July 4, 1950 R. A. FAIRBAIRN 2,513,301

METHOD AND APPARATUS FOR REMOVING BURRS AND OTHER VEGETABLE DEFECT FROM TEXTILE FIBERS

Filed Dec. 3, 1946 2 Sheets-Sheet 1

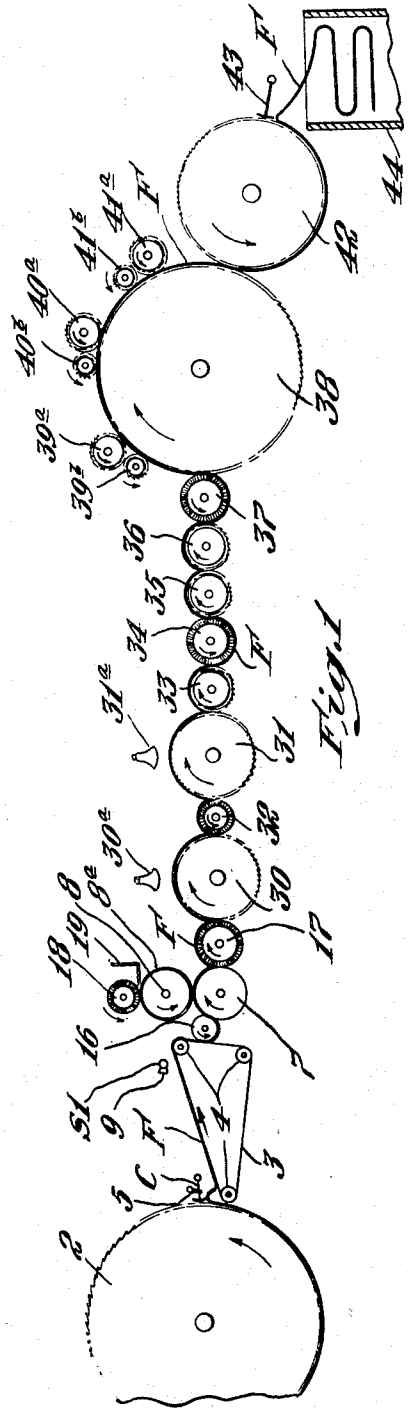


Fig. 1

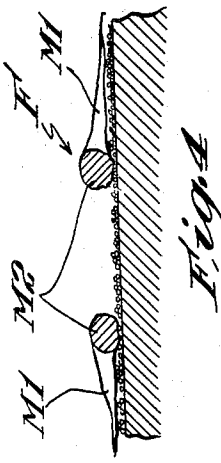


Fig. 4

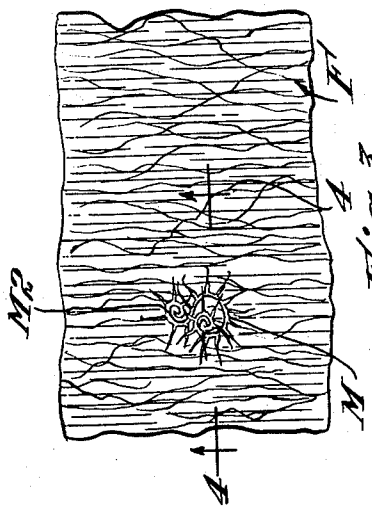


Fig. 3

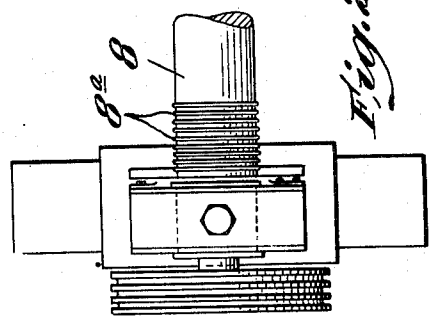


Fig. 2

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METHOD AND APPARATUS FOR REMOVING BURRS AND OTHER VEGETABLE DEFECT FROM TEXTILE FIBERS

