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(71) Applicant: **Promatech S.p.A.**
24020 Colzate (Bergamo) (IT)

(72) Inventors:
- **Oprandi, Giancarlo**
24020 Cerete Alto, (Bergamo) (IT)
- **Nettuno, Boris**
80100 Napoli (IT)
- **Capitanio, Osvaldo**
24020 Cene, (Bergamo) (IT)

(74) Representative:
Faggioni, Carlo Maria, Dr. Ing. et al
Fumero
Studio Consulenza Brevetti
Franz-Joseph-Strasse 38
80301 Munich (DE)

(54) Method and device for forming the inset selvedge in air looms

(57) Method and device for forming the inset selvage in an air weaving loom, of the type in which the weft yarn is cut so as to form free weft ends which are reinserted into the shed so as to be beaten up together with the next weft.

The method comprises, in succession, the following steps to be performed after closing of the shed and before insertion of a new weft: a) pneumatically deviating the weft ends into a receiving channel; b) pneumatically transferring the weft end from said receiving channel, in a direction perpendicular to the weft insertion line, to a zone upstream thereof; c) pneumatically reinserting the weft end inside the shed.

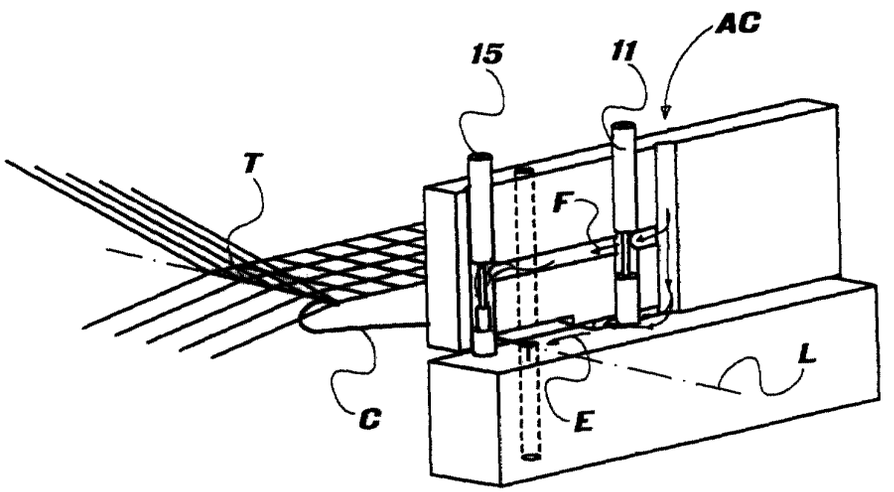

FIG.2C

EP 1 126 062 A1

Description

[0001] The present invention relates to a method and a device for forming the inset selvage in air looms and in particular to a device of this type operated pneumatically and devoid of movable parts.

[0002] A first method and device of this type, designed and marketed by the same Applicant, has been disclosed EP-A-534,429. According to the teaching of this patent, after having inserted and beaten-up the weft and cut to size the free end thereof, the weft tail thus formed was sucked up inside a suction nozzle, the nozzle was displaced into a zone upstream of the weft insertion line and, finally, the weft tail was reinserted inside the shed, reversing the direction of the air flow inside the nozzle. This solution has the advantage of providing excellent results from a weaving point of view, providing an inset selvedge free from defects and with a constant height, but has the drawback of the mechanical complexity required for nozzle displacements.

[0003] A different and subsequent solution has been disclosed in EP-A-786,547. According to this patent, the weft tail, soon after cutting, is initially taken up by a suction nozzle housed in a first selvedge forming device, arranged along the extension of the weft insertion line. A blowing nozzle arranged in said first selvedge forming device is then apt to transfer the weft tail, moving the same in a direction parallel to the weft insertion line, as far as a second selvedge forming device arranged in the vicinity of the shed. A blowing nozzle housed in this second selvedge forming device finally inserts the weft tail inside the shed. In this second known solution, there is the advantage of eliminating moving mechanical parts, but the disadvantage of not performing reinsertion of the weft tail in a zone which is desirably upstream of the weft insertion line, as occurred instead in EP-A-534, 429, said reinsertion occurring in fact in a zone perfectly aligned with the weft insertion line.

