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(54) Device for producing textile of the defined thickness

(57) The invention relates to the device for producing a textile of defined thickness by folding a two-dimensional textile into folds, which comprises a group of forming disks arranged on the first working shaft and a group of forming disks arranged on a second working shaft, which is parallel with the first working shaft. Each of the forming disks on its periphery is equipped with a system of working protrusions and working interspaces, while the forming disks mounted on the first working shaft are arranged against the forming disks mounted on the second working shaft, while the working protrusions of forming disks on the first working shaft extend at least partially into the working interspaces of forming disks on the second working shaft and vice versa, and on the output from the forming space formed between the forming disks on the first working shaft and forming disk on the second working shaft there is performed the off-take of the folded textile formed at least by one first guiding surfaces and at least one second guiding surfaces.

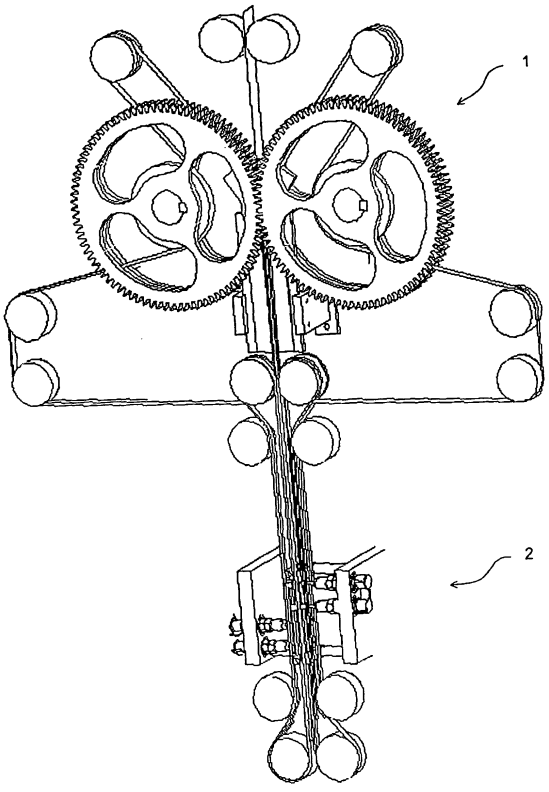

Fig. 1

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Description

Technical field

[0001] The invention relates to the device for producing a textile of defined thickness by folding a two-dimensional textile into folds, which comprises a group of forming disks arranged on the first working shaft and a group of forming disks arranged on the second working shaft, which is parallel with the first working shaft, whereas each of the forming disks on its periphery is equipped with a system of working protrusions and working interspaces.

Background art

[0002] It is generally known that the structure of textiles influences an important effect as to their properties. Deformation properties, air permeability, permeability of liquids and insulation properties, both thermal insulating and noise insulating may significantly be effected by orientation of fibres in the inner structure of a textile. Based on this knowledge there was designed and produced several devices for forming of especially non-woven textiles, e.g. into the vertically organised lamellas.

[0003] Among such devices belong e.g. the device for piling a nonwoven from the vertically piled web known from the Czech patent CZ 280 153 or its analogy EP 516964, which remedies disadvantages of previous devices according to the Czech author's certificate 273997 and the Czech author's certificate 269300. The device is provided with a feeding mechanism formed of feeding roller, on which in the pitch of 3 to 100 mm the feed disks with roughened surface are positioned, and the guiding pan. Parallel with the feeding roller there is arranged the working roller on which the working disks equipped on its entire periphery with stuff pikes are mounted, while the working disks extend into areas between the feed disks on the feeding roller. Upon rotation of the working roller and working disks, the stuff pikes are producing the web fed by the feeding mechanism into lamellas producing the resultant textile, whose thickness usually is in the range of 15 to 50 mm. The disadvantage of this device is that it is not able to produce textiles having thickness under 15 mm, which expressively limits its application.

[0004] The goal of the invention is to design such a device that would be able to form a textile of defined thickness under 15 mm from a two-dimensional textile.

Principle of the invention

[0005] The goal of the invention has been reached by the device for producing a textile of defined thickness by folding a two-dimensional textile into folds, which comprises the first working shaft, on which the forming disks on its periphery equipped alternately by working protrusions and working interspaces are mounted, and the second working shaft, on which the forming disks on its periphery equipped on a rota basis by working protrusions and working interspaces are mounted, while the second working shaft is parallel with the first working shaft. The principle of this device consists in that the forming disks mounted on the first working shaft are arranged against the forming disks mounted on the second working shaft, and the working protrusions of forming disks on the first working shaft extend at least partially into the working interspaces of forming disks on the second working shaft and vice versa, while in the space between the forming disks on the first working shaft and the forming disks on the second working shaft the forming space is formed, on whose output the off-take of the folded textile is arranged.

[0006] The off-take of the folded textile is formed by at least one first guiding surface in the space between the forming disks on the first working shaft, and at least one second guiding surface positioned in the space between the forming disks on the second working shaft. Next to the off-take of the folded textile from the forming space, the off-take also serves for a temporary fixing of the folded textile in its shape after exiting the forming space. The distance of the first guiding surface from the against it arranged second guiding surface therefore does not exceed the thickness of the folded textile.

[0007] From the point of view of maintenance and operation of the device it is advantageous if the first guiding surfaces are performed as non moveable.

