May 15, 1951 B. STERNER 2,553,017

MEANS FOR PRODUCING CARPET-LIKE FABRIC

Filed Feb. 20, 1948 2 Sheets-Sheet 1

FIG. 2.

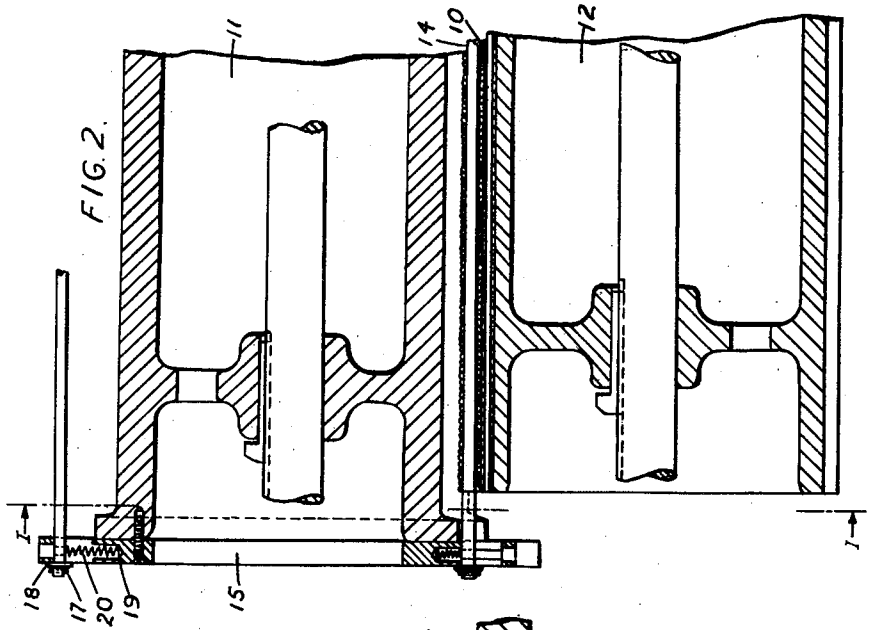
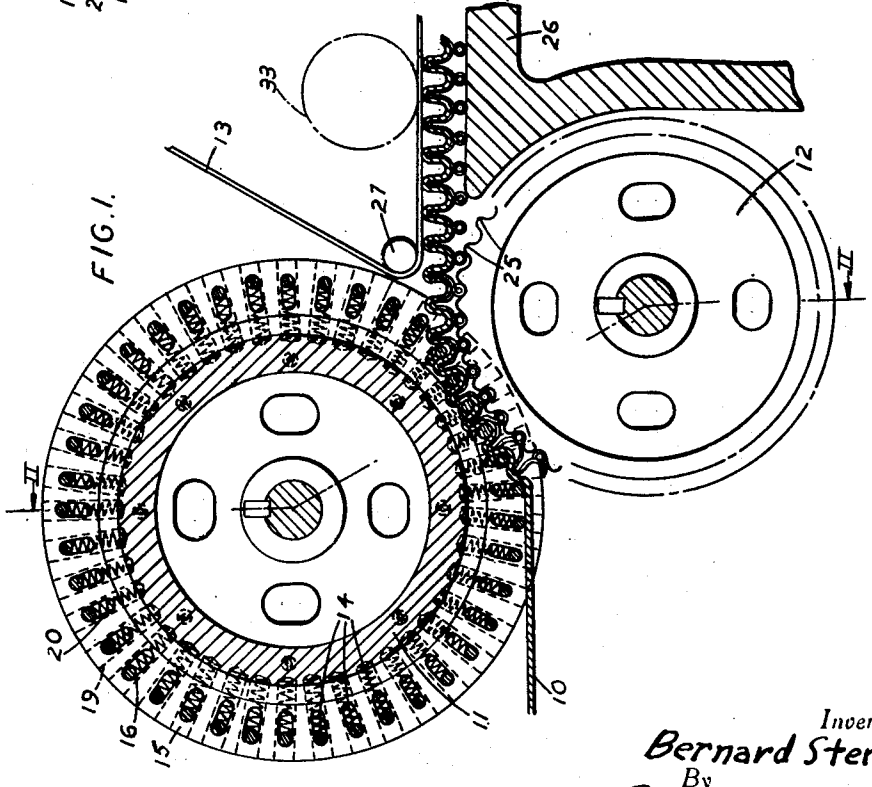


FIG. 1.



