

Description

This invention relates in general to a gear-like stitching assembly adapted for use in a converter mechanism adapted for producing a packaging material or cushioning dunnage, as it is known in the art (US-A- 4 750 896). The invention also relates to a spur gear for use in such an assembly to a converter mechanism for producing pad-like cushioning dunnage product and to a method for producing cushioning dunnage product in pad-like form.

Dunnage producing converter mechanisms for producing resilient pad-like or pad-shaped cushioning dunnage product in strip-like form and having lateral pillow-like or pillow-shaped portions and a central connecting or joining section, running generally lengthwise of the strip of dunnage product, are well known in the art.

US-A-4,750,896 dated June 14, 1988 to Anthony J. Komaransky, et al and entitled Method And Mechanism For Producing Cushioning Dunnage Product, discloses a cushioning dunnage converter or dunnage producing machine of the general type to which the present invention may be applied.

This type of converter mechanism is adapted to take sheets of stock material from a multi-ply stock roll, and pull them into the mechanism while generally turning or rolling the lateral edges of the sheet-like material inwardly, and then connecting the rolled, lateral confronting stock material sections thereof together along the central portion of the pad-like or pad-shaped product by coining, and then emitting the strip of cushioning dunnage product from the machine, with the produced cushioning product comprising relatively resilient, laterally spaced pillow-like or pillow-shaped sections or portions, and a generally centrally oriented coined, connecting portion or section, running generally lengthwise of the strip of product.

The connecting mechanism in the type of prior art converter machine previously identified may be a pair of coacting, generally vertically arranged, gear-like members or the like, which coin or deform the adjacent confronting edges of the lateral pillow-like sections of the pad-like product along the generally central section of the rolled edge strip of stock material, thus connecting together the lateral pillow-like or pillow-shaped sections, and resulting in the pad-like or pad-shaped dunnage product.

The product is adapted to be emitted through an exit opening in the converter machine, and a cutter mechanism is generally provided for severing the strip of cushioning product into selected length, for use in wrapping or packing parts, and the like.

In US-A- 4,717,613 dated January 5, 1988 to Gary W. Ottaviano and entitled Mechanism And Method For Producing Cushioning Dunnage there is disclosed a dunnage converter mechanism which is

operable to produce a pad-like cushioning dunnage product of the general type as that produced by the converter mechanism of the latter discussed Komaransky, et al patent.

There are a number of other prior art patents disclosing dunnage producing mechanism and methods for producing resilient pad-like or pad-shaped cushioning dunnage product of the same general type as that produced by the converter mechanism shown in the aforesaid Komaransky, et al and the Ottaviano patents. Some of these are US-A- 3,655,500 dated April 11, 1972 to G. R. Johnson and entitled A Resilient Cushioning Dunnage Product For Use In Packaging And Packing, and US-A- 4,026,198 to Gary W. Ottaviano dated May 31, 1977 and entitled Cushioning Dunnage Mechanism And Transfer Cart Therefor And Method, both of which disclose resilient pad-like or pad-shaped cushioning dunnage products comprising lateral generally resilient pillow-like or pillow-shaped portions connection along the central portion of the pad lengthwise thereof, together with methods and apparatuses for producing the same.

While coining and/or adhesive means have been utilized in these prior art arrangements, for connecting or holding the pillow-like or pillow-shaped portions of the pad-like or pad-shaped product together in pad-like form, to applicants knowledge, no one prior to applicants has provided a stitching mechanism for use in a converter mechanism which includes perforating means for forming perforations in the produced pad-like product to aid in the holding or securement of the central connecting portion of the pad-like product, for more positively maintaining the pad-like or pad-shaped form of the product, and thus enhancing use and performance of the product.

Therefore according to the invention there is provided a gear-like stitching assembly adapted for use in a converter mechanism utilizable for the production of pad-like cushioning dunnage product from sheet-like stock material disposed in stock roll form, the converter being operable to cause inward rolling or the lateral edges of the sheet-like stock material into generally rolled form prior to being formed into the pad-like product, the stitching assembly being operable to receive generally abutting rolled edge portions of the sheet-like stock material, and to connect the same together along the generally central section of the produced pad-like product in a direction lengthwise thereof, the stitching assembly comprising a pair of rotatable, gear-like members adapted to be disposed in meshed condition and to stitch confronting rolled edge portions of the sheet-like stock material together by coining as the latter rolled edge portions pass between the members, characterised in that the teeth of at least one of the gear-like members have projections thereon for perforating the stock material along the central coined section of the produced pad-like cushioning dunnage product, to aid the coined

section in maintaining the product in its pad-like form.

A mechanism or machine according to the invention includes a gear-like stitching assembly which is operable to both coin and perforate confronting rolled edge portions of the sheet-like stock material during operation of the mechanism to aid in maintaining the produced pad-like product in its pad-like form especially during use of the product in packaging or packing, such as for instance in wrapping of parts or articles for shipment thereof.

