Dec. 10, 1968 H. BIDWELL 3,415,456

METHODS AND APPARATUS FOR DRY DEFIBERING OF FIBROUS MATERIALS

Filed Oct. 22, 1965

FIG. 1A.

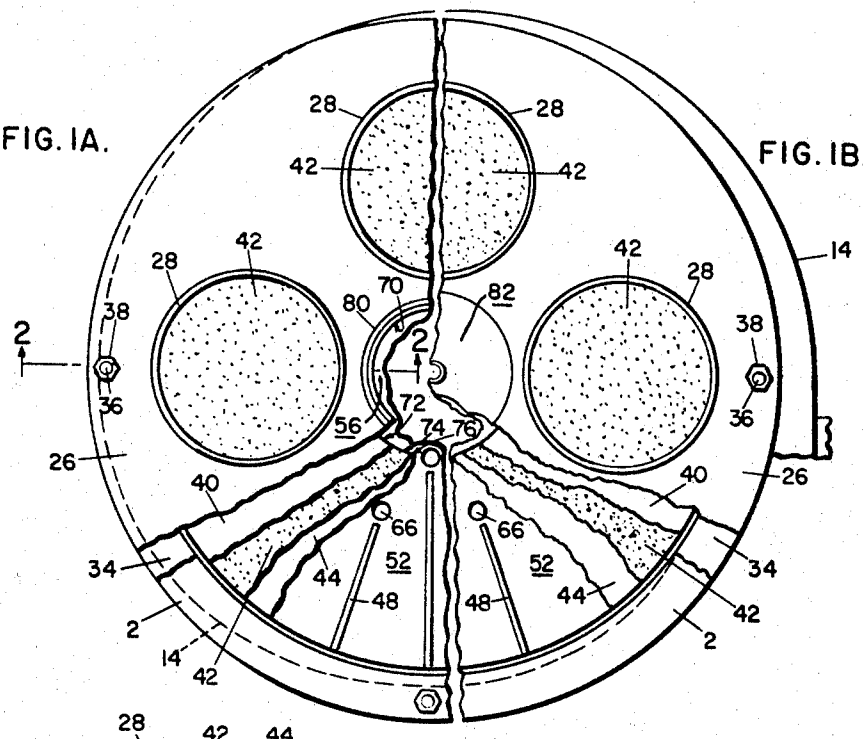


FIG. 1B.

FIG. 2.

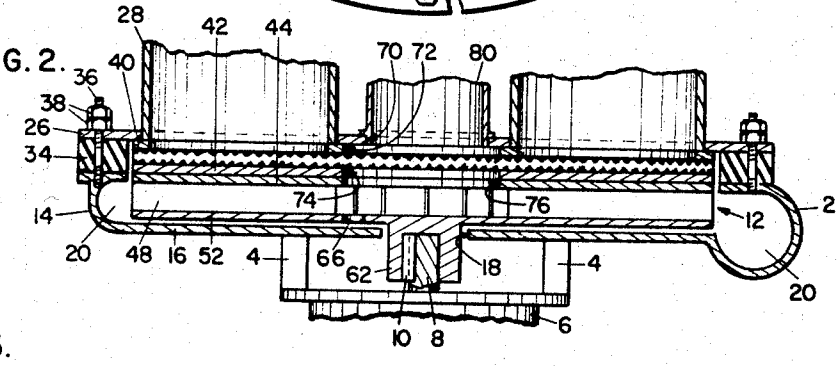


FIG. 3.

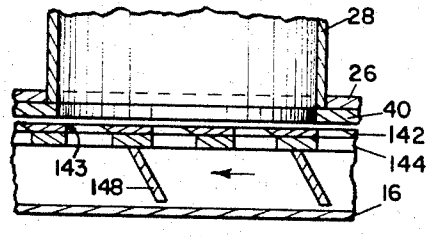


FIG. 4.

