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(54) Carding flat, device and procedure for producing such flat

(57) In a carding flat at least one metallic wire (3,6,7,9,18) is wound around in a curved path around a main body (13,30,37).

This flat does not comprise "streets" due to the curved path of the wire which allows larger angles of inclination of the wire on the main body.

A device for producing such flat comprises means for supporting and turning the main body (13,30,37) with a longitudinal axis and means for supplying a metallic wire (3,6,7,9,18) being wound around said main body (13, 30, 37). Guiding means rotate at the same speed as the main body (13,30,37) and comprise a surface (24) positioned approximately perpendicular to said longitudinal axis and forcing said wire (3,6,7,9,18) against the coils (19) already wound on said main body (13,30,37).

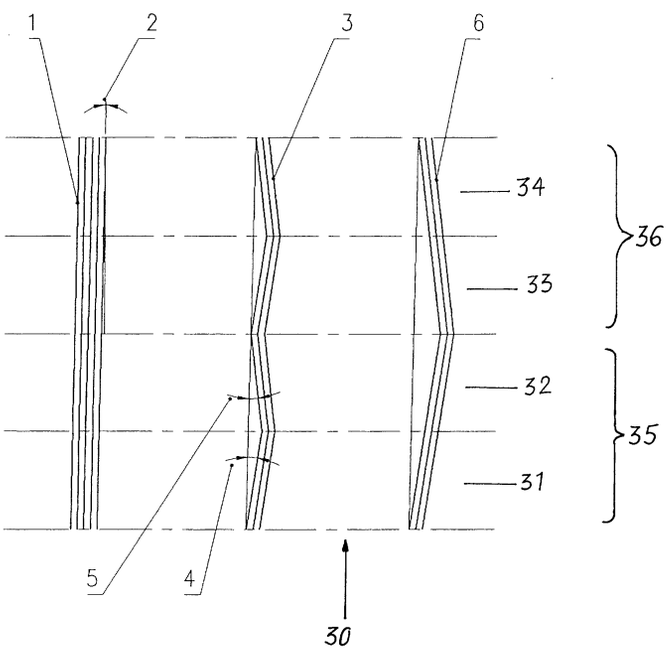

Fig. 1

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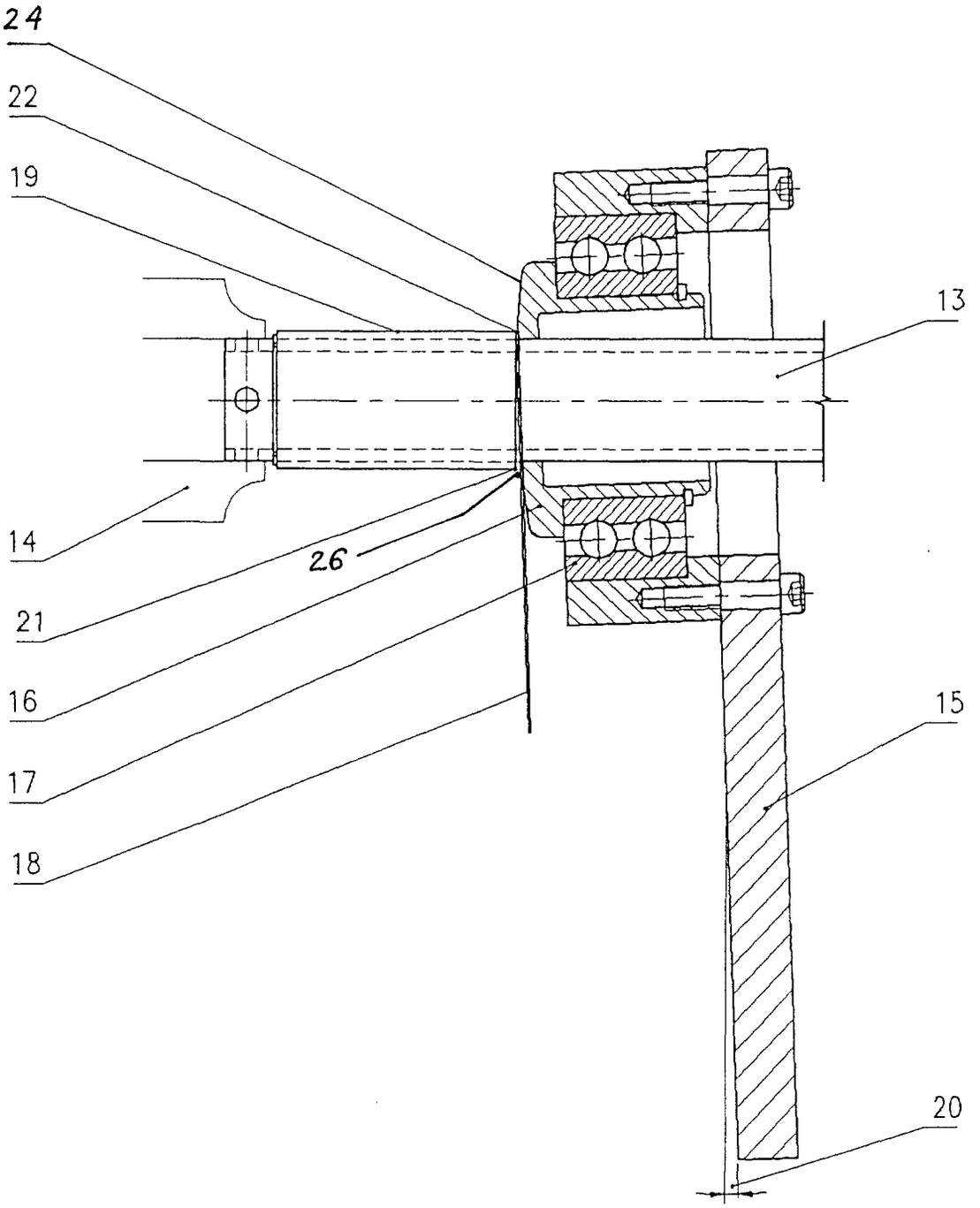

