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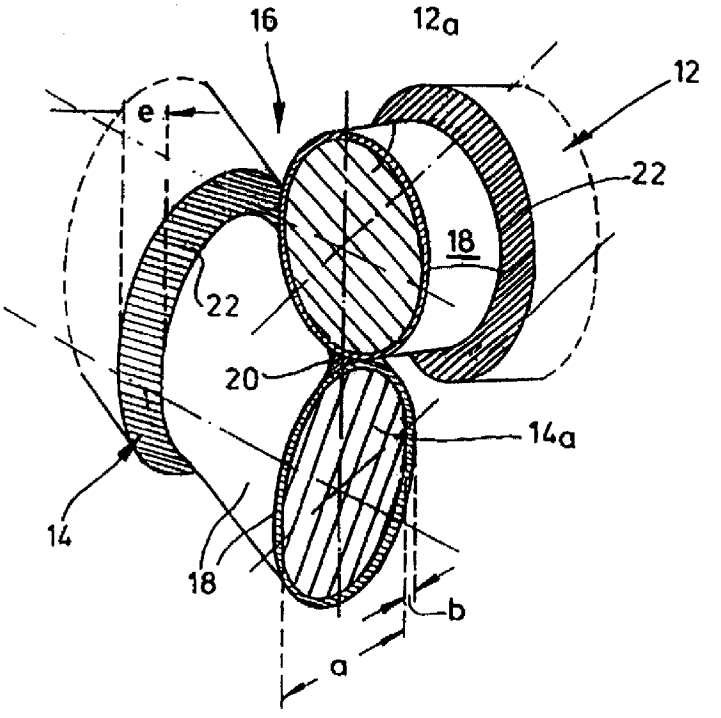
(54) **PROCEDE POUR LA FABRICATION D'UNE BANDE DE TISSU, NOTAMMENT POUR UNE FORME DE SERIGRAPHIE, AINSI QUE TISSU NOTAMMENT TISSU DE SERIGRAPHIE**

(54) **METHOD TO PRODUCE A FABRIC STRIP, ESPECIALLY FOR A SCREEN PRINTING FORM, AND FABRIC, ESPECIALLY SCREEN PRINTING FABRIC**



(57) L'invention concerne un procédé pour fabriquer une bande de tissu, destinée notamment à être utilisée comme pochoir de sérigraphie constitué d'un tissu de plastique, cette bande de tissu étant munie d'un revêtement métallique. Dans ce procédé, le tissu est métallisé sous vide avec une couche d'enrobage et ensuite revêtue par voie galvanique.

(57) The invention relates to a method to produce a fabric strip, especially for use as a screen printing template made from plastic fabric, which is vacuum metallized with an encasing layer and is then given an electroplated coating.

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Mit internationalem Recherchenbericht.
Vor Ablauf der für Änderungen der Ansprüche zugelassenen Frist. Veröffentlichung wird wiederholt falls Änderungen eintreffen.

(54) **Title:** METHOD TO PRODUCE A FABRIC STRIP, ESPECIALLY FOR A SCREEN PRINTING FORM, AND FABRIC, ESPECIALLY SCREEN PRINTING FABRIC

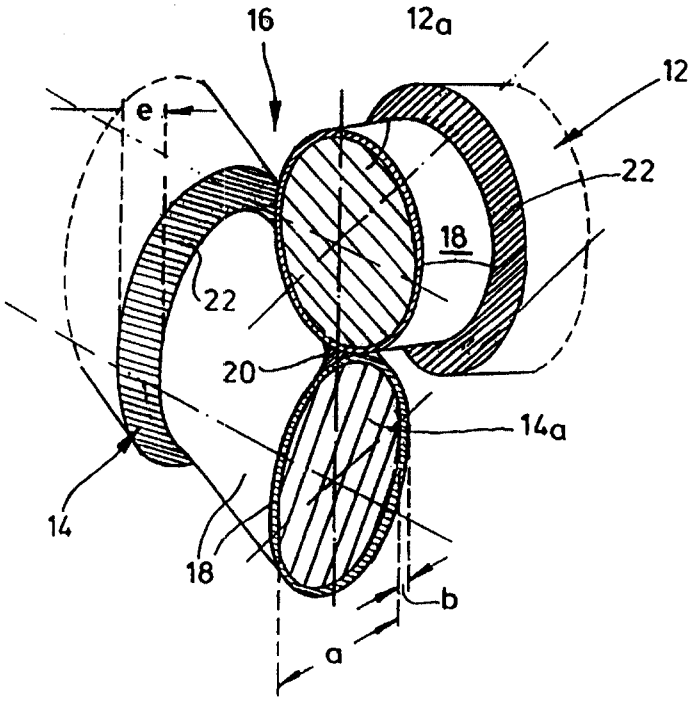
(54) **Bezeichnung:** VERFAHREN ZUM HERSTELLEN EINER GEWEBEBAHN, INSBESONDERE FÜR EINE SIEBDRUCKFORM, SOWIE GEWEBE, INSBESONDERE SIEBDRUCKGEWEBE

