

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11)

Publication number:

0 045 287
A1

(12)

EUROPEAN PATENT APPLICATION

(21)

Application number: **81830130.1**

(51)

Int. Cl.³: **D 04 B 1/26**
// D04B9/10

(22)

Date of filing: **27.07.81**

(30)

Priority: **29.07.80 IT 950380**

(71)

Applicant: **OFFICINE SAVIO S.p.A., Via Udine 105,
I-33170 Pordenone (IT)**

(43)

Date of publication of application: **03.02.82**
Bulletin 82/5

(72)

Inventor: **Luchi, Luciano, Via della Cooperazione, 10,
Tavarnuzze Impruneta (FI) (IT)**

(84)

Designated Contracting States: **AT BE CH DE FR GB LI
LU NL SE**

(74)

Representative: **Petraz, Gilberto, G.L.P. S.a.s. di Gilberto
Petraz P.le Cavedalis 6/2, I-33100 Udine (IT)**

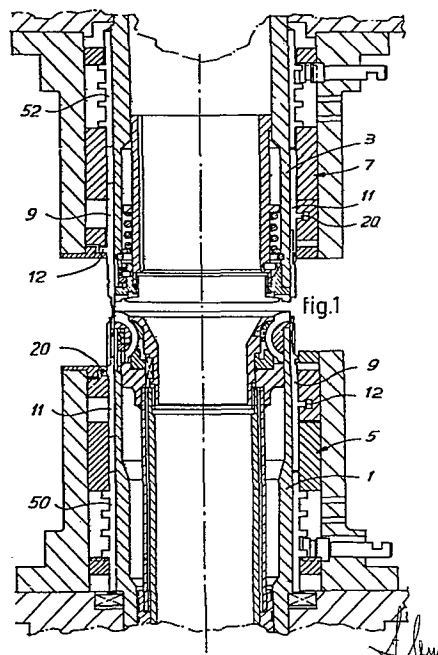
(54)

Procedure and equipment for the production of a sock on double-cylinder circular knitting machines.

(57)

A sock is produced with uniform rib stitching throughout the whole length of the product, even at the pockets for the heel (T) and toe (E) where said rib stitching is formed with alternating motion and with increases and reductions in the courses for formation of said pockets.

The appearance and elastic characteristics of the fabric, especially as regards the top (I) of the sock, are obtained by differentiated interlacing of the stitches of said rib stitching fabric, for instance by tucked stitches.



EP 0 045 287 A1

0045287

Classe Int. n.

B 04 B 1/50
D 04 B 9/46

ref. S/P 3-2785

1. Description of the industrial invention entitled:
"PROCEDURE AND EQUIPMENT FOR THE PRODUCTION OF A SOCK ON
DOUBLE-CYLINDER CIRCULAR KNITTING MACHINES".
in the name of OFFICINE SAVIO S.p.A. of Italian nationality
5. at 105 Via Udine, PORDENONE

DESCRIPTION

Circular knitting machines are known which comprise a
10. double bar of needles or other working organs that cooperate
to form tubular products with plain and purl stitches, namely
rib stitching. So as to make a simple tubular continuous prod-
uct, machines can be envisaged with the two bars; and, in
particular, machines can be visualised with two opposed cyl-
15. inders and with special double needles able to be transferred
from one cylinder to the other, or else with simple latch
needles and controlling butts; said sock products, even when
they are made on sock-manufacturing machines, do not offer
a shape such as that which can be obtained with the pockets
20. for the heel and toe, which can be made with alternating move-
ments of the neddle cylinders; the socks products thus ob-
tained, therefore, are not regarded very highly. In the mak-
ing of traditional socks shaped with a heel and toe, double-
cylinder machines are employed which are equipped with double
25. needles that can be transferred between one cylinder and the

Gilberto Petros

1. other and that cooperate with needle pushers or so-called
sliders, which have the twofold task of ensuring the open-
ing of the latch of the point of the needle opposite each
slider and of inducing the point or hook of the needle in
5. such a way as to draw it into their own cylinder or to bring
about its displacements; the pockets for the heel and toe
of a sock are made with this kind of machine and with this
kind of process by working with alternating motion, and it
is possible thereby to obtain a product which is relatively
10. more highly regarded and which, in the area of said pockets
for toe and heel and perhaps of the sole of the foot, is
processed with a smooth texture instead of a ribbed texture,
whereas the leg and back part of the sock can be obtained
with a ribbed or, perhaps, patterned texture; furthermore,
15. the top of the sock or its elastic edge can be formed at the
upper open end of the product with a combination of ribs,
namely of plain and purl stitches, which is different from
that employed for the leg.

Moreover, this method of working and this traditional equip-
20. ment in a two cylinder machine implicate a certain complica-
tion in the processing, a limit to the speed, extreme pre-
cision (which is lost as wear proceeds), burdensome mainten-
ance and a considerable loss of production through machine
down times.

25. The invention has the purpose of making a product which
is commercially well liked owing to its structure and which
can be made on a two-cylinder machine simply equipped and
able to operate at high speed with modest maintenance re-
quirements and also with relatively very economical com-
30. ponents.

According to the invention a sock product, or the like
consists of uniform ribbed stitching throughout its whole
length, the pockets for toe and heel being also produced

Gilberto Petraz

1. with the said ribbed texture made with alternating movement.
and with reductions and increases in the courses so as to
form said pockets.

In a product of this kind the formation may be envisaged
5. of a structure differentiated as regards appearance in the
area of the open end of the sock, namely coinciding with
said top of the sock, by means of a process of differentia-
ted interlacing of the stitches of said ribbed stitch text-
ure, for instance, with tucked stitches. A variation in
10. the elastic characteristics can be obtained by introducing
an elastic, or by employing elastic yarn.

The invention also concerns a procedure for the proces-
sing of a sock product or a product with said pockets with
an alternating motion, whereby said procedure eliminates
15. the shortcomings mentioned earlier. According to the invent-
ion, the processing is envisaged with uniform ribbed stit-
ching throughout the whole length of the product, even in
the areas of said pockets obtained by processing with al-
ternating motion and in the area of the sole.

