

[54] **MACHINE FOR PRODUCING NON-WOVEN FLOOR COVERINGS**

[75] Inventors: **Stoyan Iliev Julev; Mihail Yordanov Milkov; Lyubomir Petrov Dachev; Rossen Petrov Vassilev; Simeon Alexandrov Grigorov**, all of Sofia, Bulgaria

[73] Assignee: **ZNIRD pri DSO "TEXTIL", Sofia, Bulgaria**

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[58] Field of Search **156/72, 435, 441, 426, 156/205, 474, 210, 180, 429, 173; 242/7.14, 7.15; 74/128, 142, 570**

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Primary Examiner—Charles E. Van Horn

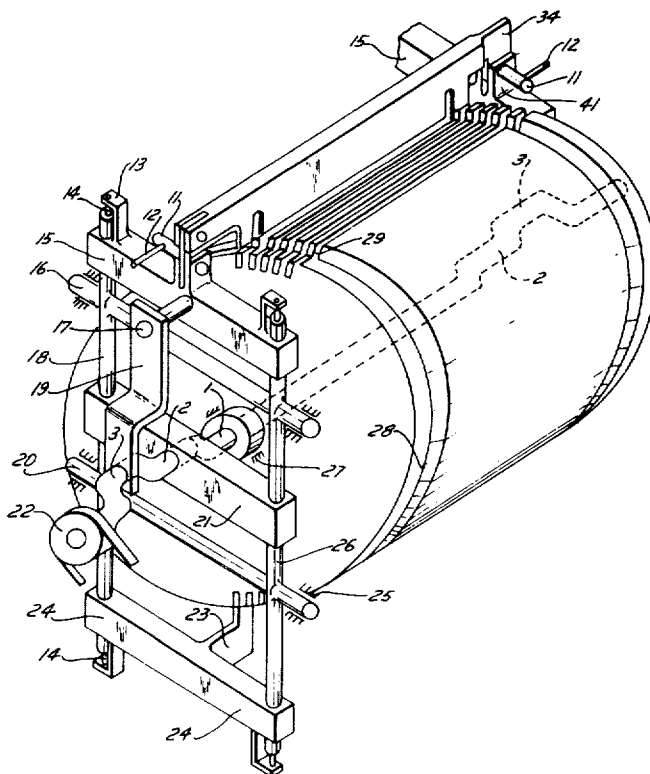
Assistant Examiner—Michael W. Ball

[57]

ABSTRACT

Machine for producing non-woven floor coverings by ramming lap or texturized filament cables, by a beating blade into grooves cut into a drum. The ramming of the lap or cables by the blade, and the indexing of the drum to bring successive grooves therein into alignment with the beating blade, are effected by one mechanism without the necessity of using auxiliary shafts and mechanisms. The drum is made for free rotation with respect to the machine and frame, a main shaft being mounted coaxially of the drum. At the two ends of the main shaft there is formed a large crank with an eccentricity equal to half the vertical motion of the beating blade, and a small crank with an eccentricity equal to a quarter of the pitch between the grooves on the drum. The small crank is joined to a middle traverse by a rotating link, and the said traverse slides along vertical guides. The two vertical guides are fixedly connected to each other by upright and lower horizontal members, thus forming a frame which is joined to the machine body.