(57) **Abstract**

The invention relates to a method to produce a fabric strip, especially for use as a screen printing template made from plastic fabric, which is vacuum metallized with an encasing layer and is then given an electroplated coating.

(57) **Zusammenfassung**

Die Erfindung betrifft ein Verfahren zum Herstellen einer Gewebebahn, insbesondere für den Einsatz als Siebdruckschablone aus einem Kunststoffgewebe, die mit einem Metallüberzug versehen wird, bei dem das Gewebe mit einer Mantelschicht bedampft und anschließend galvanisch beschichtet wird.



S300WP2

DESCRIPTION

Process for the production of a cloth web, in particular for a screen printing form, and a cloth, in particular a screen printing cloth

The invention concerns a process for the production of a cloth web, in particular for use as a screen printing form comprising a non-metallic cloth which is provided with a casing layer and then galvanically coated with a metal coating. The invention also concerns a cloth comprising mutually crossing strands, in particular a screen printing cloth produced by that process.

Centuries after it was first used in China the screen printing process has been known in Europe approximately since the 19th Century; a fine-mesh textile cloth or wire mesh material is stretched out in a screen printing frame and covered at the image-free regions so as to be impermeable to ink. Besides manual cut stencils - for example for labelling or writing - nowadays preferably photographically produced direct or indirect stencils are the usual practice; the choice of the kind of stencil adopted - in the case of direct stencils those with emulsion, with direct film and emulsion or with direct film and water - is left to the discretion of the screen printer.

A plurality of steps are usually required to produce a screen printing form. Firstly a screen printing cloth is stretched out over a clamping frame of light metal or alloy, wood or the like, and is glued to the frame in its stretched position. Cleaning of the cloth permits the subsequent application of a photosensitive emulsion, for example using a coating channel manually or by machine with an automatic coating apparatus. As the coating thereon cannot be

produced exactly as far as the inward side of the frame, the remaining surface area must be subsequently sealed off using screen filler. The coated surface is now exposed by means of a copy original (film) corresponding to the print image. The regions of the print image which are not exposed are washed out. After the operation of drying the stencil, a retouching operation is effected, and the edges are covered over with screen filler.

For certain areas of use, it is known, when dealing with plastic meshes, to settle palladium nuclei or seeds on the surface by a chemical treatment of the surface, and to metallise the filaments. Those chemical treatment procedures involve a plurality of stages and are to be matched in terms of their compositions and operating procedures to the respective plastic material involved. Limitations in regard to the choice of material are predetermined on the basis of poor or unsuitable materials. The known expensive preliminary treatments can be followed by expensive chemical metal deposition processes; because of its inadequate conductivity, the pre-treated plastic cloth surface cannot be directly covered with a galvanic metal deposit.

US-A-1 934 643 dating from the year 1930 describes a cloth of electrically conductive material, the surface of which is provided with a non-metallic cover layer or a cover layer of pure metal or an alloy, in particular with nickel or chromium, using spraying, plating or a chemical or galvanic process.

US-A-4 042 466 discloses a process for the production of a cloth web which is produced for use as a screen printing stencil from a textile cloth, the cloth web being provided with a metallic cover layer. For that purpose the plastic yarns are coated with a thin metal layer of for example copper of a layer of 1 to 2 μm as a conductive intermediate layer and a nickel layer of 25 μm is applied thereto by galvanisation.