Fig. 3

Description

[0001] The invention relates to a flat with metallic wire clothing and a device and a method for manufacturing such flat.

[0002] Flats are preferably used in carding machines and therefore they are usually called carding flats. However, the invention relates to other flats used in similar machines like opening or cleaning machines with cylinders with metallic wire clothing too.

[0003] Carding flats comprise a main body and a clothing attached to this main body. This clothing cooperates with the clothing of the cylinder such that fibres are opened and cleaned as perfect as possible. Carding flats and their clothing are of major influence on the performance and the costs of carding.

[0004] Carding flats are either revolving in the cards or they are stationary fixed to the card frame. This invention relates to both systems. The flats clothing can be flexible, made out of clasps or might be of metallic wire. This invention relates to the latter one.

[0005] The known standard flat clothing made of metallic wire consists of short wire strips held by a main body made of aluminium or clued to a base plate or squeezed to each other by a bolt or any other means. These systems have in common that an endless wire has to be cut into pieces and stapled afterwards. This is a time consuming and therefore expensive process. Additionally it is difficult and even impossible to staple wires of small cross section, in particular below approximately 0.6 mm. But it are these thin wires which are necessary to achieve optimum carding quality.

[0006] Further the individual wire strips should not be positioned parallel to the cylinders circumference speed direction, but they rather should be positioned in an angle of approximately 2° to 4° to this direction as it is known from EP-A 0 144 607. This avoids "streets" where fibres might pass without being opened. Carding quality is thus improved by postioning the individual cut wire strips in an angle with respect to the circumference speed direction.

[0007] These facts made the manufacture of clothing made of metallic wire for carding flats expensive and even impossible and were some of the major reasons why metallic wire - in spite of its advantages - has not yet achieved a broad acceptance for flats.

[0008] To overcome these problems and drawbacks it has already been proposed to make carding flats with rectangular or triangular sectioned main bodies and to wind a wire around them (EP-A 0 095 519). This proposal however does not solve the problems of streets and no means were mentioned how to wind the wire properly around the flat.

[0009] The optimal wire cross section is approximately 0.5 mm wide and 2.5 mm high and it has to be placed upright on the main body. Without particular means this is impossible as the wire will tip over and the flat cannot be used. This is one of the reasons why the flat of EP-A 0 095 519 did not yet succeed.

[0010] The inventor of the flat of EP-A 0 095 519 was well aware of the problems in connection with streets and his proposal was to wind several single wires parallel to each other around the main body. Since winding one single wire already was a difficult and unsolved task it is needless to say that winding more than one wire is even more complicated and therefore no apt method for the manufacture of carding flats with endless wire.

[0011] It is therefore an object of the present invention to propose a flat, in particular for carding machines, which avoids "streets" and is easy to produce.

[0012] According to this invention there is provided a flat, in particular for carding machines or cleaning machines, comprising a main body with a longitudinal axis around which at least one metallic wire is wound, said wire defining a clothing, characterized in that said metallic wire is wound in a curved path around said main body.

