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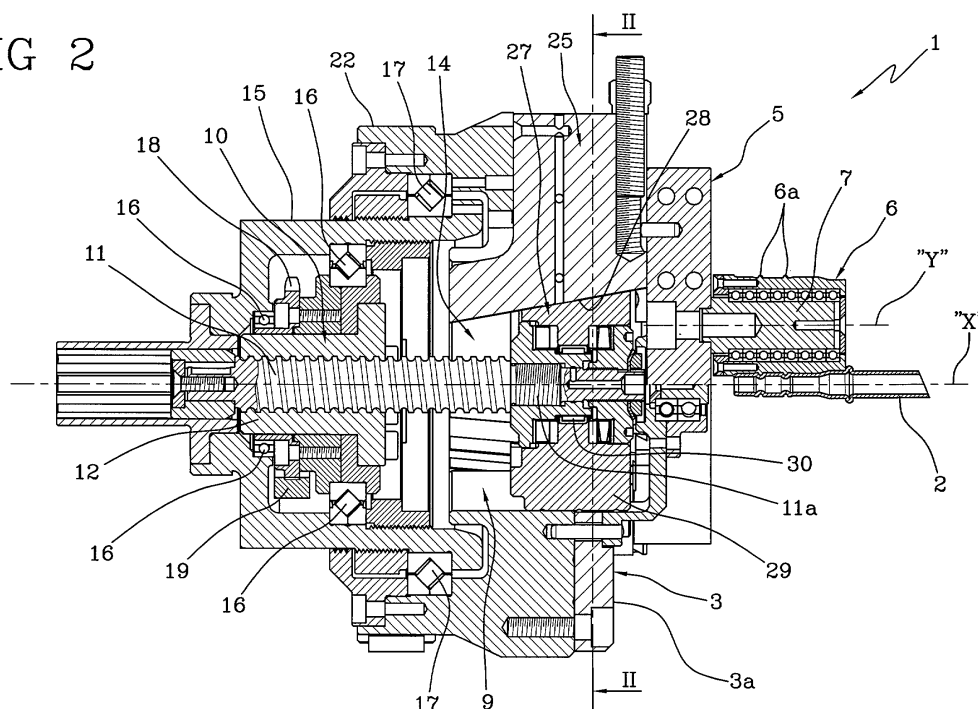
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Amended claims in accordance with Rule 86 (2) EPC.

(54) Pipe rolling head and machine for shaping pipes comprising said head

(57) A pipe-rolling head comprises a body (3) rotating around a respective rolling axis (X); at least three roll-holders (5) mounted on the rotating body (3), each adapted to receive a respective roll (6); the rolls (6) are freely rotatable around respective rotation axes (Y) that are substantially parallel to the rolling axis (X). The three roll-holders (5) are movable in translation relative to the rotating body (3) between an open position at which the rolls (6) lie spaced apart from each other and from the rolling axis (X), and a closed position at which the rolls

(6) lie close to each other in the vicinity of the rolling axis (X), to encompass a pipe (2) to be rolled which is coaxial with the rolling axis (X). The head further comprises means (4) for setting the rotating body (3) in rotation and means (9) for actuating the roll-holders (5) between the open position and the closed position. The means (9) for actuating the roll-holders (5) comprises at least one ball-bearing actuator (10) kinematically connected with the roll-holders (5) to cause translation of the latter between the open and closed positions.

FIG 2**EP 1 618 973 A1**

Description

[0001] The present invention relates to a pipe-rolling head and to a machine for shaping pipes comprising said head.

[0002] In the field of pipe manufacture it is known to submit the pipe ends to cold-deformation operations through the combined action of a punch and a die, to modify the traditional cylindrical and axially uniform cross-section of the pipe, in order to allow connection with other construction elements, such as pipe fittings, sleeves, hoses, etc.

[0003] Rolling is a particular working obtained by cold deformation carried out by means of a head provided with three rolls idly mounted on a rotating support and disposed around a predetermined axis which is coincident with the longitudinal axis of a pipe to be rolled. Each roll has a ridge on its circumferential surface the shape of which matches that of the impression to be formed in the pipe. The end of the pipe clamped by an appropriate vice, is enclosed by the three rolls and only subsequently the rolls are driven in rotation around the longitudinal axis of the pipe through rotation of the rotating support. The roll pressure combined with the rotational motion of the head gives rise to the desired impression in the pipe end.

[0004] In rolling heads of known type, rolls are moved to the closed or open position by a pneumatic system. In particular, as depicted in Fig. 4 showing the longitudinal section of a rolling head of known type, the pneumatic system comprises a thrust element (A) disposed around a rotation shaft (B) of the rolling head and movable in translation along the longitudinal axis (C). The thrust element is moved forward by admitting air under pressure through a duct (D) delimited by the thrust element itself. The thrust element, on the opposite side from the pressurised duct, has a sloping surface (E) on which three wheels (F) rest, each wheel being connected to a respective shaping roll (G). Translation of the thrust element gives rise to rolling of the wheels on the sloping surface and displacement of said wheels and of the rolls connected therewith along respective directions perpendicular to the longitudinal axis. As shown in Fig. 4, moving forward of the thrust element to the right causes approaching of the rolls to the longitudinal axis and closure of said rolls around the pipe, against the action of return springs (H) interposed between the rotation shaft and the wheel-supporting arms (I), while moving backward of the thrust element to the left allows the return springs to move the rolls away from the pipe. To limit the stroke of the rolls towards the pipe, each roll is further provided with a stop of the mechanical type (L) abutting against a spacer (M) mounted in the vicinity of the longitudinal axis. The rolls are mounted in a removable manner on carriages (N) rigidly connected to the arms carrying the wheels, so that the position of each roll in relation to the carriage carrying it can be varied.

