

AUSTRALIA
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619062

APPLICATION FOR A STANDARD PATENT

Mefina S.A., of Boulevard de Perolles 5, CH-1700 FRIBOURG, SWITZERLAND

hereby applies for the grant of a standard patent for an invention entitled

A presser foot device for a sewing machine

which is described in the accompanying complete specification.

Details of basic application(s):

Basic Application: Country:
4437/88-0 SWITZERLAND

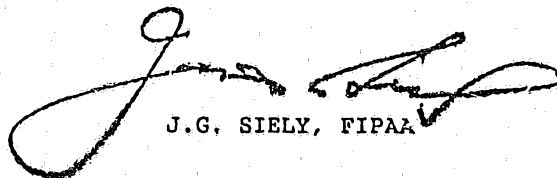
Date:
30 November 1988

The address for service is:

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SYDNEY NSW 2000

DATED this TWENTY EIGHTH day of NOVEMBER
1989

Mefina S.A.
By Its Patent Attorneys
ARTHUR S. CAVE & CO.



J.G. SIELY, FIPAA

TO:
The Commissioner of Patents
COMMONWEALTH OF AUSTRALIA

FEE: 220.00

*"Patents Act 1952-1973"***DECLARATION IN SUPPORT OF A CONVENTION APPLICATION UNDER
PART XVI FOR A PATENT OR PATENT OF ADDITION**To be signed by the applicant(s) or in the case of a Company, to be
signed by a person authorised by the Company

In support of the Convention application made for a ^{patent} ~~patent of addition~~ for an invention entitled
(a) A PRESSER FOOT DEVICE FOR A SEWING MACHINE

(a) Insert title
of invention.(b) Insert full
name(s) of
declarant(s).~~I/We~~ (b) HEINRICH VOCK AND JACQUES HOPF(c) Insert
address(es) of
declarant(s).of (c) BOULEVARD DE PEROLLES
CH-1700 FRIBOURG SWITZERLAND

do solemnly and sincerely declare as follows:-

~~I am/we are the applicant(s) for the~~ ^{patent} ~~patent of addition.~~

(OR, IN THE CASE OF AN APPLICATION BY A BODY CORPORATE.)

1. ~~I am/we are authorised by~~ MEFINA S.A.
the applicant for the ^{patent} ~~patent of addition~~ to make this declaration
on its behalf.

2. The basic application(s) as defined by Section 141 of the Act was/were made in the following
country or countries on the following date(s) namely:-

(d) Insert
country in
which basic
application(s)
was filed.in (d) SWITZERLAND on (e) 30 NOV. 1988 No. (f) 4437/88-0(e) Insert date
of basic
application(s).

by (g) on (e) No. (f)

(f) Insert
number of
basic application.

by (g) on (e) No. (f)

(g) Insert full
names of
applicant(s).~~3. I am/we are the actual inventor(s) of the invention referred to in the basic application.~~

(OR, WHERE A PERSON OTHER THAN THE INVENTOR IS THE APPLICANT)

(h) Insert full
name(s) of
actual
inventor(s)3. (h) ANTONIO JIMENEZ and MICHEL COMBEPINE(i) Insert
address(es) of
actual
inventor(s).of (i) 19, RUE DE LA PRULAY, 1217, MEYRIN, SWITZERLAND; and
9, RUE FRANCOIS DUBAFOUR, 1220, LES AVANCHETS,
SWITZERLAND respectively

~~I am/we are~~ the actual inventor(s) of the invention and the facts upon which ^{I am/we are} ~~the Company is~~ entitled to make
the application are as follows:

(k) Set out how
applicant(s) title
derives from actual
inventor(s)
i.e., assignee of
the invention
from the actual
inventor(s).
Attestation or
legalization
not required.

(k) THE APPLICANT IS THE ASSIGNEE OF THE INVENTION FROM
THE INVENTORS.

4. The basic application(s) referred to in paragraph 2 of this Declaration was/were the first
application(s) made in a Convention country in respect of the invention the subject of the application.

Declared at Fribourg this 10th day of November 19 89

To:

The Commissioner of Patents,
COMMONWEALTH OF AUSTRALIA

ARTHUR S. CAVE & CO.
PATENT AND TRADE MARK ATTORNEYS
SYDNEY

MEFINA S.A.

