May 24, 1960 J. D. HOLLINGSWORTH 2,937,412

CARD CLOTHING

Filed Nov. 7, 1955

FIG. 1.

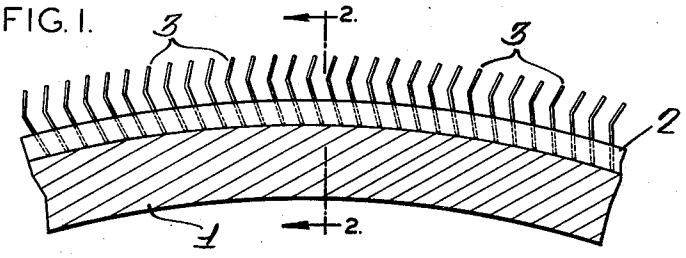


FIG. 3.

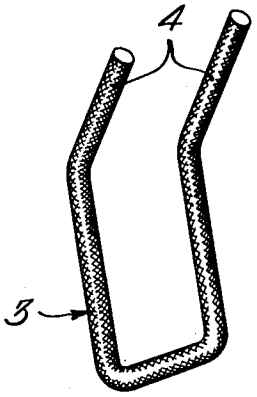


FIG. 4.

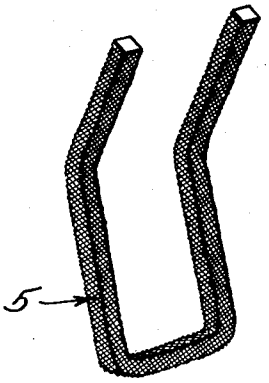


FIG. 2.

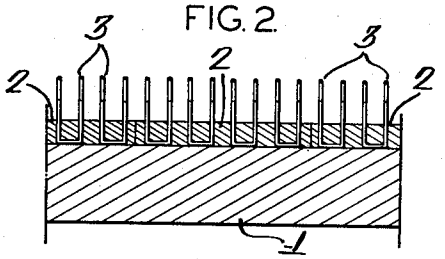


FIG. 6.

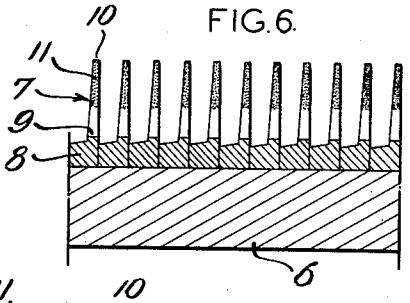


FIG. 5.

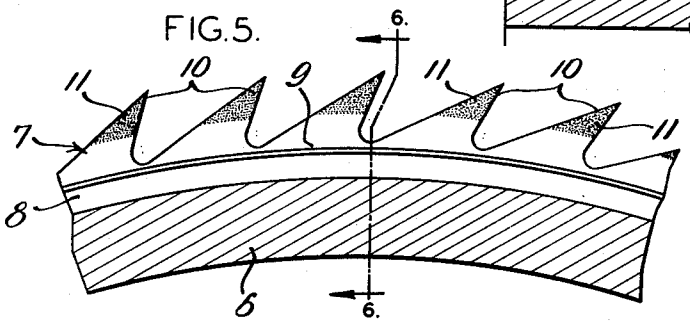
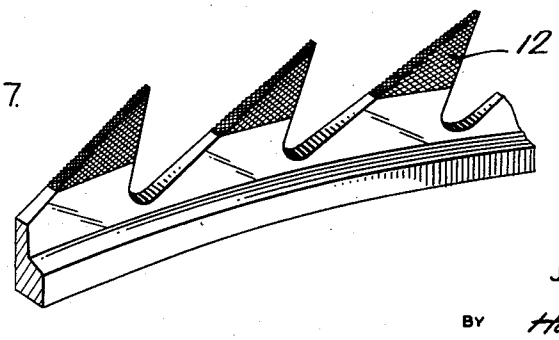


FIG. 7.



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CARD CLOTHING

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18 Claims. (Cl. 19—114)

This invention relates to an improvement in card clothing of the class employed for carding and opening textile fiber stocks such as cotton, jute, wool, synthetics, and blends of fibers, and relates more particularly to an improved character of carding tooth of both the metallic and fillet types.

A more specific object is to provide a carding tooth of improved form and functional characteristics.

Still more specifically, an object of the invention is to provide a carding tooth which will function actively over all or any predetermined part of the total length thereof exposed to the work material.

The invention will be more readily understood by reference to the attached drawings, wherein:

Fig. 1 is a fragmentary sectional view of a carding cylinder equipped with flexible or fillet card clothing having teeth made in accordance with my invention;

Fig. 2 is a sectional view on the line 2—2, Fig. 1;

Fig. 3 is a view in perspective and on enlarged scale of a form of tooth member adapted for use in conventional manner in clothing of the flexible or fillet type and made in accordance with my invention;

Fig. 4 is a view in perspective also on enlarged scale of a modified form of tooth member within the scope of my invention;

Fig. 5 is a fragmentary sectional view corresponding to Fig. 1 showing a section of a card cylinder equipped with metallic card clothing having teeth made in accordance with my invention;

Fig. 6 is a sectional view on the line 6—6, Fig. 5, and

Fig. 7 is a fragmentary view in perspective showing a section of garnett wire and illustrating a possible modification within the scope of the invention.

