



(11) Publication number : **0 494 052 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **91830538.4**

(51) Int. Cl.⁵ : **D05B 1/22, D05B 73/00**

(22) Date of filing : **06.12.91**

(30) Priority : **28.12.90 IT 2257190**

(43) Date of publication of application :
08.07.92 Bulletin 92/28

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

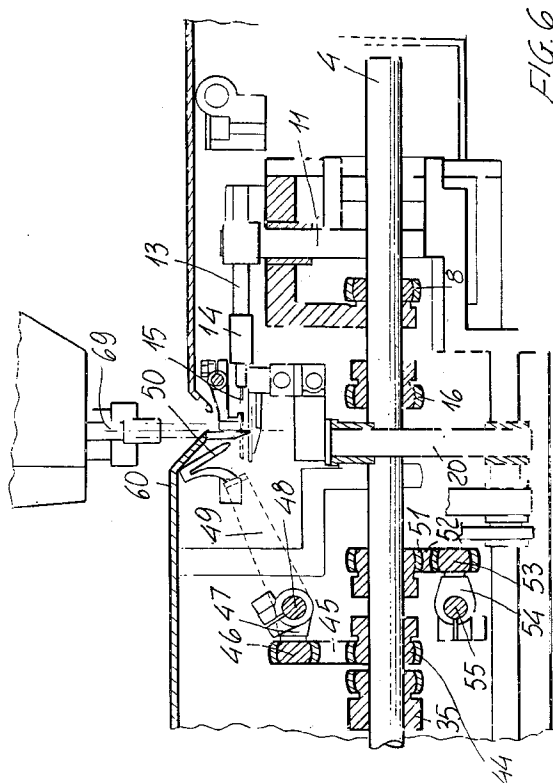
(71) Applicant : **MACPI S.p.A. PRESSING DIVISION**
Via Piantada 9/D
I-25036 Palazzolo Sull'Oglio (Brescia) (IT)

(72) Inventor : **Cartabbia, Giovanni**
c/o MACPI S.p.A., Via Piantada, 9/D
I-25036 Palazzolo Sull'Oglio (IT)

(74) Representative : **Cicogna, Franco**
Ufficio Internazionale Brevetti Dott.Prof.
Franco Cicogna Via Visconti di Modrone, 14/A
I-20122 Milano (IT)

(54) **Industrial sewing machine for simultaneously making different seaming patterns.**

(57) An industrial sewing machine comprises at least two driven shafts (4,5) which are rotatively driven in a timed manner, on one of these shafts (4) being keyed cam members (8,16,44,51) for reciprocally driving in a horizontal plane one or more needle bars (13), as well as grippers for feeding with fabric operating hook elements, the other driven shaft (5) operating a vertically displaceable needle bar (69) arranged downstream of the first mentioned needle bars, the spacing of the needle bars being so designed that the needles (15) supported thereby can make simultaneously rectilinear, curved and broken seaming lines.



The present invention relates to a sewing machine, for industrial use, which has been specifically designed for simultaneously performing a plurality of different seaming lines.

As is known, in the garment industry frequently arises the need of performing several seaming lines which can be, for example, of the overlock or chain stitch type.

Also known is the fact that the mentioned main stitches must frequently be performed on a given portion of the same cloth or garment.

For example, for seaming a shirt sleeve, it is necessary to provide a overlock stitche and then this seaming arrangement must be "stopped" by means of a chain stitch.

These different types of stitches, in particular, must be made on different sewing machines, with different working passes, which, as it should be apparent, in addition to requiring long operating times, frequently provides not perfectly finished products, because of the difficulty of holding the several seaming lines in a properly aligned condition.

SUMMARY OF THE INVENTION

Accordingly, the main object of the present invention is to overcome the above mentioned drawbacks, by providing a sewing machine, for industrial use, which is specifically designed and arranged to perform, in a single pass, two or more seaming lines, either of the like or different type.

Another object of the present invention is to provide an industrial sewing machine adapted to make either horizontal or vertical stitches.

Another object of the present invention is to provide such a sewing machine in which the fabric being sewn can also be fed or transported with different angles.

Another object of the present invention is to provide such a sewing machine in which the fabric flaps or portions to be sewn can be oriented in all of the working orienting directions, independently from the fact that said fabric portions are in a loose condition or in a partially assembled condition.

According to one aspect of the present invention, the above mentioned objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a sewing machine for industrial use, as claimed in the main claim.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the industrial use sewing machine according to the present invention will become more apparent from the following detailed description of a preferred embodiment thereof, which is illustrated, by way of an indicative but not limitative example, in the figures of the

accompanying drawings, where:

Figures 1, 2 and 3 are respectively elevation side and top plan schematic views illustrating the industrial use sewing machine according to the present invention;

Figure 4 is a top plan view of the sewing machine shown without its covering casing;

Figure 4a is a partial perspective view of the subject sewing machine;

Figure 5 is a vertical cross-section view of the subject sewing machine, taken along the line V-V of Figure 4;

Figure 5a is a vertical cross-sectional view, with a top view, taken along the section line Va-Va of Figure 5;

Figure 6 is a vertical cross-section view of the subject sewing machine, taken along the line VI-VI of Figure 4;

Figure 7 is a cross-sectional view of Figure 6;

Figure 8 shows an embodiment of the operating assembly for driving hook members cooperating with one or more needles operating in a horizontal direction included in the sewing machine.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the Figures of the accompanying drawings, the sewing machine for industrial use according to the present invention comprises a supporting frame which has been specifically designed for supporting at least a main shaft 1 which is driven by an electric motor (not shown).

On this main shaft 1 there are keyed at least two pulleys, indicated respectively at 2 and 3, provided for transmitting a rotary movement to a first and a second driven shafts 4 and 5 through corresponding belts 6 and 7.