Finally DE 32 43 190 A1 is concerned with a continuous process for the production of metallised textile flat structures which are coated with an electrically conductive metal layer and then galvanically reinforced. The first metal layer can be applied by

means of a wet-chemical, current-less process or by vapour deposition. The result obtained is a metallised, textile surface structure with still textile properties. Gluing of the mesh intersections is undesirable.

In consideration of that state of the art, the inventor set himself the aim of so improving the process as set forth in the opening part of this specification that, while avoiding the known disadvantages, operationally reliable cloth webs are produced inexpensively, in particular for use in screen printing, under a high loading they result in a substantially lesser degree of stretch in comparison with the state of the art, and they can no longer be displaced or deformed. The invention seeks to provide that expensive metal cloths can be replaced by metallised plastic cloths of corresponding properties.

That object is attained by the teachings of the independent claims; the appendant claims set forth advantageous developments.

In accordance with the invention a plastic cloth is prepared from both sides thereof in a multiple procedure by vapour deposition or so-called sputtering - using cathodic atomisation - for the galvanisation operation, that is to say it is provided with a metallic casing layer of a surface resistance of 0.2 ohm/2 to 200 ohm/2 and is then galvanically coated.

Finally, such a preparation procedure by means of vacuum plasma spraying is also in accordance with the invention.

In accordance with the invention all vapour deposition materials can be freely selected and are to be matched to the subsequent galvanisation procedure. However nickel in particular is preferred because of its chemical resistance; other substances which are advantageously used here are gold, silver, copper, steel or a light metal - in particular aluminium - alone or as an alloy.

The vapour deposition, sputtering process or spray process is to be implemented on both sides, and it can also be repeated a plurality of times. In that respect, layer thicknesses of about 5 to over 200 nanometres - in particular over 50 nm -, are produced.

Electrical conductivity of the cloth is afforded by the dry process step of vapour deposition, cathode sputtering as mentioned above or vacuum plasma spraying.

The mechanical properties of the metallised cloth are primarily determined by the galvanisation operation; stretching is strikingly reduced, with an increased level of strength of the cloth, and - irrespective of the nature of the initial cloths - the resistance to slip of the cloth is increased to an extraordinary degree. The metallising substances contribute in particular to the strength at the bonding locations of the cloth of plastic base materials and form a conductive surface. It thus becomes possible to replace expensive metallic cloths by metallised plastic cloths with similar properties.

Therefore, the basis used for the screen printing form which is produced in a finished condition and which is provided with a coating is a metallised plastic cloth, preferably with a metal coating of nickel because of its general strength. The metallic surface of the screen printing plate reduces the wear of the stencil, whereby it is possible to achieve very high numbers of print copies with the latter. The conductive surface of the screen printing plate prevents

static charging phenomena. Limitations in regard to materials to be printed or inks, due to problems with static, can be practically eliminated.

The metallised plastic cloth according to the invention guarantees very minimal stretch phenomena with an adequate level of basic strength and provides that there are scarcely measurable register differences on the stencil, irrespective of the set clamping tension.

The fact that the limitedly flexible metallised cloth is coated over its full surface area provides for a high, reproducible stencil quality with excellent edge sharpness and accurate ink metering. A protective foil which is applied if necessary reduces improper manipulation operations which could cause impairment of the quality of coating. As the coating is effected on the endless roll of cloth, there is no need for covering operations, as are the conventional practice at the present time.

To sum up, the advantages achieved are as follows:

- the metal vapour deposition operation, the sputtering operation or the vacuum plasma spraying operation on cloths - in particular plastic cloths - is effected inexpensively and continuously and provides a conductive casing layer as a basis for subsequent galvanic metallisation, without the occurrence of by-products or waste products which would have to be removed for disposal thereof;

- without involving specific process adaptation, any plastic base materials can be used for the metal vapour deposition or sputtering procedure, for example PET, PA, PE, HPPE, or the like;

- the vapour deposition materials can also be practically freely selected and can thus be adapted for example to a subsequent galvanisation procedure;

- the galvanic metal deposition which can be freely determined in regard to its thickness of application can occur directly onto the casing layer;

- the metallised plastic cloths produced in that way have a substantially lower degree of stretching with a higher level of load-

bearing capacity and thus afford similar stretch and load-bearing properties to steel mesh; and

- the meshes of the cloth can no longer slide or be deformed, by virtue of the metallisation, that is to say tension in a yarn direction does not result in deformation of the cloth - very open-mesh cloths retain their mesh geometry, under a mechanical loading.

