July 19, 1955 W. F. BOKUM 2,713,182

INTERMEDIATE FEED DEVICE FOR CARDING MACHINES

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FIG. 1.

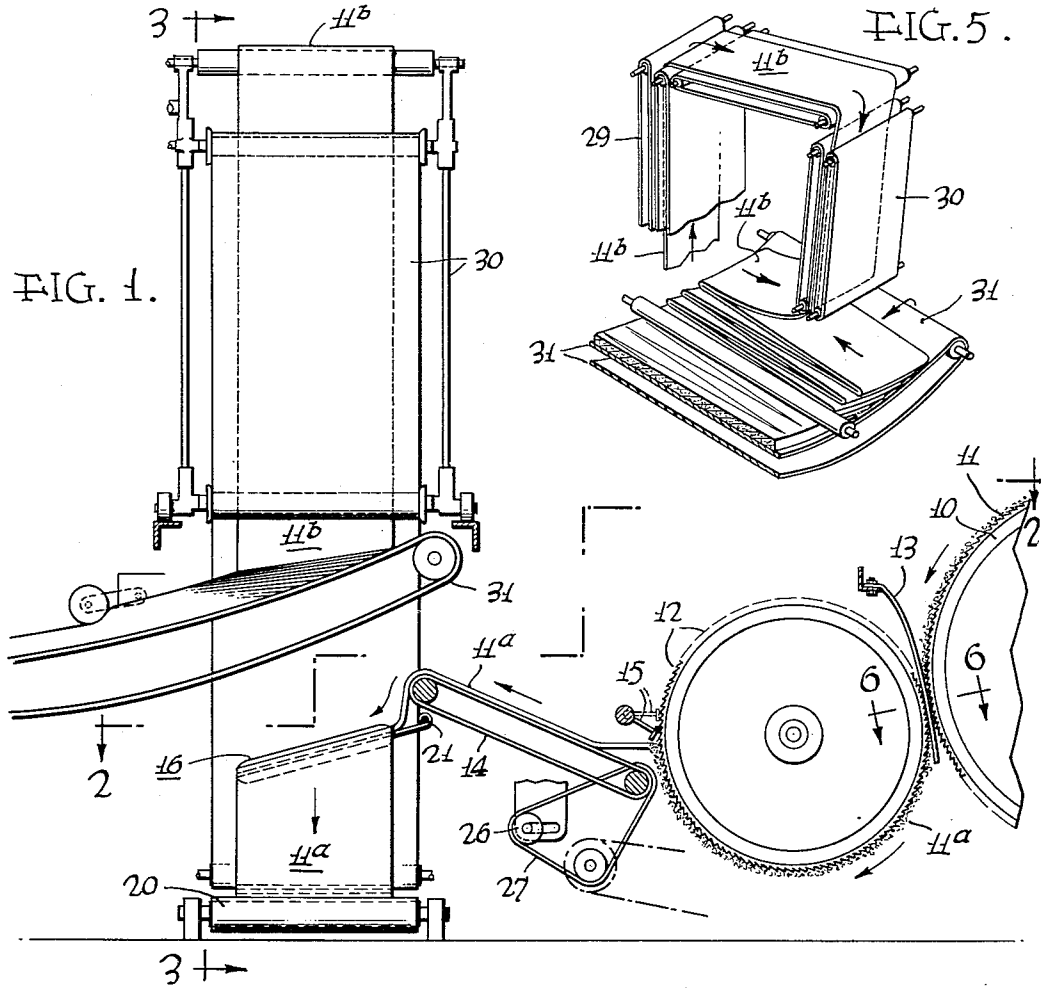


FIG. 5.

FIG. 6.

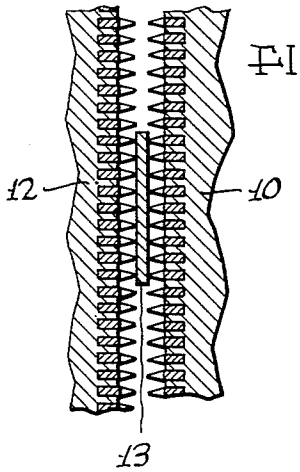
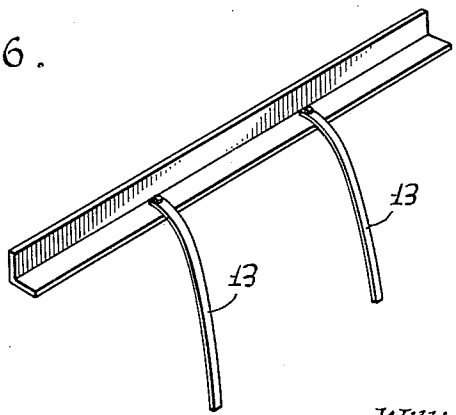


FIG. 7.



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INTERMEDIATE FEED DEVICE FOR CARDING MACHINES

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FIG. 2.