17 Claims, 3 Drawing Figures



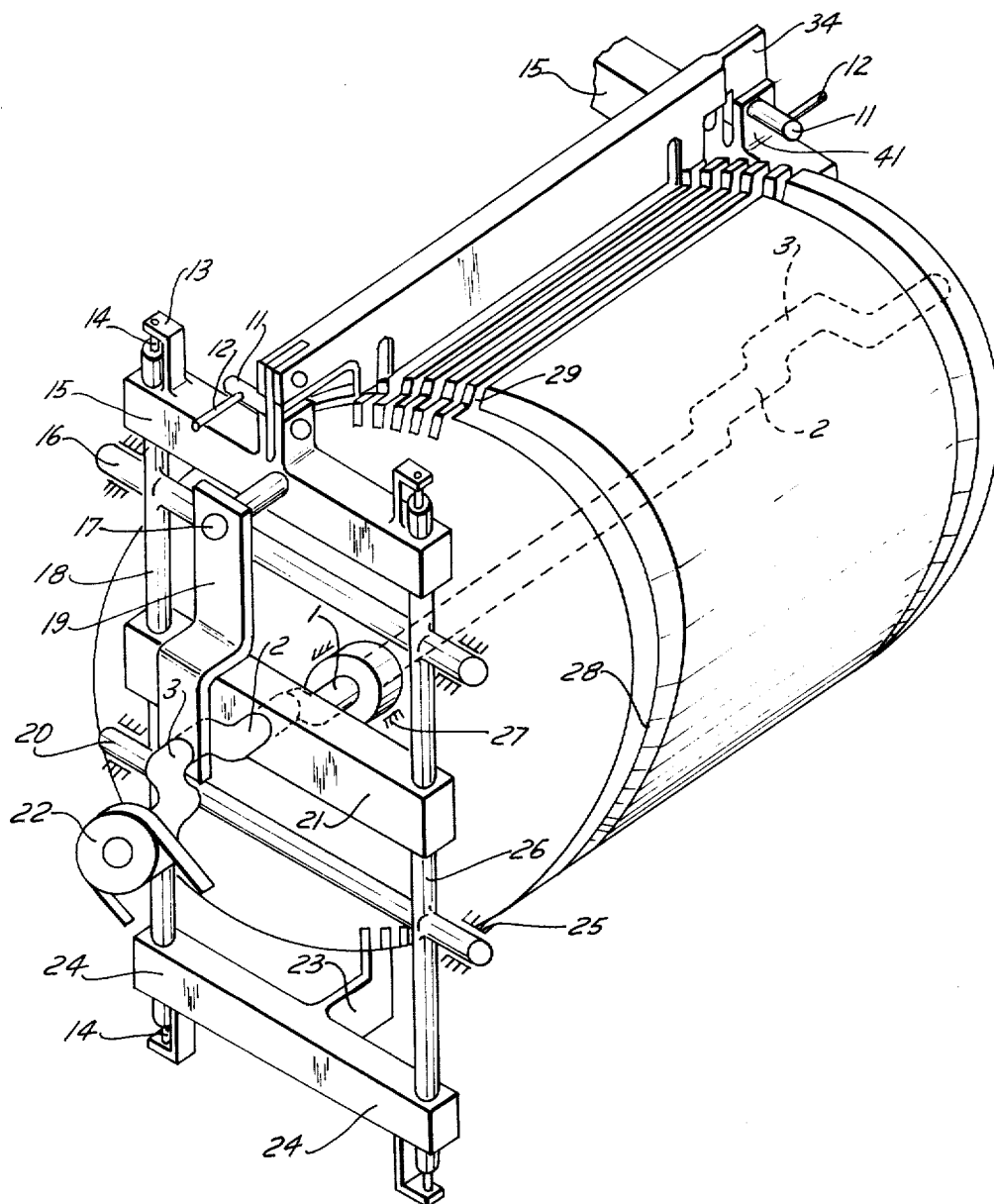


FIG. 1

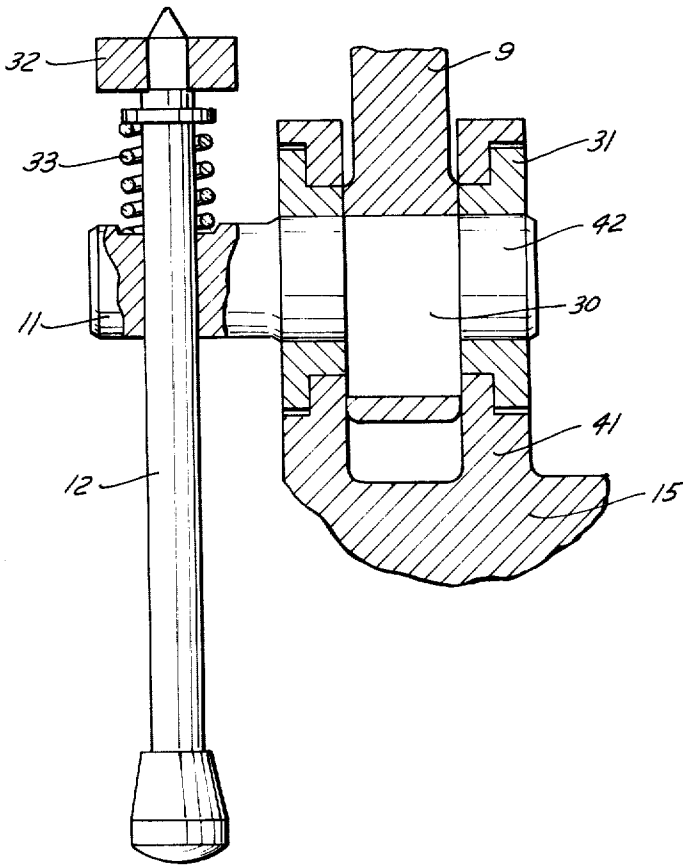


FIG. 2

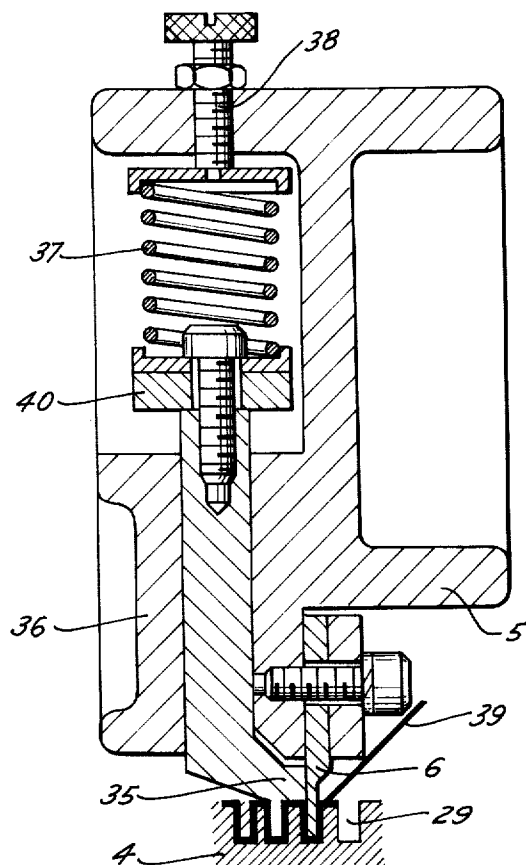


FIG. 3

MACHINE FOR PRODUCING NON-WOVEN FLOOR COVERINGS

This invention relates to a machine for producing non-woven floor coverings; in such machine lap or textured filament cables are rammed by a beating blade in the grooves cut upon the drum, the beating blade being driven by a crank-connecting rod mechanism. The intermittent rotation or indexing of the drum is achieved by two opposite fingers fixedly joined to the beating blade.

A device is known for producing non-woven floor coverings with a beating blade which is driven by crank-connecting rod mechanism, the beating blade being guided by the connecting rod of a parallelogram mechanism. The main shaft of such known device is arranged above a grooved drum, and the auxiliary shafts are disposed beneath the drum. The main and auxiliary shafts are synchronized to run in the identical phase relationship by an additional chain, the parallelogram connecting rod being adjustable longitudinally. The above-described device is disadvantageous because of a large number of elements which must be accurately adjusted relative to each other. Parallelism between the drum axis, the main and the auxiliary shafts, as well as between the main and auxiliary shaft cranks is disturbed by inaccuracies in the manufacture of the parts and in the mounting thereof, as well as deformation of the machine elements during operation; in particular the chains which connect the main and auxiliary shafts vary in length due to the stresses to which they are subjected. Besides the above-described disadvantages, the arrangement of the main shaft makes access to the beating and pressing blades difficult and complicates the driving of the machine. The precision of the intermittent rotation or indexing of the drum is not very good, due to the considerable deformation of the parallelogram guiding means for the crank-connecting rod mechanism.

The present invention has among its objects the provision of a machine for producing non-woven floor coverings, wherein the working movement, that is, the ramming or the lap or cables and the indexing movement of the drum are achieved by a single mechanism, without using auxiliary shafts and mechanisms, and with no centering of the ramming blade with respect to the drum.

In the machine of the invention the drum is mounted for free rotation with respect to the machine body or frame, the main shaft is mounted coaxial with the drum, so that it can rotate easily toward the drum. At the two ends of the main shaft there is formed a large crank with an eccentricity equal to one half the vertical motion of the beating blade, and a small crank with an eccentricity which is equal to one quarter of the pitch between the grooves in the periphery of the drum. The small crank is joined to a middle traverse by a rotating link, and the said traverse slides along left and right parallel vertical guides. The two vertical guides are fixedly connected to each other by upper and lower horizontal members, the vertical and horizontal members forming a frame which is joined to the machine body through the medium of horizontal slide supports.