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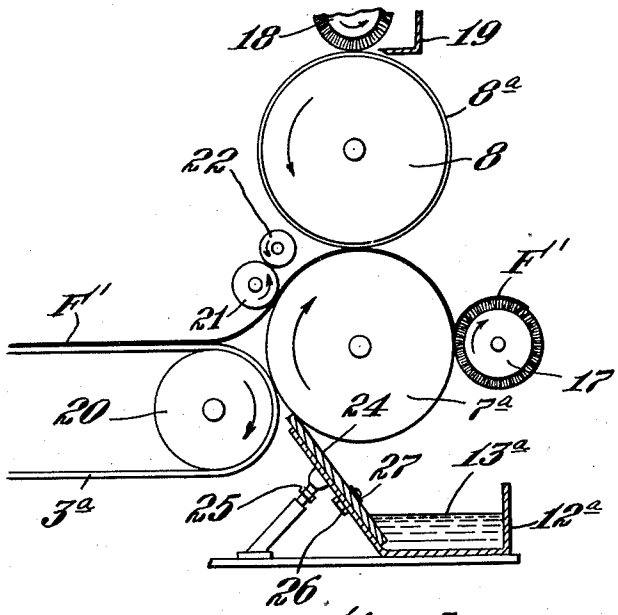


Fig. 5

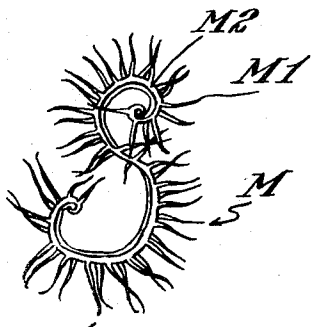


Fig. 7

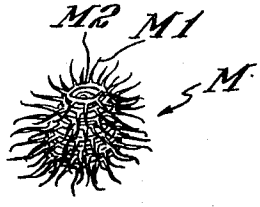


Fig. 6

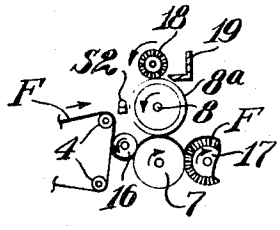


Fig. 8

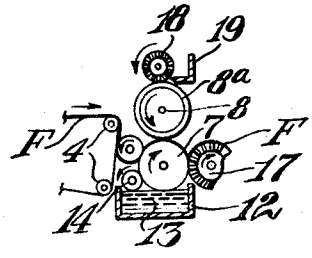


Fig. 9

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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR REMOVING BURRS AND OTHER VEGETABLE DEFECT FROM TEXTILE FIBERS

Robert A. Fairbairn, Needham, Mass.

Application December 3, 1946, Serial No. 713,768

10 Claims. (Cl. 19—65)

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This invention relates to a method of and apparatus for removing burrs, vegetable defect, straw, branding paint and other foreign bodies from wool and other animal fibers and from cotton and other vegetable fibers. This application is a continuation in part of my copending applications Serial No. 662,240, filed April 15, 1946, entitled "Method and Apparatus for Parallelizing Textile Fibers" (now Patent No. 2,420,034), and Serial No. 706,488, filed October 29, 1946, entitled "Method and Apparatus for Separating Fibers."

One prior art method of removing such foreign bodies comprises passing a card web through the bite of one or more pairs of smooth surfaced rolls which crush or pulverize dry burrs, vegetable defect, etc. Many of the crushed particles adhere to the surfaces of the crushing rolls and are thus separated from the web. They are scraped from the surfaces of the rolls by doctor blades or other suitable means. The web and the remaining crushed particles are subjected to the action of a reciprocating beater as the web leaves the bite of the rolls, with the result that many of the remaining particles are shaken loose and fall to the floor. Thereafter the web is passed forwardly to a card section provided with fillet card clothing where the bulk of the remaining particles sink into the spaces between the teeth of the clothing. This crushing method has several disadvantages. To effectively crush and remove so-called mestiza or spiral burrs, "green" burrs and vegetable defect that is resilient or has "life in it," it is necessary to run the crushing rolls with so much pressure between them that considerable fiber fracture is caused. Many of the fine worsted wools contain large quantities of these spiral burrs and because of the fiber fracture caused by the crushing rolls it is undesirable to process such wools by this method since many of the fractured short fibers are combed out as noils in the manufacture of a worsted top and the remaining fibers have a poor fiber length distribution for worsted spinning because of the presence of a large percentage of fibers which have been fractured into random lengths. In deburring wools to be used on the woolen system, fiber length and even fiber distribution are not as important as in the worsted system; however, the crushed burr rubble which does not adhere to the crushing rolls sinks into the fillet clothing of the woolen card finishing section requiring frequent stripping of the cylinders for cleaning with the resultant loss of production.

Another prior art method comprises subjecting the burrs in a card web to the mechanical impact at high speed of the longitudinally extending

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blades of one or more beater rolls which knocks the burrs and vegetable defect into a trough or container. While this method removes a large quantity of the burrs and other defect it also removes many of the fibers and it does not remove blotches of branding paint, particularly retentive burrs, such as spiral or mestiza burrs or chaff and vegetable defect of small physical dimensions.