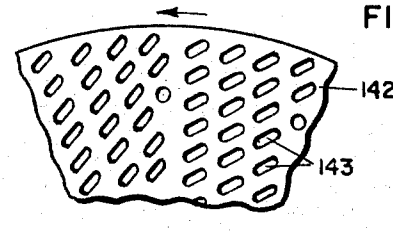
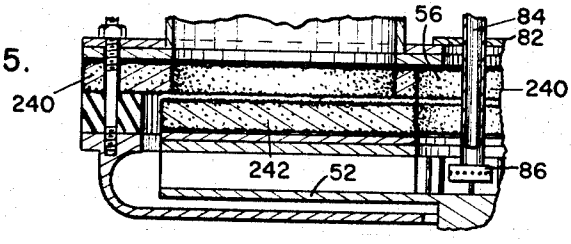


FIG. 5.



INVENTOR.
HOWARD BIDWELL

BY Kenwood Ross

ATTORNEY.

Published by AsbestosClaims.Law
asbestosclaims.law/library/23176/1

United States Patent Office

3,415,456

Patented Dec. 10, 1968

3,415,456

METHODS AND APPARATUS FOR DRY DEFIBERING OF FIBROUS MATERIALS

Howard Bidwell, 56 Aldrich St., Granby, Mass. 01033

Continuation-in-part of application Ser. No. 172,321, Feb. 9, 1962. This application Oct. 22, 1965, Ser. No. 502,102

5 Claims. (Cl. 241—21)

ABSTRACT OF THE DISCLOSURE

The within invention is concerned with a method of defibering fibrous in a dry state. The materials are charged into a plurality of off-center radially-disposed material confining and feeding magazines of a type having a continuity of outlets common to the plurality of magazines in the form of a unitary stationary granular surfaced rotor fiber abrading surface, adjustably spaced from the opposing coarse jagged granular surfaced material defibering element part of an air flow impelling open center ported type rotating assembly, by which the material is caused to be pressed against the rotor defibering part, on the effective rotation of the rotor, while simultaneously directing air currents drawn through the material confining-feeding magazines, and over the granular surfaces, so as to convey the fibers freed from the material through the center port opening of the rotor, by the action of the air impelling vaned part of the rotating assembly, by which the airborne fibers are transported to the collecting circumventus type scroll to a discharge opening provided therefor.

This application is a continuation-in-part of my Patent No. 3,224,687 issued Feb. 7, 1963.

It relates to improved methods and means for defibering non-flowable fibrous materials by way of reducing such materials to pulps of substantially individualized fibers which may then be subsequently wet fabricated to board, sheet or web form by conventional papermaking techniques or to molded form by conventional molding procedures.

By the means hereof, the simultaneous blending of unlike materials into homogeneous blended mixtures is possible. Herewith, abrading actions are performed upon the materials, while in their dry state preparatory to forming by the wet processing thereof. Improved dispersions are the unique result, particularly of fibrous materials of types heretofore difficult to blend or heretofore difficult to process separately or individually in a slurry condition.

In broadest terms, the structure aspect of the invention envisions a rotatable abrading member having a granular surface, means for pressing the material or materials being worked against the surface of the abrading member, and means for so exhausting impelling air as to effect the discharge of the fibers freed from the material or materials by the abrading action to a distant point for further working.

The method aspect of the invention comprehends the steps of: (1) creating a partial vacuum within a casing for maintaining a continuous air flow stream sufficient to press the body of fibrous material against a coarse granular surface within the air flow stream; (2) simultaneously effecting relative movement between the coarse granular surface and the body of fibrous material for freeing fibers from the body; (3) simultaneously directing a current of air in a confined path through the material confining magazines and over the coarse granular surface for effecting the airborne movement of the freed fibers; and (4) discharging the freed fibers in either a dry or slurried condition.

Another object hereof is to teach the system of introducing slurrying fluids independently of the material for altering the mobility or conveyability of the processed fibrous materials.

Another object hereof is to provide means by which the clearances between one or more charge containing magazines and the abrading surface of a rotating member may be accurately and variably adjusted.

Another object is to teach means for providing a continuity of the magazine outlets in the form of a unitary stationary abrading member having a surface common to all magazines and opposed by a rotating member assembly and which may be demountable and reversible so as to allow an increased range of abrading effects by virtue of the versatility of the alternate abrading surfaces to the charges of material as fed from the various magazines.

