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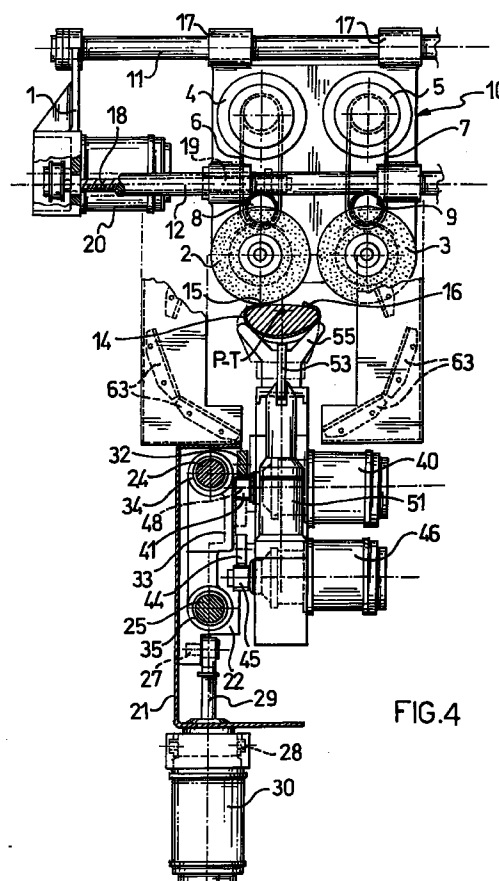
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(54) A machine for roughing edge portions of the upper in the manufacture of footwear

(57) A machine for roughing the side edge portions (15, 16) of a footwear upper (14) which are folded against the base of the last (13) on which the upper is fitted, comprising means (31, 53, 55) for supporting the last (13) with its base facing upwards, means (10) for supporting a pair of rotary roughing tools (2, 3) with their operative peripheries facing the base of the last (13), each tool being intended to roughen a respective edge portion (15, 16) of the upper (14) which extends beside the longitudinal toe-to-heel axis (PT) of the last, guide means (24, 25) for the movement of the support means for the last relative to the roughing tools (2, 3), drive means (40, 46, 30) for moving the support means for the last on the guide means, drive means (4, 5) for rotating the rotary roughing tools, and electronic means (63) for detecting the size and shape of the last (13), for processing them, and for sending corresponding control signals to the drive means. The support means (31, 53, 55) for the last are movable only rectilinearly and angularly in a plane parallel to the vertical plane containing the toe-to-heel axis (PT) of the last (13), whereas the means (10) for supporting the pair of rotary roughing tools (2, 3) can be moved rectilinearly transverse the toe-to-heel axis (PT) of the last (13).

The advantage achieved is a simple mechanical structure, which can be controlled and operated easily in order to carry out the roughing cycle.



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Description

The present invention relates to a machine for roughing the side edge portions of a footwear upper which are folded against the base of the last on which the upper is fitted, the machine comprising means for supporting the last with its base facing upwards, means for supporting a pair of rotary roughing tools with their operative peripheries facing the base of the last, each tool being intended to roughen a respective edge portion of the upper which extends beside the longitudinal toe-to-heel axis of the last, guide means for the movement of the support means for the last relative to the roughing tools, drive means for moving the support means for the last on the guide means, drive means for the rotary roughing tools, and electronic means for detecting the size and shape of the last, for processing them, and for sending corresponding control signals to the drive means.

Machines of the type mentioned are known in the art and an example is described in EP-A-0 043 645.

According to the type of known roughing machine, movements are imparted to the support means for the last along the longitudinal toe-to-heel axis of the last, vertically, so as to raise and lower the base of the last relative to the opposed roughing tools, as well as transversely, that is, along the width of the last, this latter movement being necessary in order to bring the side portions to be roughed alternately under respective roughing tools provided in fixed positions relative to the central longitudinal toe-to-heel axis of the last.

The need to provide means for the transverse movement of the last support which already has to perform movements to and fro in a longitudinal direction as well as vertically, renders the structure of the known machine somewhat complex from a mechanical point of view, with disadvantages with regard to economy and maintenance.

The object of the invention is therefore to prevent the problems encountered in known machines by proposing a roughing machine which is structurally simpler and less expensive as well as being easily automated.

This object is achieved by the roughing machine characterized according to the following claims.

The invention will now be described in greater detail with reference to a preferred embodiment illustrated in the appended drawings, in which:

Figure 1 is an overall, schematic, side view of the roughing machine according to the invention with the last carriage in the position in which the last is loaded with the upper, and in which it is furthest from the roughing tools,

Figure 2 is a plan view of the machine of Figure 1,

Figure 3 is a side view of the machine of Figure 1 with the last carriage in a position beneath the pair of roughing tools,

Figure 4 is a schematic view partially sectioned vertically on the line IV-IV of Figure 3,

Figures 5, 6, 7 and 8 show the structure of the last carriage on an enlarged scale in comparison with the preceding drawings.

With reference to the drawings, the frame supporting the operative unit of the machine which is concerned with the pair of rotary roughing tools, indicated 2 and 3 (Figure 4), is indicated 1.

The tools, with the respective conventional drive devices including electric motors 4 and 5, transmission belts 6 and 7 and pinions 8 and 9 are carried by a carriage 10 which is slidable on a pair of guide rods 11 and 12 carried in turn by the frame 1.

The guide rods extend perpendicular to the toe-to-heel axis PT of the last 13 on which the upper 14 is mounted for the roughing operations to be carried out on the opposite edge portions 15 and 16.

The carriage 10 is connected to the rods 11 and 12 by means of sliding bushes 17 and is moved by means of a male-and-female screw mechanism 18, 19 with a motor 20, the latter being fixed to the frame 1 of the unit.