Card clothing of both fillet and metallic types have conventionally employed teeth of the respective forms peculiar to these two types of clothing having generally smooth side surfaces. In the case of flexible card clothing, these teeth are commonly composed of round wire cut to required length and shaped to a generally U-shaped form with angularly offset extremities, the U-shaped members being set in a flexible foundation consisting usually of a number of plies of cloth. The teeth thus produced take the general shape of those illustrated in Figs. 1 to 4 inclusive of the attached drawings. In all instances, the wires have maintained generally their original smooth side surfaces.

Metallic card clothing consists of so-called garnett wire formed with a generally rectangular base and with a longitudinal series of relatively narrow projecting teeth integral with the base, the wire being wound in helical convolutions on the cylindrical shell of the carding roll to form the typical metallic clothing. The general form of this type of clothing is illustrated in Figs. 5 to 7 of the attached drawings. In this case also the teeth conventionally have maintained in the clothing their original generally smooth flat side and edge surfaces.

I have found that in clothing of both types, the greater part of the carding action takes place at the tips of the

teeth, this by reason of the fact that the generally smooth side surfaces of the teeth are incapable of participating effectively in the carding or opening operation. I have discovered further that the side surfaces of the teeth below the tips may be made to constitute effective functioning parts of the tooth in the carding operation by roughening the side surfaces and to thereby eliminate the original smooth surfaces. In the practice of this invention, it is apparently immaterial in the broad sense how these surfaces are given the desired roughened texture, or whether the roughening be prior to or subsequent to the application of the clothing to the cylinder or other carding member. It is immaterial also with respect to the flexible card clothing whether roughening of the surfaces be effected prior to the subsequent to formation of the individual tooth members, or before or after the elements are assembled in the base fabric of the clothing.

With reference to the drawings, and more particularly to Figs. 1 to 4, inclusive, 1 is a section of the cylindrical shell of a carding roll which carries clothing of the flexible or fillet type. As previously described, this type of clothing comprises a flexible base 2 which may be composed of cloth and in which are set U-shaped tooth members 3 of the general form better illustrated in Figs. 3 and 4, said teeth having the typical angularly offset terminal end portions 4, 4. The tooth element 3 shown in Fig. 3 differs from that shown in Fig. 4 and indicated by the reference numeral 5, only in that the element 3 has been produced of round wire of suitable gauge, whereas the tooth member 5 has been formed from wire of rectangular or square cross section. Insofar as described, the structure of the carding roll and of the clothing, except as to the cross sectional shape of the wire 5 is conventional.

In accordance with the present invention, I roughen the side surfaces of the wires 3 and 5, and in the present instance the roughening operation, performed prior to the forming of the individual tooth members, extends over the full length of the latter. This roughening of the surfaces may be produced in any suitable manner, such for example as by scoring the wire with a grinding wheel, say of 40 grit, in criss-cross design, the wheel being allowed to touch the wire only to the extent of producing the scored and roughened surfaces. This same method has been found suitable also for scoring the surfaces of a wire of rectangular section such as that illustrated in Fig. 4, and I have found that where as in this case the wire is shaped other than round in cross section, the slight edge or burr at the junctures of sensibly flat sides is of particular benefit in the carding operation.

While in this type of clothing, the teeth may be given the required burred or roughened side-surface texture, extending preferably around the entire circumference, after the tooth elements have been set in the flexible foundation material, and if desired after the clothing has been applied to the roll, as by means for example of file-like broaches or other roughening tools, it is desirable both economically and as productive of a better end result to roughen the component wire of the teeth either in process of production or by subsequent grinding or working with suitable tools before forming the wire into the individual tooth members.

The invention in its application to card clothing of metallic type is illustrated in Figs. 5, 6 and 7. In this instance, the cylindrical wall of the roll is indicated by the reference numeral 6 and the garnett wire which forms the clothing by the reference numeral 7, this wire being wound in helical convolutions on the outer surface of the roll. As best illustrated in Figs. 6 and 7, the wire consists of a relatively wide base portion 8 and a relatively narrow web 9 which has formed therein the individual teeth 10. The teeth as illustrated are of conventional form except that the side, front and rear edge sur-