[0008] Upon processing of the two-dimensional textiles at higher speeds, or upon processing of the two-dimensional textiles of greater surface weights it is advantageous, if at least one or more first guiding surfaces is moveable, which improves and makes easier the motion of the folded textile in the off-take and its transfer from the forming space.

[0009] The moveable first guiding surface is with advantage formed by a part of surface of the moving conveyor belt.

[0010] Similarly as the first guiding surface at least one second guiding surface may be performed as a non moveable or as a moveable, whereas it is possible to mutually combine this embodiment of the second guiding surfaces for the purpose to achieve an optimum structure of off-take and suitable conditions for transfer of the folded textile, and simultaneously to combine them with various embodiments of the first guiding surfaces.

[0011] For an easy and precise feeding of the two-dimensional textile into the working and forming space it is advantageous if at least one first guiding surfaces extends to both sides of the central plane, while, from this point of view, it is even more advantageous, if to both sides of the central plane at the same time also at least one second guiding surfaces extends.

[0012] The most suitable operational conditions and simultaneously the simplest production of forming disks of the device according to the invention is achieved in a case, when the lateral curve of the working protrusions is of an involute profile.

Description of the drawing

[0013] An example of the device for producing a textile of defined thickness according to the invention in vertical embodiment is schematically represented on the enclosed drawing, where the Fig. 1 represents axonometric view to this device, the Fig. 2 axonometric view to the forming section of this device and the Fig. 3 a cross section of the device according to the invention.

Examples of embodiment

[0014] The device for producing a textile of defined thickness by folding a two-dimensional textile according to the invention and its operation shall be explained on an exemplary embodiment illustrated on the Fig. 1, 2 and 3, where the device according to the invention is represented schematically in a vertical embodiment. Represented are only the main elements of this device, which are essential for understanding the principle of the invention, moreover in a simplified manner, regardless their real structure or technology of their production. To keep lucidity of the enclosed drawing, on each of working shafts in the Fig. 1 and Fig. 2 only two forming disks and one guiding pulley are represented, while due to the same reason there is not represented e.g. the drive of feeding means of the two-dimensional textile, the drives of working shafts or drives of twisting elements of the fixing unit, etc.

[0015] The device according to the invention comprises the forming section **1** and under it arranged fixing section **2**.

[0016] The forming section **1** represented in the Fig. 2 comprises the known feeding means **3** of the two-dimensional textile, which in the represented example of embodiment is formed by a pair of parallel, horizontally arranged feeding rollers **31** and **32**, which are rotatably mounted in the not represented frame of the device. One of the feeding rollers **31** and **32** is performed as an pressure one, and at least one of them is coupled with the not represented drive for its rotation movement around its longitudinal axis. Between the feeding rollers **31** and **32** the brought two-dimensional textile **33** is being compressed.

[0017] Under the feeding means **3** of the two-dimensional textile **33** on the frame of the device rotatably is mounted the first working shaft **41** coupled with the not represented drive, and the second working shaft **42** parallel with the first working shaft **41.** Longitudinal axis **51** of the first working shaft **41** and the longitudinal axis **52** of the second working shaft **42** are horizontal and the plane interposed through them forms the central plane **6**.

[0018] On the first working shaft **41** there are firmly mounted the forming disks **71,** while each of them on its entire periphery is equipped with plurality of working protrusions **81** of the same size whose lateral curve in the represented example of embodiment has an involute profile, and which are separated by a working interspaces **91.** The working protrusions **81** of neighbouring forming disks **71** on the first working shaft **41** are arranged in alignment, and their peaks are laying on straight lines parallel with longitudinal axis **51** of the first working shaft **41.**

[0019] Outer circles **101** are circles escribed of the respective forming disks **71**. Semi-diameter of the outer circle **101** equals to the semi-diameter of the head circle of working protrusions **81** increased by the thickness of the two-dimensional textile **33**. Outer circles **101** are intersecting the central plane 6 in the first working points **111.** All first working points **111** lie on the first working straight line **121.**

[0020] Through the first working straight line **121** perpendicular to the central plane **6** the first working plane **61** is passing.

[0021] In the space between the neighbouring forming disks **71** on the first working shaft **41** freely rotatably are mounted the guiding pulleys **131**, whose diameter is smaller than the diameter of forming disks **71.**

[0022] On the second working shaft **42** in the embodiment represented in the Fig. 1 to Fig. 3 are mounted the forming disks **72** of the same structure and the same diameter as the forming disks **71** on the first working shaft **41,** while in the space between them freely rotatably are mounted the guiding pulleys **132** of the same structure as the guiding pulleys **131** on the first working shaft **41.** The outer circles **102** assigned to the forming disks **72** on the second working shaft **42** are intersecting the central plane **6** in the second working points **112,** while all the second working points **112** lie on the second working straight line **122.**

[0023] Through the second working straight line **122** perpendicular to the central plane **6** intersects the second working plane **62**, which together with the first working plane **61** encloses the working space **60.** Part of the working space **60** limited from below by the central plane **6** and from side by planes interlaid by outer faces of outer forming disks **71** and **72** forms the forming space **600**, in which the two-dimensional textile **33** is folded into folds **331**, through which the folded textile **330** is produced. Into this forming space at least partially extend the working protrusions **71** of forming disks on the first working shaft **41** and/or working protrusions **72** of forming disks on the second working shaft **42**.