[0005] In the heads of the known art, the depth of the impression left by the rolls on the pipe depends on the

geometry of the circumferential surface of the rolls and the position of the rolls relative to the carriages and to the spacer size.

[0006] Therefore, disadvantageously, it is necessary to replace the spacer and/or to vary the position of each roll on the respective carriage, depending on the diameter of the pipe to be worked, so as to adapt approaching of the rolls being closed to the pipe sizes and the geometry and dimension features of the impression.

[0007] In addition, since the stroke of the rolls is fixed, the position of the rolls relative to the carriages being the same and the same spacer being adopted, the heads of the known art do not enable rolling operations to be automatically carried out at different depths on a single pipe.

[0008] Finally, by adopting the mechanical stopping element typical of the rolling heads of the known art, the high tolerances increasingly more required by users of shaped pipes are not ensured.

[0009] Under this situation the technical task underlying the present invention is to devise a pipe-rolling head and a machine for pipe shaping comprising said head that are capable of obviating the mentioned drawbacks.

[0010] In particular it is an aim of the present invention to devise a pipe-rolling head and a machine for shaping pipes comprising said head adapted to enable rolling operations to be carried out on pipes of different diameters without requiring dismantling and repositioning of head elements in order to adjust the roll stroke towards the rolling axis to the type of pipe under working, and without a need to control accuracy of the rolling depth.

[0011] It is a further aim of the present invention to make available a pipe-rolling head and a machine for shaping pipes comprising said head enabling rolling operations to be carried out with very narrow tolerances.

[0012] The technical task mentioned and the aims specified are achieved by a pipe-rolling head having the features set out in one or more of the appended claims 1 to 16, and by a machine for pipe shaping comprising said head in accordance with claims 17 or 18.

[0013] Description of a preferred but not exclusive embodiment of a pipe-rolling head is now given by way of nonlimiting example and shown in the accompanying drawings, in which:

- Fig. 1 is a perspective view of a pipe-rolling head in accordance with the present invention;
- Fig. 2 is a longitudinal section of a portion of the head shown in Fig. 1;
- Fig. 3 is a diagrammatic cross-sectional view of the head portion of the invention taken along line II-II in Fig. 2; and
- Fig. 4 is a longitudinal section of a rolling head belonging to the known art.

[0014] With reference to Figs. 1, 2 and 3, a pipe-rolling head in accordance with the present invention is denoted by reference numeral 1.

[0015] Head 1 is mounted on a machine for shaping

the pipe ends. The machine, of known type and therefore not shown or described in detail, comprises suitable means, such as a vice, capable of clamping a pipe 2 to be worked. One end of pipe 2 clamped in the vice faces a tool assembly mounted on a base frame of the machine. The tools, among which the rolling head 1, are moved so as to sequentially face the vice, in order to carry out different types of machining operations on the end of pipe 2 through cold deformation and/or material removal.

[0016] Head 1, once it is positioned in front of the vice, is actuated by actuating means "M" of known type and only diagrammatically shown in Fig. 1, along a rolling axis "X". Head 1 carries out a translation between a position at which it is moved close to the vice and a position at which it is spaced apart therefrom, so as to be positioned at an axial portion of the end of pipe 2 designed to be machined.

[0017] Head 1 comprises a rotating body 3 being set in rotation around the rolling axis "X" which is coincident with the longitudinal axis of pipe 2, by dedicated means 4 comprising a main motor 4a.

[0018] The rotating body 3 externally has a cylindrical shape the base 3a of which, when head 1 is brought in front of the pipe 2 (Fig. 2) retained by the vice, faces the vice itself.

[0019] Mounted on the rotating body 3 are at least three roll-holders 5 disposed around the rolling axis "X" and each of them being adapted to receive a respective roll 6. Rolls 6 freely rotate around respective rotation axes "Y" substantially parallel to the rolling axis "X".

[0020] In the preferred embodiment shown in Fig. 2, each roll 6 is rotatably coupled, through a ball bearing for example, with a respective stem 7 integral with a roll-holder 5.

[0021] Each roll 6 has one or more raised portions 6a on its circumferential side surface, said raised portions being designed to leave their impression on the pipe 2 to be submitted to rolling. Rolls 6 can be replaced by other rolls having different features depending on the type of impression it is necessary to leave on pipe 2.

[0022] The three roll-holders 5 carry out a translation relative to the rotating body 3 between an open position at which rolls 6 lie spaced apart from each other and from the rolling axis "X" and a closed position at which rolls 6 lie close to each other in the vicinity of the rolling axis "X" to encompass the pipe 2 to be rolled.

[0023] A pin 8 is installed in a removable manner on the rotating body 3 and extends along the rolling axis "X", which is coincident with the longitudinal axis of the rotating body 3, between rolls 6. The radial sizes of pin 8 are adapted to enable housing of same into the pipe 2 to be machined, so as to perform the function of counteracting the pressure exerted by rollers 6. Pin 8 too can be replaced and it is selected based on the inner sizes of pipe 2.

[0024] Actuating means 9 moves the roll-holders 5 between the open and closed positions.

[0025] Advantageously and unlike the heads of the

known art, said actuating means 9 comprises at least one ball-bearing actuator 10 kinematically connected with the roll-holders 5.

[0026] In the embodiment shown in the accompanying figures, the ball-bearing actuator 10 has a single lead screw 11 coaxial with the rolling axis "X" and a lead screw nut 12 rotatably in engagement on the lead screw 11. The lead screw 11 is prevented from rotating, is movable in translation along the rolling axis "X" and is kinematically connected with the roll-holders 5.

[0027] An auxiliary motor 13 (Fig. 1) connected to the lead screw nut 12 drives the lead screw nut 12 in rotation and causes translation of the screw 11.