Inventor
Bernard Sterner
By
Emery, Holcombe & Blair
Attorney

May 15, 1951 B. STERNER 2,553,017

MEANS FOR PRODUCING CARPET-LIKE FABRIC

Filed Feb. 20, 1948 2 Sheets-Sheet 2

FIG. 3.

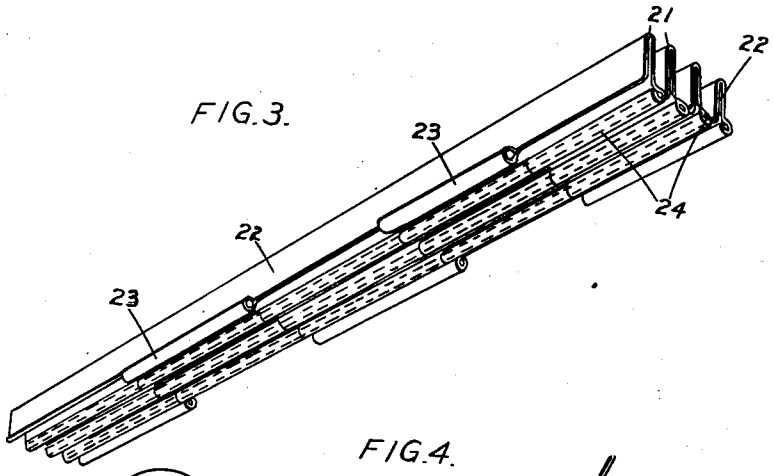


FIG. 4.

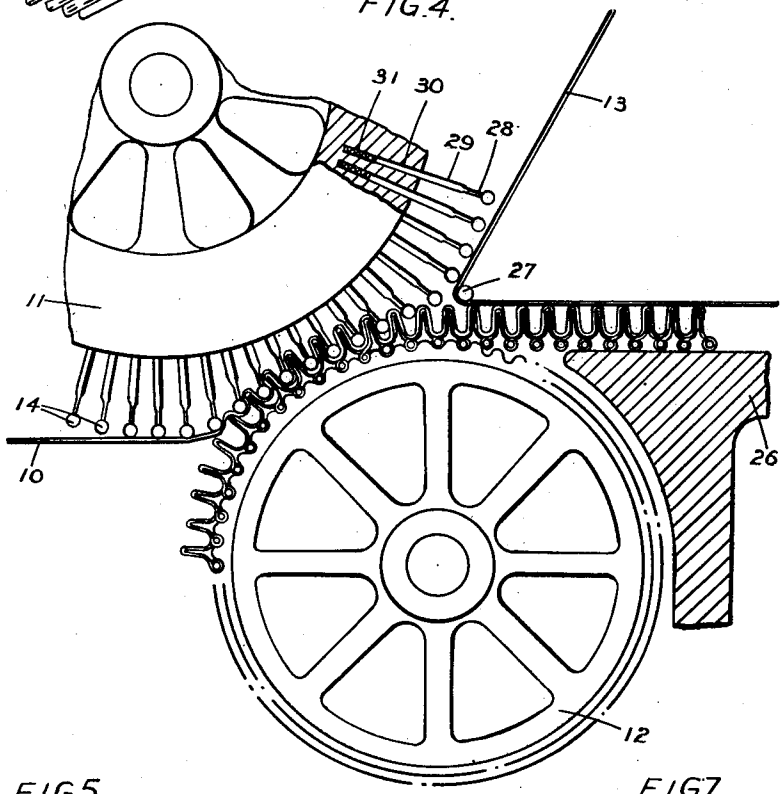


FIG. 5.



FIG. 6.

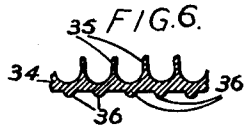
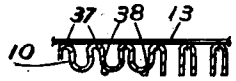


FIG. 7.



