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(54) **Positioning unit for the clamping head and for the contrast carriage, particularly for a pipe bending machines**

(57) A clamping head positioning unit, particularly for pipe bending machines and the like comprises a chuck (1) for securing a part to be machined against a die (6) of a bending head of a pipe bending machine, the die (6) being supported on a bending arm (3) of the bending head, and a kinematic actuation (10,12) which is adapted to move the chuck (1) into the securing posi-

tion, the unit comprising a further spacer (7) for the chuck (1) which is interchangeable according to the cross-section of the part to be machined and is actuated by the kinematic actuation over a constant stroke. A contrast carriage positioning unit is also disclosed.

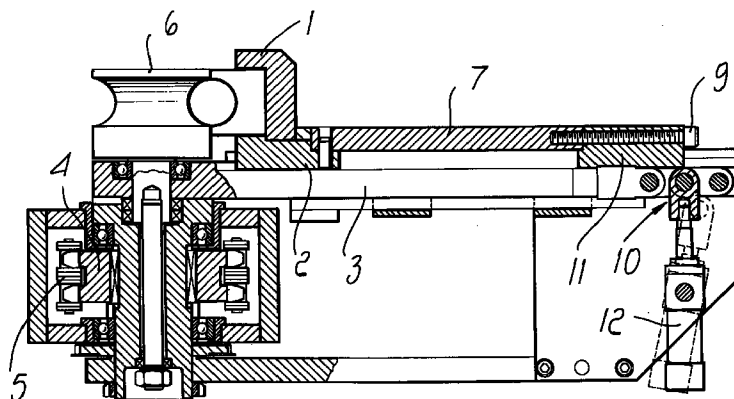


FIG. 1

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Description

[0001] The present invention relates to a unit for actuating the chuck and the contrast carriage, particularly for a pipe bending machine.

[0002] More particularly, the invention relates to a unit for actuating the chuck which is adapted to clamp the part to be bent against the die that is part of the bending head of the machine.

[0003] It is known that so-called pipe bending machines are used to bend pipes; said machines comprise a footing on which a bending head and an associated bending arm are arranged, and a core to be inserted in the pipe to be bent while being appropriately actuated by an extraction unit for extracting the core from the pipe gradually during bending.

[0004] Early extraction of the core allows to retract the core only during the brief final bending step, before the set bending angle is completed: in this manner, one achieves a better finish of the bend formed by the pipe around the bending head, pulled by the bending arm, and clamping of the pipe on the core, which would prevent its extraction, does not occur.

[0005] The bending arm has a chuck for securing the pipe to be machined and the bending arm is fixed to the bending head.

[0006] The pipe to be bent is then inserted over the core, which is arranged along the footing of the machine and ends substantially in the vicinity of a contrast or counterthrust carriage, which guides the pipe that is captured by the chuck of the bending arm in order to produce a rotation through a chosen angle around the bending head.

[0007] The bending head is actuated by means of a sprocket which is driven by a closed-loop chain which is in turn driven by an actuator constituted by a piston.

[0008] The chuck for securing the pipe being machined secures the pipe against the die of the head; the head is constituted by a shaped circular body with a recess which is adapted to accommodate the pipe and constitute an abutment for it when the chuck keeps it pressed.

[0009] The chuck is kept under pressure against the part by a spacer which must be pushed against it by an adapted kinematic system in order to secure the part to be machined.

[0010] This system, however, has the drawback of having to precisely adjust the stroke of the kinematic system and accordingly of the spacer that moves in abutment against the chuck.

[0011] This stroke adjustment is difficult to be achieved with precision, and most of all the extent of the necessary stroke is different in each instance according to the cross-section of the part to be machined.

[0012] Accordingly, the result is that pipe bending becomes troublesome and difficult to reproduce in each instance, also in view of the unavoidable tolerances of the kinematic system meant for the sliding of the spacer

in abutment against the chuck.

[0013] The aim of the present invention is therefore to provide a unit for positioning a chuck and the contrast carriage, particularly for pipe bending machines, which allows precise and simple adjustment of the position of the chuck with respect to the die of the bending head.