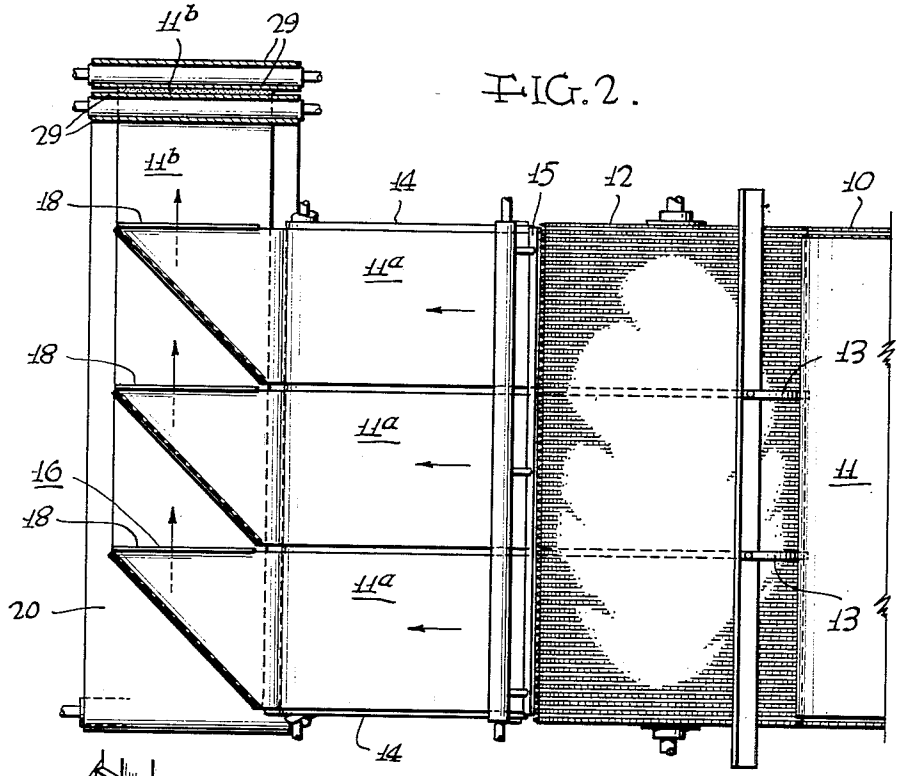
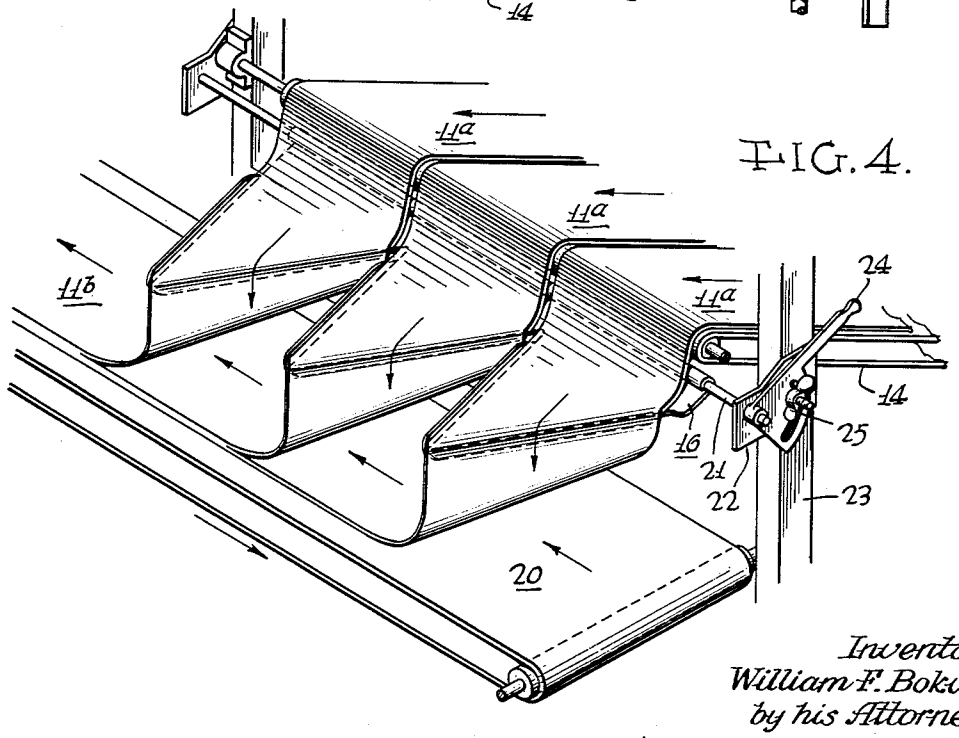


FIG. 4.