20. In practice, for the formation of said pockets with
alternating motion there are envisaged increases and reduct-
ions in the arcs of needles working in both the upper and
lower cylinders of the machine.

A further object of the invention is formed by a two-
cylinder machine (or the equivalent) for processing with an
25. alternating motion too, said machine being characterized by
including:

- in each cylinder, simple needles with hook-wise point and
latch, said needles being alternated, according to a suit-
able lay-out, with sliding elements also called "sliders",
30. which are intended for functions more understandably de-
tailed hereinafter and which cooperate with the needles
of the other cylinder, wherein needles are envisaged that

1. coincide with the sliders of the first cylinder so as to
cooperate with them;
- stitch cams substantially symmetrical in respect of the
feed, for processing with alternating motion, and substant-
5. ially symmetrical in respect of a plane of symmetry between
the two cylinders;
- and transfer means or so-called pickers, symmetrically
placed respectively for inserting and excluding from work,
during the alternating movement, the needles and sliders
10. of each cylinder in combination with the aforesaid substant-
ially symmetrical stitch cams, said pickers making possi-
ble the increases and reductions in the courses of alter-
nating stitches.

To be more specific, the machine according to the inven-
15. tion is equipped with substantially traditional needles
provided with a hook-like point and a latch, said needles
each having at least one butt to control the needle; the
sliders are conformed without the attachment means for tran-
sferring two-spring needles but are conformed solely to en-
20. sure the opening of the latch and are provided with butts
to cooperate with the pickers and possible selection butts.

The symmetrical stitch cams are preferably of the type
usually employed in flat knitting machines for alternating
motion, the purpose being to ensure better protection of
25. the latches.

With a lay-out such as the aforesaid lay-out many ad-
vantages are obtained which will be obvious to experts in
this field. From said advantages we can pick out the follow-
ing. The machine is not equipped with two-hook needles,
30. which besides being expensive, are troublesome when they
are thin for making products of so-called fine gauges.

The sliders too are made without the hook-wise conforma-
tion which causes certain problems. As a result, the possi-

1. bility is avoided of breakages due to the continuous impacts
which occur between a slider and a two-spring needle attached
thereto in the presence of the play needed for the attach-
ment, a play which increases with wear. The necessity for
5. high-precision processing is avoided, which would otherwise
be needed if it were necessary to arrange for the reciprocal
attachment of needles and sliders. All the organisms are
eliminated which are needed, in machines equipped with two-
spring needles, to cause the transfer of the needles and the
10. radial oscillation of the sliders necessary for the attach-
ment of the needle. The necessity is also eliminated of hav-
ing to hold down the speed of the machine and, therefore, to
restrict the productivity of said machine, a disadvantage
which is, instead, necessary with two-hook needles and the
15. relative sliders.

The invention will be understood more readily by reading
the description and attached figures, which show a practical
but non-restrictive example of the invention itself, and wherein:
Fig. 1 shows a section of the double-cylinder;
20. Fig. 2 shows a rough overall sketch of the development of
the jacket of cams;
Figs. 3 & 4 show in detail two portions of that jacket, with
needles and sliding elements, or so-called "sliders"
in various positions;
25. Figs. 5 & 6 give two views of a needle;
Figs. 7 & 8 give two corresponding views of a slider;
- Fig. 9 shows a sock product which can be made according to
the invention;
- Figs. 10 & 11 show an angular diagram relating to the arcs
30. of needles working during the formation of
the said pockets, and a diagrammatic struc-
ture of a pocket.

According to the details shown in the attached drawings

Gilberto Petraz

1. of a double-cylinder circular knitting machine, 1 is the
lower cylinder and 3 is the upper cylinder, which are embodied substantially in a traditional way and are provided, amongst other things, with corresponding lengthwise channels for needles and sliders; around each of the cylinders is envisaged a jacket of cams, 5 and 7 respectively; each of said jackets 5 or 7 is equipped with cams shown in the drawings and described better hereinafter. The cams of the two jackets 5, 7, are substantially symmetrical in respect of a plane of symmetry of the cylinders 1, 3 at right angles to the common axis of said cylinders and disposed between the two cylinders 1, 3.

Each cylinder 1 or 3 is equipped with needles 9 and sliders 11. The needles are of a substantially traditional type, having a body provided with at least one butt 12 for cooperation with inclusion and exclusion pickers and also provided with an end or hook-shaped point 14 and with a latch 16 articulated close to said point 14 and cooperating therewith; the lower needles are intended for processing the heel and toe of the sock and are equipped with a lateral-latch appendix 18 which serves so as to be able to close the sinker nib of the lower cylinder 1 during the increases and reductions of the heel, this being a process already known with double cylinder machines with transfer of needles and with dummy sinker. The sliders 11 too comprise a butt 20 intended to cooperate with the pickers and have an active end 22 to ensure the opening of the latch 16 of an apposed needle 9 up to the time when this task is undertaken by an appropriate cam envisaged in the respective jacket 5 or 7; in essence, the slider 11 serves to protect the latch 16 and to determine the opening thereof in a traditional manner as regards the apposed needle 9; each slider 11 also serves to regulate the operation of the pickers and to obtain regular reductions

1. and increases during formation of said pockets with alternat-
ing motion, as will be shown better hereinafter. The lower
sliders 11 of the zones of pockets with increases and re-
ductions also comprise a lateral latch 24 like the latch 18;
5. said lateral latch has the purpose, like the latch 18, of
closing the sinker nibs in the zone of the reductions and
already exists in two-cylinder machines with transfer of
needles.

The machine has in a first cylinder the needles and
10. sliders 11 alternating in successive channels with a predispo-
sed lay-out depending on the conformation of the ribbed
fabric to be made; in the other cylinder the needles 9 are
arranged opposite the sliders 11 of the first cylinder, while
the sliders 11 are opposite the needles 9 of the first cyl-
15. inder.

