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(54) **Separable adjustable cushion for backpart moulding machine with tubular pressure element and flexible mould**

(57) Separable cushion mechanism for forming the heel of the shoe uppers, which can be mounted on the backpart moulding machine with its symmetry axle at the projection of the shoe last axle. This forming cushion is composed of two equal arms (1) fixed and adjusted on one plate support (8) to create a symmetrical cavity. Two pneumatic flexible pressure tubes (2) are fixed on the internal side of this cavity and when they are activated by compressed air, they are forcing one flexible mould (3) 1-15 mm thickness (it depends on the case) to press the shoe upper on the aluminium last to take the desired shape. This mould is perimetrically free and can be turned round its pin (7).

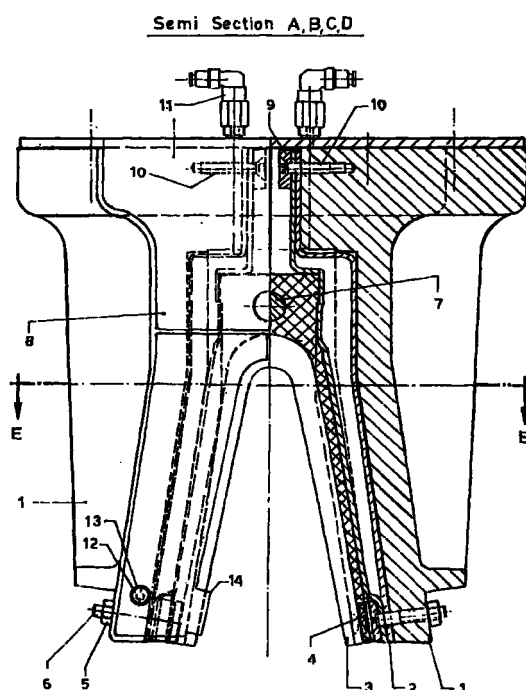


FIG. 1

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Description

[0001] The invention under description refers to one separable mechanism, which is made of two equal solid arms, two pneumatic flexible pressure elements and one mould. All these main parts are assembled in one unit, called the cushion, which can be mounted in back-part moulding machines, to perform the forming of the heel of the shoe uppers.

[0002] The cushions for forming the shoe uppers are basic equipment of all backpart moulding machines. Until now, in the modern shoe industry, there are mainly in use three types of such cushions:

[0003] First type: It is based on a mechanical system of levers, which is forcing with one mould, 30-40 mm thickness, in order to embrace and press the shoe upper being on the aluminium last. By this action, the heel of the shoe upper is getting its desired possible form.

[0004] Second type: The cushion is made of one solid metallic element having a symmetrical cavity shaped like an inverse U, ie $\cap$. On the internal sides of this cavity is fixed an air bag of square or rectangular figure, which is peripherally air-tight with steel blades and screws. The surface of this air chamber is covered with a piece of leather fixed with the same blades and screws. During the forming process the leather is coming in contact with the shoe upper and transferring the pressing forces from the expanding air-bag. By applying compressed air into the air-bag, this one expands to form a spherical section which cannot embrace perfectly the aluminium last, ie the entire surface of it. Given that the aluminium last is moving upwards (carrying the upper by a pneumatic cylinder) to enter the cavity of the cushion, it is impossible with this type of cushion to perform a perfect forming, ie to get shoe uppers without wrinkles in many types of leather.

[0005] Third type: The cushion is made again of one solid element having a symmetrical cavity shaped like an inverse U, ie $\cap$. On the internal sides of this cavity is fixed one flexible tubular element surrounding the external sides of the mould. When this tubular element expands by applying compressed air it forces the mould to close and to embrace the upper being on the aluminium last. The mould of this type of cushion is shaped like $\cap$ and it has a relatively big thickness, 30-40 mm. The internal sides of this mould have also two cavities corresponding to the aluminium last with which the mould is supposed to co-operate. The fabrication of this type of moulds is done by moulding process using the shoe lasts as models, plus the thickness of the shoe upper. For removing the uppers after forming, it is necessary to open the mould allowing to the aluminium last to redraw. In this type of cushions the opening of the mould is effected by one steel plate fixed on the external sides of the mould by riveting it with steel nails. This steel plate operates like a curved plate spring which opens the mould if the tubular pressure element is not activated.

[0006] The third type of forming cushion has been patented by the inventor of the present invention Patents No 85073 and No 85074 have been issued in Greece, and No 548755 in Italy.

[0007] All these cushions as above, besides that they perform to some extend the forming of the heel of the shoe uppers, are involving serious disadvantages concerning the quality and the cost:

a. The great thickness of moulds in types one and three (30-40 mm) is the reason for imperfect embrace of the shoe uppers.

b. The steel plate for opening the mould after forming (third type of cushion) represents an additional work and cost for fabricating and fixing the mould.

c. For different sizes and shapes of the shoe lasts, the mould must be replaced.

d. In the second type of cushion, when the air-bag expands forming a spherical section, the leather which protects the air-bag, as it is fixed peripherally, it has no margin to reciprocate in order to get the gaps. As a result, in many cases (it depends on the leather) to get shoe uppers with wrinkles in the forming. Also, the cleaning of the leather of the air-bag from the dirties of the shoe uppers is very difficult on the internal sides of the cavity.

e. There is an important delay of time for the assembly and maintenance of the forming cushions.

[0008] The present invention, just to cure all these previous disadvantages, has the target to create a forming cushion mechanism permitting:

To achieve a perfect forming without wrinkles on the heel of the shoe uppers.

To form successfully shoe uppers of different heel height and to use aluminium lasts of various shapes. This is due to the shape and the small thickness (1-15 mm, it depends on the case) of the concrete mould.