The carriage 10, with its roughing tools 2 and 3, is moved by means of the motor 20 and the associated male-and-female screw device from a first position in which it is displaced towards the right as seen in Figure 4, in which the rotary tool 2 is in the operative position for roughing the edge portion 15 of the upper 14 to a position in which it is displaced towards the left, in which the tool 3 is in the operative position relative to the edge portion 16 of the upper 14, in accordance with the conventional operating cycle of the machine.

In a position beneath the unit with the roughing tools 2 and 3, the machine comprises a unit for supporting and moving the last 13 with the upper 14.

This unit comprises a plate-shaped support 21 with end shoulders 22 and 23 to which the ends of rectilinear rods 24 and 25 extending parallel to the toe-to-heel axis PT of the last 13 are fixed.

Adjacent the shoulder 23, the support 21 is fixed to the frame of the machine, which is not shown to simplify the drawing, by means of a pin 26, the axis of which is perpendicular to the toe-to-heel axis PT of the last 13.

At the opposite end, however, the shoulder 22 is connected by means of articulated joints 27 and 28 and a rod 29 to a drive device which, in the embodiment in question, is constituted by a pneumatic jack 30.

The support 21 can perform angular movements about the pin 26, by the operation of the jack 30, these movements being contained within a plane parallel to the vertical plane passing through the toe-to-heel axis PT of the last 13.

A carriage, generally indicated 31, is mounted on the guide rods 24 and 25 for supporting the last 13 and for moving it towards and away from the unit with the roughing tools 2 and 3.

A rectilinear rack 32, shown in section in Figure 4, parallel to the guide rods 24 and 25, is fixed to the support 21 and also extends between the shoulders 22 and 23 of the support 21.

As will be appreciated from the following, the rack is intended for moving the carriage 31.

The latter comprises a first plate-like element 33 which has sleeves 34 and 35 surrounding the guide rods 24 and 25 and to which a plate 37 is fixed by means of screws 36.

A cup-shaped element 39 is anchored on the latter plate by means of screws 38 and a motor 40 is fixed thereto, its pinion 41 projecting from the hole 42 in the plate 37 and meshing with the rectilinear rack 32.

A toothed circular sector 44, fixed to the plate 37 by means of screws 43, is intended to mesh with the pinion 45 mounted on the shaft of another electric motor 46 supported by a second plate-shaped element 47 forming a constituent part of the carriage 31.

The second plate-shaped element 47 is mounted for pivoting about an axis 48 which is perpendicular to the toe-to-heel axis PT and which, in the embodiment shown, coincides with the axis of the shaft of the motor 40, by means of an annular bush 49 and a bearing 50 which engages with the cup-shaped element 39.

Upright column-like portions 51 and 52, the free ends of which are used for supporting the last 13, are connected to the second plate-shaped element 47.

More precisely, the free end of the column-like element 51 has a pin 53, the inclination of which can be adjusted about a pin 54, for the connection of the heel portion of the last 13, whereas the column-like element 52 has a fork-like member 55 for supporting the toe portion of the last.

The fork-like member 55 has a base 56 fixed to a slide 57 by means of a screw 58.

The slide 57 is adjustable on the free end of the column-like portion 52 by a rectilinear movement parallel to the toe-to-heel axis PT of the last 13 by means of a male-and-female screw mechanism 59, 60, driven by an electric motor 61 with a belt transmission 62, the whole being fixed rigidly to the column-like portion 52.

The machine also has a conventional electronic scanner 63 for detecting the size and shape of the last 13.

The scanner is fixed to the support 21 of the unit supporting the last in a position in front of the roughing-tool unit so that the size and shape of the last with its upper, positioned on the column-like portions 51 and 52 of the carriage, are detected as it is transferred towards the roughing unit.

The data collected and processed are transformed, in conventional manner, into control signals which are sent to the motor 20 of the roughing unit in order to position it relative to the edges 15 or 16 of the upper 14 to be roughed, as well as to the motors 40, 46 of the carriage 31 and the jack 30 of the frame 21 to cause the last 13 to adopt the various positions necessary according to

the size and shape detected by the scanner 63 as it passes beneath the roughing tools.

In particular, these positions are achieved by a combination of angular movements of the support 21 about the pin 26 and of the plate-shaped element 47 with its columns 51 and 52 about the axis 48 as a result of the meshing between the sector 44 and the pinion 45.

As far as the cycle of the machine as a whole is concerned, it is conventional and can be deduced clearly from the foregoing description and the appended drawings.

