



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 704 256 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.04.1996 Bulletin 1996/14

(51) Int. Cl.⁶: **B21B 31/04**

(21) Application number: **94202813.5**

(22) Date of filing: **29.09.1994**

(84) Designated Contracting States:
AT BE DE ES FR GB SE

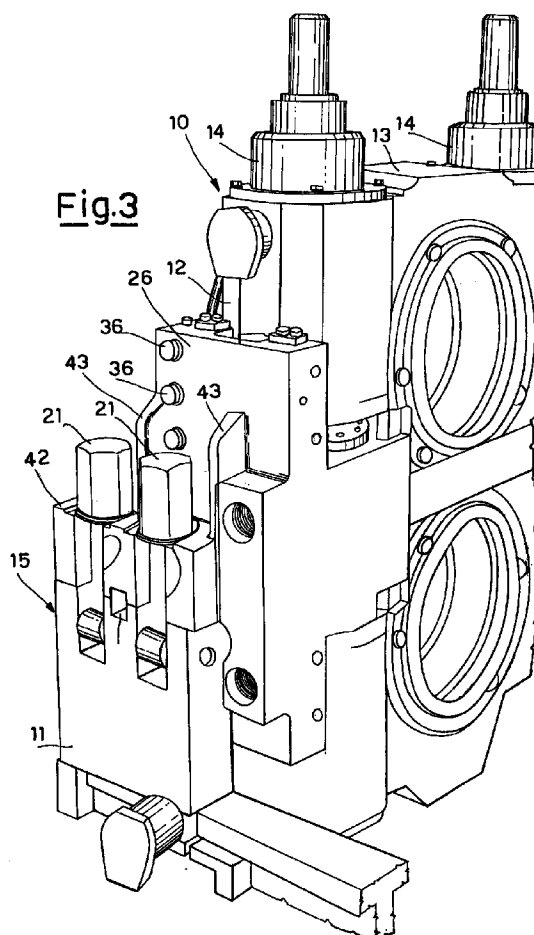
(72) Inventor: **Mantovan, Gianfranco**
I-21052 Busto Arsizio (Varese) (IT)

(71) Applicant: **POMINI S.p.A.**
I-21053 Castellanza (VA) (IT)

(74) Representative: **Martegani, Franco**
Via Damiano Chiesa, 56
I-20099 Sesto San Giovanni (Milano) (IT)

(54) **Rolling stand with tie-rods with extremely high strength to axial stresses**

(57) A rolling stand of the type with tie-rods, endowed with extremely high strength to axial stresses, which comprises a stand base (11) supporting at least two rolling rolls (13) borne by carriers (12) which can be vertically moved in order to be approached/moved apart from each other, by means of four vertical tie-rods (14) displaying screw-threaded portions (27) provided on opposite sides of at least one pair of support feet (15) arranged between the stand base and the carriers (12) which support and contain a central smooth portion (25') of the tie-rods (15), wherein from at least one of the support feet (15), a contoured portion (26) extends upwards and downwards in parallel direction to the tie-rods (14), which contoured portion (26) is suitable for housing and guiding a vertical rib (29) protruding outwards from said carriers (12), with both said contoured portion (26) and said vertical rib (29) bearing, on mutually opposite surfaces, freely removable adjustment/sliding elements (32, 33, 38).



EP 0 704 256 A1

Description

The present invention relates to a rolling stand of the type with tie-rods, endowed with extremely high strength to axial stresses, which makes it possible high-precision nonsymmetrical-profile rolled sections to be obtained

The presently used rolling stands of the type with tie-rods (referred to in the following as "tie-rod rolling stands") are such as to enable also rolled sections with particular contours, such as a double-"T" contours, to be manufactured with very good quality.

However, it should be remarked here that these rolling stands operate very well for rolled sections with symmetrical contour. An example of a tie-rod rolling stand of the above type is disclosed in detail in European patent No. 0 166 478.

If the contour of the cross-section of the rolled section is nonsymmetrical, for example an "L"-shaped contour, stresses arise which, by being oriented parallel to the axis of the rolling rolls, cannot be easily counteracted.

The axial stresses have a detrimental impact on the whole structure of the rolling stand, causing mutually engaged moving components to undergo wear during the rolling process. Among such mutually moving components, we remind here, for example, the lead nuts or threaded rings installed in the carriers, and those components which perform the task of guiding the movement.

This drawback generates clearances in the rolling stand and can also endanger the dimensional tolerances of the rolled section product which consequently may not meet the requirements.

The purpose of the present invention is of obviating these drawbacks, by providing a tie-rod rolling stand capable of meeting the necessary requirements of strength and stability, i.e., of allowing rolled sections of non-symmetrical profile with any sizes and with very precise dimensional tolerances to be obtained, while simultaneously preventing the components which constitute the rolling stand from undergoing wear.

This purpose is achieved by a rolling stand of the type with tie-rods which displays the features expounded in the appended claims.

