(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 550 881 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.01.2013 Bulletin 2013/05

(51) Int Cl.:
A41H 37/06 *(2006.01)*

(21) Application number: **12178345.0**

(22) Date of filing: **27.07.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **29.07.2011 IT UD20110121**

(71) Applicant: **Ventura SRL Con Unico Socio**
31011 Asolo (TV) (IT)

(72) Inventor: **Canton, Gabriele**
31011 Asolo (TV) (IT)

(74) Representative: **Petraz, Gilberto Luigi et al**
GLP S.r.l.
Piazzale Cavedalis 6/2
33100 Udine (IT)

(54) Equipment to apply a zipper to an article and method to apply a zipper to an article

(57) Equipment to apply an invisible zipper (11) to a fabric (12) which comprises at least an attachment station (13) of the zipper (11) to the fabric (12) and a cutting station (15) provided with a cutting member (25), suitable to cut only the fabric (12), in a through manner. The cutting station (15) comprises a centering member (26) of the zipper (11) provided with two centering blades (29) disposed opposite each other and defining an interstice (30) on which the zipper (11) glued with the fabric (12) is positioned. The centering blades (29) being selectively movable with respect to each other by means of an actuator (31), to vary the width of the interstice

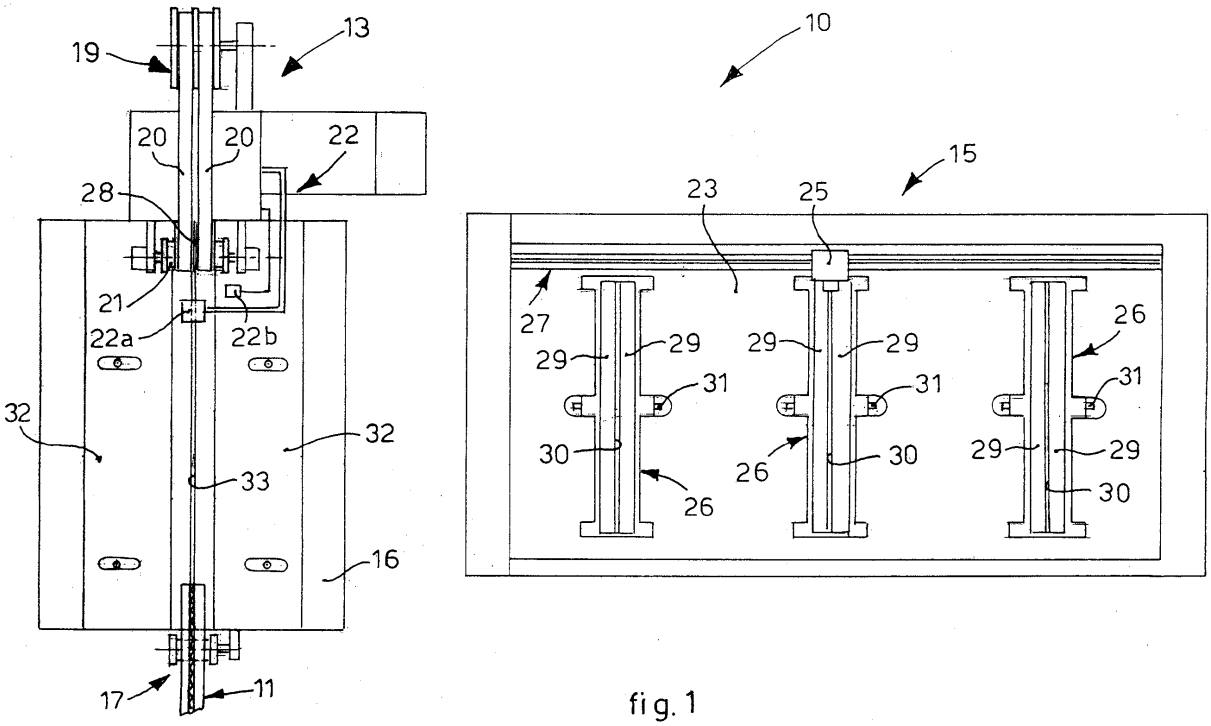

fig. 1

EP 2 550 881 A1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns an equipment and a method to apply a substantially invisible zipper to an article, such as a fabric, a hide or length of cloth or other, able to form an article of clothing, an accessory, an awning or other. In particular the equipment and the method according to the present invention advantageously, but not exclusively, refer to the application of said zipper on articles which can have an image, a logo or any other alphanumeric sign made on at least one area of their visible surface.

BACKGROUND OF THE INVENTION

[0002] Articles are known, such as articles of clothing, leather goods, awnings, covers or other, in which the application of a zipper is provided, for the selective opening/closing of two edges of the article.

[0003] The application is also known of so-called invisible zippers, that is, zippers which when they come into contact do not interrupt or throw out of sync the image or alphanumerical sign which they cross.

[0004] Normally, in order to apply such zippers, for example to an article of clothing, the fabric is cut from the top to the bottom to define the two edges. The printing and the subsequent cutting have to provide the shaping of a determinate stitching margin for stitching the zipper.

[0005] The portion of image or other alphanumerical sign interrupted by the cut has to be duplicated.

[0006] This known technique not only requires a step of re-closing the fabric in the zone not affected by the positioning of the zipper, but also requires optimal manual skill of the operator in order to exactly fit together the two edges, keeping the fabric suitably stretched and respecting the graphical correspondences between the two edges.