[0004] The reinsertion of the weft tail in a zone upstream of the weft insertion line is a highly desirable procedure because in this zone the distance between the warp yarns is sufficiently high to ensure that 100% of the weft tails are reinserted correctly inside the shed. If operation takes place in the vicinity of the weft insertion line, as in fact occurs in EP-A-786,547, the distance between the warp yarns is very low and therefore there is the possibility - anything but infrequent - that weft tails may be reinserted outside the shed, i.e. above or below the warp yarns, so that they are not woven inside the fabric together with the following wefts, resulting in a defective fabric.

[0005] It was proposed, in order to overcome this drawback, to incline in an upstream direction the blowing nozzle of the second selvedge forming device so as to direct the weft ends into a zone where the distance between the warp yarns is sufficiently high. In this way it is possible to ensure, in an effective manner, a sufficiently high percentage of correctly reinserted weft tails, although the direction of the weft tail is greatly inclined with respect to the weft insertion line and these weft tails are therefore beaten up by the reed in a non-uniform manner, resulting in the formation of a selvedge lacking of a constant height.

[0006] The object of the present invention is therefore that of providing a method and a device for forming the inset selvage in air looms, which are devoid of the drawbacks shown by the known selvedge forming devices and, therefore, in particular, which do not use moving mechanical parts, while allowing reinsertion of the weft tails in a zone upstream of the weft insertion line, and along a direction substantially parallel to said line.

[0007] This object is achieved, according to the present invention, by means of a method for forming the inset selvedge according to Claim 1.

[0008] This method is preferably implemented using a device according to Claim 5.

[0009] Further characteristic features and advantages of the present invention will emerge, however, more clearly from the detailed description which follows of a preferred selvedge forming device according to the method of the invention, illustrated in the accompanying drawings, in which:

fig. 1 is a schematic plan view of a loom incorporating four devices for forming the inset selvage according to the present invention;
fig. 2A is a front perspective view of the device for forming the inset selvage according to the present invention;
fig. 2B is a perspective view, similar to fig. 2A, with parts partially removed, showing a first selvedge formation step;
fig. 2C is a perspective view, similar to fig. 2B, showing a second selvedge formation step;
fig. 3A is a perspective view, from below, of the top part of the device for forming the inset selvage according to the present invention;
fig. 3B shows, on a larger scale, the detail of the adjustable nozzle shown in Fig. 2C; and
figs. 4A, 4B and 4C show three different operation steps of the device.

[0010] The particular structure of the inset selvedge forming device according to the present invention is clearly shown in Fig. 2. This device consists of a block of metallic material 1 formed by a top block 1s and a bottom block 1i, which are assembled together and fixed to the loom in a manner known per se, using screw means (not shown) after performing the necessary mechanical machining operations thereon. Once assembly has been performed, the block 1 appears as in Fig. 2A, while its internal structure, described in detail below, is illustrated in the split views according to Figs. 2B and 2C as well as in Figs. 3A and 3B.

[0011] The top block 1s has a first vertical through-channel 2 exactly crossing the weft insertion line L. The

channel 2 continues into a channel 3 aligned therewith and formed in the bottom block 1i. In addition to the channel 2, the top block is also comprises other three vertical through-channels 4, 5 and 6, the axes of which lie in a vertical plane which is perpendicular to the weft insertion line L and positioned at a certain distance from the channel 2, towards the outside of the weaving zone, as can be seen in Figs. 2B and 3A.