[0013] It is another object of this invention to propose a procedure by means of which flats and in particular flats according to this invention may easily produced.

[0014] According to this invention there is provided a procedure for producing a flat, wherein a metallic wire is continuousely wound around a main body, characterized in that said metallic wire is wound in a curved path around said main body.

[0015] This flat does not comprise "streets" due to the curved path of the wire which allows larger angles of inclination of the wire on the main body.

[0016] Preferred embodiments of this flat and the procedure to produce such flat are defined in the attached subclaims.

[0017] It is another object of this invention to propose a device by means of which flats and in particular flats according to this invention may easily be produced.

[0018] According to this invention there is provided a device for producing a flat, comprising means for supporting and turning a main body with a longitudinal axis and means for supplying a metallic wire being wound around said main body, characterized by guiding means rotating at the same speed as the main body, said guiding means comprising surfaces positioned approximately perpendicular to said longitudinal axis and forcing said wire against the coils already wound on said main body.

[0019] This device allows for proper production of flats due to the guiding means which rotate at the same speed as the main body and force said wire against the coils already wound on said main body.

[0020] Preferred embodiments of this device are defined in the attached subclaims.

[0021] Preferred embodiments of the invention will now be explained in more detail with reference to the attached drawings in which:

Fig. 1: shows a pattern of winding of a wire in a developed projection of the surface of a quad-

ratic cross section of a main body;

Fig. 2: shows a pattern of winding of a wire in a developed projection of the surface of a triangular cross section of a main body;

Fig. 3: shows a side view of an embodiment of a device according to the invention;

Fig. 4: shows a front view of a pressure plate of the device of Fig. 3; and

Fig. 5: shows a section of the pressure plate of Fig. 4 along line A-A in Fig. 4.

[0022] Fig. 1 shows a developed projection of surfaces 31, 32, 33 and 34 of a main body 30 of a flat with quadratic cross section around which a metallic wire 1 is wound. On the left side in Fig. 1 a pattern of a winding of a wire **1** according to the state of the art is shown. The wire **1** is normally put in a straight line and the angle **2** is given by the thickness of the wire and the circumference of the main body 30 of the flat. The preferred wire thickness is about 0.5 mm and for a standard card the angle **2** will be 0.23° for example. This extremely small angle **2** allows fibre a free flow in the open gaps between the individual loops of the wires **1**.

[0023] In the middle of Fig. 1 a winding configuration according to this invention is shown. The wire **3** is wound in an curved or angled path as shown. The angle **4** may now be considerably larger, preferably between 2° to 4°. On the surface 32 following surface 31 the wire 3 is bent back in an angle **5**. On the surfaces 33 and 34 the wire 3 is again bent along angle 4 and 5. Due to this forward/backward bending of the wire **3** the angle of inclination with respect to the longitudinal axis of the main body 30 may be significantly increased which avoids streets entirely and fibres cannot pass without touching of the wire teeth (not shown).

[0024] Whereas in the embodiment shown in the middle of Fig. 1 each surface 31, 32, 33 and 34 defines a section in which the angle 4, 5 of inclination is different to the adjacent one on the right side in Fig. 1 another embodiment of curved wiring is shown in which surfaces 31, 32 and 33, 34 respectively define sections 35 and 36. The wire 6 does not swing back on every single surface 31, 32, 33 and 34 but only after two surfaces 31, 32 and 33, 34, respectively. A pattern like this fulfils the technological task too.

[0025] Fig. 2 shows the developed projection of the surfaces 38, 39 and 40 of a main body 37 of a flat with triangular cross section. Again on the left side the wire **7** is placed in a straight manner on the surface according to the state of the art and angle **8** is rather small. On the right side a curved pattern of a wire **9** according to the invention is shown. Because of the odd number of surfaces of a triangular main body the angles **10, 11, 12** cannot be all the same. For example angle 10 may be 4° and angles **11** and **12** may be 2° each. In this case surface 38 defines one section 41 and surfaces 39 and 40 define another adjacent section 42. A flat like this will solve the problem of streets in a perfect manner as well.

[0026] It shall be emphasized, that the angles 4, 5, 10, 11 and 12 may be smaller then 2° or larger than 4° and may be between 1° and 5° or 6° as well.

[0027] Fig. 1 and 2 show embodiments of flats according to the invention: the wire is not placed in a straight manner but in a curved shape or pattern. The invention may be adapted for all kinds of main bodies, with even or odd numbers of surfaces and also of unequal width of the individual surfaces.