In this connection it should be apparent that said driven shafts 4 and 5 can also be driven by other driving sources, in a timed manner.

The first driven shaft 4 supports a first cam member 8 which, through a connecting rod 9, a ball joint 10 and a swinging pivot sleeve 11, drives a lever 12 provided with a thread tension arm 12' for controlling one or more needle bars 13.

These needle bars are driven in a horizontal plane, possibly with different angles (but with a single and timed driving assembly) and support, by means of clamp members 14, corresponding needles 15 which can be selectively operatively driven.

On the driven shaft 4 there is moreover keyed a second cam member 16 which, through a connecting rod 17, a ball joint 18, a sleeve 19 and a swinging pivot pin 20, drives a trimming knife 21 supported on a curved supporting arm and the blade of which is indicated at 22.

On the driven shaft 4 there is moreover keyed a

third cam member 23 which, through a connecting rod 24, a ball joint 25 and a sleeve 26, drives a first swinging pivot pin 27 which in turn, through a lever, drives a second pivot pin 28.

These pivot pins, in particular, support respective eccentric levers 29 and 30 which can rise gripper bearing sliders, respectively indicated at 31 and 32.

More specifically, the gripper bearing slide 31 fixedly supports the gripper or clamp 33 which operates to feed the fabric to the needle or to the needles.

The slider 32, in turn, supports the gripper 34 for driving the fabric beyond the needle or needles.

In this connection it should be pointed out that the gripper 33 can also be called "differential gripper" since it can carry out a different operating stroke from that of the gripper 34 which, in turn, can be called the "stitching gripper".

On said driven shaft 4 there is moreover mounted a stitch stretching cam member 35 which, through a connecting rod 36, a ball joint 37 and a sleeve 38, can drive a swinging pivot pin 39.

This pivot pin drives rotatively the levers 40 and 41 which are respectively provided with driving pins 42 and 43, which, in operation, drives the respective gripper bearing sliders 31 and 32 so as to bring said sliders in contact with the fabric being sewn and cause said sliders to come back, in a lowered condition, under the control of the mentioned eccentric levers 29 and 30.

On the mentioned first driven shaft 4, moreover, there is provided a cam member 44 which, through a connecting rod 45 and a ball joint 46, drives a sleeve 47.

This sleeve, as is shown, restrains a swinging pivot pin 48 thereon there is keyed a lever 49 bearing a hook member 50, which can perform a reciprocating movement.

On the same driven shaft 4 there is moreover keyed a further cam member 51 which, through a connecting rod 52 and a ball joint 53 and a sleeve 54, swingably drives a pivot pin 55.

With this latter there is rigidly coupled a lever 56 to which there is articulated an arm 57 which in turn is slidably coupled to a swinging ball joint 58 and supports, at the free end portion thereof, a further vertically movable hook member 59.

Cooperating with the above mentioned grippers 33 and 34 there is moreover provided a needle plate 61, thereon a pressing small foot 62 abuts, said foot 62 being mounted on a lever 63 pivoted to a rod 64 resiliently urged by an adjustable spring device 65.

Downstream of the grippers there are provided guides 66, mounted on a guide supporting element 67 and adapted to convey the two seamed fabric portions, which have been seamed or stitched by the horizontal needle or needles 15, under a further needle 68 which is driven along a vertical axis and is adapted to perform a "riveting" or sealing sewing

operation.

This vertical needle or needles is/are assembled on a respective needle bar 69, which is reciprocally driven by the driven shaft 5 through any known driving means.

With the vertical needle or needles 68, cooperate the foot 70, pressing on the horizontal plate 71, the hook elements 72 and 72' respectively driven by the mentioned driven shafts 5 and 1, through suitable driving means, as well as corresponding grippers 73.

There is moreover provided a suitable enclosing casing 70 which, advantageously, is also adapted to be used as a working surface.

In operation, the two fabric portions to be jointed are arranged on the mentioned working surface so as to arrange their corresponding edges with an adjoining relationship, with a vertical descending configuration, at the level of the horizontally operating needle or needles 15.

More specifically, the mentioned fabric portions are arranged with horizontally opposite arrangements with the right side of the fabric upward directed.

In this connection it should be pointed out that the timed driving of the grippers 33 and 34 will allow two or more fabric portions to be stitched to be simultaneously and timely driven, and, in particular, the fabric portions can be driven with different angles in order to perform the desired sewing operation.

Moreover, the side edges, facing one another and downward directed, of the fabric portions entrained by the grippers will be trimmed at the free edge portions thereof, by the knife 31 and then they will be further stitched by the vertical needle 68.

From the above disclosure it should be apparent that the sewing machine according to the present invention affords the possibility of making, in a single operating step, at a single working place and with a single operator, an assembling sewing operation on two fabric portions, followed by a "riveting" or sealing sewing operation.

Moreover, the sewing machine according to the invention allows the fabric portions to be stitched to be arranged with a horizontal arrangement with the right side of the fabric upward turned.

Moreover, it also affords the possibility of performing two subsequent sewing operations, by orienting or spreading apart the fabric portions as desired between the two stitching operations.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof, it should be apparent that the disclosed embodiment is susceptible to several modifications and variations all of which will come within the spirit and scope of the appended claims.

Claims

1. An industrial sewing machine comprising two driving shafts, rotatively driven with timed speeds, on one of said driven shafts being keyed cam members which, through mechanically operating assemblies, drive one or more needle bars in a horizontal plane, said cam members further driving fabric transporting grippers and hook elements, the other of said driven shafts driving a further needle bar which is displaced in a vertical plane and arranged downstream of said needle bars, said needle bars being so spaced from one another as to make several simultaneous either rectilinear, curved or broken sewing lines.