[0012] The channel 4 is a smooth-wall channel, similarly to the former channels 2 and 3. On the contrary, the channel 5 has an internal threading, inside which an adjusting screw 11 with a narrow-diameter central portion is engaged. The channel 6 houses internally an adjustable nozzle 7, the structure of which will be described below, and is provided with end zones with a larger diameter which form the seats for respective sealing O-rings. The channels 4, 5 and 6, finally, are connected together by a transverse channel 8, which channel also has smooth walls.

[0013] The nozzle 7, which has a central zone with a narrow diameter 7a, is bored internally and this internal cavity communicates on the one hand with one or more inlet openings 9 and on the other hand with a single outlet opening 10. The outlet opening 10 may have any suitable shape in order to create an outlet air jet of the desired shape. A preferred opening 10 has, for example, the shape of a slit, with the larger side arranged parallel to the warp yarns and with the internal walls flared in the form of a triangle, so as to form a fan-type air jet with the desired angular width.

[0014] The bottom part of the top block 1s, finally, is provided with recesses 12 and 13 for guiding the air flows, the function of which will become clear below. The recess 13 is formed in an undercut zone 14 of the block 1s, suitable for allowing the weft yarn T to pass through the block 1.

[0015] During operation of the device, after a weft T has been inserted into the shed, beaten up by the reed P and then cut to size by the cutting devices G, thus forming a free weft end, a compressed air flow is activated inside the channel 2. This flow penetrates into the underlying aligned channel 3, drawing with it the weft tail C which, during the weft insertion step is arranged transversely between the outlet mouth of the channel 2 and the inlet mouth of the channel 3, inside the cavity formed between the blocks 1s and 1i by the undercut zone 14. This situation is shown schematically in Fig. 4A and in greater detail in Fig. 2B.

[0016] While the reed P is reassuming its retracted position (Fig. 4B), the air flow to the channel 2 is interrupted and an air flow to the channel 4 is activated. The compressed air introduced into this channel splits up at the channel 8 into two streams E and F; the distribution ratio of the streams E and F may be adjusted by operating the screw 11 which throttles, with its end, the flow of the stream E through the recess 12.

[0017] The compressed air flow E, flowing out from the recess 12, interferes with the weft tail C housed inside the channel 3 and begins to transfer the same in a direction perpendicular to the weft insertion line L, i.e. towards a zone upstream of said line, until the weft tail C is positioned in front of the outlet opening 10 of the nozzle 7. In order to facilitate correct transfer of the weft tail C, the walls of the recess 12 may be formed at the outlet so as to direct the flow E towards the common axis of the channels 2 and 3.

[0018] At the same time the compressed air flow F passes along the whole channel 8, enters into the channel 6 at the narrow-diameter zone 7a of the nozzle 7 and then, penetrating into the inlet openings 9 and into the internal cavity of the nozzle 7, emerges from the opening 10 exactly in the zone to which the weft end C has been transferred by the air flow E. In this way the flow F allows the said weft tail C to be reinserted inside the shed, as schematically illustrated in Fig. 4C and, in greater detail, in Fig. 2C, during the weaving step where in the reed P is moving back towards the beating-up zone. The angular position of the nozzle 7 may be adjusted using an ordinary screwdriver inserted into an end notch 15, so as to obtain the desired direction of insertion of the end C, which is as parallel as possible to the weft insertion line.

[0019] With the method and device according to the invention it has therefore been possible to achieve fully the predefined object since the weft tail C is displaced by the air flow E from a position aligned with the weft insertion line L into a zone upstream thereof. The insertion of the weft end by the compressed air flow F may be performed in this zone in a reliable manner and parallel to the weft yarns, owing to the fact that the warp yarns are here positioned at a greater distance from each other.

[0020] The invention has been described with particular reference to the embodiment illustrated, but it is obvious that many different embodiments thereof within the reach of a person skilled in the art are possible, all of which fall within the scope of the invention as defined in the accompanying claims.