Another object is to provide means for increasing the rate of the processing of the material or materials by the establishment of extended atmospheric pressure differentials imposed upon said materials within the magazines and resultant from the effects of the rotating member.

In the drawings:

FIG. 1A is a fragmentary view, in top plan, of one type of apparatus of the invention showing one form having a granule surfaced continuity of the material receiving-confining and feeding magazines;

FIG. 1B is a fragmentary view, in top plan, of the apparatus of FIG. 1A showing the discharge scroll in part and with a non-abrading type of continuity of the material magazines;

FIG. 2 is a fragmentary view, in section, of the apparatus of FIG. 1A, taken along a diameter projected along the foreshortened line **2—2** of that figure;

FIG. 3 is a fragmentary view, in section, on a slightly enlarged scale taken through one of the material feeding magazines of FIG. 1B and showing a modified form of rotor subassembly cooperant therewith and non-abrading continuity of the material magazines;

FIG. 4 is a fragmentary view, in top plan, showing the rotating abrading component of the rotor subassembly of FIG. 3; and

FIG. 5 is a fragmentary view, in section, showing a modified form of structure inclusive of a ceramic type of statoinary and rotary abrading elements and with a cooperant spray head.

A scroll-type annular rotor-enclosing casing **2** is supported by suitable stands **4** upwardly of a motor **6** or other suitable drive means from which extends a vertically-disposed driving shaft **8** which is keyed as by splining **10** to the downwardly depending-hub of a rotor subassembly, generally indicated by **12**.

Rotor subassembly **12**, comprised of components to be defined, is nestably received within the annular area defined by a curving side wall **14** of casing **2** and upwardly of a horizontally-disposed lower wall **16** of said casing.

Through a central opening **18** of lower wall **16**, a downwardly-facing hub of the rotor subassembly is extendable for facilitating interconnection of the rotor subassembly and driving shaft **8** as hereinabove mentioned, all in such manner that the rotor subassembly is spaced upwardly from the casing lower wall and concentrically relative to an annular scroll passage **20** defined by the casing walls, which passage is of a configuration such that it increases in its widthwise dimension from a closed inner end to an open outer discharging end.

The casing is enclosed by a disc-like cover **26** spaced upwardly of and coplanar with lower wall **16** and provided with one or more circular openings therethrough, in each of which openings the lower end of a cylindrical, open-

Published by AsbestosClaims.Law

asbestosclaims.law/library/23176/2

ended, stock feeding magazine **28** is stationarily seated and suitably secured.

Cover **26**, and accordingly the discharge openings of magazines **28** immediately adjacent the cover, are adjustably spaced relative to casing wall **16** and rotor subassembly **12** by means of an annular compressible gasket **34** which is so dimensioned as to be seatable upon the upper rim of casing side wall **14** and secured thereto and to the cover seated thereupon by means of studs **36** extendable through aligned openings in side wall **14**, gasket **34** and cover **26** and having nuts **38** in threaded engagement therewith. Tightening of the nuts upon the studs serves the function of compressing the gasket so as to bring the cover and the magazine outlets closer to the rotor subassembly. Thereby, the relative spacing of the components may be varied to suit operating needs.

A disc-like stationary granular-surfaced abrading element **40** is fixed to and coplanar with the lower surface of the cover and is provided with an opening or openings therethrough registrable with the cover openings and the outlets of the stock feeding magazines.

Abrading element **40** carries on one or both of its opposite surfaces a coating of coarse, irregular, jagged granules of alumina oxide, silicon carbide, tungsten carbide, or equivalent hard material, bonded together and to the abrading element in known manner as by an appropriate bonding material.

Preferentially, both surfaces of the abrading element will be so prepared, one surface being conditioned with granules of one type, with respect to grain size and surface configuration, and the other surface being conditioned with granules of another size and/or with configurations of another pattern. The abrading element, being readily detachable, will be reversible wherefore the granular-surface to best suit the operating requirements of a given defibering procedure with respect to the material or materials being served may then be disposed face downwardly in the operating position.

