March 6, 1956 A. G. BORCK 2,737,435

METHOD OF WASHING RAW WOOL WITH ORGANIC SOLVENTS

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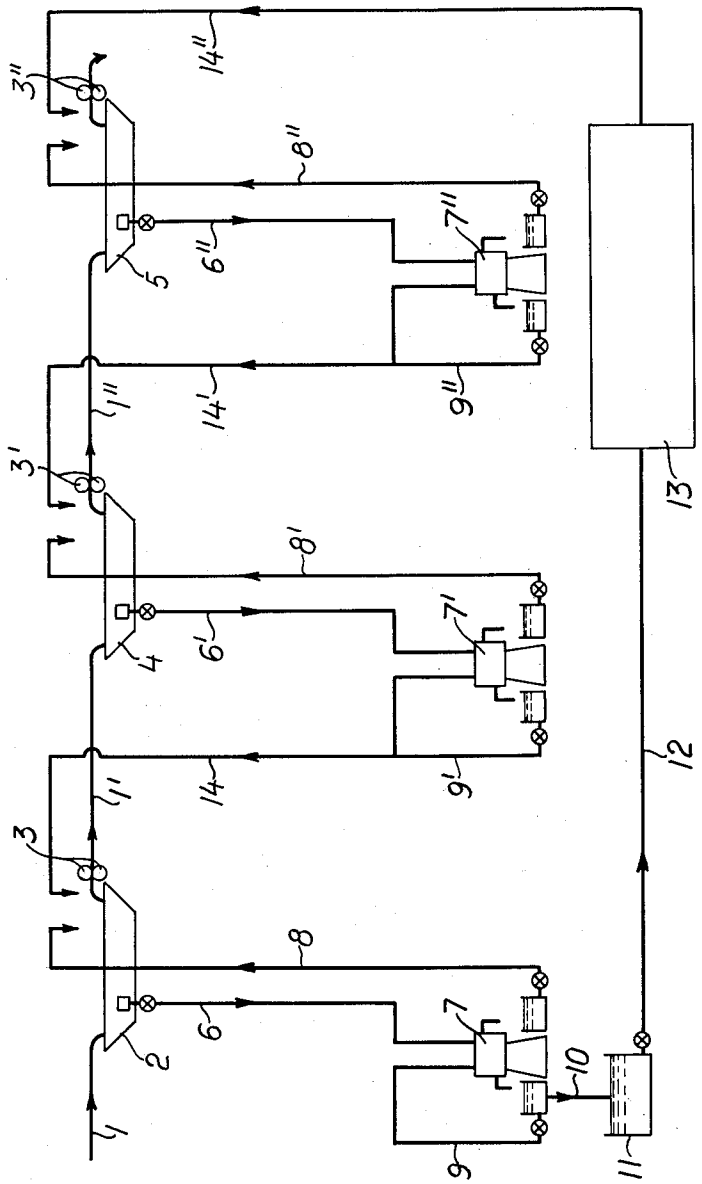


Fig. 1

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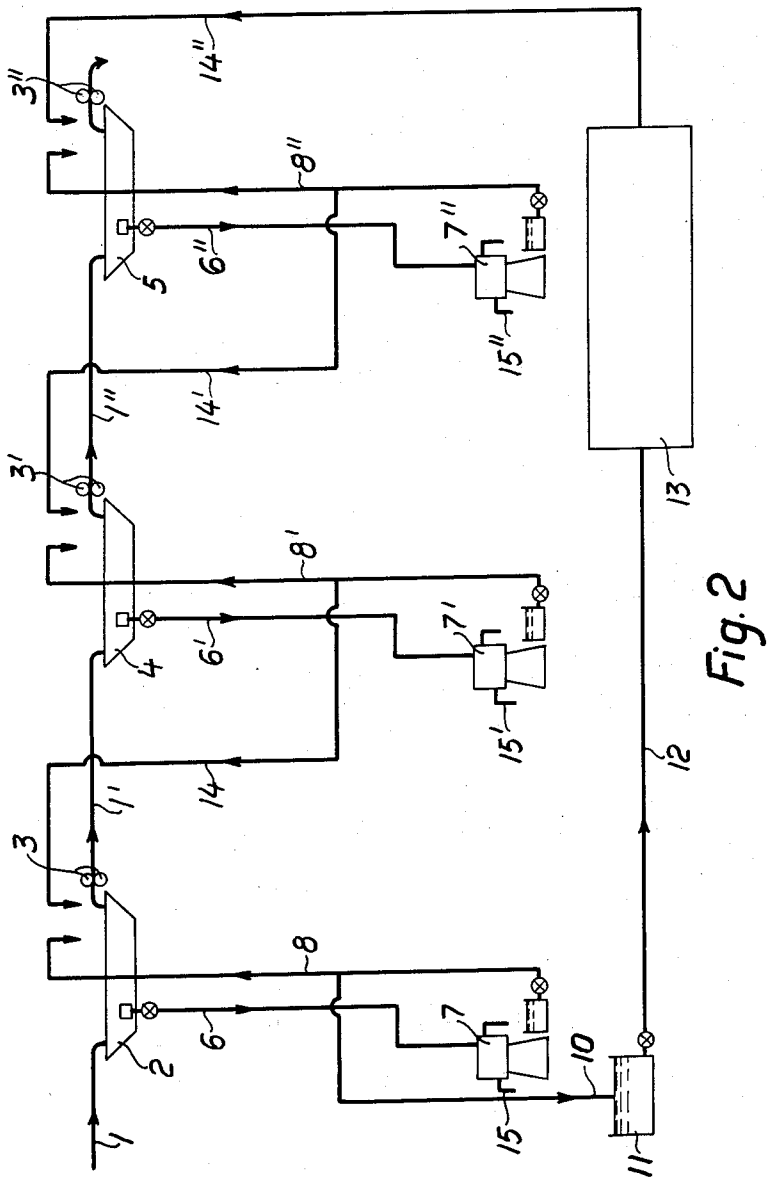