Inventor
Bernard Sterner
By
Emery, Holcombe & Blair
Attorney

Patented May 15, 1951

2,553,017

UNITED STATES PATENT OFFICE

2,553,017

MEANS FOR PRODUCING CARPETLIKE FABRIC

Bernard Sterner, London, England, assignor to Gustave Michaelis, Middlesex, England

Application February 20, 1948, Serial No. 9,735
In Great Britain August 17, 1945

12 Claims. (Cl. 154—1.1)

1

This invention relates to means for producing carpet-like fabric in which corrugations or waves are first formed in flexible strands, strips, or sheets, the corrugated material being subsequently secured to a suitable backing sheet.

According to the invention the flexible strands, strips, or sheets are passed between two sets of intermeshing teeth that define the sinuous configuration to which the material is to conform, individual teeth of one of the sets of teeth being yieldably mounted on a rotatable wheel or drum, so that they will mesh over an arc of considerable length with the other set of teeth which are carried by a second rotatable wheel or drum, or by a belt or band passed around a second rotatable wheel or drum, the yielding teeth nesting neatly in the material while the two sets of teeth are in mesh, the material being backed by teeth of the other set, whereby any tendency to straighten out the corrugations already made will be avoided, the corrugated or waved material being subsequently secured to a suitable backing sheet. The material may be secured to a backing sheet along the corrugations by adhesive and further the material may be stitched to the backing sheet along the corrugations so that it will be more firmly secured thereto.

In order that the invention may be clearly understood and readily carried into effect, a machine designed according to the invention in which corrugations are formed in strands of woolen yarn or the like during the manufacture of carpet-like fabric, will now be more fully described with reference to the accompanying drawings in which:

Figure 1 is a sectional view through the corrugating means, on the line I—I of Figure 2;

Figure 2 is a sectional view on the line II—II of Figure 1;

Figure 3 is a detail perspective view showing the construction of one of the sets of cooperating teeth;

Figure 4 is a view similar to Figure 1, but illustrating a modified arrangement of the cooperating teeth;

Figure 5 is a section through part of a toothed conveyer band illustrating an alternative construction;

Figure 6 is a view similar to Figure 5 but showing a further modification, and

Figure 7 is a section through a piece of carpet-like fabric made according to the invention.

Referring to the drawings, a sheet of parallel strands 10, which may be woolen yarn or other suitable material, is passed between a pair of

2

drums 11 and 12 with which are associated cooperating teeth to form corrugations in the strands, and then the corrugated strands are brought into contact with woven fabric 13 coated with adhesive, and the outer bends of the corrugations are caused to adhere to the fabric 13. The teeth on the drum 11 are radially yieldable and are provided by a series of rods 14, parallel to the axis of the drum and of circular cross-section and evenly spaced apart around the circumference of the drum 11. An annular end plate 15 is secured on each end of the drum 11 and each plate 15 has a series of radial slots 16. The ends of the rods 14 are passed through the slots 16 and are retained therein by split pins 17 passed through holes in the rods, and washers 18 on the rods are located between the pins 17 and the outer faces of the plates 15. A series of radially disposed blind bores 19 are formed in each end plate 15, the bores 19 are aligned with the slots 16, and a compression spring 20 is housed in each bore so that each spring engages between the bottom of its bore and one of the rods 14. In this way the springs 20 urge the rods 14 radially towards the outer ends of the slots 16, so that the rods constitute radially yieldable teeth around the drum 11, the slots serving as guides for, and also limiting the radial movements of, the rods 14. Spring-loaded yielding supports may also be provided for the rods 14 at intermediate positions along the length of the drum 11.

The cooperating teeth associated with the drum 12, in this embodiment, are formed on a conveyor band which passes around the drum 12, and also around one or more other drums or sprockets not shown. The conveyer band of Figures 1 to 4 is built up from pressed metal members hinged together, see particularly Figure 3. Each such member consists of a metal strip folded about its longitudinal centre line along which is thereby formed a rounded peak 21, corresponding to the top of a gear tooth, and the bent over portions 22 of the strip at each side of the peak correspond to the flanks of a gear tooth. The flank portions 22 are flared away from each other near their free ends, and the edges of the flared portions are formed with tongues rolled back to form hinge cylinders 23. The adjacent flared portions of two tooth members provide between them a substantially semi-cylindrical base between the two adjacent teeth. The hinge cylinders 23 along the flared edge of one flank portion 22 of each strip are staggered with respect to the hinge cylinders along the flared edge of the other flank portion, so that the hinge cylin-

ders on adjacent tooth members will interengage, and lie coaxially, with each other. The tooth members are then connected together by hinge pins 24 passed through the coaxial hinge cylinders. A conveyer band is built up in this manner so that, at one side it has a series of tooth members for interengagement with the radially yielding teeth of the drum 11, and at its other or under side, the hinge cylinders 23 project sufficiently to engage with teeth or longitudinal corrugations 25 on the drum 12.