The large crank is connected by a rotating link with a connecting rod which at its other end is pivotally connected by a socket joint with the upper traverse. The said traverse is joined by slides to the right and left ver-

tical guides, and is fixedly connected to the lower traverse by rods which pass through the hollow vertical guides. The lower traverse is fixedly joined to the lower finger which enters the grooves, cut on the flanges of the drum, the lower finger turning the drum in the interval when the beating blade is out of the drum grooves. The upper traverse is joined by eccentrics such as cams on one of the sides directly to the beating blade carrier, and at the other side to an ear-ring, the other end of the ear-ring having a socket joint connection with the beating blade carrier. To the beating blade carrier there is fixedly joined the upper finger and the beating blade, and by a slide, the pressing blade; the pressing blade is maintained at its lower end position by springs which at their other ends engage the beating blade carrier.

The axis or cam shaft comprises three cylindrical elements, the axis of the middle cylinder being eccentric of that of the other two. The eccentric operates an oscillating strap connected to the beating blade carrier. By turning the cam shaft the said traverse is fixed firmly with respect to the upper traverse in two positions. The first position being the working one, achieving the technological process. At the second position of the cam axis lever is obtained an additional lifting of the beating blade carrier, in order to make easy the machine attending. At the two positions the cam axis lever is fixed to a bowed console, firmly joined to the upper traverse.

The frame formed by the vertical and horizontal guides moves translatory in horizontal direction with a motion, equals half the pitch between the drum grooves. All the points on the upper and lower traverse, as well as on the beating blade, upper and lower finger, have equal trajectories, resembling ellipses with a large vertical axis, equal to the big crank eccentricity, and a small horizontal axis, equal to the small crank eccentricity. The beating and pressing blades move simultaneously until the pressing blade touches the already formed stitches upon the drum surface. Further, the pressing blade remains immovable with respect to the drum preventing the formed stitches from deformation, while the beating blade enters the next groove for the formation of a new stitch. The drum rotates continuously, as at the ramming interval it is driven by the upper finger, and when the beating blade is out of the groove by the lower finger.

Further advantages and features of the present invention will be more fully understood in the following detailed description read with the accompanying drawings in which:

FIG. 1 is a schematic view of the machine,

FIG. 2 is a detail of a mechanism for the additional lifting of the beating blade carrier; and

FIG. 3 is a view in cross section of the beating blade carrier and the mutual arrangement of the beating and pressing blades for the formation of a new stitch.

The drum 4 is mounted for rotation about a horizontal axis, as shown. A flange 28 is affixed to each end of the drum there being aligned grooves 8 and 29 in the end flanges in the drum proper, respectively, the pitch or distance between successive grooves being constant. A shaft 1 runs through the drum 4, such shaft having a central portion thereof coaxial with the drum and journaled in fixed bearings of which one is shown at 27. Outwardly of the bearings 27 the shaft 1 is provided with small cranks 2, and outwardly the small cranks 2 the shaft 1 is provided with larger cranks 3. The shaft

1 is driven by a belt entrained over a pulley 22 which is affixed to the end of the shaft 1 near the rear in FIG. 1. All of the cranks 2 and 3 lie in a single plane extending through the central straight of the shaft 1. The eccentricity of the small cranks 2 equals a quarter of the pitch between the grooves 8, 29, when the eccentricity of the larger cranks 3 equal one half the extent of the vertical motion of the beating blade 6. The small crank 2 extends through and drives a middle traverse 21 which is connected by slides to a left 18 (FIG. 1) and a right 26 vertical guide, such guides being fixedly connected to each other by an upper horizontal member 16 and a lower horizontal member 20. The thus formed frame is joined to the body of the machine by horizontal guide supports 25; the vertical stroke of the frame equals twice the eccentricity of the small cranks 2.

The larger cranks 3 extend through and drivingly engage respective oscillating links 19 which are joined at their other ends by aligned stub shafts 17 connected to respective upper traverses 15. Each upper traverse 15 is connected by a vertical left slide 18 (FIG. 1) and a vertical right slide 26. The upper traverse 15 is fixedly joined to a lower traverse 24 by rods 14 and connecting means 13, such rods 14 passing through the hollow vertical guides 18, 26. A lower finger 23 which is integrally attached to the lower traverse 24, the finger 23 rotating the drum 4 in the interval when the beating blade 6 is withdrawn from the grooves 29 in the drum 4.