[0028] Embodiments of a device and a procedure are explained now by way of example.

[0029] Fig. 3 shows a device for producing a flat according to this invention. The device may be attached to any known winding apparatus (not shown). Facilities are well known in the textile industry, for example for clothing of a lickerin. The main body 13, preferably with a quadratic cross section, is held by two supports 14 (only one of which is shown) and turned around its longitudinal axes. The device comprises a fixed part or arm **15**, a rotating pressure and guiding plate **16** and a ball bearing **17**. The fixed part **15** is mounted on the standard wire mechanism (not shown). The ball bearing **17** allows for free rotation of the pressure plate 16 which is driven by the main body 13. The pressure plate **16** guides and supports the wire 18 while it is wound on the main body 13. The wire **18** is fed from a coil through a break means (not shown) in a known manner. The wire **18** is guided between the pressure plate **16** and the wire already coiled **19** around the main body **13**. This gives the wire **18** the necessary support to prevent it from turning or tipping over, in particular at the critical edges of the main body 13 where the surfaces 31, 32, 33, 34 and 38, 39, 40 adjoin each other. The fixed part or arm 15 is inclined by an angle 20. Thus the ball bearing 17 and the revolving plane of pressure plate 16 is inclined by an angle of for example 5° to 8° with respect to a plane perpendicular to the rotational exis of main body 13. This opens up a gap **21** in which the wire **18** is supplied to the main body **13**. On the opposite side **22**, where the wire **18** is already laid down, the pressure plate **16** pushes the wire **18** firmly to the coils **19** already wound on the main body 13.

[0030] The apparatus according to Fig. 3 allows for proper winding of a wire in straight lines. To achieve the curved winding according to the invention the pressure plate **16** can be designed according to the embodiment shown in Fig. 4 and 5.

[0031] Fig. 4 shows a front view of the pressure plate 16. The pressure plate 16 has a center hole **23** the shape of which being adapted to the shape of the main body **13**. The hole 23 is circumferenced by a conical surface **24**. In this conical surface **24** are included two opposed flat surfaces **25**.

[0032] Fig. 5 shows a cross section of the pressure plate 16 along line A-A in Fig. 4. The conical surface **24** carries the even surfaces 25 which are inclined with respect to the rotaional axis of pressure plate 16 in an angle 27 smaller than that of conical surface 24. The angle

27 lies for example between 2° to 5°. This results in a gap 26 in the region of hole 23. When the pressure plate 16 is turned the wire will swing forward and backward along longitudinal axis of main body 13 following gap **26**. This way automatically the curved line of the wire on the main body is produced.

Claims

1. Flat, in particular for carding machines or cleaning machines, comprising a main body (13,30,37) with a longitudinal axis around which at least one metallic wire (3,6,7,9,18) is wound, said wire (3,6,7,9,18) defining a clothing, **characterized in that** said metallic wire (3,6,7,9,18) is wound in a curved path around said main body (13,30,37).

2. Flat as claimed in Claim 1, **characterized in that** said wire (3,6,7,9,18) is wound in at least two sections (35,36;41,42) around said main body (13,30,37) and **in that** the angle between said axis and one section (35,41) of said wire (3,6,7,9,18) and said axis and the adjacent section (36,42) of said wire (3,6,7,9,18) is different.

3. Flat as claimed in Claim 2, **characterized in that** said main body (13,30,37) comprises at least three circumferential surfaces (31,32,33,34;38,39,40) aligned in parallel to said axis and **in that** one section (35,36;41,42) comprises one or more surfaces (31,32,33, 34;38,39,40).

4. Flat as claimed in any of Claims 1 to 3, **characterized in that** the angle (4,5,10,11,12) between said wire and a plane perpendicular to the said axis is between about 2° to 5°.

5. Device for producing a flat, in particular a flat as defined in any of Claims 1 to 4, comprising means for supporting and turning a main body (13,30,37) with a longitudinal axis and means for supplying a metallic wire (3,6,7,9,18) being wound around said main body (13,30,37), **characterized by** guiding means rotating at the same speed as the main body (13,30,37), said guiding means comprising a surface (24) positioned approximately perpendicular to said longitudinal axis and forcing said wire (3,6,7,9,18) against the coils (19) already wound on said main body (13,30,37).

6. Device as claimed in Claim 5, **characterized in that** the guiding means comprise a pressure plate (16) defining the surface (24).