Rotor subassembly **12**, constituting the rotatable subassembly of the apparatus, includes an uppermost disc-like abrading component **42** detachably seated upon the upper face of an upper rotor disc component **44**, from which upper rotor disc component vanes **48** extend, and a lower rotor disc component **52** spaced from and below the upper rotor disc component by means of the vanes. Hub **62**, heretofore alluded to, extends downwardly from the lower rotor disc component.

Abrading component **42** carries on one or both of its opposite surfaces a coating of coarse, irregular, jagged granules of alumina oxide, silicon carbide, tungsten carbide, or equivalent hard material, bonded together and to the abrading component in known manner as by an appropriate bonding material.

Preferentially, both surfaces of the abrading element will be so prepared, one being conditioned with granules of one type and/or configurations of one pattern and the other surface being conditioned with granules of another type and/or configurations of another pattern. The abrading element, being readily detachable, will be reversible wherefore the granular surface to best suit the operating requirements of a given procedure may then be disposed face upwardly in the operating position coplanar with and spaced from the oppositely facing surface of stationary element **40** that forms a continuity of said magazines and which may or may not be granule surfaced depending on the type of rotor accompaniment.

Radially-arranged vanes **48** of varying lengths project vertically downwardly from upper rotor disc component **44**. By virtue of their different lengths, the problem of the bridging or accumulating of the defibered material in the form of light, downy fluff between the inner ends of adjacent vanes is minimized. Such bridging or accumulating is a possibility when and where no vacuum condition exists at the outlet ends of the magazines or no auxiliary exhausting air is employed.

Further to minimize this bridging or accumulating tendency, openings **66** may be provided through lower rotor disc component **52** inwardly of each of the radially-arranged vanes for the flow of air therethrough as induced by air friction between the lower rotor disc component and casing wall **16** as the rotor subassembly is rotated.

Centrally of cover **26**, stationary abrading element **40**, rotatable abrading component **42**, and upper rotor disc component **44**, aligned central port openings **74** and **76** respectively are provided therethrough and serve, in the collecting of the abraded fibers.

By the rotation of the rotor subassembly, air is caused to be pulled through the magazines and central port openings **74** and **76** by the action of the vanes **48** and is impelled outwardly from the areas between the vanes toward and into the scroll passage.

It is the pulling power of this ingested air which serves to draw the magazine contents downward against the defibering component **42**, the freed fibers being conveyed by the action of the impeller vanes **48** through central port openings **74** and **76** and scroll discharge opening.

An auxiliary air intake **80**, in the form of a cylindrical open ended tube, may be suitably seated upon cover **26** so as to register with openings **70**, **72**, **74** and **76** to allow the ready introduction of additional air into the vaning area and to aid in the air drying of the fluff in suspension subsequent to the defibering thereof.

When and where operating conditions do not dictate the use of such additional air as in the case of strictly air-dry materials, the air intake, being detachable, may be removed from attachment to the cover and a disc-like secondary cover **82** may be secured to the cover, same being of such dimensions as to seal off cover opening **70**, as shown in FIG. 1B.

The arrangement so far discussed is best suited for air-dry materials, inclusive of materials dried by sublimation, such materials being readily defiberable into light fluffy conditions.

On the other hand, for stocks having relatively low moisture contents, and desirably fluffed for air-drying and air-conveying purposes, which stocks may be intended to be stored and/or shipped in such state, the rotor subassembly, such as is shown in FIG. 3, may comprise an uppermost disc-like abrading component **142** attachably seated upon the upper face of an upper rotor disc component **144**, from which disc component inclined vanes **148** extend. The component **142** is perforated, with openings **143**, as shown in FIG. 4, same being more effective particularly when such modified rotor subassembly is employed with auxiliary air intake **80**.

In the case of either the preferred or modified exemplifications, the vanes serve to create a partial vacuum in the abrading zone, thereby to cause an increase air flow through the magazines and accordingly an increased air pressure upon the materials therein contained, wherefore increased rates of stock feeding and abrading are realized.