The invention admittedly serves in particular for the production of a screen printing stencil, but cloths can also be treated in the described manner for other uses, in particular filter cloths or surface or flat elements for screening or shielding purposes in the electronics sector.

Further advantages, features and details of the invention will be apparent from the following description of a preferred embodiment and with reference to the diagrammatic drawing in which:

Figure 1 is a view in cross-section through a cloth,

Figure 2 is a perspective view of an enlarged part of the cloth, and

Figure 3 shows a part of Figure 2 on an enlarged scale, with a perspective view onto a bonding between two mutually crossing yarns.

A cloth 10 for the production of screen printing stencils is produced from mutually crossing warp threads or yarns 12 and weft yarns or threads 14, as shown in Figure 1 in a so-called linen or basket weave, in which two warp threads 12 and two weft threads 14 belong to a respective repeat - namely, a unit of repetition which is fixed by a given number of bonding locations as indicated at 16. The threads 12, 14 can comprise any plastic base materials, for example polyamide (PA), polyethylene (PE), polyethyleneterephthalate (PET), or the like.

The plastic cloth 10 is subjected continuously, as a roll, to a vapour deposition process, the maximum web length being determined by the largest possible winding diameter in the vapour deposition installation.

The vapour deposition material used is for example gold, silver, copper, nickel, steel, aluminium or the like precious, non-

ferrous, heavy or light metals - each alone or in combination - , more specifically, in such a way as to be matched to the subsequent galvanisation operation.

The vapour deposition or sputtering operation - or possibly also vacuum plasma application - is effected on both sides and is possibly repeated a plurality of times, for special requirements. In that operation, a casing layer 18 of a layer thickness b of about 50 to over 200 nm, which is clearly shown in Figure 3, is produced around the threads 12, 14 each as a respective plastic core - which is identified in Figures 2 and 3 by references 12_a and 14_a to distinguish them from the warp and weft threads 12 and 14 respectively for the sake of enhanced clarity of the drawing - of a diameter a of for example 15 μm to 100 μm; depending on the type of cloth and the kind of vapour deposition, the casing layers can involve surface resistance values of below 0.5 ohm/2 to over 100 ohm/2.

That dry coating operation can also result in accumulations of material in the region of each bonding 16, one such bonding being indicated at 20 in Figure 2 between the mutually crossing threads 12, 14.

Direct galvanic metal deposition can now be effected on the plastic cloth which has been prepared by vapour deposition in the above-described manner. In the galvanic application procedure, once again any metals can be used such as for example Cu, Ni or the like.

The vapour deposition material and the vapour deposition thickness are to be matched to the subsequent galvanising process in order to prevent the casing layer 18 from being reduced by the galvanic bath, whereby the conductivity of the vapour deposition would be reduced or eliminated in the event of prolonged exposure times. Combinations for galvanic metallisation are inter alia as follows:

- a Cu-vapour deposition with a surface resistance of about 0.5 to 1 ohm/2 for subsequent galvanic nickel-plating, or
- steel vapour deposition with a surface resistance of about 0.4 ohm/2 to 10 kohm/2 for subsequent galvanic nickel-plating.

The galvanic metallisation operation can be implemented as a continuous procedure with practically any roll length and results in a closed metal coating 22 of selectable layer thickness e - of preferably 2 μm to 20 μm and more - over the entire cloth 10; that metal coating 22 provides both for a high level of mechanical stability, in particular slip resistance, and also for chemical resistance on the part of the metallised cloth 10; as stated, its strength is considerably increased, with a considerable reduction in stretchability.