The principal object of this invention is to provide a novel method and apparatus for removing foreign bodies from textile fibers.

Further objects are to provide such a method and apparatus which eliminates the above mentioned disadvantages of crushing rolls and beater rolls, which is economical to make and use and which may readily be installed in standard textile machinery.

Further objects will be apparent from a consideration of the following description and of the annexed drawings in which two embodiments of my apparatus are chosen for the purpose of illustration.

In the drawings:

Fig. 1 is a diagrammatic view in elevation illustrating the several steps in one embodiment of the method and indicating appropriate mechanical elements for performing one embodiment of the method;

Fig. 2 is a fragmentary plan view showing certain details of a foreign body disintegrating apparatus;

Fig. 3 is a fragmentary plan view showing a card or garnett web or film of fibers after they have been parallelized to a substantial extent and reduced to substantially one fiber thickness;

Fig. 4 is an enlarged section on the lines 4—4 of Fig. 3;

Fig. 5 is a diagrammatic view in elevation illustrating another embodiment of the invention and indicating appropriate mechanical elements for performing the method;

Fig. 6 is a perspective view of a mestiza or spiral burr;

Fig. 7 is a plan view of a mestiza or spiral burr in opened or unwrapped condition;

Fig. 8 is a diagrammatic view in elevation illustrating a portion of the apparatus of Fig. 1, an alternate form of moistening apparatus being shown; and

Fig. 9 is a diagrammatic view in elevation illustrating a portion of the apparatus of Fig. 1, a further alternate form of moistening apparatus being shown.

By appropriately controlling the feed and the operation of a card or a garnett, the web or film which is produced may be controlled from a co-

herent web or film which varies in thickness from two or more fibers to several fibers and wherein the fibers cross and recross each other, to a film or web in which the individual fibers are separated laterally of the film or web so that the film is not coherent. A photograph of a card web or film of cashmere which is of average thickness is shown in Fig. 8 of the drawings of my copending application Serial No. 410,300, entitled "Method and Apparatus for Separating Fibers," filed September 10, 1941 (now Patent No. 2,420,033). The method and apparatus of this invention contemplates forming the fibers and foreign bodies into a coherent web a plurality of fibers in thickness, reducing the web to a film of substantially single fiber thickness and parallelizing the majority at least of the fibers therein and advancing such thin film of parallelized fibers and subjecting it to the pressure of rigid members to disintegrate the foreign bodies into fragments.

Referring to Fig. 1, which diagrammatically illustrates the various steps of one embodiment of the improved method, together with apparatus employed in performing certain of the steps of such embodiment, the numeral 2 designates the doffer cylinder of a card or garnett, and the numeral 3 indicates an endless conveyor belt which may have a smooth surface and which is suitably supported by and driven by the rolls 4. The conveyor belt 3 is designed to receive and to advance the thin web or film F from the doffer roll 2 of the card or garnett. A vibratory comb C peels the film from the doffer roll.

When the web or film F is thin, it has a strong tendency to roll beneath the doffer comb C, especially if a charge of static electricity has been built up in the stock during its passage through the card. In order to insure satisfactory delivery of the web or film from the doffer roll to the upper run of the conveyor 3, there may be provided a di-electrifying apparatus, indicated generally by the numeral 5, and here shown as associated with the comb C. This apparatus may be of a known commercial type supplied, for example, with alternating current at 60 cycles and producing a potential of 14,000 volts at 0.01 ampere or the like and it comprises a discharge device disposed close to the surface of the doffer roll which is operative to neutralize the effect of any static electrical charge within the fleece or film.

The web or film F which is carried by the upper run of the conveyor 3 is moved to the right, as viewed in Fig. 1, and delivered to the rolls 16 and 7 of the parallelizing apparatus. These rolls are each of sufficient length to receive the complete width of the web or film F produced by a card or garnett; the roll 7 may be made of steel, and the roll 16 rubber covered. As shown in Fig. 1, the surface of the roll 16 bears against the conveyor belt 3 and continuously removes the film or web F from the surface of the conveyor belt 3.

The roll 16 is rotated in a counterclockwise direction, looking at Fig. 1, and preferably at a surface speed which is not less than the surface speed of the conveyor belt 3. The roll 7 is rotated in a clockwise direction looking at Fig. 1, and at a faster surface speed than the surface speed of the roll 16. The rolls 7 and 16 are preferably constructed and mounted so that a substantially uniform pressure is exerted by the surface of one roll against the surface of the other roll throughout its length, and preferably they are mounted so that the amount of such pressure may be varied for different thicknesses or materials.