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INTERMEDIATE FEED DEVICE FOR CARDING MACHINES

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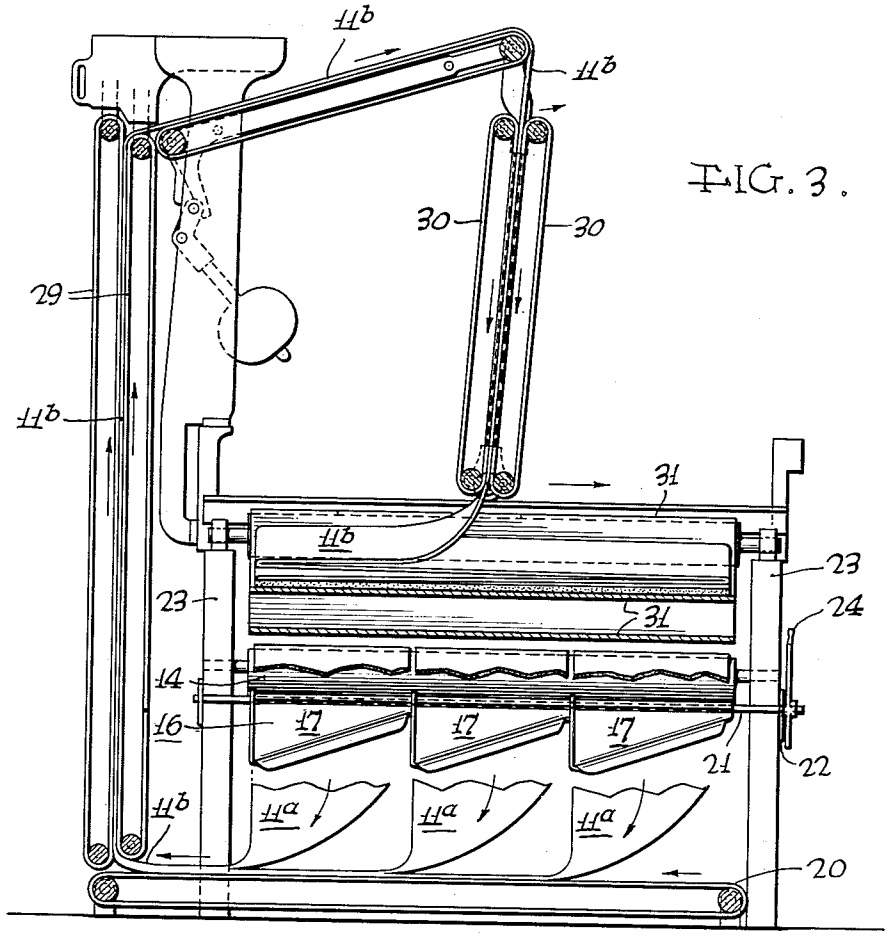


FIG. 3.

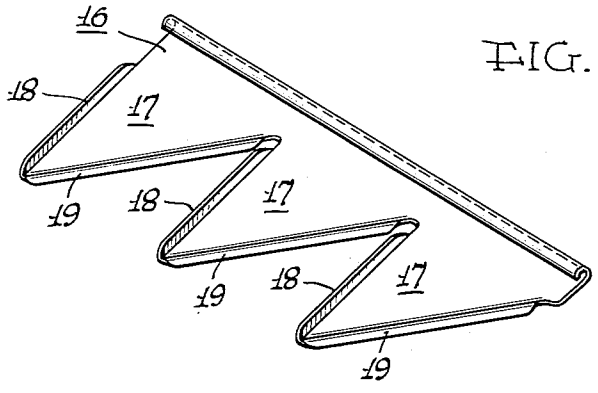


FIG. 8.

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INTERMEDIATE FEED DEVICE FOR CARDING MACHINES

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FIG. 9.