(Signature of Declarant)

Heinrich VOCK Jacques HOPF

(12) PATENT ABRIDGMENT (11) Document No. AU-B-45699/89
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 619062

(54) Title
A PRESSER FOOT DEVICE FOR A SEWING MACHINE

(51)⁴ International Patent Classification(s)
D05B 029/02

(21) Application No. : 45699/89 (22) Application Date : 29.11.89

(30) Priority Data

(31) Number (32) Date (33) Country
4437/88 30.11.88 CH SWITZERLAND

(43) Publication Date : 07.06.90

(44) Publication Date of Accepted Application : 16.01.92

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(57) Claim

1. A material presser device for a sewing machine comprising:

a tilting lever having first and second ends;
a presser foot mounted to said first end of said tilting lever; and

an actuating device for moving said tilting lever selectively into at least two angular end positions, one of said end positions being a low position wherein said presser foot is applied to a material to be sewn, the other of said end positions being a high position wherein said foot is spaced from the material, said second end of said tilting lever having a rolling member for resting on a guide ramp, at least one of a profile of said ramp and a profile of a portion of said rolling member in contact at each instant with said ramp being such that when said tilting lever is moved from one of said at least two angular end positions to the other of said at least two angular end positions, the presser foot moves along a substantially vertical path.

Our Ref: 300405

619062

AUSTRALIA
Patents Act

FORM 10

COMPLETE SPECIFICATION

(ORIGINAL)

Application Number:
Lodged:

Complete Specification Lodged:
Accepted:
Published:

Priority:
Related Art:

Applicant(s): Mefina S.A.
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Complete specification for the invention entitled

"A presser foot device for a sewing machine".

The following statement is a full description of this invention, including the best method of performing it known to me:-

A PRESSER FOOT DEVICE FOR A SEWING MACHINE

The present invention has for its subject a presser foot device for a sewing machine, comprising, on the one hand, a tilting lever whose free end carries a presser foot, and, on the other hand, an actuating device allowing this lever to be brought into at least two angular end positions, in one of which, a low position, the foot is applied onto the material to be sewn, and in the other of which, a high position, it is distant from the material.

In one broad form the present invention is a material presser device for a sewing machine comprising:

- a tilting lever having first and second ends;

- a presser foot mounted to said first end of said tilting lever; and

- an actuating device for moving said tilting lever selectively into at least two angular end positions, one of said end positions being a low position wherein said presser foot is applied to a material to be sewn, the other of said end positions being a high position wherein said foot is spaced from the material, said second end of said tilting lever having a rolling member for resting on a guide ramp, at least one of a profile of said ramp and a profile of a portion of said rolling member in contact at each instant with said ramp being such that when said tilting lever is moved from one of said at least two angular end positions to the other of said at least two angular end positions, the presser foot moves along a substantially vertical path.

The accompanying drawings show, by way of example, an embodiment of the present invention:

Figure 1 is a view in side elevation, with part sectioning of certain elements;

Figure 2 is a front view;

Figure 3 is a plan view in partial section on the line III - III of Figure 1;

Figure 4 is a partial view, from the front, of a first variant;

Figure 5 is a part-sectional view on the line V - V of Figure 4;

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- 1b -

Figure 6 is a view on the line VI - VI of Figure 4;

Figure 7 is a detailed view, with partial sectioning, of a second variant;

Figure 8 shows the schematic of an electrical control circuit for a presser foot device according to the invention.

In the drawing (Figure 1), 1 is the base of the casing of a sewing machine on which there stands a column 2 carrying two arms 3 and 4, the first of which, 3,

contains in particular a loop pick-up device and its control mechanism as well as a feed device for the material to be sewn, none of which are visible, and the second arm of which, 4, carries a mechanism, not shown, adapted to control the sliding, alternately in two opposite directions, of a needle bar 5, as well as a device 6 for driving this bar 5 in its stitching movement and a presser foot device 7 whose features will be described hereinafter.

The central motor of the sewing machine, not shown, on which there depend in particular the driving of the loop pick-up device, that of the material to be sewn, and that of the bidirectional vertical movement of the needle bar, is disposed in the column 2, alongside a step-down transformer and a rectifier assembly, neither of which is visible in the drawing, for electrical supply to the motor as well as to an electronic circuit, not shown, which groups, in the form of "solid state" chips, information-storing memories programmed for the control of the different functions of the sewing machine, and one or more micro-processors on which this control depends. The assembly of these means, their connection and their functions, are well known to the man skilled in the art and will not be described here.

On its casing, and more particularly on its front right-hand surface in the drawing, the sewing machine shown carries a control keyboard of which only one switch 8, for the actuation of the presser foot device 7, has been shown in Figure 1.

The device 6 is of the type described in Swiss Patent No. (Application filed by the title holder together with the present application) which may be referred to for information about the structural details.