[0024] The forming disks **71** on the first working shaft **41** and forming disks **72** on the second working shaft **42** are arranged against each other, while some working protrusions **81** of the forming disks **71** on the first working shaft **41**, which in the given instant of time are to be found in the forming space **600**, extend into the respective working interspaces **92** of forming disks **72** arranged on the second working shaft **42** and vice versa.

[0025] In the Fig. 3 in front of the forming disk **71** on the first working shaft **41** is represented the first guide-rail **141** and in front of the forming disk **72** on the second working shaft **42** is represented the second guide-rail **142.** The first guide-rail **141** on its surface adjoining to

the working space **60** is provided with a sliding surface **1410**. A part of sliding surface **1410** under the central plane **6** is perpendicular to the central plane **6** and parallel with the second working plane **62**, while a part of the first guide-rail **1 41** and its sliding surfaces **1410** extending above the central plane **6** is bent in direction from the working space **60**. The first guide-rail **141** in example of embodiment represented in the Fig. 1 to Fig. 3 is arranged between each two neighbouring forming disks **71** on the first working shaft **41**. The structure of the second guide-rail **142** is identical with structure of the first guide-rail **141**, while positioning and arrangement of the second guide-rail **142** is mirrored to arrangement of the first guide-rail **142**. That means the second guide-rail **142** on its surface adjoining to the working space **60** is provided with sliding surface **1420**, whose part under the central plane **6** is perpendicular to the central plane **6**, and parallel with the first working plane **61**, while a part of the second guide-rail **142** and its sliding surfaces **1420** extending above the central plane **6** is bent in direction from the working space **60**, which together with similar shaping of a part of the first guide-rail **141** makes easier introduction of the two-dimensional textile **33** into the forming space **600**. The second guide-rail **142** in example represented in the Fig. 1 to Fig. 3 is arranged between each two neighbouring forming disks **72** on the second working shaft **42**.

[0026] Above the forming disks **71** mounted on the first working shaft **41** on frame of the device rotatably is mounted the upper shaft **151** being parallel with the first working shaft **41,** while the working length of the upper shaft **151** extends above all guiding pulleys **131** mounted on the first working shaft **41.**

[0027] In the space under the forming disks **71** of the first working shaft **41** on frame of the device rotatably is mounted the tensioning shaft **161**, which is parallel with the first working shaft **41.** Operating length of the tensioning shaft **161** extends under all guiding pulleys **131** mounted on the first working shaft **41.**

[0028] Under the tensioning shaft **161** on frame of the device rotatably, parallel with the tensioning shaft **161** is arranged the lower shaft **171**, whose working length extends under all guiding pulleys **131** mounted on the first working shaft **41.**

[0029] In space under the guide-rails **141** is arranged the driving shaft **181**, adjoined rotatably on frame of the device. The driving shaft **181** is parallel with the first working shaft **41** and its working length extends under all guiding pulleys on the first working shaft **41,** while the plane interlaid with sliding surfaces **1410** of the first guide-rails **141** is towards the driving shaft **181** tangential. The driving shaft **181** is coupled with the not represented drive for its rotating movement around the longitudinal axis.

[0030] A part of surface of the upper shaft **151,** of the guiding pulley **131,** of the tensioning shaft **161**, lower shaft **171**, driving shaft **181** and the sliding surface **1410** of the first guide-rail **141** forms a system for guiding the conveyor belt **191**, which is arranged between each two neighbouring forming disks **71** on the first working shaft **41.** Each conveyor belt **191** is guided from the upper shaft **151** to the surface of guiding pulley **131**, from where is continues to the surface of the tensioning shaft **161** and further to the surface of lower shaft **171**. From the lower shaft **171** the conveyor belt **191** is guided to the surface of the driving shaft **181**, from which it transfers to the sliding surface **1410** of the respective guide-rail **141**. On the sliding surface **1410** of the first guide-rail **141** the conveyor belt **191** is brought back to the upper shaft **151** and it is closed into an infinite loop. Outer surface of each conveyor belt **191** on a part of the sliding surface **1410**, which is perpendicular to the central plane **6**, and the outer surface of a part of the conveyor belt **191** between the guide-rail **141** and driving shaft **181** forms the first guiding surface **201.**

[0031] Similar conveyor belts **192** are arranged also between the neighbouring forming disks **72** on the second working shaft **42**, when each of these conveyor belts **192** is guided on sliding surface **1420** of the second guide-rail **142** and on a part of surface of the upper shaft **152**, of the guiding pulley **132**, the tensioning shaft **162,** lower shaft **172** and driving shaft **182.** Outer surface of each conveyor belt **192** on a part of the sliding surface **1420** being perpendicular to the central plane **6**, and outer surface of a part of conveyor belt **192** between the guide-rail **142** and the driving shaft **182**, forms the second guiding surface **202.** All first guiding surfaces **201** and all second guiding surfaces **202** form the off-take **200** of the folded textile **330** from the forming space **600**, while the distance of the first guiding surface **201** from against it arranged second guiding surface **202** equals to the height of the working protrusion **81** or **82** of the forming disks **71** or **72** extending into the working interspace **92** or **91** of the opposite forming disk **72** or **71** in the central plane **6** increased by double thickness of the two-dimensional textile **33**, this is the thickness of the folded textile **330**.

[0032] Under the driving shafts **181** and **182** on frame of the device rotatably are mounted the first tensioning shaft **211** and the second tensioning shaft **212**, which are parallel with the driving shafts **181** and **182**, while working length of the tensioning shafts **211** and **212** is identical with working length of the driving shafts **181** and **182.**

[0033] In space under the tensioning shafts **211** and **212** is arranged the fixing unit **22**, which in the represented example of embodiment is performed as a device according to the patent document CZ 281287.