7. Device as claimed in Claim 5 or 6, **characterized in that** the pressure plate (16) has a conical shape.

8. Device as claimed in any of Claims 5 to 7, **characterized in that** the guiding means (16) is inclined with respect to a plane perpendicular to said longitudinal axis about an angle of about 5° to 8°.

9. Device as claimed in any of Claims 5 to 8, **characterized in that** the guiding means (16) comprise a center hole (23) adapted to the shape of said main body (13,30,37) which is passing through said center hole (23).

10. Device as claimed in any of Claims 6 to 9, **characterized in that** the pressure plate (16) comprises at least one flat surface (25) next to the center hole (23), the angle of inclination with respect to the longitudinal axis being smaller than the angle of inclination of the adjoining portions (24) of the pressure plate (16).

11. Procedure for producing a flat, in particular a flat as defined in any of Claims 1 to 4, wherein a metallic wire (3,6,7,9,18) is continuousely wound around a main body (13,30,37), **characterized in that** said metallic wire (3,6,7,9,18) is wound in a curved path around said main body (13,30,37).

12. Procedure as claimed in Claim 11, **characterized in** forcing said wire (3,6,7,9,18) against the coils (19) already wound on said main body (13,30,37).

13. Procedure as claimed in Claim 11 or 12, **characterized in that** a guiding means forcing said wire (3,6,7,9,18) against the coils (19) already wound on said main body (13,30,37) revolves in a plane which is inclined with respect to a plane perpendicular to the axis of rotation of said main body (13,30,37) thus producing a gap (26) circulating around said main body (13,30,37) between the coils (19) already wound on said main body (13,30,37) and said guiding means (16), in which gap (26) said wire (3,6,7,9,18) is supplied.

14. Procedure as claimed in Claim 13, **characterized in that** the guiding means (16) forces said wire (3,6,7,9,18) on the opposite side of said gap (26) against the coils (19) already wound on said main body (26) (13,30,37).