Let us however say that it comprises a stepper motor 9, on a vertical axis, for control of the tilt of a lever 10, pivoted at 11 on a fixed support 12 and having a frustoconical opening forming a seat for the external surface, of spherical profile, of a bearing 13, disposed in alignment with a second bearing 14, of identical structure to that of the bearing 13 and engaged in a corresponding seat provided in the upper end plate 9a of the motor 9.

The bearings 13 and 14 are maintained in their respective seats by a spring 15, placed under load between these bearings and traversed, as are the bearings themselves, by the needle bar 5, this being in addition slidingly

mounted in these bearings.

A lamp 16 is fixed under the support 12 assuring the lighting up of the sewing area of the arm 3 through a window 4a provided in the wall of the arm 4. A second window 4b of oblong shape assures the passage of the needle bar 5 and permits its stitching movements.

The presser foot device 7 comprises (Figure 1) a lever 70, at the right-hand end of which there is pivotally mounted, by a pin 70a, a presser foot 71 situated below the needle bar 5. The lever 70 is adapted to bring the presser foot either into a low position, shown in solid line, in which the foot holds the material to be sewn on a needle plate 3a defined by the upper surface of the arm 3 of the machine (Figure 3) and more precisely on the gripper, not shown, for feeding the material to be sewn from right to left in the drawing or vice versa, or to bring the foot into a high position, shown in broken lines, which is vertical from that occupied by the foot 71 in its low position.

In this high position, the material to be sewn may be freely displaced by hand, in particular to position the part required to receive the stitch under the needle 5a carried by the needle bar 5.

It is convenient, at this point, to note that the presser foot according to the invention permits the formation of seams in cloth even of great thickness, indeed becoming suddenly irregular, without the foot 71 blocking this cloth.

In effect, in this device, the lever 70 may tilt with equal ease to the one as to the other of the two directions F_1 and F_2 , even when the foot 71 is applied onto the cloth to be sewn, which explains the ease with which the sewing machine shown may be applied to the sewing of folds of cloth even of substantial thickness.

To do this, the lever 70 carries, on its left-hand part (Figure 1), a flat and rectangular sole plate, 70b, extending to each side of the lever and having, along the length of its two longitudinal edges, two toothed sectors 70c and 70d, each resting on a rectilinear rolling track individual to each sector, 72a, 72b respectively (Figures 1 and 2), of toothed profile cut in the upper surface of a bracket 72 integral with the partially shown frame of the sewing machine.

As may be seen in the drawing, the pitch and the shape of the teeth of the toothed sectors 70c and 70d and those of the rolling tracks 72a and 72b are identical, the teeth of the sectors engaging perfectly with those of the tracks.

However, if the teeth of the tracks 72a and 72b extend horizontally, the toothing of the sectors 70c and 70d of the lever 70 is developed according to an arcuate profile so that as the lever 70 progressively swings in the direction F_2 , the sectors 70c and 70d literally roll on the tracks 72a and 72b, towards the left in the drawing, over a length compensating for, at each instant, the displacement towards the right that the foot 71 would unavoidably undergo if the lever 70 was simply pivoted about a fixed axis.

A similar compensation, but in the opposite direction, takes place of course when the lever 70 is brought from its position shown in broken line to that in solid line.

This kinematic feature is made necessary by the fact that the foot 71 must be capable of being raised even if the needle 5a is in its lowest position and this without meeting this needle.

In a variant, not shown, it would of course be possible to have a rectilinear gear for the sectors 70c and 70d, the rolling tracks 72a and 72d having a curvature appropriate to the required objective.

According to another variant, also not shown, sectors 70c and 70d and the rolling tracks 72a and 72b may each have an arcuate profile of their own set out in such a manner as to permit obtaining the same type of operation as in the case of the assembly of Figure 1.

Finally, it is understood that the sectors as well as the tracks may have no toothing whatever and have a substantially smooth profile, it being however understood that a choice of materials offering a good mutual adherence would then be in question.

The actuation of the lever 10 may be obtained either by means of a motorised control, such as that shown in Figures 1 and 8 in particular, or by a manual control of the type shown in Figures 4 and 6 for example. It is of course,

possible to provide only for the second of these possibilities, in particular in the case of bottom-of-the-range sewing machines, or, on the contrary, to provide for only the first possibility for high performance sewing machines, in particular machines such as microprocessor sewing machines. As a variant, such a type of sewing machine may incorporate both the motorised control and the manual control for the presser foot device according to the invention.