[0034] Under the fixing unit **22** to frame of the device are rotatably connected the first rolling shaft **231** and the second rolling shaft **232**, which are parallel with the tensioning shafts **211** and **212** and are of the same working length as the tensioning shafts **211** and **212.**

[0035] Under the rolling shafts **231** and **232** to the frame of the device are rotatably connected the first terminal shaft **241** and the second terminal shaft **242,** which are parallel with the rolling shafts **231** and **232** and are of the same working length as the rolling shafts **231** and

232.

[0036] On surface of the driving shaft **181** between each two neighbouring conveyor belts **191** is guided one the first shifting belt **251.** Each first shifting belt **251** is guided from surface of the driving shaft **181** to the first tensioning shaft **211,** into the fixing unit **22,** and to the surface of the first rolling shaft **231** and from here to surface of the first terminal shaft **241.** From surface of the terminal shaft **241** the shifting belt **251** is guided between the twisting elements **220** of fixing unit **22** to the driving shaft **181,** while outer surface of the shifting belt **251** between the terminal shaft **241** and driving shaft **181** forms the first shifting surface **2510,** which in the represented example of embodiment lies in the second working plane **62.** The first shifting belt **251** on surface of the driving shaft **181** is enclosed into an infinite loop.

[0037] On surface of the driving shaft **182,** of the second tensioning shaft **212,** of the second rolling shaft **232** and the second terminal shaft **242** there is guided the second shifting belt **252** enclosed into an infinite loop, whose outer surface between the driving shaft **181** and the terminal shaft **242** forms the second shifting surface **2520,** which in the represented example of embodiment lies in the first working plane **61.**

[0038] Upon operation of the device the two-dimensional textile **33** is caught between the rollers **31** and **32** of the feeding means **3,** and it is brought into the working space **60** and into the forming space **600** between the rotating forming disks **71** on the first working shaft **41** and the rotating forming disks **72** on the second working shaft **42.** In the forming space **600** the two-dimensional textile **33** by means of the working protrusions **81** and **82** on periphery of the forming disks **71** and **72** of the first working shaft **41** and the second working shaft **42** is folded into the shape of the folded textile **330** formed by folds **331,** whose height during passing through the forming space **600** gradually increases, while the actual height of the fold **331** corresponds to the sum of a depth of penetration of the given working protrusion **81** or **82** into the working interspace **92** or **91** and the thickness of the two-dimensional textile **33.** The greatest height of the fold **331,** which corresponds to the thickness of the textile **332** of a defined thickness is achieved at the moment, when the working protrusion **81** or **82** extending into the corresponding working interspace **92** or **91** is passing through the central plane **6.**

[0039] After passing through the central plane **6** the depth of penetration of the working protrusions **81** and **82** of the forming disks **71** and **72** gradually decreases, till these working protrusions **71** and **72** exit from the working space **60,** while the folded textile **330** is compressed between the first guiding surfaces **201** and the second guiding surfaces 202, which in the represented example of embodiment are formed by the surface of moving conveyor belts **191** and 192, which move in the same direction as the forming disks **71** and 72. Through motion of the first guiding surfaces **201** and second guiding surfaces **202** the folded textile **330** is brought between in the same direction moving the first shifting surface **2510** and the second shifting surface **2520.**

[0040] Between the first shifting surface **2510** and the second shifting surface **2520** the folded textile **330** is brought into contact with the twisting elements 220 of the fixing unit 22. The twisting elements **220** perpendicular to the plane of the folded textile **330** after then twist the fibres protruding from peaks of individual folds **331** into a stable linear formations similar to the yarns, through which the folded textile **330** is mechanically fixed and transformed into the textile **332** of defined thickness, which is of a stable shape and appearance.

[0041] Further not represented examples of embodiment differ from the described example e.g. by that the drive is not only coupled with the first working shaft **41,** but also with the second working shaft 42. By mutual control of these drives e. g. by means of PC, it is possible between the working protrusions **81** and **82** of the forming disks **71** and **72** to maintain permanently clearance of certain sizes, which prevents any possible damage of the two-dimensional textile **33** or the folded textile **330** due to pressure between the side surfaces of working protrusions **81** and **82** and their mutual motion.

[0042] In further examples of embodiment it is advantageous if the first working shaft **41** and/or the second working shaft **42** is connected to the frame of the device in an adjustable manner, so that the axial distance between them is adjustable, and as a result of which adjustable is also the size of forming space **600** and size of penetration of the working protrusions **81** and **82** of the forming disks **71** and **72** into the working interspaces **91** and **92** of opposite forming disks **72** and **71.** Adjustment of axial distance between the first working shaft **41** and the second working shaft **42** enables a certain degree control of the height of folds **331** and thus the thickness of the folded textile **330** and thus also of the final thickness of the textile **332** of defined thickness. In this case it is nevertheless essential to secure that simultaneously with axial distance of the first working shaft **41** and the second working shaft **42** by the same value is changed also the distance between at least some of the first guiding surfaces **201** and at least some of the second guiding surfaces **202,** so that these guiding surfaces **201** and **202** may fulfil their function, this is to maintain the folded textile **330** in the same status as it leaves the forming space **600.**

[0043] By controlling the speed of motion of the conveyor belts **191** and **192** there is enabled the control of density of folds **331** of the folded textile **330** and change of its surface weight, and as a result of it also control of a surface weight of the textile **332** of defined thickness.