[0028] The actuating means 9 further comprises a motion-transmitting member 14 installed at one end 11a of the lead screw 11 and coupled with the roll-holders 5 to convert translation of the lead screw 11 along the rolling axis "X" into a movement of the roll-holders 5 between the open position and the closed position (Fig. 2).

[0029] In more detail in terms of construction and referring particularly to Fig. 2, head 1 has a casing 15 inside which the lead screw nut 12 is rotatably housed, supported by roller and/or ball bearings 16. Casing 15 does not rotate but carries out a translation relative to the base frame of the machine moved by the above mentioned actuating means to take a position close to the axial portion of the end of pipe 2 designed to be machined.

[0030] The rotating body 3 is rotatably coupled, through respective roller bearings 17 for example, with casing 15, and the lead screw 11 carries out a translation both in the casing 17 and in the rotating body 3.

[0031] The lead screw nut 12 on its outer circumferential surface has a toothing 18 in which a flexible transmission element 19, preferably a chain trained around a shaft 20 of the auxiliary motor 13 is engaged, to transmit motion from the auxiliary motor 13 to the lead screw nut 12 (Figs. 1, 2 and 3).

[0032] In a quite similar manner, a transmission 21 interposed between the main motor 4a and the rotating body 3 allows motion to be transmitted from said main motor 4a to said rotating body 3. For the purpose, the rotating body 3 is provided with a toothing 22 around which a flexible element 23 is partly wrapped, a toothed belt for example, also passing over a shaft 24 of the main motor 4a.

[0033] The motion-transmitting member 14 comprises a support element 25 for each of the roll-holders 5 mounted on the rotating body 3 and movable along a respective direction "Z" orthogonal to the rolling axis "X". In particular, each support element 25 is slidably inserted in a groove 26 having a radial extension and formed in the rotating body 3 (Figs. 1 and 3). As shown in Fig. 3, grooves 26 are spaced apart the same distance from each other through an angle of 120° and open on base 3a of the rotating body 3 to enable each support element 25 to carry the respective roll-holder 5 in cantilevered fashion (Fig. 1).

[0034] The motion-transmitting member 14 further

comprises a coupling element 27 mounted on the first end 11a of the lead screw 11 within the rotating body 3. The motion-transmitting member 14 is slidably associated with the support element 25 along a respective sloping surface 28 inclined relative to the rolling axis "X". In the embodiment shown, the sloping surfaces 28 converge towards the rolling axis "X" and towards each other moving away from the first end 11a of the lead screw 11.

[0035] In addition, the coupling element 27 is rotatably mounted on the lead screw 11 and rotates together with the rotating body 3.

[0036] In more detail, the coupling element 27 comprises a cylindrical body 29 coaxial with the lead screw 11 (Fig. 3) and coupled therewith by means of bearings 30 (Fig. 2). The cylindrical body 29 has at least three slits 31 formed at a side surface thereof, which slits 31 extend over the whole height of the cylindrical body 29 along a direction substantially parallel to the rolling axis "X". Each slit 31 further has a varying depth to define a respective sloping surface 28, and slidably receives a respective support element 25 extending along a radial direction relative to the rolling axis "X".

[0037] Each slit 31 is such shaped as to be able to exert both a thrust action away from the rolling axis "X" and a pulling action close to the same axis "X", on the support element 25.

[0038] For the purpose, in accordance with the preferred but not exclusive embodiment shown in Fig. 3, each slit 31 has, seen in cross-section relative to the rolling axis "X", a T-shaped conformation, in which the upper horizontal segment of the "T" faces the rolling axis "X". The sloping surface 28 of each slit 31 is therefore formed of the bottom surface 28a of the slit 31 itself and of two auxiliary surfaces 28b of said slit 31 facing the bottom surface 28a.

[0039] In addition, each support element 25 has an end 25a the shape of which matches that of the slit 31 and which is housed in the slit 31 itself.

[0040] The cylindrical body 29 is installed in a hollow space 3b formed in the rotating body 3 the size of which that is parallel to the rolling axis "X" is bigger than the axial size of the cylindrical body 29, to enable translation of the cylindrical body 29 itself together with the lead screw 11.

[0041] As diagrammatically shown in Fig. 1, advantageously head 1 also comprises a programmable control device 32 of the CNC (an acronym meaning Computerised Numerical Control) type, interlocked with the actuating means 9 to move the roll-holders 5 between the open and closed positions so as to control closing and opening of said roll-holders 5.

[0042] The CNC control device 32 is connected with the auxiliary motor 13 and preferably also with the main motor 4a and the machine means capable of actuating the head 1 for translation, in order to control the head-actuating means 1, the auxiliary motor 13 and main motor 4a in synchronism and co-ordinate all movements of the head 1 and rolls 6.

[0043] The control through the CNC device in particular enables the head 1 to be moved along the axis of pipe 2 by combining this movement with opening/closing of rolls 6 on pipe 2 and with the rotation of the rotating body 3, so as to carry out a dynamic shaping that is a combination of the three movements and not only a function of the shape of rolls 6.

[0044] In use, with reference to the embodiment shown, the head 1 is moved forward by the actuating means of the machine, towards the pipe 2 to be rolled which is clamped by the vice, with the rolling axis "X" that is coincident with the longitudinal axis of the pipe 2 and the roll-holders 5 in the open position.

[0045] In the open position, the lead screw 11 lies in a backward position with its first end 11a and the cylindrical body 29 axially spaced apart from the roll-holders 5. With reference to the sectional view of the head in Fig. 2, the backward position corresponds to displacement to the left of screw 14.

[0046] Moving forward of head 1 leads rolls 6 to arrange themselves around the end of pipe 2, the pin 8 being inserted in pipe 2. During moving forward of head 1 towards pipe 2 or, alternatively, when advancing has been completed, the auxiliary motor 13 driven by the CNC control device 32, causes rotation of the lead screw nut 12 in a predetermined direction, so as to move forward the lead screw 11 and the cylindrical body 29 towards the roll-holders 5 (to the right in Fig. 2).