With metallic granular surfaced elements **40** and **42** as shown in FIG. 2, certain air dry materials, particularly asbestos and composite mixtures of asbestos, are more advantageously defibered to an unusual degree of refinement, when the material is prepared in the form of slugs prepared and extruded by separate apparatus of the type exemplified in my Patent No. 3,227,606 issued Jan. 4, 1966, and subsequently dried before charging into magazines **28**. This is because the asbestos fibers are then sufficiently confined as to permit the mineral strands to be more completely opened up.

Leather stocks are also well defibered with these types of surfaces.

Rag stocks are well defibered with abrading elements of the porous granular bodied elements of the type shown in FIG. 5.

Materials in a damp condition are better defibered with a rotating element such as in FIGS. 3 and 4.

Published by AsbestosClaims.Law
asbestosclaims.law/library/23176/3

Accordingly, the apparatus hereof when so equipped could conceivably function as a component part of such disclosed apparatus, and in such instance, the extrusion part of that apparatus would be directed into the magazine or magazines. In such arrangement, stationary abrading element **40** could take the form of a smooth surfaced plate and abrading component **42** could take the form of a perforated type plate having abrading perforation edges of any conventional type, for directing the extracted material particles into an air stream supplied through conduit **80** in a loosened flaked condition suitable for drying in suspension while being airborne preparatory to baling and transporting for subsequent processing.

The apparatus allows the simultaneous defibering of unlike materials and their blending into a homogeneously blended composite stock, with one of the component materials conceivably being refinable to a greater degree than would be possible if processed separately and then subsequently blended.

For purposes of illustration, a discussion of the processing of asbestos fibers is indicated.

By using granular surfaced processing tackle plates and with secondary cover **82** in place, asbestos dry pulp may be more readily refined and in greater degree to its constituent fibers in a loose fluffy condition than is possible by any conventional means, such as wet beating.

Wet beating tends to destroy fiber length, and in the illustrated instance, would degrade the asbestos stock to the point where knots would develop. Contrariwise, by this invention, the asbestos strands are opened in a manner distinguishable from conventional wet beating or dry carding techniques and without the employment of the carding clothing covered rolls or other carding covered surfaces.

With respect to separately-refined asbestos fibers, a problem exists in the difficulty in obtaining homogeneous blendings with other fibers either in the wet or dry state, which problem is solved herewith in that the asbestos material may be thoroughly blended. Composite mixtures, in the form of packs of alternated sheets of unlike materials, are charged endwise into the magazines and withdrawn therefrom to engage the rotatable abrading component **42**. The endwise arrangement allows the constituent fibers to be drawn out proportionally in the case of each of the unlike materials according to the composition of the pack makeup or charge. This assures a homogeneous dispersion of the unlike fibers.

Such dispersion having been established within a composite mixture, asbestos fibers may then subsequently be refined further and more extensively than now can be done alone. This is for the reason that, when further processed after blending, for example with fibers such as cotton linters, the linters act as a matrix to allow the asbestos fibers to be further subdivided into their constituent strands and without knotting, portions of the asbestos strands adhering to the linter fibers.

While pure asbestos fibers may be effectively reduced to their constituent strands with apparatus such as is exemplified in Patent No. 3,227,606, wherewith an extruded mass is subjected to engagement with an abrading surface, such abrasion may be more effective if as herein, the extruded mass is first brought to an air-dry state and is then abraded. Furthermore, where pure asbestos material is so processed, there still remains the vexing problem. Also, asbestos fibers may be more extensively subdivided into their constituent fiber strands by means of the apparatus hereof.

While some fibrous materials, such as asbestos, may be more extensively refined in the dry state, the dry refined fibers, due to their light, bulky and fluffy condition, do not readily go into liquid suspension. To overcome such problem, this apparatus may be readily adapted to alter such physical characteristics by substituting for intake **80**, as shown in FIG. 1B and FIG. 5, a secondary cover plate **82** having a small opening therethrough for receiving a liquid admitting conduit **84** terminating in a spray nozzle head **86** located centrally of the apparatus in the plane of the vanes with a plurality of spray jets arranged in a 360° circle and directed in a nearly horizontal radial plane more particularly along the inside wall of lower disc component **52** so as to wet the abraded fibers and thereby to form a liquid slurry. Such wetting action may be accelerated by the employment of appropriate wetting agents in the liquid spray projected through said jets.

