

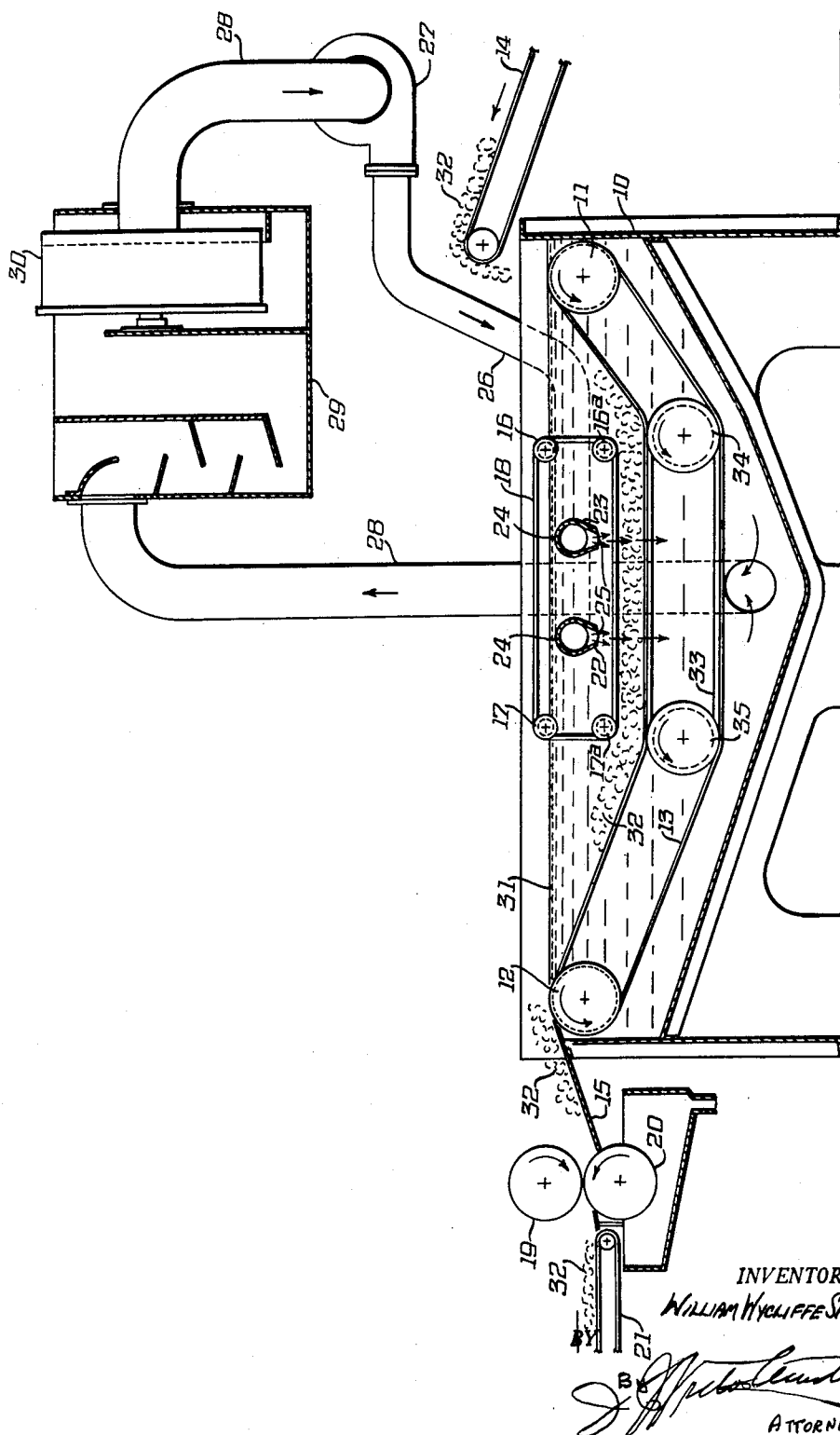
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W. W. SPOONER

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APPARATUS FOR WASHING LOOSE WOOL

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APPARATUS FOR WASHING LOOSE WOOL

William Wycliffe Spooner, Ilkley, England

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2 Claims. (Cl. 68—158)

The present invention relates to the washing of loose wool.

Loose wool is usually washed by passing it through a succession of tanks containing washing liquors.

According to the present invention loose wool is washed by conveying it in a layer along a given path through a liquor bath and projecting onto the wool whilst travelling in said path, relatively long narrow jets of liquid such as water or washing liquor, extending transversely of the path of travel of the wool, preferably from above to below.

The method of the present invention may be used either for the main operation, or in an initial washing operation in which the loose wool is first washed by projecting jets of water on to the wool so as mechanically to flush away some of the matter to be removed and is thereafter washed by a washing liquor containing soap, alkali or other suitable washing medium. The washing liquor may also be projected onto the wool in a similar manner.

Preferably the wool is flushed with liquid at relatively high pressure so as to force the liquid through the wool and thereby to remove some of the grease and much of the dust and other matter which adheres to the wool.