Claims

1. Method for forming the inset selvage in an air weaving loom comprising means for inserting the weft yarn inside the shed, a reed for beating up the weft yarn thus inserted and means for cutting the weft yarn - of the type in which the weft yarn is cut at a distance from the first and last warp yarn sufficient to form free weft ends which are reinserted into the shed so as to be beaten up together with the next weft - the method comprising, in succession, the following steps to be performed after closing of the shed and before insertion of a new weft:

    a) pneumatically deviating the weft end into a receiving channel;

b) pneumatically transferring the weft end from said receiving channel, in a direction perpendicular to the weft insertion line, to a zone upstream thereof;
c) pneumatically reinserting the weft end inside the shed.

2. Method according to Claim 1, wherein the axis of said receiving channel substantially intersects the weft insertion line and forms an angle with respect thereto.

3. Method according to Claim 1 or 2, wherein said steps for pneumatically deviating, transferring and reinserting the weft end are performed by means of respective compressed blowing air jets formed in a single pneumatic device for forming the inset selvage.

4. Method according to Claim 3, wherein the steps for pneumatically transferring and reinserting the weft end are performed by means of a single compressed air jet divided into two separate flows inside said pneumatic device for forming of the inset selvage.

5. Device for forming the inset selvage in an air weaving loom, comprising means for inserting the weft yarn inside the shed, a reed for beating up the weft yarn thus inserted and means for cutting the weft yarn - of the type in which the weft yarn is cut at a distance from the first and last warp yarn sufficient to form free weft ends which are reinserted into the shed so as to be beaten up together with the next weft - characterized in that it comprises a channel for receiving the weft end, formed in a block fixed to the loom in a position adjacent to the edge of the fabric being woven along the weft insertion line, first pneumatic means for deviating the weft end inside said receiving channel, second pneumatic means for transferring the weft yarn from said receiving channel, in a direction perpendicular to said weft insertion line, to a zone upstream thereof, and third pneumatic means for reinserting the weft end inside the shed.

6. Device according to Claim 5, wherein said first, second and third pneumatic means are all housed inside the same block into said receiving channel is formed.

7. Device according to Claim 5 or 6, wherein the axis of said receiving channel substantially intersects the weft insertion line and forms an angle with respect thereto.

8. Device according to Claim 5 or 6, wherein the axis of said receiving channel is substantially perpendicular to the weft insertion line.

9. Device according to any one of Claims 5 to 8, wherein said first pneumatic means are formed by a first channel supplying compressed blowing an aligned with the weft yarn receiving channel.

10. Device according to any one of Claims 5 to 8, in which said second pneumatic means are formed by a second channel supplying compressed blowing air, the end portion of which has a direction substantially perpendicular both to the axis of said receiving channel and to the weft insertion line, the air flow of said second pneumatic means being apt to strike the inlet opening of said weft end receiving channel, so as to transfer the weft end, in a direction perpendicular to the weft insertion line, to a zone upstream thereof.

11. Device according to any one of Claims 5 to 8, in which said third pneumatic means are formed by a third channel supplying compressed blowing air ending in a nozzle, said nozzle being positioned upstream of the weft insertion line, in a zone where the weft end is supplied to by said second pneumatic means, the air flow of said third pneumatic means being apt to reinsert the weft end inside the shed.

12. Device according to Claims 10 and 11, wherein said second and third supply channels are connected to a single compressed blowing air source, control means being further provided for adjusting the distribution of the compressed air flow between said two channels.

13. Device according to any one of Claims 5 to 12, in which the mouth of the nozzle of said third supply channel is located at a distance from the edge of the fabric greater than that of said weft end receiving channel.

14. Device according to any one of Claims 5 to 13, in which the mouth of the nozzle of said third supply channel is in the form of a slit with the longer side parallel to the warp yarns and with internal walls flared in the form of a triangle.

15. Device according to any one of Claims 5 to 14, in which the angular position of the mouth of the nozzle of said third supply channel is adjustable.