All these together are achieved using the new separable forming cushion mechanism which is composed of two equal solid metallic arms placed against each other in order to obtain a symmetrical cavity shaped, as we can see in FIG.1.

On the internal side of each arm is fixed one piece of flexible tube being air-tight on both ends with two steel blades and screws. The width of this tube piece equals the width of the arm side and it is selected large enough to embrace the shoe uppers when the tubes are expanding.

Consequently, there are two air-chambers (two pieces of flexible tubes), symmetrically fixed in the cavity of the separable cushion, each one with a fitting in the upper end for connecting to the compressed air of the back-part moulding machine. In this way, the separable cushion is composed of two equal semi-elements, each one equipped with an elastic tube. These two semi-elements are fixed against each other on a steel plate

guide and the entire unit is mounted on the body of the backpart moulding machine so that its axle of symmetry coincides with the vertical axle of the aluminium last.

Finally, in the cavity of the separable cushion, as above, is placed the mould, made of a flexible material like PU, rubber, leather etc. This mould has a small thickness 1-15 mm (it depends on the case) and it can be fixed in the cavity with one pin passing through two holes on the plate guide or even with a spring or a piece of cord.

[0009] Referring to the advantages of this new separable cushion mechanism for forming the heel of the shoe uppers, the following remark are valid:

a. The width of each flexible tube of the semi-elements (which equals the width of the arm side) is large enough and so is obtained the complete embrace between the mould and the aluminium last carrying the upper. As a result, the forming is done without wrinkles.

b. Using the concrete mould of small thickness (1-15 mm, it depends on the case) shoe uppers of different heel height can successfully be formed and aluminium lasts of various shapes can be used. This is due to the shape and the thickness of the concrete mould.

c. there is no need of curved plate spring to bring back the mould to its inactive initial status. This is done by itself, due to the small thickness and flexibility of the mould which reciprocates in the socket of the protective guide (14). The absence of plate spring in the separable cushion mechanism reduces considerably the fabrication cost.

d. the maintenance time is reduced in half, in comparison to the existing moulds.

e. we can freeze the mould by applying frigid gas or liquid to the flexible tube. By this way we convey the freezing to the upper through the mould. This is due to the small thickness of the concrete mould and to the possibility to embrace the upper. The freezing of the flexible mould in combination with the freezing of the aluminium last are giving the best results at the minimum possible time.

[0010] The present invention is described with the help of an example and of the figures attached herewith, which make clear its operation.

At first, the assembly of each semi-element has to be done, ie one arm, one flexible tube piece, two fixing blades and screws, one fitting for each semi-element. The two semi-elements are fixed and adjusted on the steel plate guide (8). Finally the mould is placed into the cavity and it is fixed there with one pin locked up on the plate guide.

In **FIG.1** is shown a general front view semi-section of the new separable cushion. On **FIG.1** one can see also the solid metallic arms (1), the flexible pressure tubes (2), the flexible mould (3), the steel

blades and the screws for air-tightening the flexible pressure tubes on the lower (4) and upper (9) sides of the cavity, the steel plate guide (8) for mounting the semi-elements (arms), the fittings (11) for compressed air intakes, the pin (7) for fixing the mould and the protective guide of the mould (14).

In **FIG.2** is shown a down view of the cushion. One can see the steel blade (9) and the screws (10) for fixing and air-tightening the flexible pressure tubes (2) on the upper end. One can see also the fittings (11) for connecting to compressed air, as well as the threads for fixing and adjusting the two arms and for mounting the cushion on the moulding machine.

In **FIG.3** one can see a moulding machine with two forming cushions mounted so that their symmetry axles coincide with the vertical axles of the shoe lasts (20).

In **FIG.4** is shown the section **E-E'** of the cushion of the **FIG.1**. One can see the status with compressed air, ie the active status and the way that the mould embraces the upper. On the internal sides of the two arms (1) we see the two flexible pressure tubes (2) and the form that they take when they have been expanded. Each time, the flexible mould (3) with the upper (21) take the form of the aluminium last (20) giving us the forming.

In **FIG.5** is shown the section **E-E'** of the cushion of the **FIG.1**. One can see the status without compressed air in the flexible pressure tubes (2), the form of the flexible mould (3) without pressure, the aluminium last (20) and the upper (21). Also, we can see that there is plenty of space for redrawing the aluminium last (20) after the forming phase and that the mould can be moved to the left or right for getting the gaps.

In **FIG.6** is shown the section **E-E'** of the cushion. One can see the different way of air-tightness of the flexible pressure tube (2a) (which can be made of any flexible material, like leather etc). We choose this way of air-tightness when we want to form thick uppers (army boots etc) that the required pressure is over 8 bar.

In **FIG.7** is shown one of the two flexible pressure tubes (2), the steel blades for air-tightening the flexible pressure tube on the lower (4) and upper (9) sides of the cavity and the fitting (11) as well. The flexible pressure tube is fixed on the internal side of the arm (1), as shown in **FIG.1**.

In **FIG.8** is shown the shaping of the flexible pressure tube (2a) (which can be made of any flexible

material, like leather etc), which is air-tight at three points. We use this type when we want to form thick uppers (army boots etc) that the required pressure is over 8 bar.

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In **FIG.9** is shown a flexible mould (3) of general use and small thickness, which is fixed with a pin (7) between the two arms (1). This mould can be made of any flexible material: PU, rubber, leather etc.

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In **FIG.10** is shown a flexible mould (3a), which is made of the same materials as the previous one. The fixing of this mould, between the two arms, can be effected by a spring or a piece of cord. We use this type of mould for the forming of boots, the shape of which does not allow us to use pin.