5
10
15
2. A sewing machine according to Claim 1, wherein said machine comprises a supporting frame, supporting a main driving shaft, thereon there are keyed at least two pulleys rotatively driving corresponding driven shafts through driving belts, said shafts driving, in turn, one or more needles according to a horizontal axis and one or more needles according to a vertical axis.

20
25
3. A sewing machine according to Claim 2, and wherein one of said driven shafts supports a first cam member which, through a connecting rod, a ball joint and a swinging pivot pin sleeve operates a lever for controlling said one or more needle bars, said needle bars being displaced in a horizontal plane, with a set angular arrangement, and bearing, through clamp members, corresponding needles which can be selectively operated.

30
35
4. A sewing machine according to Claim 3, wherein on said driven shaft there is keyed a second cam member which, through a connecting rod, a ball joint sleeve and a swinging pivot pin, drives a trimming knife, said trimming knife being supported on a trimming knife supporting arm.

40
5. A sewing machine according to Claim 3, wherein on said driven shaft there is moreover arranged a third cam member which, through a connecting rod, a ball joint and a sleeve, drives a first swinging pivot pin which, by means of a lever, in turn drives a second swinging pivot pin, said pivot pins bearing corresponding cam members adapted to synchronously drive two gripper bearing slides.

45
50
6. A sewing machine according to Claim 5, wherein one of said slides supports a gripper provided for feeding a fabric in front of said needle or needles, the other of said slides supporting a gripper provided for transporting said fabric beyond said needles.

55
7. A sewing machine according to Claim 3, wherein on said driven shaft there is further arranged a stitch stretching cam member which, through a connecting rod, a ball joint and a sleeve, controls a swinging pivot pins adapted to reciprocate two levers provided with control pins, said control pins driving said gripper bearing slides so as to cause said slides to contact said fabric and stop at a lowered position.

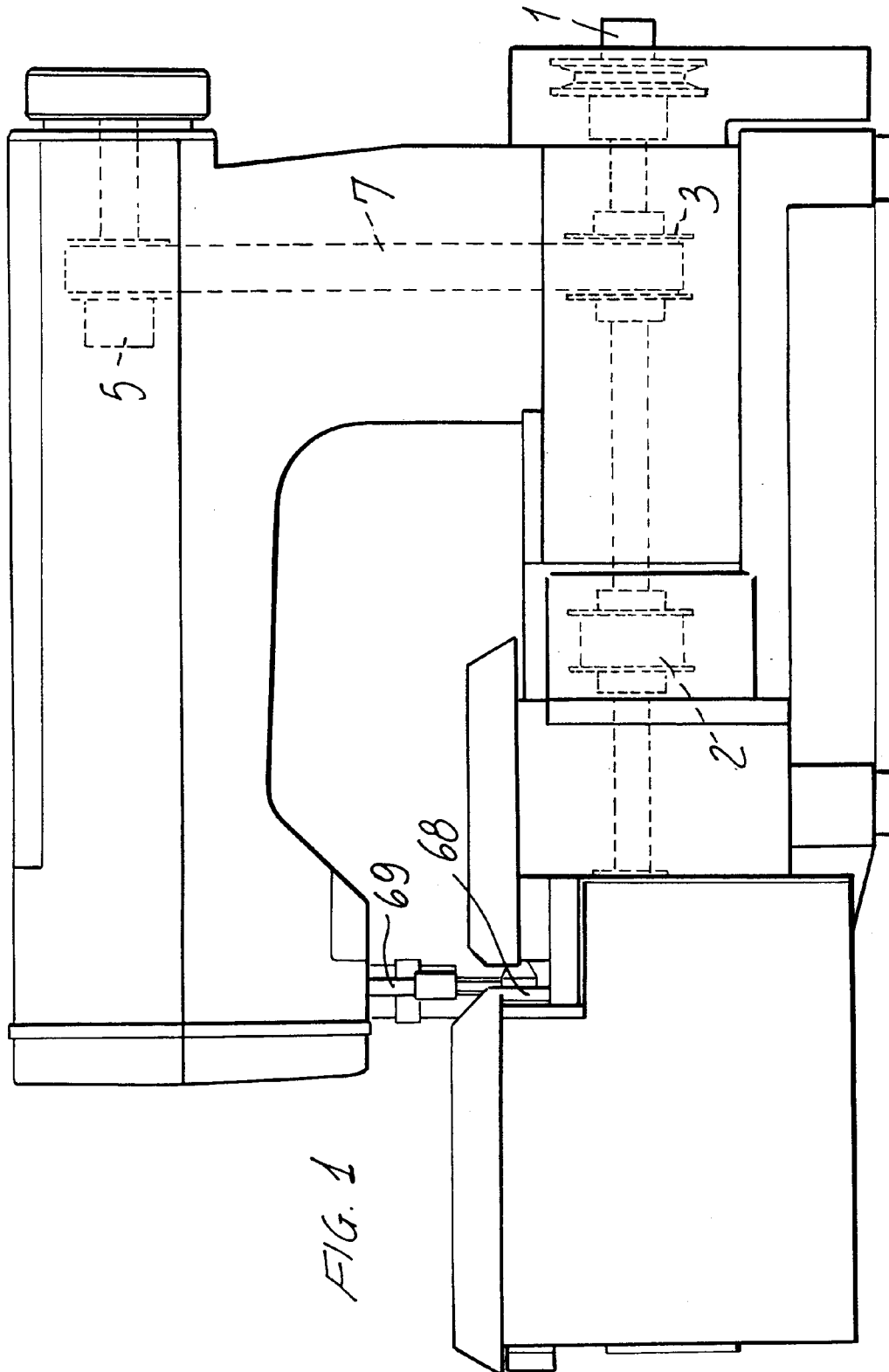
5
8. A sewing machine according to Claim 3, wherein on said driven shaft there is moreover provided a further cam element adapted to drive, through a connecting rod and a ball joint, a sleeve, restraining a swinging pivot pin, thereon is keyed a lever bearing a first hook element which can be displaced with a reciprocating rotary movement.

