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(71) Applicant: **ARIETE S.r.l.**
I-50040 Settimello di Calenzano (Firenze) (IT)

(72) Inventor: **Baldacci, Lapo**
I-50129 Firenze (IT)

(74) Representative: **Porsia, Attilio, Dr.**
c/o Succ. Ing. Fischetti & Weber
Via Caffaro 3/2
I-16124 Genova (IT)

(54) **Method for manufacturing irons with steel sole plate**

(57) Method for manufacturing irons which comprises the following stages: cold-working a continuous strip (1') of sheet steel in a calender provided with a press roll (4), the surface of which has closely-packed ribs (104), and with a smooth back-pressure roll (5); cutting, forming and shaping the edges (201) of the said grooved sheet steel in order to obtain a sole plate (1) for an iron, the said grooves (101) being parallel with the major axis of the said sole plate; and securing the said sole plate to the peripheral edge of the sole (2) of the iron.

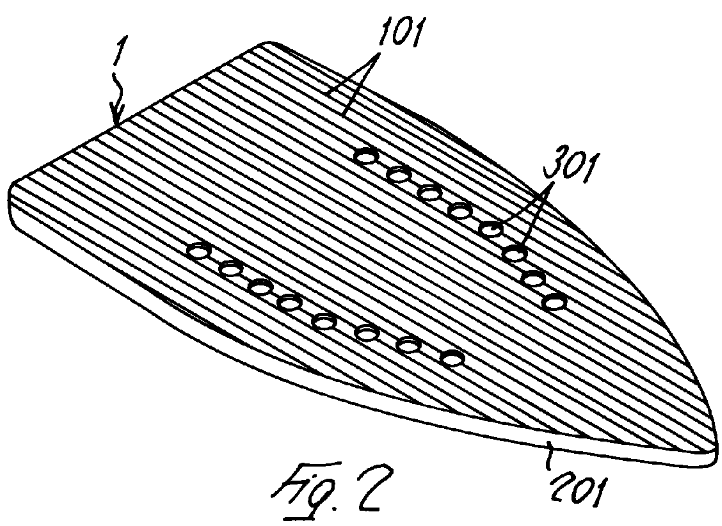

Fig. 2

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Description

The invention relates to a method for manufacturing irons, and in particular relates to a method for manufacturing irons with a steel sole plate.

In techniques for producing irons there has always been a particular emphasis placed on the need to provide a sole which combines a high heat exchange diffusivity with an equally important ability to glide over the surface of the fabrics to be ironed.

In this respect, irons are known (USA Patent No. 2,270,316) which have an iron sole on to which a relatively thick layer of metal, for example nickel, is deposited electrolytically. The layer of nickel is subsequently worked with an abrasive, in order to make a series of microscopic parallel lines therein which extend longitudinally with respect to the sole of the said iron. A thin layer of chromium is then deposited electrolytically on the surface thus worked.

Moreover, document EP-A-0,378,479 discloses irons in which the aluminium soles are coated with a layer of vitrifiable enamel on to which raised strips, also of vitrifiable enamel, are applied by means of silk-screen printing. Vitrification takes place in a furnace at a temperature of the order of 550°C.

Naturally the processes mentioned above; even though achieving good results with respect to the gliding ability and heat conduction of the irons, are nevertheless characterized by not insignificant complexities and high manufacturing costs.

Finally, it is also known to apply an outer sole plate of stainless steel, which has good gliding characteristics, on to the aluminium soles of the irons. However, an application of this type involves the use of special aluminium-based heat-conductive mastics which makes the manufacture of irons of this type more complicated and more expensive. Without these mastics, heat transmission between the aluminium sole and the steel sole plate is very poor, especially on account of the infiltration of steam between the two parts.

The object of the present invention is therefore to provide an iron with a steel sole plate which glides smoothly over fabrics and has good heat diffusion and conduction properties, whilst at the same time keeping production costs within contained limits, and also to provide a method for its production.