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Claims

1. One separable cushion mechanism for forming the heel of the shoe uppers, as one can see on the **FIG.1**. This separable cushion is made of two equal solid arms fixed and adjusted on a plate guide (8), two flexible pressure tubes **FIG.7** (2) or **FIG.8** (2a) fixed on the internal sides of the arms and one flexible mould **FIG.9** (3) or **FIG.10** (3a) fixed with a pin (7), all these assembled as shown in **FIG.1** attached herewith. 20
2. One separable cushion mechanism for forming the heel of the shoe uppers, as in previous claim 1, equipped with two flexible pressure tubes **FIG.7** (2) or **FIG.8** (2a), being fixed and air-tighten on the internal sides of the arms **FIG.1**, which by their expansion are forcing the mould to press the upper on the aluminium last, when this latter has entered into the cushion cavity. 30
3. One separable cushion mechanism for forming the heel of the shoe uppers, as in previous claim 1, equipped with one flexible mould, 1-15 mm thickness (it depends on the case) **FIG.9** (3) or **FIG.10** (3a), which is made of PU, rubber, leather or other equivalent flexible materials, fixed with one pin (7) on the plate guide (8) or even with a spring or a piece of cord and free from all sides as shown in **FIG.5** (calm position, without air pressure) and which can get all the gaps during the forming phase. 40