In the case of a motorised control, this device comprises a stepper motor 73 whose windings E_1 and E_2 (Figure 8) are energised, in an appropriate manner, by "drivers" D_1 and D_2 controlled by a microprocessor μP , which, in a computerised sewing machine, may also serve for general control of the operations of the machine. Activation of the switch 9 causes the sending to the microprocessor of pulse type information alternately determining the putting into operation of the driver D_1 or of the driver D_2 for a length of time sufficient to bring the foot 71 from its low position to its high position, and vice-versa.

The casing of the motor 73 carries a barrel 73a, pivoted on the casing of the sewing machine by the intermediary of two pins 73b (Figures 1 and 3) projecting out from the barrel 73a, on both sides of the barrel. This barrel is traversed by the left-hand end, in the drawing, of a threaded rod 73c extending as a continuation of the shaft, not shown, of the motor, in integral manner with this shaft and engaged in a threaded passage 74a of a shaft 74c carrying rollers 74b. Shaft 74c is part of a carriage 74 capable of rolling on the sole plate 70b of the lever 70, from the right-hand end of this sole plate to its left-hand end and vice-versa, according to the direction of rotation of the threaded rod 73c, that is to say of the armature of the stepper motor. The length of the path of the carriage on the sole plate 70b is determined by the number of control pulses supplied by the drivers D_1 and D_2 to the windings E_1 and E_2 each time the switch 8 is activated. This number will obviously be identical for each driver so that the path of the carriage will be the same in the one direction or in the other of its displacement on the sole plate 70b.

As may be seen in the drawing, the carriage 74 is fixed to the lower end of a bar 75 whose upper end, forked at 75a, slidably embraces a guide rod 76 fixed horizontally to the casing of the machine.

About the bar 75 there is disposed a spring 76, prestressed between the rod 77 and the carriage 74 against which it is engaged. The length of the spring is such that it remains under load even when the bar 75 which carries it is disposed in its inclined position, represented in broken lines in the drawing.

The assembly formed by the bar 75, the rod 76 and the spring 77 form a sort of thrust jack exerting its action on the sole plate 70b of the lever 70. The angular position of the lever is determined by the position occupied at each instant by the carriage 74 on the sole plate 70b. It is to be remembered that the carriage may be displaced on this sole plate by rotation of the threaded rod 73c in one direction or in the other, according to the direction desired for the movement of the carriage 74.

In effect, as the lever 70 is free to tilt in the direction F_1 or F_2 by rolling of its toothed sectors 70c and 70d on the corresponding tracks 72a and 72b, it suffices that the vertical component of the force exerted by the spring 77 on the carriage 74 passes to the left, in the drawing (Figure 1), of the region of contact of the sectors 70c and 70d on these tracks so that the lever 70 tilts in the direction F_2 from its low position to its high position.

The lever 70 will take up its low position as soon as, by a movement in the opposite direction of the carriage 74, the same vertical component of the force exerted by the spring 77 passes beyond the region of contact of this lever, towards the right.

In the low or working position of the foot 71, this exerts a maximum pressure on the cloth which it is responsible for applying against the grips, not shown, of the feeder mechanism for this cloth. In effect it is in this position of the foot 71 that the spring 75 develops its maximum force, because, with the needle bar 75 occupying a vertical position, the deflection of this spring is then a maximum.

If, while sewing, the thickness of the portion of the material to be sewn arriving at a given instant under the presser foot is very much greater than that of the rest of this material, the foot 71 and the lever 70 will be raised by an amount corresponding to this thickness. At the limit, the lever 70 and its foot 71 may even be brought momentarily into the high position shown in

broken line in the drawing, allowing passage for the extra thickness of the material to be sewn without blocking of the machine.

In effect, in such a case, the bar 75 will rise vertically by sliding of its forked extremity 75a on the rod 76 and compressing of the spring 77.

This bar will again take up its usual axial position, without jerking, by relaxation of the spring 77, as soon as the foot 71 has passed over the instantaneous extra thickness of the material to be sewn.

Thus the foot 71 and the lever 70 are as it were mounted in a veritable floating manner allowing them to absorb with ease any obstacle presented by the surface of a piece to be sewn, even of relatively great thickness, as is the case when it is a question of assembling several layers of heavy jeans type canvas material or of corduroy, for example.

As already described, the presser foot device according to the invention may likewise only comprise a manual control of the type shown by way of example in Figures 4 to 6.

Such a device is different from that described with reference to Figures 1 to 3 and Figure 8 in that the motor 73 and its adjoining parts as well as the circuit, the subject of Figure 8, are eliminated, with the corresponding modifications which this requires for the casing of the sewing machine in particular. Accordingly, the drive of the carriage 74* on the sole plate 70*b of the lever 70* will be carried out by corresponding horizontal displacement, manually effected, of a pull handle 78* fixedly attached to the carriage 70*b and traversing a slot formed in the casing of the machine. This pull handle may be controlled by the user by the action of the fingers on a button 78*a fixed at the free end of this handle (Figures 1 and 6).