The structural and functional characteristics of the invention, and its advantages over the prior art, will be still more evident from an examination of the following disclosure made by referring to the accompanying schematic drawings, which display an example of a tie-rod rolling stand embodying the principles of the same invention.

In the drawings:

-- Figure 1 shows a front elevation view illustrating a rolling stand of the type with tie-rods according to the present invention;

-- Figure 2 shows a vertical sectional view, on an enlarged scale, of a side portion of the rolling stand, illustrating a stabilizer/contrast foot provided side-

ways of the carriers which support the neck of the rolling rolls;

-- Figure 3 shows a top perspective view illustrating a portion of a shoulder of the rolling stand as displayed in Figure 2, according to the present invention;

-- Figure 4 shows a top plan view illustrating a half of a shoulder of the rolling stand as displayed in Figure 2, without the eye tie-rods which are used to fasten it to the stand base;

-- Figure 5 shows a horizontal sectional view seen from upwards, of the shoulder with the stabilizer/contrast foot at the bearings which support the neck of a rolling roll between the tie-rods or set-screws;

-- Figure 6 shows a vertical sectional view of a half of the shoulder with foot of Figure 2.

Referring to the figures, the tie-rod rolling stand according to the invention is generally indicated with 10 and is structurally formed by a stand base 11 performing the task of containing carriers 12 bearing at least one pair of respective horizontal rolling rolls 13.

The rolling rod according to the present invention is provided with tie-rods or setscrews 14 which enable the rolling rolls 13 to be adjusted in position relatively to each other, driven by an adjustment/synchronism unit arranged above the rolling stand and not illustrated, because it is of a well-known type for those skilled in the art. This unit causes the carriers 12 bearing the rolling rolls 13, to be vertically moved towards/apart from each other.

On the stand base 11, according to the present invention, four support feet or bases, generally indicated with 15, are mounted and constrained to it by means of eye tie-rods 16 which are hinged, at their bottom ends 17, onto the stand base 11.

The eye tie-rods 16 are hinged, through a shaft 18, inside hollows 19 provided in the stand base 11, can rotate around the shaft 18 and can be inserted inside purposely provided hollows 20 of the support feet 15, inside which they are fastened by means of nuts 21.

The support feet 15 are also centered relatively to the stand base 11, by means of keys 22 positioned inside complementary, mutually opposite key seats 23 and 24 provided in the support feet 15 and in the stand base 11, and protruding ribs suitable for being housed inside corresponding seats, not shown in the drawings.

Each support foot 15 protrudes inside the interior of the rolling stand, to form a sleeve portion 25 which receives a central, smooth portion 25' of the tie-rods 14.

Outside the rolling stand, each support foot 15, according to the present invention, extends into two "C"-shaped portions 26, extending upwards and downwards to surround, at least partially, the external sides of the carriers 12.

The tie-rods 14 have screw-threaded portions 27, provided on opposite sides of the support foot 15, which

receive ring nuts 28 integral with the stand base relatively to the rotation inside the carriers 12.

The carriers 12 are provided, along side portions thereof, in perpendicular direction to the direction of the axes of the rolling rolls 13, with outwards protruding, vertical ribs 29 which get engaged inside the contoured portions 26 of the support feet 15.

As shown by Figures 2-5, the "C"-shaped portions 26 have, in section, an enlarged end portion 30 and an opposite, thinned end portion 31. Inside such end portions 30, 31 adjustment wedge elements 32, 33 are housed, which are horizontally fastened the one, in parallel direction to the axes of the rolling rolls; and the other, in perpendicular direction to the axes of the rolling rolls. The wedge elements 32 and 33 are freely removable adjustment/sliding elements.

As it can clearly be seen from Figure 4, the enlarged end portion 30 is facing the interior of the rolling stand in which the rolling rolls are housed, and, in this example, the relevant wedge element 32 is fastened by means of at least two fastening screws 34.

The opposite, thinner end portion 31 facing the outside of the rolling stand houses an "L"-shaped support block 35 fastened by means of three side screws 36. In its turn, the wedge element 33 is fastened by means of screws 37 to the support block 35 and is constrained to the whole structure of the support foot 15.

The wedge elements 32 and 33 have an "L"-shape and their inner, longer side acts as an slant plane, and cooperates, in order that said wedge elements can be correctly positioned, with complementary slant planes internally provided on the enlarged end portion 30 and on the support block 35.

However, on both said wedge elements 32 and 33 crowned runners 38 slide, which act as freely removable sliding elements, constrained, on opposite sides, to the bottom end of the vertical rib 29 protruding from the carriers 12.

Said crowned runners 38 enable the carriers 12 to match the deformations of the rolling rolls 13.

Figure 4 displays how each "L"-shaped wedge element 32 and 33 is further fastened by means of a small plate 39 provided above the base of the "L"-shape of the wedge element.