Each upper traverse 15 has a pair of vertical longitudinally spaced parallel ears 41 which support bushings journaled on a cam shaft 11. (See FIG. 2) An eccentric or cam 30 on shaft 11 is disposed between the ears 41; one end of an eccentric strap 9 surrounds and accurately engages the cam 30, as shown, the other end of each eccentric strap 9 being pivotally connected to the respective end 34 of the beating blade carrier 5. The cam shaft 11 has three cylindrical elements, the outer two elements 42 being journaled in the bushings 31, whereas the eccentric or cam 30, intermediate the portions of 42, drives the eccentric strap 9, as above explained. A rod 12 extends through a transverse bore in the cam shaft 11, the rod 12 being freely slidable in such transverse bore. In the position of the part shown in FIG. 2, the smaller-diametered pilot end of the rod 12 is disposed in a passage in a member 32 which is a part of an upper traverse 15. The rod 12 is maintained in the position shown by means of a coil compression spring 33 acting between a spring seat on the cam shaft 11 and a washer affixed to the rod 12 inwardly of the pilot end thereof. When the rod 12 and the cam shaft 11 occupy the position shown in FIG. 2 the oscillating strap 9 and thus the beating blade 6 are disposed in a lower one of two positions. When the rod 12 is withdrawn from the passage in the member 32 and the cam shaft 11 is rotated into a second position, the oscillating strap 9 and the beating blade 6 are raised. The cam shaft may be stably maintained in such second positions by having the pilot end of the rod 12 received in a second passage in an element which is affixed to the upper traverse 15. The described first position of the rod or lever 12 and the cam shaft 11 is the working position, whereas the second position thereof is that which the beating blade and its carrier occupy when it is desired to make adjustments on the machine when the machine is idle.

The oscillating strap 9 is connected at its upper end by a bolt 10 to the respective end or the carrier 5 for

the beating blade 6. As shown in FIG. 3, a beating blade 6 is fixedly connected to the carrier 5. Integral with the carrier 5 for the beating blade 6 are upper fingers 7 which enter the grooves 8 in the discs 28. A pressing blade 5 (FIG. 3) is connected by a slide with the beating blade carrier 5 and with a pressing blade guide 36 which is firmly joined to the beating blade carrier 5. A pressing blade 35 is constantly urged downwardly by coil compression springs 37, of which one is shown in FIG. 3, such springs acting between a lower spring seat 40 affixed to the upper end of the presser blade 35 and an adjustable upper spring seat 38 which may be adjusted vertically, thereby to adjust the pretension of the spring 37, by means of a screw threaded adjusting means 38. The upper and lower fingers 7 and 23, respectively, as well as all points along the beating blade 6 rise and fall through similar distances, the path of such fingers and points on the beating blade resembling ellipses with large vertical axes equal in dimension to the eccentricity of the large crank 3, and small horizontal axes, which are equal in dimensions to the eccentricity of the small cranks 2.

The drum 4 is rotated by the action of the upper and lower fingers 7 and 23, respectively, which progressively enter the grooves 8 cut into the end flanges 28 mounted on the drum. The rotation of the drum 4 momentarily halts as one of the fingers 7, 23 leaves a groove 8 and another of such fingers enters the next succeeding groove. The beating blade 6 and the pressing blade 35 move together simultaneously until the pressing blade 35 touches the several last stitches formed on the drum 4. During the further travel of the beating blade 6 into the groove 29 in the drum, the pressing blade 35 remains immovable with respect to the drum, the coil compression spring 37 being compressed while the beating blade 6 continues to push the lap or filament cables 39 into the next following groove 29 in the drum 4, thus forming a new stitch.

Although the invention is illustrated and described with reference to one preferred embodiment thereof, it is to be noted that the application is not to be limited to the disclosure of such a single preferred embodiment but is to be construed within the context of the appended claims by those skilled in the art.