Fig. 2

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METHOD OF WASHING RAW WOOL WITH ORGANIC SOLVENTS

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5 Claims. (Cl. 8—156)

It is known to wash raw wool by a water solution of soap in a series of washing vats, whereby the sludge (dirt) is removed from each vat separately and led off. The washed fat from the wool is also led off from each washing vat. This is done by the washing water, in which the fat is held in suspension, being discharged from each washing vat and treated for recovery of the fat in an apparatus arranged separately for each washing vat. Neither the fat nor the dirt can be taken out in a pure form but is taken out together with the washing liquid. This means a loss of washing liquid at several points in the system, as well as great expense for fat recovery and removal of dirt from relatively large quantities of washing water.

It is also known to wash raw wool with kerosene in a large cistern, the washing process being repeated several times while replacing the washing agent in the cistern. This is a discontinuous process and, in consequence, is very expensive.

The present invention relates to an improved method of washing raw wool by using organic solvents as a washing agent. This method is characterized principally in that the wool is continuously passed through a series of washing vats arranged one after the other and that the washing agent, reckoning in the direction of motion of the wool, is continuously led counter-currently to the wool from each washing vat to the vat next proceeding it, and from the first vat back to the last one in the mentioned series, the washing agent when passing from at least one vat to another being conducted through a purifying device from which part of the washing agent is returned to the same vat from which it was discharged, and part of it is passed to the vat next preceding it, the latter part from the first vat being passed to the last vat. These partial flows of washing agent are in a purer condition, as regards the content of sludge and/or wool grease, than the washing agent in the vat to which the partial flow in question is returned. To the last washing vat, however, it is advantageous to feed a supply of fresh washing agent only, in order to bring about a final washing of the wool discharging from that vat. Both the sludge content and the content of dissolved wool grease in the washing agent rises, in this way, in the direction from the last to the first washing vat. The sludge consists here of a mixture of dirt (e. g. grains of sand) and solid wool grease particles. An important advantage of this method is that the washing agent can be discharged at a single point in the washing system in order to be liberated from wool grease and dirt, that is, from the first washing vat where the washing agent has the greatest content of dirt and wool grease. Thus, the recovery of both fat and washing agent will be more economical than in the methods known previously.

The invention will now be described in more detail in the following, reference being made to the accompanying drawings in which:

Fig. 1 is a schematic view of a plant for use in practicing the new method, and

Fig. 2 is a similar view of another form of the plant.

Referring to Fig. 1, raw wool is fed by a conveyor **1** into a washing vat **2**, passes out of this vat between cylinders or squeeze rolls **3** and then proceeds to the next washing vat **4**, finally leaving the system when being discharged from a third vat **5**. As a washing agent, kerosene or other hydrocarbons with a low content of aromatic compounds can be used to advantage.

Through a pipe **6**, a sludgy washing agent is discharged from the first vat **2** and fed into a nozzle centrifuge **7**, that is, a centrifuge of the type having nozzles in the outer or peripheral wall of the bowl for discharging sludge separated in the bowl. Here the washing agent is divided into a component with a low percentage of sludge (dirt plus solid wool grease) which is returned through a pipe **8** to the same vat **2** where the washing agent thus purified may be sprinkled on the wool leaving the vat, to wash it further. The washing agent component with higher sludge content (dirt plus solid wool grease) obtained in the centrifuge **7** is partly re-circulated through the centrifuge **7** by way of a pipe **9** and is partly discharged via a pipe **10** and passed into a cistern **11** which will contain washing agent with the highest content of dirt and dissolved and solid wool grease occurring in the system. The devices **1'** and **1''**, **3'** and **3''**, and **6'** to **9'** and **6''** to **9''**, associated, respectively, with the vats **4** and **5**, have the same functions as the devices **1**, **3** and **6** to **9** of the vat **2**.

The washing agent in the cistern **11** is passed through a pipe **12** to a purifying plant **13** where the washing agent is heated until all the solid wool grease has been dissolved. Thereupon, the dirt particles are centrifuged out in a centrifugal separator, and the washing agent is then subjected to distilling. In this way, I obtain a substantially pure wool grease, and also a washing agent substantially freed from all the dirt and all the wool grease. The washing agent thus purified is then led, possibly after addition thereto of fresh washing agent to compensate for losses during the washing process, through a pipe **14''** to the washing vat **5**. It may be introduced into vat **5** by sprinkling the wool leaving the vat, so that the wool will be ultimately washed clean by a substantially clean washing agent.