[0007] One purpose of the present invention is to obtain an equipment and to perfect a method which allow to apply a zipper of the invisible type to an article, in particular with images or other alphanumerical signs provided on said article, overcoming the known disadvantages.

[0008] Another purpose of the present invention is to obtain an equipment which allows the precise positioning of the zipper with respect to the fabric to which it must be applied.

[0009] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0010] The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0011] In accordance with the above purpose, an equipment and a method according to the present invention are applied to position a substantially invisible zipper - hereafter referred to simply as zipper - to any fabric characterized indistinctly by being knitwear, woven material, in the form of warp and weft, ladder-proof, jacquard, consisting of artificial, synthetic or natural fibers, also combined in variable percentages.

[0012] The equipment comprises at least an attachment station to attach the zipper to the fabric and a cutting station provided with a cutting member, able to cut only the fabric, in through manner, at least in correspondence with the zipper.

[0013] According to one feature of the present invention, the cutting station comprises a centering member provided with two centering blades disposed opposite each other and defining an interstice on which the zipper glued to the fabric is positioned. The centering blades are selectively movable with respect to each other by means of an actuator, to vary the width of the interstice.

[0014] In this way, the zipper, and in particular its chain, is disposed in the substantially rectilinear interstice in order to make it assume a univocal position to guarantee the subsequent precision of the cut which is made with the cutting member.

[0015] According to one form of embodiment, the centering member is aligned, or can be aligned, with the cutting member to guarantee the alignment between the position of the zipper and the through cut on the fabric.

[0016] According to another form of embodiment, the cutting station comprises a work top on which the fabric is positioned and the zipper glued; the centering member is also integrated into the work top.

[0017] In advantageous forms of embodiment, the cutting member comprises a laser type cutting head, wherein the intensity of the laser rays is adjustable, manually or programmably, according to the characteristics of the fabric.

[0018] According to another feature, the attachment station comprises heating means to heat the edges of the zipper, and gluing means able to apply at least an adhesive support on the edges, so as to glue the zipper on a first side of the fabric, which during use is not visible.

[0019] In some forms of embodiment, the attachment station comprises a work top on which the zipper and the fabric, a first feed unit of the zipper, a second feed unit of the adhesive supports, and a drum suitable to exert at least a pressure between the zipper and the fabric are all able to be positioned.

[0020] According to another feature, the work top comprises two centering boards able to define a centering interstice between them which is suitable to guide the zipper toward the drum, keeping the chain substantially rectilinear.

[0021] Moreover, the drum is suitable to heat and compress the zipper and the fabric, between which a layer of adhesive support is affixed, so as to determine a ther-

mo-attachment of the zipper and the fabric.

[0022] According to another feature, the second feed unit comprises a partition suitable to feed two adhesive supports at the same time, keeping them separated longitudinally so as to define a central gap in correspondence with the chain of the zipper.

[0023] It is advantageous to provide, in some forms of embodiment, that the attachment station comprises a guide unit, able to emit a reference signal on the work top in correspondence with the median longitudinal axis of the interstice, and to identify such reference signal to guide the positioning of the fabric with respect to the zipper.

[0024] The present invention also concerns the method of applying a zipper to an article which comprises at least a first attachment step in which the zipper passes under first means so that said means heat the edges, or strip, supporting the chain of the zipper.

[0025] The strip must be pre-heated before every process so as to stabilize it in the natural dimensional modification consequent to the shrinkage of its plastic component. By operating in this way, and anticipating the natural effect of contraction of the plastic component, any torsions and/or undulations in the final product are prevented, above all in correspondence with the strip.

[0026] During this working step, the strip is subjected to static pressure which is in any case sufficient to allow it to keep its positioning, for a period of time which can vary between 15 and 25 seconds, preferably 20, at a temperature in any case higher than the following one which is able to glue the portion of the fabric to the edges or strip of the zipper.

[0027] Alternatively, the strip can be treated with a continuous cycle machine suitable to apply a pressure able to maintain the positioning of the material, with a feeding speed of the strip comprised between about 1 and about 2 m/min, preferably about 1.5 m/min, at a temperature in any case higher than the following one which is able to glue the portion of the fabric to the edges, or strip of the zipper.

[0028] It is also provided that glues or adhesive supports/films, possibly protected on one of their sides by a removable, non-adhesive protective material, for example such as paper, on the side opposite the one where the removable material is affixed, are glued and/or punched on the edges, or strip of the zipper.

[0029] The gluing and/or punching, or in any case the attachment of the adhesive support on the strip, can be continuous or discontinuous, it is carried out at the necessary temperature to fasten said support to the strip of the zipper.

[0030] The necessary temperature is variable according to the type of strip of the zipper and/or the fabric.

[0031] The adhesive supports are positioned on the two sides of the strip of the zipper at a distance slightly greater than the size of the beam of the laser ray. For example, the position is chosen to guarantee a distance between said adhesive supports of about 1 mm, in correspondence with the chain (or teeth) of the zipper.

[0032] Once the adhesive films are attached on the edges, it is possible to proceed with the cutting to size of the desired length of the zipper.