[0047] Moving forward of the cylindrical body 29 causes sliding of the ends 25a of the support elements 25 housed in the slits 31 relative to the cylindrical body 29 itself, and approaching of the support elements 25 slidable in the respective grooves 26, to the rolling axis "X". The radial translation of the support elements 25 towards the rolling axis "X" is caused by the pulling action exerted by the auxiliary surfaces 28b on the ends 25a of the support elements 25 themselves (Fig. 3). Approaching between the rolls 6 and the rolling axis "X", and therefore the closing degree, is a function of the number of revolutions of the lead screw nut 12.

[0048] When closure of rolls 6 has been completed, the main motor 4a sets the rotating body 3 in rotation to cause the rolls 6 to roll on pipe 2 and leave their impression on the outer surface of the pipe 2 itself. When machining is over, the auxiliary motor 13 causes rotation of the lead screw nut 12 in the opposite direction and the backward movement of the lead screw 11 and of the cylindrical body 29 (to the left in Fig. 2). The backward movement of the cylindrical body 29 makes the support element 25 move away from the rolling axis "X". The radial translation of the support elements 25 away from the rolling axis "X" is caused by the thrust action exerted by the bottom surface 28a of groove 31 on the ends 25a of the support elements 25 themselves (Fig. 3).

[0049] The invention achieves important advantages.

[0050] It is to be pointed out first of all that the rolling head in accordance with the present invention allows rolling operations to be carried out either on pipes of different

diameters, or on the same pipes but with different impression depths, without dismantling and repositioning of the head elements being required in order to conform the stroke of the rolls towards the rolling axis to the type of pipe or the type of working. In fact, the radial displacement of the rolls of the head being the object of the invention is a direct function of the axial displacement of the lead screw and therefore of the rotation of the lead screw nut. The number of revolutions imparted to the lead screw nut being known, also the exact radial position of the rolls is known.

[0051] In addition, by virtue of the precise command and operation through lead screw and lead screw nut, the head of the invention is able to carry out rolling operations with very narrow tolerances.

[0052] Finally, adoption of the lead screw and lead screw nut, associated with the particular conformation of the slits of the cylindrical body, allows a bi-directional control on the roll-holders. In fact, translation of the lead screw in the two directions enables both a thrust action on the support elements to open the rolls and a pulling action of the support elements to close the rolls around the pipe to be exerted, without requiring the presence of return springs, which disadvantageously happened in the head of the known art shown in Fig. 4.

Claims

1. A pipe-rolling head comprising:

- a body (3) rotating around a respective rolling axis (X) ;
- at least three roll-holders (5) mounted on the rotating body (3), and each adapted to receive a respective roll (6), the rolls (6) being freely rotatable around respective rotation axes (Y) that are substantially parallel to the rolling axis (X) ; said at least three roll-holders (5) being movable in translation relative to the rotating body (3) between an open position at which the rolls (6) lie spaced apart from each other and from the rolling axis (X), and a closed position at which the rolls (6) lie close to each other in the vicinity of the rolling axis (X), to encompass a pipe (2) to be rolled which is coaxial with said rolling axis (X) ;
- means (4) for setting the rotating body (3) in rotation; and
- means (9) for actuating the roll-holders (5) between the open position and the closed position;

characterised in that the means (9) for actuating the roll-holders (5) comprises at least one ball-bearing actuator (10) kinematically connected with the roll-holders (5) to make them carry out a translation between the open position and the closed position.

2. A head as claimed in claim 1, **characterised in that** the ball-bearing actuator (10) has a lead screw (11) coaxial with the rolling axis (X) and a lead screw nut (12) slidably engaged on the lead screw (11).

3. A head as claimed in claim 2, **characterised in that** the lead screw (11) is prevented from rotating, is movable in translation along the rolling axis (X) and is kinematically connected to the roll-holders (5); and **in that** the means (9) for actuating the roll-holders (5) further comprises an auxiliary motor (13) connected with the lead screw nut (12), to drive said lead screw nut (12) in rotation and cause translation of the lead screw.

4. A head as claimed in claim 3, **characterised in that** the means (9) for actuating the roll-holders (5) further comprises a motion-transmitting member (14) installed at a first end (11a) of said lead screw (11) and coupled with the roll-holders (5) to convert translation of the lead screw (11) along the rolling axis (X) into a movement of the roll-holders (5) between the open position and the closed position.

5. A head as claimed in claim 4, **characterised in that** the motion-transmitting member (14) has a support element (25) for each of said roll-holders (5) that is mounted on the rotating body (3) and is susceptible of translation along a respective direction (Z) orthogonal to the rolling axis (X); and a coupling element (27) mounted on the first end (11a) of the lead screw (11) and slidably associated with the support element (25) along a respective sloping surface (28) that is inclined relative to the rolling axis (X).

6. A head as claimed in claim 5, **characterised in that** the sloping surface (28) converges towards the rolling axis (X) moving away from the first end (11a) of the lead screw (11).

7. A head as claimed in claim 5, **characterised in that** the coupling element (27) is rotatably mounted on the lead screw (11) for rotation together with the rotating body (3).

8. A head as claimed in claim 6, **characterised in that** the coupling element (27) comprises a cylindrical body (29) coaxial with the lead screw (11) and provided with at least three slits (31), each defining a respective sloping surface (28) and slidably receiving a respective support element (25).

9. A head as claimed in claim 7, **characterised in that** each slit (31) seen in cross section relative to the rolling axis (X) has a T-shaped conformation with the upper segment of the "T" facing the rolling axis (X) , and **in that** each support element (25) has an end (25a) housed in the slit (31) the shape of said end

matching that of said slit (31).