In substance, to each needle 9 there corresponds in the
opposite cylinder 10 a slider 11 intended to cooperate
with said needle in opening the latch 16. Figs. 3 & 4 show
a lay-out of needles 9 to make ribbed stitches 1 : 1. Figs.
20. 10 & 11 show a diagram of the lay-out of needles 9 to form
a pocket for toe and heel, and also a diagram of the pocket
which can be obtained with alternating motion. In the inter-
mediate arc B of the pocket are formed the courses of stitch-
ing of minimum length; in the arcs A outside the arc B are
25. formed the increases and reductions during the formation of
a pocket with alternating motion, the courses of stitches of
maximum length being indicated with the arc C; the arcs A
are, roughly, of the order of 30° and the arc B is, roughly,
of the order of 100°-120° for the formation of a heel or toe
30. of a sock. The needles and sliders are ready, when correspond-
ing with the arcs A, to cooperate with the pickers.

Figs. 2 & 4 show the development of the two jackets of
cams 5 & 7, wherein the cams are substantially symmetrical,

1. apart from the lay-out of the cams 30, which serve to protect the latches 16 and keep them open. In the jacket of
cams 5 or 7 the double arrows f32D and f32S indicate the two
positions of a first feed of the yarn, which serves to feed
the yarn for forming the stitches in correspondence with
stitch-forming cams 34 of the lower cylinder and 134 of the
upper cylinder; the relative thread guide is displaced to
the position f32D for the formation of the tubular portion
of the sock with continuous motion; said thread guide is, instead,
displaced alternatively to the two positions f32D and
F32S in step with alternating movements of the needle cylinder 1 or 3 during formation of the toe and heel pockets with
alternating motion and with only aforesaid feed. During continuous motion (formation of the tubular portion of the sock)
there intervenes, according to the drawings, at least another
feed at f36, which is intended to feed the thread for formation of stitches in correspondence with the stitchforming cams
38 in the lower cylinder and 138 in the upper cylinder; this
second (and every other) feed is at a fixed position because it is intended to work only with continuous motion of
rotation of the needle 1 & 3 cylinders in the direction of
the arrow fC, while the first feed is displaced to f32D and
f32S when working with alternating motion of the needle cylinders, the cams 34 and 134 being symmetrical in respect
of a diametral plane.

Two exclusion pickers 42 and 44 may cooperate in a traditional way with the cam 34, being arranged symmetrically in respect of the cam 34; likewise, pickers 142 and 144 are envisaged for cooperating with the cam 134 and are arranged symmetrically thereto. Moreover, one single insertion picker 46 is envisaged for cooperating with the cam 34, and in a corresponding manner an insertion picker 146 is envisaged for cooperating with the cam 134. In a lay-out 1 : 1 for rib-

1. bed stitching, when the pickers 42, 44 and 142, 144 are in-
serted, they exclude the first needle 9 or first slider 11
in an arc of needles at work advancing in every cylinder 1,
3 and bring the butt 12 of each needle 9 or butt 20 of the
5. opposed slider above the cam 34 or 134 (and outside the
action thereof) in such a way as to prevent the formation of
the stitch with said needle 9. Each of the pickers 46 and 146,
when inserted, includes (according to ribbed stitching 1 : 1)
a needle 9 and a slider 11 adjacent to the arc working and
10. acts on the butt 12 or 20 of the needle 9 and slider 11 adjacent
to the ends of an arc of needles at work at that moment,
causing their butts 12 and 20 to pass below the cams 34 and
134 so as to form the stitch with said needles. Thus it is
possible to obtain with said pickers 42, 44; 142, 144 the
15. reductions, and to obtain with the picker 46; 146 the in-
creases along the arcs of needles A during formation of
pockets with alternating motion, so as to obtain said pockets
in a substantially traditional way; furthermore, as regards
the foregoing, each pocket is obtained with the formation
20. of some stitches with the needles 9 of the lower cylinder 1
and of other stitches with the needles 9 of the upper cyl-
inder 3, in relation to the lay-out of the needles 9 and
sliders 11 on the two cylinders, 1 and 3, as shown in figs.
3 and 4, for instance.

25. Seeing that the pickers of the upper and lower jackets
7 & 5 are activated or deactivated at one and the same time
(for reductions or increases respectively), when, for example,
the complex of pickers 44, 144 is inserted, either the butt
12 of a needle or the butt 20 of a slider is taken out of
30. work, above the cam 34, in the lower cylinder 1 by the picker
44, depending on whether the first butt of the arc then at
work belongs to a needle 9 or to a slider 11; at the same
time the picker 144 takes out of work a butt 12 of a needle

1. 9 (if the picker 44 has taken out of work a butt 20 of a
slider) or else a butt 20 of a slider 11 (if the picker
44 has taken out of work a butt 12 of a needle).

It obviously follows therefrom that at each inverted
5. stroke of the needle cylinder 1 or 3 there are excluded simultaneously a needle 9 in one cylinder 1 or 3 and a slider 11 in the other cylinder 3 or 1, whilst during the successive alternating oscillations of each cylinder 1 or 3 the needles 9 and the sliders 11 which are located in the successive
10. grooves with the pre-set lay-out are excluded successively. Therefore, a regular reduction is obtained in the course of stitches and, thereby, in the arc of needles at work at that moment. It should be noted that the decrease can be brought about butt by butt or even, in some cases, each time per pair
15. or greater number of butts in relation to the conformation of the pickers (for instance, per two feeds during the formation of the pockets). When the two pickers 46 and 146 too are set to work simultaneously, at each oscillation there are inserted into operation a needle 9 and slider 11 opposite to each other, of which the butts 12 & 20 are made to
20. pass under the cams 34 and 134, so as to obtain in this way an increase in the arc of needles at work and, therefore, an increase in the pocket being formed; normally the pickers 46 and 146 include two butts, one of which is excluded by
25. the respective picker 42 and 142 or 44 and 144 from the successive course. In this case too, to a needle 9 set to work in a cylinder 1 or 3 there corresponds the activation of the corresponding opposed slider 11 in the other cylinder 3 or 1; this is brought about by the presence of butts 12
30. or 20 in each of the channels of each cylinder 1 or 3.