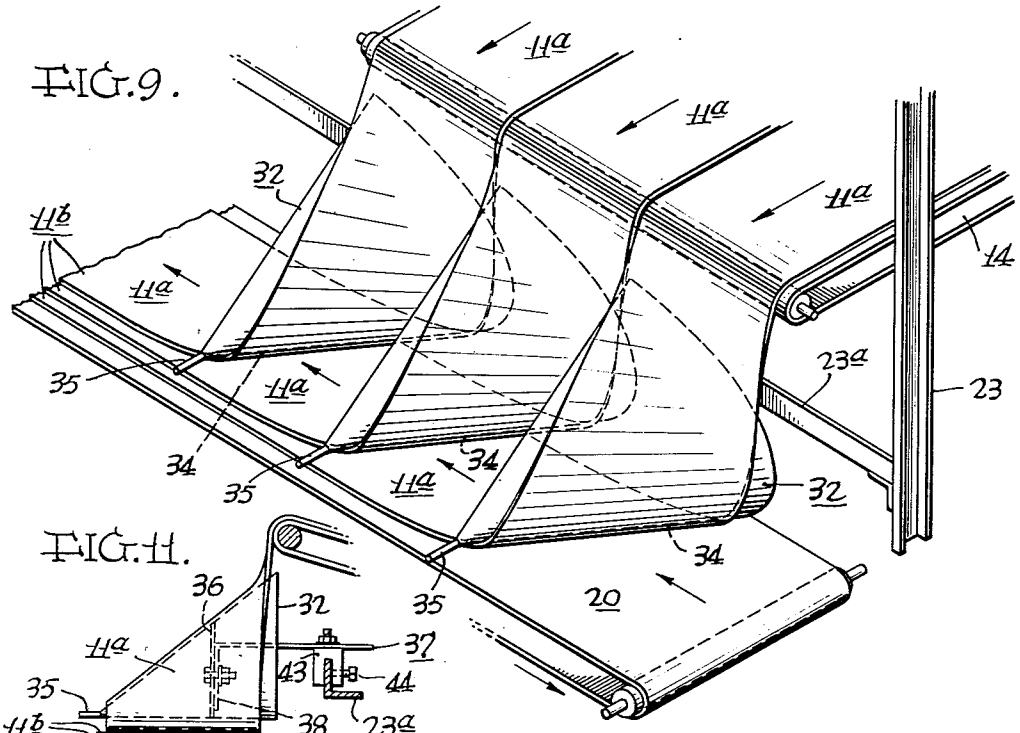


FIG. 11.

FIG. 10.

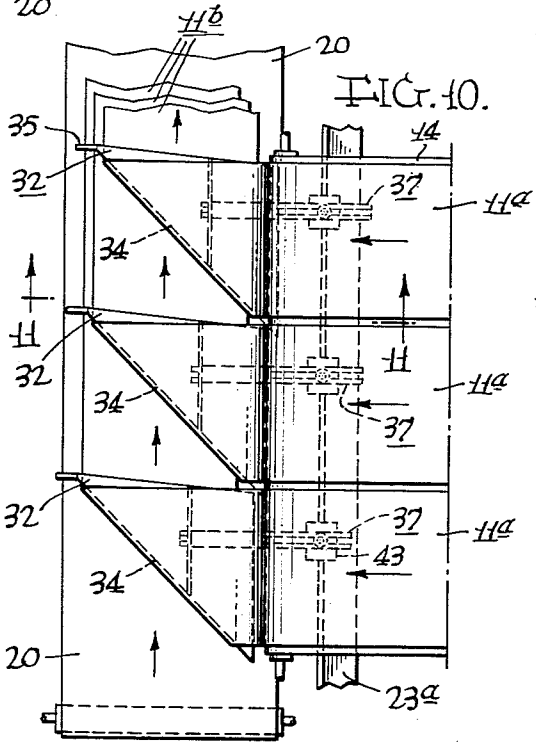
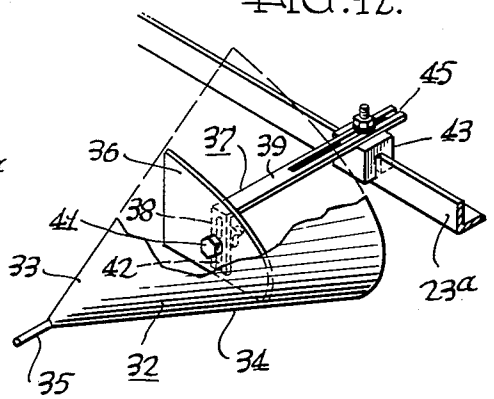


FIG. 12.



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INTERMEDIATE FEED DEVICE FOR CARDING MACHINES

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Application May 31, 1951, Serial No. 229,169

13 Claims. (Cl. 19—163)

This invention relates to new and useful improvements in apparatus used in conjunction with carding machines to assure a more uniform density in the web produced and is a continuation-in-part of co-pending application, Serial No. 132,519, filed December 12, 1949, now abandoned. More particularly the present invention relates to new and useful improvements in intermediate feed devices for dividing or splitting the web produced on a primary or breaker carding machine, and forming a batt or lap of uniform density both longitudinally and axially which is fed to a secondary or finisher carding machine.

By producing a sliver of uniform density in which the fibres are comparatively parallel the number of steps now required between carding and spinning can measurably be decreased thus permitting an increase in the production of yarn through less handling and processing. Furthermore, with a decrease in the number of times the sliver and the resultant roving are handled the less will be the fibre breakage, hence the amount of waste will likewise be decreased.

The intermediate feeds extant prior to this invention have several defects or faults. In an attempt to correct this fault, improvements have been made, but they only partially leveled out the unequal distribution of fibres and the varying density of the shingled layers which have the approximate appearance of a shingled roof resulted in only a sliver that still required a multiplicity of drawings and doublings before it was suitable for spinning.