The small plate 39 constrains, through screws 40, the wedge element 32 to the enlarged end portion 30 of the "C"-contoured portion 26. In an analogous way, the small plate 39 constrains, through screws 40, the wedge element 33 to the support block 35.

Figures 4 and 5 show top plan views of the support foot 15 of the tie-rod rolling stand according to the invention, which has a nonsymmetrical body aligned with the axis 41 running through the centre of the tie-rods 14. From its sleeve portion 25, the body of the support foot 15 extends towards the outside of the rolling stand into a slant portion 42 which acts like a strut in order to counteract the axial thrusts generated by the rolling rolls 13.

In the slant, strut-acting portion 42 the hollows 20 are provided which receive the eye tie-rods 26 --with, in the instant example, two of them being provided.

The general structure of the support feet 15 is such as to bear the operating axial load which is generated during the rolling of a nonsymmetrical rolled section.

In this situation of the structure, the rolling stand according to the present invention displays a very high stiffness and secures that rolled sections will be produced in the desired size, with very narrow dimensional tolerances. Of course, the shape of the upwards/downwards extending "C"-shaped portions 26, as well as of the wedge elements 32 and 33 results to be designed for an easy servicing.

In the event that the mutually engaging parts undergo wear owing to the stresses they are submitted to, and to their mutual sliding, the screws 34 and 37 make it possible the wedge elements 32 and 33 and the screws 36 to be easily and rapidly removed, with the support block 35 being as easily and rapidly removed too.

The wedge elements 32 and 33 can thus be replaced and in the event that their coupling planes with the contoured portions 26 are no longer perfectly smooth, they can be levelled off, with a correct coupling being restored.

Also the support block 35 of the wedge element 33, subject to a higher axial stress, can be reprocessed in order to restore the coupling planarity of the parts.

The rolling stand of the present invention can be provided with such support feet at one shoulder only, or, according to an alternative embodiment, said support feet can be provided at both rolling stand shoulders.

Externally to the support feet on the "C"-shaped portions, vertical ribs 43 can be provided which act to further stiffen the structure thereof, i.e., stabilize the whole tie-rod rolling stand.

Also a tie-rod rolling stand according to the present invention is suitable for being horizontally opened, i.e., by moving apart the shoulders containing the carriers and the supports, in order to remove the rolling rolls, which remain in their position, and replace them with a new pair of rolling rolls. This result can be attained because both the old (i.e., presently installed) rolling rolls, and the new rolling rolls (i.e., the rolling rolls which the operator wishes to install) are borne by a suitable service unit according to U.S. patent No. 4,552,007.

Claims

1. Rolling stand of the type with tie-rods, endowed with extremely high strength to axial stresses, which comprises a stand base (11) supporting at least two rolling rolls (13) borne by carriers (12) which can be vertically moved in order to be approached/moved apart from each other, by means of four vertical tie-rods (14) displaying screw-threaded portions (27) provided on opposite sides of at least one pair of support feet (15) arranged between the stand base and the carriers (12) which support and contain a

central smooth portion (25') of the tie-rods (15), characterized in that from at least one of the support feet (15), a contoured portion (26) extends upwards and downwards in parallel direction to the tie-rods (14), which contoured portion (26) is suitable for housing and guiding a vertical rib (29) protruding outwards from said carriers (12), with both said contoured portion (26) and said vertical rib (29) bearing, on mutually opposite surfaces, freely removable adjustment/sliding elements (32, 33, 38).

5

10

2. Rolling stand according to claim 1, characterized in that said contoured portions (26) and said vertical ribs (29) are arranged at opposite side ends of said carriers (12) aligned to an axis (41) running through one pair of tie-rods (14) of a same rolling stand shoulder. 15
3. Rolling stand according to claim 1, characterized in that said contoured portions (26) have a "C"-shaped cross-section. 20
4. Rolling stand according to claim 3, characterized in that said contoured portions with "C"-shaped cross-section have an enlarged end portion (30) and an opposite, thinned end portion (31) which bear, constrained, both said adjustment/sliding elements (32, 33), with said vertical ribs (29) constraining complementary, crowned sliding elements (38). 25
30
5. Rolling stand according to claim 1, characterized in that said adjustment/sliding elements constrained to said contoured portion (26) are wedge elements (32, 33). 35
6. Rolling stand according to claim 5, characterized in that at least one of said wedge elements (33) is fastened onto a small support block (35) which, in its turn, is fastened to said contoured portion (26) in a thinned portion (31) thereof. 40
7. Rolling stand according to claim 6, characterized in that said wedge elements (32, 33) have an "L"-shape and are constrained, at a base portion of said "L"-shape thereof, the one (32) to said contoured portion (26), and the other one (33) to said support block (35). 45
8. Rolling stand according to claim 1, characterized in that said support feet (15) are constrained to said stand base (11) by means of eye tie-rods (16), with said stand base (11) and said support feet (15) being kept centered by keys (22) housed inside mutually complementary seats (23, 24) which are provided partially on said support feet (15) and partially on said stand base (11). 50
55
9. Rolling stand according to claim 1, characterized in that said support foot (15), in a central portion

thereof, extends towards the outside into a slant, strut-acting portion (42).