[0033] The attachment step of the method, preceded by the possible removal of the removable protective material, if there is any, provides that the zipper is positioned in the machine so as to keep its position centered, with the side in which the adhesive film has been attached toward the top, so that the latter can contact the side of the fabric opposite the one characterized by images and/or other alphanumerical signs.

[0034] Here and hereafter in the description and the claims reference is always made to the application of an adhesive film to the zipper, in order to allow it to be attached by gluing to the fabric. However, it cannot be excluded that the attachment by gluing of the zipper and the fabric can also be achieved by providing the application of segments, or separate pieces, of adhesive film, by means of spraying or spreading a glue on the strip, or according to other substantially known methods and not described here in detail.

[0035] Once the fabric is centered with respect to the zipper - which occurs thanks to the coordination between the reading, for example using laser rays, of the position of the zipper and the consequent manual positioning of the fabric, taking as reference the markers previously affixed therein, able to indicate where the next cut should be - the strip can be thermo-glued to the portion of the article positioned above. The thermo-gluing occurs by passing the zipper and the fabric positioned above it between the means present in the machine, which are able to thermo-glue at an adequate temperature and pressure and for an adequate time depending on the type of fabric, the edges of the zipper and of the adhesive film, or more generally, the adhesive used.

[0036] After the thermo-gluing a cutting step is provided which comprises at least a first centering sub-step using a centering member provided with two centering blades opposite each other defining an interstice. The centering sub-step provides at least to position the zipper together with the fabric on the interstice, in order to center and keep the zipper in the desired position so as to guarantee precision in the cutting. A second sub-step is also provided to adjust the width of the interstice to adapt it to the zipper.

[0037] The cut is advantageously made by laser means whose power is modified and calibrated according to the characteristics of the fabric but without impairing the zipper in any way.

[0038] It is during this step that the distance between the two adhesive films is appreciated, which are associated to the edges of the zipper. If it were not so, the laser cut could damage them, at least partly, producing both unwanted burns, also for the aesthetic value of the product, and poisonous fumes for the operators.

[0039] Once the laser cut has been made and the slider inserted in the chain of the zipper, the product and the

working are finished.

[0040] The method now described allows to obtain a product without manual steps - thus avoiding the errors which these entail - and allows to have a substantial continuity of surfaces, or images on the visible side of the fabric. In addition there is no need for laying or stretching steps or for another and/or additional feed in the movement or positioning of the fabric, further reducing the risk of defects which, in practice, is substantially canceled.

[0041] To these advantages can be added those concerning the reduced waste of material, or no waste at all.

[0042] Another advantage of the solution according to the present invention is the reduction in operating times, even as much as 50% or more, mainly because the steps of sewing the zipper to the fabric are substantially absent.

[0043] Moreover, the absence of folded edges in proximity to the zipper allows to keep the thickness of the fabric uniform in correspondence with the edges, in practice increasing the invisibility of the zipper.

[0044] A further advantage of the solution according to the present invention, given by the absence of stitches, is particularly evident in articles of sport clothing which during sport activities can rub the user's skin.

[0045] The article according to the present invention provided with this zipper has one side of the fabric on which the zipper is glued, and a second visible side where images or other alphanumerical signs are possibly positioned, opposite said first side, where a through cut of only the fabric is provided, said cut being in correspondence with the position of the zipper.

BRIEF DESCRIPTION OF THE DRAWINGS

[0046] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 schematically shows a lay-out of an equipment according to the present invention;
- fig. 2 shows a first enlarged detail of the equipment in fig. 1 in a first operating configuration;
- fig. 3 shows a second enlarged detail of fig. 1 in a second operating position;
- fig. 4 shows a third enlarged detail of fig. 1.

[0047] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one form of embodiment can conveniently be incorporated into other forms of embodiment without further clarifications.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0048] With reference to the attached drawings, an equipment is indicated in its entirety by the reference number 10 and is used to apply a zipper 11 to a fabric 12.

[0049] In particular the zipper 11 (fig. 3), of a substantially invisible type, comprises a closing chain 11a and two attachment edges 11b, while the fabric 12 comprises a first side 12a and a second side 12b opposite the first, which is visible during normal use and on which images 14 are printed.

[0050] In this case, for ease of description, reference is made to the application of the zipper 11 on a fabric 12 of an article such as knitwear or other clothing article, but it cannot be excluded that what is described in the following description can equally be applied in different applications.

[0051] In general, the equipment 10 (fig. 1) according to the invention substantially comprises an attachment station 13 to attach the zipper 11 to the fabric 12 and a cutting station 15 to cut the fabric 12 in correspondence with the opening of the zipper 11. The equipment 10 also provides a positioning station to position the zipper 11, where the edges 11b are pre-heated and which, in the present embodiment, substantially coincides with the attachment station 13.

[0052] The attachment station 13 (figs. 1-4) comprises a work top 16 on which the fabric 12 is positioned, a first unit 17 to feed the zipper 11, a second unit 19 to feed an adhesive support 20, and a drum 21 (figs. 2 and 3).

[0053] The work top 16 comprises two centering boards 32, placed adjacent each other and mobile on the work top 16 so as to define a centering interstice 33 between them to center the zipper 11, as will be made clear hereafter.

[0054] The movement of the centering boards 32 allows to adjust the distance between the centering boards 32 and therefore the sizes of the interstice, defined between them.

[0055] In any operating condition the interstice 33 is centered and aligned to the median portion of the drum 21.