The invention will now be described by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a partially broken, top plan view of a cushioning dunnage producing machine or converter, which embodies the invention;

FIGURE 2 is a partially broken, side elevational view of the machine of Figure 1;

FIGURE 3 is an enlarged, fragmentary, perspective illustration of the converging member of the converter and the coacting meshed coining and perforating gear-like means of the stitching assembly for connecting the laterally arranged, generally abutting pillow-like portions of the dunnage product together, and illustrating the passage of the rolled edge stock material into the stitching assembly;

FIGURE 4 is an enlarged fragmentary, perspective view of the meshed connecting gear-like members of the stitching assembly disposed adjacent the exit end of the converging member of the converter mechanism, and illustrating projections on the teeth of the gear-like members of the stitching assembly;

FIGURE 5 is an enlarged, partially diagrammatic, side elevational view of the idler gear-like member of the stitching assembly;

FIGURE 6 is a partial sectional view taken generally along line 6-6 of Figure 5;

FIGURE 7 is an enlarged, partially diagrammatic, side elevational view of the driven gear-like member of the stitching assembly;

FIGURE 8 is a partial sectional view taken generally along line 8-8 of FIGURE 7;

FIGURE 9 is an enlarged diagrammatic, perspective plan view of a strip of the produced pad-like or pad-shaped cushioning dunnage product; and FIGURE 10 is an enlarged, generally fragmentary, diagrammatic illustration taken generally along the plane of cross sectional line 10-10 of FIGURE 9.

Referring now again to the drawings, there is illustrated a dunnage producing machine 10, or converter as it is known in the art, which, in the embodiment illustrated, utilizes a multi-ply stock roll 12 of sheet-like stock material, such as, for instance, 30 pound kraft paper sheet. In the embodiment of stock roll illustrated in, for instance, FIGURES 1 and 2, the

plies of the stock roll are preferably of equal width and in this embodiment comprise three plies disposed in roll form, for expeditious and compact installation on the dunnage producing machine or converter.

Stock roll 12, in the embodiment illustrated, comprises a hollow core 14 of generally cylindrical configuration on which the three super-imposed webs or sheets of stock material are wound. The stock roll is adapted to be mounted on a supporting rod 16 extending preferably relatively loosely through the core 14, for rotation of the stock roll 12 relative to the supporting frame structure 18 as the stock is drawn from the roll into the dunnage machine.

Reference may be had to aforementioned U.S. patent No. 4,750,896 which is incorporated herein by reference, for a more detailed explanation of the mounting of the stock roll on the converter. It will also be understood that the stock roll could be mounted on a separate stand or cart and the plies therein fed into the converter in a manner known in the art (e.g. U.S. patent No. 4,650,456 in the name of Steven E. Armington and issued March 17, 1987).

Machine 10 in the embodiment illustrated, comprises an enclosed or sheathed support framework 20 including leg portions 20a, which may include means (not shown) associated therewith for leveling the support framework with respect to the supporting surface S.

Framework 20 supports a longitudinally converging chute-like member 22 (FIGURES 1 and 2) which chute or converging member forms a guide and support for the webs or plies of stock material as they are drawn off the stock roll 12 and are passed toward connecting or stitching mechanism section 24 of the dunnage producing machine.

A three dimensional stock forming frame 26 which in the embodiment illustrated comprises a tubular frame body portion of generally triangular shape in plan (FIGURE 1) is supported in the chute and projects rearwardly of the entry end 22a of the chute or converging member 22. Stock forming mechanism 26 at its forward nose end 26a is preferably disposed relatively close to the underlying bottom wall of the chute 22 adjacent the exit end 22b thereof, and as illustrated in FIGURES 1 and 2. The webs of stock material are adapted to move or slide between the nose end 26a and the chute exit end 22b during movement of the stock material from the stock roll 12 to the connecting or stitching section 24, which pulls the stock material through the machine, and causes discharge of the produced resilient dunnage pad product P through exit opening 24 in the machine frame 20.

Connecting or stitching section 24 of the converter includes, in the embodiment illustrated, stitching assembly 30 comprising rotatable, generally loosely meshed gear-like members 30a, 30b, which are adapted to "coin" abutting lateral pillow-like or pillow shaped portions of the produced pad-like product, as

the rotating gear-like members move the product through the converter and out exit opening 28. An electric motor and speed reducer mechanism 32, 32a may be utilized to drive one of the gear-like stitching members (i.e. member 30b) which because of its generally meshed relation with the other of said members (i.e. member 30a) likewise causes rotation of the latter. Reference may be had to aforementioned patent No. 4,750,896 for a more detailed disclosure of a converter mechanism, including pusher or forming frame mechanism 26 of the general type shown in FIGURES 1 and 2, together with the operation thereof.

As the sheet-like stock material is pulled from the stock roll through the chute 22 by connecting or stitching mechanism 24, the side edges of the stock webs are rolled inwardly into generally spiral form and are urged inwardly toward one another so that the inwardly rolled edges form resilient pillow-like or pillow-shaped portions 34 (FIGURES 1, 2 and 9) of stock material disposed in generally abutting relationship as they merge from the exit end of the chute-like member 22 and pass into the rotatable connecting or stitching section 24 of the converter mechanism where such inwardly rolled edges of the stock material are adapted to be joined or stitched together lengthwise of the produced dunnage product, by the rotating gear-like members 30a, 30b thus resulting in a generally central coined section 36 on the product extending lengthwise of the pad-like product, and stitching together (FIGURES 1 and 9) the compressed, overlapped abutting coined edges 36a and 36b (FIGURE 9) of the formed pillow-like portions of the pad-like or pad-shaped product. The latter edges 36a, 36b are generally disposed in generally random overlapped relation as illustrated, along the central compressed coined connecting section 36 of the produced pad-like product.