10. A head as claimed in anyone of claims 3 to 9, **characterised in that** it further comprises a casing (15); the lead screw nut (12) being rotatably housed in the casing (15); the lead screw (11) being movable in translation in the casing (15) and the rotating body (3) being rotatably coupled with said casing (15). 5
11. A head as claimed in anyone of claims 3 to 9, **characterised in that** it further comprises a flexible transmission element (19) trained around a shaft (20) of the auxiliary motor (13) and around the lead screw nut (12) to transmit motion from the auxiliary motor (13) to the lead screw nut (12). 10 15
12. A head as claimed in claim 1, **characterised in that** the means (4) for setting the rotating body (3) in rotation comprises a main motor (4a) and a transmission (21) interposed between the main motor (4a) and said rotating body (3). 20
13. A head as claimed in claim 12, **characterised in that** the transmission (12) has a flexible element (23) trained around a shaft (24) of the main motor (4a) and around the rotating body (3), to transmit motion from the main motor (4a) to the rotating body (3). 25
14. A head as claimed in anyone of the preceding claims, **characterised in that** it further comprises a control device (32) of the CNC type that is interlocked with the means (9) for actuating the roll-holders (5) between the open position and the closed position, to drive closure or opening of said roll-holders (5). 30 35
15. A head as claimed in claim 14 when depending on at least one of claims 3 to 13, **characterised in that** the CNC control device (32) is connected with the auxiliary motor (13). 40
16. A head as claimed in claim 14 when depending on at least one of claims 12 or 13, **characterised in that** the CNC control device (32) is in addition also connected with the main motor (4a). 45
17. A machine for shaping pipes, comprising:
 - means for clamping a pipe (2) to be shaped;
 - at least one head (1) for pipe (2) rolling;
 - means (M) for actuating said at least one head (1) between a position close to the pipe-clamping means and a position away from said means, so as to be positioned at an axial portion of the end of the pipe (2) designed to be machined; 50

characterised in that said at least one pipe-rolling head (1) is made in accordance with at least one of claims 1 to 16. 55

18. A machine as claimed in the preceding claim when depending on claim 14, **characterised in that** the CNC control device (32) is further connected with the means (M) for actuating said at least one head (1), so as to control said means (M) for actuating said at least one head (1), the auxiliary motor (13) and the main motor (4a) in synchronism, and combine the movements of the head (1) and rolls (6).

Amended claims in accordance with Rule 86(2) EPC.

1. A pipe-rolling head comprising:

- a body (3) rotating around a respective rolling axis (X);
- at least three roll-holders (5) mounted on the rotating body (3), and each adapted to receive a respective roll (6), the rolls (6) being freely rotatable around respective rotation axes (Y) that are substantially parallel to the rolling axis (X); said at least three roll-holders (5) being movable in translation relative to the rotating body (3) between an open position at which the rolls (6) lie spaced apart from each other and from the rolling axis (X), and a closed position at which the rolls (6) lie close to each other in the vicinity of the rolling axis (X), to encompass a pipe (2) to be rolled which is coaxial with said rolling axis (X);
- means (4) for setting the rotating body (3) in rotation;
- means (9) for actuating the roll-holders (5) comprising a ball-bearing actuator (10) having a lead screw (11) coaxial with the rolling axis (X), prevented from rotating and movable in translation along the rolling axis (X), and a lead screw nut (12) slidably engaged on the lead screw (11); a motion-transmitting member (14) to convert translation of the lead screw (11) along the rolling axis (X) into a movement of the roll-holders (5) between the open position and the closed position;

wherein the motion-transmitting member (14) has a support element (25) for each of said roll-holders (5), that is mounted on the rotating body (3) and is susceptible of translation along a respective direction (Z) orthogonal to the rolling axis (X), and a coupling element (27) mounted on the first end (11a) of the lead screw (11); **characterised in that** the coupling element (27) is slidably associated with the support element (25) along a respective sloping surface (28) that is inclined relative to the rolling axis (X).

2. A head as claimed in claim 1, **characterised in that** the means (9) for actuating the roll-holders (5)

further comprises an auxiliary motor (13) connected with the lead screw nut (12), to drive said lead screw nut (12) in rotation and cause translation of the lead screw.

3. A head as claimed in claim 1, **characterised in that** the sloping surface (28) converges towards the rolling axis (X) moving away from the first end (11a) of the lead screw (11).

4. A head as claimed in claim 1, **characterised in that** the coupling element (27) is rotatably mounted on the lead screw (11) for rotation together with the rotating body (3).

5. A head as claimed in claim 3, **characterised in that** the coupling element (27) comprises a cylindrical body (29) coaxial with the lead screw (11) and provided with at least three slits (31), each defining a respective sloping surface (28) and slidably receiving a respective support element (25).

6. A head as claimed in claim 4, **characterised in that** each slit (31) seen in cross section relative to the rolling axis (X) has a T-shaped conformation with the upper segment of the "T" facing the rolling axis (X), and **in that** each support element (25) has an end (25a) housed in the slit (31) the shape of said end matching that of said slit (31).

7. A head as claimed in anyone of claims 1 to 6, **characterised in that** it further comprises a casing (15); the lead screw nut (12) being rotatably housed in the casing (15); the lead screw (11) being movable in translation in the casing (15) and the rotating body (3) being rotatably coupled with said casing (15).

8. A head as claimed in anyone of claims 1 to 6, **characterised in that** it further comprises a flexible transmission element (19) trained around a shaft (20) of the auxiliary motor (13) and around the lead screw nut (12) to transmit motion from the auxiliary motor (13) to the lead screw nut (12).

9. A head as claimed in claim 1, **characterised in that** the means (4) for setting the rotating body (3) in rotation comprises a main motor (4a) and a transmission (21) interposed between the main motor (4a) and said rotating body (3).