[0044] In other examples of embodiment the diameter of forming disks **71** on the first working shaft **41** is different from diameter of forming disks **72** on the second working shaft **42.** By a change in ratio of diameters of the forming disks **71** and **72** also the size of forming space **600** is changed.

[0045] Another difference between the described example of embodiment and any from possible not repre-

sented examples of embodiment of the device according to the invention is that the working protrusions **81** and **82** of neighbouring forming disks **71** and **72** need not be unconditionally aligned - their peaks need not lie on straight lines being parallel with axis of the working shaft **51** and **52.** Neighbouring forming disks **71** on the first working shaft **41** may towards one another be turned in principle arbitrarily, while it is important that in the same manner are turned one towards another also the forming disks **72** on the second working shaft **42,** and so the arrangement of working protrusions **81** and **82** and working interspaces **91** and **92** necessary for folding the two-dimensional textile **33** into folds **331** is achieved. Such device is applicable for producing the folded textile **330** from the two-dimensional textile **33** of suitable flexible-elastic properties.

[0046] The working protrusions **81** and **82** on the forming disks **71** and **72** are not limited only to their shapes with involute profile of lateral curve, but they can be substantially arbitrary shaped, nevertheless it must enable folding of the two-dimensional textile **33** into folds **331** and the easiest transport of the formed fold from the working interspace **91** and/or **92**. From this point of view it is therefore advantageous if the broadest place of each working protrusion **81** and **82** is its base. Through various shaping of working protrusions **81** and **82** it is possible to a certain degree to influence the shape, arrangement and density of folds **331** of the textile **332** of defined thickness.

[0047] The structure of the textile **332** of defined thickness and its properties may be changed also by that the working protrusions **81** and **82** on periphery of the forming disks **71** and **72** are of a different size - for example on periphery of the forming disks **71** and **72** the working protrusions **81** and **82** of two different sizes are changing, whereas in these cases the outer circle **111** and **112** is understood to be the head circle of the working protrusions **81** and **82** with the greatest diameter, which is increased by thickness of the two-dimensional textile **33.** In another examples of embodiment the working protrusions **81** or **82** are performed only on a part of periphery of the forming disks **71** or **72.**

[0048] Further modifications with respect to the device of the described structure may further consist in shaping the first guiding surfaces **201** and the second guiding surfaces **202** and in its number. The first guiding surfaces **201** and the second guiding surfaces **202** may substantially be formed arbitrarily, in any case it is necessary, that the second guiding surfaces **202** were under the central plane **6** parallel with the first guiding surfaces **201,** so that their distance under the central plane **6** is not greater than the thickness of the folded textile **330** (though it may be smaller), and at least a part of the off-take **200** of the folded textile **330** was arranged under the forming space **600,** from where the folded textile **330** is brought into the off-take **200.** Number of the first guiding surfaces **201** as well as the second guiding surfaces **202** is nearly arbitrary, nevertheless sufficient for that these guiding surfaces secure the folded textile **330** transporting from the forming space **600** in its shape.

[0049] The first guiding surfaces **201** as well as the second guiding surfaces **202** in the represented example of embodiment are moveable - they are formed by parts of outer surfaces of moving conveyor belts **191** and **192,** nevertheless in further not represented examples of embodiment they may be non-moveable, e.g. formed by the sliding surfaces **1410** and **1420** of the guide-rails **141** and **142,** possibly some of the first guiding surfaces **201** and/or the second guiding surfaces **202** may be fixed, and the remaining guiding surfaces **201** or **202** moveable.

[0050] In cases when the first guiding surfaces **201** and/or the second guiding surfaces **202** are formed by parts of outer surfaces of conveyor belts **191** and **192,** these conveyor belts **191** and **192** in the device may be guided nearly arbitrarily, nevertheless their parallelism under the central plane **6** must be preserved and their distance under the central plane **6** may not exceed thickness of the folded textile **330** transporting from the forming space **600.** In examples of embodiment, when the conveyor belts **191** and **192** are guided identically or similarly as in example represented in the Fig. 1 to Fig. 3, it is possible, that any of the shafts, on which the conveyor belts **191** and **192** are guided, this is the upper shaft **151** and **152,** tensioning shaft **161** and **162,** lower shaft **171** and **172** or the driving shaft **181** and **182** were performed as the static ones, while the conveyor belts **151** or **152** at their movement are sliding on their surface. Any of these shafts, which in the frame of the device is attached rotatably, may be coupled with a drive for rotation motion and for drive of conveyor belt. Any of these shafts may also on its surface be provided with some of the known surface treatment to prevent the undesired motion of conveyor belts, or their slippage.

[0051] In the same way, arbitrarily may be guided the first shifting belts **251** and the second shifting belts **252,** while the parallelism of the first shifting surfaces **2510** with the second shifting surfaces **2520** must be preserved and their distance may not exceed thickness of the folded textile **330.** The first and second shifting surfaces **2510** and **2520** may as the first guiding surfaces **201** and second guiding surfaces **202** be formed as fixed non moveable surfaces. In some examples of embodiment it is possible and advantageous, if the non moveable first guiding surfaces **201** fluently verge into the first non moveable shifting surfaces **2510,** or they merge in them, and the second non moveable guiding surfaces **202** continuously verge into the second non moveable shifting surfaces **2520,** or they merge in them.