It follows from the foregoing that increases and reductions are obtained regularly, just as in a pocket made with smooth stitching, by inserting or taking out (at the

ends of an arc of needles at work) needles 9 belonging alternatively (according to the pre-set programme for ribbed stitching) one needle 9 to the upper cylinder 3 and one needle to the lower cylinder 1 along the arcs A.

As said earlier, to the insertion of one needle 9 in one cylinder 1 or 3 there corresponds the insertion of a slider 11 in the other cylinder 3 or 1, and therefore to every needle 9 at work there corresponds an active slider 11 which thus protects the latch 16 of the needle 9 and ensures that it is open during the functioning of the needle 9; to the exclusion of a needle 9 from work there corresponds the exclusion of the corresponding slider 11 in the opposed cylinder. The sliders 11, therefore, have the double task of regularizing the insertion and exclusion of the needles 9, whereby said sliders 11 and said needles 9 cooperate with pickers, and also of starting to work in a timely manner so as to protect the needles 9 opposite to them.

The foregoing makes it clear that after the formation of a leg G with ribbed stitching (see Fig. 9) and after the front, marked with F1, F2 and F3 in said figure, has been reached the alternating motion begins for the formation of the heel T with increases and reductions along the arcs A, whilst along the front of the instep of the foot the needles 9 remain out of action and withhold the (ribbed) stitching while waiting to restart their work. During the alternating motion the heel T is formed in the manner described with ribbed stitching throughout, exactly like the stitching used along the leg G. When the heel T is completed, the working front is that indicated with F4, F2 and F3; from this point onward the work begins again with continuous motion of the needle cylinder 1-3 so as to form the zone P of the foot, said zone too being worked with ribbed stitching according to the pre-set programme, until the front indicated with

1. F5, F6 and F7 is reached; a second end pocket E is then
formed for the toe of the sock or stocking by means of fur-
ther processing with alternating motion, making use of arcs
of needles which in general correspond with those used for
5. the formation of the pocket T. The pocket E too is formed
with the same structure of texture with ribbed stitching,
as programmed for the whole product.

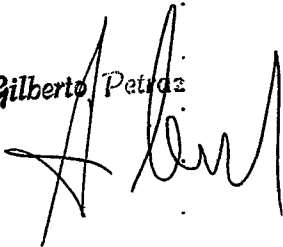
As in traditional machines, in the channels of the cyl-
inders 1 and 3 or of only one of the cylinders, besides the
10. sliders 11 and needles 8 and besides the selection jacks 50
and 52 for the starting operations and for the pockets, fur-
ther jacks are envisaged by means of which the lifting of
the needles 9 and sliders 11 can be operated selectively to
obtain regularly discharged stitching or tucked stitches,
15. depending on determined patterns. These patterns, still ob-
tained with ribbed fabric but with tucked stitches or dis-
charged to suit the pattern, can be developed along the leg
G and foot D of the sock in a circular manner or in desired
areas along the circumferential periphery of the product.

20. In particular, a differentiation based on such criteria
can be obtained to advantage in correspondence with an initial
zone 1 coinciding with the top of a sock, in this way making
something like the top traditionally produced with ribbed
stitching differentiated from that of the leg G and/or foot
25. D of the sock; a differentiation can also be obtained simply
(or in addition to the effect of a pattern) with the intro-
duction of a different or supplementary yarn, particularly
an elastic yarn as a rubber thread.

It is to be understood that the drawings show only one
30. example, which is given only as a practical demonstration
of the invention, but said invention can be varied as re-
gards shapes and lay-outs without departing thereby from
the scope of the concept inspiring the invention itself.

1. The possible presence of reference numbers in the attached .
claims has the purpose of making easier the reading of the .
claims with reference to the description and drawings and .
does not restrict the scope of the protection afforded by .
5. the claims.

It is best to note that a needle and its opposed slider .
can be introduced into the channels of the cylinders of tra-
ditional machines in all the positions in which, during the
whole cycle of production of the product, a transfer of a
10. stitch from one needle board to the other is not required.

Gilberto Petrucci


15.

20.

25.

30.

CLAIMS

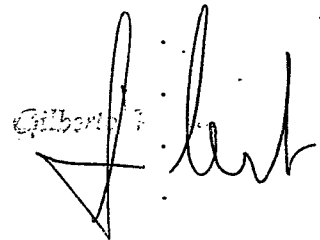
1. 1-Procedure for the production of a sock or the like with
uniform ribbed stitching, with pockets for heel (T) and/or
toe (E) formed with alternating motion, characterized by
the fact that processing is carried out with uniform ribbed
stitching throughout the whole length of the product, whereby
the pockets for heel (T) and/or toe (E) are also made with
said ribbed stitching with alternating motion and with
reductions and increases in the course for the formation
of said pockets.
- 2 - Procedure as in the Claim hereinbefore, characterized
by the fact that, so as to form the pockets (T & E) with
alternating motion, increases and reductions are envisaged
in the arcs of needles working in the upper and lower
cylinders (3-1) of the machine.
- 3 - Procedure for forming a sock, as described and shown.
- 4 - A sock product or the like with heel (T) and, possibly,
toe (E) characterized by the fact that it is worked with
the procedure described and shown and thus is composed
of uniform ribbed stitching throughout the whole length
of the product, even in the zones of the pockets (T & E),
which are of the type made with processing with alternating
motion and also in the zone of the sole (P).
- 5 - A double-cylinder machine (or the equivalent) for process-
ing also with alternating motion, characterized by comprising
- in each cylinder (1 & 3) simple needles (9) with hook-wise
point (14) and latch (15), whereby said needles are alternated,
according to a lay-out pre-set for a given ribbed texture,
with sliding elements (11) intended to cooperate with the
needles (9) or the other cylinder (3-1), and whereby the
needles in each cylinder (1 or 3) are located so as to
correspond with the sliding elements (11) of the other cylinder
(3 or 1) in order to cooperate therewith: cams to form



1. stitches (34, 134; 38, 138) which are substantially simmetrical
in respect of the feeds (F32, F36) for processing with alter-
nating motion, and are substantially symmetrical in respect
of a plane of symmetry between the two cylinders (1-3): and
5. transfer means or so-called pickers (42, 44, 46) symmetrical
in respect of said plane for respectively inserting into or
excluding from work during the alternating motion some need-
les (9) and sliding elements (11) of each cylinder (1, 3)
simultaneously in combination with the aforesaid substantially
10. symmetrical cams (34-134, 38-138) forming the stitching and
belonging to the same one feed, whereby said pickers (42, 44
46) enable reductions and increases to be made in the alternate
courses of stitches.