[0014] Within the scope of this aim, an object of the present invention is to provide a unit for positioning a chuck, particularly for pipe bending machines, where the adjustment of the position of the chuck and of the contrast carriage is linked to the cross-section of the part being machined but not linked to the stroke of the kinematic system conventionally used to adjust the position of the chuck.

[0015] Another object of the present invention is to provide a unit for positioning the chuck and the contrast carriage, particularly for pipe bending machines, which allows to keep the stroke of the kinematic system unchanged, regardless of the cross-section of the part to be machined.

[0016] Another object of the present invention is to provide a unit for positioning the chuck and the contrast carriage, particularly for pipe bending machines and the like, which is highly reliable, relatively easy to manufacture and at competitive costs.

[0017] This aim, these objects and others which will become apparent hereinafter are achieved by a chuck positioning unit, particularly for pipe bending machines and the like, which comprises a chuck for securing a part to be machined against a die of a bending head of a pipe bending machine, said die being supported on a bending arm of said bending head, and kinematic means which are adapted to move said chuck into the securing position, characterized in that it comprises a spacer for said chuck which is interchangeable according to the cross-section of the part to be machined and is actuated by said kinematic means over a constant stroke.

[0018] Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of the device according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional lateral elevation view of the chuck positioning unit according to the present invention;

Figure 2 is a view of the positioning unit of the contrast carriage;

Figure 3 is a transverse sectional view of the kinematic actuation of the chuck positioning unit of Figure 1;

Figure 4 is a transverse sectional view of a detail of Figure 1;

Figure 5 is a view of the bolt for locking the die supporting plate on a vertical plane; and

Figure 6 is a plan view of the bolt.

[0019] With reference to the above figures, the actuation unit for the chuck according to the invention comprises a chuck, designated by the reference numeral 1, which is rigidly coupled to a slide 2 slideable on the upper surface of a bending arm 3 which supports the bending head of the machine.

[0020] Figure 1 illustrates the sprocket 4, around which the bending head actuation chain 5 winds, and the die 6, which is arranged at the same elevation as the upper surface of the bending arm 3 and around which the part to be bent rests, rotated by the chain 5 and clamped against the die 6 by the chuck 1.

[0021] The positioning of the chuck 1 in relation to the die 6 is assigned to a spacer 7 which is detachably connected to the upper surface of the bending arm 3.

[0022] In particular, the spacer 7 is a rod-like element which has a substantially T-shaped cross-section and is meant to be changed each time according to the cross-section of the part to be bent and therefore according to the movement to be imparted to the chuck 1 along the upper surface of the bending arm.

[0023] In particular, the spacer 7 must always have a length by virtue of which its insertion in the upper surface of the bending arm, which has an adapted seat 8, allows the chuck 1 to secure the part to be machined (not shown) against the die 6 with the force required to avoid deforming the part, on one hand, and to prevent it from slipping on the other hand.

[0024] One end of the spacer 7 is detachably connected to the slide 2 and constitutes the end for abutment against the chuck 1.

[0025] The end of the spacer that lies opposite the end for abutment against the chuck 1 is detachably connected to a block 11 which is slideable on the upper surface of the bending arm 3.

[0026] The sliding of the block 11 with the spacer 7 connected thereto by means of a pin 9 is assigned to kinematic means which conveniently comprise a toggle joint 10 which is connected to the block 11 and is actuated by a piston 12.

[0027] The piston 12 is shown in Figure 1 in the maximum upward stroke position (solid lines) and in the maximum downward stroke position (dashed lines).

[0028] The maximum upward stroke position of the piston 12 corresponds to the maximum movement of the block 11 and of the spacer 7 rigidly coupled thereto, in abutment against the chuck 1, which secures the part to be machined against the die 6.

[0029] Viceversa, the maximum downward stroke position of the piston 12 corresponds to the retraction of the block 11 and of the corresponding spacer 7 and chuck 1 connected thereto by means of the slide 2.

[0030] It is optionally possible to insert shims (not shown in the figures) between the spacer 7 and the block 11; said shims are meant to provide fine adjustment of the positioning of the chuck 1.