The laterally arranged pillow-like or pillow-shaped portions 34 of the pad-like cushioning product possess considerable resiliency, each being of a substantially greater thickness than the compressed central coined portion 36. The coining of the product by the gear-like members 30a, 30b produces flat or valley sections 38 with intermediate rise sections 39, with the rise sections projecting outwardly from the level of the associated flat or valley sections, and as clearly shown for instance in FIGURE 10.

Referring now in particular to FIGURES 1 and 2, there is provided at the forward end of the embodiment of converter machine illustrated, a separating mechanism 40 which is adapted to receive the sheet-like stock material from the stock roll 12 and to separate the multi-ply of the roll into individual plies or webs of stock material prior to their passing beneath the forming frame 26 and into the converging chute-like member 22, thus aiding in maintaining the resiliency of the produced dunnage product P. Separating means 40 in the embodiment illustrated, comprises a

plurality of vertically spaced, generally horizontally oriented cylindrical bar-like elements 40a, 40b and 40c about which is adapted to pass the respective web a, b and c of the stock material from the rotatable stock roll, prior to passage thereof underneath the forming frame 26 and into converging chute member 22.

As can be best seen in FIGURE 2, the lower transverse bar-like member 40c is preferably of a materially greater thickness or diameter as compared to those of the upper bar-like members 40a and 40b, with member 40c preferably being rotatably mounted on the upper arm 18b of the respective support bracket 18. Members 40a, 40b and 40c are all preferably rotatable with respect to their mounting structure.

The arrangement of the stock arterial webs a, b and c with respect to the separating bars 40a, 40b and 40c are preferably as shown in FIGURE 2. Webs b and c both may engage roller 40c while web a passes over rotatable bar 40b as shown in FIGURE 2. The rotatable mounting of elements 40a, 40b and 40c aids in preventing tearing of the sheet or web stock material in its passage through the machine.

Disposed outwardly from separating mechanism 40 and also supported on upper arm 18b is preferably a further bar member 42 which in the embodiment illustrated is a rotatable roller having a cylindrical exterior surface, with the ends of roller 42 being rotatably mounted directly on the spaced upper arms 18b of U-brackets 18.

Roller member 42 provides a non-varying point of entry of the plies of sheet-like stock material from the stock roll 12, as they (the plies) are pulled into the dunnage producing mechanism toward the separating means 40, and irrespective of the diameter of the stock roll. Thus in the event of utilizing a larger diameter roll, or as the stock roll is used up during operation of the converter mechanism, the point of entry of the material toward the separating means remains constant, thus facilitating a more uniform production of dunnage pad product from the mechanism. Reference may be had to aforementioned US-A-4,750,896 for a more detailed description of separating mechanism 40 and associated common entry point member 42.

After passing through the exit opening 28 of the converter, the continuously formed pad-like product P is adapted to be severed by a cutter mechanism 44 mounted on the converter machine generally adjacent the exit opening 28, to cut the strip of produced dunnage product into desired lengths.

Referring now in particular to FIGURES 3 and 4, the generally loosely meshed, substantially vertically arranged gear-like members 30a, 30b are rotatably mounted as by means of a respective shaft 46, 46a. Shaft 46 of the upper idler gear-like member 30a is preferably arranged with the ends of the shaft being

mounted in slotted bracket frames 48 (FIGURE 3) and with both of the ends of the shaft being spring loaded as at 50, for urging shaft 46 and associated gear-like member 30a downwardly toward the underlying gear-like member 30b. It will be seen therefore that the top member 30a which is rotatable relative to its supporting shaft 46 generally "floats" due to supporting slotted bracket structure 48 with member 30a and associated shaft 46 being movable vertically relative to the underlying member 36b, to thus provide for automatic varying of the space between the teeth of the gear-like members in the event of varying amounts or thicknesses of the sheet-like stock material attempting to pass therebetween during the connecting or stitching operation. Such arrangement aids in preventing tearing of the stock material due to too hard "meshing" between the gear-like members of the stitching assembly 30. As can be best seen in FIGURE 4, the underlying driven gear-like member projects upwardly through a slot or opening 52 in generally horizontal support plate 54, which extends between the chute member 22 and the product exit opening 28 of the dunnage producing machine.

Shaft 46 is preferably provided with roller sleeves 56 (FIGURES 3 and 4) on both sides of the gear 30a so that as the crumpled rolled edge stock material emerges from the exit end 22b of the chute member 22, it passes beneath the shaft 46 and associated roller sleeves 56 which are rotatable relative to the shaft, and thus aid in preventing tearing of the pad-like product as the connecting or stitching assembly 30 coins the generally central portion of the strip of product, and connects the lateral pillow-like sections 34 thereof together, as illustrated for instance in FIGURE 9, prior to emergence of the finished product from the machine.

The underlying connector gear-like member 30b is keyed or fixed to its shaft 46a, the latter being rotatably mounted at its ends in bearing structure 58, and may include a sprocket 60 secured adjacent one end of shaft 46a, and which sprocket 60 in turn is connected as by an endless chain or belt to aforementioned geared speed reducer 32a.