The conveyor band is passed around the drum 12, and the effective or upper run of the band passes forwardly from the drum 12 over a table 26. The drums 11 and 12 are preferably so disposed relatively to one another that the two sets of cooperating teeth are in mesh while the band is passing around the drum 12. For this purpose, the drum 11 is set slightly backwards round the periphery of the drum 12 from the effective run of the conveyor band. The woven fabric 13 is passed around a roller 27, then forwardly above and adjacent to the peaks 21 of the effective run of the conveyor band.

In operation, the two drums 11 and 12 are rotated with the two sets of cooperating teeth in mesh with one another, and it will be seen that on account of the yielding teeth on the drum 11 being provided by the rods 14, clearance is afforded behind the rods for the peaks 21 of the tooth members of the conveyor band at the points where the teeth approach and depart from each other. The sheet of strands 10 is fed between the drums 11 and 12 and as one of the rods 14 enters the space between two cooperating tooth members of the conveyor band, it begins to press the strands between the two teeth and continues to do so until the base of the space between the two teeth is reached. It is to be particularly noted that this point is reached before the yielding tooth has reached a position lying on a straight line between the axes of the two drums. Therefore as the drums continue to rotate, the yielding tooth is pressed inwards against its springs towards the axis of the drum 11 until it reaches a position on the said straight line. Thereafter the spring action urges the yielding tooth outwards and thus continues until it reaches its outermost position with respect to the drum 11. Then the rod 14 departs from the base of the space between the two cooperating teeth of the conveyor band.

It will be appreciated, therefore, that the yielding mounting of the rods 14 increases the arc in which they are effective.

The strands 10 are carried forward by the conveyor band, over the table 26 so that the outer bends of the corrugations formed in the strands engage with the fabric 13, to the adhesive side of which they are caused to adhere. The adhesive coating may be in a "tacky" state whilst the fabric is in contact with the strands 10, so that the said outer bends of the corrugations adhere thereto, and are permanently secured thereby when the adhesive sets. Rollers such as that indicated at 33 in Figure 1 or other suitable means may be provided to press the fabric more firmly into contact with the outer bends of the strands 10. Alternatively the adhesive coating on the fabric 13 may be of the kind rendered tacky by the application of heat. In this connection the roller 33 may be heated or other suitable means may be arranged to engage with the fabric 13 and press it into contact with the outer bends of the strands 10, so as to soften the adhesive coating, and at the same time ensure effective adhesion to the strands 10.

As the tooth members of the conveyor band pass to the effective run of the band from the curved path at which the strands 10 are received by the band, the peaks 21 will approach each other slightly. This slight closing together of the peaks 21, while the bases of the spaces between the teeth remain constant, tends to retain the material in position on the band.

An alternative method of yieldingly mounting the rods 14 is illustrated in Figure 4. In this modification each of the rods 14 is connected by a thin blade 28 to the body of its tooth 29 which is slidable in a radial slot 30 in the roller 11, and one or more springs 31 in each slot 30 engage with the members 29 and urge them radially outwards. The radial movements of the teeth may be limited in any convenient manner, such as by the provision of pins engaging in grooves in the members 29. The blades 28 provide the effect of undercut portions in the flanks of the yielding teeth giving clearance for the peaks 21 of the cooperating teeth of the conveyor band at the points where the teeth approach and depart from each other. The operation of this embodiment is similar to that described with reference to Figures 1 and 2.

An alternative construction for the conveyor band is illustrated in Figure 5, and comprises a flexible belt of rubber or other flexible material 34 formed with teeth 35 which serve the same purpose as the teeth of the conveyor band shown in Figure 3. The back surface of the belt 34 may be plain as in Figure 5, or it may have corrugations 36 as shown in Figure 6 for engagement in the teeth or longitudinal corrugations 25 of the drum 12.

After the corrugated strands have been secured by means of the adhesive to the fabric, they are withdrawn from the teeth of the conveyor band and if it is desired to secure them more positively, this may be done by stitching along the corrugations as indicated at 37 in Figure 7.

