinders (1), each of which is fixed under a respective sliding support block (2) which can slide, in the case of adjustment, in a box-shaped guide (3), firmly fixed under the above plate (4), in that in front of the rod (1a) of each cylinder (2) a tooth (2a) projecting from the bottom of the above sliding block (2) is fixed at a short distance.

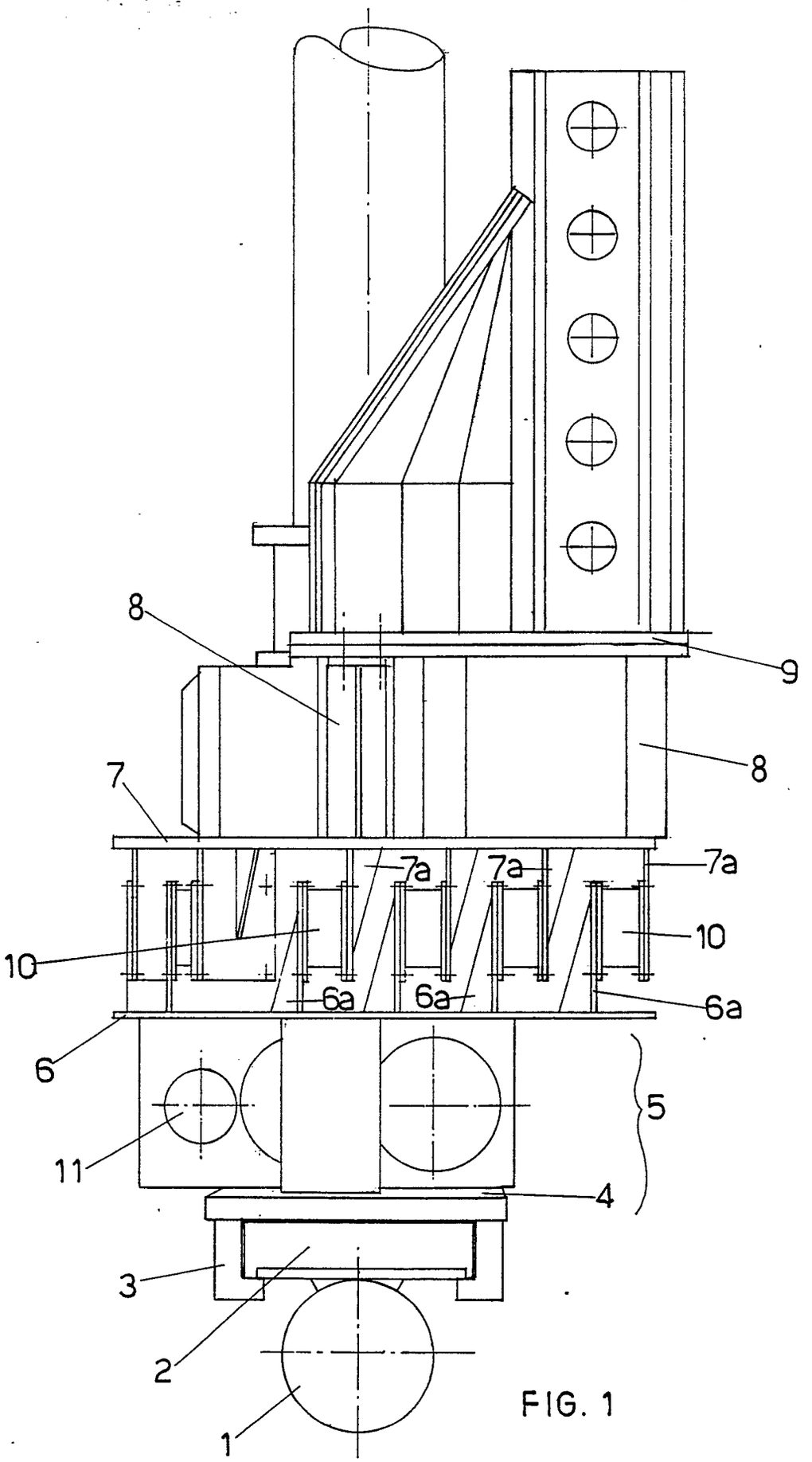

FIG. 1

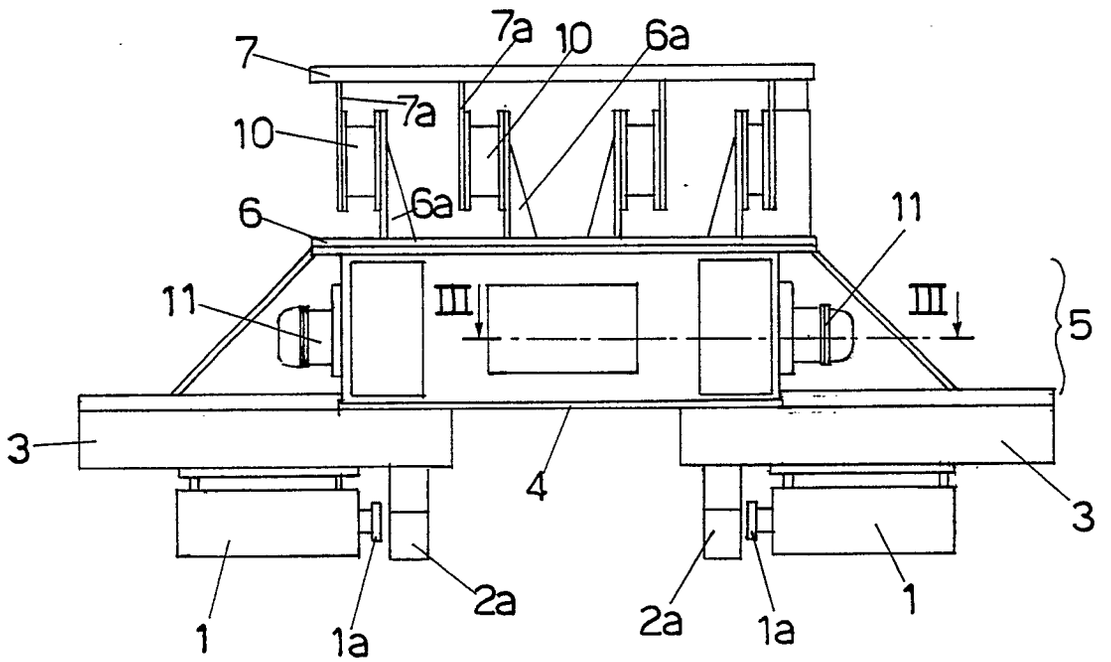

FIG. 2

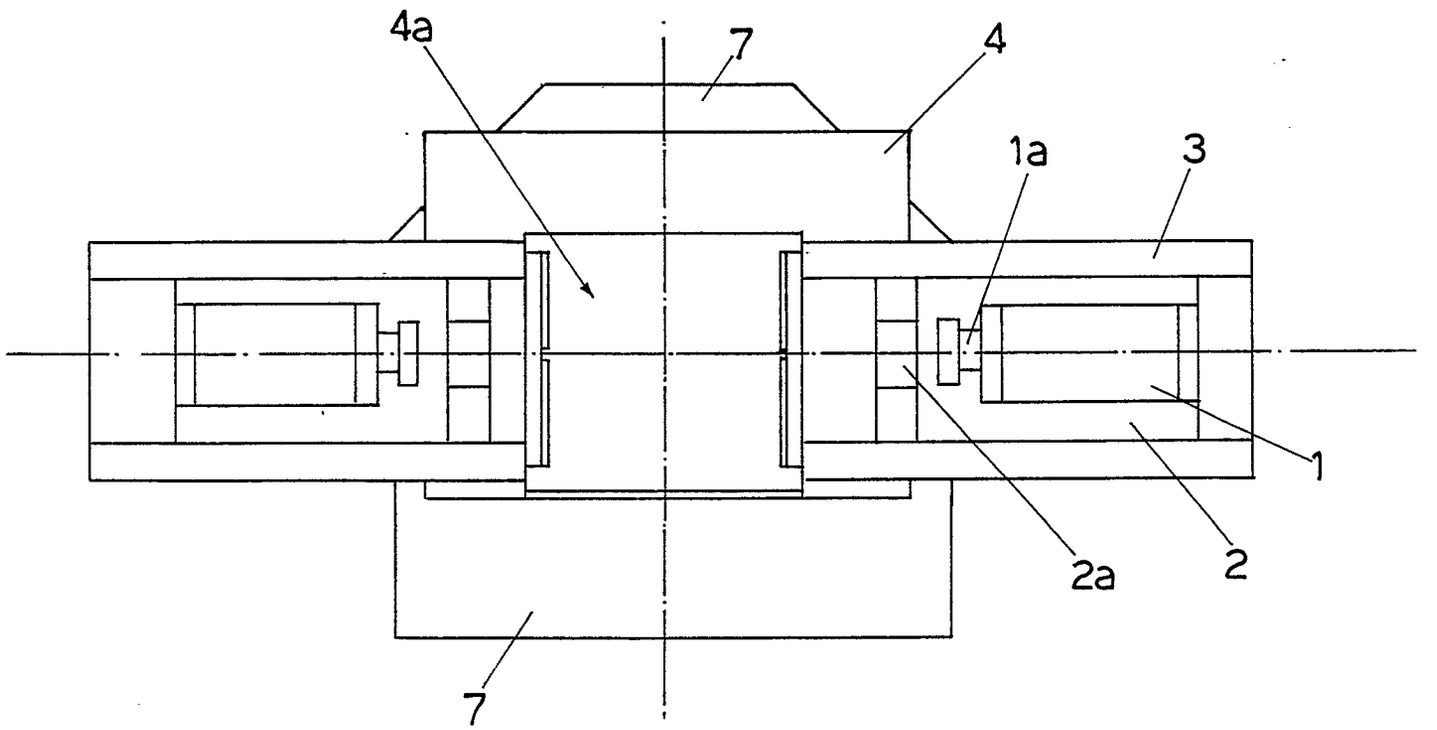

FIG. 4

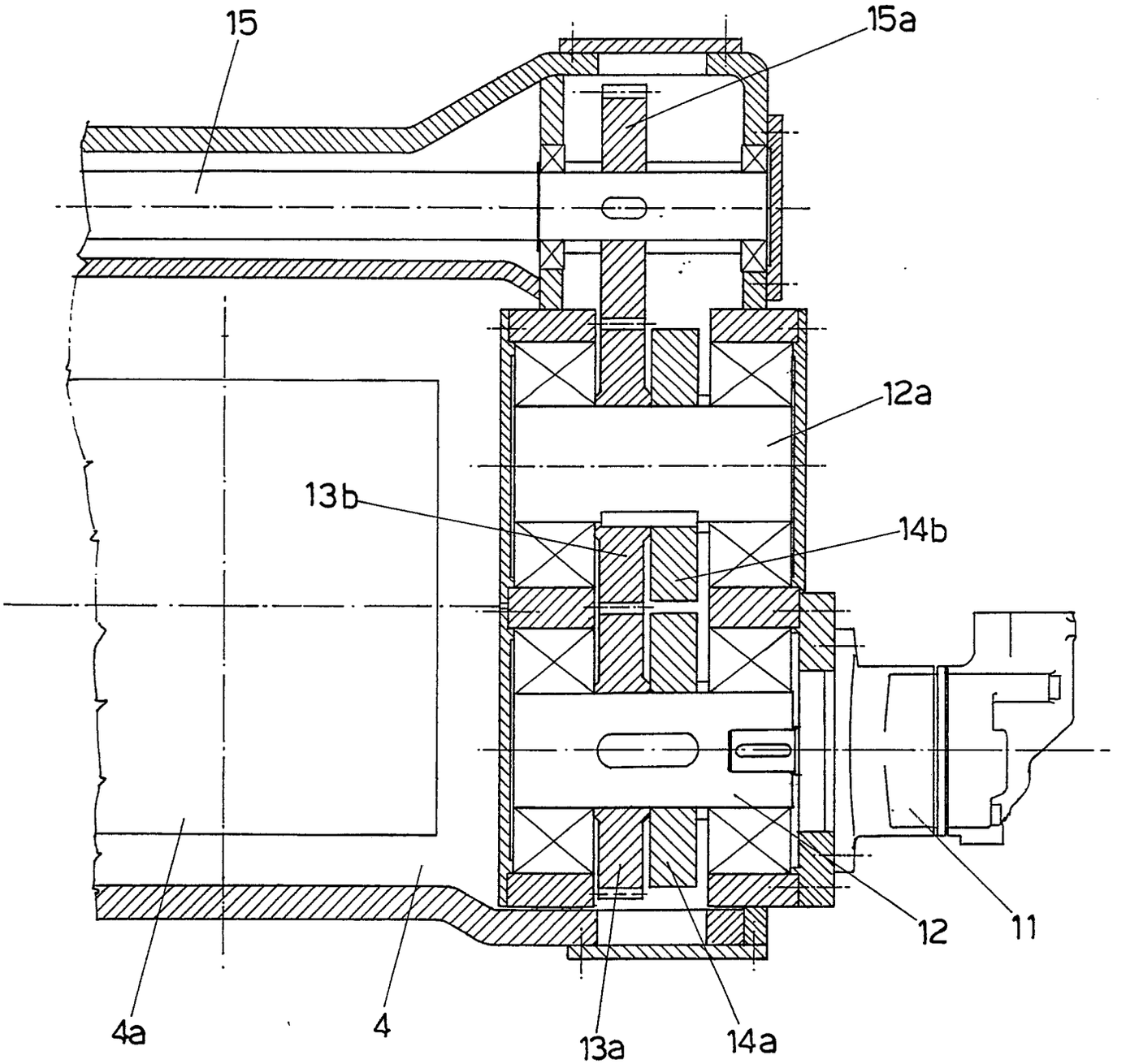

FIG. 3