FIGURES 5-8 illustrate enlarged detail views of gear-like members 30a, 30b, wherein such members are basically spur gears with the teeth 64 thereof embodying the $14\frac{1}{2}$ Deg. Involute System. In accordance with the invention however, the teeth have been cut or formed to provide projections 66, 66a thereon, with such projections being spaced laterally of one another in a direction transverse of the tooth (FIGURES 6 and 8). The central projection 66a in each row of projections is preferably of a greater width as compared to the width of each of the other projections 66 in the respective row of projections, and as illustrated.

The driven gear-like member 30b, in the embodiment illustrated, has threaded openings 68 formed

therein for receiving threaded set screws (not shown) for fixing or locking the member 30b to its associated shaft 46a. The idler gear 10a is rotatable with respect to its associated shaft 46, and may be provided with a sleeve bearing 70 for facilitating rotation of gear 30a with respect to shaft 46.

During rotation of the gears as afore-described in connection with operation of the converter mechanism, the projections 66, 66a on the teeth simultaneously with the coining of the central section 36 of the produced product, pierce or perforate the underlying compressed stock material to form spaced openings disposed transverse of the central connecting section 36 of the product, and extending in a direction lengthwise of the product, to aid the coined portions in maintaining the product in its pad-like or pad-shaped form, thus facilitating the use of the product as packing or packaging material. In other words, the perforations 72 (FIGURES 9 and 10) stake the compressed stock material together along the central connecting section 36 of the product, and aid the coined portions in preventing opening up or separation of the connecting section of the product.

A pressure of approximately 10 p.s.i. (approximately $6.89 \cdot 10^4$ N/m²) is preferred as applied by each spring unit 50 to shaft 46, to thus resist movement of the idler member 30a away from the driven member during the stitching operation by the stitching assembly 30. However, means 74 is preferably provided coacting with each spring unit 50, for varying the pressure applied to the shaft by the respective spring unit. If for instance heavier webs or sheets of stock material are utilized for the stock material, then the adjusting means 74 can be turned or actuated to increase the pressure for obtaining satisfactory coining and perforation or piercing of the central connecting section of the product. However, for the usual tri-ply, 30 pound kraft paper stock roll utilized in connection with the converter to form the produced product, a set-up or pre-applied pressure of approximately 10 p.s.i. (approximately $6.89 \cdot 10^4$ N/m²) for each spring unit 50 is preferred.

From the foregoing discussion and accompanying drawings it will be seen that the invention provides a novel stitching assembly useable in different types of cushioning dunnage producing machines or converters which includes means for perforating or piercing the stock material along the central connecting section of the produced pad-like cushioning product, for aiding the coined section of the product in maintaining the product in its pad-like form. The invention also provides a novel converter mechanism embodying a stitching assembly of the latter type, as well as a novel method of producing pad-like cushioning dunnage material from web-like or sheet-like material.



Claims

1. A gear-like stitching assembly (30) adapted for use in a converter mechanism utilizable for the production of pad-like cushioning dunnage product (p) from sheet-like stock material disposed in stock roll form (12), the converter being operable to cause inward rolling or the lateral edges of the sheet-like stock material into generally rolled form (34) prior to being formed into the pad-like product (p), the stitching assembly (30) being operable to receive generally abutting rolled edge portions of the sheet-like stock material, and to connect the same together along the generally central section (36) of the produced pad-like product in a direction lengthwise thereof, the stitching assembly (30) comprising a pair of rotatable, gear-like members (30a, 30b) adapted to be disposed in meshed condition and to stitch confronting rolled edge portions of the sheet-like stock material together by coining as the latter rolled edge portions pass between the members, characterised in that the teeth (64) of at least one of the gear-like members (30a, 30b) have projections (66, 66a) thereon for perforating the stock material along the central coined section of the produced pad-like cushioning dunnage product, to aid the coined section in maintaining the product in its pad-like form.
2. A stitching assembly in accordance with Claim 1 including means providing for movably mounting one of the gear-like members with respect to the other to provide to and from movement of the gear-like members relative to one another during the stitching operation.
3. A stitching assembly in accordance with claim 1 or Claim 2 in which the projections comprise a plurality of spaced projections on each of the teeth of the member or members oriented with respect to one another in a direction transversely of the respective tooth of the member or members.
4. A stitching assembly in accordance with Claim 3 in which each of the spaced projections is of a greater dimension in a direction lengthwise of the member or members as compared to the direction transverse of the member or members.
5. A stitching assembly in accordance with Claim 3 in which the spaced projections on each tooth comprise one projection disposed generally coplanar with the longitudinal center plane of the member or members and other projections being spaced laterally of the said plane and of the said one projection on opposite sides thereof.
6. A stitching assembly in accordance with any preceding claim in which the members are spur gears, wit the teeth of each member having the projections thereon.
7. A stitching assembly in accordance with Claim 6 in which the gear teeth embody the 14½ Deg. Involute System and each spur gear has eleven teeth.
8. A stitching assembly in accordance with any preceding claim including a mounting shaft for each member.
9. A stitching assembly in accordance with any preceding claim in which the shaft for one of the members is non-movably connected thereto while the shaft for the other of the members is rotatable relative to the other member, so that the member is idly mounted on the shaft.
10. A spur gear of the type adapted for use in an assembly according to Claim 1 characterised in that at least one of the teeth (64) of the gear (30a, 30b) have projections (66, 66a) thereon for perforating the stock material along the central coined section of the produced pad-like cushioning dunnage product, to aid the coined section in maintaining the product in its pad-like form.
11. A spur gear in accordance with Claim 10 including a transverse axial opening therethrough for mounting the spur gear on a shaft (56).
12. In a converter mechanism for producing pad-like cushioning dunnage product from sheet-like stock material comprising a support (20), means (26) on the support for causing inward rolling of the lateral edges of the stock material into generally rolled form, and gear-like stitching means (24) on the support adapted to receive confronting rolled edge portions of the sheet-like stock material and to connect the same along the generally central section of the produced pad-like product in a direction lengthwise thereof, the stitching means (24) comprising a pair of spaced meshed, rotatable toothed gear-like members (30a, 30b) adapted to stitch confronting rolled edge portions of the sheet-like stock material together by coining as such rolled edge portions pass between the members, characterised in that the teeth (64) of at least one of the members (30a, 30b) have projections (66, 66a) thereon for perforating the stock material along the central coined section of the produced cushioning dunnage product, to aid the coined section in maintaining the product in its pad-like form.