Claims

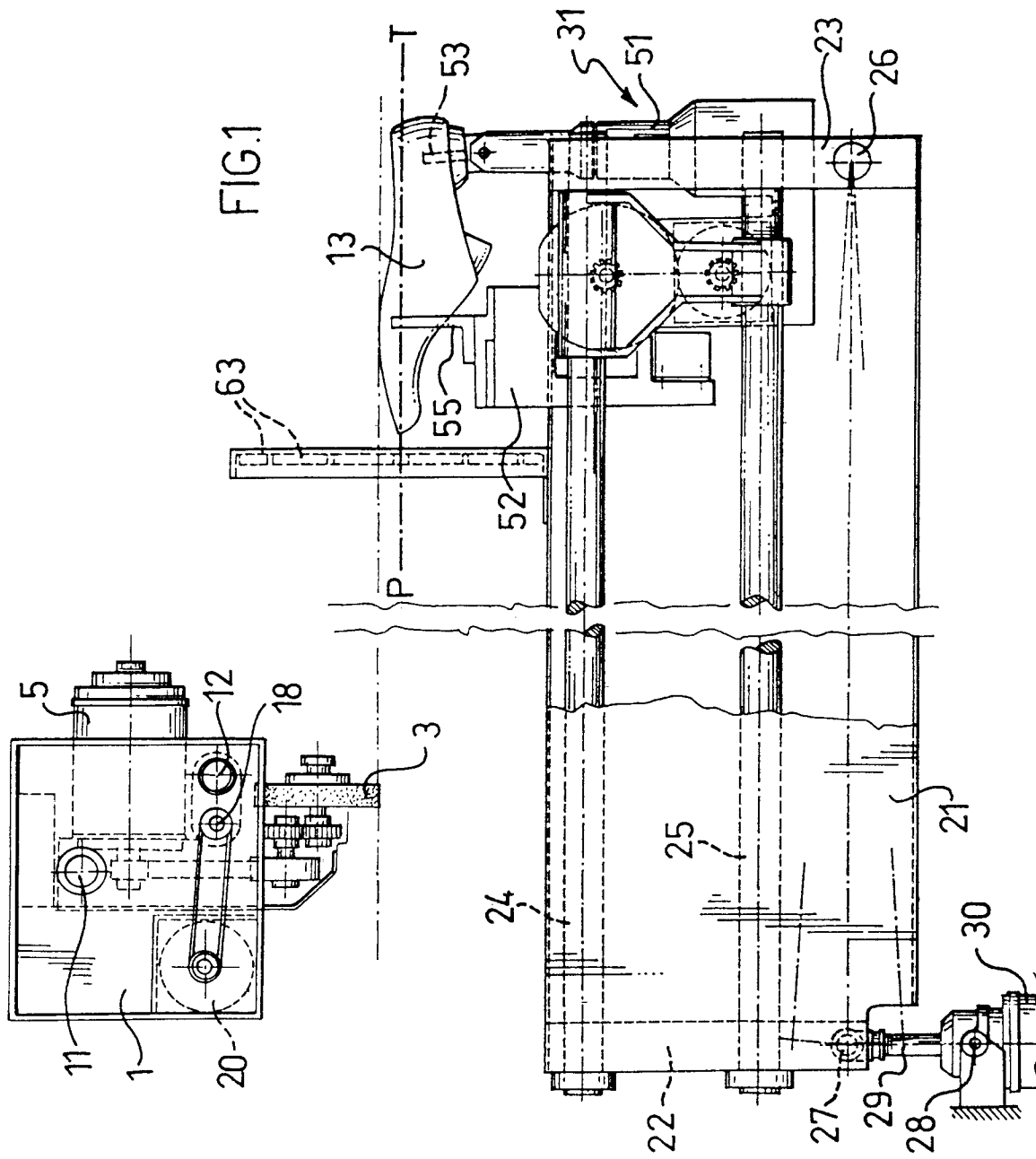
1. A machine for roughing the side edge portions (15, 16) of a footwear upper (14) which are folded against the base of the last (13) on which the upper is fitted, comprising means (31, 53, 55) for supporting the last (13) with its base facing upwards, means (10) for supporting a pair of rotary roughing tools (2, 3) with their operative peripheries facing the base of the last (13), each tool being intended to roughen a respective edge portion (15, 16) of the upper (14) which extends beside the longitudinal toe-to-heel axis (PT) of the last, guide means (24, 25) for the movement of the support means for the last relative to the roughing tools (2, 3), drive means (40, 46, 30) for moving the support means for the last on the guide means, drive means (4, 5) for rotating the rotary roughing tools, and electronic means (63) for detecting the size and shape of the last (13), for processing them, and for sending corresponding control signals to the drive means, characterized in that the support means (31, 53, 55) for the last are movable rectilinearly and angularly in a plane parallel to the vertical plane containing the toe-to-heel axis (PT) of the last (13), and in that the means (10) for supporting the pair of rotary-roughing tools (2, 3) can be moved rectilinearly transverse the toe-to-heel axis (PT) of the last (13).
2. A machine according to Claim 1, characterized in that the means for supporting the pair of roughing tools comprise a carriage (10) slidable on a pair of rectilinear guides (11, 12) which extend perpendicular to the toe-to-heel axis (PT) of the last (13), drive members (20) being provided for moving the carriage (10) on the pair of guide rods between a first position in which the periphery of one (2) of the pair of rotary roughing tools (2, 3) is operatively in engagement with a first edge portion (15) of the upper (14) and a second position in which the periphery of the other roughing tool (3) is operatively in engagement with the edge portion (16) of the upper, opposite the first.
3. A machine according to Claim 2, characterized in that the drive members (20) comprise a male-and-female screw mechanism (18, 19), the male screw