[0031] The contrast carriage is described with reference to Figure 2 and is generally designated by the ref-

erence numeral 20; said carriage is connected to a positioning unit which is conceptually identical to the one used to position the chuck and therefore its description is omitted and its parts are designated by the same reference numerals.

[0032] The device also comprises a bolt for locking the die supporting plate to prevent the clamping reaction of the chuck on the die supporting plate from causing the rotation of the die.

[0033] Said bolt is provided by means of a pawl system, designated by the reference numeral 30, which engages a key 31, in locking conditions, which is located below the die supporting plate, designated by the reference numeral 32.

[0034] The pawl system of the bolt is actuated by means of a linkage 33 which is arranged below the spacer and is meant to disengage the pawl system of the bolt from the die supporting plate during the return steps for continuing the bending action, while it rigidly couples the arm to the die supporting plate during the steps for the closure of the chuck.

[0035] In practice it has been observed that the unit for positioning the chuck and the contrast carriage according to the invention fully achieves the intended aim, since it allows to position, in each instance, the chuck in the position that is adapted for the type of part being machined, without resorting to changes in the stroke of the kinematic system that is meant to provide the translatory motion of the block that is rigidly coupled to the spacer.

[0036] The only operation required is replacement of the spacer with the one having the appropriate length according to the cross-section of the part to be bent, without having to modify every time the stroke of the piston and therefore of the toggle joint.

[0037] The chuck positioning unit thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may furthermore be replaced with other technically equivalent elements.

[0038] In practice, the materials used, so long as they are compatible with the specific use, as well as the dimensions, may be any according to the requirements and the state of the art.

[0039] The disclosure in Italian Patent Application N. MI97A01786 from which this application claims priority are incorporated herein by reference.

[0040] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A chuck positioning unit, particularly for pipe bend-

- ing machines and the like, comprising a chuck (1) for securing a part to be machined against a die (6) of a bending head of a pipe bending machine, said die (6) being supported on a bending arm (3) of said bending head, and kinematic means (10, 12) which are adapted to move said chuck (6) into the securing position, characterized in that it comprises a spacer (7) for said chuck (1) which is interchangeable according to the cross-section of the part to be machined and is actuated by said kinematic means (10, 12) over a constant stroke.
2. A chuck positioning unit according to claim 1, characterized in that said spacer (7) is inserted in a seat (8) formed on the upper surface of the bending arm (3) of the bending machine.
3. A chuck positioning unit according to claim 2, characterized in that said positioning spacer (7) is rigidly fixed, at one end, to a block (11) which can slide on the upper surface of said bending arm (3), actuated by said kinematic means (10, 12), the other end of said positioning spacer (7) being connected to a slide (2) which supports said chuck (1), said slide (2) being slideable on the upper surface of said bending arm (3).
4. A chuck positioning unit according to claim 3, characterized in that said kinematic means are constituted by a toggle joint (10) which is actuated by a piston (12), said toggle joint (10) being connected to said block (11) to move it over a preset stroke.
5. A chuck positioning unit according to claim 3, characterized in that said slide (2) is slideable along the upper surface of said bending arm (3), said chuck (1) being detachably connected to said slide (2).
6. A chuck positioning unit according to claim 1, characterized in that said spacer (7) is a rod-like element which has a substantially T-shaped cross-section and is detachably connected to said slide (2).
7. A chuck positioning unit according to claim 3, characterized in that at least one shim is inserted between said block (11) and the end of said positioning spacer (7) that is meant to be connected to the block (11).
8. A contrast carriage positioning unit, particularly for pipe bending machines and the like, comprising a contrast carriage (20) which is adapted to engage the part being machined proximate to the core inserted in a pipe being machined on a pipe bending machine, kinematic means being also provided which are adapted to move said contrast carriage (20) into a securing position, characterized in that it comprises a spacer for said contrast carriage (20) which is interchangeable according to the cross-section of the part to be machined and is actuated by kinematic means over a constant stroke.
9. A unit for positioning the chuck (1) and the contrast carriage (20), characterized in that it comprises a bolt (30, 31) for the detachable locking of the die supporting plate (32), said bolt having a pawl system (30) which can engage a key (31) of said die supporting plate (32), said bolt being actuatable by a linkage (33) which is arranged below said spacer (7).