While the apparatus is shown as having a multiplicity of magazines, it may employ a single magazine as when employed for continuous operation as a secondary component of apparatus such as previously referred to.

To facilitate employment as a secondary component of apparatus such as exemplified in Patent No. 3,227,606, or other arrangements, the magazines may be tilted at angles relative to the cover, preferably inclining rearwardly with respect to the direction of rotation, for receiving the extruded material directly from said related apparatus.

It is further to be stated that in processing various types of materials, the abrading elements may be of the metallurgical furnace bonded metallic carbide granular surfaced type or may be of the kiln vitrified ceramic bonded type employing silicon carbide or alumina oxide granules offering contoured and serrated granular surfaces, all as may be best suited for the particular materials being processed.

Cover **26** and hence the magazines may be so arranged as to conform to and provide space for the utilization of such vitrified bonded ceramic granular bodied abrading members and the adjustment of the clearances therebetween for the full realization of the objectives of the invention.

Some materials of a proteinaceous nature, such as hides and leather, defiber more effectively with metallurgically bonded metallic carbide granular surfaced abrading members.

On the other hand, cellulosic materials, such as wood chips, shavings, bark, textile wastes, cut fabrics and rags, may be more advantageously defibered with the ceramic type of granular bodied elements which may be prepared according to the teachings of my copending applications Ser. No. 93,272 filed Mar. 3, 1961 and Ser. No. 473,115 filed July 19, 1965, and reinforced and mounted as exemplified in my Patents No. 3,191,876 of June 29, 1965, and No. 3,193,206 of July 6, 1965.

Again on the other hand, certain forms of the above mentioned fibrous materials may be more effectively processed by a perforated type of abrading member such as herein exemplified, all without departing from the spirit and scope of this invention.

To illustrate specifically, hot moist rag stocks as dumped from rotary bleach boilers may be effectively defibered for more effective washing and further bleaching with the ceramic type of tackle which eliminates many of the difficulties encountered with conventional means.

In other words, this invention provides the means for employing the various forms of defibering tackle for the more effective processing of various types of fibers in various forms for the conversion from one physical condition to another more acceptable state, all whereby improved products are more economically obtainable processwise.

Another illustrative example may be cited in the rapid opening-up of compressed and compacted bales and bundles of materials to a loosened acceptable pulp preparatory to subsequent further processing, wherefore, the receiving magazine or magazines may be of any suitable shape and inclination to suit the type of service requirement.

While the apparatus is shown as having a vertical axis, said axis may be tilted to any angle as suits the particular material handling requirement.

It has been found that metallurgically bonded granular abrading members are not practical for defibering moist materials whereas perforated abrading members are well adapted.

Also, it has been found that the ceramic type of granular bodied abrading members are suitable for abrading certain types of dry materials and will satisfactorily defiber moist materials when the defibering action is accompanied with sufficient admitted liquid for slurrying the freed fibers when said liquid is suitably admitted ahead of the abrading action so as to be distributed throughout the porous structure of the uppermost abrading member as to satisfy the abrading action of both opposed abrading members. That is, liquid injected into the porous body of the upper abrading member **240** by any suitable means (not shown) is transmitted to the opposed abrading member or the requirements of both members may be met by the above described central spray head when adjustably directed toward member **240**, (not shown) in central chamber **56**.

In operation, the cover is adjusted so that the openings in the lower ends of the magazines offer a sufficient space through which the separated fibers may be drawn by the air currents through the material in the magazines created by the vanes to keep the working surfaces operatively clean and to draw the separated fibers into the scroll passage and thence to the discharge opening.

In general, a relatively low speed with an abrading surface of coarse granules is preferable to a relatively high speed with an abrading surface of fine granules, as the latter tends to give a high percentage of fines. High speeds also tend to create excessive heat at the working faces.

Substances of a proteinaceous nature, such as leather, defiber more freely and more satisfactorily when in an air-dry condition than when in a moist, wet or saturated condition.