The path of the carriage 74* on the sole plate 70*b of the lever 70* is limited by the rollers 74*b meeting two pairs of stops, 70*d and 70*e alternately, depending on the direction of displacement of this carriage (Figure 5).

In a particularly advantageous embodiment (Figure 7), the rolling tracks 172

adapted for the toothed sectors 170c of the lever 170 carrying the foot 171 may be cut in a single piece 180 which forms at the same time the lower end plate for a stepper motor 190 for the control of the stitching movement of the needle bar of the machine. The upper end plate of this motor, 180*, may comprise a fork 180*a at the end of which is fixed the rod 176 permitting the axial sliding of the bar 175 of the pressure jack formed by this bar in co-operation with a spiral spring 177.

The solution set forth hereinabove permits combining the presser foot device according to the invention and enables the control device for the stitching action of the needle bar and this needle bar to form a single assembly, capable of being manufactured and mounted in a self-contained manner, independently of the rest of the sewing machine, even in a workshop or factory distant from the site of final assembly and at a different time from that of this final assembly.

It permits, moreover, facilitating the aftersales service, in particular in any case where repairs may have to be carried out in places very distant from the place of production of the machine, and only requires very simple tools as well as non-specialised personnel.

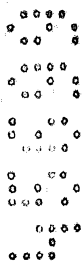
The invention is not of course limited to that which has been described or shown. In particular, it is evident that the spring jack shown in particular in Figure 1 may, for example, be replaced by a hydraulic or a pneumatic jack.

Furthermore, with the aim of obtaining an adaptation of the force exerted by the device described on the material to be sewn as a function of the nature of that material, it is possible, in a variant of the control circuit shown in Figure 8, to arrange this so that the windings E_1 and E_2 only receive one motorising pulse for actuation of the switch 8.

In this manner, the jack may be brought to any intermediate position located between on the one hand, the right-hand end, in the drawing, of the sole plate 70b, 170b respectively (Figures 1 and 7), and, on the other hand, the region of contact of the sectors 70c and 70d, 170c respectively, on the rolling tracks 72a and 72b, 172, respectively, and thus vary the magnitude of the vertical component of the force developed by this jack on the sole plate, and thus on the presser foot.

One may furthermore obtain a substantial modulation of the above effect by giving to the surface of the sole plate 70b, 170b respectively (Figures 1 and 7), a profile different from the flat profile envisaged in the embodiments shown, in such a manner as to precisely vary the state of compression of the spring of the jack as a function of the position occupied at each instant by the carriage 74 on this sole plate.

According to another variant, also not represented, the adaptation mentioned hereinabove may be automatic by virtue of a computerised programme used by the microprocessor of the circuit (Figure 8) and which may be accessed by different control buttons, each corresponding to a different position of the jack on the sole plate 70b, 170b respectively (Figures 1 and 7), that is to say, corresponding to an optimal pressure exerted by the presser foot of the machine on the material to be sewn according to the characteristics of the material and the nature of the pattern to be sewn.



The claims defining the invention are as follows:

1. A material presser device for a sewing machine comprising:

a tilting lever having first and second ends;

a presser foot mounted to said first end of said tilting lever; and

an actuating device for moving said tilting lever selectively into at least two angular end positions, one of said end positions being a low position wherein said presser foot is applied to a material to be sewn, the other of said end positions being a high position wherein said foot is spaced from the material, said second end of said tilting lever having a rolling member for resting on a guide ramp, at least one of a profile of said ramp and a profile of a portion of said rolling member in contact at each instant with said ramp being such that when said tilting lever is moved from one of said at least two angular end positions to the other of said at least two angular end positions, the presser foot moves along a substantially vertical path.

2. A device according to claim 1, wherein said portion of said rolling member and said guide ramp each having a corresponding, interdigitating toothed profile, respective toothed portions of said rolling member and said guide ramp being in mutual interdigitating contact.

3. A device according to claim 2, wherein first and second rolling members are defined on said second end of said tilting lever, one of said rolling members being disposed on each lateral side of said tilting lever and wherein first and second guide ramps are provided, one disposed so as to be in contact with each of said rolling members.