The cause of this non-uniformity is attributal to the first step in the carding process, which we will assume in this case is the depositing of raw material into the hopper of the card feed. The raw stock consists of a multitude of unopened fibre bundles in a more or less matted condition. These fibre bundles vary greatly in size and degree of hardness. The spike apron in the hopper of the card feed carries the fibre bundles in an upward direction where a hopper comb supposedly removes all the excess material from the spike apron. The distribution of the fibre bundles across the face of the spike apron is non-uniform, hence one side of the apron may be conveying far more material than the other side of the apron. The stock remaining on the spike apron is removed from it and deposited in the scale pan of the card feed. In general, the weighing mechanisms of these feeds are accurate within certain limits. The scale pan dumps the non-uniformly distributed mass of stock upon the feed apron of the primary or breaker card. It therefore, follows due to the character of the stock in the hopper, that the stock subsequently deposited on the feed apron to the card will also be uneven in thickness in a direction parallel to the axis of the carding machines. This mottled mass is then passed through the feed rolls of the primary or breaker card. The card to a great extent levels out this unevenness, but not to a degree that is required to produce a good uniform sliver in the final carding stage. The web as now produced on the

primary or breaker card varies considerably as to density both in axial direction and a longitudinal direction. In addition the outside edges of the web, known as selvage are not in alignment with or uniformly even with the ends of the carding cylinders, therefore, on a 60 inch wide card the width of the web will vary from approximately 56 inches or less to 60 inches, this axial variation cannot do other than produce under previous methods an uneven web. A web can roughly be defined as a thin film of fibrous material, the thickness of which if under perfect carding conditions of the order of the cross-sectional diameter of one fiber, and the fibres composing the web would be distributed in an oriented pattern paralleled with the axis of the carding machine. In the primary or breaker card this condition cannot be atained and the fibres follow a non-oriented pattern, and the thickness varies with the number of fibres that are laid one on top of another, this poor distribution, coupled with the ragged edge of the two selvages is not conducive to uniformity.

In an attempt to correct the faulty web as delivered by the primary or breaker card intermediate feeds have been produced for the purpose of receiving the web of fibres as it comes off the doffer of the primary or breaker carding machine, gathering it together into a narrow crumpled ribbon which is either lapped or laid across the feed conveyor leading to the secondary or finisher carding machine. While the intermediate feeds extant prior to the present invention partially levelled out the unequal distribution of fibres the varying density of the shingled layers produced uneven amounts of fibres feeding into the next carding operation and thus the finished sliver and rovings were never of uniform density.

It is well at this point to define the usage of the words "batt" or "lap." In this instance the batt or lap is the finished product of the intermediate feed. It is composed of a multiplicity of the superimposed bands, which having been made into a composite web are progressively laid upon an apron by means of a traversing carriage traveling in a direction normal to the axis of the carding machines. The width of the batt or lap can be controlled, further the weight of the lap or batt per lineal yard is likewise controlled. The manner in which the batt or lap is produced will now be discussed.

The principal object of this present invention is to provide an intermediate feed device having novel means which will blend the non-uniform web as produced by the primary card into a uniform batt or lap that will have a uniform density in an axial direction and in a longitudinal direction.

The foregoing and other objects of the invention and the various features and details of the construction and operation thereof are hereinafter fully set forth and described with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view through a portion of a carding machine showing the intermediate feed of the present invention;

Fig. 2 is a view taken along the line 2—2 of Fig. 1, showing the means for dividing the web of fibres into a plurality of adjacent bands and the guide for disposing the bands in superimposed relation;

Fig. 3 is a view taken along the line 3—3 of Fig. 1;

Fig. 4 is a perspective view of the guide showing the bands of fibres passing over them;

Fig. 5 is a perspective view of a part of the intermediate feed showing the means for lapping the superimposed bands of fibres across the full width of the machine;

Fig. 6 is an enlarged fragmentary sectional view taken along the line 6—6, Fig. 1;

Fig. 7 is a perspective view of the means for dividing the web of fibres into bands;

Fig. 8 is a perspective view of the guide used for superimposing the bands of fibre on top of each other;

Fig. 9 is a perspective view of another construction and arrangement of the guide which may be used in conjunction with the present invention;

Fig. 10 is a plan view of the guide illustrated in Fig. 9.

Fig. 11 is a transverse sectional view taken on line 11—11, Fig. 10; and,

Fig. 12 is a fragmentary perspective view of a single guide blade illustrating the method of adjusting the position of the guide.

Referring more specifically to the drawings, reference numeral 10 designates a carding cylinder over which a web 11 of fibres is passing. The web 11 is taken from the carding cylinder 10 by the doffer 12. Intermediate the carding cylinder 10 and the doffer 12 there is provided means for dividing the initial web 11 longitudinally into a plurality of laterally adjacent bands designated 11*a*. In the present instance this splitting or dividing means comprises a plurality of elements 13 which operate effectively to divide the initial web 11 into a number of separate bands 11*a* which are stripped from the doffer 12 and placed on the first conveyor apron 14 by the action of a doffing comb 15.