It has been discovered that by cold-working sheet steel in a calender provided with a roll having a series of closely-packed ribs and with a smooth back-pressure member, a sheet of steel is produced which has a series of tiny parallel grooves on one side, this sheet having been given a permanent elastic curvature in a direction perpendicular to that of the grooves.

According to the invention, it was thought to exploit the phenomenon described above of the elastic curvature of this sheet steel for the production of iron sole plates which, once secured, adhere with an elastic force to the surface of the sole of the iron, thereby ensuring excellent heat transmission between these two surfaces without having to resort to the use of heat-conductive mastics.

The subject of the present invention is therefore a method for manufacturing irons which comprises the following stages: cold-working a strip of sheet steel in a calender provided with a press member, the surface of which has closely-packed ribs, and with a smooth back-pressure member; cutting, forming and shaping the edges of the said grooved sheet steel in order to obtain a sole plate for an iron, the said grooves being parallel with the major axis of the said sole plate; and securing the said sole plate to the peripheral edge of the sole of the iron.

A further subject of the invention is an iron made according to the method described above. Advantageously, the aluminium sole of the said iron is formed such that the connection of the sole plate to the said sole is capable of withstanding the elastic return force produced by the curvature of the sole plate. This may be obtained quite simply if, for example, the said sole has a trapezoidal cross-section, or if the peripheral edge of the said sole has a channel into which the peripheral edge of the said sole plate can be folded.

An iron which uses a sole plate of this design, on the one hand possesses an extremely smooth-gliding contact surface, by virtue of both the grooves produced in the surface of the sole plate and the intrinsic gliding properties of stainless steel and, on the other hand, leads to the aluminium sole and the sole plate of the iron being efficiently connected together, thereby ensuring excellent conduction of heat. Moreover, all this is obtained at a much lower cost than that of methods known from the prior art.

Further advantages and characteristics of the present invention will become clear from the following description of one embodiment, which description is given by way of non-limiting example with reference to the appended drawings, in which:

Figure 1 is a diagrammatic perspective view of a first embodiment of the method of the invention, according to which a strip of sheet steel, used to produce the sole plate of the iron according to the invention, is grooved and curved between a ribbed between a ribbed press roll and a smooth back pressure roll;
Figure 2 is a perspective view of a sole plate formed according to the method of the invention;
Figure 3 is a cross-sectional view of the sole plate of Figure 2 and of the aluminium sole of an iron, in the stage preceding the stage in which the sole plate is secured to the aluminium sole of the iron;
Figure 4 is a cross-sectional view similar to that of Fig. 2, showing the stage in which the steel sole plate is secured to the aluminium sole of the iron;
Figure 5 is an enlarged cross-sectional view of a detail of the sole plate illustrated in Figure 3; and
Figure 6 is a graph comparing the gliding properties of various materials used for the soles of irons, with respect to the surfaces of different fabrics.

Figure 7 is a diagrammatic perspective view of the second embodiment of the method of the invention, according to which a previously drawed sole plate is supported on a smooth back-pressure member cooperating with a ribbed press roll, in order to be grooved and curved, and

Figure 8 is a cross-sectional view of the arrangement of Figure 7.

Figure 1 diagrammatically shows the method of grooving the sole plate according to a first embodiment of the invention. Sheet steel 1' is introduced between two rotating rolls, of which the roll 4 is the press roll provided with press ribs 104 on its surface, and the roll 5 is a pressure roll which pushes the sheet steel against the roll 4.

After suitable machining operations (not shown), the sole plate 1 illustrated in Figure 2 is produced from the sheet steel which has been grooved in the manner described above. The said sole plate has a peripheral edge 201 for securing it to the sole of the iron (see Figs. 3 and 4), a series of holes 301 through which the steam escapes, and a series of grooves 101 which are parallel with one another and with the major axis of the sole plate and which give the sole plate an inward curvature, as illustrated in Fig. 3.