[0056] In this way, the zipper 11 is fed to the drum 21, also continuously, keeping its chain 11a inside the interstice 33, so as to be guided in a centered manner toward the drum 21.

[0057] As well as having a guiding and drawing function, the drum 21 is suitable to heat and compress the material fed to it, so as to determine a consequent thermophysical reaction and, in the case of suitable glues, to cause a thermo-attachment, in this case between the zipper 11 and the adhesive support 20.

[0058] In this case, the second feed unit 19 (fig. 3) comprises a partition 28 suitable to feed two adhesive supports 20 at the same time, keeping them separated longitudinally so as to define a central gap.

[0059] In this way, the two adhesive films 20 are deposited on the edges 11b of the zipper 11, leaving the chain 11a partly free.

[0060] Advantageously, the gap between the two adhesive films 20 is wider than the laser ray which deter-

mines the cut which will then be made on the fabric 12 in the cutting station 15.

[0061] In particular each adhesive film 20 comprises two opposite surfaces with a glue, in which one of the two surfaces is protected by a covering film 24 (fig.2), or protective film, which can consist of any removable non-adhesive material, such as paper.

[0062] The attachment station 13 also comprises a guide unit 22 (fig. 1) provided with a reference indicator 22a, such as for example a laser indicator, able to emit a reference signal on the work top 16 in correspondence with the median longitudinal axis of the interstice 33, and a camera 22b which identifies the reference signal emitted by the reference indicator 22a.

[0063] The cutting station 15 (figs. 1 and 4) comprises a work top 23 on which the fabric 12 is positioned with the zipper 11 glued, a mobile cutting head 25 above the work top 23 and three centering guides 26 integrated into the work top 23.

[0064] The cutting head 25 is able to emit a laser ray capable of making the cut on the fabric alone, and it is mobile on two axes by means of a plotter device 27 commanded electronically.

[0065] The centering guides 26 are mounted on a single positioning frame in order to guarantee the co-planarity and reciprocal positioning, and each of these comprises two centering blades 29 opposite each other and defining an interstice 30.

[0066] In particular, each centering blade 29 is substantially coplanar to the work top 23 and can be selectively moved with respect to the other by means of a screw actuator 31. This movement allows to define the width of the interstice 30.

[0067] Advantageously, a single screw actuator is provided which moves both the centering blades 29 simultaneously with respect to a single axis of symmetry.

[0068] The equipment 10 as described heretofore, to apply a zipper 11 to a fabric 12, functions as follows.

[0069] In a preliminary step, the zipper 11 (fig. 2) is fed by a first feed unit 17 to the drum 21 in a guided manner through the interstice 33 of the work top 16.

[0070] In this step the edges 11b of the zipper 11 are pre-heated to a temperature such as to stabilize them, since their plastic component is stabilized.

[0071] Applicant has found that the pre-heating temperature can be comprised between about 20 and about 40 degrees centigrade, advantageously about 30 degrees centigrade, higher than the following one which is able to glue the portion of the fabric to the edges, or strip, of the zipper.

[0072] Subsequently (figs. 2 and 3), both the zipper 11 and the adhesive films 20 are fed simultaneously to the drum 21 by the respective feed units 17 and 19.

[0073] In particular the adhesive films 20 are made to stick to the edges 11b of the zipper 11on the side free of the covering film 24 (fig. 2).

[0074] Subsequently the zipper 11, positioned on the work top 16 in cooperation with the interstice 33, has the adhesive films 20 with their side protected by the covering film 24 facing upward, thus allowing the covering 20 to be removed.

[0075] By means of the guide unit 22 (fig. 1), which can be a laser ray, the effective position of the zipper 11 can be identified, so that the fabric 12, for the subsequent gluing step, can be correctly positioned with its first side 12a, not visible, above the zipper 11.

[0076] The correct positioning of the fabric 12 is done manually and is given by the indication of the position of the zipper 11 supplied by the laser reference indicator 22a of the guide unit 22 and by markers already present on the second side 12b of the fabric 12 previously affixed, for example during the printing of the fabric 12 itself, which indicate the zone where the fabric 12 has to be aligned.

[0077] The zipper 11 and the fabric 12, positioned and aligned with respect to each other, are then fed simultaneously toward the drum 21, in a guided manner due to the cooperation between the chain 11a of the zipper 11 and the interstice 33.

[0078] In this case, in the subsequent passage on the cutting station 15, three articles at a time are disposed, with obvious advantages in productivity.

[0079] In the cutting station 15 (fig. 4), each article is disposed with the zipper 11 facing toward the work top 23 with its chain 11a secured inside the interstice 30 and the fabric 12 with the second side 12b visible.

[0080] Subsequently, the plotter device 27 positions the cutting head 25 exactly in correspondence with the axis of symmetry between the two centering blades 29 and, therefore, substantially in axis with the zipper 11.

[0081] The same plotter device 27 moves the cutting head 25 along the fabric 12, so as to make a through laser cut on it in correspondence with the zipper 11, without damaging it.

[0082] The length of the through cut made by the cutting head 25 is normally less than the length of the zipper 11.

[0083] The fabric 12 is thus cut and can be selectively opened and closed by the zipper 11, without stitches and keeping the graphics of the image 14 unaltered, when the zipper 11 is closed.