The apron conveyor 14 in turn deposits the bands 11*a* upon a guide 16. The guide 16, as clearly shown in Fig. 8, may comprise a unitary structure having a plurality of triangular blades 17 corresponding in number to the number of bands 11*a*. Each blade 17 has an upturned edge 18 extending in the direction of travel of the original web 11 and is provided with a downwardly curving edge portion or lip 19 which is disposed at an acute angle, for example 45°, to the travel of the inital web 11. Alternatively the guide 16 may consist of a plurality of independent triangular blade sections fastened to a common shaft, as more fully described hereinafter. According to the present invention the first conveyor apron 14 feeds one of the bands 11*a* to each of the blades 17, and the bands 11*a* then are drawn over and about the lips 19 of the blades in a direction normal to the travel of the initial web 11 and deposited upon a bottom conveyor apron 20 which travels at right angles to the direction of travel of the first conveyor apron 14. By this construction and arrangement of the guide 16 and the angular disposition of the lips 19, the several bands 11*a* will be deposited one upon another in superimposed relation on the bottom conveyor 20 to thereby form a composite multilayer web 11*b*. This composite web 11*b* has a substantially more uniform density than the original web 11 since the relatively less dense side portions present in the original web 11 have been placed on the top and bottom, respectively, of the more dense central portion of the original web 11.

The guide 16 is secured to a shaft 21 that is carried by brackets 22 mounted on the framework 23 of the apparatus. A handle 24 is fixedly secured to the shaft 21 so that the latter may be rotated and thus lower or raise the guide 16. The guide 16 is lowered to a position below that shown in Fig. 1 to aid in starting the bands through the apparatus. This is necessary since in normal operation the guide 16 is substantially horizontal and the thin film of fibres which composes the band cannot be pushed out even as much as one inch upon the guide 16.

When starting up, the guide 16 must in this instance be rotated in a downward direction so that the band of fibre 11*a* being delivered by the first conveyor apron 14 will drop vertically upon the bottom or second apron 20 which is moving in a direction normal to the first horizontal conveyor apron, the action of the second or bottom horizontal apron draws the fibre band in a direction at right angles to its previous direction of travel. At this point, the guide 16 is slowly raised to level out the band which is being drawn out by the movement of the bottom horizontal apron 20. While the band is being drawn by the bottom horizontal apron it slowly advances across the face of the guide portions until the full width of the band overlies the lip 19 portion of the guide. Each band in turn is deposited upon the bottom conveyor apron in like manner to form the superimposed laminated web 11*b*. By adjusting the guide blades relative to each other as hereinafter set forth, each band may be offset a predetermined distance from the subsequent deposited band so that the shingling effect cannot occur. The order in which the bands are deposited upon the apron is first the right hand outside band is deposited upon the bottom conveyor apron, the center band, being the more dense of the three bands may be deposited in the center of the lamination and is offset in a direction toward the breaker card as shown in Figs. 9 and 10, the left hand outside band is then deposited on top of the other two bands and it likewise may be offset in a direction toward the breaker card. When each of the fibre bands overlie the entire length of the guide lips 19 the guide will be in the correct operating position. Means are provided as shown at 25 to hold the handle 24 in any desired position.

When starting the machine the movement of the first conveyor apron 14 is slowed down by moving the idler wheel 26 as shown in Fig. 1 to the right thus decreasing the tension on the belt 27 and causing the latter to slip on the pulleys attached to the intermediate feed drive shaft and the conveyor shaft. This slowing down of the conveyor apron 14 allows the bands 11*a* being fed to the guide 16 to thicken and makes it easier to thread the bands through the apparatus.

The bottom conveyor apron 20 transfers the composite laminated web 11*b* to a pair of vertical conveyor aprons 29 and thence to the top horizontal conveyor apron which in turn transfers the laminated web 11*b* to a pair of downward traveling conveyor aprons 30 which are attached to a carriage adapted to travel back and forth in a direction normal to the travel of the first conveyor apron 14. Means are provided for adjusting the distance the downward moving conveyor aprons 30 will travel back and forth in an axial direction thereby depositing the laminated web 11*b* in a substantially overlapping relation back and forth across the conveyor apron 31 leading to a secondary or finisher carding machine. Means are provided for building up the laminated batt or lap to any predetermined thickness. By virtue of the present invention a web of uniform density is produced since the relative less dense portions of the original web 11*a* are placed on top and bottom respectively of the more dense central portion thereof to form a composite web having a uniform density. In the case where each single band composing the web 11*b* is offset transversely a predetermined distance with respect to the next adjacent band, it follows that this pattern is followed when the composite web is deposited upon the conveyor apron 31, hence each lineal inch will have the same number of bands composing the laminated batt or lap. By this construction, the thickness at one point of the batt will of a necessity be identical to the thickness at any other point of the batt. As an illustration, assuming that the composite web 11*b* which is formed of three superimposed bands of fibers is cross-layered sixteen times on the apron conveyor 31 while the apron conveyor 31 advances a distance equal to the width of the web 11*b* thus forming what is commonly referred to as a sixteen layer lap or batt. This sixteen layer lap or batt would thus be composed of forty-eight individual bands of fibers, each one superimposed upon the other as previously described. Therefore, with this type of blending, the imperfections of the initial web are nullified by the proper disposition of each band in relation to each other band and the batt thus produced is uniform throughout its length and width.