13. A converter mechanism in accordance with Claim 12 in which the stitching means (24) include means (48) providing for movably mounting one of the members (30a, 30b) relative to the other in directions toward and away from one another.

14. A converter mechanism in accordance with Claim 13 in which the stitching means (24) include spring means (50) coacting with the said members for urging the members (30a, 30b) toward one another.

15. In a method of producing cushioning dunnage product in pad-like form from sheet-like stock material and in which the product comprises lateral pillow-like portions connected by a central section (36) extending lengthwise of the product, comprising taking at least one web of sheet-like stock material and moving it longitudinally while rolling the lateral edges of the web inwardly into generally spiral form and causing inwardly rolled edge portions (34) to be disposed into generally abutting condition, and then connecting the rolled edge portions (34) together by coining thereof along the juncture thereof and transversely of the pad-like product lengthwise thereof to form the central connecting section (36) of the product (p), characterised in that the stock material is perforated along the central connecting section (36) to aid in connecting the lateral rolled edge pillow-like portions (34) together.

16. A method in accordance with Claim 15 in which coining and perforating are done substantially simultaneously.

17. A method in accordance with Claim 15 or Claim 16 in which the coining is accomplished by providing a pair of meshed gear-like members (30a, 30b) through which the rolled edge portions (34) are passed to connect the rolled edge portions (34) together by the coining, and providing projections (66, 66a) on the teeth (64) of the gear-like members (30a, 30b) to cause the perforation of the stock material along the central coined section (36) during passage of the abutting rolled edge portions through the gear-like members (30a, 30b).

18. A method in accordance with any of Claims 15 to 17 including providing to and from movement of the gear-like members (30a, 30b) relative to one another during the connecting operation to aid in preventing tearing of the stock material, while applying a pressure of approximately 10 p.s.i. (approximately $6.89 \cdot 10^4 \text{ N/m}^2$) to the movable gear-like members to resist movement of one away from the other.

19. A method in accordance with any of Claims 15 to 18 including the step of providing a predetermined width multi-ply roll of the sheet-like stock material (12) and mounting it for rotation about its axis of curvature prior to the moving of the sheet-like stock material longitudinally.

20. A method in accordance with Claim 19 including providing three plies of the sheet-like stock material (12) in the roll form.

Patentansprüche

1. Zahnradartige Heftanordnung (30), geeignet zur Verwendung in einer zur Herstellung von polsterartigem Dämpfungs-Unterlegmaterial (p) aus einem bahnförmigen, in Form einer Vorratsrolle (12) angeordneten Vorratsmaterial einsetzbaren Umwandlervorrichtung, die so betrieben werden kann, daß die Seitenkanten des bahnförmigen Vorratsmaterials nach innen in eine im wesentlichen gerollte Form (34) gerollt werden, bevor das polsterartige Produkt (p) gebildet wird, wobei die Heftanordnung (30) so betrieben werden kann, daß sie im wesentlichen gegeneinander anliegende, gerollte Kantenbereiche des bahnförmigen Vorratsmaterials aufnimmt und diese entlang dem im wesentlichen zentralen Bereich (36) des erzeugten polsterartigen Produkts in einer Längsrichtung zu diesem verbindet, wobei die Heftanordnung (30) ein Paar von drehbaren, zahnradartigen Elementen (30a, 30b) aufweist, die in Eingriffszustand miteinander gebracht werden und gegenüberliegende, gerollte Kantenbereiche des bahnförmigen Vorratsmaterials durch Prägen aneinander heften können, wenn die gerollten Bereiche zwischen den Elementen durchlaufen, dadurch gekennzeichnet, daß die Zähne (64) wenigstens eines der zahnradartigen Elemente (30a, 30b) Vorsprünge (66, 66a) zum Lochen des Vorratsmaterials entlang dem zentralen, geprägten Bereich des erzeugten polsterartigen Dämpfungs-Unterlegmaterials aufweisen, um den geprägten Bereich bei der Beibehaltung des Produkts in seiner polsterartigen Form zu unterstützen.

2. Heftanordnung nach Anspruch 1, dadurch gekennzeichnet, daß Mittel zum beweglichen Anbringen eines der zahnradartigen Elemente relativ zum vorgesehen sind, um eine Bewegung der zahnradartigen Elemente aufeinander zu und voneinander weg während des Heftvorgangs zu erlauben.