Figure 3 shows the said sole plate in cross-section, during its assembly on the sole 2 of an iron; the curvature of the sole plate produced by the operations described previously is transverse to the grooves of the sole plate I. The sole 2 has a trapezoidal cross-section and has, along its peripheral lateral edge 102, a recess 112 which is complementary to the peripheral edge 201 of the sole plate. In Figure 3 the said peripheral edge 201 is positioned inside the said recess 112 and the flat inner face of the sole plate 1 adheres perfectly to the flat underside of the sole 2 of the iron.

Implementation of the method according to the invention will be clear from the following description. The strip of stainless-steel sheet 1' is inserted between the rolls 4 and 5 of a calender. The pressure roll 5 pushes the sheet steel 1' against the surface of the press roll 4, in other words against the press ribs 104 which imprint the grooves 101 into the surface of the said sheet steel. Thereafter, the grooved sheet steel is suitably cut and its edges are shaped, the holes 301 are then made therein, and it is thus transformed into the sole plate 1. This sole plate, as illustrated in Figure 3, is curved inwards; this is on account of the grooving action to which it is subjected in the processing stage described previously. When the peripheral edge 201 of the sole plate is secured in the recess 112 of the peripheral edge 102 of the sole 2 of the iron, the result is that the flat face of the sole plate 1 adheres tightly to the flat underside of the sole 2 of the iron, on account of the abovementioned curvature; the slope of the peripheral edge 102 of the sole enables the connection between the sole plate and the said sole to hold firm against the elastic return force produced by the curvature of the sole plate 1. This gives extremely efficient heat contact between the sole 2 and the sole plate 1, which therefore makes the use of special heat-conductive mastics, such as those adopted in the prior art, superfluous.

In Figures 7 and 8 a second embodiment of the method according to the invention is shown.

According to this embodiment, from a sheet of steel (not shown) a sole plate is produced by cutting a suitably profiled blank from said sheet, and by subjecting said blank to a drawing operation so as to obtain the shaped, ungrooved sole plate 401, preferably already provided with the holes 301, and with the peripheral edge 201. The said sole plate 401 is disposed on a profiled support plate 105, which in turn is carried by the carriage 106 which may be moved, by suitable means not shown, in the direction of the arrow A beneath the rotating roll 4 provided with press ribs 104 so as to form on the sole plate 401 the longitudinal grooves 101.

It goes without saying that the sole can have a cross-section other than a trapezoidal one, as long as it is provided with means which enable its connection to the sole plate to withstand the elastic return force produced by the curvature of the latter.

In addition, the grooves on the surface of the sole plate increase the gliding properties, already high in themselves, of the material used, that is steel. Advantageously, these grooves also increase the radiating surface of the iron and channel the steam which enhances the action of the said sole plate 1 on the surface of the material to be ironed 3, as illustrated in Figure 5.

By way of example, a number of tests were carried out on various fabrics using various covering surfaces on the soles of the irons. Pieces of fabric of a standard length were placed on an inclined plane and samples of materials used to cover the soles of irons were then made to slide over them, varying the load placed on the sample until the same velocity of descent was reached.

The results are illustrated in the graph of Figure 6. The various textiles over which the samples were made to slide are plotted on the horizontal axis, and the load expressed in grams is plotted on the vertical axis.

Covering materials

Chromium	(— — - -)
Steel	(— - - —)
Aluminium	(— — —)
Teflon	(- - - - -)
Durilium	(— - — -)
Sole plate according to the invention	(———)
Gliding surfaces	
A = polyester	
B = wool	
C = cotton	
D = cotton + steam	

The results of the tests carried out clearly show that the sole plate according to the present invention possesses gliding properties which are in all cases at least as good as all the other covering materials, and in some cases are far better; all this combined with the fact that the materials most similar in behaviour to that of the sole plate of the invention are teflon and durilium, which are unquestionably far more expensive and complex to produce than the materials required for the sole plate of the invention.

In the light of this fact and of those described earlier, the present invention provides a sole plate for irons which, within limited manufacturing and materials costs, ensures improved heat diffusion and conduction, together with high quality gliding properties.