6 - Machine as in Claims hereinbefore, characterized by being
15. equipped with substantially traditional needles (9) provided
with a hook-wise point (14) and latch (16) and with sliding
elements (11) conformed without the attachment means for
transferring two-hook needles but conformed only to ensure
the opening of the latch (16) and equipped with butts (20)
20. to cooperate with the pickers (42, 44, 46) and with possible
selection butts.

7 - Machine as described and shown.

Gilbert


25 .

30 .

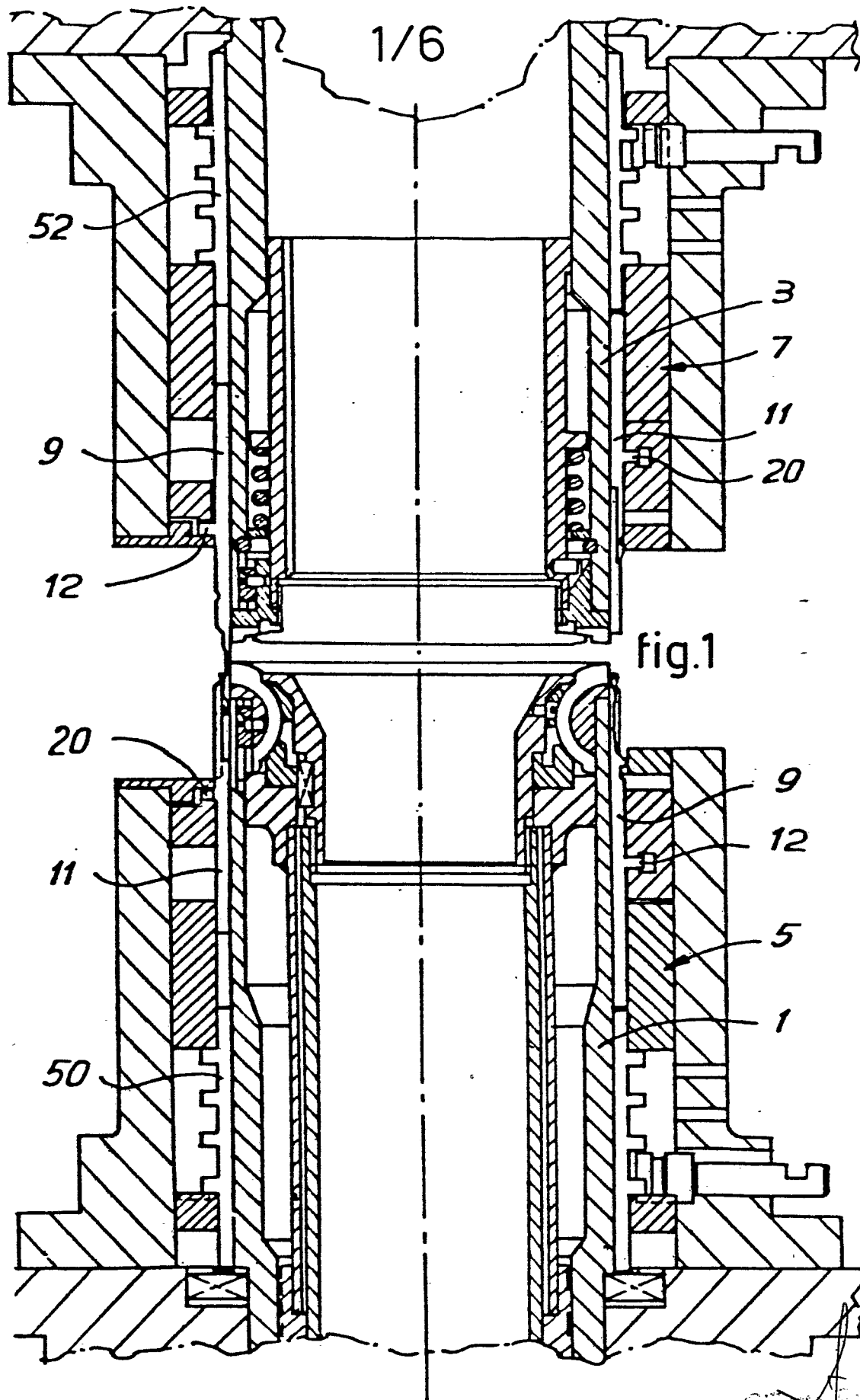
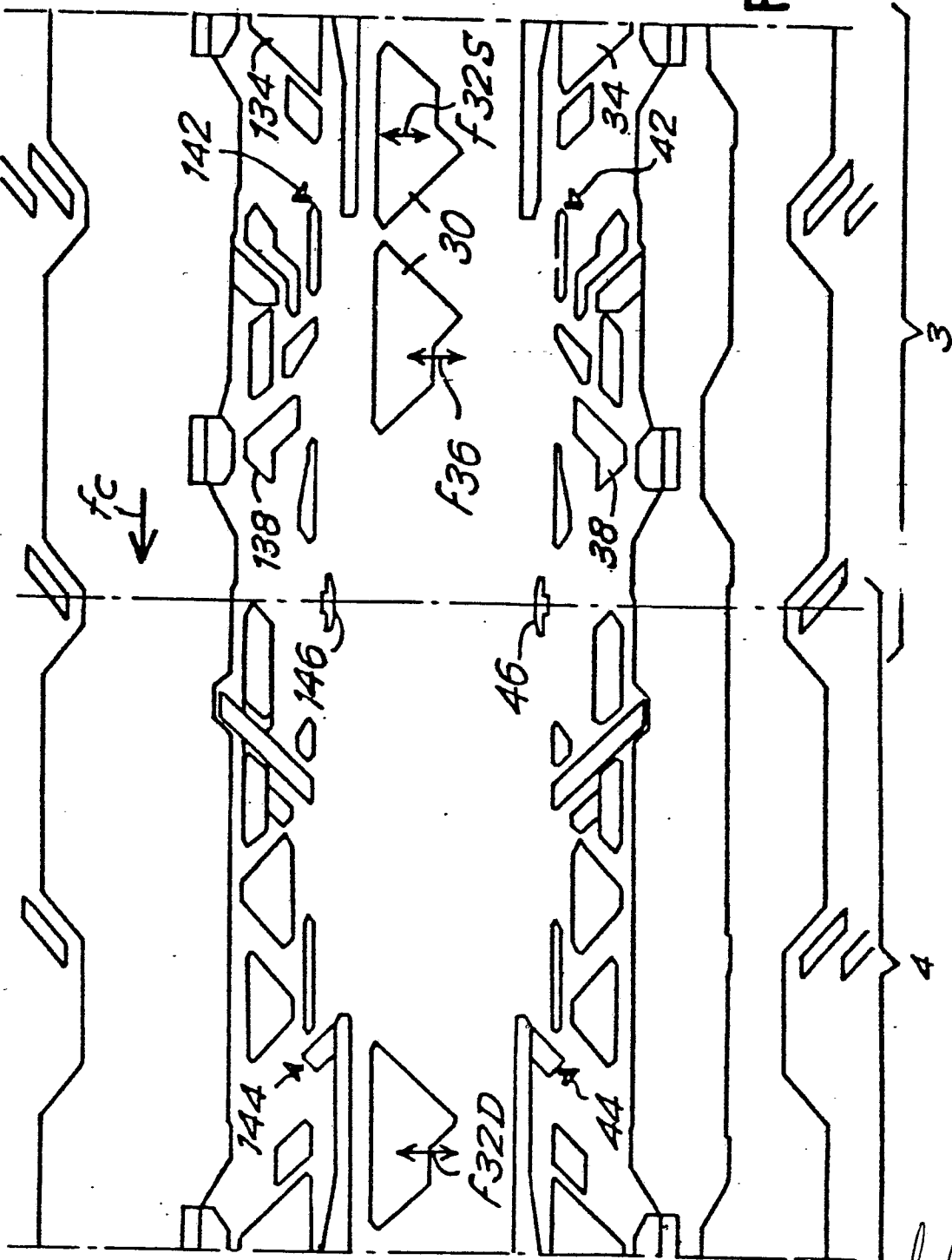