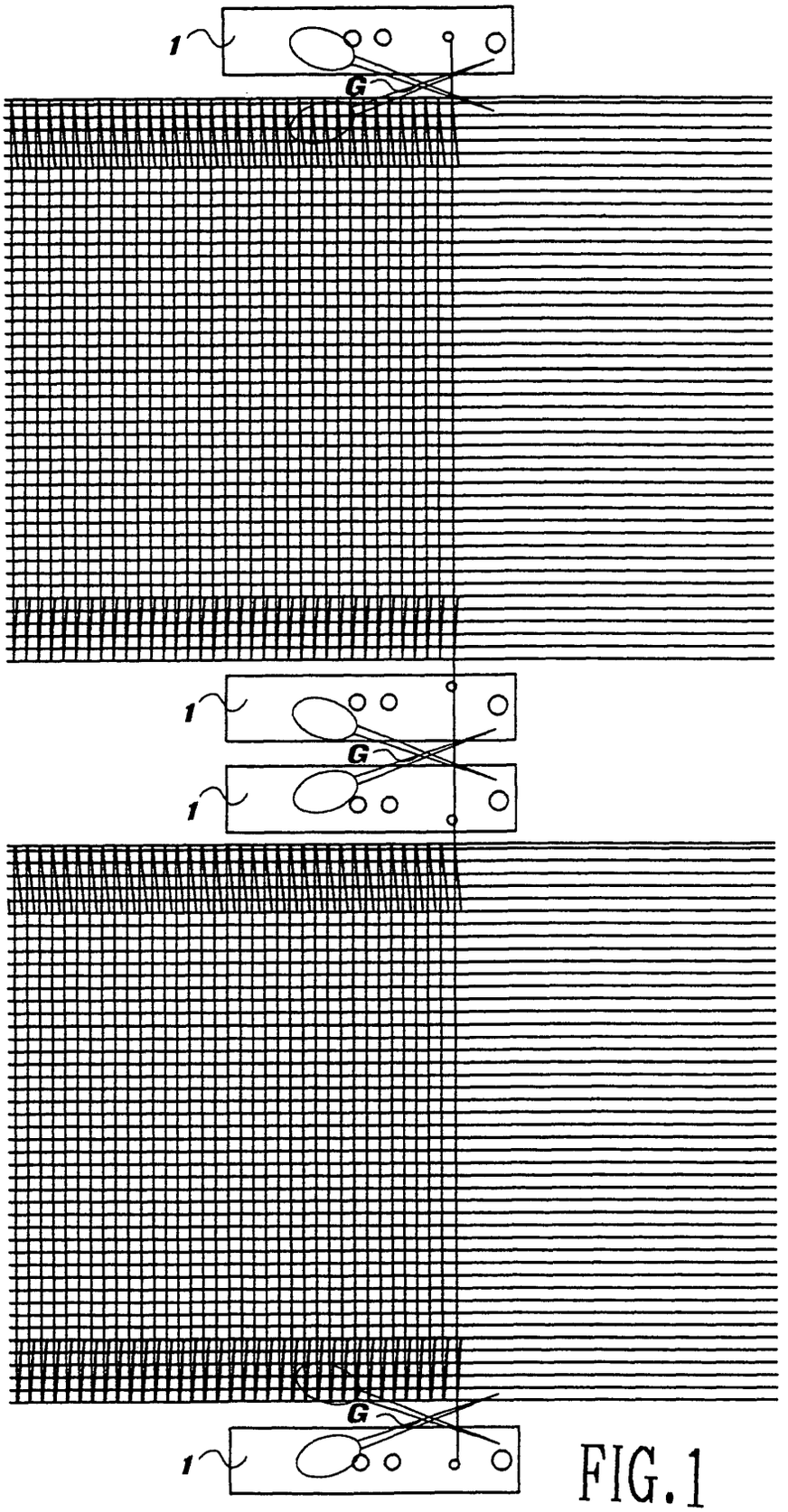

FIG.1

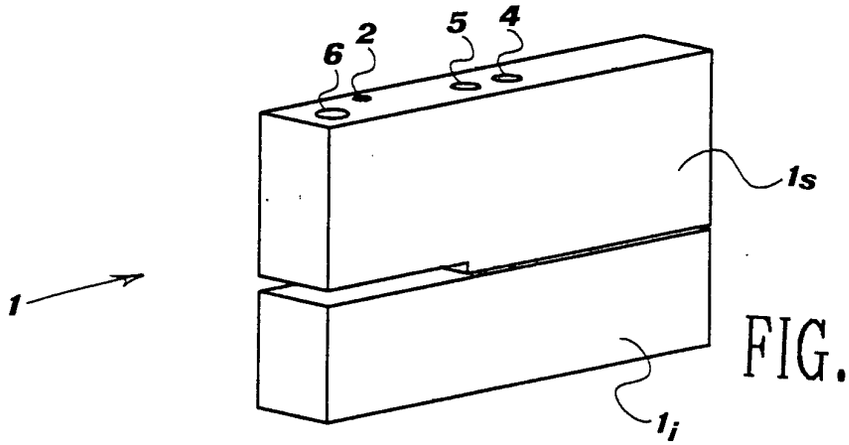

FIG.2A

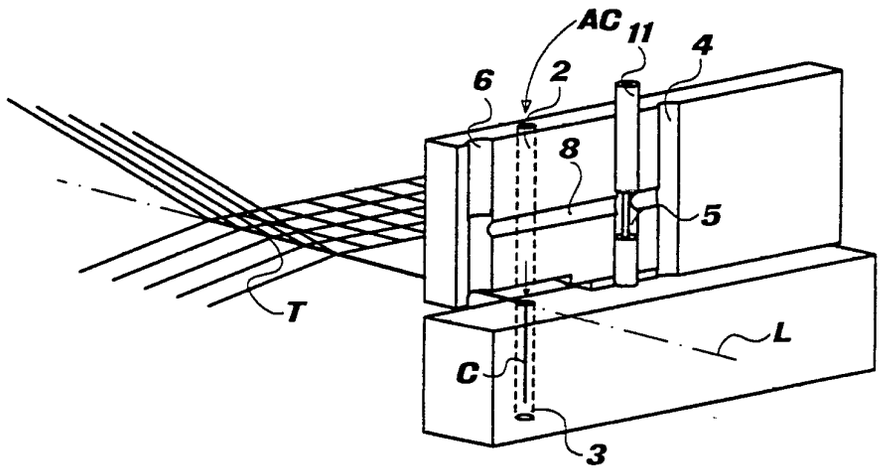

FIG.2B

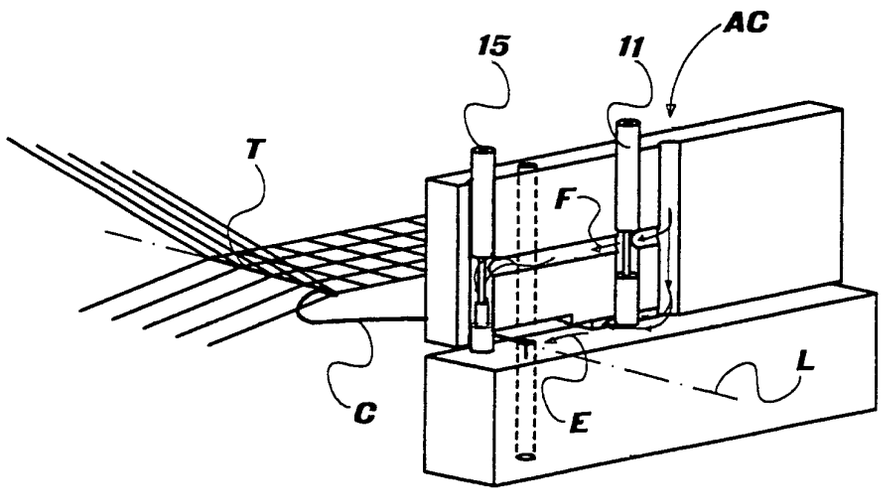

FIG.2C