In accordance with this invention either the fibers themselves, the roll 16, or the roll 7 are moistened so that when the fibers engage or are engaged by the surface of the roll 7 a thin film of moisture is presented between each fiber and the surface of the roll, causing each fiber to tend to cling to the surface of the roll but permitting the fiber to slide or slip both laterally and longitudinally when the surface is moved at a greater speed than that of the fiber.

In Figs. 1, 8 and 9 three alternate methods of moistening are illustrated. According to my preferred apparatus as shown in Fig. 1, a spray header S—1 is mounted above the film or web F and extends transversely thereof throughout its width. A series of finely adjustable nozzles 9 are mounted at spaced intervals on the spray header S—1. The nozzles are adjusted so that they continuously emit a fine spray of water or other fluid. This spray moistens the film or web F throughout its width and the film or web in turn moistens the surfaces of the rolls 16 and 7. Thus as the fibers leave the bite of the rolls 16 and 7 they cling to the moist surface of the faster moving roll 7.

Instead of the spray header S—1, a spray header S—2 may be utilized as illustrated in Fig. 8, said spray header S—2 operating to moisten the surface of the roll 16 in the same manner as the spray header S—1 in the embodiment of Fig. 1 moistens the fibers of the web or film F, whereby the roll 16 moistens the film F and it in turn moistens the surface of the roll 7 throughout its length.

Instead of the spray headers S—1 or S—2, a reservoir 12 containing water or other fluid 13 may be utilized as illustrated in Fig. 9 of the drawings. The surface of the roll 7 continuously picks up a thin film of fluid from the reservoir, the scraper roll 14, which is rotated in a counterclockwise direction, looking at Fig. 9, uniformly distributes the fluid over the surface of the roll 7 and returns excess fluid to the reservoir.

The brush 17 is rotated in a clockwise direction, looking at Fig. 1, it engages the surface of the roll 7 throughout its length, and it removes the film of fibers from the surface of the roll 7.

As the forward end of each fiber progresses beyond the bite of the rolls 7 and 16, the moist surface of the faster moving roll 7 causes the forward end of the fiber to straighten out to a position in which it extends substantially perpendicular to the bite of the rolls 7 and 16. During such action the forward movement of the fiber is retarded by the slower moving roll 16 which engages the trailing end of the fiber and the forward end of the fiber clinging to the moist surface of the roll 7 slides on this surface until it has assumed a direction substantially parallel to the direction of rotation thereof, which is a direction substantially perpendicular to the bite of the rolls 16 and 7 at the point where its trailing end is engaged by the roll 16. This aligning action continues until the trailing end of the fiber leaves the bite of the rolls 7 and 16 and the fiber is then carried forward by the surface of roll 7, the film of moisture then serving to retain it thereon in its aligned position. Each of the fibers in the web or film F is thus arranged in substantially parallel relationship and in a film or web which is of the order of thickness of a single fiber.

It has been found that the moist surface of the roll 7 serves as an ideal medium for parallelizing and advancing a film of parallelized fibers which are naturally very crinkly or curly. For example, in working with a web or film of wool fibers which are very crinkly, the fibers are held in aligned re-

lationship on the surface of the roll 7 after they have been freed from the bite of the rolls 7 and 16, and they do not recurl or recrinkle thereby losing or disrupting the parallelized relationship as would be the case if the fibers or the surface of the roll 7 were not moistened or otherwise treated to cause the fibers to cling thereto. For example, if the machine is stopped and the fibers and the surface of the roll 7 are dried, the fibers immediately separate from the surface of the roll and lose their parallel relationship. A film or web of substantially parallelized wool fibers is illustrated in Figs. 3 and 4, together with an opened or unwrapped mestiza burr.

The roll 8 illustrates one form of foreign body disintegrating apparatus which may be utilized for disintegrating the majority at least of the foreign bodies into fragments without substantially shortening the majority at least of the textile fibers.

The surface of the roll 8 is provided with a series of spaced substantially parallel disintegrating elements 8^a which extend substantially parallel to the direction of rotation of the roll 8 which is also substantially parallel to the longitudinal center line of the web or film F and to the direction of the parallelized fibers. These disintegrating elements may be formed by a steel wire of a diameter of approximately 0.01 of an inch and which may be appropriately arranged by winding two wires around the surface of the roll 8 and then removing one of the wires, thus leaving the turns of the wire 8^a spaced apart approximately 0.01 of an inch between adjacent edges, or 0.02 of an inch from center line to center line. The spacing of the disintegrating elements may be varied depending upon the character of the foreign bodies which are being removed; for example, I have found a spacing of one-sixteenth of an inch from center line to center line satisfactory in removing burrs from wool.