[0084] Once the cutting step is finished, before opening the zipper 11, an opening slider is inserted so that the zipper 11 can function correctly.

[0085] It is clear that modifications and/or additions of parts may be made to the equipment 10 and method as described heretofore, without departing from the field and scope of the present invention.

[0086] For example it comes within the scope of the present invention to provide only one centering guide 26, or more than three centering guides 23 on the same work top 23.

[0087] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of equip-

ment for the application of a zipper to an article, the method to apply a zipper to an article, and the article provided with said zipper, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Equipment to apply an invisible zipper (11) to a fabric (12) comprising at least an attachment station (13) of said zipper (11) to said fabric (12) and a cutting station (15) provided with a cutting member (25), able to cut only said fabric (12), in a through manner, at least in correspondence with said zipper (11), **characterized in that** said cutting station (15) comprises a centering member (26) of said zipper (11) provided with two centering blades (29) which are disposed opposite each other and define an interstice (30) on which the zipper (11), glued with the fabric (12), is positioned, said centering blades (29) being selectively movable with respect to each other by means of an actuator (31), to vary the width of said interstice (30).

2. Equipment as in claim 1, **characterized in that** said centering member (26) is aligned, or is able to be aligned, with the cutting member (25) in order to guarantee the alignment between the position of said zipper (11) and the through cut on said fabric (12).

3. Equipment as in claim 1 or 2, **characterized in that** said cutting station (15) comprises a work top (23) on which the fabric (12) is positioned and the zipper (11) glued, **and in that** said centering member (26) is integrated into said work top (23).

4. Equipment as in any claim hereinbefore, **characterized in that** said cutting member comprises a cutting head (25) of the laser type.

5. Equipment as in any claim hereinbefore, **characterized in that** said attachment station (13) comprises heating means to heat the edges (11b) of the zipper (11) and gluing means able to apply at least an adhesive support (20) on said edges (11b), gluing said zipper (11) on a first side (12a) of the fabric (12).

6. Equipment as in claim 5, **characterized in that** the attachment station (13) comprises a work top (16) on which the zipper (11) and the fabric (12), a first feed unit (17) of said zipper (11), a second feed unit (19) of the adhesive supports (20), and a drum (21) are able to be positioned.

7. Equipment as in claim 6, **characterized in that** the work top (16) comprises two centering boards (32) able to define a centering interstice (33) between them, able to guide the zipper (11) toward the drum (21).

8. Equipment as in claim 6 or 7, **characterized in that** the drum (21) is suitable to heat and compress the zipper (11) and the fabric (12) between which an adhesive support layer (20) is affixed, so as to determine a thermo-attachment of said zipper (11) and the fabric (12).

9. Equipment as in any claim from 6 to 8, **characterized in that** the second feed unit (19) comprises a partition (28) suitable to feed two adhesive supports (20) at the same time, keeping them separated longitudinally so as to define a central gap in correspondence with the chain (11a) of the zipper (11).

10. Equipment as in any claim from 7 to 9, **characterized in that** said attachment station (13) comprises a guide unit (22), able to emit a reference signal on the work top (16) in correspondence with the longitudinal median axis of the interstice (33), and to identify said reference signal in order to guide the positioning of the fabric (12) with respect to the zipper (11).

11. Method to apply an invisible zipper (11) to a fabric (12) comprising at least a first attachment step in which the edges (11b) of said zipper (11) are glued on a first side (12a) of said fabric (12), and a second cutting step, in which said fabric (12) is cut in correspondence with said zipper (11), said cut being made through only with respect to said fabric (12), **characterized in that** before said cutting step, a first centering sub-step is provided by means of a centering member (26) provided with two centering blades (29) which are disposed opposite each other and which define an interstice (30), said centering sub-step providing at least the positioning of said zipper (11) with the fabric (12) on said interstice (30) to center and keep said zipper (11) in the desired position in order to guarantee the precision of the cut, and a second sub-step being provided of adjusting the width of said interstice (30) in order to adapt it to said zipper (11).

12. Method as in claim 11, **characterized in that** during said cutting step said centering member (26) is aligned with the cutting member (25) in order to guarantee the reciprocal alignment between the position of said zipper (11) and the through cut on said fabric (12).

13. Method as in claim 11 or 12, **characterized in that** before said first attachment step, a positioning sub-step is provided, in which edges (11b) of said zipper (11) are pre-heated to a higher temperature than the temperature needed to glue said zipper (11) to the

fabric (12).

14. Method as in claim 13, **characterized in that** the pre-heating temperature of the edges (11b) of the zipper (11) is about 20-40 degrees centigrade, advantageously 30 degrees centigrade, higher than the temperature needed to glue said zipper (11) to the fabric (12).

15. Method as in any claim hereinbefore, **characterized in that** upstream of the gluing step on at least one edge (11b) of the zipper (11) at least an adhesive support (20) is deposited, able to determine the gluing of the zipper (11) on the fabric (12).