4. A device according to claim 3, wherein the rolling members are mounted on a thrust-resistant sole plate and wherein said actuating device includes a jack having a thrust end, said thrust end of said jack being applied against said sole plate, and means permitting displacement of the point of engagement of the jack on the sole plate from a first area of the sole plate to a second area of the sole plate spaced from said first area and said thrust end being movable from said second area to said first area by

MPS

rolling said rolling members on said guide ramps, said first area being disposed with respect to the region of contact of said rolling members with said corresponding guide ramp so that said tilting lever occupies said low position and said second area being disposed on an opposite side of said region of contact from said first area, corresponding to said tilting lever occupying its high position.

5. A device according to claim 4, wherein said jack is one in which said energy is resiliently stored.

6. A device according to claim 5, wherein the jack comprises a rigid and elongate member, one end of said rigid and elongate member engaging against said thrust-resistant sole plate and the other end of which is pivoted at a fixed point and a spiral spring disposed in surrounding relation to said rigid and elongate member, said spiral spring being compressed between said first end of said member and said second end so that the spring exerts a thrust on said sole plate irrespective of a point of engagement of the jack on the sole plate.

7. A device according to claim 6, comprising means for controlling pivoting of said rigid and elongate member.

8. A device according to claim 7, wherein the end of the jack which is applied against said sole plate includes a carriage accommodating rolling members for rolling on the sole plate.

9. A device according to claim 8, including a rod operatively coupled to said carriage, said rod being displaceable along the length of said sole plate.

10. A device according to claim 9, wherein said carriage comprises a nut having an axis parallel to a desired path of the carriage on said sole plate and further comprising a stepper motor having a shaft which controls rotation of a threaded rod in contact with said nut and a controlled circuit for the motor for delivering pulses to the motor sufficient in number to drive the carriage on the sole plate between two predetermined areas of the surface of the sole plate corresponding respectively to said high position and said low position of the presser foot, said pulses having a polarity indicative of the driving direction.

MVS

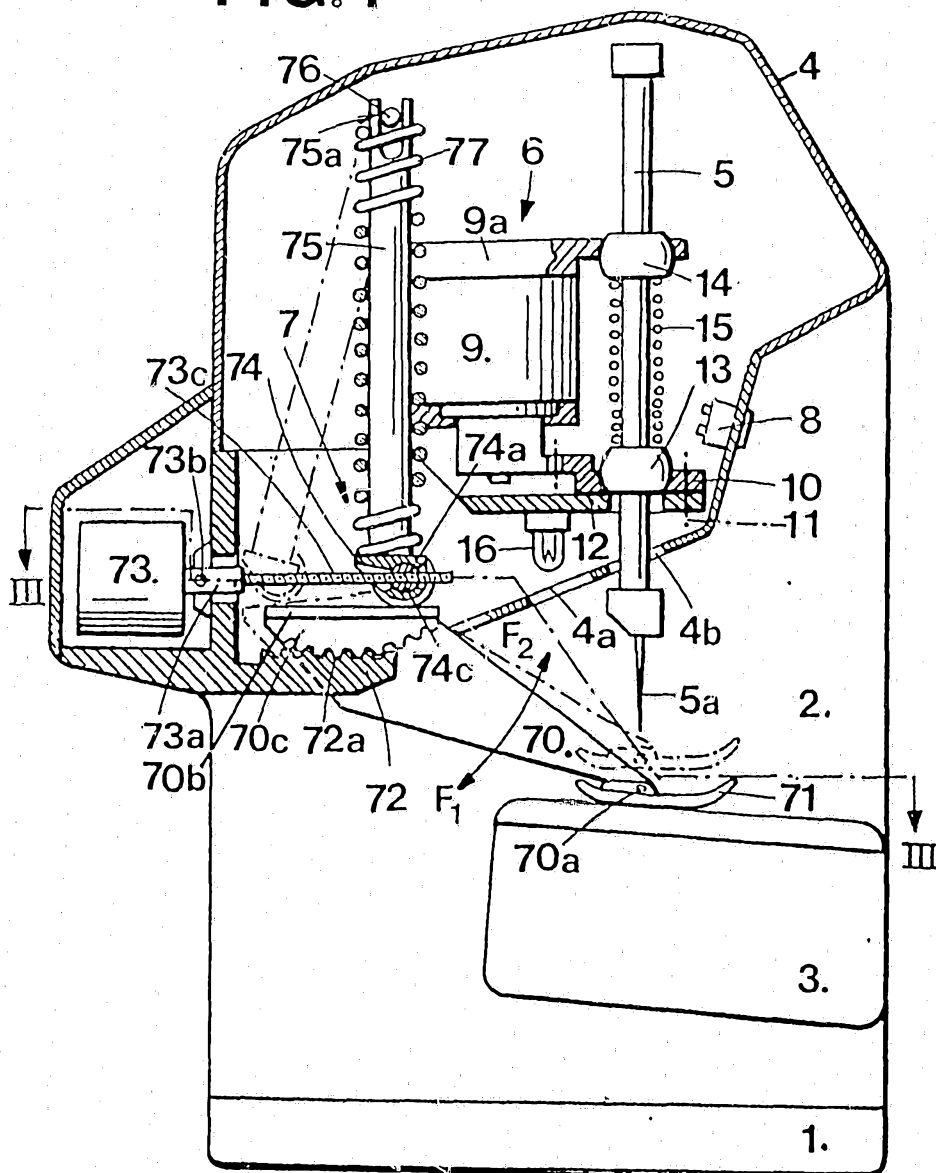
11. A device according to claim 10, wherein a casing is provided for the motor, said casing being pivotable about a horizontal axis so that said threaded rod follows variations in the position of the carriage with respect to a horizontal reference plane during displacement of the carriage on the sole plate.