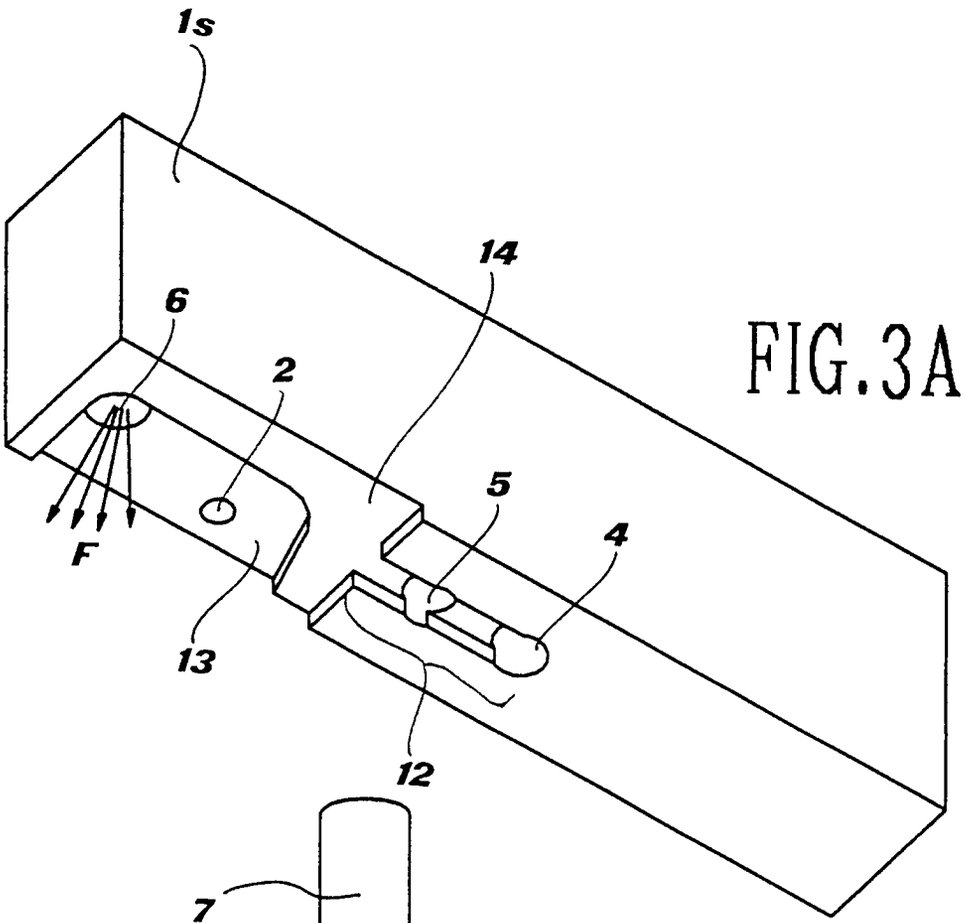

FIG.3A

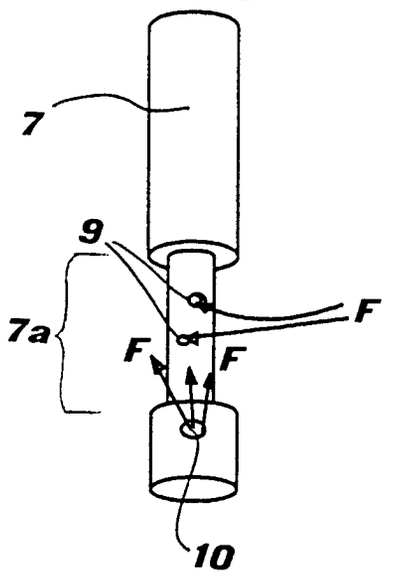

FIG.3B

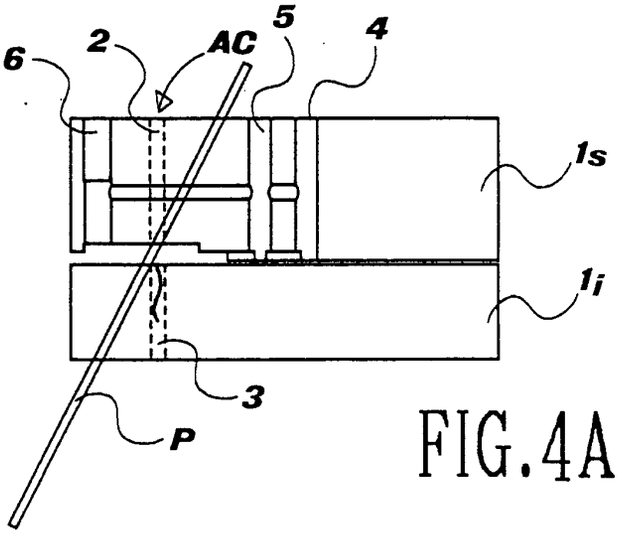

FIG.4A

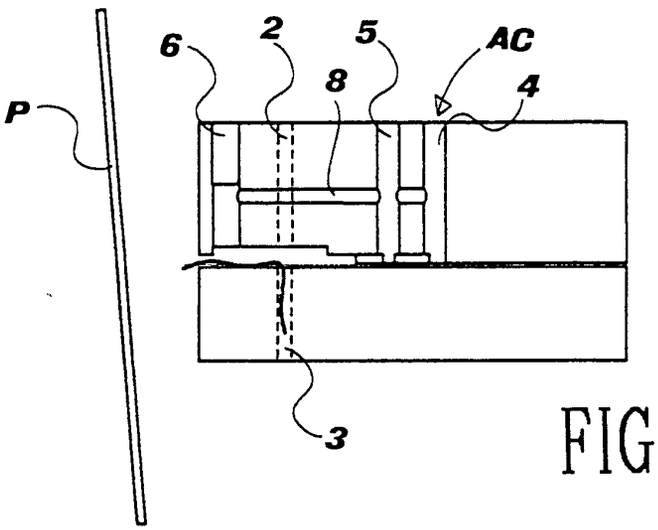

FIG.4B