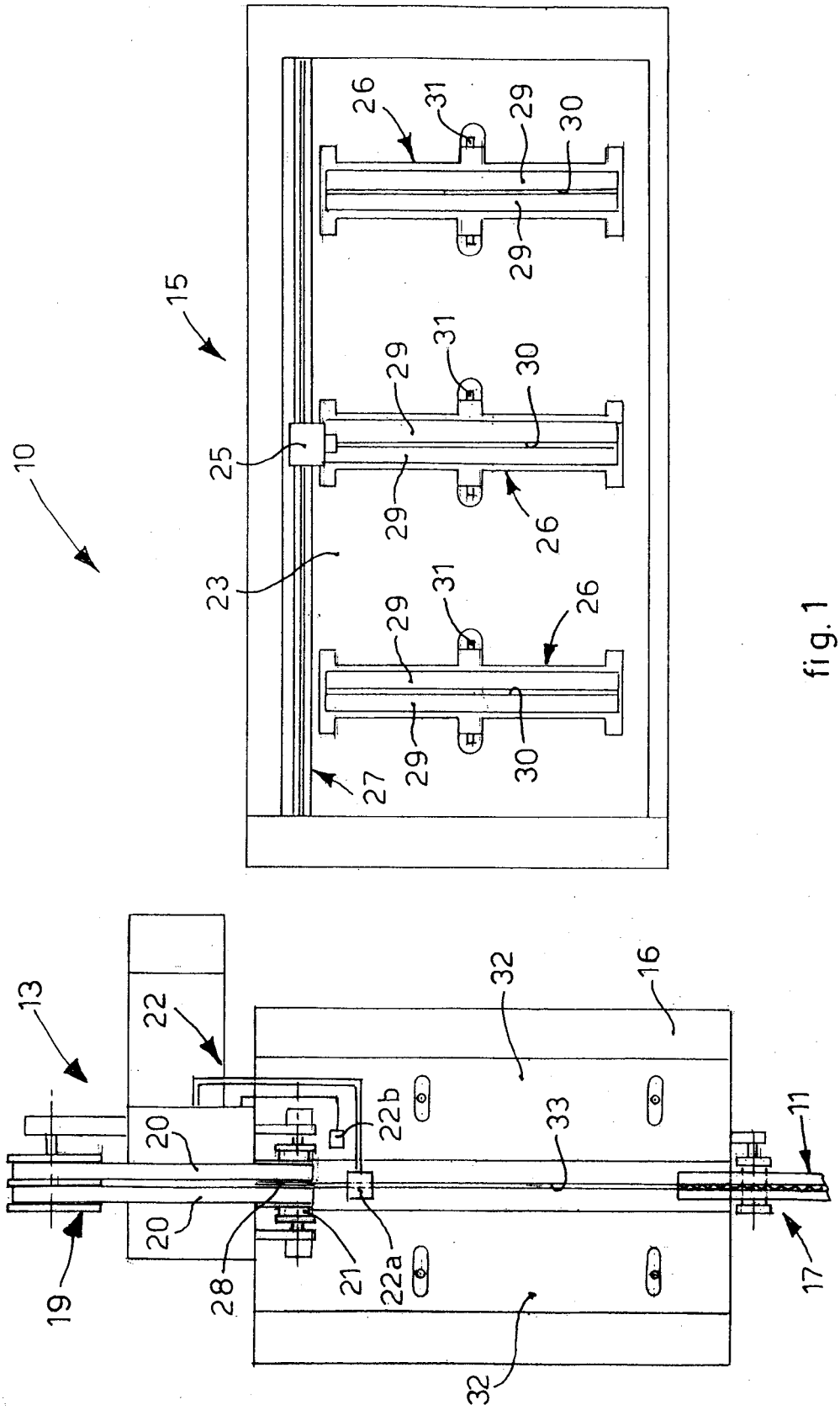

fig. 1

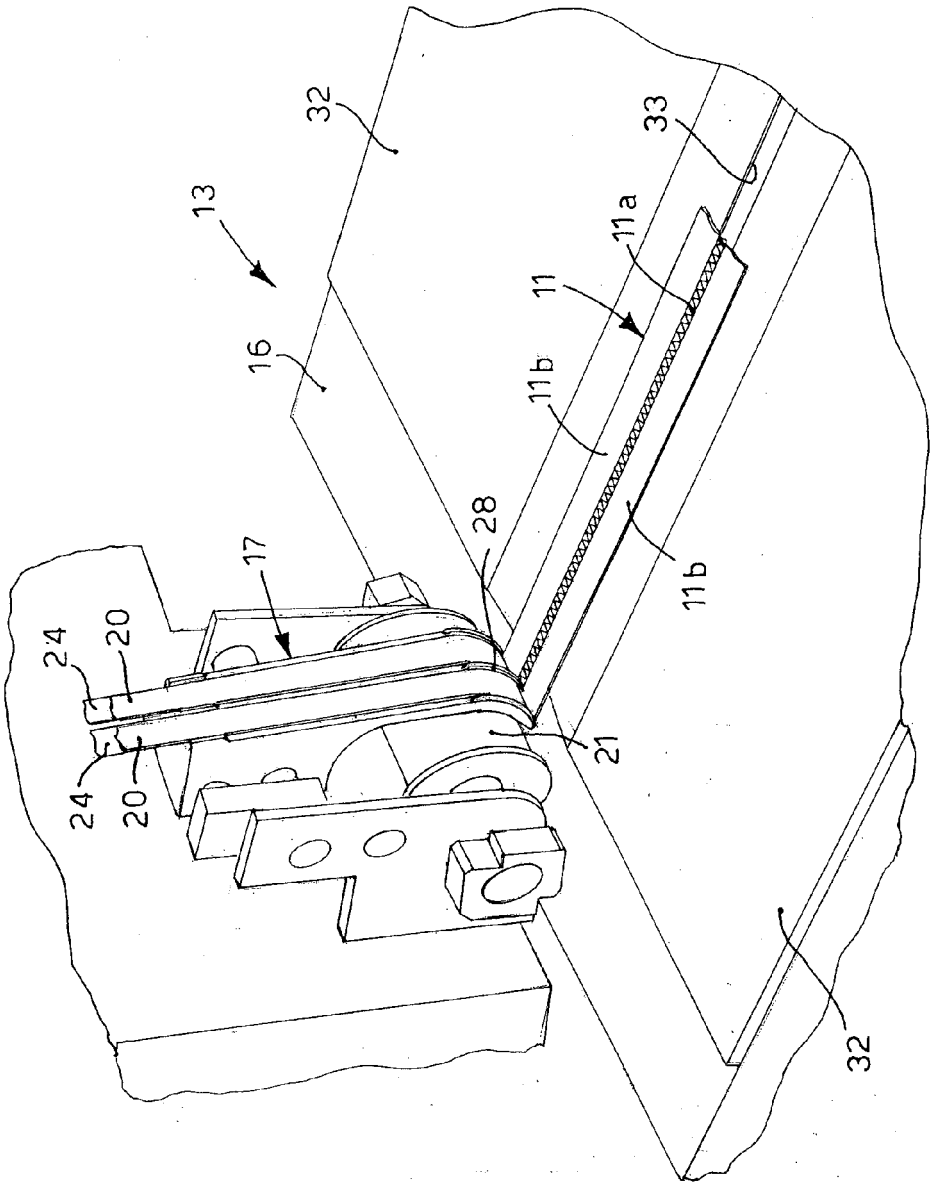

fig. 2

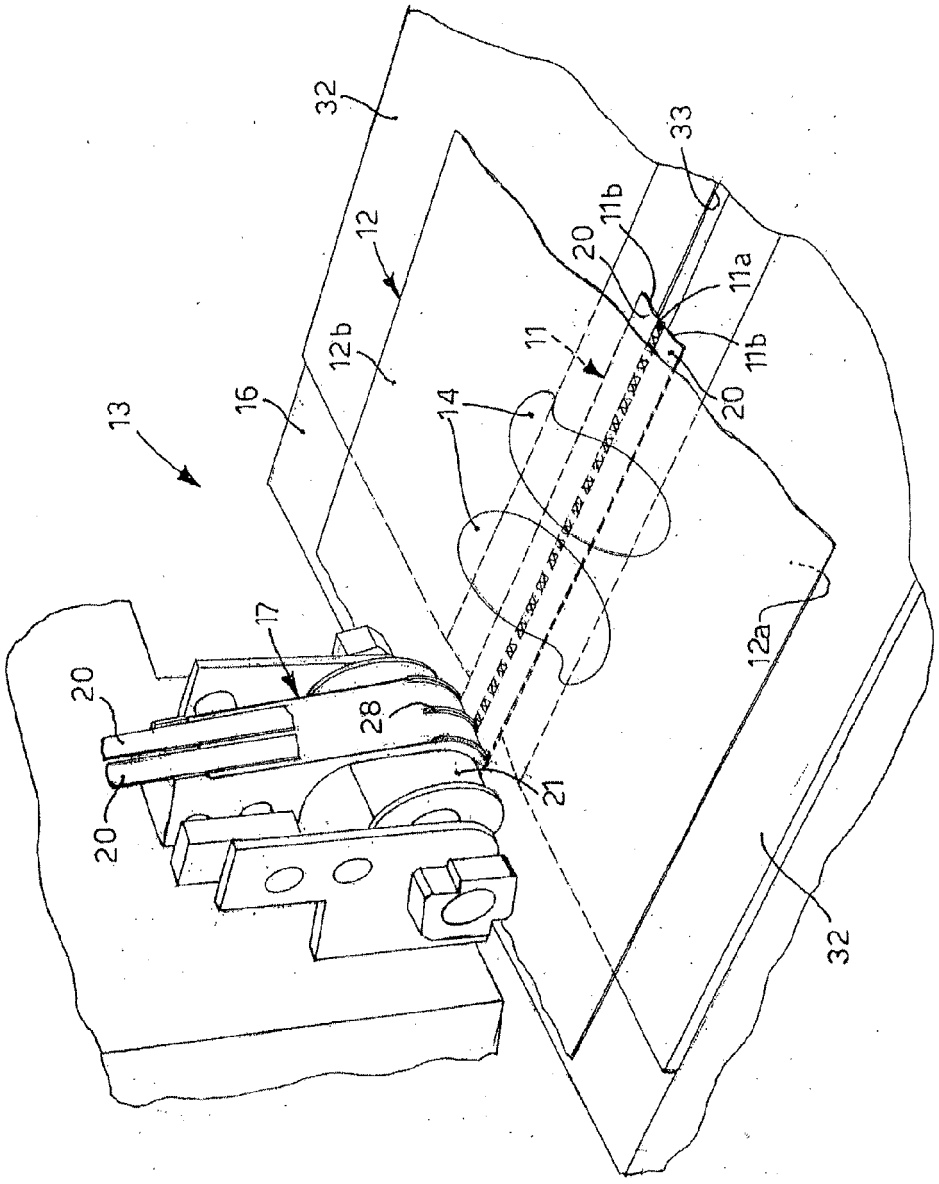

fig. 3

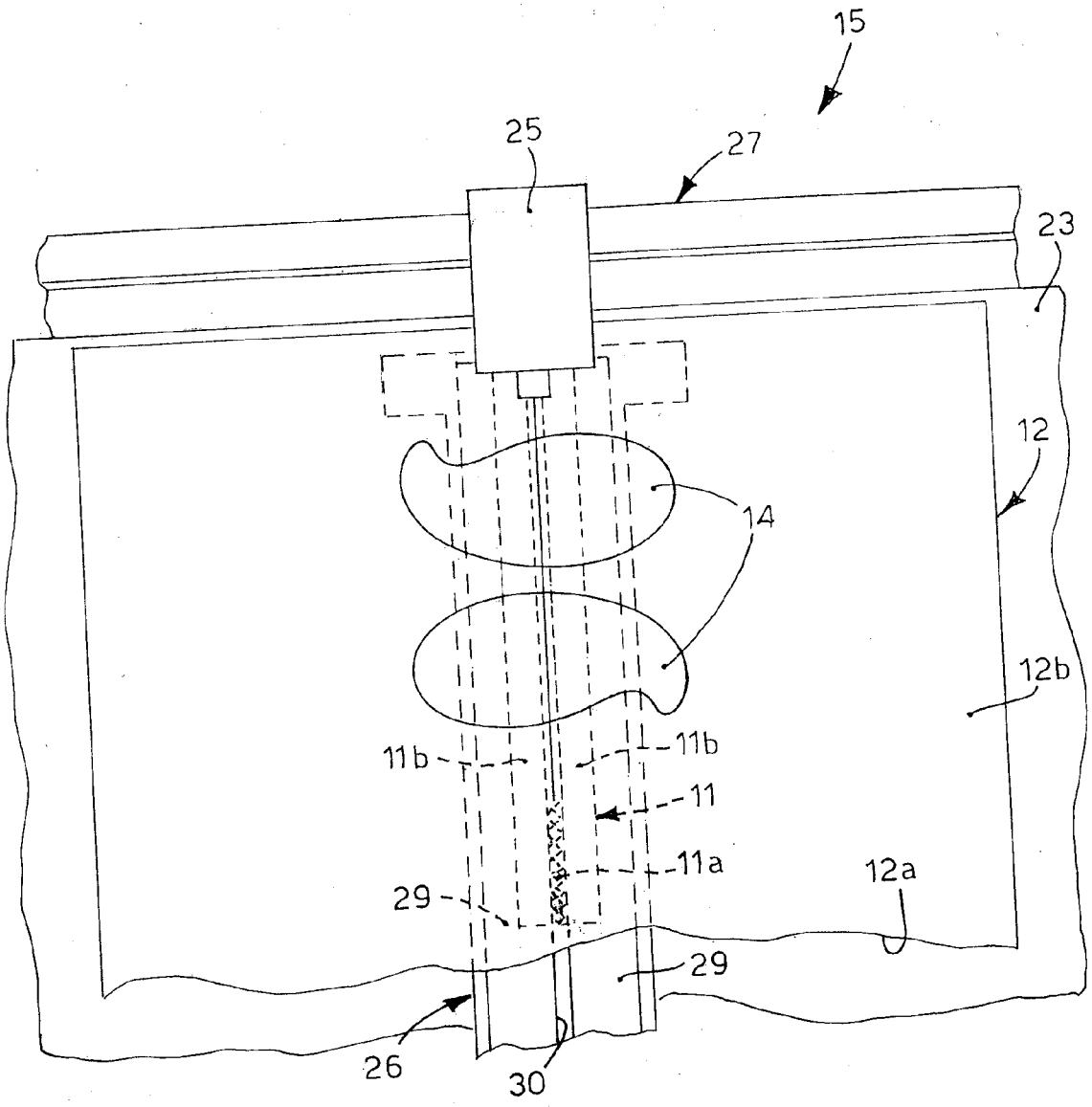

fig. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 17 8345

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 859 150 A (W.F. VAN AMBURG) 7 January 1975 (1975-01-07) * column 3, line 6 - column 5, line 34 * -----	1-3,11, 12	INV. A41H37/06
A	US 3 884 738 A (D.V. HOFIUS, SR.) 20 May 1975 (1975-05-20) * column 1, line 66 - column 4, line 24 * -----	1-3,11, 12	

TECHNICAL FIELDS SEARCHED (IPC)

A41H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 September 2012	Goodall, Colin

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

2

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 17 8345

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-09-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3859150 A	07-01-1975	AR 200434 A1	08-11-1974
		AU 499389 B2	12-04-1979
		AU 6677174 A	18-09-1975
		BE 812468 A2	15-07-1974
		CA 1022737 A1	20-12-1977
		CH 563131 A5	30-06-1975
		DE 2412845 A1	03-10-1974
		FR 2222038 A1	18-10-1974
		GB 1449737 A	15-09-1976
		IT 1011087 B	20-01-1977
		JP 49126451 A	04-12-1974
		JP 56053361 B	18-12-1981
		NL 7403606 A	24-09-1974
		US 3859150 A	07-01-1975
US 3884738 A	20-05-1975	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82