10. Rolling stand according to claim 1, characterized in that said contoured portions (26) of said support feet (15) are externally provided with vertical stiffening ribs (43).

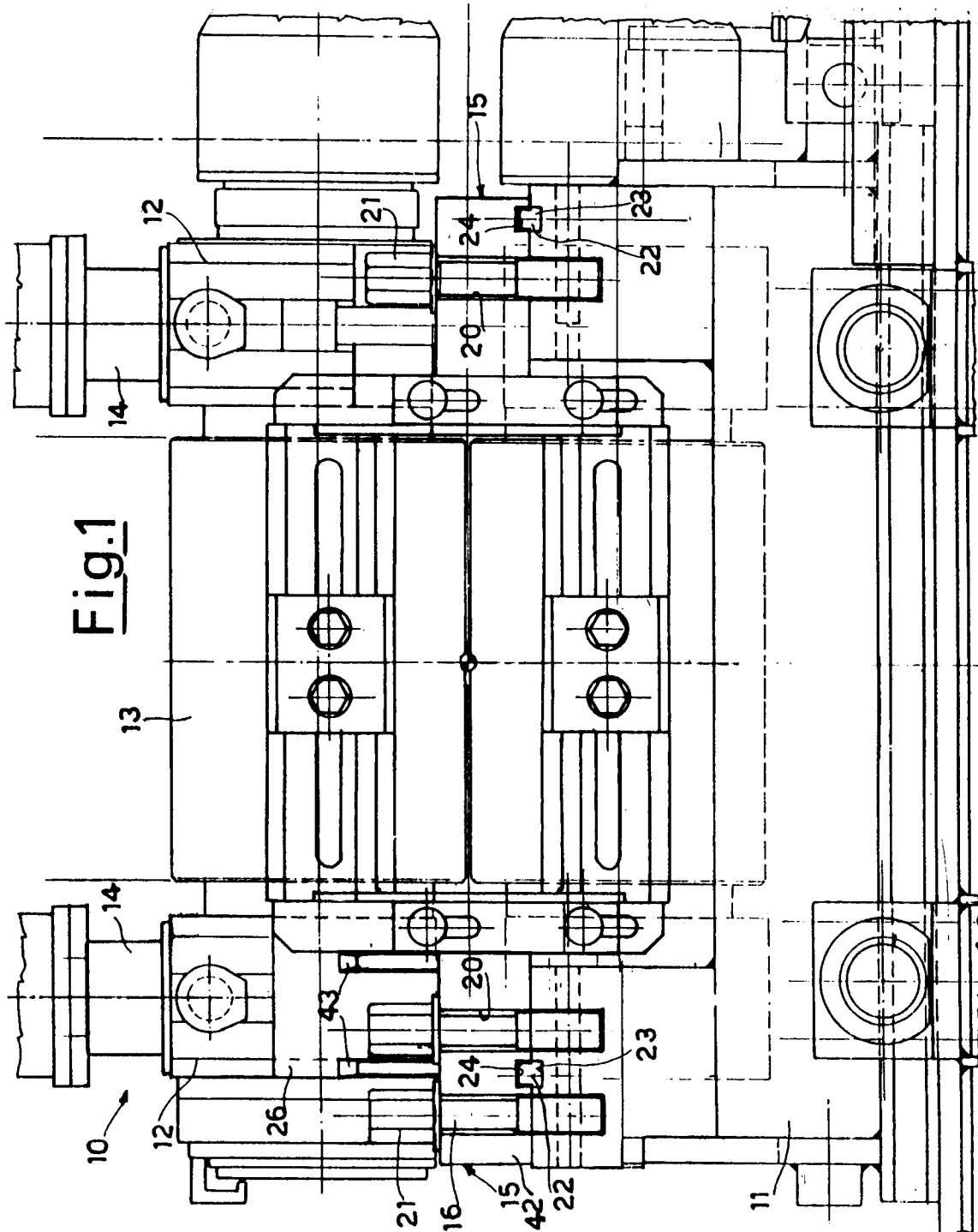
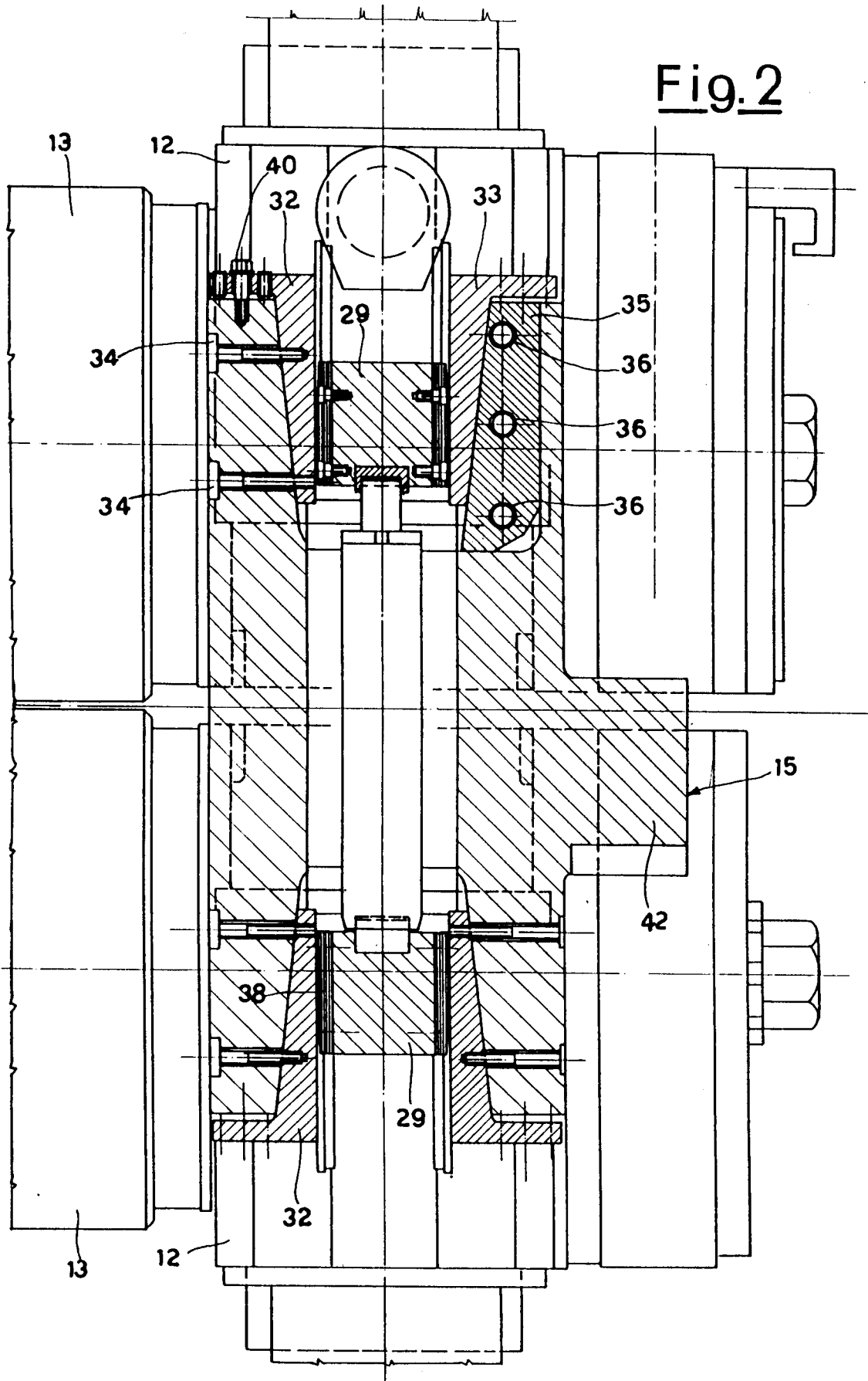
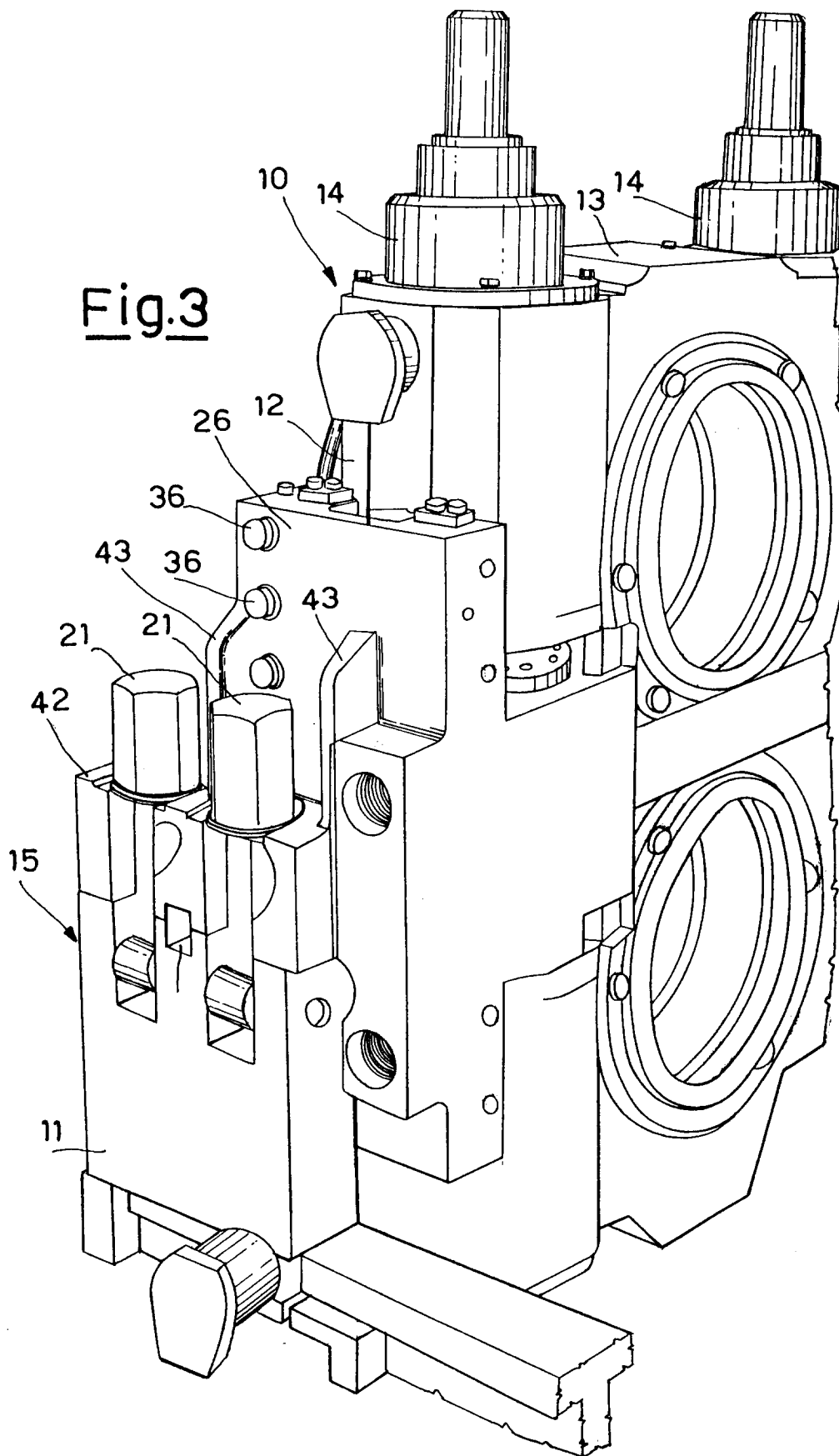