3. Heftanordnung nach Anspruch 1 oder 2,



- dadurch gekennzeichnet, daß jeder der Vorsprünge eine Vielzahl von beabstandeten Vorsprüngen auf jedem der Zähne des Elements oder der Elemente aufweist, die zueinander in einer Richtung quer zum betreffenden Zahn des Elements oder der Elemente orientiert sind.
4. Heftanordnung nach Anspruch 3, dadurch gekennzeichnet, daß jeder der beabstandeten Vorsprünge in Längsrichtung des Elements oder der Elemente größerer Abmessung ist als in Querrichtung des Elements oder der Elemente.
5. Heftanordnung nach Anspruch 3, dadurch gekennzeichnet, daß die beabstandeten Vorsprünge auf jedem Zahn einen im wesentlichen mit der Längsmittlebene des Elements oder der Elemente koplanar angeordneten Vorsprung aufweisen, wobei andere Vorsprünge seitlich zu dieser Ebene und zu diesem einen Vorsprung auf dessen entgegengesetzten Seiten angeordnet sind.
6. Heftanordnung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Elemente Zahnräder sind, wobei die Zähne jedes Elementes mit den Vorsprüngen versehen sind.
7. Heftanordnung nach Anspruch 6, dadurch gekennzeichnet, daß die Zahnradzähne das 14 1/2°-Involutensystem bilden und jedes Zahnrad elf Zähne hat.
8. Heftanordnung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß für jedes Element eine Montagewelle vorgesehen ist.
9. Heftanordnung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Welle für eines der Elemente nicht-bewegbar mit diesem verbunden ist, während die Welle für das andere der Elemente drehbar relativ zum anderen Element ist, so daß das Element leerlaufend auf der Welle angebracht ist.
10. Zahnrad des zur Benutzung in einer Anordnung nach Anspruch 1 geeigneten Typs, dadurch gekennzeichnet, daß wenigstens einer der Zähne (64) des Zahnrads (30a, 30b) Vorsprünge (66, 66a) zum Lochen des Vorratsmaterials entlang dem zentralen, geprägten Bereich des erzeugten polsterartigen Dämpfungs-Unterlegmaterials aufweist, um den geprägten Bereich bei der Beibehaltung des Produkts in seiner polsterartigen Form zu unterstützen.
11. Zahnrad nach Anspruch 10, welches zur Befestigung des Zahnrades auf einer Welle (56) eine durch es hindurchgehende axiale Öffnung aufweist.
12. Umwandlervorrichtung zur Herstellung von polsterartigem Dämpfungs-Unterlegmaterial (p) aus einem bahnförmigen, in Form einer Vorratsrolle (12) angeordneten, Vorratsmaterial mit einem Träger (20), einem Mittel (26) am Träger, das bewirkt, daß die Seitenkanten des Vorratsmaterials nach innen in eine im wesentlichen gerollte Form (34) gerollt werden, und einem zahnradartigen Heftmittel (24) am Träger, das gegeneinander anliegende, gerollte Kantenbereiche des bahnförmigen Vorratsmaterials aufnehmen und diese entlang dem im wesentlichen zentralen Bereich des erzeugten polsterartigen Produkts in einer Längsrichtung zu diesem verbinden kann, wobei das Heftmittel (24) ein Paar von drehbaren, zahnradartigen Elementen (30a, 30b) aufweist, die in Eingriffszustand miteinander sind und gegenüberliegende, gerollte Kantenbereiche des bahnförmigen Vorratsmaterials durch Prägen aneinander heften können, wenn die gerollten Bereiche zwischen den Elementen durchlaufen, dadurch gekennzeichnet, daß die Zähne (64) wenigstens eines der zahnradartigen Elemente (30a, 30b) Vorsprünge (66, 66a) zum Lochen des Vorratsmaterials entlang dem zentralen, geprägten Bereich des erzeugten polsterartigen Dämpfungs-Unterlegmaterials aufweisen, um den geprägten Bereich bei der Beibehaltung des Produkts in seiner polsterartigen Form zu unterstützen.
13. Umwandlervorrichtung nach Anspruch 12, dadurch gekennzeichnet, daß das Heftmittel (24) Mittel (48) zum beweglichen Anbringen eines Elements (30a, 30b) relativ zum anderen in Richtungen aufeinander zu und voneinander weg aufweist.
14. Umwandlervorrichtung nach Anspruch 13, dadurch gekennzeichnet, daß das Heftmittel (24) ein mit den Elementen zusammenwirkendes Federmittel (50) aufweist, um die Elemente (30a, 30b) aufeinander zuzubewegen.
15. Verfahren zur Herstellung von polsterartigem Dämpfung-Unterlegmaterial aus einem bahnförmigen Vorratsmaterials, wobei das Unterlegmaterials seitliche, kissenartige Bereiche aufweist, die durch einem sich längs zum Unterlegmaterial erstreckenden zentralen Bereich (36) verbunden sind, wobei wenigstens eine Bahn des bahnförmigen Vorratsmaterials ergriffen und längs bewegt wird, während die Seitenkanten der Bahn nach innen in eine im wesentlichen spiralförmige