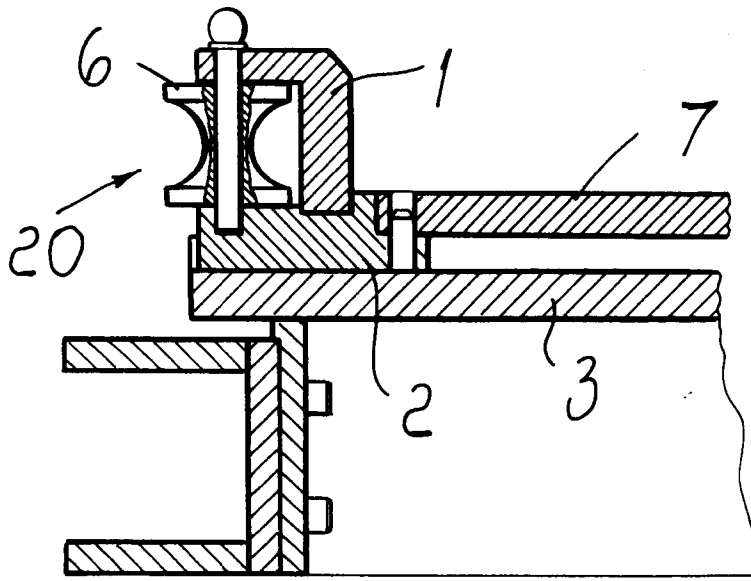


FIG. 2

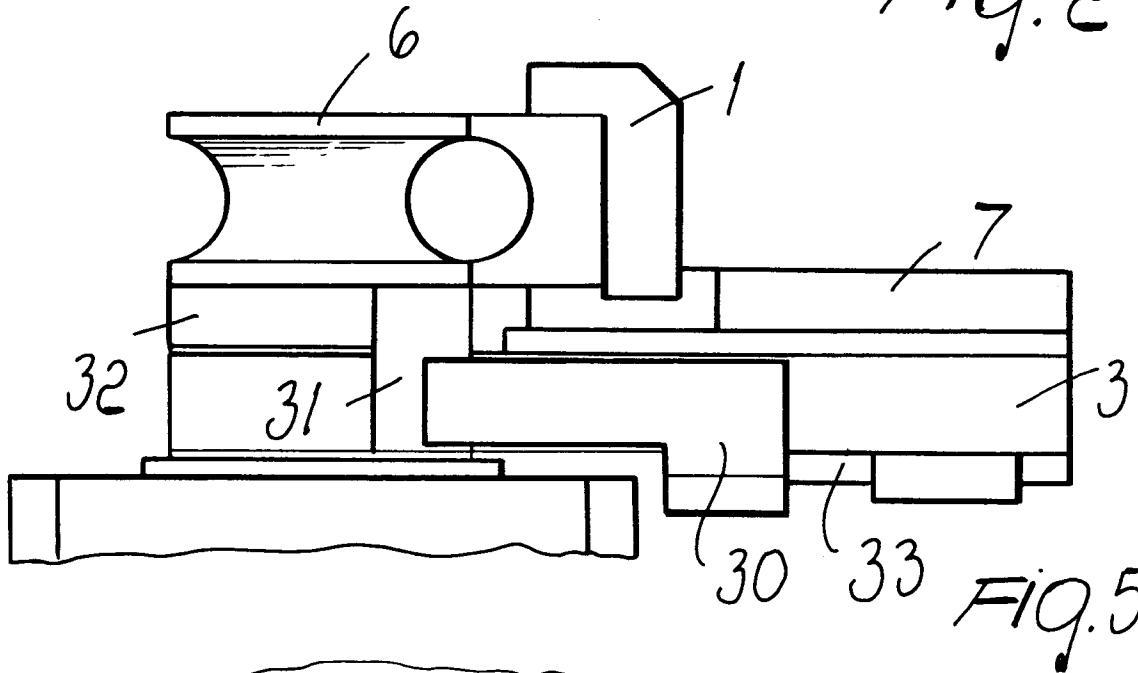


FIG. 5

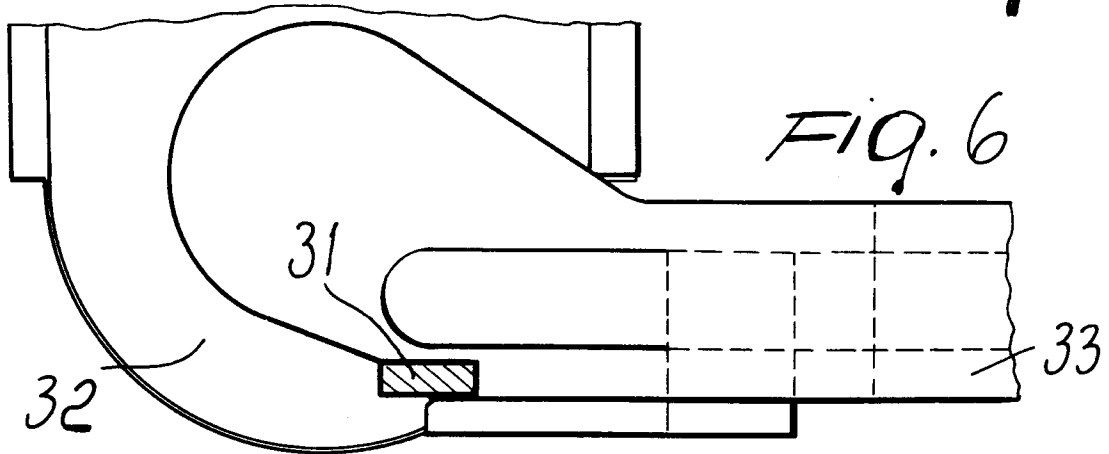


FIG. 6

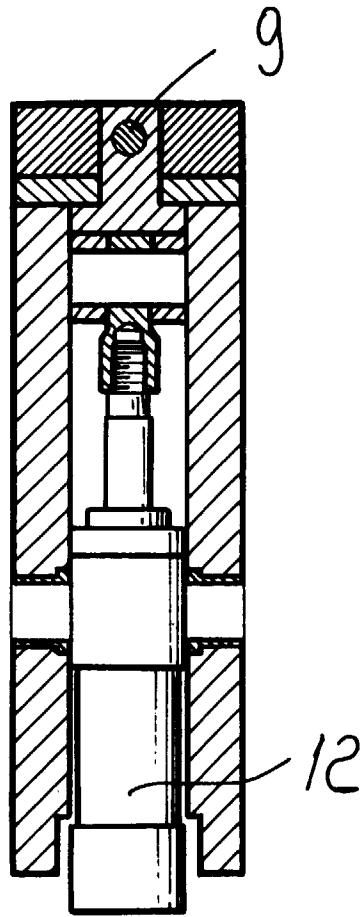


Fig. 3

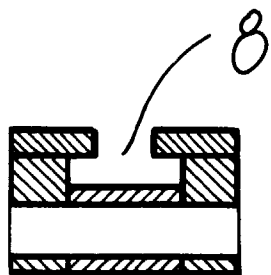


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 2158

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.8)
X	US 2 810 422 A (PINE ENGINEERING CO.) 22 October 1957	1-5,7	B21D7/025 B21D7/02
A	* column 3, line 26 - column 3, line 4; figures 4-6 *	6,8,9	B21D9/07
X	US 4 870 849 A (EATON LEONARD TECHNOLOGIES, INC.) 3 October 1989	1,4	
A	* column 6, line 29 - column 7, line 57; figures 3-6 *	2,3,5-9	
X	FR 1 538 262 A (HILGERS MSCHINEN- UND APPARATE BAUANSTALT) 30 August 1968	8	
	* page 2, line 14 - page 2, line 24; figure 1 *		
A	GB 2 293 784 A (EUROBEND LIMITED) 10 April 1996	1-9	
	* figures 1-4 *		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B21D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
MUNICH		18 November 1998	Vinci, V
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 11 2158

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18-11-1998

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2810422 A	22-10-1957	NONE	
US 4870849 A	03-10-1989	US 4760726 A	02-08-1988
FR 1538262 A		NONE	
GB 2293784 A	10-04-1996	NONE	

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