The roll 8 is mounted in suitable bearings capable of micrometer adjustments, so as to vary the distance between the peripheries of the rolls 7 and 8 with extreme accuracy whereby the pressure exerted by the disintegrating elements 8^a upon spaced portions of the surface of the roll 7 which are engaged during each complete revolution of the rolls 7 and 8 may be delicately adjusted. The surfaces of the rolls 7 and 8 are ground with extreme accuracy both longitudinally and concentric with their bearing surfaces to further insure such uniform pressure.

The surface speed of the rolls 7 and 8 is substantially the same and they are continuously driven in opposite directions. The bite of the rolls 7 and 8 preferably is located a distance from the bite of the rolls 7 and 16 which is greater than the average length of the fibers which are being run so that the fibers are not gripped by both bites at the same time. The rotary brush 18 extends throughout the length of the roll 8 and is driven in the same direction as the roll 8. It functions to brush from the disintegrating elements and from the channels between the disintegrating elements that portion of the foreign material which tends to accumulate there. The brush throws this material into the trough 19 from which it may be continuously withdrawn to one side of the machine by suitable means (not shown).

As the web or film F enters the bite of the rolls 7 and 8 in my preferred embodiment the parallelized fibers extend in a direction substantially perpendicular to the bite. The majority at least of

the fibers pass between the disintegrating elements 8^a without being operatively engaged thereby, whereas the burrs, segments of vegetable defect, blotches of branding paint and the like, being larger than the spaces between the disintegrating elements 8^a, are fractured thereby into short segments in lines substantially parallel to the direction of the parallelized fibers. Such of the fibers as are located between a foreign body and the surface of the roll 7, or directly between a disintegrating element 8^a and the surface of the roll, are not substantially divided or fractured, first, because when engaged by the arcuate surface of the disintegrating element they tend to slip or slide laterally of the surface of the roll 7 to thus avoid operative engagement by the disintegrating elements 8^a and, second, because the pressure of the disintegrating elements against the surface of the roll 7 while sufficient to cut or divide the thicker burrs and other defects may be insufficient (since such pressure may be delicately adjusted) to crush or fracture the majority at least of such fibers which are engaged thereby.

The rotary brush 17 continuously removes the film F and the remaining segments of foreign material from the surface of the roll 7 and transfers it to the drying cylinder 30 from which it is advanced through the separating apparatus which will be described below.

In the apparatus illustrated in Fig. 5 of the drawings the card or garnett web or film F' is conveyed from the doffer by the conveyor belt 3^a which passes around the periphery of the driven roll 20. The web or film is fed from the conveyor belt to the bite of the rubber covered roll 21 and the parallelizing roll 7^a. The parallelizing roll 7^a is continuously rotated in a clockwise direction, looking at Fig. 5. The roll 21 and the rubber covered roll or brush 22 are continuously rotated in a counterclockwise direction, looking at Fig. 5. The roll 21 engages the surface of the rolls 7^a and 22. The roll 22 engages the surface of the roll 21 but does not engage the surface of the rolls 7^a and 3. The bite of the rolls 21 and 7^a is preferably located at a greater distance from the bite of the rolls 8 and 7^a than the average length of the fibers which are being treated. The roll 21 may be rotated at substantially the same surface speed as the surface speed of the conveyor belt 3^a or at a greater surface speed. The roll or brush 22 is rotated at a greater surface speed than that of the roll 21 and it serves to return to the surface of the roll 7^a any fibers which may adhere to the surface of the roll 21. The roll 7^a is rotated at a greater surface speed than that of the roll 21. The brush 17 engages the surface of the steel roll 7^a. It is rotated in a clockwise direction, looking at Fig. 5, and at a surface speed substantially equal to the surface speed of the roll 7^a. It serves to remove the fibers and segments of foreign bodies from the surface of the roll 7^a. The length of each of the rolls 21, 22 and 7^a is at least equal to the width of the web or film F produced by a card or garnett which may customarily vary from 48 to 90 inches.

