

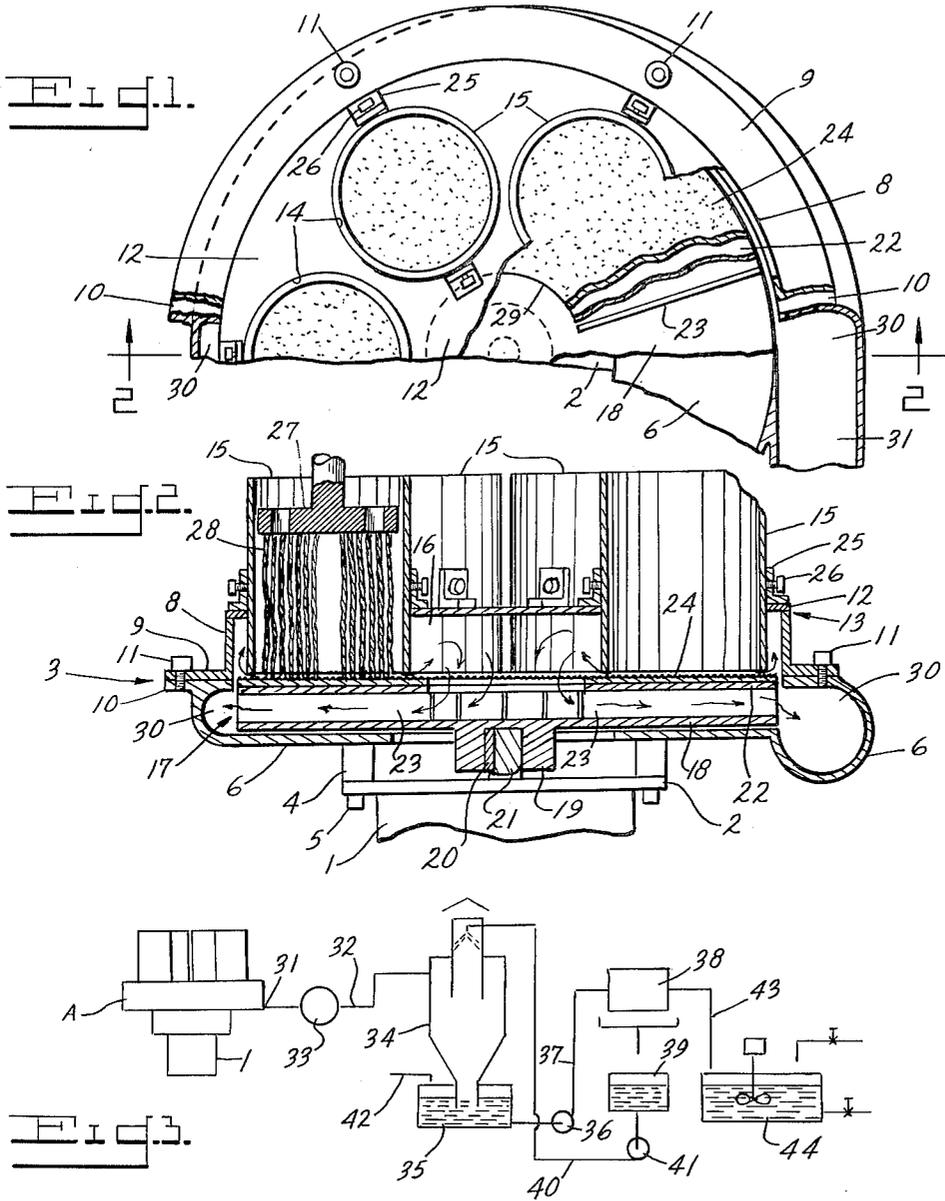
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H. BIDWELL

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APPARATUS FOR DRY DEFIBERING OF FIBROUS MATERIALS

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INVENTOR.  
*Howard Bidwell*  
BY *Chapin & Neal*  
*Attorneys*

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APPARATUS FOR DRY DEFIBERING OF  
FIBROUS MATERIALS

Howard Bidwell, Granby, Mass., assignor of one-half to

Rachel Bidwell, Granby, Mass.