- Form gerollt werden und die gerollten Kantenbereiche (34) in einen Anlagzustand gebracht werden, und wobei dann die gerollten Kantenbereiche (34) durch Prägen entlang ihrer Verbindungsstellen und quer zum erzeugten polsterartigen Produkt längs desselben miteinander verbunden werden, um den zentralen Verbindungsbereich (36) des Produkts (p) zu bilden, dadurch gekennzeichnet, daß das Vorratsmaterial entlang dem zentralen Verbindungsbereich (36) gelocht wird, um beim Verbinden der seitlichen, gerollten, kissenartigen Kantenbereiche (34) zu unterstützen.
16. Verfahren nach Anspruch 15, dadurch gekennzeichnet, daß das Prägen und das Lochen im wesentlichen gleichzeitig erfolgen.
17. Verfahren nach Anspruch 15 oder 16, dadurch gekennzeichnet, daß das Prägen durch ein Paar von zahnradartigen Elementen (30a, 30b), die in Eingriffszustand miteinander gebracht werden und durch die die gerollten Kantenbereiche (34) durchlaufen, um diese durch Prägen miteinander zu verbinden, und durch Vorsprünge (66, 66a) an den Zähnen (64) der zahnradartigen Elemente (30a, 30b) zum Lochen des Vorratsmaterials entlang dem zentralen, geprägten Bereich (36) während des Durchgangs der anliegenden gerollten Kantenbereiche durch die zahnradartigen Elemente (30a, 30b) erfolgt.
18. Verfahren nach Anspruch 15 bis 17, dadurch gekennzeichnet, daß eine Bewegung der zahnradartigen Elemente (30a, 30b) aufeinander zu und voneinander weg während des Verbindungsvorgangs vorgesehen ist, um beim Vermeiden von Reißen des Vorratsmaterials zu unterstützen während ein Druck von etwa 10 psi (etwa $6.89 \times 10^4 \text{ N/m}^2$) auf die beweglichen, zahnradartigen Elemente aufgebracht wird, um der Bewegung voneinander weg entgegenzustehen.
19. Verfahren nach einem der Ansprüche 15 bis 18, dadurch gekennzeichnet, daß der Schritt enthalten ist, eine Mehr-Schicht-Rolle des bahnförmigen Vorratsmaterials (12) mit vorgegebener Breite vorzusehen und diese drehbar um ihre Kurvenachse anzubringen, bevor das bahnförmige Vorratsmaterial längs bewegt wird.
20. Verfahren nach Anspruch 19, dadurch gekennzeichnet, daß drei Schichten des bahnförmigen Vorratsmaterials (12) in Rollenform vorgesehen sind.

Revendications

1. Un système d'assemblage à engrenage (30) réglé pour l'emploi dans un ensemble convertisseur utilisable pour la production de matériau de calage en forme de bourrelet rembourré (p) à partir de matière première en forme de feuille disponible sous forme de bobine (12), le convertisseur permettant un enroulement vers l'intérieur des bords latéraux du matériau sous forme de feuille pour donner une forme enroulée (34), avant la formation du produit en forme de bourrelet (p), le système d'assemblage (30) étant prêt à recevoir généralement des portions de bordures enroulées contiguës du matériau sous forme de feuille, et de les relier ensemble le long de la partie centrale (36) du bourrelet produit dans le sens de la longueur de celui-ci, le système d'assemblage (30) étant constitué d'une paire de pièces d'engrenage mobiles sur un axe (30a, 30b), positionnées de manière à être en condition d'engrènement et d'assembler les portions contiguës de bordures enroulées de la matière première sous forme de feuille par embossage, alors que les portions de bordures enroulées passent entre les éléments, caractérisé en ce que la dent (64) d'au moins une des pièces d'engrenage (30a, 30b) est munie de saillies (66, 66a) sur le dessus pour la perforation de la matière première le long de la partie centrale embossée du matériau de calage produit, de manière à aider la partie embossée à maintenir le produit sous sa forme de bourrelet.
2. Un système d'assemblage selon la revendication 1 comprenant un dispositif de montage rendant un des pièces d'engrenage mobile par rapport à l'autre pour permettre un mouvement de va-et-vient d'un des pièces d'engrenage par rapport à l'autre durant l'opération d'assemblage.
3. Un système d'assemblage selon les revendications 1 ou 2 dans lequel les saillies sont constituées d'un ensemble, sur chacune des dents d'une pièce ou des pièces, de saillies espacées et orientées l'une par rapport à l'autre dans une direction transversale par rapport à la dent respective de la pièce ou des pièces.
4. Un système d'assemblage selon la revendication 3 dans lequel chacune des saillies espacées possède une dimension plus importante dans le sens de la longueur de l'élément ou des éléments que dans la direction transversale de la pièce ou des pièces.
5. Un système d'assemblage selon la revendication 3 dans lequel l'ensemble des saillies espacées