CLAIMS

1. A process for the production of a cloth web, in particular for use as a screen printing form comprising a non-metallic cloth which is provided with a casing layer (18) and then galvanically coated with a metal coating (22), in which a plastic cloth (10) is multiply provided from both sides of the cloth by means of vapour deposition or cathode sputtering with the metallic casing layer (18) with a surface resistance of about 0.2 ohm/2 to 200 ohm/2 and is then galvanically coated.

2. A process for the production of a cloth web, in particular for use as a screen printing form comprising a non-metallic cloth which is provided with a casing layer (18) and then galvanically coated with a metal coating (22), in which a plastic cloth (10) is provided in vacuum by plasma spraying by plasma spraying on both sides with the metallic casing layer (18) of a surface resistance of about 0.2 ohm/2 to 200 ohm/2 and is then galvanically coated.

3. A process according to claim 1 or claim 2 characterised by a treatment of the mutually crossing strands or plastic yarns (12, 14) with copper and subsequent galvanic nickel-plating, wherein a surface resistance of about 0.5 to 1 ohm/2 is produced in the vapour deposition layer.

4. A process according to one of claims 1 to 3 characterised by a treatment of the mutually crossing strands or plastic yarns (12, 14) with steel material and subsequent galvanic nickel-plating, wherein a surface resistance of about 0.4 ohm/2 to 10 ohm/2 is produced in the vapour deposition layer.

5. A process according to claim 1 or claim 2 characterised by a content of gold, silver, nickel or copper, in particular in the

very pure form of the elements, in the treatment material for the casing layer (18).

6. A process according to claim 1 or claim 2 characterised by a content of nickel, chromium, steel or aluminium in the treatment material for the casing layer (18).

7. A process according to one of claims 1 to 6 characterised in that the casing layer (18) of a layer thickness (b) of about 5 to over 200 nanometres, in particular from 50 nm to 200 nm, is produced.

8. A process according to one of claims 1 to 7 characterised by a galvanically produced metal coating (22) enclosing the casing layer (18), the layer thickness (e) of the metal coating (22) being about 2 µm to over 20 µm, wherein in particular nickel is galvanically applied as the metal coating.

9. A cloth comprising intersecting non-metallic strands, in particular a screen printing cloth, which was produced in accordance with one of the preceding claims, characterised in that the strands or plastic yarns (12, 14) are coated with a casing layer (18) which is multiply applied on both sides by vapour deposition, sputtering or spraying, with a surface resistance of about 0.2 ohm/2 to 200 ohm/2, which in turn is covered with a metal coating, wherein the casing layer comprises at least one metallic material.

10. A cloth according to claim 9 characterised in that the casing layer (18) contains gold, silver, nickel, copper, chromium, steel and/or light metal or steel material.

11. A cloth according to claim 9 or claim 10 characterised by a thickness (b) of the casing layer (18) of between about 5 and over 200 nanometres, in particular 50 to 200 nanometres.

12. A cloth according to one of claims 9 to 11 characterised in that the galvanically produced metal coating (22) on the casing layer (18) has a layer thickness (e) of about 2 μm to over 20 μm.