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1 Claim. (Cl. 241—55)

This invention relates to an apparatus for defibering fibrous material, in a dry state, including such materials as untanned hides, leather, and similar fibrous protein materials, either in the form of scraps, trimmings or otherwise.

It is the principal object of the invention to reduce such materials to a pulp of substantially individualized fibres which may be subsequently fabricated to molded form, board, sheets or webs, by conventional molding procedures or to sheet and web form by techniques such as are used in making paper.

A further object is to provide ways and means of defibering such materials, and conditioning the fibres for the formation of a pulp product.

Other and further objects will be made apparent in the following specification and claim.

The fibrous structure of green hide lacks strength and durability, and by chemical means and techniques familiar to the tanning industry the hides are transformed into leather having strength, durability and long life.

In accordance with the present invention the raw hide material is subjected, either before or after any or all of the various usual treatments commonly employed prior to tanning operations, to dehydration by sublimations by which the moisture in the material is first crystallized and removed by sublimation, using known techniques. Following such dehydration the hide material is defibered by pressing the material against a coarse granular surface and effecting relative movement between the material and such surface while maintaining the pressure. By this procedure the fibres of the material are abraded from the material and collected, in any suitable manner, as a dry mass of fibres. The fibres are then dispersed in tanning liquors of conventional character whereby the strength and durability characteristic of leather are imparted to the fibres. The tanning liquors are pressed or otherwise removed in whole or in part from the fibres, and the fibres washed, as and if found desirable, prior to the fabrication of the fibres into moldings or into sheet or web form.

By the method above described the raw hide material is reduced substantially to individual fibres and the fibres thereafter "tanned" in an individualized state.

It has been found that hides in the so-called limed de-haired condition, when treated with a permanent preservative such as formaldehyde and/or similar preservatives by soaking in solution, and later air or otherwise dried, may be defibered directly without further processing, into a finely defibered state, by applying the hide to a coarse granular surface in relative motion.

Leather material may be similarly treated. However, in the case of leather the material may be directly subject to the described defibering attrition. The individualized leather fibres, having previously been tanned, are directly dispersed in a water or other suitable liquid carrier, to which a suitable wetting or dispersing agent has been added. The dispersing liquid is then pressed or otherwise removed in whole or in part as desired or found desirable prior to fabrication of the fibres into moldings or into sheet or web form.

While the method has been particularly described with respect to animal hides, and it is particularly applicable to such materials, it will be understood that other fibrous

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animal products such for example as muscular material, may be similarly processed.

The accompanying drawing discloses one embodiment of means for carrying out the defibering steps of the methods of the invention.

In the drawing:

FIG. 1 is a fragmentary plan view, parts broken away, of apparatus for carrying out the defibering of fibrous animal material in accordance with the invention;

FIG. 2 is a sectional view substantially on line 2—2 of FIG. 1; and

FIG. 3 is a diagrammatic view illustrating certain steps in the method.

Referring to the drawings an electric motor is generally indicated at 1, the casing of which includes a cap plate 2. A housing generally indicated at 3 is mounted on circumferentially spaced lugs 4 secured to plate 2 as by cap screws 5. Housing 3 comprises an annular lower member 6, welded or otherwise secured along its lower edge portion to the lugs 4 as indicated at 7. The upper portion of housing 3 comprises an annular wall member 8 provided with an outwardly extending flange 9, which is secured to a mating flange 10, formed on lower housing member 6, as by cap screws 11. A disc 12 is welded at its edges to the upper edge of wall member 8 as indicated at 13.

Disc 12 is provided with a plurality of circular openings 14 in each of which is mounted a cylindrical magazine chamber 15 which is open at each end. The lower ends of the magazines 15 extend downwardly into the chamber 16, formed by the described housing members, and into close proximity to the upper surface of a rotatable member, generally indicated at 17. Member 17 comprises a disc 18, provided with a hub 19 which is splined at 20 to the driving shaft 21 of motor 1, and an annular member 22 which is concentrically spaced from and secured to disc 18 by fan forming vanes 23.