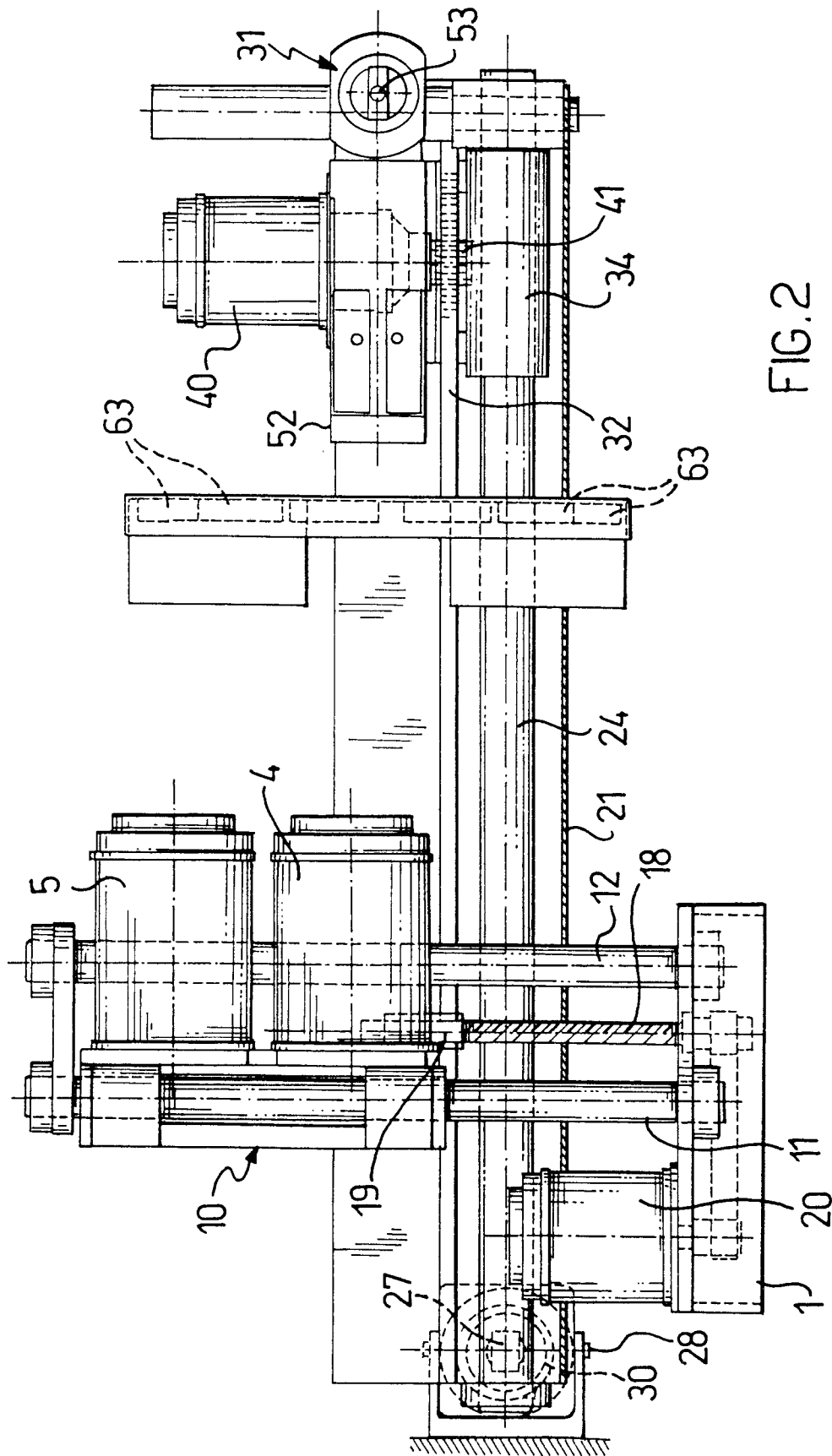
(18) being driven by an electric motor (20) fixed to the pair of guide rods (11, 12).

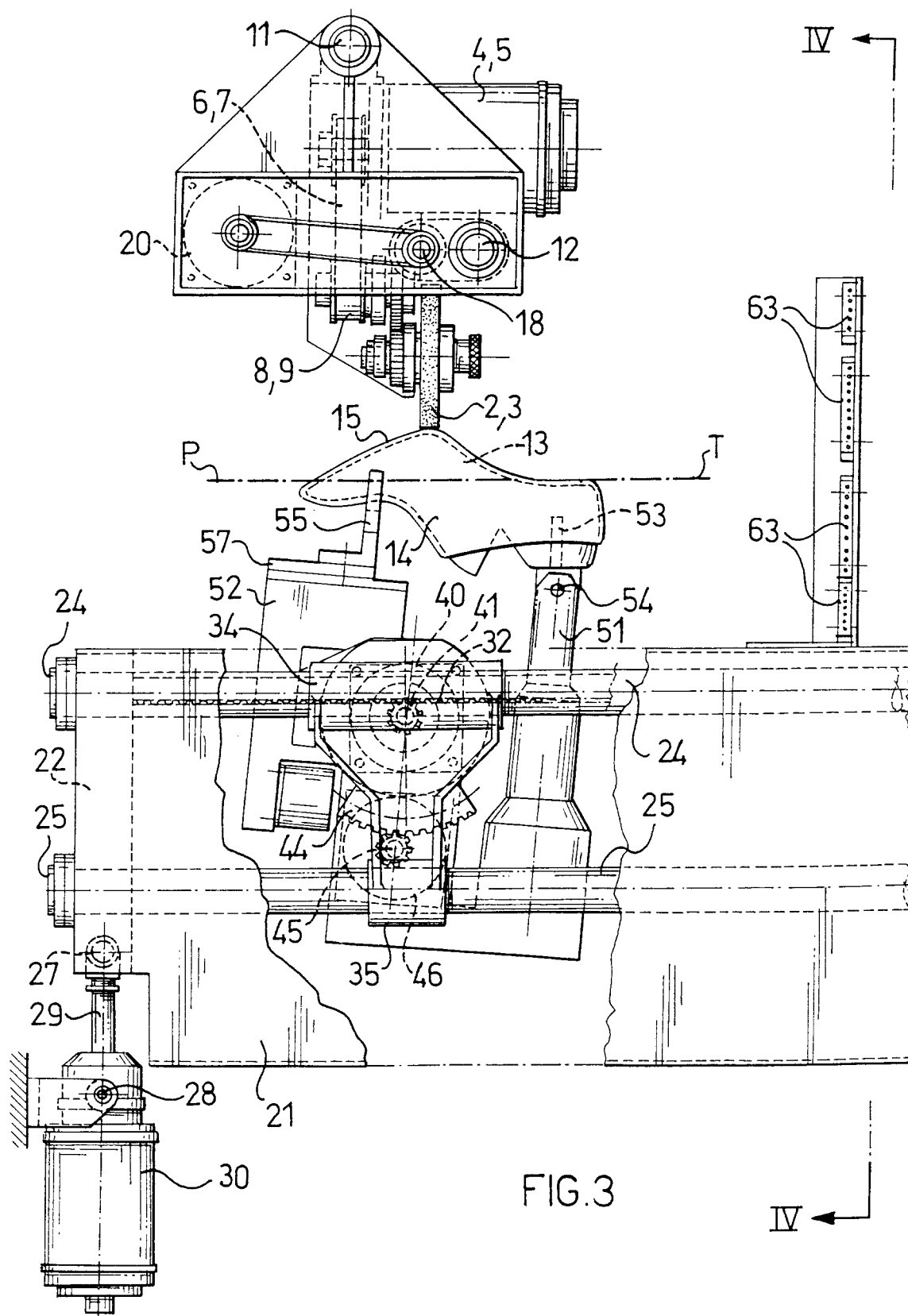
4. A machine according to Claim 1, characterized in that the means for supporting the last comprise a carriage (31) slidable on a pair of rectilinear guide rods (24, 25) which extend parallel to the toe-to-heel axis (PT) of the last (13), and which are mounted on a plate-shaped support (21) movable angularly in a plane parallel to the vertical plane containing the toe-to-heel axis (PT) of the last. 5 10
5. A machine according to Claim 4, characterized in that the carriage (31) comprises a first plate-shaped element (33) mounted for sliding on the guide rods (24, 25) and a second plate-shaped element (47) having first and second upright column-like portions (51, 52) the free ends of which are spaced apart and aligned on the toe-to-heel axis (PT) of the last (13) in order to support the latter, the second element (47) being connected to the first for pivoting about a pin (48) perpendicular to the toe-to-heel axis (PT) of the last (13) and being positionable angularly about the axis, first drive members (46) being provided for bringing about the movement and the angular positioning of the second element (47) relative to the first (33) and second drive members (40) being provided for moving and positioning the first element (33) on the rectilinear guide rods (24, 25). 15 20 25 30
6. A machine according to Claim 5, characterized in that the first drive members comprise an electric motor (46), mounted on the second element (47) of the carriage (31) with its shaft perpendicular to the toe-to-heel axis (PT) of the last and having a pinion (45), as well as a toothed circular sector (44) fixed to the first element (33) of the carriage (31), the teeth of the sector (44) being meshed with the pinion (45) of the motor shaft. 35 40
7. A machine according to Claim 5, characterized in that the second drive members comprise an electric motor (40) mounted on the first element (33) of the carriage with a motor shaft having a pinion (41) and arranged with its axis of rotation perpendicular to the toe-to-heel axis (PT) of the last, as well as a rectilinear rack (32) extending parallel to the guide rods (24, 25) of the carriage (31) and fixed to the plate-like support (21) thereof, the pinion (41) being meshed with the teeth of the rack (32). 45 50
8. A machine according to Claim 4, characterized in that the plate-like support (21) of the pair of guide rods (24, 25) is movable angularly about a pin (26) the axis of which extends perpendicular to the toe-to-heel axis (PT) of the last (13) and which is positioned at one end of the longitudinal extent of the 55