10. A head as claimed in claim 9, **characterised in that** the transmission (21) has a flexible element (23) trained around a shaft (24) of the main motor (4a) and around the rotating body (3), to transmit motion from the main motor (4a) to the rotating body (3).

11. A head as claimed in anyone of the preceding claims, **characterised in that** it further comprises a

control device (32) of the CNC type that is interlocked with the means (9) for actuating the roll-holders (5) between the open position and the closed position, to drive closure or opening of said roll-holders (5).

12. A head as claimed in claim 11 when depending on at least one of claims 3 to 13, **characterised in that** the CNC control device (32) is connected with the auxiliary motor (13).

13. A head as claimed in claim 11 when depending on at least one of claims 12 or 13, **characterised in that** the CNC control device (32) is in addition also connected with the main motor (4a).

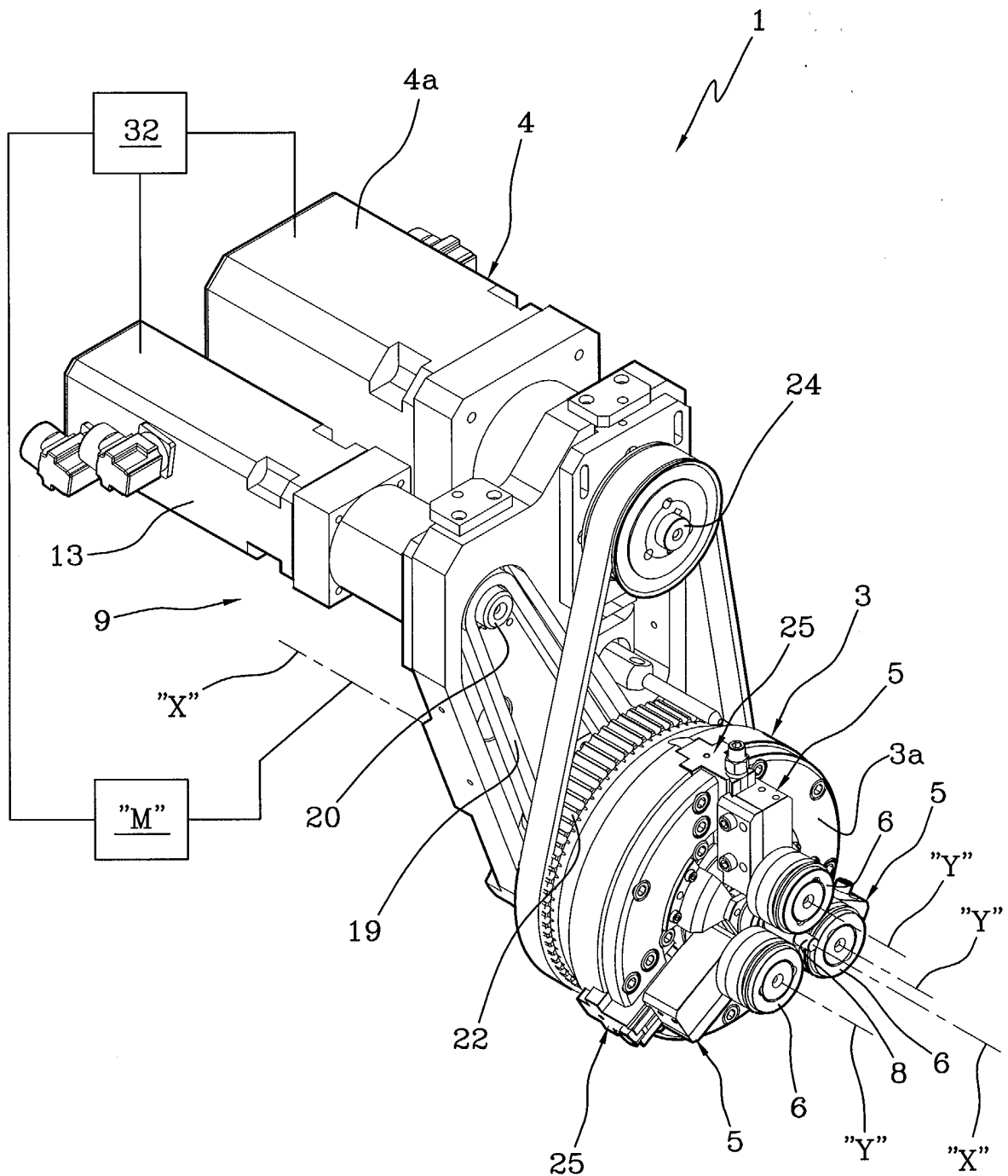
14. A machine for shaping pipes, comprising:

- means for clamping a pipe (2) to be shaped;
- at least one head (1) for pipe (2) rolling;
- means (M) for actuating said at least one head (1) between a position close to the pipe-clamping means and a position away from said means, so as to be positioned at an axial portion of the end of the pipe (2) designed to be machined;

characterised in that said at least one pipe-rolling head (1) is made in accordance with at least one of claims 1 to 13.

15. A machine as claimed in the preceding claim when depending on claim 11, **characterised in that** the CNC control device (32) is further connected with the means (M) for actuating said at least one head (1), so as to control said means (M) for actuating said at least one head (1), the auxiliary motor (13) and the main motor (4a) in synchronism, and combine the movements of the head (1) and rolls (6).