Further, the free bends 38, Figure 7, of the corrugations may be cut to form a pile fabric, and this may be accomplished by a knife or other means attached to the machine and inserted in the corrugations as these are being withdrawn from the conveyor band. Alternatively, the free bends of corrugations may be cut subsequently as an additional operation. In Figure 7, the free bends 38 at the left hand side are uncut, and those at the right hand side are cut.

It will be understood that instead of providing the cooperating teeth on a conveyor band, they may be formed on, or carried directly by, the roller 12.

I claim:

1. Means for producing carpet-like fabric, comprising two sets of intermeshing teeth each set of teeth being supported by a rotatable member, and means for resiliently mounting individual teeth of one of said sets of teeth on its rotatable member, in combination with means for passing flexible textile material having fibers laid side by side in parallel relation between the said two sets of teeth, the resiliently mounted teeth nesting neatly in the material while the two sets of teeth are in mesh and the material being backed by the other set of teeth, whereby corrugations are formed in the said material, and means for bringing together and securing

the bends of said corrugations at one side of said material to a backing sheet.

2. Means for producing carpet-like fabric as defined in claim 1, wherein the said resiliently mounted set of teeth are disposed around the periphery of a rotatably mounted roller.

3. Means for producing carpet-like material as defined in claim 2, wherein the said set of resiliently mounted teeth comprises a series of rods spaced around the periphery of said roller and parallel to the axis thereof, said rods being slidably mounted in radially disposed guides carried by said roller and urged outwardly by spring means.

4. Means for producing carpet-like fabric, as defined in claim 3, wherein an annular end plate is secured at each end of said roller, each of said end plates having a series of radially disposed slots into which the end portions of said series of rods project, and springs housed within said slots engage with said rods to urge them radially outwards, stop means being provided for limiting the outward movements of said rods.

5. Means for producing carpet-like material, as defined in claim 1, wherein the said resiliently mounted set of teeth are spaced apart around the periphery of a rotatably mounted roller and parallel with the axis thereof, said teeth projecting radially from a series of slots in the surface of said roller, spring means in said slots urge said teeth radially outwards, and stop means limit the outward movements of said teeth.

6. Means for producing carpet-like fabric as defined in claim 5, wherein the head of each tooth of said set of teeth comprises a rod disposed parallel to the axis of said drum and connected by a thin blade to the main body of said tooth.

7. Means for producing carpet-like fabric as defined in claim 1, wherein the said other set of teeth are carried by a conveyor band passed around said second rotatable member.

8. Means for producing carpet-like fabric as defined in claim 7, wherein said conveyor band is made of resilient material.

9. Means for producing carpet-like fabric as defined in claim 1, wherein the said other set of

teeth comprises a series of pressed metal members hinged together to form a conveyor band and is passed around said second rotatable member, each said pressed metal member comprising a strip of metal folded together along its longitudinal centre line to provide a blade constituting a tooth and means for hingedly connecting the said members together along their longitudinal edges.

10. Means for producing carpet-like fabric as defined in claim 9, wherein the portions of each said metal strip at each side of said fold are flared away from each other near their longitudinal edges.

11. Means for producing carpet-like fabric as defined in claim 10, wherein the longitudinal edges of said metal strips are formed with tongues rolled back to form hinge cylinders, the tongues along one edge of each said strip being staggered with respect to the tongues along the other edge, whereby hinge cylinders along adjoining edges of adjacent strips can be interengaged and coaxially disposed to receive a hinge pin for hingedly connecting said strips together.

12. Means for producing carpet-like material as defined in claim 1, wherein means are provided for causing the outer bends of the corrugations in said material to adhere to an adhesive coating applied to a sheet of backing material.

BERNARD STERNER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 22,842	Hill	Feb. 17, 1947
1,822,510	Smith	Sept. 8, 1931
1,917,430	Clark	July 11, 1933
2,101,906	Hopkinson	Dec. 14, 1937
2,116,048	Smith	May 3, 1938
2,140,457	Knowland et al.	Dec. 13, 1938
2,248,135	Stoddard	July 8, 1941
2,254,210	Cunnington	Sept. 2, 1941
2,344,537	Cone	Mar. 21, 1944