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Semi Section A,B,C,D

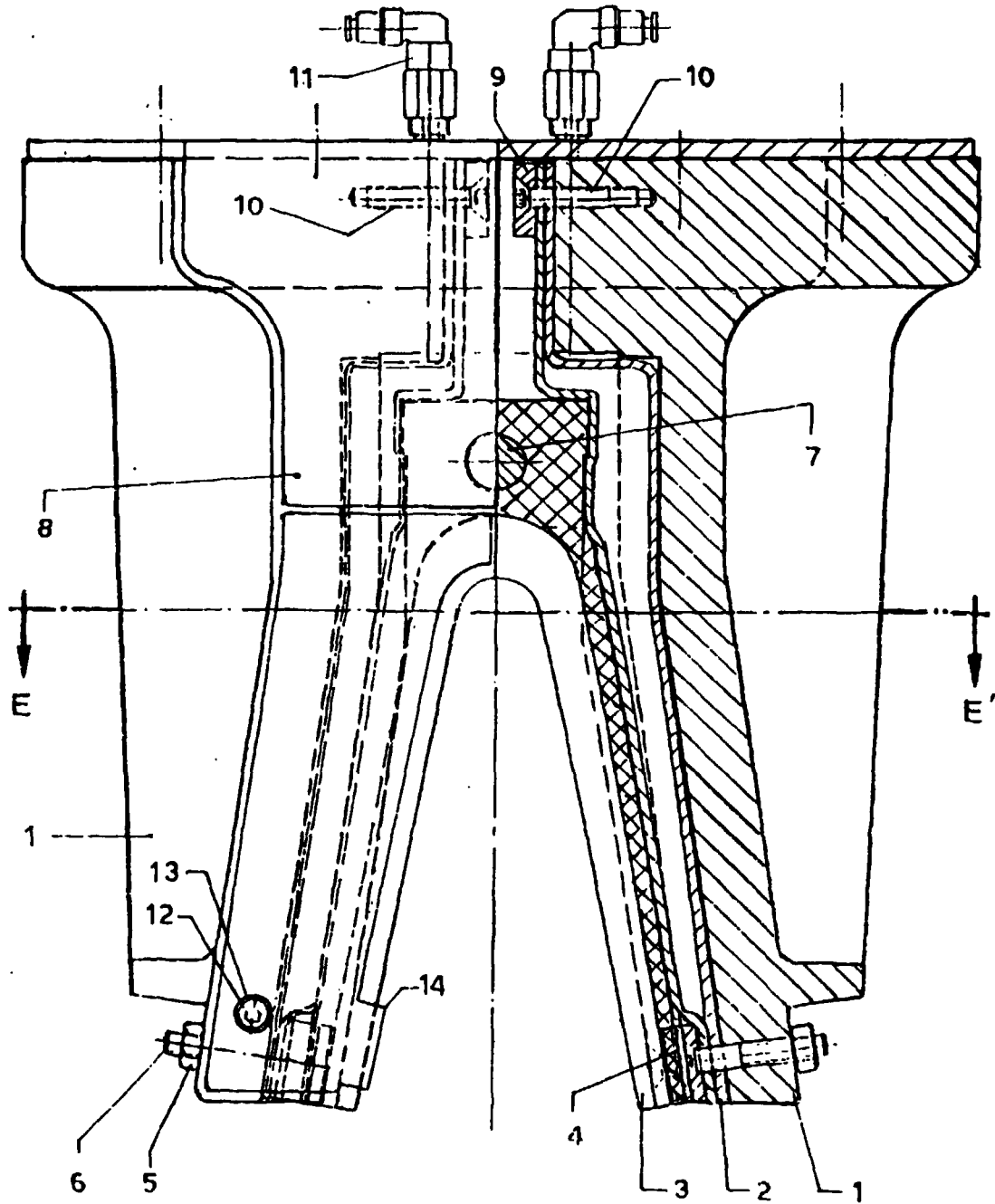


FIG. 1

Down view

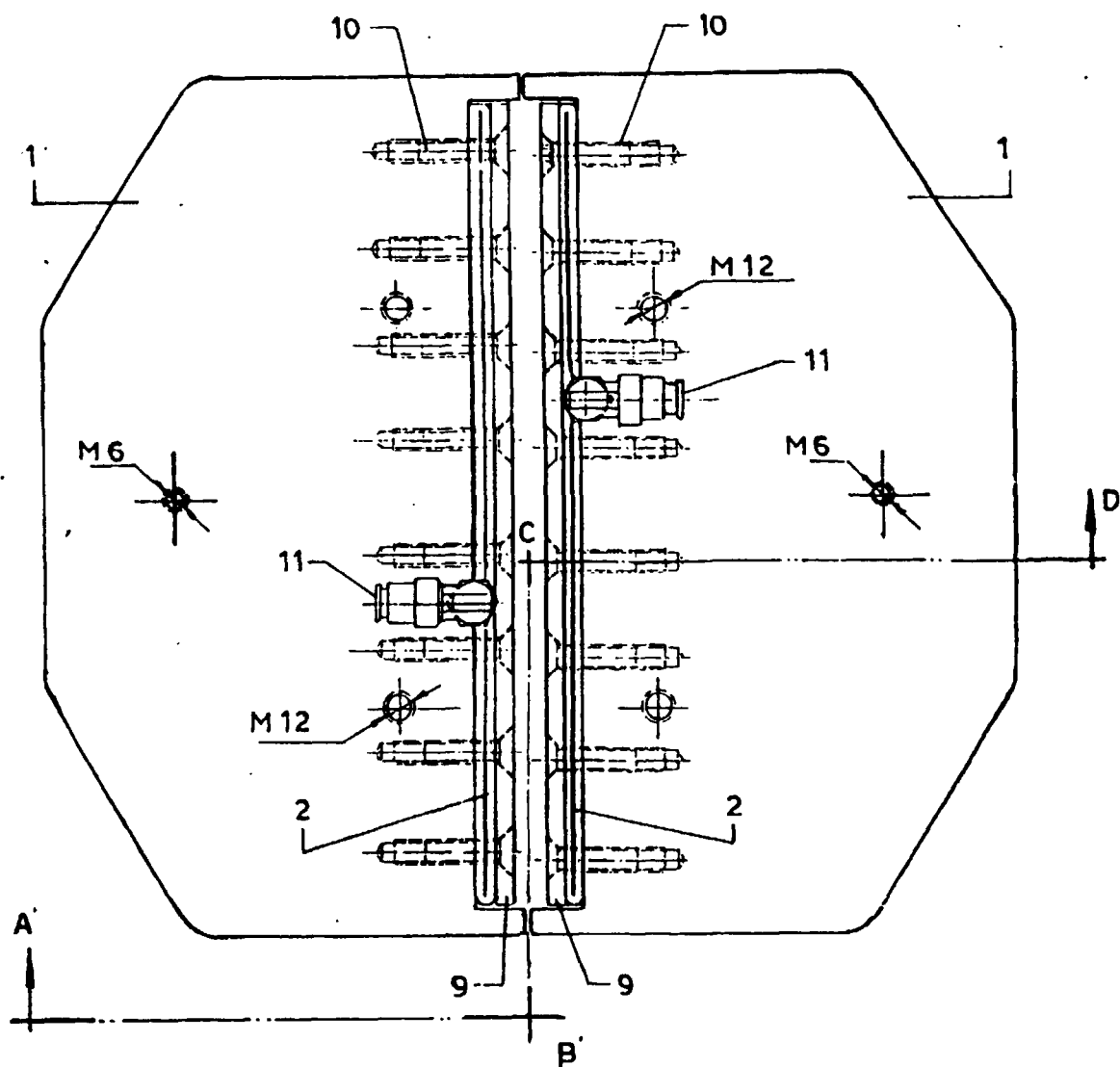


FIG. 2

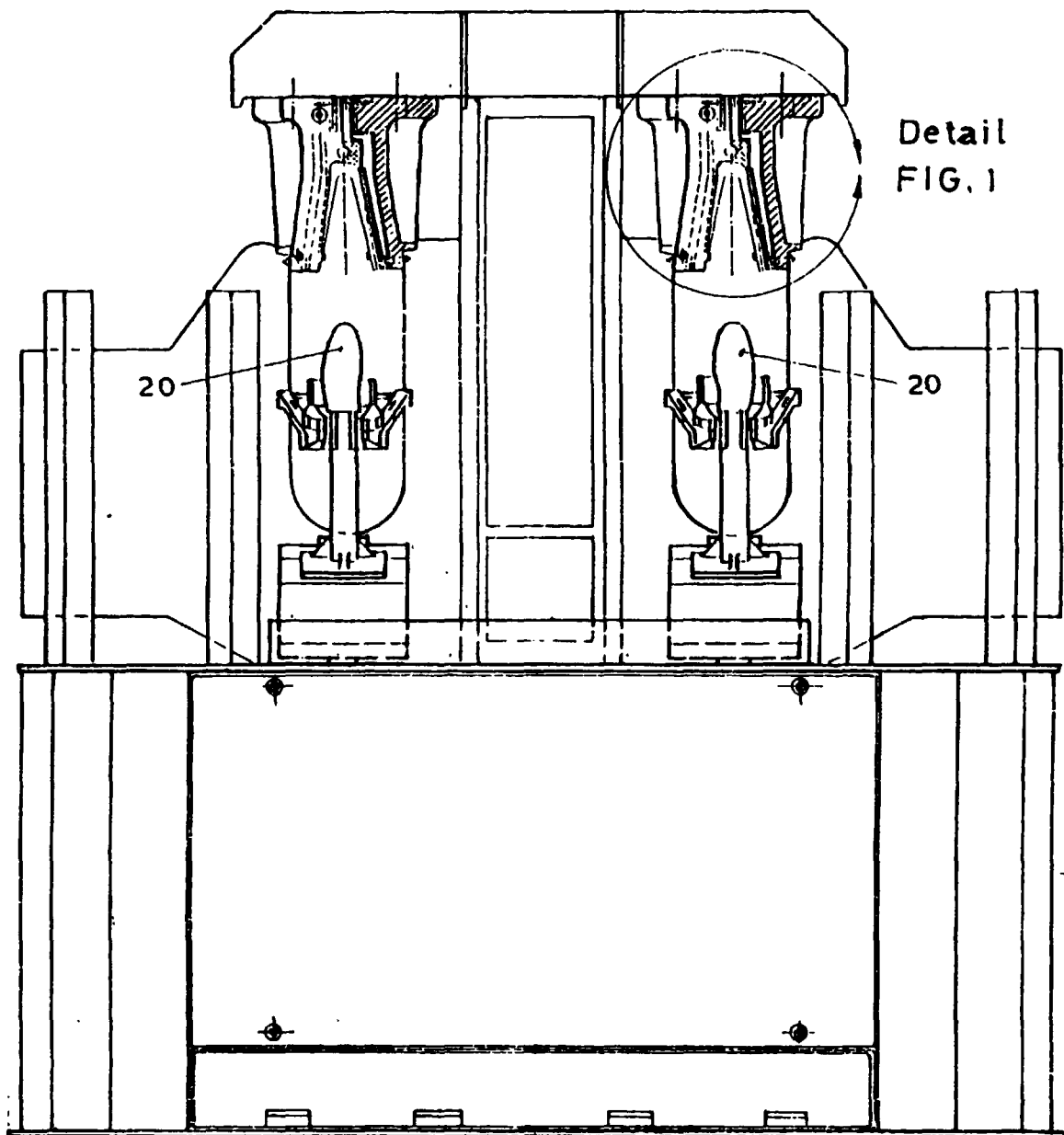


FIG. 3

Section E - E'
WORK POSITION