What is claimed is:

1. A machine for producing non-woven floor coverings, said machine comprising a horizontal drum having a plurality of longitudinally extending equally spaced grooves therein extending completely about its periphery, a drum supporting shaft mounted therewithin coaxial thereof, two parallel frames, one disposed at each end of the drum in a respective plane transverse to the axis of the drum, each frame having two spaced vertical guide members, the frame being mounted for movement in a transverse horizontal direction, means for rotatably driving the shaft, means for reciprocating the frame in a horizontal direction comprising an intermediate traverse slidable along the vertical guide members of the frame and first, smaller eccentrics mounted on the drum supporting shaft adjacent the respective ends of the drum, means on the intermediate traverse constituting first eccentric follower means, upper and lower traverses mounted above and below, respectively, the intermediate traverse, means connecting the upper and lower traverses to move in unison, said last named means comprising a second eccentric having an eccentricity markedly greater than that of the first eccentric,

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integrally attached to said drum supporting shaft, and second eccentric follower means connected to the connected upper and lower traverses, discs on the ends of the drum having grooves therein aligned with respect to the grooves in the drum proper, drum indexing fingers connected to the respective upper and lower traverses for alternate engagement with the grooves in the grooved discs affixed to the drum, a beating blade extending longitudinally of the drum, and means connecting the ends of the beating blades to the upper traverses at the opposite ends of the drum, the drum indexing fingers and the beating blade describing a substantially elliptical path having a vertical axis which markedly exceeds in length the length of the horizontal axis.

2. A machine for producing non-woven floor coverings according to claim 1, comprising means for selectively securing the beating blade in a first, operating position with respect to the upper traverses and in a second, inoperative position with respect thereto.

3. A machine for producing non-woven floor coverings according to claim 2, wherein the means for selectively lowering and raising the beating blade with respect to the upper traverse comprises a shaft having circular cylindrical portions disposed eccentrically with respect to each other, one of said portions being journaled on the upper traverse and the other of said portions being connected to a carrier for the beating blade.

4. A machine for producing non-woven floor coverings according to claim 3, wherein said eccentric shaft has three circular cylindrical portions, the two outer end portions being coaxial and the intermediate portion thereof being eccentric with respect thereto.

5. A machine for producing non-woven floor coverings according to claim 4, wherein the two coaxial cylinder portions of the eccentric shaft are mounted in parallel ears of a fitting which is secured to the upper traverse.

6. A machine for producing non-woven floor coverings according to claim 3, comprising an eccentric oscillating strap having an enlarged end portion surrounding and journalling the eccentric portion of the cam shaft, and means pivotally connecting the other end of the oscillating strap to the carrier for the beating blade.

7. A machine for producing non-woven floor coverings according to claim 6, wherein the oscillating strap member is pivotally connected by a pivot pin to the carrier for the beating blade.

8. A machine for producing non-woven floor cover-

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ings according to claim 2, comprising means for selectively retaining the cam shaft in either of two terminal positions, the first such position being a lower, operative position in which the beating blade enters successive slots on the drum, and the second position being one wherein the beating blade is raised from engagement with the drum.

9. A machine for producing non-woven floor coverings according to claim 8, wherein the means for selectively retaining the cam shaft in a selected one of two terminal positions comprises a transverse lever slidably mounted upon the cam shaft, means on the upper traverse presenting two spaced seats for selectively receiving the end of such lever, and spring means constantly urging the lever stably into a selected one of said seats.

10. A machine for producing non-woven floor coverings according to claim 1, comprising means for fixedly securing the beating blade to the beating blade carrier.

11. A machine for producing non-woven floor coverings according to claim 1, comprising a pressing blade, and slide means for mounting the pressing blade upon the beating blade carrier.

12. A machine for producing non-woven floor coverings according to claim 11, comprising means for resiliently urging the pressing blade toward the periphery of the drum.

13. A machine for producing non-woven floor coverings according to claim 12, wherein the means resiliently pressing the pressing blade comprises coil compression springs interposed between the pressing blade and the beating blade carrier, and comprising means for adjusting the pre-tension of the coil compression springs.

14. A machine for producing non-woven floor coverings according to claim 1, wherein the upper and lower traverses are rigidly connected together by elongated rods.

15. A machine for producing non-woven floor coverings according to claim 14, wherein the spaced vertical guides are tubes and the rods pass through the respective tubes.

16. A machine for producing non-woven floor coverings according to claim 1, wherein the lower traverse is joined by a slide to the two vertical guides.

17. A machine for producing non-woven floor coverings according to claim 16, wherein the lower, drum indexing finger is fixedly joined to the lower traverse.

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