[0052] On the trajectory of the folded textile **330** in the fixing section **2** of the device which is delimited by the first shifting surfaces **2510** and the second shifting surfaces **2520** there may be installed nearly unlimited number of fixing units **22,** which fix the folded textile **330** either by the described mechanical twisting of fibres on surfaces of the folds **331** or in other manner - e.g. by application of fusing binders, by laser, or by another

known manner or by their combinations.

[0053] The device represented and described in the vertical embodiment may further be arbitrarily tilted, possibly its forming section **1** and fixing section **2** may be mutually nearly arbitrarily arranged.

[0054] The described device according to the invention and its various technical embodiments is not applicable strictly only for processing of two-dimensional textiles 33 of various parameters and kinds, but it may process also similar two-dimensional materials, e.g. paper, cardboard, etc., while in these cases it is necessary to adjust to the material being processed also the type of fixing unit, possibly of units.

List of referential markings

[0055]

1	forming section of the device
2	fixing section of the device
3	feeding means of the textile
31	roller
32	roller
33	two-dimensional textile
330	folded textile
331	fold
332	textile of defined thickness
41	first working shaft
42	second working shaft
51	longitudinal axis of the first working shaft
52	longitudinal axis of the second working shaft
6	central plane
60	working space
600	forming space
61	first working plane
62	second working plane
71	forming disk
72	forming disk
81	working protrusion
82	working protrusion
91	working interspace
92	working interspace
101	outer circle
102	outer circles
111	first working point
112	second working point
121	first working straight line
122	second working straight line
131	guiding pulley
132	guiding pulley
141	guide-rail
1410	sliding surface
142	guide-rail
1420	sliding surface
151	upper shaft
152	upper shaft
161	tensioning shaft
162	tensioning shaft
171	lower shaft
172	lower shaft
181	driving shaft
182	driving shaft
191	first conveyor belt
192	second conveyor belt
200	off-take of the folded textile
201	first guiding surface
202	second guiding surface
211	first tensioning shaft
212	second tensioning shaft
22	fixing unit
220	twisting element
231	first rolling shaft
232	second rolling shaft
241	first terminal shaft
242	second terminal shaft
251	first shifting belt
2510	first shifting surface
252	second shifting belt
2520	second shifting surface

Claims

1. The device for producing of a textile of defined thickness by folding a two-dimensional textile into folds, which comprises a group of forming disks arranged on the first working shaft and a group of forming disks arranged on the second working shaft, which is parallel with the first working shaft, whereas each of the forming disks on its periphery is equipped with a system of working protrusions and working interspaces, **characterised in that** the forming disks (71) mounted on the first working shaft (41) are arranged against the forming disks (72) mounted on the second working shaft (42), and the working protrusions (81) of forming disks (71) on the first working shaft (41) extend at least partially into the working interspaces (92) of forming disks (72) on the second working shaft (42) and vice versa, whereas in the space between the forming disks (71) on the first working shaft (41) and the forming disks (72) on the second working shaft (42) the forming space (600) is formed, on whose output the off-take (200) of the folded textile (330) is arranged.

2. The device according to the claim 1, **characterised in that** the off-take (200) of the folded textile (330) comprises at least one first guiding surface (201) extending into the space between the forming disks (71) on the first working shaft (41), and at least one second guiding surface (202) extending into the space between the forming disks (72) on the second working shaft (42).

3. The device according to the claim 2, **characterised in that** at least one first guiding surface (201) is fixed.

4. The device according to the claim 2 or 3, **characterised in that** at least one first guiding surface (201) is moveable.

5. The device according to the claim 4, **characterised in that** at least one first guiding surface (201) is formed by a part of surface of the moveable conveyor belt (191).

6. The device according to any of the claims 2 to 5, **characterised in that** at least one second guiding surface (202) is fixed.

7. The device according to any of the claims 2 to 6, **characterised in that** at least one second guiding surface (202) is moveable.

8. The device according to the claim 7, **characterised in that** at least one second guiding surface (202) is formed by a part of surface of the moveable conveyor belt (192).

9. The device according to any of the claims 2 to 8, **characterised in that** at least one first guiding surface (201) extends to both sides of the central plane (6).

10. The device according to any of the claims 2 to 9, **characterised in that** at least one second guiding surface (202) extends to both sides of the central plane (6).

11. The device according to any of the previous claims, **characterised in that** the lateral curve of the working protrusions (81) and (82) is of an involute profile.