FIG 1



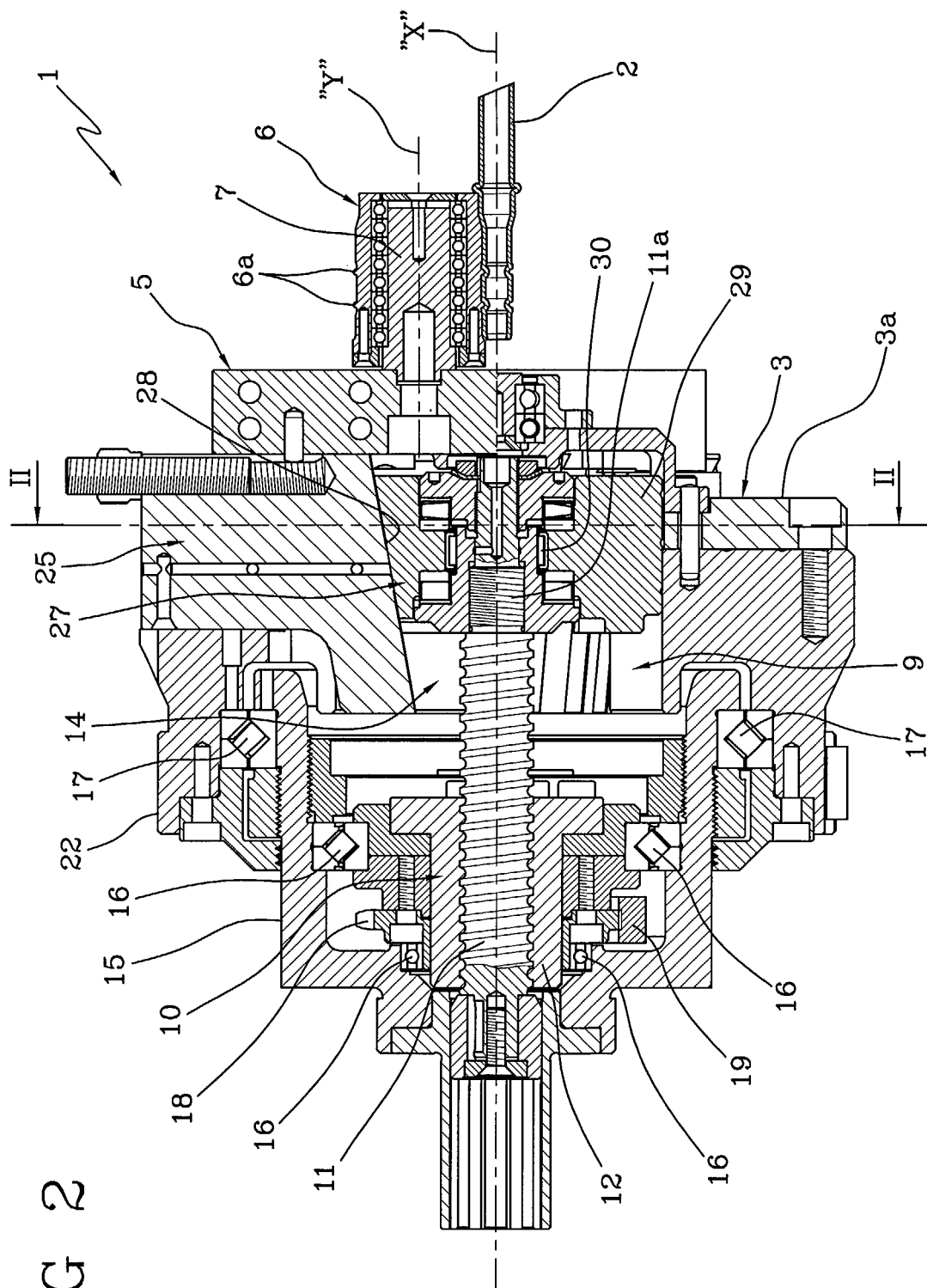


FIG 2

FIG 3

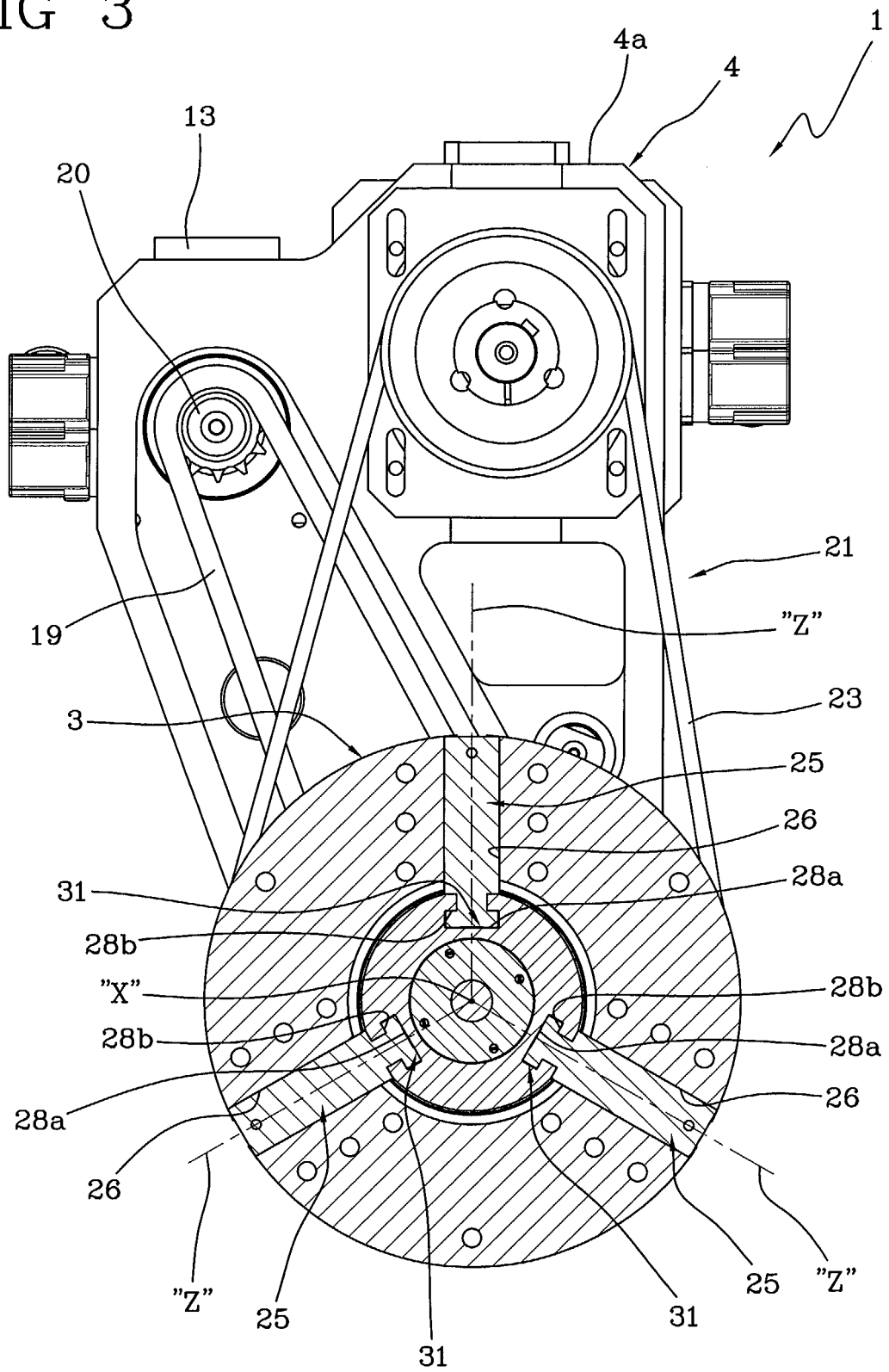
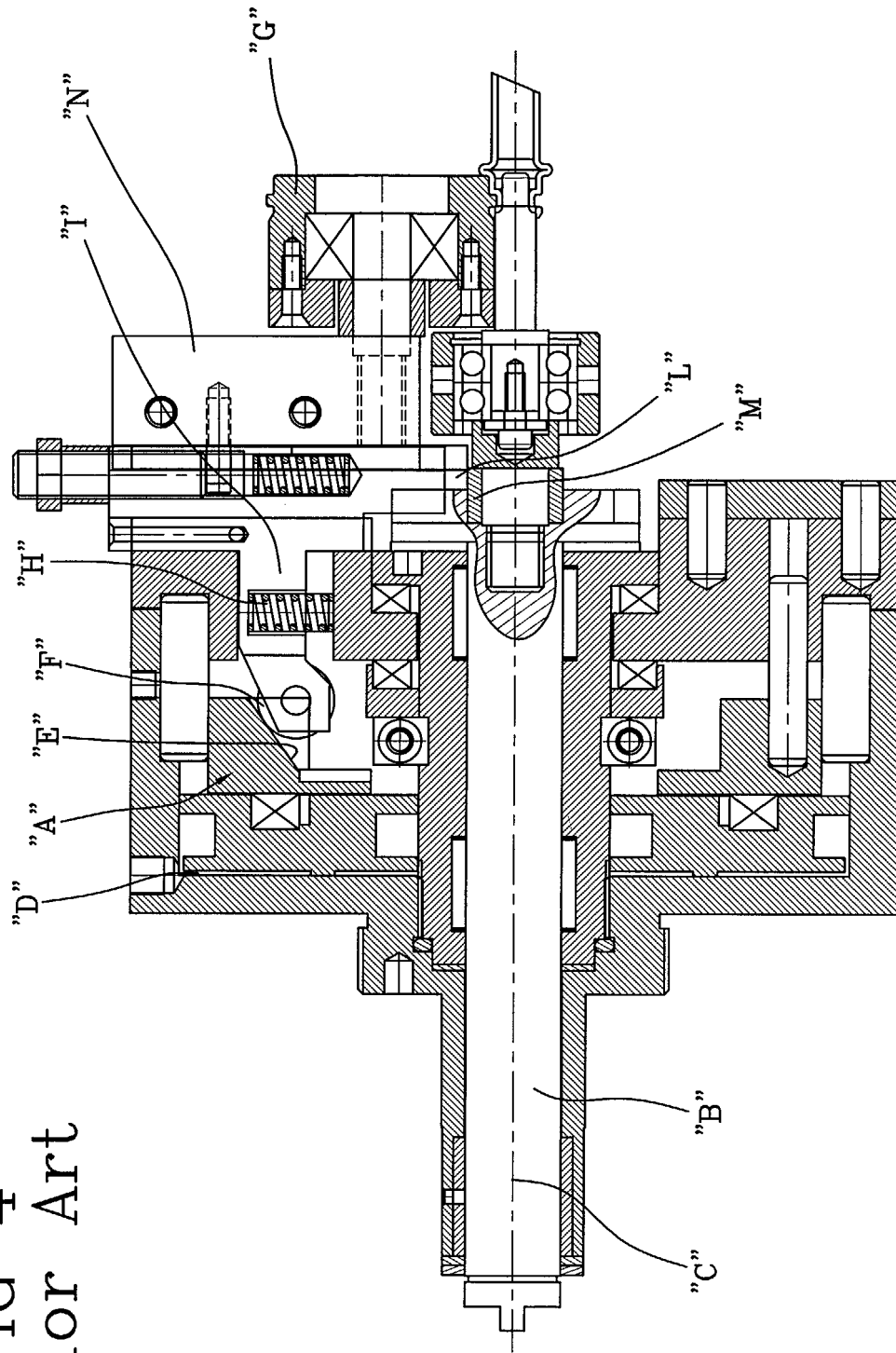


FIG 4
Prior Art





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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Place of search Munich		Date of completion of the search 14 December 2004	Examiner Meritano, L
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			

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