In lieu of the guide 16, as previously described, another construction and arrangement of guiding or forming apparatus as shown in Figs. 9 to 12 inclusive of the drawings may be used in conjunction with the present invention. This guiding apparatus consists of a plurality of

independent generally triangular guide or blade sections 32 adjustably secured to a cross frame member 23*a* of the frame 23. Each blade section 32 has a curved upper surface 33 sloping downwardly in the direction of travel of the web 11 and away from the direction of travel of the composite multi-layer web 11*b* and is provided with a downwardly curving edge portion or lip 34 disposed at an acute angle, for example, 45°, to the direction of travel of the conveyor 20. A short cylindrical rod 35 extending outwardly from the extreme forward end of each blade section 32 is provided to prevent the strips 11*a* from being drawn around the forward edge of the forming sections. By this construction the blade sections 32 do not have to be lowered or tilted when the strips 11*a* are started through the apparatus.

In accordance with the present invention each of the blade sections 32 is independently adjustable to permit the bands 11*a* to be placed in any desired position on the conveyor 20. To this end, a plate 36 having substantially the same configuration as the upper surface 33 of the blade section 32 is provided transversely of each blade section, as illustrated in Fig. 12. This plate 36 is carried by an L-shaped bracket 37 having vertical and horizontal leg portions 38 and 39, respectively. With reference to Fig. 12 of the drawings, the plate 36 is pivotally secured to the bracket 37 as indicated at 41 for pivotal movement about a horizontal longitudinal axis of the blade section 32. A slot 42 in the vertical leg portion 38 of the bracket 37 permits relative vertical movement of the blade section 32. The bracket 37, in turn, is pivotally mounted to an adjusting block 43 which is adjustably secured as indicated at 44 in Fig. 11 to the cross frame member 23*a*. A slot 45 in the horizontal leg portion 39 of the bracket 37 permits relative horizontal adjustment of the blade section 32 transversely of the conveyor 20. By this construction each of the blade sections 32 is independently adjustable and may be supported in any desired position with respect to the conveyor 20. In the embodiment illustrated in Fig. 9 of the drawings, the blade sections 32 are positioned in such a manner that the bands 11*a* are deposited on the conveyor 20 in a staggered, overlapping relationship. By doing this the shingle effect produced by offsetting the successive laps of the web 11*b* as it is deposited on the conveyor 31 by means of the vertical apron 30 is much less pronounced than if the bands 11*a* are not staggered as set forth. This is so as each step on the surface of the batt produced by depositing the web 11*b* thereon is equal to the thickness of one band of fibers as compared to a step equal to three thicknesses of the band in the case where the bands are not offset transversely in the web.

While certain embodiments of this invention have been illustrated and described herein, it is not intended to limit the invention to such disclosures, and changes and modifications may be incorporated and embodied therein within the scope of the following claims.

I claim:

1. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of an initial fibre web formed by the first carding machine to produce a batt of uniform density and thickness, comprising means operable to divide said initial fibre web into a plurality of bands, a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said band directing portions at a predetermined angle of inclination, said directing portions each having a surface portion arranged at an acute angle to the direction of movement of said web and about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web, a feed conveyor for the second carding machine, and conveyor means including a lapping device operable to receive the composite web and deposit the same back and forth in substantially overlapping relation upon the feed conveyor in a direction transversely of the direction of travel thereof.

2. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of an initial fibre web formed by the first carding machine to produce a batt of uniform density and thickness, comprising means operable to divide said initial fibre web into a plurality of bands, and a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said band directing portions at a predetermined angle of inclination, said directing portions having a surface portion arranged at an acute angle to the direction of movement of the bands about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web.

3. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of an initial fibre web formed by the first carding machine to produce a batt of uniform density and thickness, comprising a plurality of elements arranged in predetermined laterally spaced relation adjacent the first carding machine and operable to split the initial fibre web formed thereon into a plurality of bands, a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said directing portions at a predetermined angle of inclination, said directing portions each having a downturned lip arranged at an acute angle to the direction of movement of the bands about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web.

4. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of an initial fibre web to produce a batt of uniform density and thickness, comprising a plurality of elements arranged in predetermined laterally spaced relation operable to split an initial fibre web formed by the first carding machine into a plurality of bands, a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said band directing portions at a predetermined angle of inclination, said directing portions each having a downturned lip arranged at an acute angle to the direction of movement of the bands about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web, and means to adjustably position said guide member and secure the same in the position to which adjusted.

5. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of an initial fibre web formed by the first carding machine to produce a batt of uniform density and thickness, comprising means operable to divide said initial fibre web into a plurality of bands, a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said band directing portions at a predetermined angle of inclination, said directing portions each having a downturned lip arranged at an acute angle to the direction of movement of the bands about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web, a feed conveyor for the second carding machine, conveyor means including a lapping device operable to receive the composite web and deposit the same back and forth in substantially overlapping relation upon the feed conveyor in a direction transversely

of the direction of travel thereof, and means to adjustably position said guide member and secure the same in the position to which adjusted.

6. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of a fibre web to produce a batt of uniform density and thickness comprising a guide member having a plurality of web directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said directing portions at a predetermined angle of inclination, said directing portions each having a surface portion arranged at an acute angle to the direction of movement of the web about which portions of the web are passed and deposited in superimposed relation to provide a composite multi-layer web.

7. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of a fibre web to produce a bat of uniform density and thickness, comprising a guide member having a plurality of web directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said web directing portions at a predetermined angle of inclination, said directing portions each having a downturned lip arranged at an acute angle to the direction of movement of the web about which portions of the web are passed and deposited in superimposed relation to provide a composite multi-layer web.

8. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of a fibre web to produce a batt of uniform density and thickness, comprising a guide member comprising a plurality of web directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said web directing portions at a predetermined angle of inclination, said directing portions each having a downturned lip arranged at an acute angle to the direction of movement of the web about which portions of the web are passed and deposited in superimposed relation to provide a composite multi-layer web, and means to adjustably position said guide member and secure the same in the position to which adjusted.

9. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of a fibre web to produce a batt of uniform density and thickness comprising a plurality of elements arranged in predetermined laterally spaced relation adjacent the first carding machine and operable to split an initial fibre web formed thereon into a plurality of bands, a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said band directing portions at a predetermined angle of inclination, said directing portions each having a downturned lip arranged at an acute angle to the direction of movement of the bands about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web, a feed conveyor for the second carding machine, conveyor means including a lapping device operable to receive the composite web and deposit the same back and forth in substantially overlapping relation upon the feed conveyor in a direction transversely of the direction of travel thereof, and means to adjustably position said guide member and secure the same in the position to which adjusted.

10. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of a fibre web to produce a batt of uniform density and thickness, comprising a plurality of elements arranged in predetermined laterally spaced relation adjacent the first carding machine and operable to split an initial fibre web formed thereon into a plurality of bands, a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said band directing portions at a predetermined angle of inclination, said directing portions each having an upturned edge in the direction of movement of the bands and downturned lip arranged at an acute angle to the direction of movement of the bands about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web, first conveyor means operable to receive the composite web and conduct the same transversely of the first carding machine, a feed conveyor for the second carding machine, second conveyor means including a lapping device operable to receive the composite web from the first conveyor means and deposit the same back and forth in substantially overlapping relation upon the feed conveyor in a direction transversely of the direction of travel thereof, and means to adjustably position said guide member and secure the same in the position to which adjusted.

11. In a carding system having first and second carding machines, apparatus intermediate said carding machines for blending the non-uniform portions of an initial fibre web formed by the first carding machine to produce a batt of uniform density and thickness, comprising means operable to divide said initial fibre web into a plurality of bands, a guide member comprising a plurality of band directing portions pivotally mounted for movement about a horizontal axis extending normal to the travel of the web for adjustably positioning said band directing portions at a predetermined angle of inclination, conveyor means to receive the bands and deliver each thereof to one of said band directing portions of the guide member, said directing portions each having a surface portion arranged at an acute angle to the direction of movement of said web and about which said bands are passed and deposited in superimposed relation to provide a composite multi-layer web, a feed conveyor for the second carding machine, and conveyor means including a lapping device operable to receive the composite web and deposit the same back and forth in substantially overlapping relation upon the feed conveyor in a direction transversely of the direction of travel thereof.

12. Apparatus for blending the portions of an initial fibre web formed by a carding machine to produce a batt of uniform density and thickness, comprising means operable to divide said initial web into a plurality of bands, a conveyor common to said plurality of bands extending generally perpendicular thereto, guide means over which the bands pass from said dividing means to said conveyor, said guide means comprising a plurality of band directing blades overlying said conveyor longitudinally thereof and each having a surface portion arranged at an acute angle to the movement of the web about which said bands are passed and deposited thereby in superimposed relation upon said conveyor to provide a composite multi-layer web thereon, and means mounting each of said blades for adjustment individually with respect to one another in directions both transversely and vertically of the conveyor thereby to control the position of individual bands laterally with respect to one another in the composite multi-layer web deposited on said conveyor.

13. Apparatus for blending the portions of an initial fibre web formed by a carding machine to produce a batt of uniform density and thickness, comprising means operable to divide said initial web into a plurality of bands, a conveyor common to said plurality of bands extending generally perpendicular thereto, guide means over which the bands pass from said dividing means

to said conveyor, said guide means comprising a plurality of band directing blades overlying said conveyor longitudinally thereof and each having a surface portion arranged at an acute angle to the movement of the web about which said bands are passed and deposited thereby in superimposed relation upon said conveyor to provide a composite multi-layer web thereon, means mounting each of said blades for adjustment individually with respect to one another in directions both transversely and vertically of the conveyor thereby to control the position of individual bands laterally with respect to one another in the composite multi-layer web deposited on said conveyor, a feed conveyor adjacent the first-named conveyor, and conveyor means including a lapping device operable to receive the composite web

from the first conveyor and deposit the same back and forth in substantially overlapping relation upon the feed conveyor in a direction transversely of the direction of travel thereof.

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