The moisture may be supplied to the surface of the roll 7^a by a reservoir 12^a which carries a body of water 13^a, the reservoir being of substantially the same length as the roll 7^a. In use of the reservoir 12^a, a sheet of fibrous material 24, for example closely compacted, degreased, wool felt, transfers the water from the reservoir 12^a to the surface of the roll 7^a, and thereby continuously applies to said surface a thin coating or film of moisture. The characteristics of this film may

be controlled by adjustment of the set screws 25 to increase or decrease the pressure of the fibrous material against the surface of the roll 7a or by adjustment of the nuts 26 to increase or decrease the pressure of the crossbar 27 against the surface of the fibrous material.

Instead of the reservoir 12a and the sheet of fibrous material 24 the moisture may be supplied to the surface of the roll 7a by spray headers. For example, a spray header identical to the spray header S—1 illustrated in Fig. 1 of the drawings may be mounted transversely of the machine above the web or film F' throughout its width, whereby the surface of the roll 7a is moistened throughout its length in the manner described above with respect to the apparatus illustrated in Fig. 1 of the drawings. Alternately a spray header identical to the spray header S—2 illustrated in Fig. 8 of the drawings may be mounted above the roll 21 extending transversely of the machine substantially parallel to the axis of the roll 21, and this spray header may be operated continuously to moisten the surface of the roll 21 whereby the film or web F' is moistened and it in turn moistens the surface of the roll 7a throughout its length.

The amount of moisture depends upon the amount of stock which is being treated during any interval of time, and upon the character of the fiber which is being treated. The place and manner of application of the moisture is believed to be immaterial so long as a sufficient amount of moisture is evenly distributed across or throughout the length of the surface of the roll 7a to cause the fibers to cling to the surface of the roll 7a as they leave the bite of the rolls 7a and 21.

The roll 8 is driven in a counterclockwise direction, looking at Fig. 5, and at substantially the same surface speed as that of the roll 7a. The roll 8 may be provided with disintegrating elements 8a similar to those shown in Fig. 2 or in one embodiment such elements may be omitted, in which case the pressure of the surface of the roll 8 against the surface of the roll 7a serves to disintegrate the foreign bodies into fragments. The latter embodiment of the apparatus and of the method is similar to the prior art crushing roll apparatus except that the surface of the roll 8 is moist so that small fragments adhere thereto and that the prior art crushing roll apparatus does not reduce the web or film to single fiber thickness nor parallelize the fibers thereof.

The roll 21 serves to retard the relative speed of forward movement of the fibers and the faster moving roll 7a serves to parallelize the fibers, to reduce the thickness of the film or web, to retain the fibers in parallelized relationship, to convey them forwardly in such relationship and to support the web or film of parallelized fibers during the disintegrating operation. In this respect the roll 21 is the equivalent of the roll 16 of Fig. 1, and the roll 7a is the equivalent of the roll 7 of Fig. 1.

The degree to which the fibers are parallelized and the thickness of the film of parallelized fibers depend primarily upon the relative surface speeds of the rolls 7 (or 7a) and 16 (or 21). By appropriate adjustment of these relative speeds and corresponding adjustment of the moistening means, a film having the desired characteristics may be produced upon the surface of the rolls 7 or 7a from any web or film produced by a card, or a garnett.

As shown in Figs. 3, 4, 6 and 7 a mestiza or spiral burr M has a plurality of long thin tentacles M—1 which protrude from the body M—2 and become entangled in the wool or other fibers. These tentacles are so securely entangled in the fibers that many of the burrs are not removed by the prior art beater roll apparatus. In the use of prior art crushing rolls the breaker section of the card or garnett usually opens or unwraps the burrs to the position shown in Figs. 3 and 4 and, because the ends of the tentacles M—1 are so fine, if the pressure between the crushing rolls is increased sufficiently to crush them, the wool fibers are also crushed or fractured. This crushing or fracturing of the fibers however is substantially eliminated if the thickness of the film or web is reduced to substantially that of a single fiber before it reaches the bite of the crushing rolls.

The disintegrating method of this invention functions to divide the majority of the tentacles M—1 from the body M—2 and to fracture them and the body into short sections whereby they may be readily separated from the wool by the moist roll 8 and by the subsequent separating apparatus which will be described below.

In Fig. 7 of the drawings, the body M—2 of the burr is shown as divided longitudinally into two layers and each of these layers has a series of tentacles. A mestiza burr normally has three such longitudinal layers and they are normally separated longitudinally by the card or garnett so that the web or film F contains but a single layer as shown in Figs. 3 and 4.