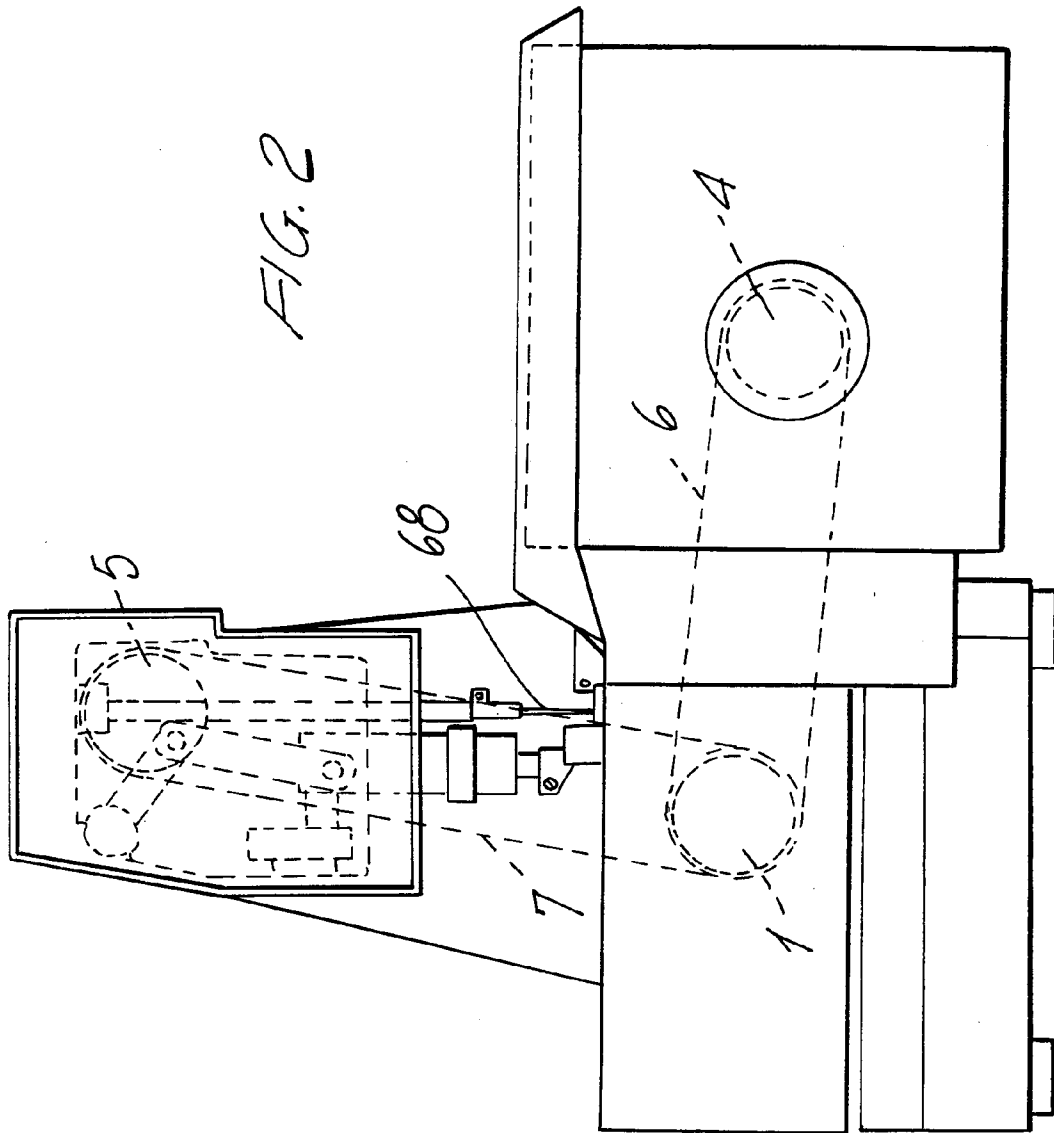
10
9. A sewing machine according to Claim 3, wherein on said driven shaft there is keyed yet a further cam element which, through a connecting rod, a ball joint and a sleeve, drives a swinging pivot pin, therewith a lever is rigid, said lever bearing an arm element which is slidably coupled to a swinging ball joint and bearing, at a free end thereof, a further hook element.