I have found that by flushing water through the wool a substantial amount of the grease and other matter are removed and that moreover the wool is brought into a lofty condition appropriate for further treatment by washing liquors so that the washing with the liquor is more effective and more easily carried out.

The degree of cleaning that can be accomplished by water flushing depends upon the nature of the wool but in some cases as much as half of the grease can be removed and usually more than half of the dust can be removed.

In carrying out the method of the present invention the wool is preferably submerged in liquid and liquid is pumped through the wool from nozzles the outlets of which are also preferably submerged and arranged so as to discharge the liquid downwards through the wool from above.

The apparatus of the present invention may consist of a reticulate conveyor for supporting the wool and conveying it in a layer along a given path in a liquid bath and one or more slot-like nozzles extending transversely of the conveyor for projecting streams of liquid onto the wool from above said path whilst travelling in said path. A second reticulate conveyor may be arranged above the first or main conveyor in order to keep the wool on the lower conveyor whilst it is being conveyed through the tank. If desired a single nozzle may extend completely across the conveyor or if desired two, three or more of such nozzles may be provided each extending completely across the conveyor and spaced longitudinally from one another along the conveyor.

The reticulate conveyors may be formed of wire mesh

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or other suitable material capable of allowing liquid to pass therethrough. The main reticulate conveyor should be sufficiently strong to withstand the impact of the jets of liquid on the wool and yet sufficiently open to permit the passage of liquid. This may be conveniently achieved by providing the main reticulate conveyor of light construction and by providing an additional third short reticulate conveyor of heavy construction below or inside the main reticulate conveyor in the region of impact of the jets of liquid. The main reticulate conveyor, being lightly woven, beneficially acts as a filter to prevent the wool being forced through the larger meshes of the third reticulate conveyor which is a more open weave. At the discharge end of the tank a relatively short rising conveyor can take the wool from the reticulate conveyor and convey it over the end of the tank and may be arranged to deliver it to a similar reticulate conveyor if a subsequent washing operation is required.

The nozzles are preferably of convergent form and formed as transverse slits in a pressure chamber which may consist of a conduit of downwardly converging or pear shaped cross section with a longitudinal opening or slit along the lower side thereof. Alternatively a number of nozzles may extend from parallel slits in a pressure chest arranged above the conveyors.

If desired a vacuum box may be arranged beneath the upper run of the conveyor to assist in drawing the water or washing liquor through the wool.

The invention will be further described by way of example with reference to the accompanying drawing which is a part sectional elevation of one form of apparatus for carrying the invention into effect.

A tank 10 suitable for containing liquid such as water or a washing liquor is provided with rollers 11, 12 supporting and driving a main layer conveyor 13 which is adapted to receive loose wool from a feeder 14 and convey it through the tank 10 on to a spill-over 15. The conveyor is preferably a reticulate conveyor and may be formed of wire mesh or other suitable material capable of allowing liquor to pass therethrough. Rollers 16, 17 support and drive a second conveyor 18 the lower run of which is resiliently urged more or less parallel to but vertically spaced from conveyor 13 by dancing rollers 16a and 17a. At the periphery end the wool may be passed through squeeze rolls 19, 20 and delivered onto any suitable means such as a further conveyor 21.

A third reticulate conveyor 33 is supported and driven by rollers 34, 35 so that its upper run is beneath the upper run of the main reticulate conveyor 13 in the region of nozzles 22 and 23.

The nozzles 22, 23 are disposed above the path of the loose wool and thus may be conveniently disposed inside the second conveyor 18. The nozzles are preferably of convergent form and may each consist of a conduit 24 of downwardly convergent or pear shaped cross section with a longitudinal opening or slit 25 along the lower side thereof. Alternatively a number of nozzles may be formed as a series of parallel slits in a pressure chest. In the arrangement shown the nozzles 22, 23 are fed by a common header pipe 26 running along the side of the tank 10 and connected to the outlet of a pump 27, whilst the inlet of the pump is connected to a suction pipe 28 which communicates with the inside of the tank 10 at a low level. A settling tank 29 and a rotary filter 30 may be included in the suction pipe 28. The pump 27 may be a centrifugal pump driven by any suitable prime mover such as an electric motor.

In operation loose wool, which is designated diagrammatically by the reference numeral 32, is received from feeder 14 onto the upper part of main reticulate con-

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veyor 13 and is conveyed beneath the level of liquid in tank 10 which level is indicated at 31.

The upper run of conveyor 13 carrying the loose wool 32 comes into contact with the upper run of the third conveyor 33 and passes therewith below the second conveyor 18 thus conveying the loose wool through the nip between the second conveyor 18 and the third conveyor 33. The wool is brought into the field of the nozzles 22, 23 and liquid is directed at high velocity onto and through the wool which is subsequently raised by main reticulate conveyor 13 and delivered to spill-over 15 whence it passes between squeeze rolls 19, 20 and is delivered on to conveyor 21.