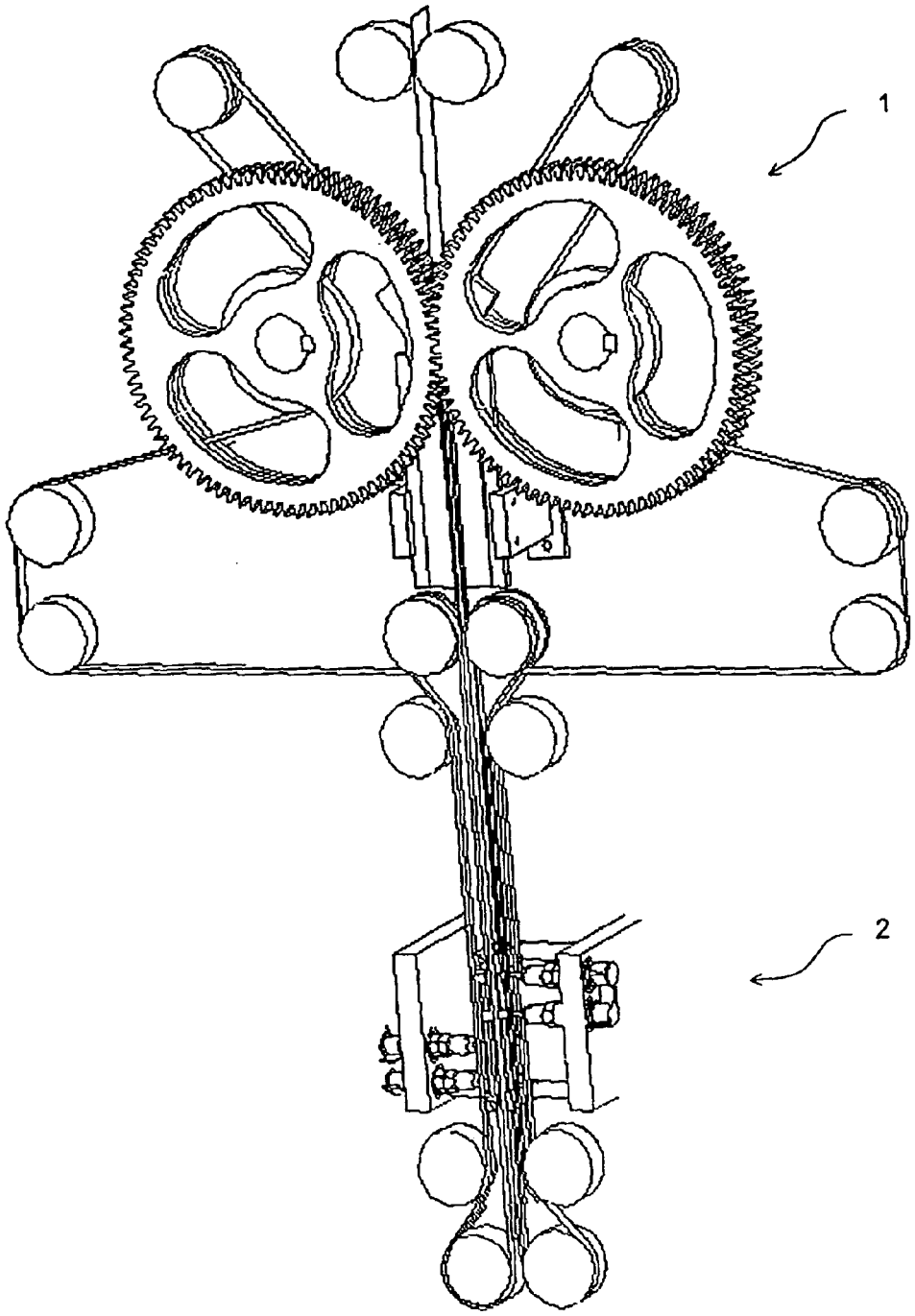
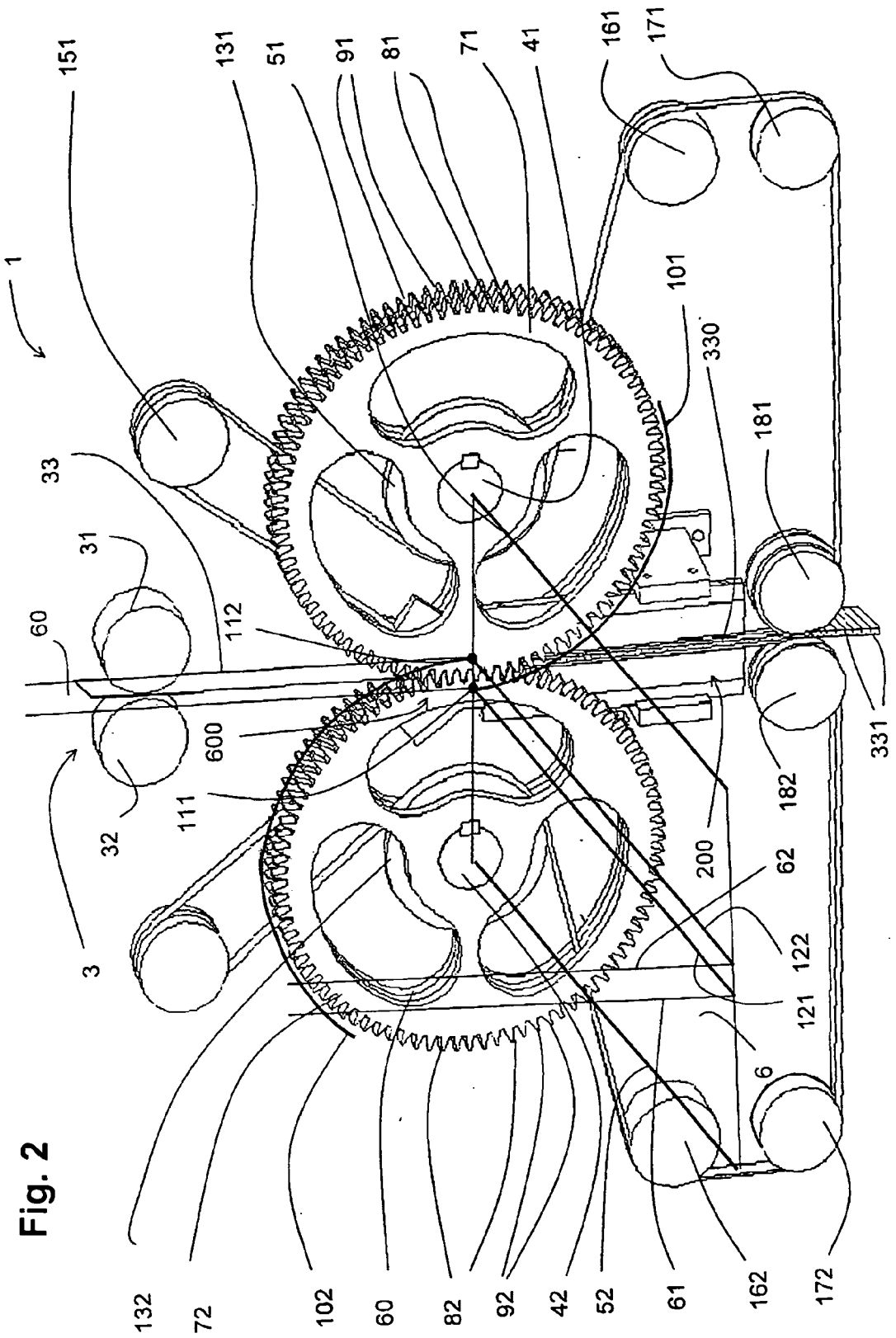