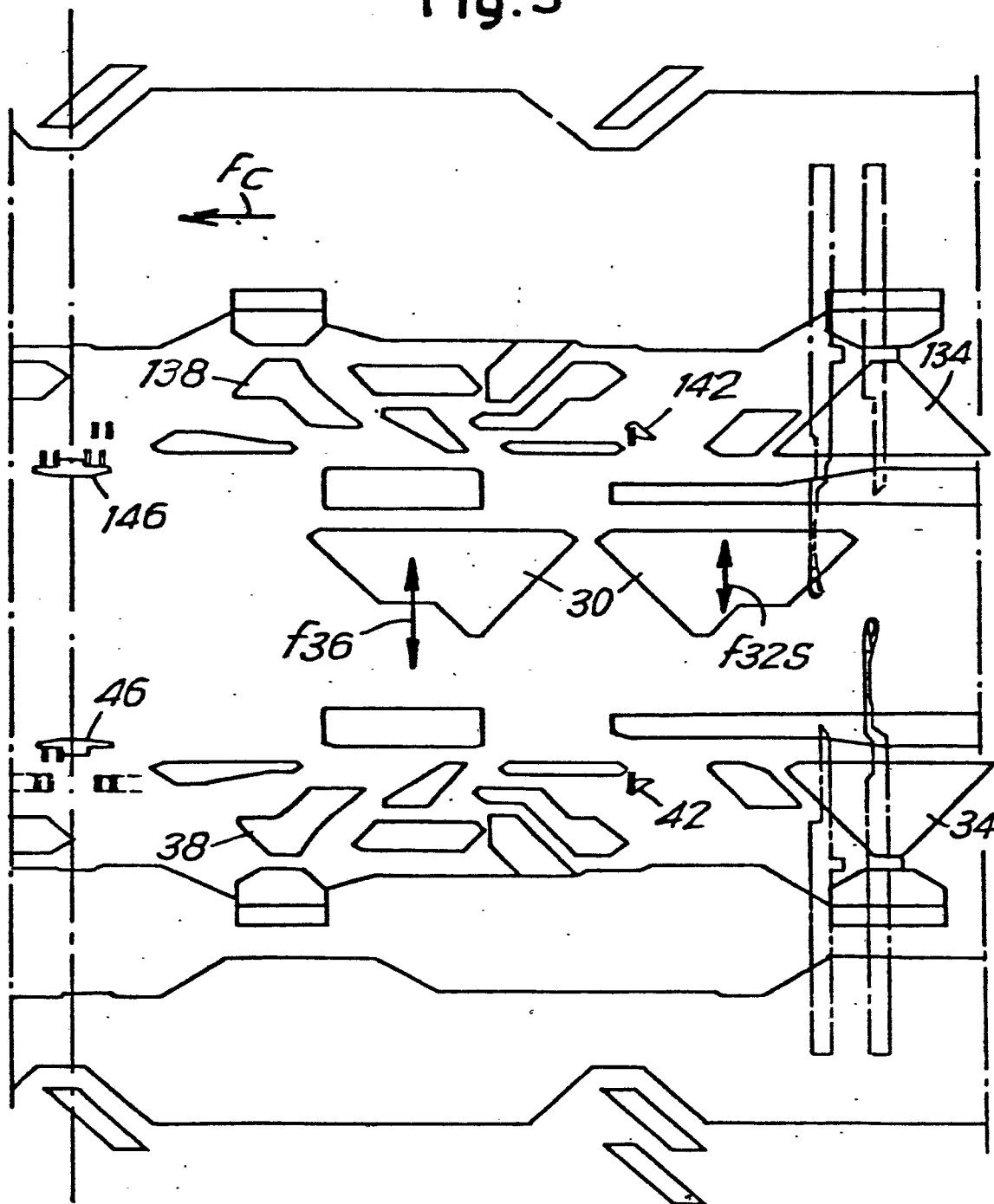
Fig.2



Gilberto Petraz

3/6

Fig.3



Gilberto Pérez

4/6

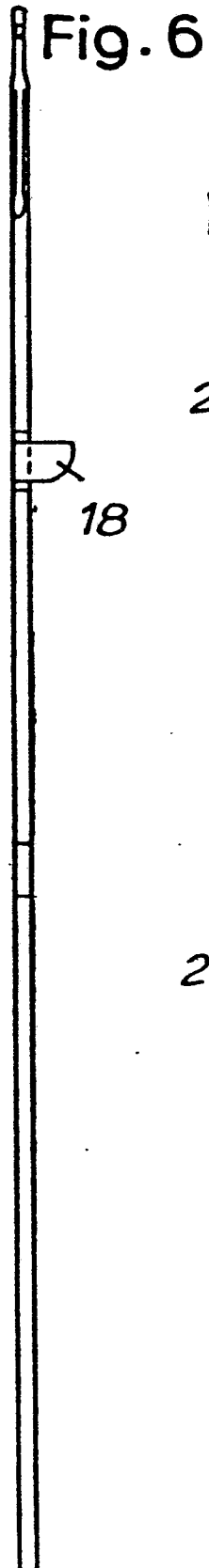