- sur chaque dent possède une saillie disposée généralement de manière coplanaire avec le plan au centre longitudinal de la pièce ou des pièces, les autres saillies étant disposées transversalement par rapport à ce plan et à cette saillie de chaque côté de ce plan et de cette saillie.
6. Un système d'assemblage selon l'une quelconque des revendications précédentes dans lequel les pièces sont des roues à denture droite dont chaque dent de chaque pièce est munie de saillies. 5 10
 7. Un système d'assemblage selon la revendication 6 dans lequel la dent d'engrenage présente une développante de $14\frac{1}{2}$ degrés et chaque roue dentée possède onze dents. 15
 8. Un système d'assemblage selon l'une quelconque des revendications précédentes comprenant un arbre de montage pour chaque pièce. 20
 9. Un système d'assemblage selon l'une quelconque des revendications précédentes dans lequel l'arbre d'une des pièces lui est fixé de manière solidaire alors que l'arbre de l'autre des pièces est monté de manière indépendante par rapport à cette pièce de façon à ce que la pièce soit en roue libre par rapport à l'arbre. 25 30
 10. Une roue à denture droite du type adapté pour l'utilisation dans un système selon la revendication 1 caractérisé en ce qu'au moins une des dents (64) de la roue (30a, 30b) possède des saillies (66, 66a) pour perforer la matière première le long de la partie centrale embossée du matériau de calage en forme de bourrelet produit, pour aider la partie embossée au maintien du matériau sous sa forme de bourrelet. 35 40
 11. Une roue à denture droite selon la revendication 10 comprenant une ouverture axiale transverse permettant le montage de la roue à denture droite sur un arbre (56). 45
 12. Dans un mécanisme convertisseur pour produire un matériau de calage en forme de bourrelet à partir de matière première sous forme de feuille, comprenant un support (20), des moyens (26) sur le support pour provoquer l'enroulement vers l'intérieur des bordures latérales de la manière première sous une forme généralement roulée, et des moyens d'assemblage par engrenage (24), placés sur le support, et adaptés pour recevoir des portions de bordures enroulées contiguës de la matière première sous forme de feuille et de les assembler le long de la partie centrale du bourrelet produit dans le sens de la longueur de celui-ci, les moyens d'assemblage (24) comprenant une paire de pièces d'engrenage mobiles sur un axe (30a, 30b), positionnées de manière à être en condition d'engrènement et d'assembler les portions contiguës de bordures enroulées de la matière première sous forme de feuille par embossage, alors que les portions de bordures enroulées passent entre les éléments, caractérisé en ce que la dent (64) d'au moins une des pièces d'engrenage (30a, 30b) est munie de saillies (66, 66a) sur le dessus pour la perforation de la matière première le long de la partie centrale embossée du matériau de calage produit, de manière à aider la partie embossée à maintenir le produit sous sa forme de bourrelet. 50 55
 13. Un mécanisme convertisseur selon la revendication 12, dans lequel les moyens d'assemblage (24) comprennent les moyens (48) procurant le montage d'une des pièces (30a, 30b) de manière mobile par rapport à l'autre dans des directions allant vers et partant l'une de l'autre.
 14. Un mécanisme convertisseur selon la revendication 12, dans lequel les moyens d'assemblage (24) comprennent un ressort (50) solidaire desdits éléments forçant ces éléments (30a, 30b) à aller l'un vers l'autre.
 15. Dans une méthode de production de matériau de calage en forme de bourrelet rembourré à partir de matière première sous forme de feuille et dans laquelle le produit est constitué de portions latérales en forme de traversin reliées par une partie centrale (36) s'étendant le long du produit, comprenant la saisie au moins d'une bande de la matière première sous forme de feuille, sa mise en mouvement longitudinale tout en enroulant les bordures latérales de la bande vers l'intérieur en forme généralement de spirale et amenant les parties de bordures enroulées (34) dans une position généralement contiguës, et l'assemblage des parties de bordures enroulées (34) par leur embossage le long de leur jonction, de manière transversale, et sur la longueur du produit sous forme de bourrelet pour former la partie centrale d'assemblage (36) du produit (p), caractérisé en ce que la matière première est perforée le long de la partie centrale d'assemblage (36) pour aider à maintenir ensemble les parties de bordures enroulées en forme de traversin (34).
 16. Une méthode selon la revendication 15 dans laquelle l'embossage et la perforation sont effectués substantiellement simultanément.
 17. Une méthode selon les revendications 15 ou 16 dans laquelle l'embossage est effectué par l'in-



termédiaire d'une paire de pièces dentées engrenées (30a, 30b) au travers lesquelles on fait passer les parties de bordures enroulées (34) pour les connecter entre elles par l'embossage, les dents (64) des pièces d'engrenage (30a, 30b) étant munies de saillies (66, 66a) pour permettre la perforation de la matière première le long de la partie centrale embossée (36) pendant le passage des portions contiguës des parties de bordures enroulées au travers des pièces d'engrenage (30a, 30b).

18. Une méthode selon l'une quelconque des revendications 15 à 17 qui comprend la possibilité d'un mouvement de va-et-vient des pièces d'engrenage (30a, 30b) l'une par rapport à l'autre pendant l'opération d'assemblage, pour éviter la rupture de la matière première, tout en appliquant une pression approximative de 10 p.s.i. (approximativement $6.89 \times 10^4 \text{ N/m}^2$) aux pièces mobiles d'engrenage pour empêcher qu'elles ne s'éloignent l'une de l'autre.
19. Une méthode selon l'une quelconque des revendications 15 à 18 qui comprend l'étape d'obtention d'un rouleau à couches multiples de largeur prédéterminée de la matière première sous forme de feuille (12) et son montage pour permettre sa rotation autour de son axe de courbure avant de dérouler longitudinalement la matière première sous forme de feuille.
20. Une méthode selon la revendication 19 qui comprend l'obtention d'un rouleau de matière première sous forme de feuille trois plis (12).

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