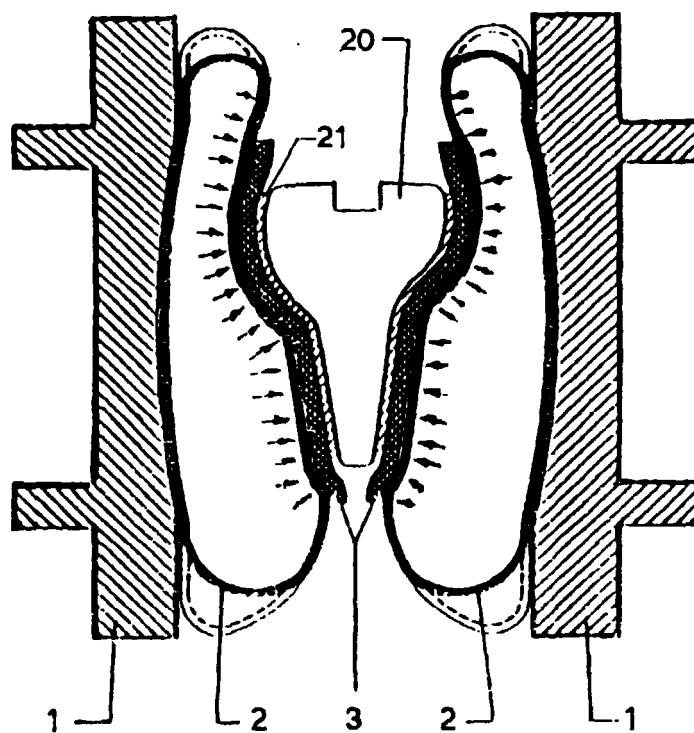


FIG. 4

Section E-E'
CALM POSITION
WITHOUT AIR PRESSURE

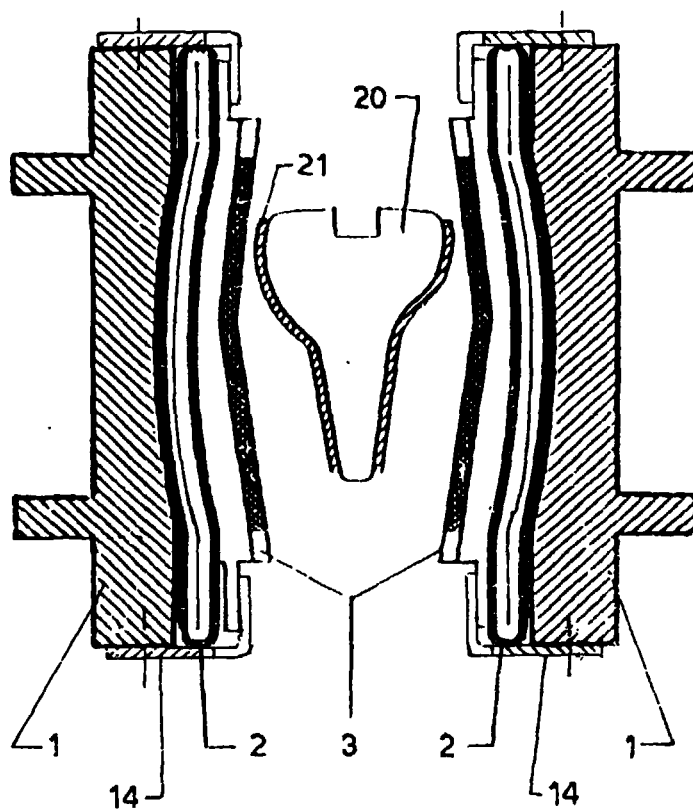


FIG. 5

Section E-E'
CALM POSITION
WITHOUT AIR PRESSURE

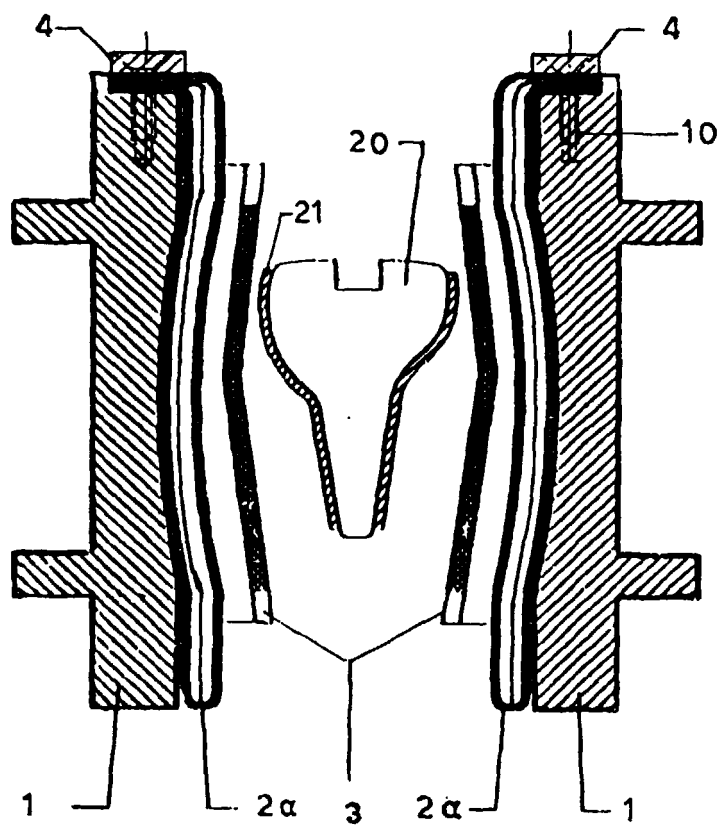


FIG. 6