Other substances, such as those of a cellulose nature, also defiber more readily, under certain physical conditions, while in an air-dry state than they do by any wet processing technique. Cotton, for instance, in the grades generally encountered in the paper industry, is usually wet processed, while cotton used in the textile industry is usually dry processed exclusive of dyeing and synthetic production.

Now textile wastes consisting of rejects are more readily reclaimed for paper making purposes by the dry defibering procedure here exemplified than is possible by any of the conventional techniques.

Likewise as to synthetic fibers which have a tendency to form into large lumps and wads within the beater, all of which is very troublesome, much more so than in the case of cotton and other natural cellulose materials. By the technique of holding same in fixed position as here exemplified, such problems are avoided.

Conventional beaters are not adequate for handling the tangled and knotted wads and snarled masses or partially prepared thread, yarns, roving and woven fabric material. Damage to the beaters is a frequent occurrence.

Herein, any and all material of such type is readily reduced to workable fibers merely by depositing the charges into the magazines so as to hold the wads of tangled or woven masses in fixed stationary positions while being defibered. Due to the immovability of the fibrous masses, defibering is possible with improved results.

While the invention teaches improvements in the means and methods of dry defibering fibrous materials while in a dry condition for conveyance by airborne means, it also teaches means for dry defibering dry materials while simultaneously wetting the so-freed fibers within the defibering apparatus for discharge in a slurried condition characterized by immediate fiber dispersion within the slurry, and also the defibering of moist materials to a suitably defiberated condition for air-drying while being conveyed air-bornewise by the drying medium.

Another modified form of construction is shown in FIG. 5 wherein the disc-like stationary granular-surfaced abrading member **240** is of the ceramic type and the disc-like abrading component **242** of the rotor subassembly is also of the ceramic type.

Both the stationary and rotating ceramic type abrading members may be made relatively thin in thickness when reenforced with epoxy resins as exemplified in my Patent No. 3,191,876 and then subsequently bonded to a metallic reenforcing backing plate as exemplified in my Patent No. 3,193,206, as to allow readily demountable abrading members which may be secured to the casing cover in the case of the stationary member and to the rotor in the case of the rotating member, each by any conventional fastening means.

Such reenforcing means offers considerable advantage in the respect that the ceramic abrading members require much less space than otherwise is possible and still withstand excessive loading and abuse and are readily replaceable or changed for abrading members having different abrading characteristics.

The fibrous materials may be either wet or dry defibered to their constituent fibers by merely altering the position of a moisture admitting spray head **290** as desired within the defibering apparatus, a particularly valuable feature in the realization of the full utility value of the ceramic type of abrading members.

While the stationary ceramic abrading member in FIG. 5 is shown as having a simple disc-like shape with the magazine openings for simplicity, said abrading member may be recessed to receive the rotating abrading member as to provide an abrading surface opposed by the rotating abrading member perimeter.

Also the discharge scroll may be depressed as required for discharging the slurried fibers.

Materials such as tanned and untanned hides, leather, and similar fibrous protein materials, in the form of scraps, trimmings or otherwise are served herewith, being reduced to a pulp of substantially individualized fibers and so conditioned that same may be subsequently fabricated to molded or sheet or web form.

The fibrous structures of green hides lack strength and durability. By chemical means and techniques, familiar to the tanning industry, the hides are transformed into leather having strength, durability and long life.

Either before or after any or all of the various usual treatments, commonly employed prior to tanning operations, the raw green or limed hide material is subjected to dehydration by sublimation. By such, the moisture in the material is first crystallized and removed by sublimation. Following dehydration, the hide material is defibered by pressing the material against the coarse granular surface and by effecting a relative movement between the materal and the surface while maintaining the pressure.

By the procedure herein taught, the fibers of the mass are abraded from the material and are collected as a wet or dry mass of fibers which may then be dispersed in tanning liquors whereby strength and durability characteristics are imparted to the fibers. The tanning liquors are then removed from the fibers, and the fibers may be washed, all prior to the fabrication into moldings or into sheet or web form.

By this method, the raw hide material is substantially reduced to individual fibers and the fibers thereafter are "tanned" in an individualized state.