It will be noted that the outlets of the nozzles 22, 23 are below the surface of the liquid in the tank 10. It is preferable that the outlets are submerged so as to obtain jets of liquid at high velocity. If the jets were not submerged a proportion of the velocity of the jet would be diffused by striking the surface of the liquor, therefore giving rise to turbulence and inefficiency. In the arrangement shown the streams of liquid from the nozzles 22, 23 must pass through the second conveyor 18 before meeting the loose wool and it is preferable that the parts of the conveyor 18 through which the jets travel should be wet and not dry at the time of impact of the jets.

The main reticulate conveyor 13 may be lightly woven and may be for example twelve mesh twenty-four gauge weave since whilst this of itself may be insufficient to withstand the force of the jets of liquid on the wool it is supported in the region of impact of the jets by the third conveyor 33 which may be much stronger and of more open mesh.

Means such as a reciprocated rake with downwardly inclined prongs may be provided in the outlet region of the tank, that is to say, in the region between the rollers 12 and 17, so as to push towards the spill-over 15 any wool which may be floating on top of the liquid.

The following examples will serve to illustrate the results which may be obtained by using the method of the present invention.

1. A typical crossbred wool was used which was expected to yield approximately 60% wool and 40% grease and dirt. This wool was passed beneath the nozzles supplied with water alone at a gauge pressure of approximately 10 pounds per square inch. Of the 40% grease and dirt one half of this was washed out with jets of water alone. Of the grease and dirt washed out, less than 50% was found to be dirt and thus a small amount of grease, that is to say lanoline, was washed out.

2. A merino wool, which was expected to have about 50% wool and 50% grease and dirt was used. On treating this similarly to that above, 16% of the total grease and dirt was washed out with water alone.

In neither of these examples was it necessary to use any soap. After a preliminary washing with water the loose wool may of course be treated to a second washing with water or to a washing with a washing liquor such as one containing soap alkali or other suitable washing medium.

I claim:

1. Apparatus for washing loose wool comprising a bath adapted to contain a liquid, an endless reticulate conveyor including an upper run and a lower run both of which lie at least partly below the normal level of the liquid in the bath, one portion of the upper run of the conveyor being inclined downwardly in the direction of travel of the conveyor and another portion of the upper run of the conveyor being inclined upwardly in the direction of travel thereof, a second endless reticulate con-

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veyor located above the first mentioned conveyor so that its lower run is at least partly beneath said liquid level and lies sufficiently close to at least a portion of the length of the upper run of the first mentioned conveyor to confine a layer of wool therebetween, a third endless reticulate conveyor substantially shorter than the first mentioned conveyor and lying between the upper and lower run thereof, the upper run of said third conveyor serving as a support for the upper run of said first mentioned conveyor, at least one flushing nozzle having a slot-like outlet located below said liquid level and spaced from said conveyors and positioned to project a submerged jet of liquid downwardly towards and through the layer of wool confined between said first and second mentioned conveyors, said slot-like outlet extending in a direction which includes at least a substantial component of direction across said conveyors perpendicular to the direction of travel thereof.

2. Apparatus for washing loose wool comprising a bath adapted to contain a liquid, an endless reticulate conveyor including an upper run and a lower run both of which lie substantially wholly below the normal level of the liquid in the bath, the upper run having in the direction of travel of the conveyor in succession a portion inclined downwardly in the direction of travel, an intermediate substantially horizontal portion and another portion inclined upwardly in the direction of travel of the conveyor, a second endless reticulate conveyor located above the substantially horizontal intermediate portion of the upper run of the first conveyor with its lower run beneath said liquid level and sufficiently close to the upper run of the first mentioned conveyor to confine a layer of wool therebetween, a third endless reticulate conveyor of heavier construction than the first mentioned conveyor and located between the upper and lower runs of the first mentioned conveyor and extending over the said intermediate portion of the first mentioned conveyor to assist in keeping said intermediate portion substantially horizontal, and at least one nozzle having a slot-like outlet located below said liquid level and positioned to project a submerged jet of liquid downwardly towards and through the layer of wool confined between said first and second mentioned conveyors, said slot-like outlet extending in a direction which includes at least a substantial component of direction across said conveyors perpendicular to the direction of travel thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

455,059	Sargent	June 30, 1891
517,566	Eyre et al.	Apr. 3, 1894
899,339	Shuman	Sept. 22, 1908
1,097,091	Gray	May 19, 1914
1,145,795	Randall	July 6, 1915
1,432,318	Brandwood et al.	Oct. 17, 1922
1,527,369	Meyer	Feb. 24, 1925
1,737,149	Cohoe	Nov. 26, 1929
2,021,616	Stuart	Nov. 19, 1935
2,064,512	Wilson	Dec. 15, 1936
2,069,311	Hilliard	Feb. 2, 1937
2,080,635	Schramek	May 18, 1937
2,199,233	Williams	Apr. 30, 1940
2,442,012	Leonard	May 25, 1948

FOREIGN PATENTS

1703/26	Australia	May 5, 1926
27,290	Germany	Nov. 8, 1883
147,766	Switzerland	Sept. 1, 1931
233,530	Switzerland	Nov. 1, 1944