13. A cloth according to one of claims 9 to 12 for use as a filter cloth.

14. A cloth according to one of claims 9 to 12 for shielding purposes in the electronic sector.

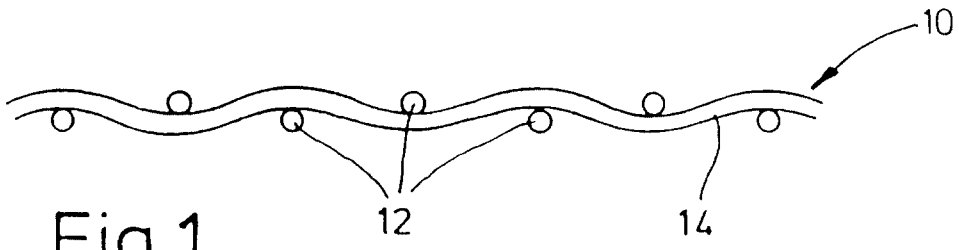


Fig.1

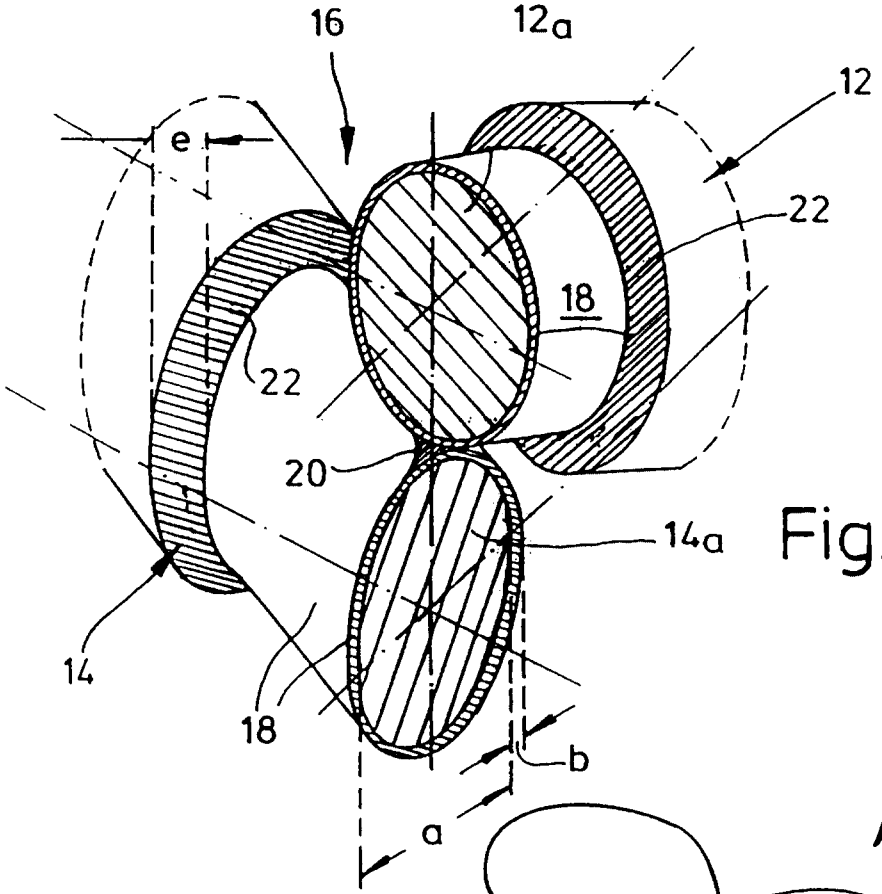


Fig.3

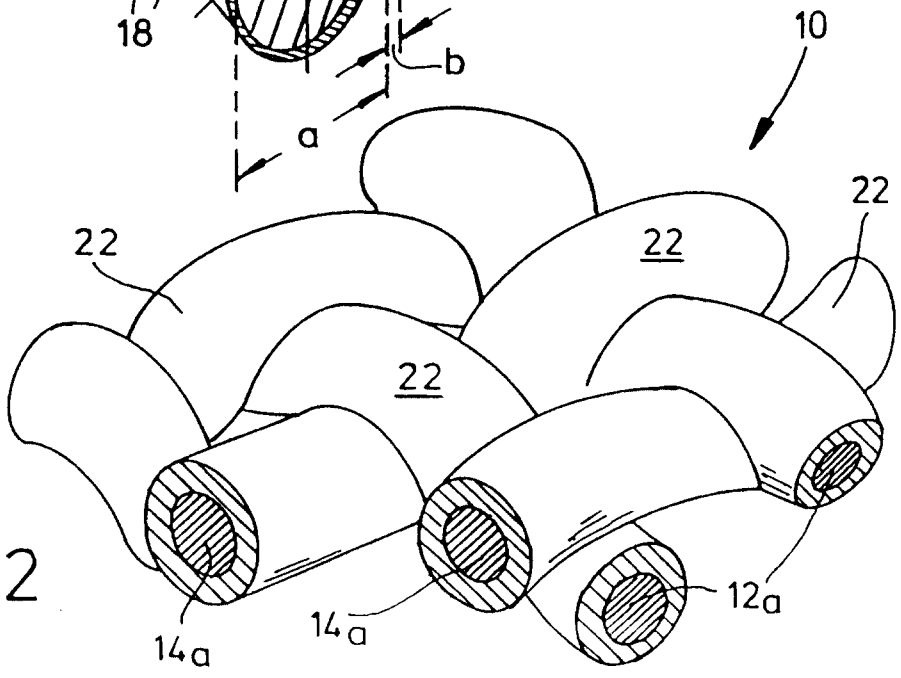
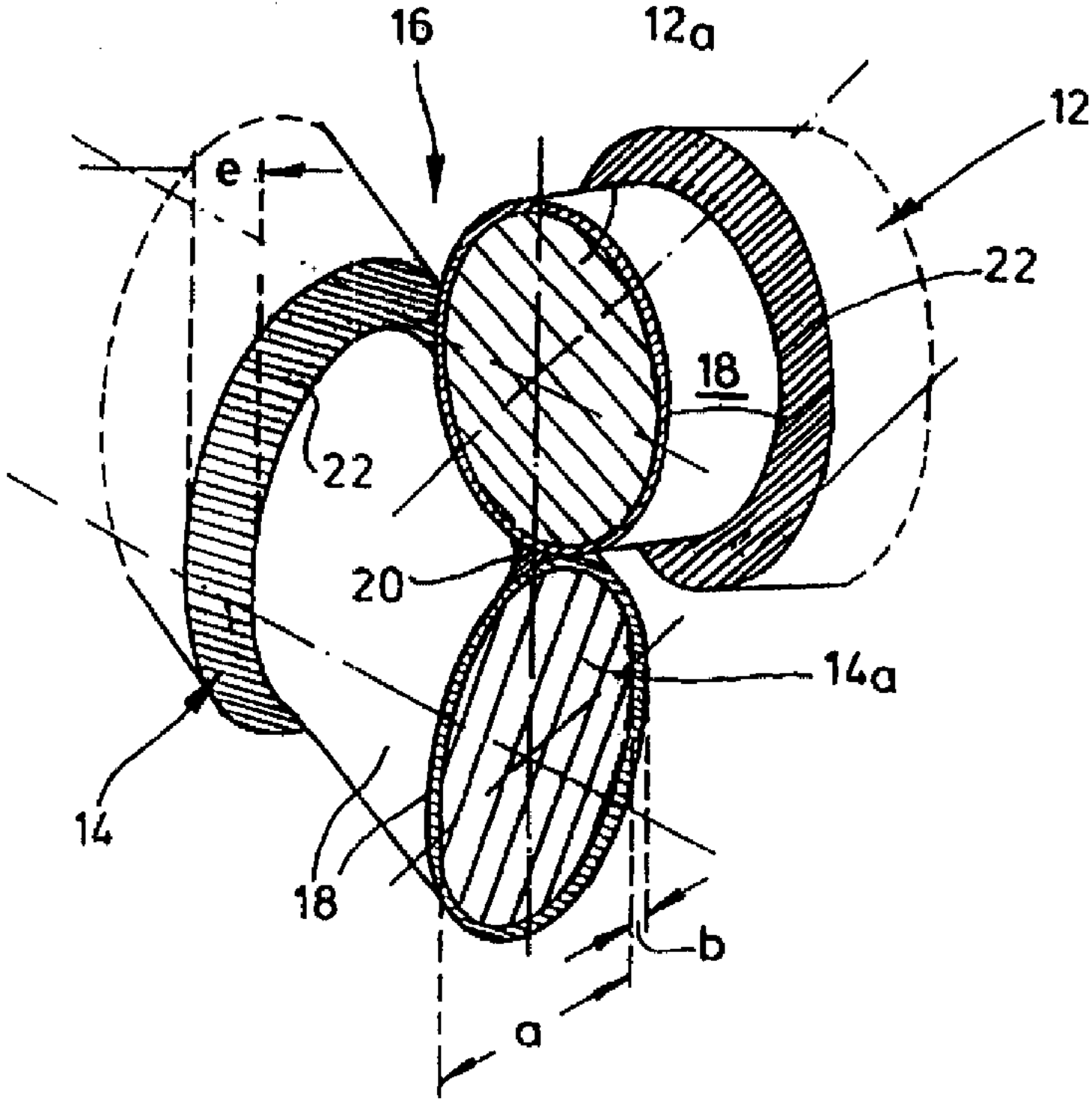


Fig.2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