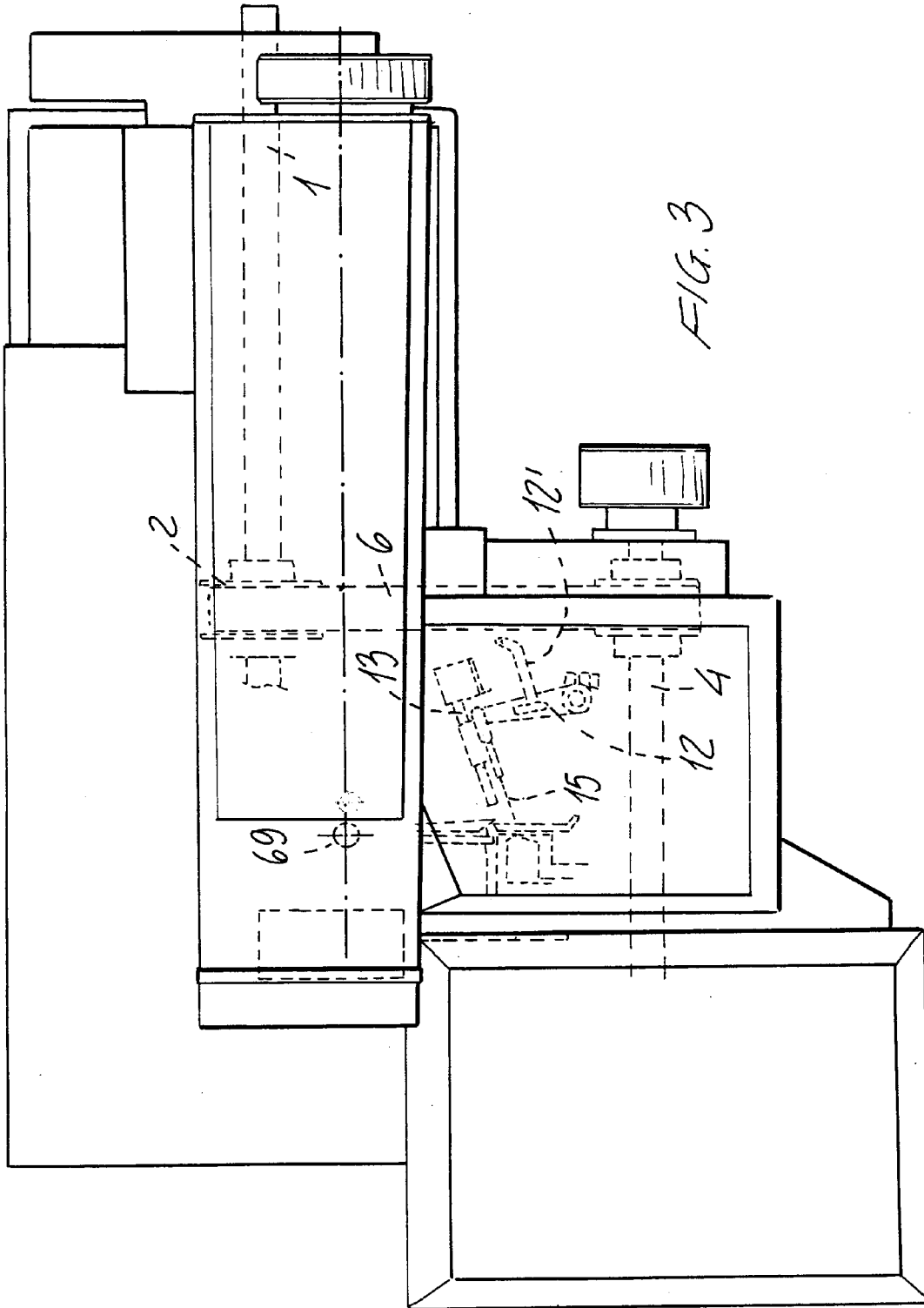
15
20
25
10. A sewing machine according to Claim 1, wherein with said gripper a needle plate cooperates, thereon a pressing foot can abut, said pressing foot being mounted on a lever pivoted onto a rod resiliently urged by an adjustable spring device, downstream of said grippers there being provided guides for conveying two portions of said fabric, having side edges seamed by said horizontal needle or needles, under a vertical needle which is vertically driven so as to provide a riveting seam line.

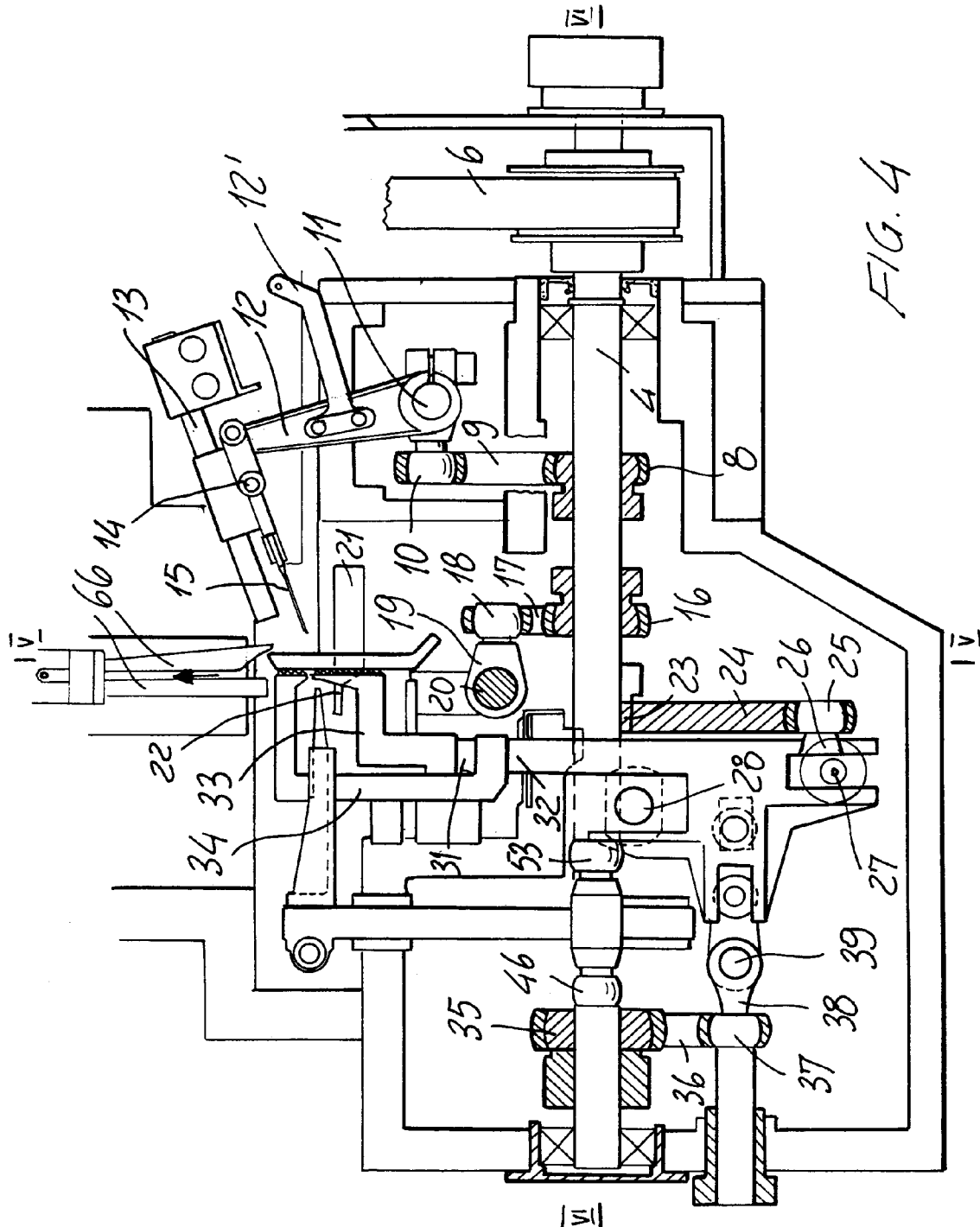
30
35
40
11. A sewing machine according to Claim 10, wherein said vertical needle is mounted on a respective needle bar which is reciprocately driven by the second driven shaft, with said vertical needle a pressing foot cooperating which presses on a horizontal plate, a further hook element driven by said driver shaft, as well as corresponding grippers.