12. A device as substantially herein described with reference to any one of the accompanying illustrations.

DATED this 23rd day of October, 1991.

MEFINA S.A.
By Its Patent Attorneys
ARTHUR S. CAVE & CO.

FIG. 1



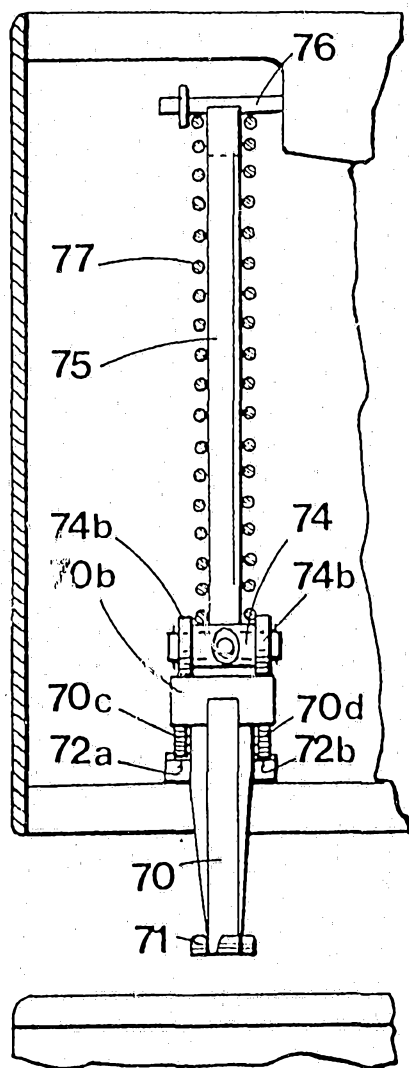


FIG. 2