Claims

1. Method for manufacturing irons which comprises the following stages: cold-working a sheet steel element in a calender provided with a press roll, the surface of which has closely-packed ribs, and with a smooth back-pressure member; forming said sheet steel into a sole plate for an iron, and securing the thus formed sole plate to the peripheral edge of the sole of the iron.

2. Method according to claim 1, in which the said sheet steel element is a continuous strip of sheet steel, the said back pressure member is a roll, and the said grooved sheet steel element is formed into a sole plate by cutting it and shaping it by drawing processes.

3. Method according to claim 1 in which the said sheet steel is a profiled blank shaped by a drawing process, and the said back-pressure element is a complementary shaped support plate carried by a movable carriage.

4. Iron made according to the method claimed in claim 1, characterized in that the aluminium sole of the said iron is formed such that the connection of the sole plate to the said sole is capable of withstanding the elastic return force produced by the curvature of the sole plate.

5. Iron according to claim 4, in which the said sole has a trapezoidal cross-section.

6. Iron according to claim 4, in which the peripheral edge of the said sole has a channel into which the peripheral edge of the said sole plate can be folded.

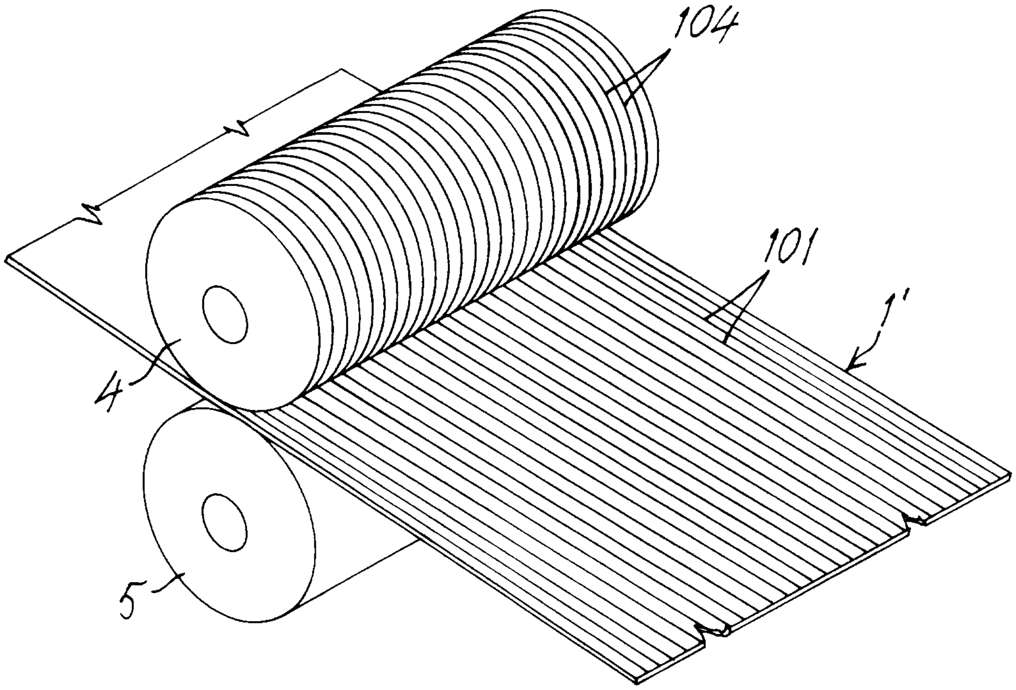

Fig.1

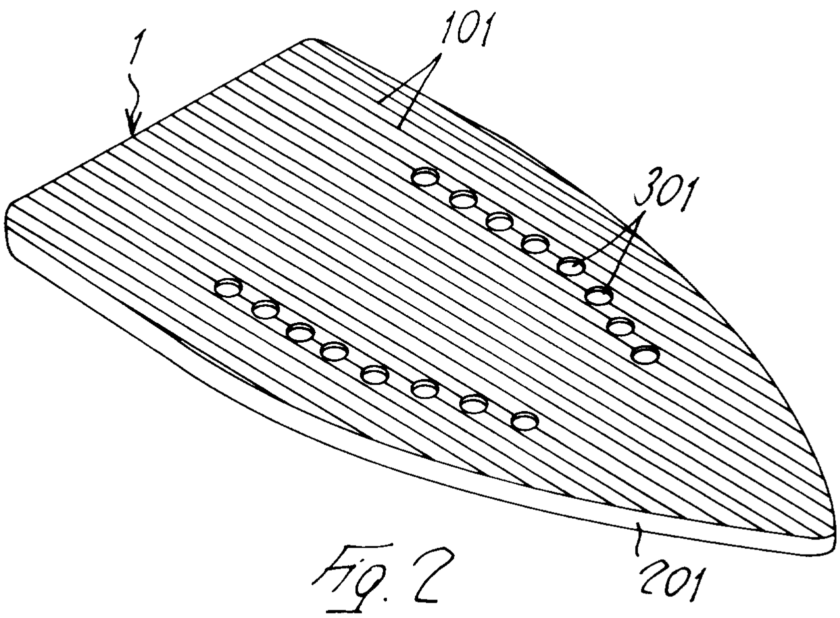