The washing agent component with the higher sludge content obtained in the centrifuge **7''** is conducted via the pipe **9''** and a pipe **14'** to the vat **4** where this washing agent, having a lower content of dissolved wool grease and also a lower content of sludge (dirt plus solid wool grease) than the washing agent in the vat **4** itself, is allowed to spray on the wool leaving the vat **4**, in the same way that the wool from the vat **5** is sprinkled with the washing agent purified by distilling in plant **13**. The washing agent component with the higher sludge content obtained in centrifuge **7'** is passed through pipes **9'** and **14** to the vat **2** where it effects in a similar manner a washing of the wool leaving this vat.

From the preceding, it will be evident that the wool leaving each washing vat is subjected to two spraying operations with the object of washing it, partly by a washing agent re-circulated from the vat and having the same content of dissolved wool grease as, but a lower sludge content than, the washing agent present in the vat, and partly by a washing agent discharged from another vat and having both a lower content of dissolved wool grease and a lower sludge content than the washing agent present in the vat. Thus, a concentration takes place, in the first washing vat **2**, of the dirt and grease contained in the wool.

In the plant according to Fig. 2, in which the details corresponding to those in Fig. 1 have the same reference numbers, all the centrifuges used are self-opening sludge centrifuges, that is, centrifuges having bowls in which

the peripheral outlets for the sludge are automatically opened when a sufficient quantity of sludge has accumulated in the bowl, and are re-closed until another quantity of sludge has accumulated. However, in practice only one or some of the centrifuges need to be self-opening. In principle, the washing system according to Fig. 2 works in the same manner as the system shown in Fig. 1. The only difference is that the sludge separated in the centrifuges 7 to 7'' and discharged through the outlets 15, 15' and 15'', respectively, is treated separately, as by being burned or subjected to recovering operations in respect to its content of wool grease and organic solvent. The washing agent discharged from the different washing vats and subjected to sludge removal operations in the centrifuges 7, 7' and 7'', respectively, is partly re-circulated to the vat from which it was discharged, through the respective pipes 8 to 8'', and partly fed to the preceding vat through the pipes 14 and 14', respectively, this part of the washing agent from the first centrifuge 7 passing through the pipe 10 and purifying plant 13 to the last washing vat 5.

Finally, it may be pointed out that, as compared with the prior methods, the present method can be carried out with small quantities of washing agent in relation to the quantity of wool being washed. According to the invention, a volume of washing agent is preferably used in each washing vat which is at most 5 times as large as the volume of the wool present in the washing vat. Besides the economic advantage of using a small quantity of washing agent, there is the further benefit of the wool being subjected to an efficient through-flow of washing agent. Furthermore, a state of equilibrium or of continuation will rapidly be produced in the washing system, e. g. within approximately an hour as against several days in other known plants. This means that frequent operation interruptions do not involve the same drawback in the present method as in the prior methods.

I claim:

1. In the washing of raw wool by passing the wool continuously through a series of washing zones in sequence, and continuously passing an organic solvent as a washing agent countercurrently to the wool from each washing zone to the zone next preceding it and from the first zone back to the last zone in said series, said first zone and last zone being reckoned in the direction of the wool flow, the improvement which comprises feeding the washing agent to a centrifugal locus in its passage from at least one washing zone to another, other than from said first zone, and separating the agent in said locus into one component rich in sludge and one component poor in sludge, returning at least part of said component poor in sludge to the same zone from which said agent was fed to the centrifugal locus, the component rich in sludge being fed at least in part to a preceding zone in said series, separating the washing agent discharged from said first zone in a second centrifugal locus into a component rich in sludge and a component poor in sludge, returning said last component to said first zone, and purifying the component rich in sludge from said second locus on its way back to the last zone to remove the sludge as well as dissolved wool grease from the agent.

2. The improvement according to claim 1, in which said purifying of the washing agent includes a distilling step.

3. The improvement according to claim 1, in which said purifying of the washing agent includes heating the same to dissolve the wool grease therein, centrifuging the heated agent to remove the dirt therefrom, and then distilling said agent.

4. The improvement according to claim 1, in which the washing agent from each of two zones is fed to a centrifugal locus from which the component poor in sludge is partly returned as defined in claim 8, and comprising also the step of subjecting the wool leaving the preceding one of said last zones to a spraying operation with the returned component poor in sludge and the component rich in sludge obtained from the centrifugal locus to which the agent from the other of said last zones was fed.

5. The improvement according to claim 1, comprising also the step of spraying upon the wool leaving at least one of said zones the component returned thereto which is poor in sludge.

References Cited in the file of this patent

UNITED STATES PATENTS

1,421,664	Brown	July 4, 1922
1,717,439	Duhamel	June 18, 1929
1,717,440	Duhamel	June 18, 1929
1,920,469	Jones	Aug. 1, 1933