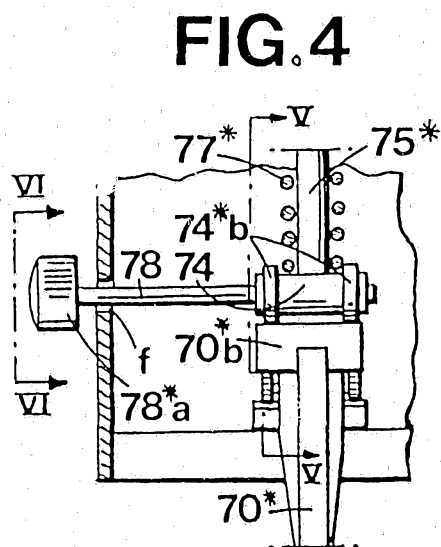


FIG. 4

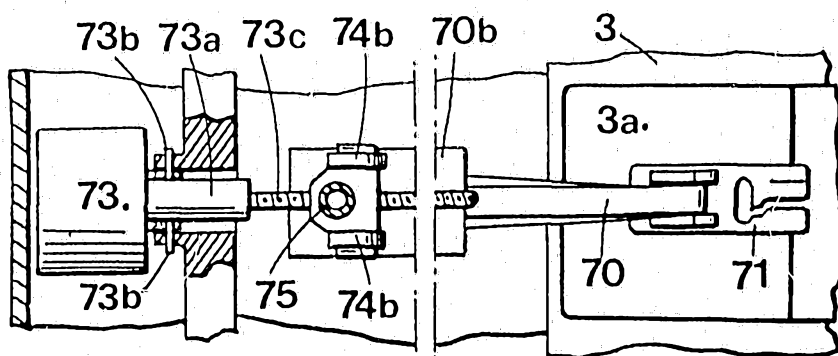


FIG. 3

FIG. 7

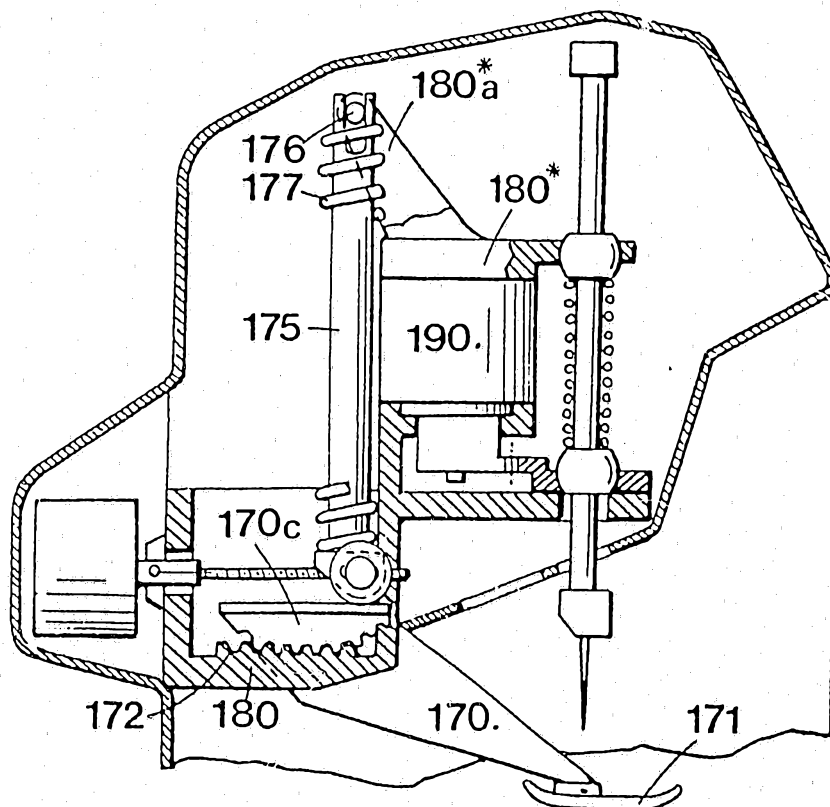


FIG. 5

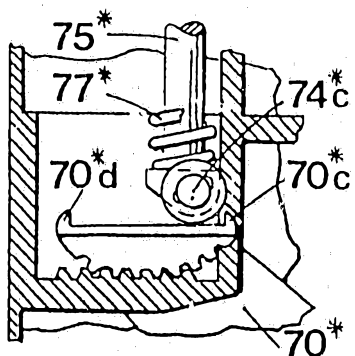
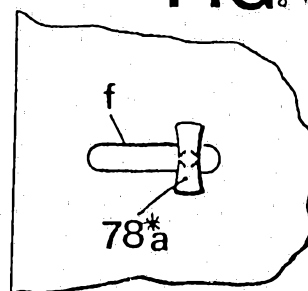


FIG. 6



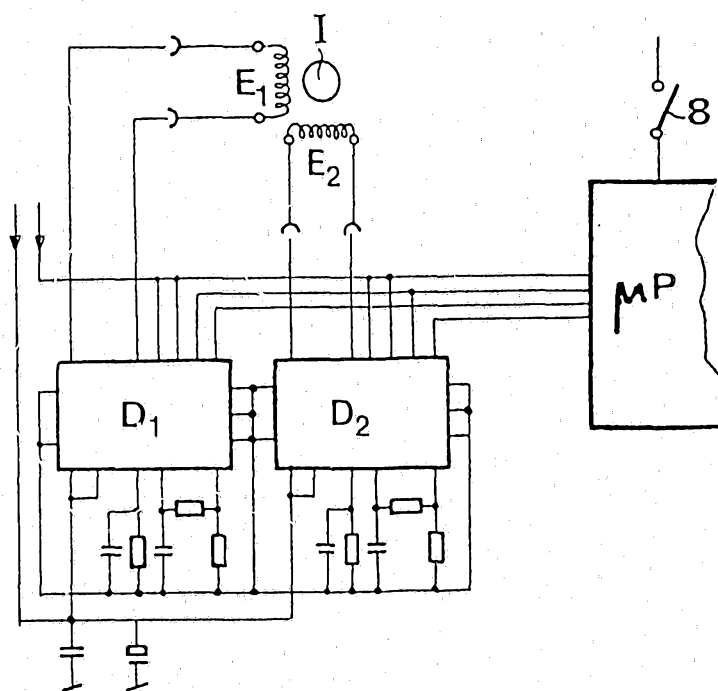


FIG. 8