Fig.2





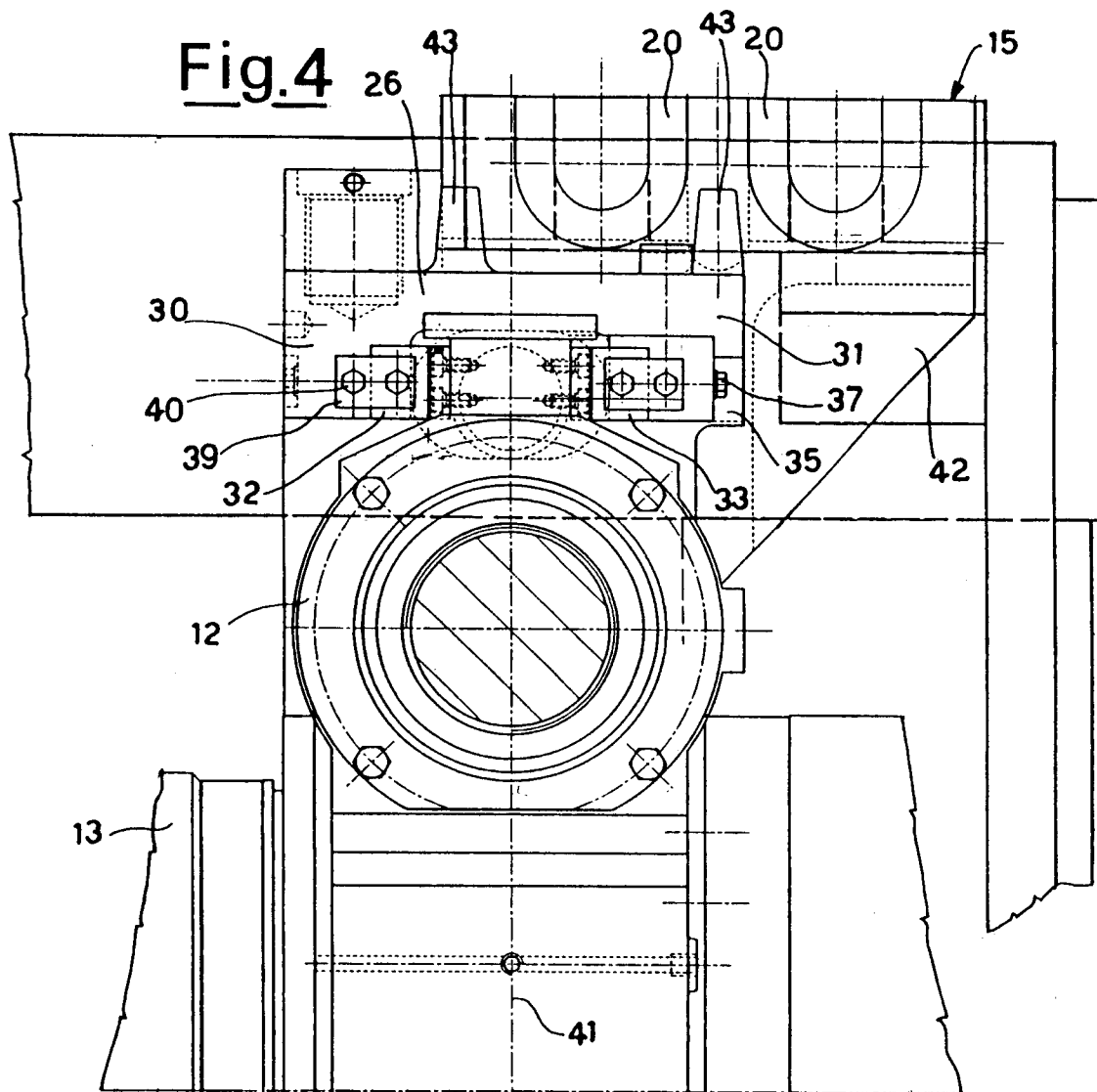
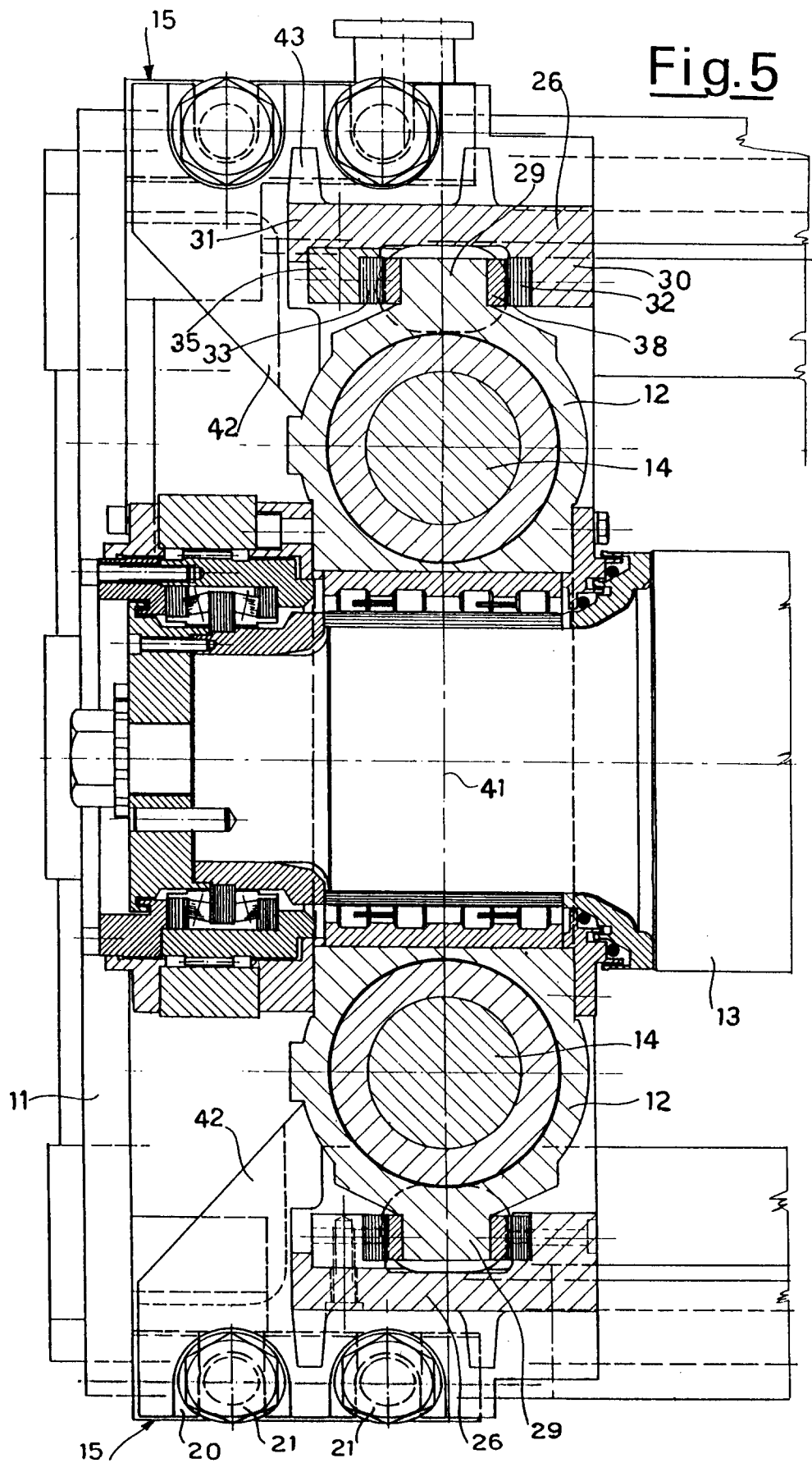
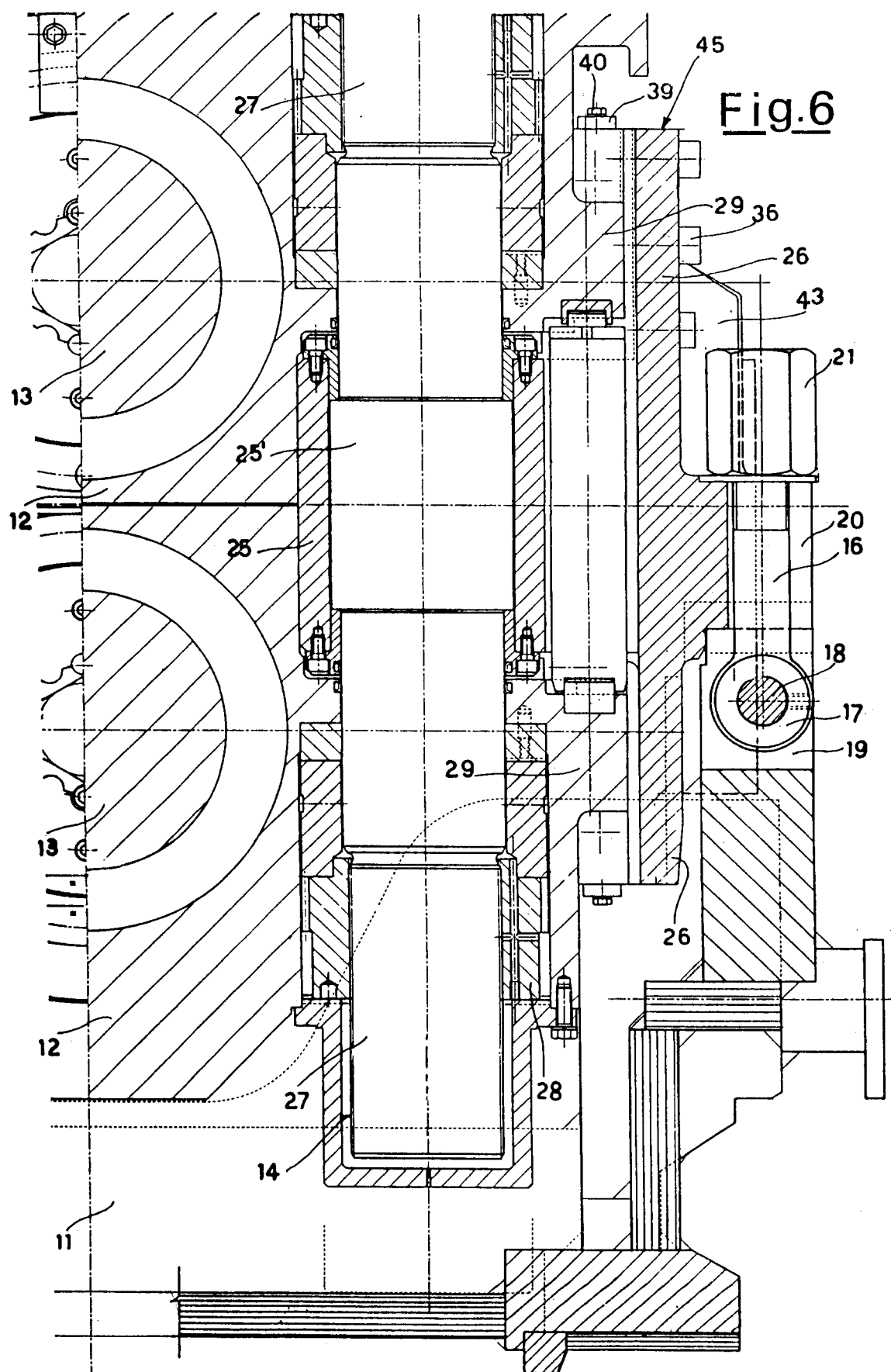


Fig.5







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 20 2813

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.6)
D,A	EP-A-0 166 478 (POMINI FARREL) * claims 1,2; figures 1,4 * ---	1	B21B31/04
A	DE-B-19 39 485 (MOELLER & NEUMANN) * column 4, line 21 - line 29; figure 1 * ---	1	
A	DE-A-25 06 449 (NIPPON KOKAN) * claims 1,2; figure 1 * ---	1	
A	GB-A-1 183 573 (DAVY AND UNITED ENGINEERING COMP.) * page 2, line 28 - line 44; claim 1; figures 1-3 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B21B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
BERLIN		23 February 1995	Schlaitz, J
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 D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)