45
50
55









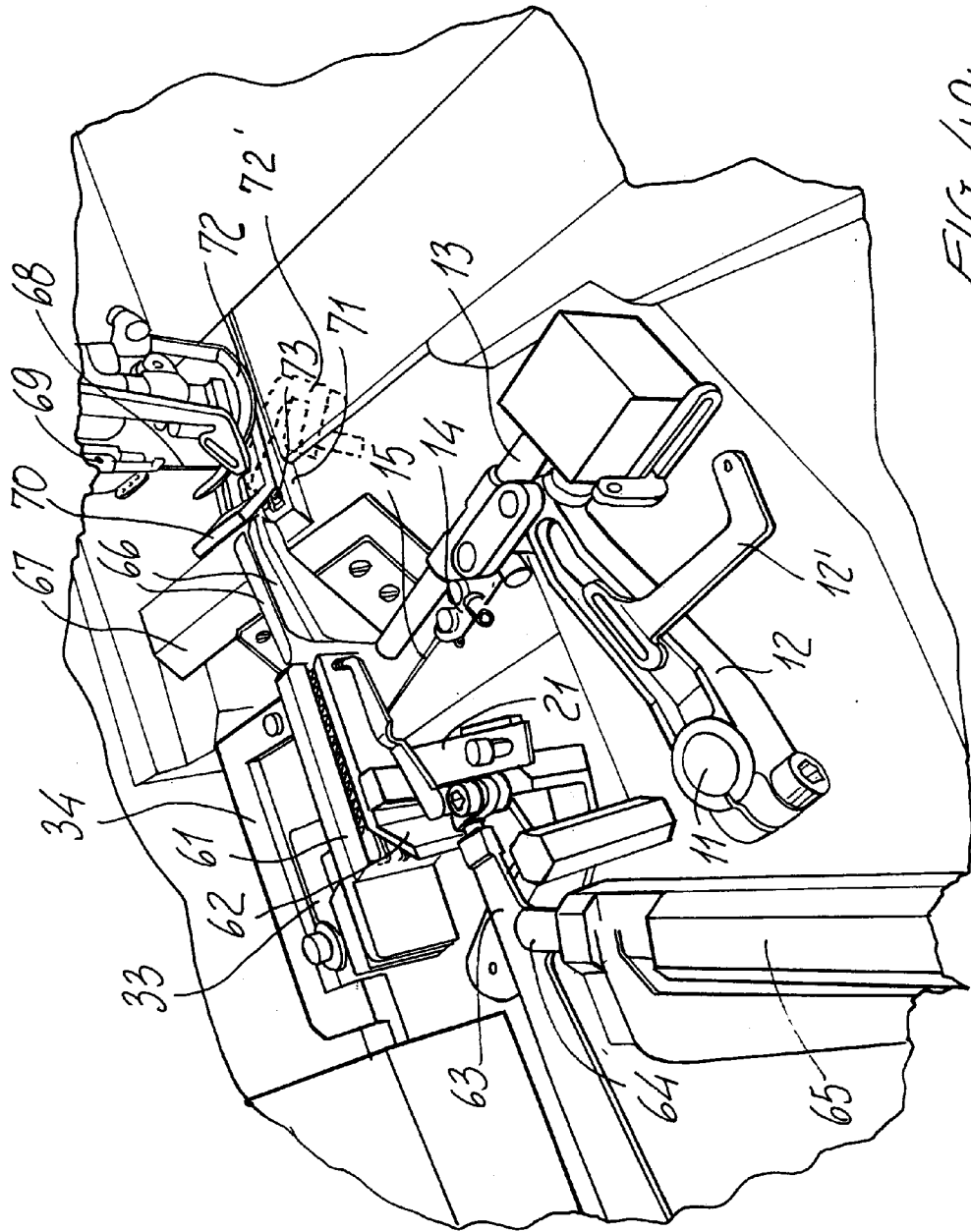
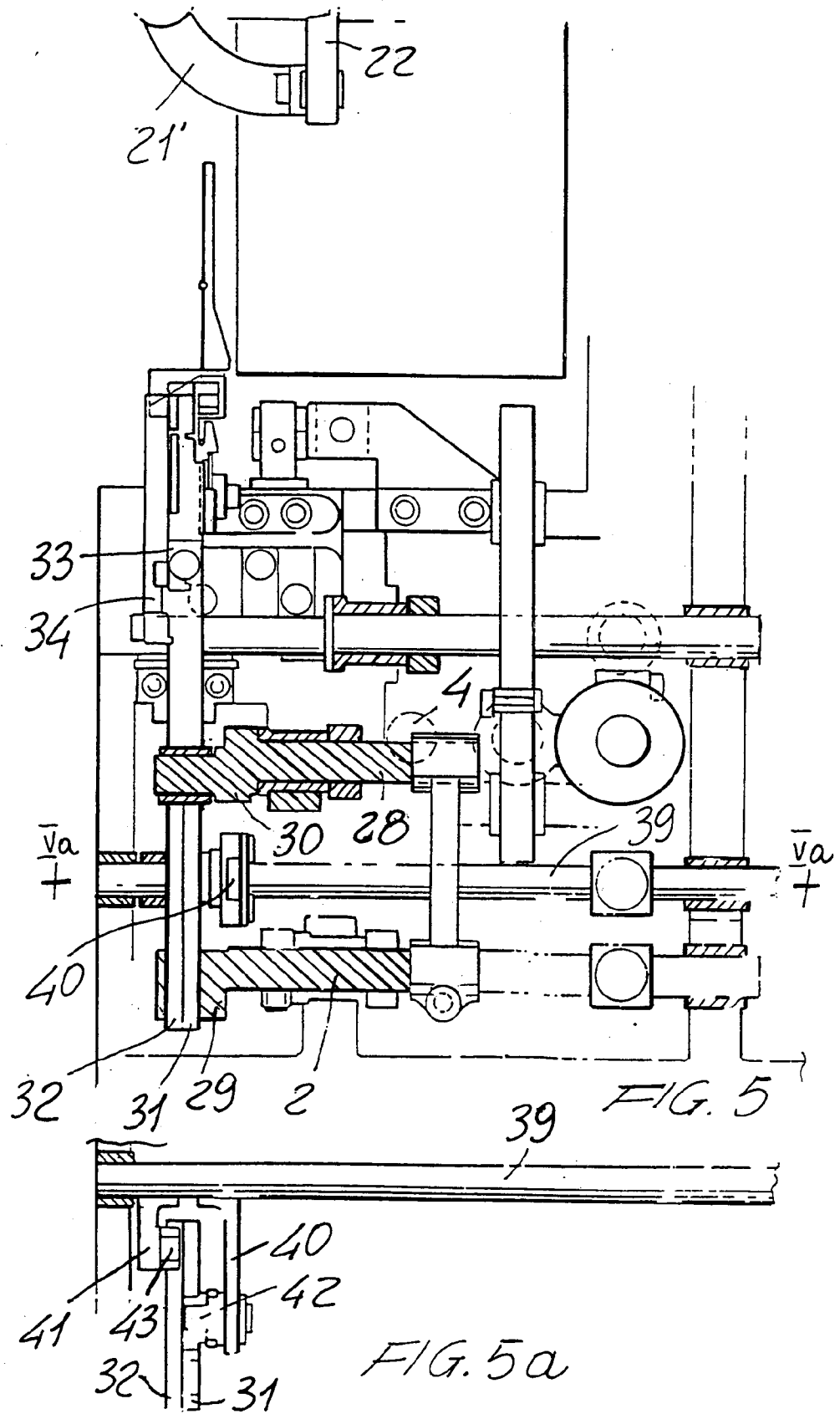
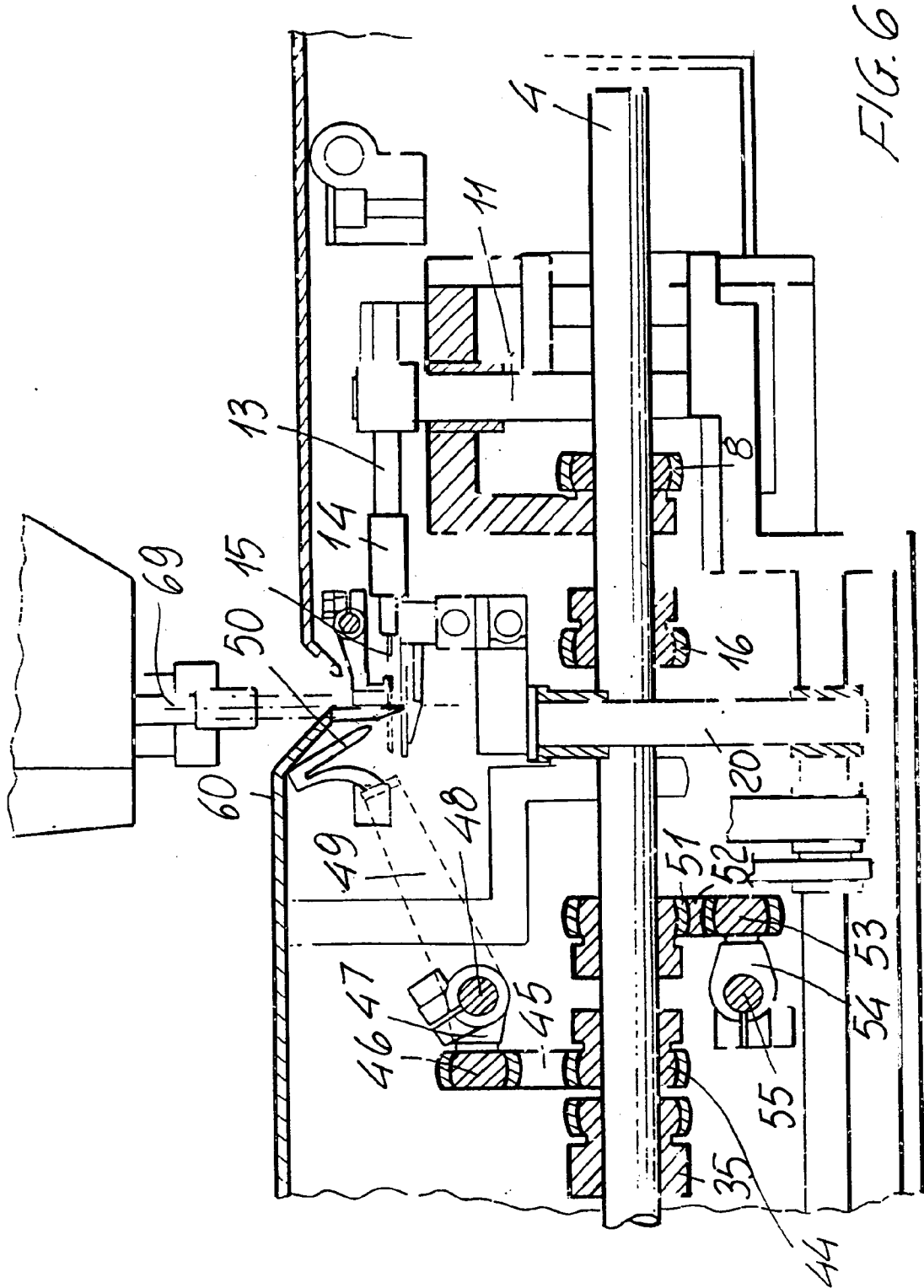
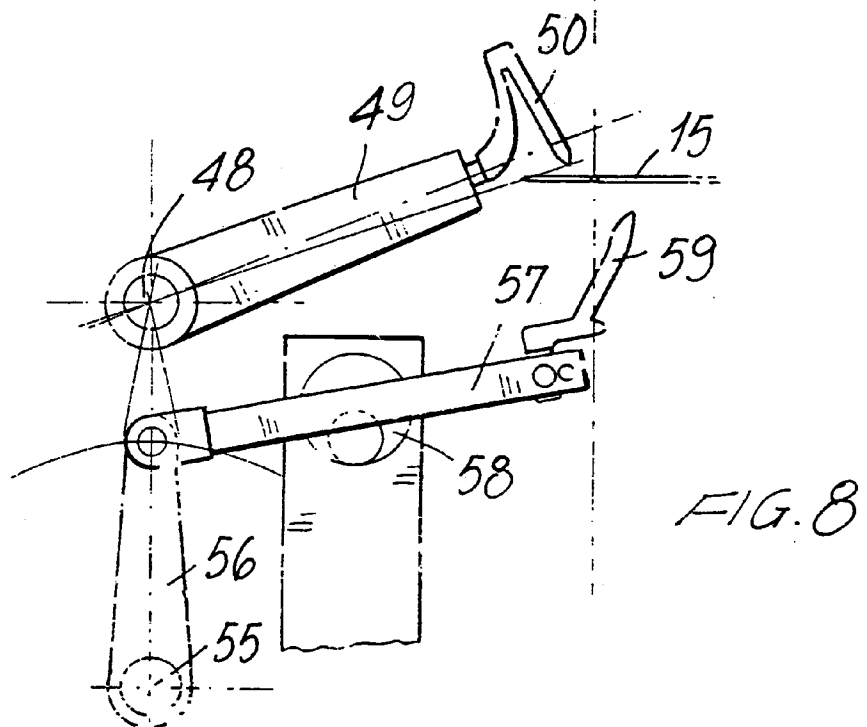
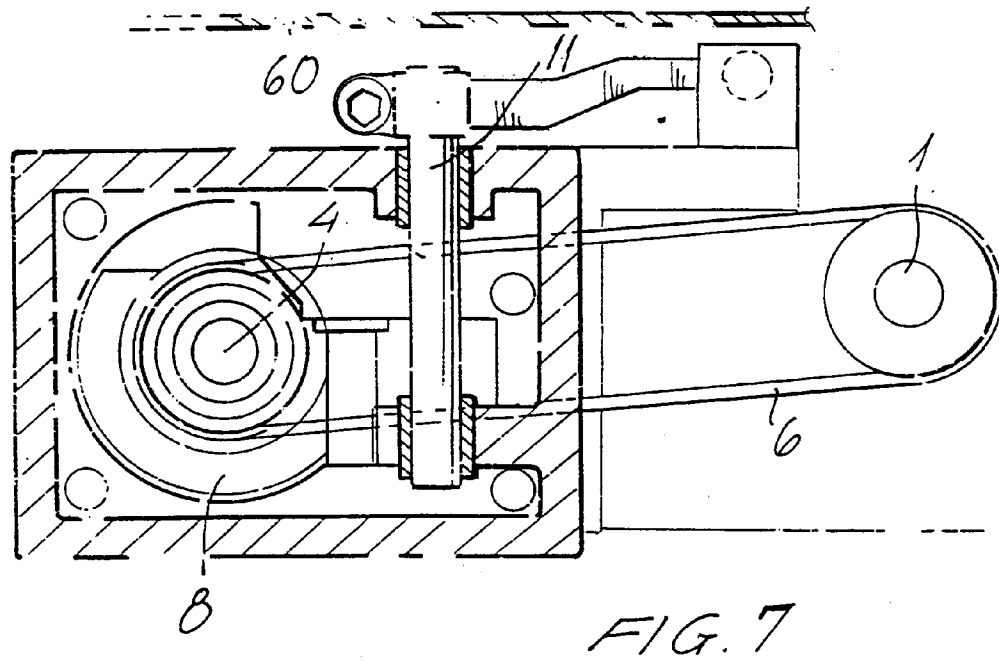


FIG. 40a









European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0538

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.5)
X	EP-A-0 353 208 (MACPI S.P.A.) * the whole document *	1-11	D05B1/22 D05B73/00
			TECHNICAL FIELDS SEARCHED (Int. CL.5)
			D05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08 APRIL 1992	Examiner D HULSTER E.W.F.
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 01.82 (P0401)