Annular member 22 carries on its upper surface a granular surfaced member 24. Member 24 is secured in any suitable manner to members 23 and may be formed as a thin disc made up of coarse irregular jagged granules of alumina oxide, silicon carbide, or other hard material, bonded together by any suitable bonding material such as is used in making abrasive wheels or it may comprise a sheet of metal or other material coated with such hard abrasive granules.

Preferably the cylindrical magazines are adjustably mounted in housing member 12, as by angle brackets 25, welded to member 12, and provided with set screws 26 threaded through the brackets 25 for tightened engagement with the outer surface of the magazines, whereby the spacing of the ends of the magazines from the granular surface of member 24 may be adjusted.

The contents of the magazines are pressed against the granular surface of member 24 by any suitable means, such as perforated removable weighted members, one of which is indicated at 27, slidably positioned in the magazines to rest on the contents of the magazines after the latter are filled, the degree of pressure exerted on the material being adjusted by selection of suitable weights for members 27. Advantageously when whole green or tanned hides are to be defibered they are rolled up and the roll inserted in the magazines on end as indicated at 28 in FIG. 2. Upon rotation of member 17 by the motor air is drawn through the magazines into chamber 16, and through the central opening 29 in the annular member 22 by the action of fan blades 23 and discharged by the latter to scroll passage 30 formed in housing member 6 and which increases in diameter to its discharge end 31.

In operation the magazines are adjusted in the open-

ings 14 so that their lower ends clear the working surface of member 24 and provide a sufficient space through which the separated fibres are drawn by the air current through the material in the magazines created by the fan elements of member 17 to keep the working surface of member 24 operatively clean and draw the separated fibres through chamber 16, opening 29, member 17, and scrooll passage 30 to discharge opening 31.

In general a relatively low speed with an abrading surface of coarse granules is preferable to high speeds and relatively fine granules, as the latter tends to give a high percentage of fines. High speeds also tend to the creation of excessive heat at the working face of member 24.

It may be found desirable that the speed of member 24 be lowered to the point where member 17 ceases to act as a fan wheel but rather as means for cooling the member 24 in which case a suitable inducer fan 33 (FIG. 3) may be inserted in the discharge line 32 outwardly of the discharge end 31 of the scroll 30 to create sufficient air velocity to transport the separated fibres.

In FIG. 3 a defibering unit such as shown in FIGS. 1 and 2 is diagrammatically indicated at A. Airborne fibres are discharged through the pipe line 32 and inducer 33 to any suitable type of air separator 34 where the fibres are showered with a liquid which in the case of leather fibres may be water and a suitable wetting agent, or in the case of raw hide fibres, suitable tanning liquors, and collected in a tank 35 from which the slurry is pumped by a pump 36 in pipe line 37 to a suitable press 38 which removes the liquid, in whole or in part, from the fibres, the recovered liquid being collected in a tank 39 from which it is returned through pipe line 40 by a pump 41 to the air separator 34 for reuse. Made up liquid may be supplied to tank 35 as at 42 or to any other suitable point in the system.

From press 38 the moist fibres are discharged through a pipe line 43 to a storage receptacle or directly to further processing devices as desired.

While the apparatus of the present invention has been described in connection with, and is of special utility, in the dry defibering of tanned and untanned hides, it will be understood that it is not limited to such use.

What is claimed is:

In reduction apparatus for defibering dry state fibrous material to a pulp of substantially individualized fibers for subsequent fabrication, the combination of, a housing, a rotatable member disposed within said housing and having a disc and an annular member spaced from and coplanar with each other and with a plurality of fan forming vanes disposed therebetween a granular surfaced member on the upper surface of the annular member, a plurality of fibrous material receiving tubular magazines extending into said housing and each having an opening at its inner end substantially adjacent said granular surfaced member, said housing being provided with a discharge opening, means for pressing the fibrous material within each of said magazines into engagement with said granular surfaced member, drive means for moving said rotatable member relative to said magazines for freeing fibers from the bodies of fibrous material and for inducing an air flow by means of the vanes capable of drawing the freed fibers away from said rotatable member and expelling the freed fibers through the discharge opening of said housing.

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J. SPENCER OVERHOLSER, *Primary Examiner.*

ABRAHAM H. WINKELSTEIN, *Examiner.*