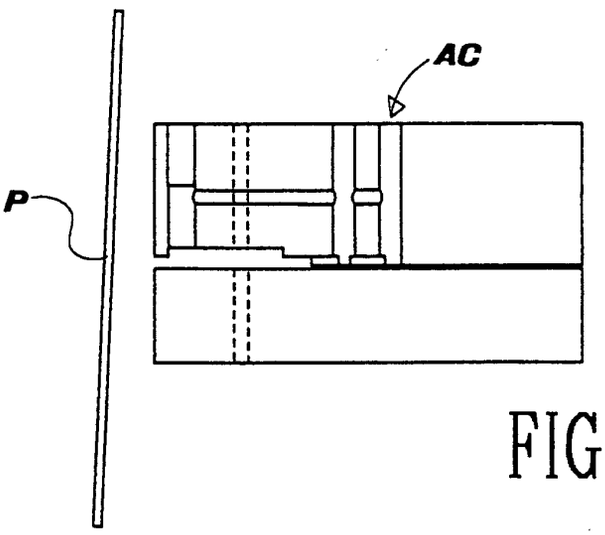

FIG.4C

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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 3476

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A,D	DE 195 48 846 C (LINDAUER) 10 October 1996 (1996-10-10)		
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 May 2001	Boutelegier, C

CATEGORY OF CITED DOCUMENTS

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