Fig. 2

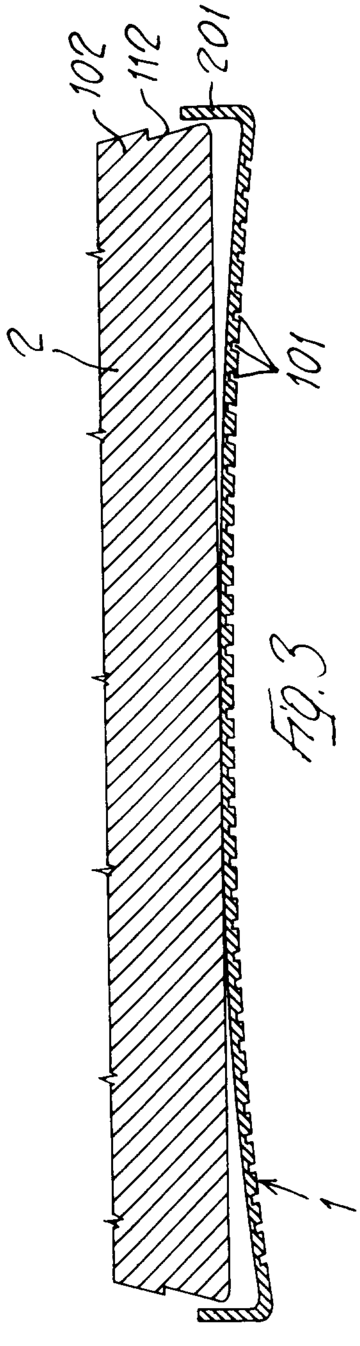

Fig.3

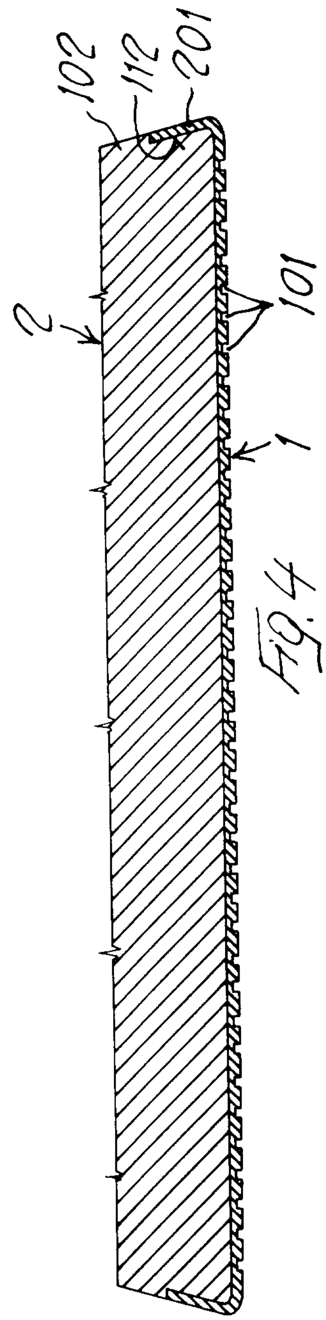

Fig.4

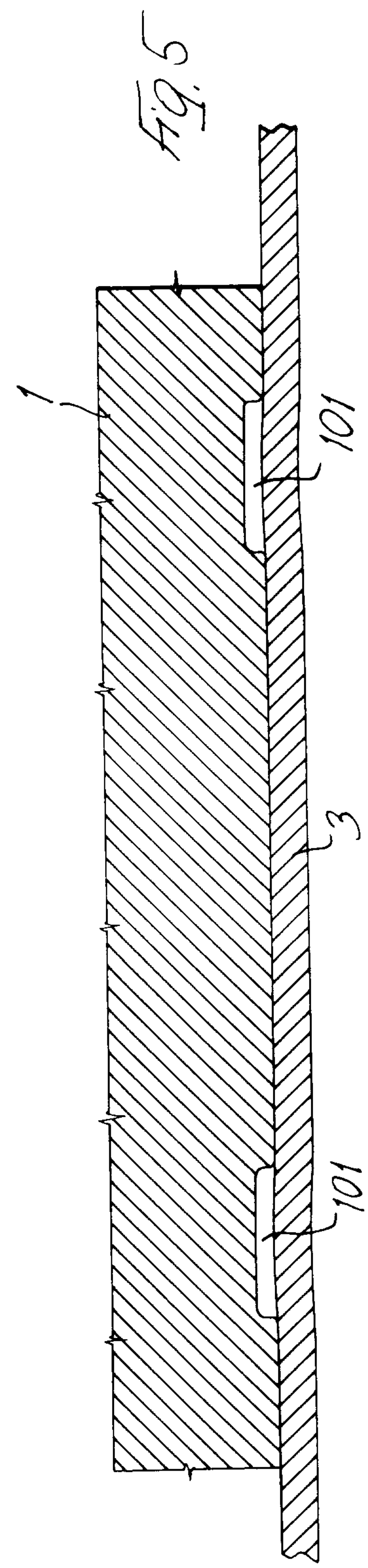

Fig.5

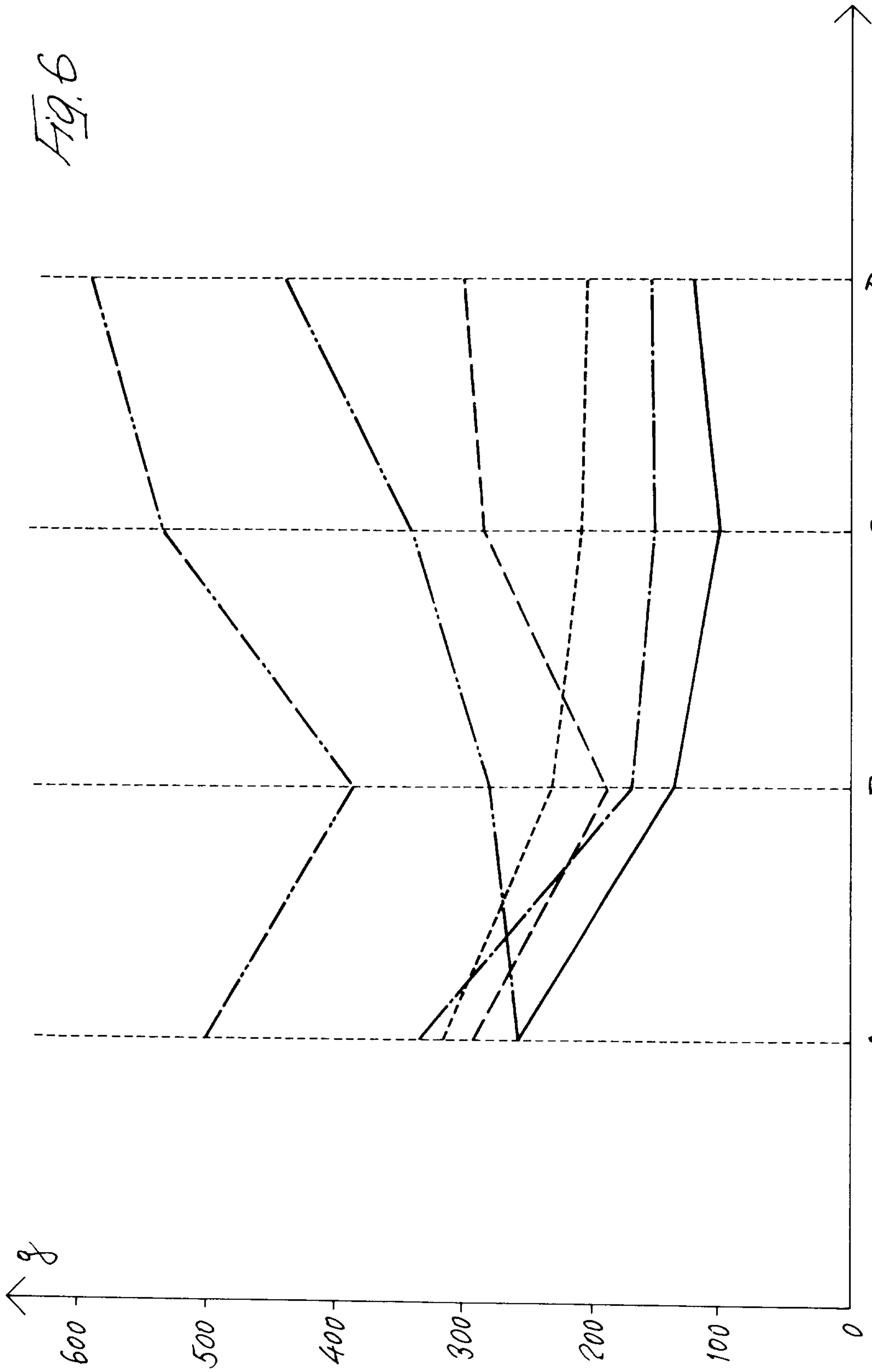

Fig. 6

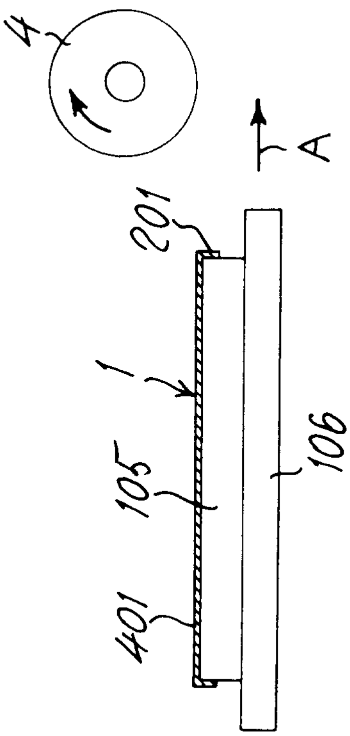

Fig. 8

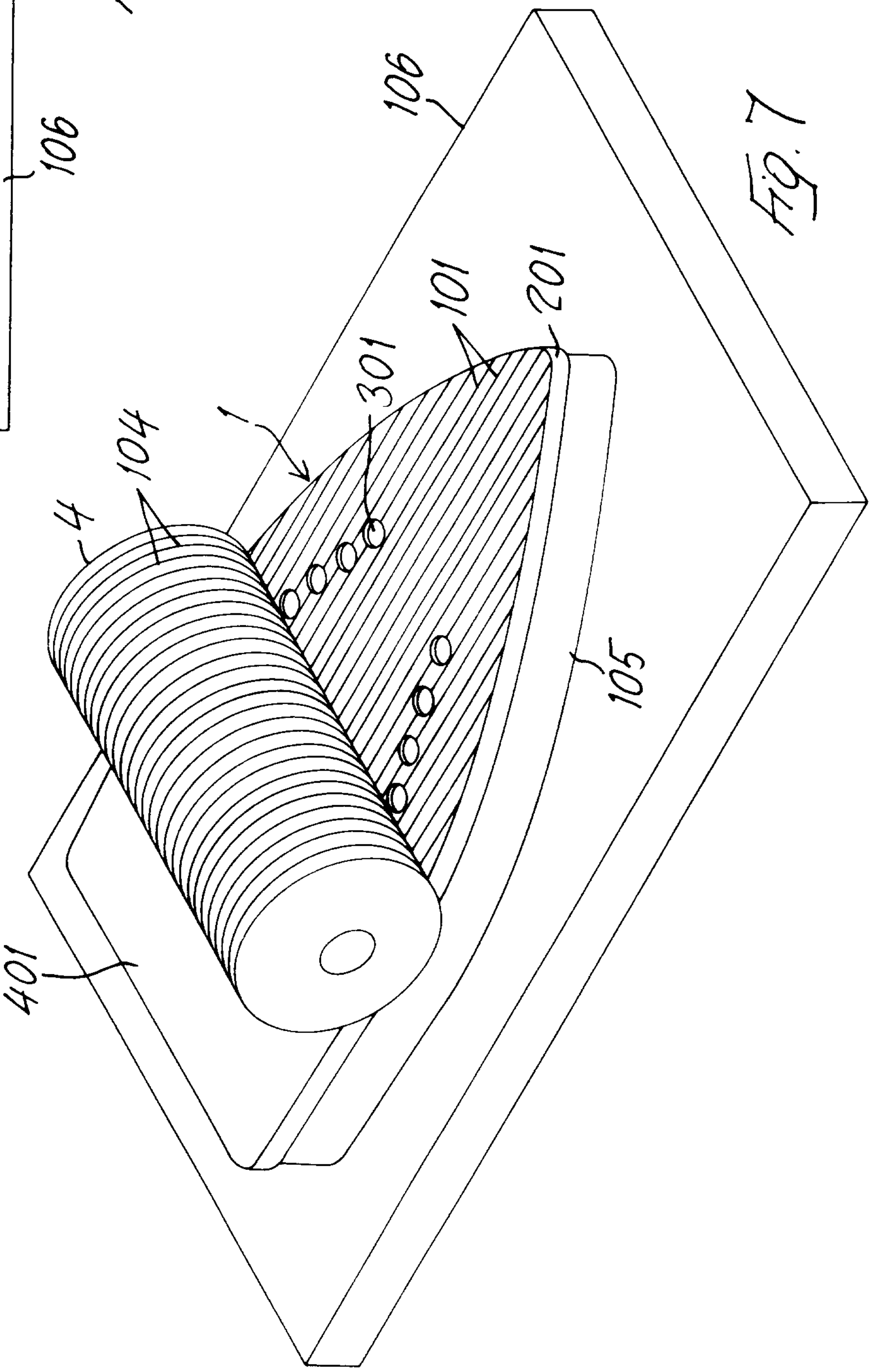

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 95 11 6706

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-0 556 721 (MOULINEX S.A.) * the whole document * ---	1,4	D06F75/38
A	US-A-1 674 092 (CANNON INGINEERING CO.) * the whole document * ---	1,4	
A	US-A-1 995 035 (CHICAGO FLEXIBLE SHAFT COMPANY) * claims; figures * ---	1,5,6	
A	EP-A-0 457 689 (SEB S.A.) * the whole document * ---	1	
A,D	US-A-2 270 316 (AMERICAN ELECTRICAL HEATER COMPANY) * the whole document * ---	1	
A,D	EP-A-0 378 479 (SEB S.A.) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 February 1996	Courrier, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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