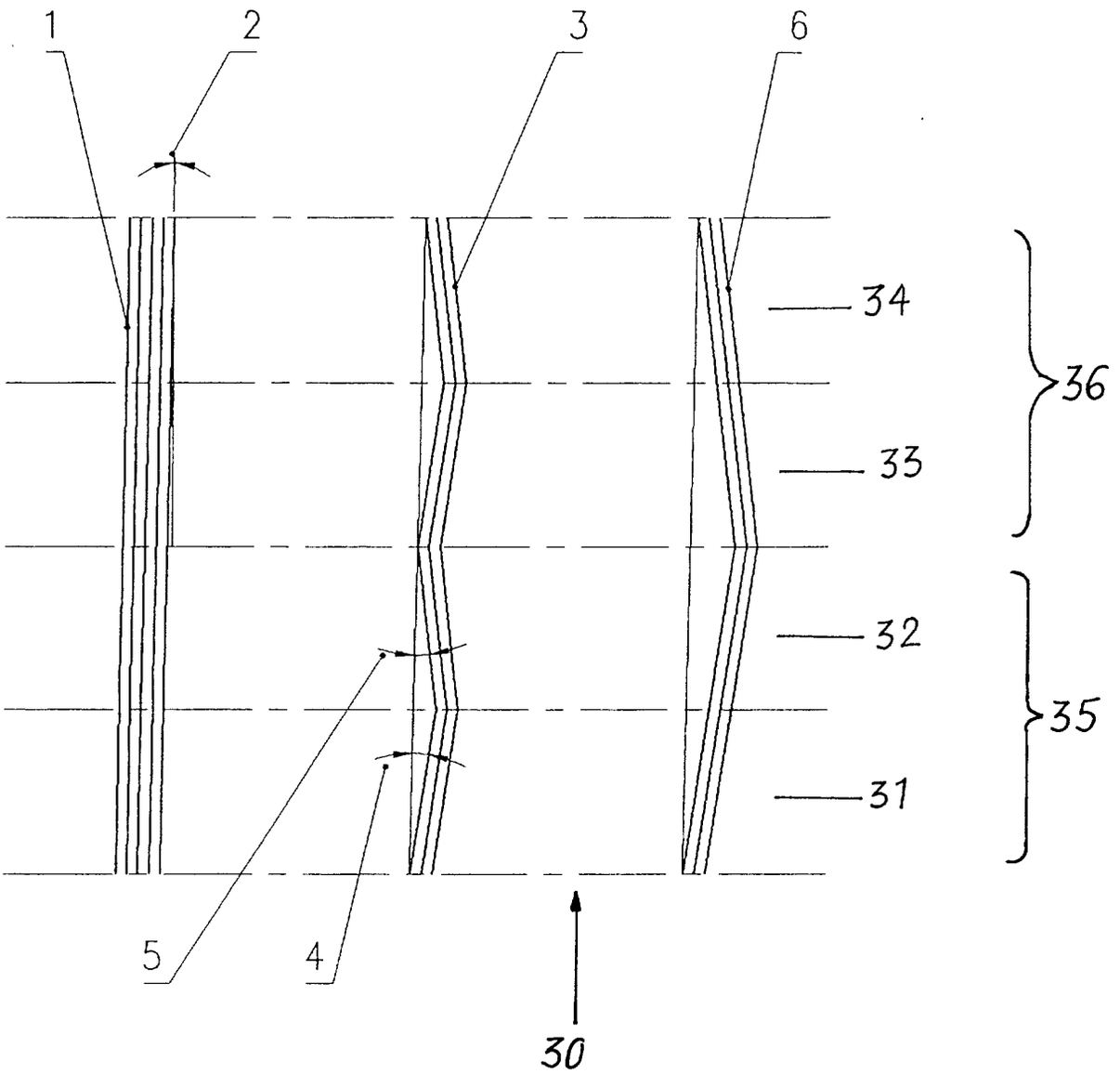

Fig. 1

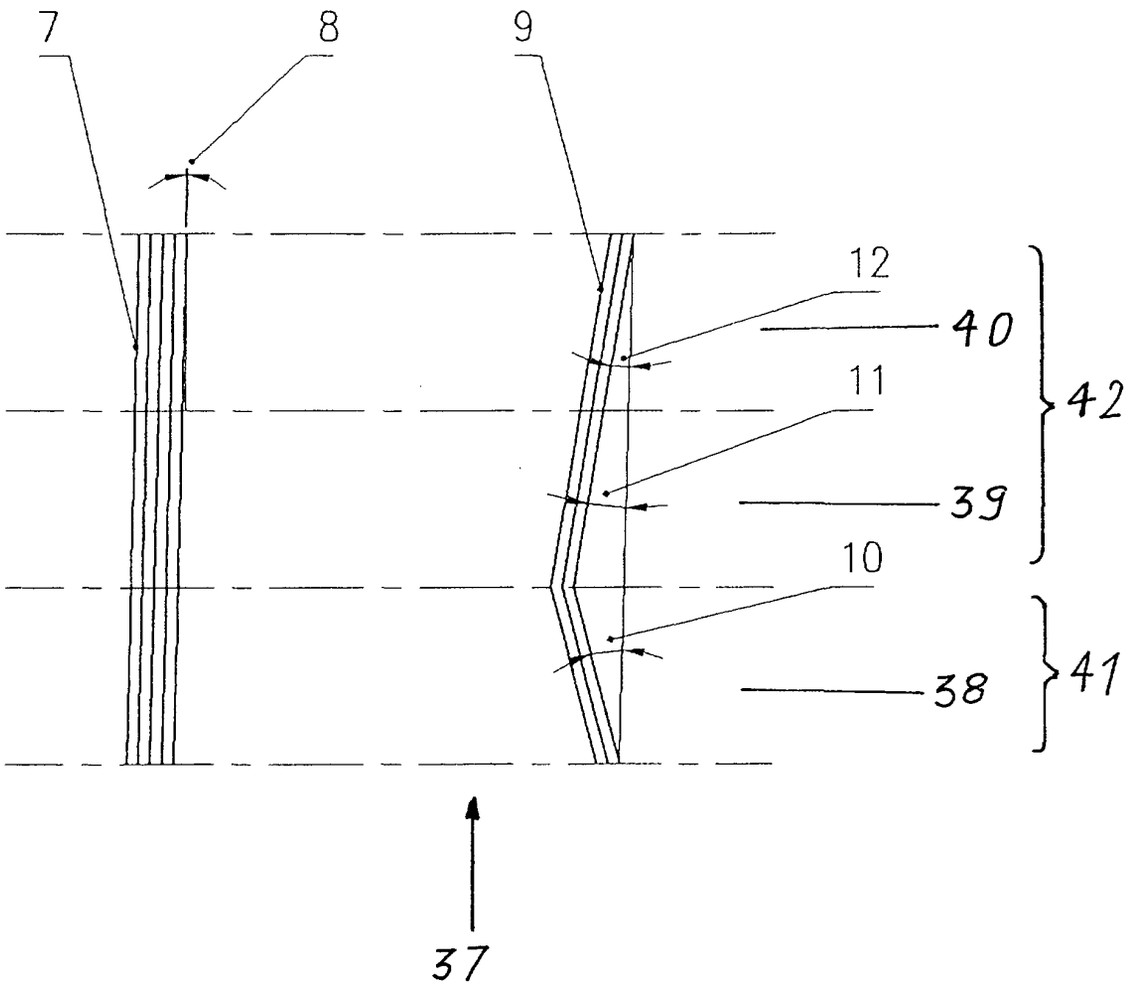

Fig. 2

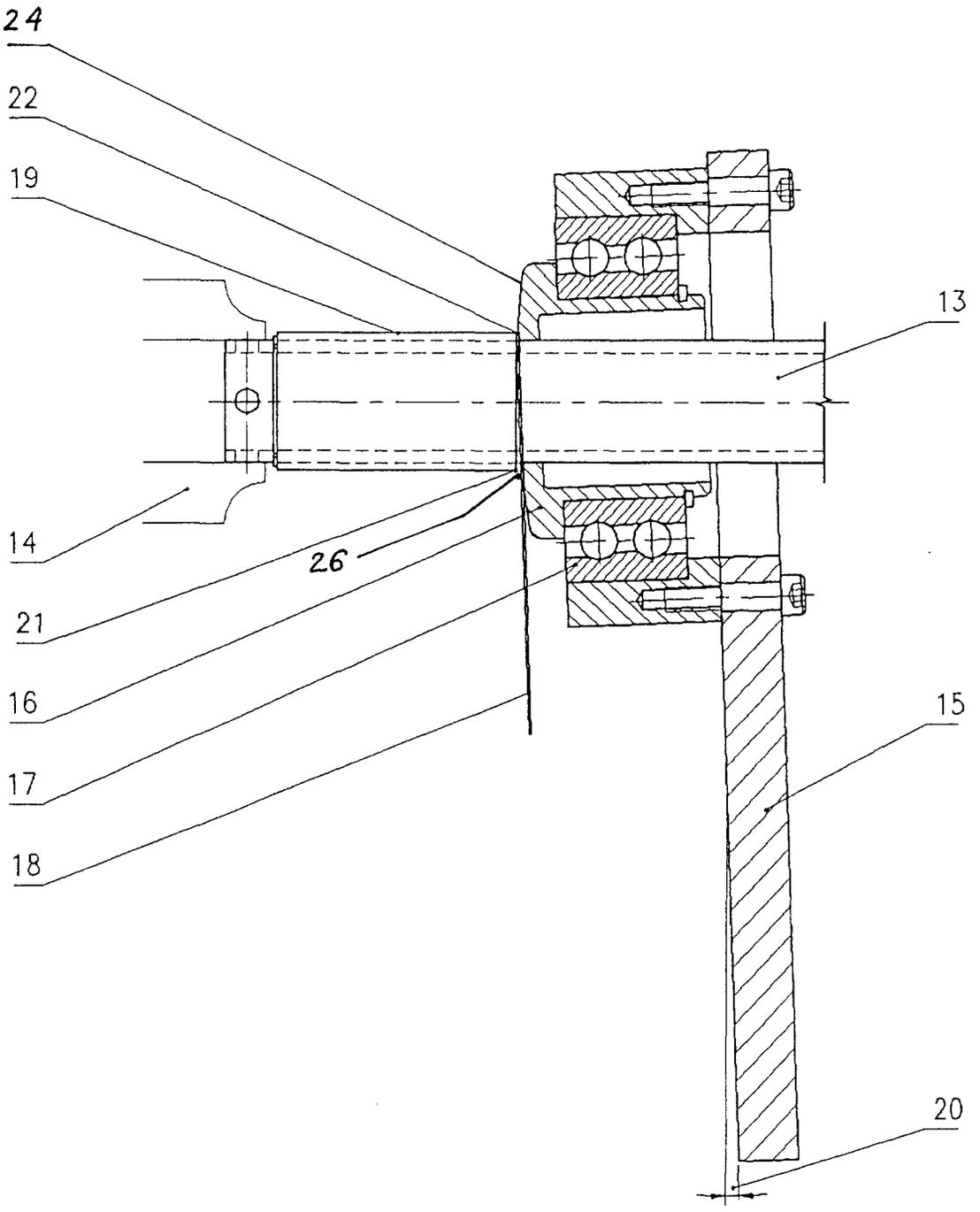

Fig. 3