Hides in the so-called limed dehaired condition, when treated with a permanent preservative, such as formaldehyde, as by soaking, and later air or otherwise dried, may herewith be directly defibered without further processing, into a finely defibered state.

Leather may be similarly treated. However, in the case of leather, the material may be made directly subject to

Published by AsbestosClaims.Law
asbestosclaims.law/library/23176/5

the described defibering attrition. The individualized leather fibers, having been previously tanned, are directly dispersed in a water or other liquid carrier to which a suitable wetting or dispersing agent is added. The dispersing liquid is then pressed or otherwise partially or entirely removed, as desired, prior to fabrication of the fibers into moldings or into sheet or web form.

The method of the invention is thus particularly applicable for animal hides. Other fibrous animal products, such as muscular material, may be similarly processed.

The method may be recited otherwise as comprising extracting moisture by sublimation by which the normal natural uncured moisture content has been first crystallized and removed by sublimation, using known techniques, is defibered by causing the dehydrated material to be pressed against a coarse granular defibering surface by effecting a relative movement between the material and the defibering surface, simultaneously maintaining an air induced pressure on the material causing air infiltration through said material and over the coarse granular defibering surface and effecting subsequent movement of the freed fibers from the sub-atmospheric pressure condition created at a ported defibering member for subsequent further processing with tanning and fiber preservative liquors and other solutions preparatory for subsequent blending and formation into web, sheet, molded and other forms of finished products.

I claim:

1. The method of defibering fibrous materials in a dry state comprising, the charging of the materials into a plurality of off-center radially disposed material confining and feeding magazines, generally of a type having a continuity of outlets common to said plurality of magazines in the form of a unitary stationary granular surfaced rotor opposed fiber abrading surface, adjustably spaced from the opposing coarse jagged granular surfaced material defibering element part of an air flow impelling open center ported type rotating assembly, by which said material is caused to be pressed against the rotor defibering part, on the effective rotation of said rotor assembly, while simultaneously directing air currents drawn through the material confining-feeding magazines, over the granular surfaces as to convey the fibers freed from the material, through the center port opening of said rotating assembly, by the action of the air impelling vaned part of said rotating assembly, by which the airborne fibers are transported to the collecting circumventus type scroll to a discharge opening provided therefor.

2. The method as set forth in claim **1**, in which the air borne fibers after being conveyed through the central port opening in the rotor assembly, are subjected to a liquid shower to form a fiber slurry flow from the scroll discharge outlet.

3. The method as set forth in claim **2**, the fibrous material being limed untanned hides comprising the steps of first dehydrating the hides by crystallization and sublimation, defibering same while still in the so-dehydrated condition, the slurry forming liquid being composed of tanning liquors.

4. In a method as set forth in claim **1**, for the difibering of various types of fibrous materials of inorganic origin such as asbestos and other mineral derivative substances or synthesized compositions thereof, and materials of organic origin such as those of a cellulosic and proteinaceous nature, all in a dry state in a varied selected combination therefrom comprising, the proportioning of said selected types to a predetermined ratio in separate sheeted or mat form, rolling said selected sheets or mats into a laminated roll suitable for charging into the material receiving-confining magazines, creating a partial vacuum within a casing for maintaining a continuous air flow stream through said magazines, thereby causing a pressing effect on the magazine charge against the rotating granular surface, with an air stream that conveys the freed fibers from between the opposed stationary and rotating granular surfaces through a center port opening of the rotating assembly, simultaneously blending and impelling the fibers by air impelling partial vacuum maintaining vanes in the transport of the scroll collected fibers in the discharge opening provided therefor against normal atmospheric conditions for fiber collecting purposes.

5. A method as set forth in claim **4**, the granular surfaced stationary and rotating defibering surfaced element parts being of a porous ceramic vitrified composition.

References Cited

UNITED STATES PATENTS

1,668,446	5/1928	Anderson	241—3
1,984,869	12/1934	Farley	241—28 X
2,035,994	3/1936	Sutherland	241—28 X
2,717,195	9/1955	Armstrong	241—28 X
845,721	2/1907	Sovereign	241—60 X

GERALD A. DOST, *Primary Examiner.*

U.S. Cl. X.R.

241—55, 60