faces from the tips of the teeth inwardly to a point short of their roots are roughened as indicated at **11**. In this case the roughening operation may be performed either before or after the individual teeth **10** have been cut from the web **9**, although I have found that in the former case, and particularly where smooth cutting tools are used to form the teeth, some of the desirable roughness is destroyed in the tooth-cutting operation. With smooth cutting tools, therefore, I prefer to roughen the wires after the teeth have been cut. I have found it practical, however, to roughen the wires before cutting the tooth and to use roughened cutting tools in the tooth-cutting operation to afford the preferred overall roughened effect. With minute grooves in the die and on the punch of the cutting tools used in producing the teeth, I have been able to apply a roughened or grooved effect to both the front and rear edges of the tooth. I have found it practical also to roughen one side face of the wire prior to the tooth-cutting operation and to employ a punch and die with roughened sides and ends to afford the roughening of both the front and back of the teeth as well as the originally unroughened side. I have also applied smooth wire to carding rolls and thereafter have roughened the sides of the wire by revolving the roll and passing a file-like broach along the sides of the teeth, the said broach having grooved cutting edges to roughen the side surfaces of the teeth. I have found it practical to achieve the roughened effect with hard chromium plating on slightly rough wire surfaces, the plating magnifying the original roughness in its tendency to deposit on the high peaks and thereby to accentuate the roughness of the surfaces. A like result has been obtained by spraying metal on the surfaces of the wire, such sprayed metal affording a surface having pronounced roughness. Knurling rolls have also been employed for producing the desired roughened texture, as illustrated at **12** in Fig. 7, the wire being passed between the rolls in obvious manner. As in the case of the flexible wire clothing, the roughening effect has also been obtained by a coarse grit grinding wheel, either before or after application of the clothing to the card roll.

Another method of roughening, suitable for both the flexible and metallic types of clothing, and adaptable for use either prior to or after application of the clothing to the roll, is by sand blasting or blasting with other suitable abrading medium such as steel grit.

In the drawings, I have illustrated the roughened surface extending inwardly to the extent approximately of one-half the height of the teeth, and for some applications a greater or lesser extent of roughness below the tip of the tooth may be found desirable.

In the case of both the flexible and metallic clothing, the roughening of the teeth has been found to effect a pronounced improvement in their carding function and this improvement apparently extends to all types of fiber stocks.

I claim:

1. As a new article of manufacture, a carding tooth having a tip, and side surfaces adjoining the tip constituting the active work surface of the tooth, said surfaces over a material part of the tooth length within the work area exhibiting a roughness-conferring pattern of minute abrasions.

2. A carding tooth according to claim 1 wherein the abrasions extend over the entire periphery of the tooth.

3. A carding tooth according to claim 1 wherein the tooth is composed of wire of smoothly curved cross sectional profile.

4. A carding tooth according to claim 3 wherein the said profile is round.

5. A carding tooth according to claim 1 wherein the tooth is composed of wire of angular cross sectional profile.

6. A carding tooth according to claim 1 wherein the side of the tooth behind the said tip has adjoining sensible flat longitudinal surfaces of which at least two adjoining pairs are roughened.

7. As a new article of manufacture a generally U-shaped tooth member for flexible card clothing, the side surfaces of the member in an area adjoining the extremities and embracing a material part of the effective tooth length exhibiting a roughness-conferring pattern of minute abrasions.

8. A tooth member according to claim 7 wherein the said extremities are rectangular in cross section and the said pattern extends at least to three adjoining faces.

9. Fillet card clothing whereof the projecting working portions of the teeth exhibit minutely scored side surfaces extending over a material part of the exposed length of the tooth.

10. Fillet card clothing according to claim 9 wherein the teeth are of substantially uniform cross sectional shape throughout.

11. Garnett wires for metallic card clothing whereof the carding teeth have narrow front and rear edges converging to a working tip and having extended flat side faces, said faces over a material part of the effective height of the tooth exhibiting a roughness-conferring pattern of minute abrasions.

12. Garnett wire according to claim 11 wherein the said teeth are of substantially uniform thickness between the side surfaces.

13. A carding roll comprising metallic card clothing whereof the exposed side surfaces of the teeth exclusive of the working tips exhibit a roughness-conferring pattern of minute abrasions.

14. The method of improving the functional properties of carding teeth, said method consisting in providing the side surfaces of said teeth within the working areas with a roughness-conferring pattern of minute abrasions, said abrasions being produced by air blasting the teeth with an abrading medium.

15. As a new article of manufacture, a carding tooth having a tip and side surfaces adjoining the tip constituting active work surface of the tooth, and wherein said surfaces over a material part of the tooth length within the said working area exhibiting a roughness-conferring coating of spray-deposited metal.

16. A method of improving the functional properties of carding teeth, said method consisting in sand-blasting the side surfaces of said teeth within the working areas, to confer on said surfaces a roughened surface texture, and subsequently spraying metal on the said surfaces.

17. Garnett wire for card clothing whereof the projecting working portions of the teeth exhibit minutely scored side surfaces extending over a material part of the height of each tooth.

18. Garnett wire for metallic card clothing whereof the carding teeth have front and rear edges converging to a working tip and have extended flat side faces exhibiting minutely scored surfaces over a material part of the height of each tooth.

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