If desired one or more prior art beater rolls or one or more sets of smooth crushing rolls or a combination of prior art beater rolls and smooth crushing rolls may be incorporated in the breaker section of the card or garnett prior to the doffer cylinder 2. These devices may be set so as not substantially to fracture the fibers and so as to remove the bulkier foreign bodies prior to passing the web or film F to the dividing operation or apparatus of this invention. The method and apparatus of this invention may be utilized without such supplementary methods or apparatus but the web or film F is preferably passed beneath a device (such as a magnetic separator) to remove metallic particles ("tramp iron") prior to the dividing step or apparatus.

As described above this invention in one embodiment includes the use of smooth crushing rolls in association with means to reduce the thickness of the web or film to substantially that of a single fiber and to substantially parallelize the majority at least of the fibers with means to moisten the smooth crushing rolls.

The raw stock to be processed preferably is dusted or scoured for the purposes of removing as much sand, dust, vegetable defect and natural grease as possible before it is fed to the breaker section of the card or garnett.

The fractured pieces of burrs and other foreign material which remain in the web or film F as it emerges from the bite of the rolls 7 and 8 (Fig. 1) or 7a and 8 (Fig. 2) may be removed by carding, carding and combing or by other means apparent to persons skilled in the art.

As disclosed in Fig. 1 the web or film F is passed to a pair of drying cylinders 30, 31 which are provided with card clothing and which may be of a diameter equal to the main cylinder of a card. The web or film F is subjected to the drying action of banks of lights 30a and 31a which extend from end to end of the cylinders 30 and 31. The rotary brush 32 transfers the web or film F from the cylinder 30 to the cylinder 31.

The stripper cylinder 33 is provided with card clothing the teeth of which point in the direction indicated and it may be rotated in a clockwise direction at the same or a slightly greater speed than that of the drying cylinder 31.

The rotary brush 34 is provided with bristles which are relatively stiff and it is rotated in a counterclockwise direction at a substantially greater surface speed than that of the stripper 33. The doffer cylinder 35 is provided with card clothing and is rotated at a slower surface speed than that of the brush 34 and in a clockwise direction. The stripper cylinder 36 is provided with card clothing and it may be rotated at a faster surface speed than that of the doffer cylinder 35 and in a clockwise direction. The rotary brush 37 is similar in construction to the brush 34 and it is rotated in a counterclockwise direction at a substantially greater surface speed than that of the stripper cylinder 36. The cylinder 38 is provided with card clothing and it is rotated at a greater surface speed than that of the brush 37.

The stripper cylinder 33 removes the film or web F from the surface of the cylinder 31 and the tips of the bristles of the brush 34 engage the fibers while they are on the surface of the cylinder 33 and they straighten the fibers, remove them from the retentive clothing of the cylinder 33 and advance them at a greatly accelerated speed. This causes many of the fragments of the burrs or other foreign material to be thrown downwardly and free from the film or web F substantially at the region of removal of the film or web from the surface of the cylinder 33. The cylinder 35 removes the film or web from the surface of the brush 34 and the cylinder 36 removes the film or web from the surface of the cylinder 35 and advances it upwardly, forwardly and downwardly. The brush 37 acting against the back of the teeth of the card clothing of the cylinder 36 removes the film or web F from the surface of the cylinder 36 and causes additional fragments of the foreign material to be thrown downwardly and free from the film or web.

The cylinder 38 removes the film or web from the surface of the brush 37 and subjects it to the action of the workers and strippers 39a—39b, 40a—40b and 41a—41b. The action of the cylinder 38 and the workers and strippers is to straighten out to some extent the fibers and to rearrange them in the form of a relatively thin web or film; they have been disarranged from such form to some extent by the action of the brush 34 throwing the fibers into the teeth of the cylinder 35.

The doffer cylinder 42 removes the web or film F from the surface of the cylinder 38 and the reciprocating doffer comb 43 removes the film from the surface of the cylinder 42 and deposits it in the container 44.

If the foreign bodies have not been sufficiently removed from the film or web F as it leaves the doffer 42 it may be passed through another series of rolls and brushes like the rolls and brushes 33, 34, 35, 36 and 37.

From the foregoing it will be apparent that my improved method and apparatus eliminates or remedies the disadvantages of the prior art crushing roll and/or the prior art beater roll apparatus, that it may be used in combination with one or both of them or independently thereof and that it is economical to make, install and use in standard textile machinery which is already present in establishments now engaged in the removal of foreign bodies from textile fibers.

In the use of the terms "disintegrating" and "disintegrated" in the appended claims I intend to include the action of pressure exerted by a smooth surface upon a foreign body as well as the localized pressure exerted thereon by spaced disintegrating elements similar to the elements 8a.