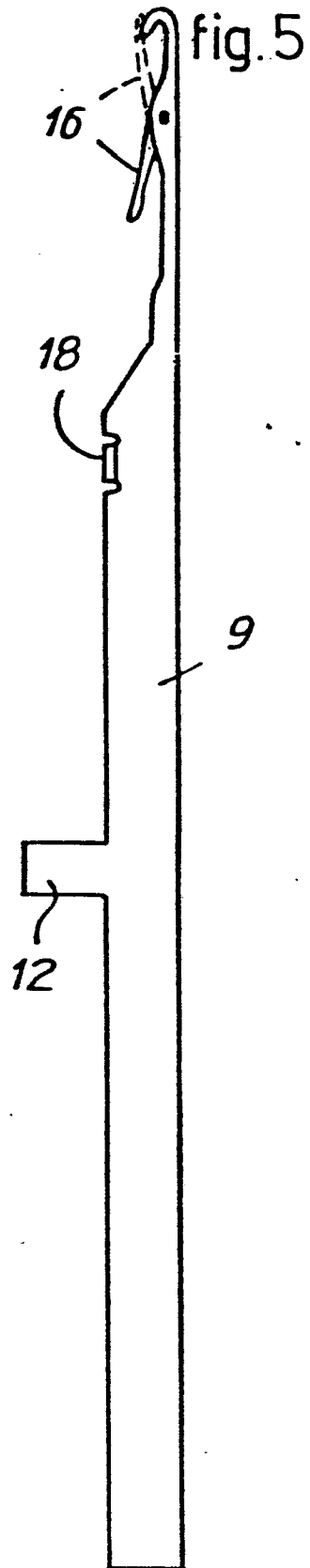


Fig. 7

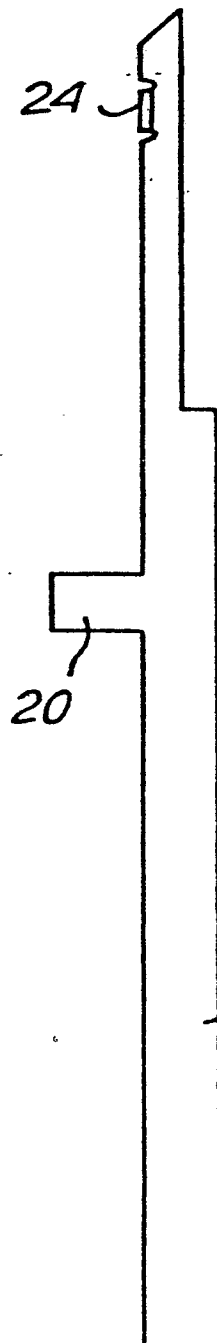
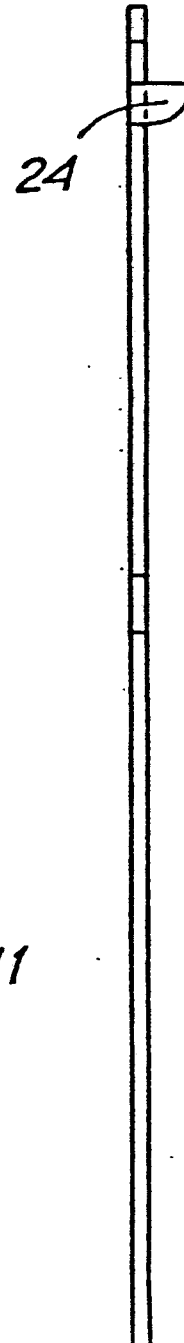