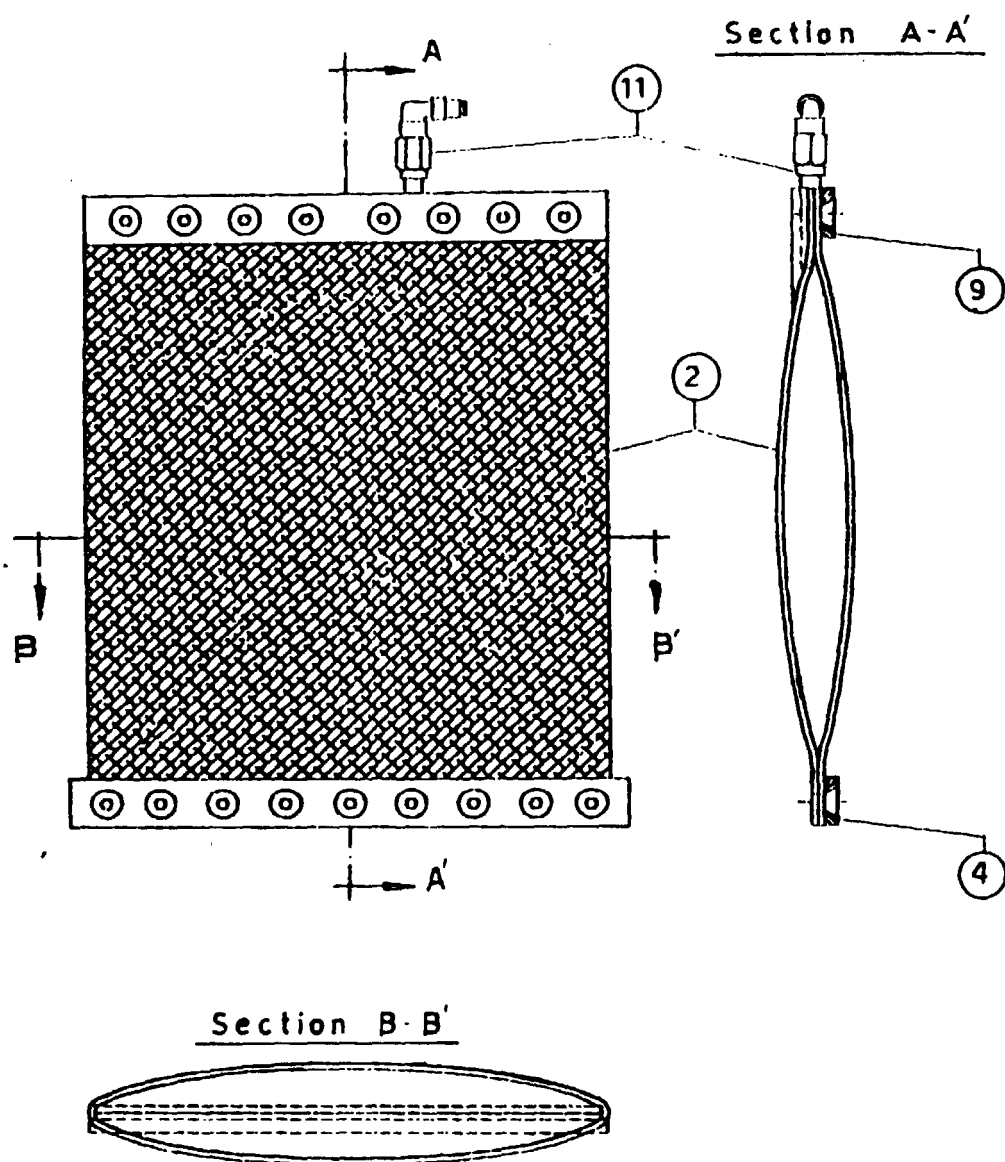


FIG. 7

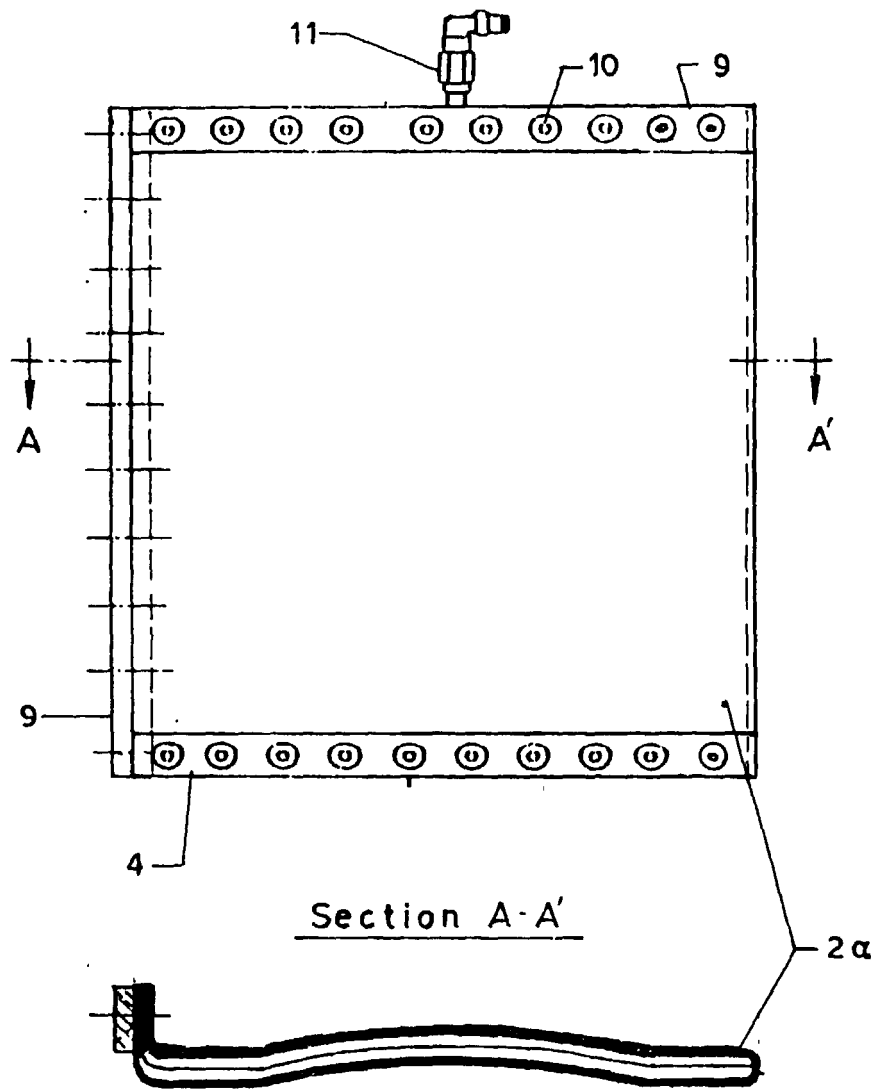


FIG. 8

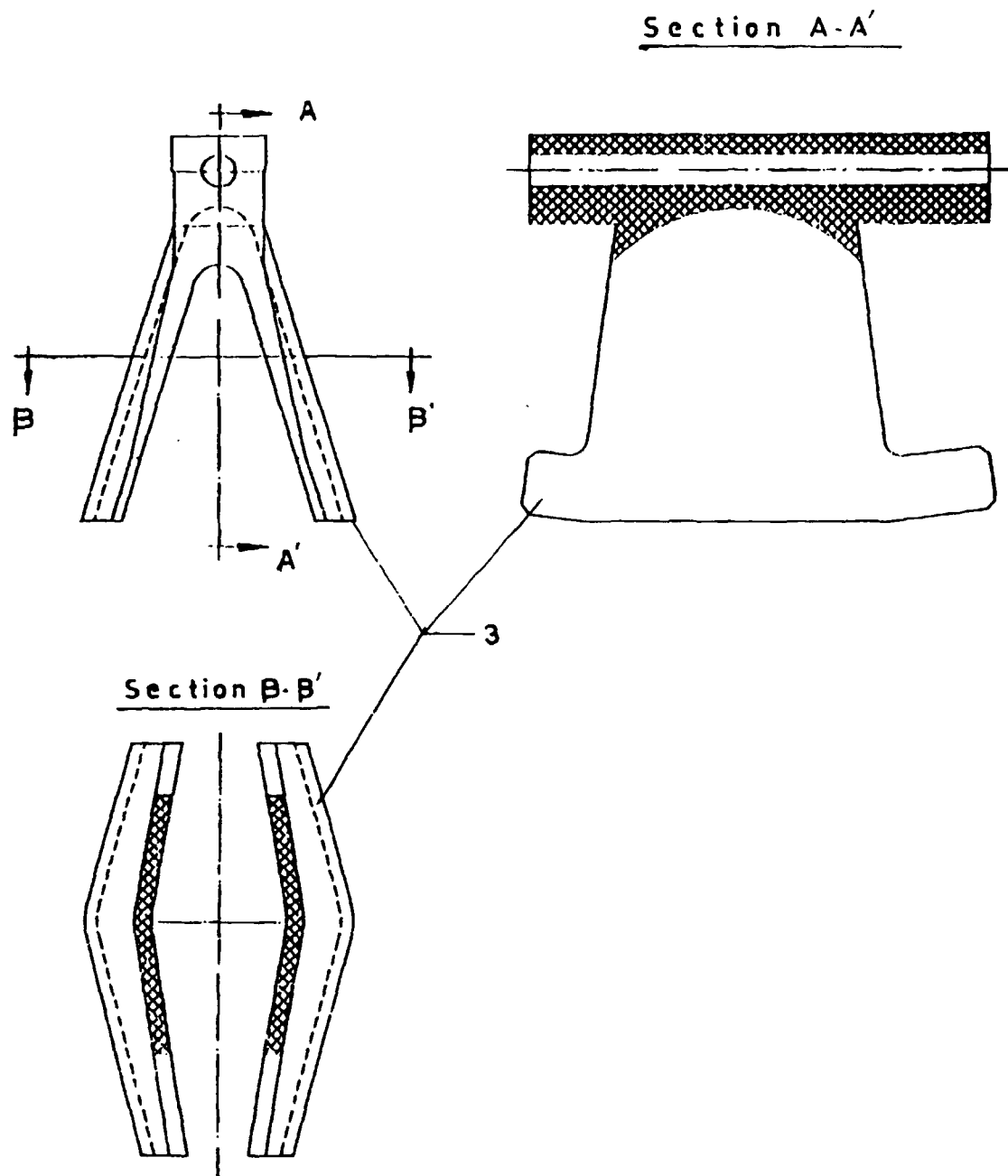


FIG. 9

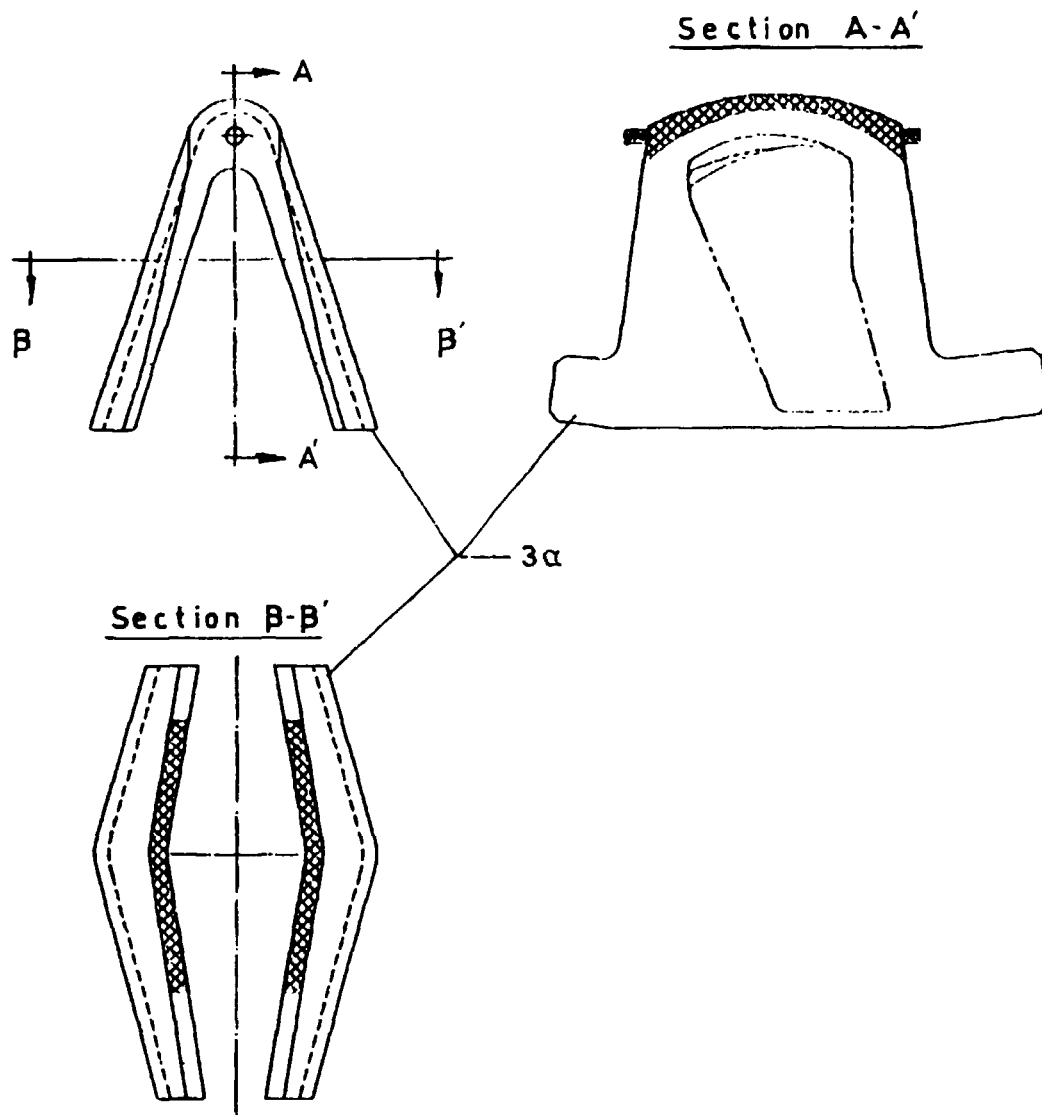


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 98 60 0016

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)
X	DE 12 17 243 B (EUGENE ALPHONSE GABRIEL BERTRAND) 18 May 1966 (1966-05-18) * column 2, line 31 - column 3, line 21; figures *	1-3	A43D11/12
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Place of search		Date of completion of the search	Examiner
THE HAGUE		16 July 1999	Scholvinck, T
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 98 60 0016

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16-07-1999

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