While I have shown and described two desirable methods and two desirable embodiments of apparatus embodying my invention, it is to be understood that this disclosure is for the purpose of illustration only and that equivalent forms of the apparatus may be used and the substitution of equivalent method steps may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. The method of treating discontinuous textile fibers preparatory to removing foreign bodies therefrom comprising forming the mingled fibers and foreign bodies into a coherent web of the character of a web normally produced by a carding machine, said web being a plurality of fibers in thickness, advancing the web at a predetermined speed, causing the fibers to cling to a surface in the presence of moisture, advancing said surface at a greater surface speed than the surface speed of the web, whereby the fibers clinging to said surface are formed into a film of substantially single fiber thickness wherein the majority at least of the fibers are separated laterally from each other and extend in a direction predominantly parallel to the direction of movement of said surface, advancing the film on said surface and subjecting the film to the pressure of a rigid member against said surface, whereby many of the foreign bodies are disintegrated into fragments.

2. The method of claim 1 further characterized by subjecting the film to pressure during the disintegrating step while the fibers remain moist.

3. The method of claim 1 further characterized by brushing the fibers from said film advancing surface after the disintegrating step.

4. Method of treating discontinuous textile fibers preparatory to removing foreign bodies therefrom comprising forming the mingled fibers and foreign bodies into a coherent web of the character of a web normally produced by a carding machine, said web being a plurality of fibers in thickness, advancing the web at a predetermined speed, causing the fibers to cling to a surface in the presence of moisture, advancing said surface at a greater surface speed than the surface speed of the web, whereby the fibers clinging to said surface are formed into a film of substantially single fiber thickness wherein the majority at least of the fibers are separated laterally from each other and extend in a direction predominantly parallel to the direction of movement of said surface, advancing the film on said surface and subjecting the film to localized pressure along lines which are substantially parallel to the parallelized fibers, whereby many of the foreign bodies are disintegrated into fragments.

5. The method of claim 4 further characterized by subjecting the film to pressure during the disintegrating step while the fibers remain moist.

6. The method of claim 4 further characterized by brushing the fibers from said film advancing surface after the disintegrating step.

7. The method of claim 4 wherein the film is advanced during the disintegrating step by a smooth surface.

8. Apparatus for treating discontinuous textile fibers preparatory to removing foreign bodies

therefrom comprising a fiber parallelizing roll, a pressure roll mounted with its axis substantially parallel to the axis of the fiber parallelizing roll, and adapted to exert pressure against the surface of the fiber parallelizing roll, means to rotate said rolls in opposite directions at substantially the same surface speed, means to form mingled textile fibers and foreign bodies into a coherent web of the character of a web normally produced by a carding machine, means for conveying the coherent web to the surface of the fiber parallelizing roll at a surface speed which is less than the surface speed of the fiber parallelizing roll, means to moisten the surface of the fiber parallelizing roll, a series of foreign body disintegrating elements extending circumferentially of said pressure roll and engaging the surface of the fiber parallelizing roll along lines which are substantially parallel to the parallelizing fibers of the film and means to remove the fibers from the surface of the fiber parallelizing roll, whereby the action of the moistened surface of the fiber parallelizing roll progressively reduces the web to a film of substantially single fiber thickness in which the constituent fibers of the film are substantially parallel and the foreign bodies are thereafter disintegrated by the action of said foreign body disintegrating elements.

9. The apparatus of claim 8 wherein the foreign body contacting surface of each of the foreign body disintegrating elements is of arcuate transverse section.

10. The apparatus of claim 8 wherein the means for conveying the web to the surface of the fiber parallelizing roll comprises a fiber retarding roll mounted with its axis substantially parallel to the axis of the fiber parallelizing roll and with its surface adapted to exert pressure against the surface of the fiber parallelizing roll and means to rotate said fiber retarding roll at a slower surface speed of the fiber parallelizing roll.

ROBERT A. FAIRBAIRN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,075,156	Albero	Mar. 30, 1937
2,213,793	Gibson	Sept. 3, 1940
2,323,167	Varga	June 29, 1943
2,420,033	Fairbairn	May 6, 1947
2,420,034	Fairbairn	May 6, 1947

FOREIGN PATENTS

Number	Country	Date
1,430	Great Britain	of 1880
3,713	Great Britain	of 1887

Certificate of Correction

Patent No. 2,513,301 July 4, 1950

ROBERT A. FAIRBAIRN

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 8, line 1, after the word "become" insert *securely*; column 12, line 11, after "speed" insert *than the surface speed*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of October, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.