guide rods (24, 25), by means of a drive member (30) acting at the opposite end.

9. A machine according to Claim 5, characterized in that the free end of the first (51) of the column-like portions (51, 52) of the second element (47) of the carriage (31) has means (53) for anchoring the heel portion of the last (13) whereas the free end of the second column-like portion (52) has members (55) for supporting the toe portion of the last (13).
10. A machine according to Claim 9, characterized in that the support for the toe portion of the last comprises a fork-like support (55) mounted on a slide (57) slidable on a rectilinear guide fixed to the free end of the column-like portion (52) and extending parallel to the toe-to-heel axis (PT) of the last (13), a motor-driven male-and-female screw mechanism (59, 60, 61, 62) being provided between the guide and the slide for the movements thereof.







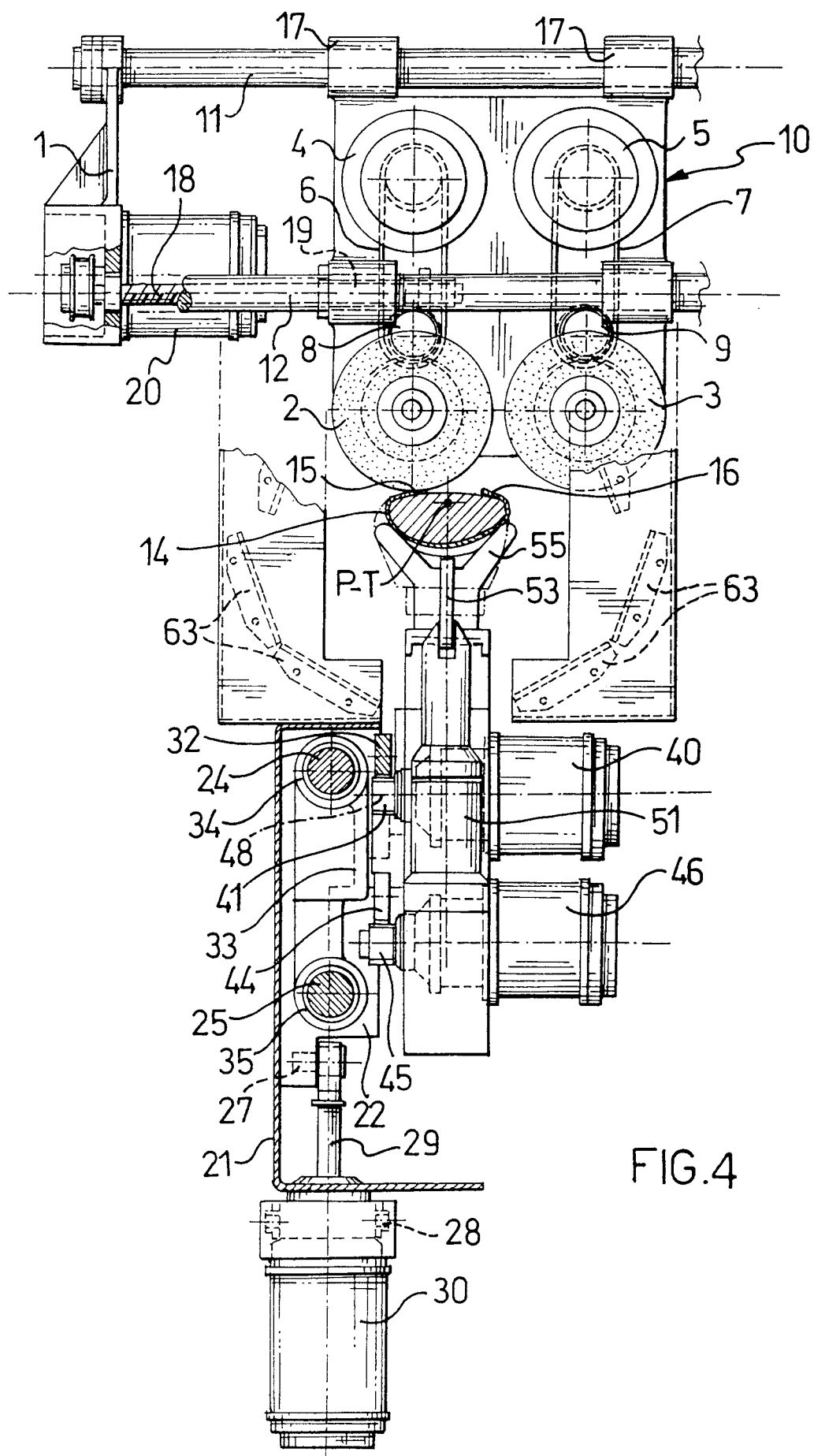


FIG.4

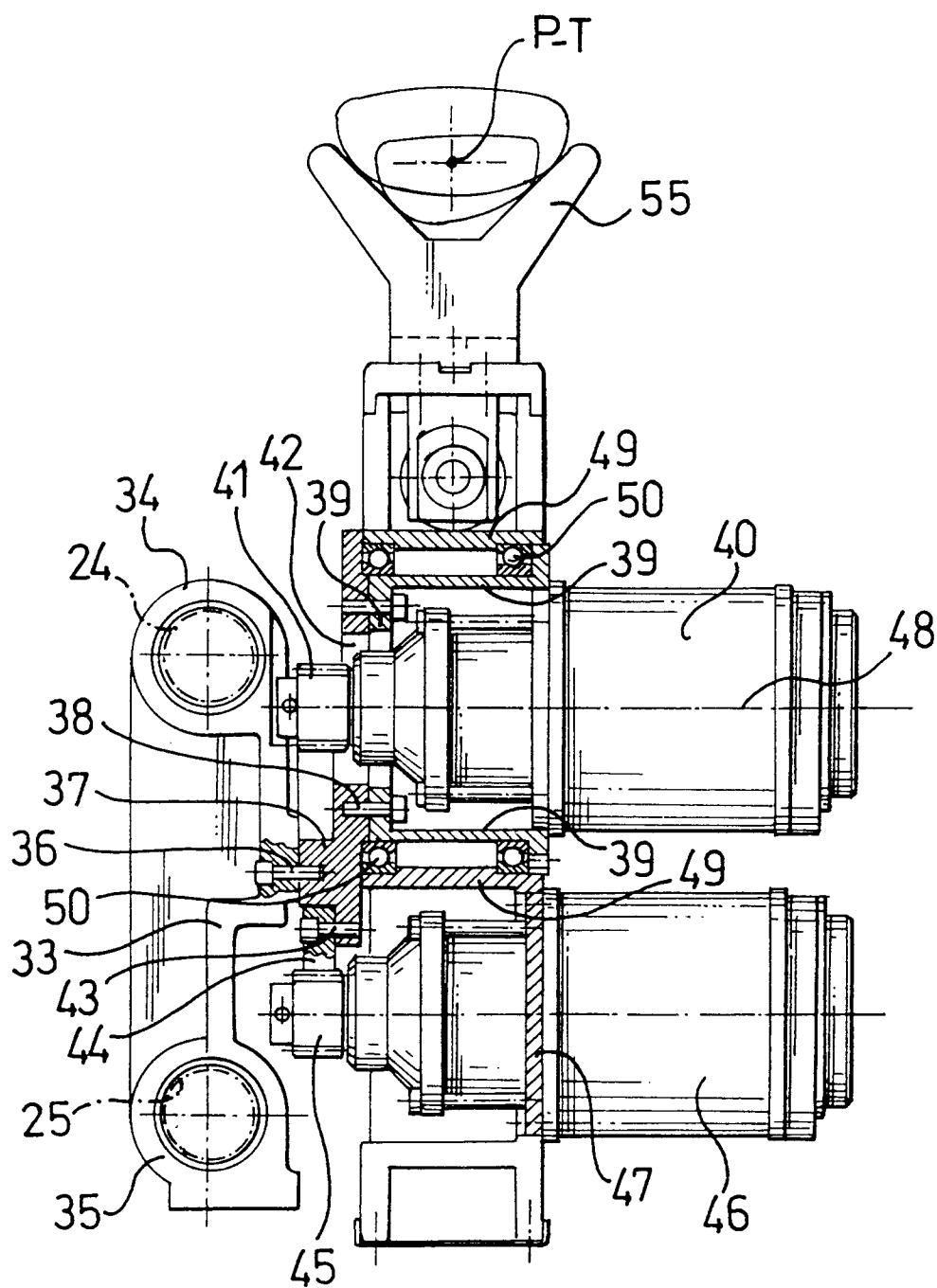


FIG.5

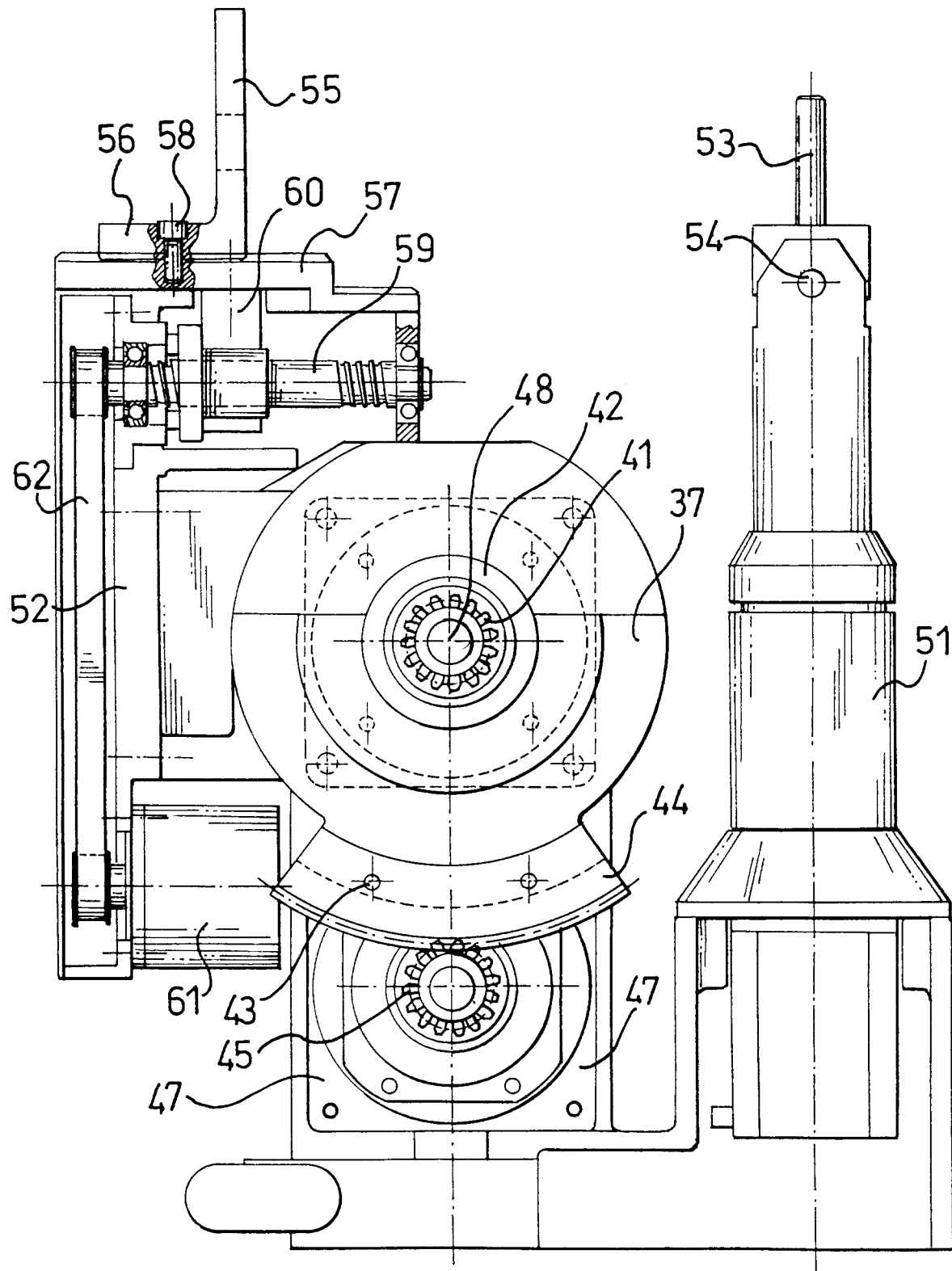


FIG. 6

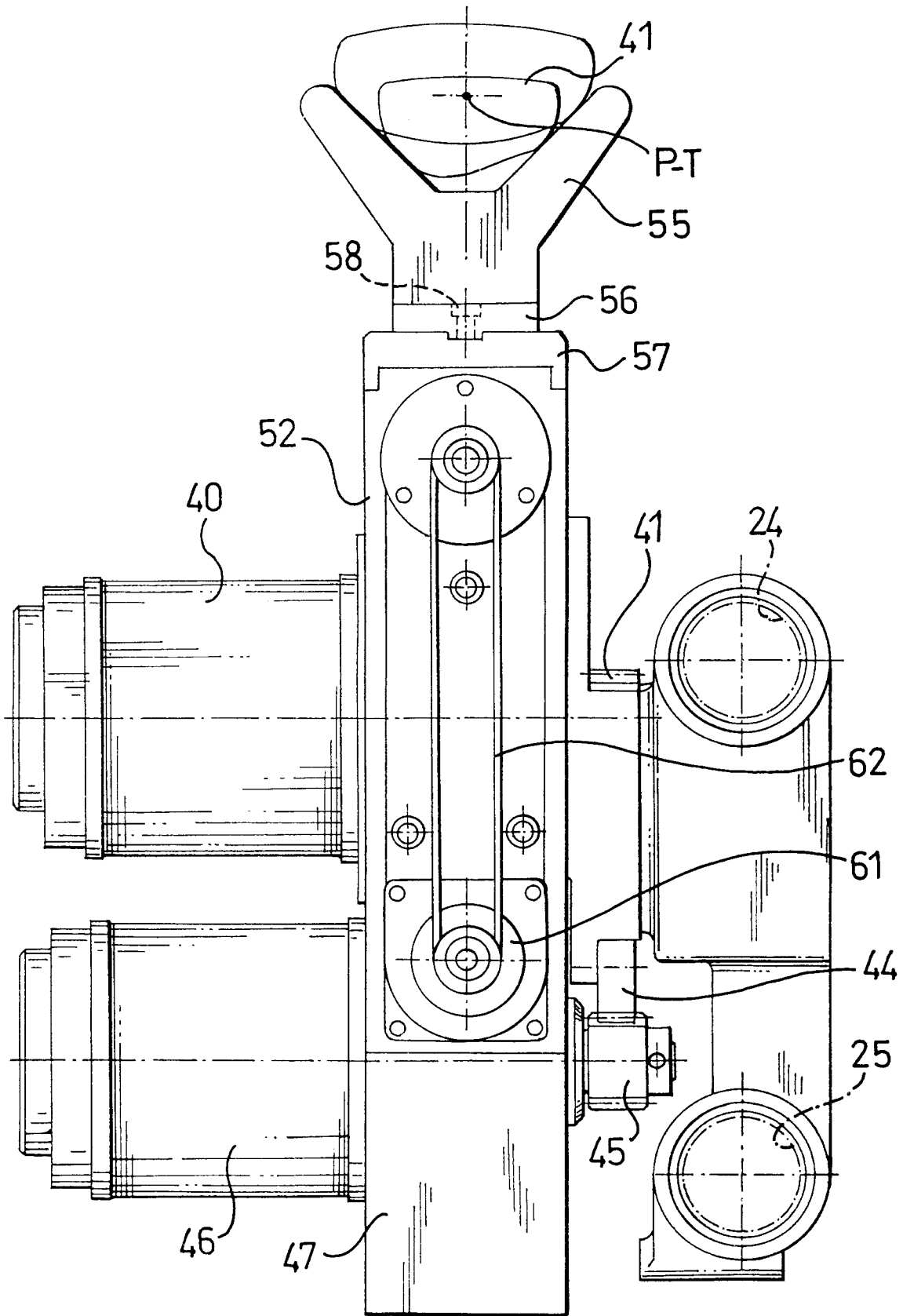


FIG.7

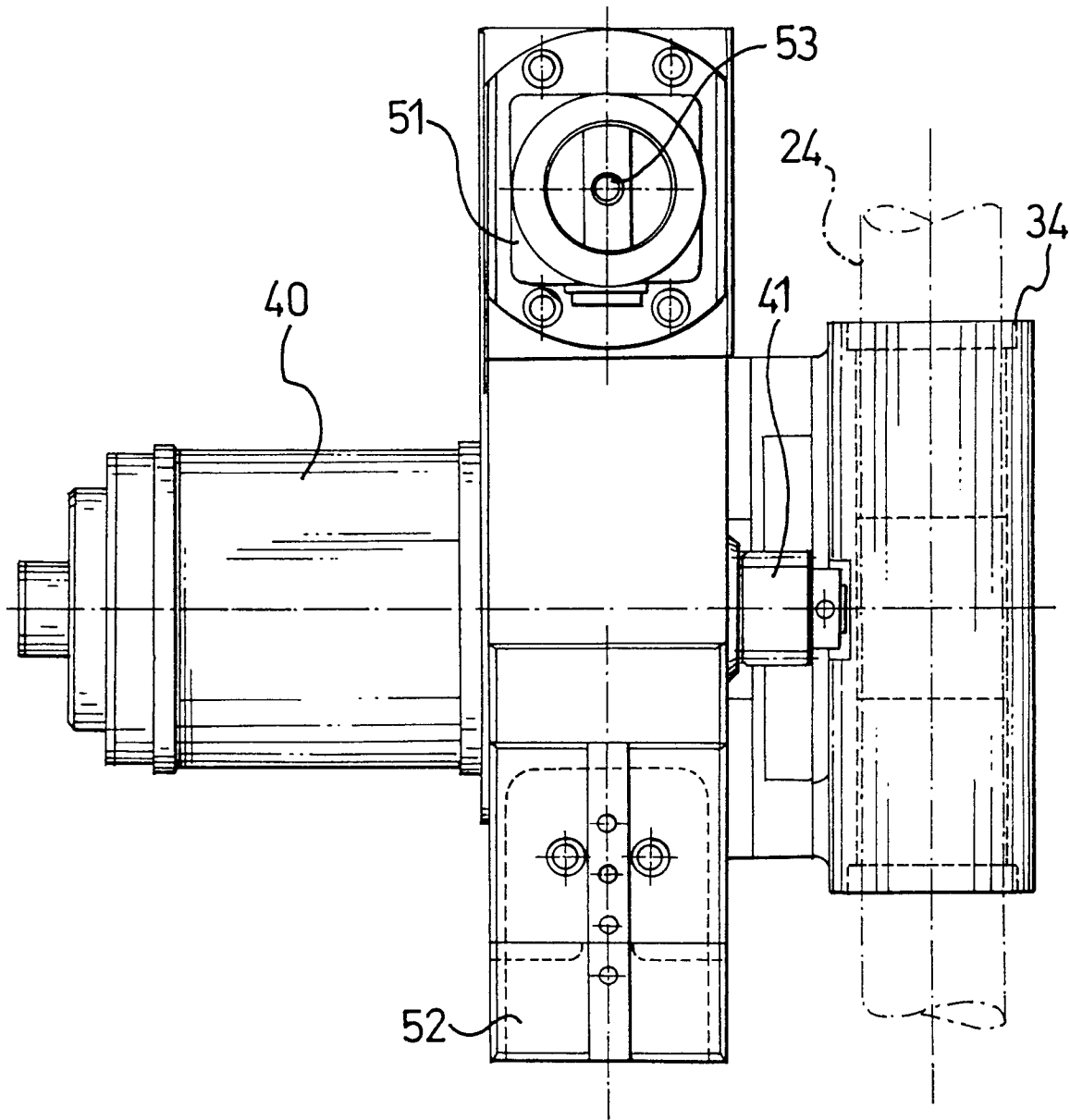


FIG. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0034

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)
A	EP-A-0 135 201 (LEADER CO. LTD.) 27 March 1985 * abstract; claims; figures *	1-10	A43D37/00
A	EP-A-0 596 570 (OFFICINA MACCANICA B.D.F. SRL) 11 May 1994 ---		
D,A	EP-A-0 043 645 (THE BRITISH UNITED SHOE MACHINERY CO. LTD.) 13 January 1982 -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A43D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 July 1995	Examiner Soederberg, 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			

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