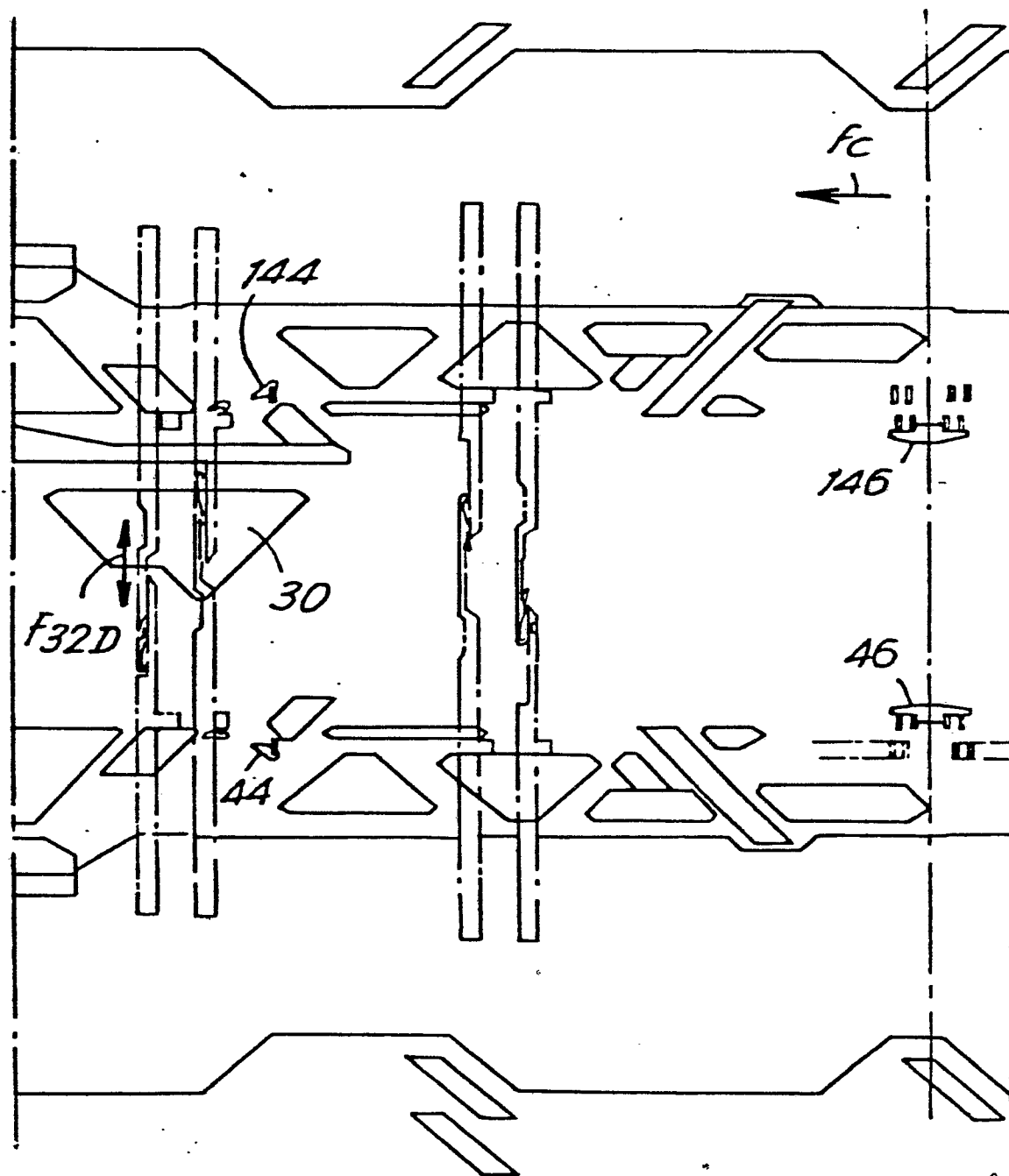
Fig. 8



Gilberto Petrucci

5/6

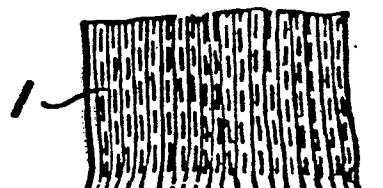
Fig.4



Gilberto Pedras

6/6

Fig.10



6

F₁

F₂

F₃

T

F₄

fig.9

P

F₅

E

F₆

F₇

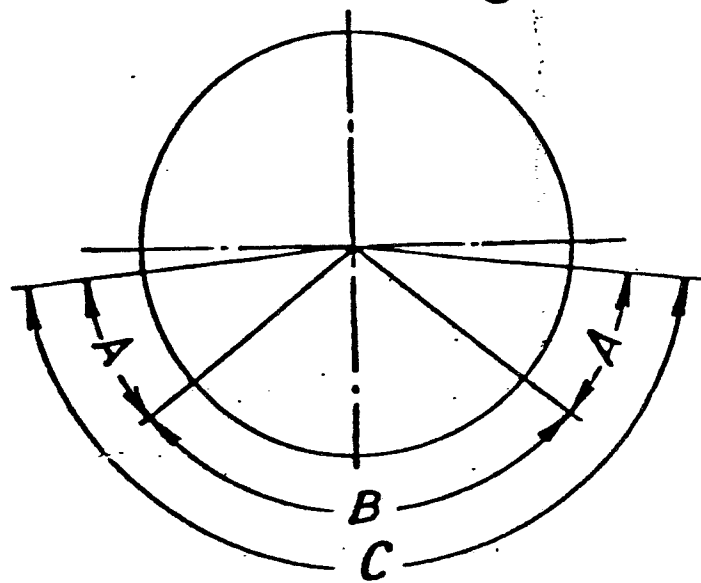
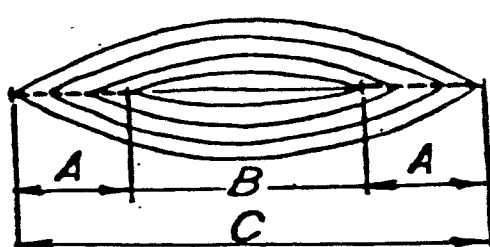


Fig.11



Gilberto Pérez

0045287



European Patent
Office

EUROPEAN SEARCH REPORT

Application number

EP 81 83 0130

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 984 564</u> (MIDLAND HOSIERY MILLS) * Page 2, lines 21-39; figures 1-3 * -- <u>GB - A - 119 478</u> (MARKS) * Page 19, line 44 - page 20, line 52; page 24, line 9 - page 25, line 4; figures 11-13, 25, 26 * --	1,3,4 1,5	D 04 B 1/26// D 04 B 9/10
A	<u>GB - A - 559 543</u> (BENTLEY) * Whole document * --	1	TECHNICAL FIELDS SEARCHED (Int. Cl.3) D 04 B
A	<u>US - A - 2 366 001</u> (BROOKSBY) * Whole document * --	1	
A	<u>GB - A - 11 991 AD 1909</u> (SPIERS) * Whole document * --	1	
A	<u>CH - A - 531 601</u> (RUTZ) * Whole document * ----	1	CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search		Date of completion of the search	Examiner
The Hague		03-11-1981	V. GELDER