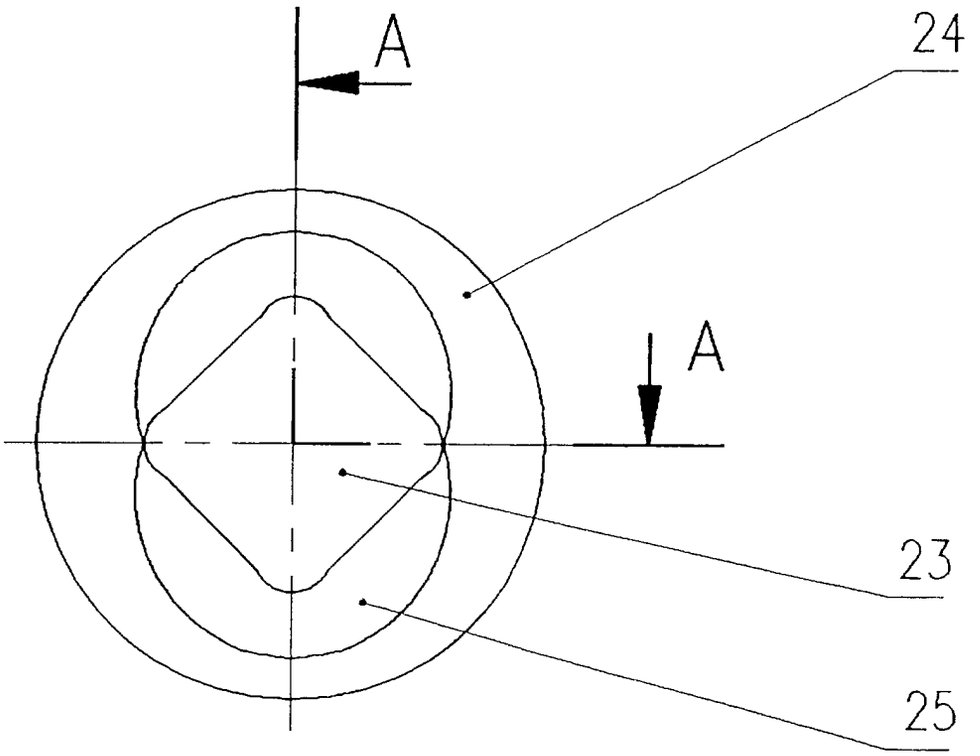

Fig. 4

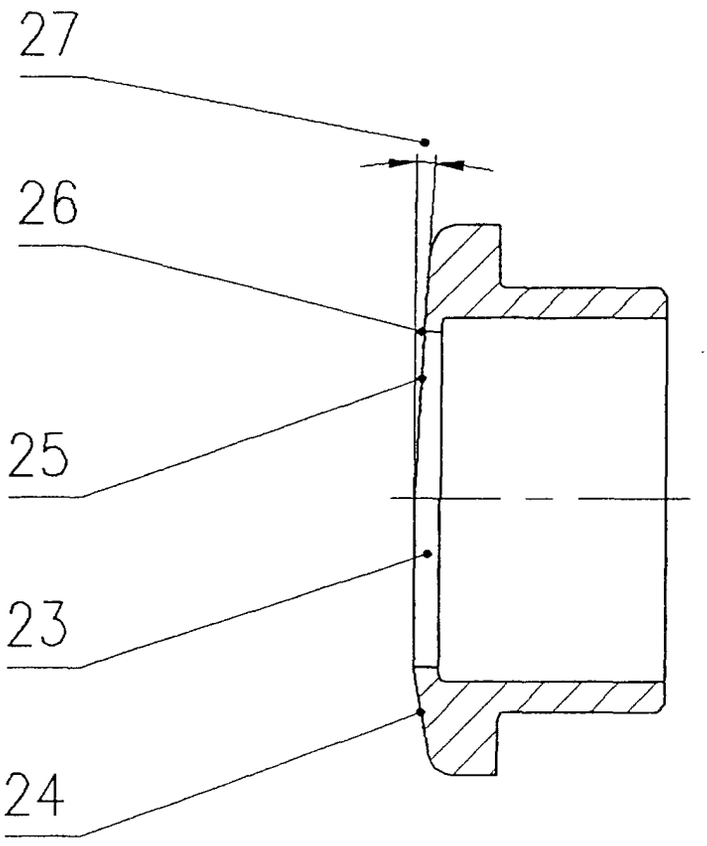

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 00 89 0248

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 January 2001	Munzer, E

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