Fig. 1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131
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81
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171
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600
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82
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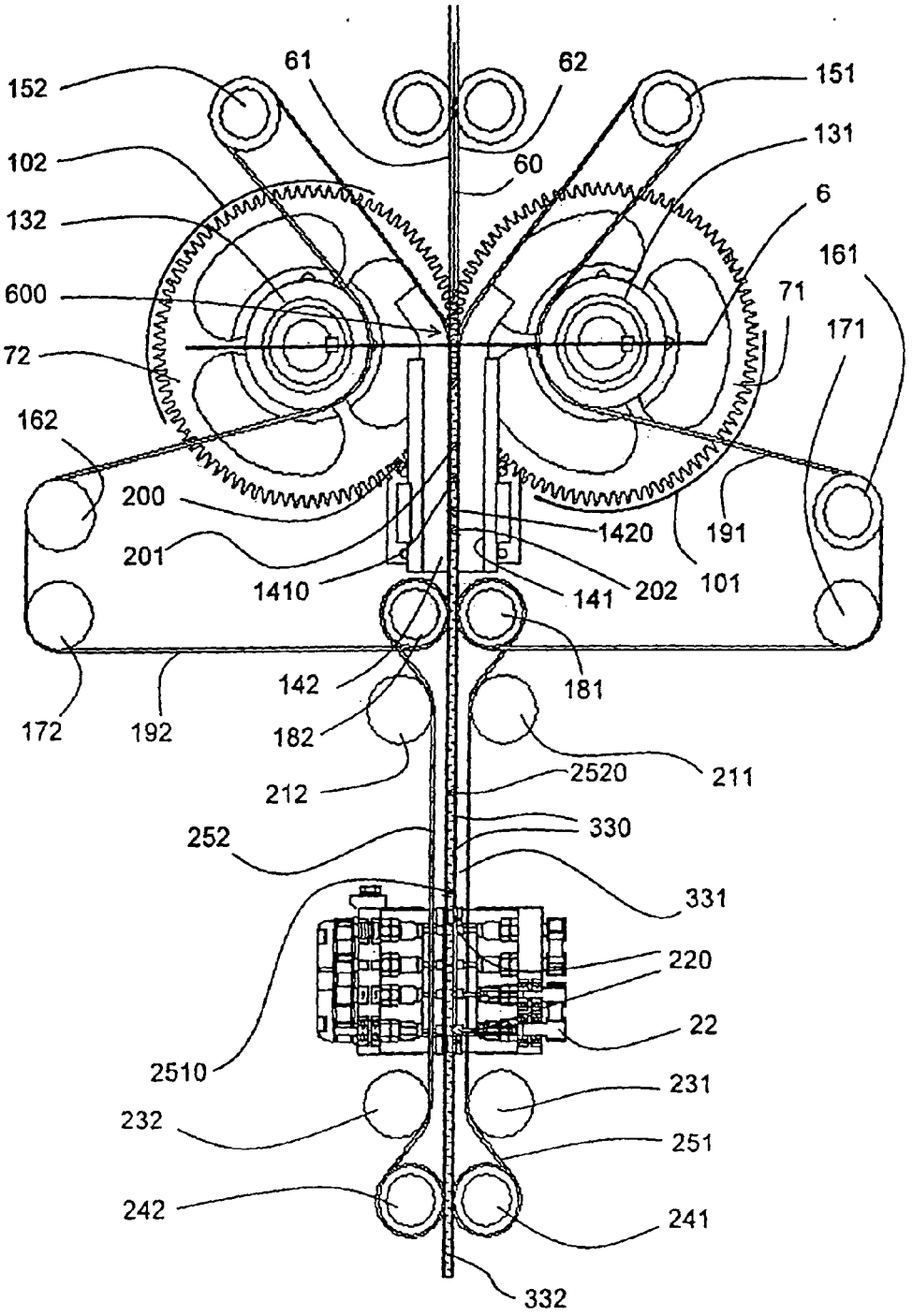
61
162
172

Fig. 2


152
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151
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132
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600
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71
72
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202
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142
181
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211
212
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Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 08 46 6009

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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	20 August 2008	Barathe, Rainier

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3

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