To all whom it may concern:

Be it known that we, ROBERT MURTON POOLE, a subject of the King of Great Britain and Ireland, &c., residing at Mount Gambier, in the State of South Australia, Commonwealth of Australia, and HENRY FREEMANTLE DAVIS, a subject of the King of Great Britain and Ireland, &c., residing at Brighton, in the State of Victoria, Commonwealth of Australia, have invented certain new and useful Improvements in Processes of Washing or Scouring Wool; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In wool washing and scouring processes effluent is produced which contains much dirt and animal matter and is either wholly wasted as sewage or the cleaner part of it is utilized for the recovery of lanolin, lubricant, and potassium carbonate.

Such existing wool scouring processes as are known to us are not productive of wool of the high quality and desirable condition attainable by our process.

We regard as of first importance the avoiding of injury of the wool by chemicals during scouring. We keep the staple intact, the fiber and texture unimpaired and remove animal matter so as to obtain a practically perfect scour. Consequently the wool is so scoured as to retain its softness and strength. Natural waviness and luster may be preserved, and the wool can be most satisfactorily dyed and woven. We also recover as by-products fatty matter and potash.

Relatively little manual labor is necessary to conduct our process which is particularly economical as compared with all other processes known to us.

Our invention is suitable for the scouring of not only the cleaner but also the dirtier kinds of wool. The latter should be treated separately by using scouring solution which is stronger than cleaner wool requires.

Our process covers the utilization (for scouring purposes) of hitherto discarded material extracted from wool previously treated; it covers the use of scouring solutions which are superior to any others known to us; and covers other features described in the explanation which follows and subsequently claimed.

We may use varied apparatus, and in drawings herewith diagrammatically show, as an example, one form of apparatus.

In these drawings Figure 1 is a general view of the said apparatus partly in section. Fig. 2 shows portion of Fig. 1 also partly in section and from another point of view. A, B, C, represent a series of vessels such as known forms of bowls or vats, each to contain wool and solution or liquid for scouring and washing it. Each bowl is provided with means to move the wool along while it is being scoured or washed and means to convey it from each vat or bowl to the next also means to press surplus liquid from the wool as it passes from bowl to bowl the said liquid being returned to any bowl or the like found suitable. All such means comprise mechanism of any known suitable form not needing illustration.

The original scouring liquor in vat A or the like will comprise solution of our invention into which enters as scouring proceeds dirt and animal matter from the wool the solution has treated.

Of a series of vats or bowls A represents the vat (or vats) to receive our said solution for scouring. B represents a vat or the like for further scouring the partly scoured wool as by raking or conveying it along in a mild solution of soft soap and water; C indicates a succeeding vat or the like in which the wool from vat B is conveyed along and washed as in clean water.

One form of our solution is characterized by the presence of, to each gallon of water, from about 2 to about 5 ounces of potassium carbonate (the greater the amount of grease or like matter in the wool the larger the proportion of potassium carbonate to make the solution stronger) and of from about 2 to about 5 ounces of sulfate of soda or the like (not predominating over the potassium carbonate) and a relatively small amount of chlorid of soda, or of potassium or of both—for example about one tenth of an ounce of potassium chlorid and about one quarter ounce or more of soda chlorid. The greater the amount of grease or the like in the wool the larger the proportion of the potassium carbonate.
This solution has been arrived at by experiment according to a fact which we enunciate that natural animal constituents in wool (and not simply its potassium carbonate) are of superior efficiency as scouring material. We take natural constituents and add them to hot or other suitable water to form our scouring solution. As therefore the natural constituents of wools vary somewhat so may our constituents be varied. D represents our solution, E wool to be scoured, and F solution containing dirt and animal matter aforesaid.

In each vat B or in vats B, C, or the like the liquid will come to resemble somewhat that accumulating in vat A as it will contain dirt and fatty and other animal matter derived from the wool.

The liquid containing animal matter and dirt which occurs in vat B or in vats B and C is utilisable in the manner to be described as to the effluent from bowl or vat A.

The treatment in all vats may be so mild as to leave oily matter in the wool with a view to the condition of the wool being appropriate to subsequent treatment. The heat of the liquid in the vats and the scouring action makes oily or fatty matter rise therein and it may be skimmed or recovered direct from solution in any vat in known manner.

Outlet as by piping G for effluent containing sludge are provided from vessels A, B, C, each vat having any number of outlets which may be controlled by cocks H.

This effluent will in some cases be thick and dirty, and hitherto such material at bottom or in the like has not been utilized as herein set forth. It is however valuable on account of the animal matter including potash matter in it. It may be moved from the vats by screw conveyers not shown or otherwise and is thus caused to enter a series of evaporators of which two, for example are shown as shallow pans I.

The effluent enters as at M the pans I and therein some fatty matter will rise to the surface and when desired will be skimmed for separate utilization. These pans will be heated in suitable manner as by steam applied as by being admitted as at J to chambers K under the pans the chambers being any suitable outlets L for water of condensation and so forth. We prefer to supply steam as through pipes N from a boiler O, having its furnace P utilized as hereinafter explained, but these are minor features.

The evaporator vessels I have inclined bottoms Q and at suitable times their contents will be agitation or means will be employed to facilitate the discharge of the more or less dense sludge therein.

For example we show rakes R and may use screw conveyers. The evaporator discharge means is shown as being through piping S having cocks T and leading to a receiver U which is a feeder to calcination pans mentioned; or the sludge can be conveyed direct to these pans.

From receiver U feed pipes or the like W extend having outlets X, while Y indicate control cocks.

Thus sludge in suitable quantities is supplied to calcination pans as Z arranged in a series on carriers (as chains 2) and conveyed loaded with sludge to means of drying and ignition to obtain calcination and solid residues which will contain animal matter from the wool and also matter derived from solution by which that wool was treated. The calcined residue is largely carbonate of potash; and more carbonate of potash can be secured thus than need be reused in the scouring of more wool as explained later. To secure advantageous heating and ignition we may provide chambers as at 3, 4, at the sides of furnace P, the loaded pans being conveyed through these chambers.

The heat of combustion of the sludge is found to be considerable, and it is an advantage to utilize it in producing boiler steam assisting fuel Z.

5, 6, indicate sprocket or conveyor wheels to support the pan carrying chains.

Pans at 7 are shown empty, others as at 8 are charged ready to enter furnace chamber entrance 9 which may be relatively small to just admit the loaded pans. 10 shows panned material drying; it burns when carried farther, is calcined as at 11, the combustion leaving a hard residue which may wholly or partly adhere to the pans.

Effluent liquid not used according to the sludge treatment here described (by reason of its being treated as surplusage) is availed of for production of by-products including soft soap; usable in bowl or vat B, about 3 to 6 drams of soft soap to a pound of wool being ordinarily suitable.

The pans leaving the furnace at 13 are emptied as by being caused to enter at 14 a receptacle as 15 containing liquid as cold water, 16 being a feed inlet thereto.

Such of the residue in the pans as does not readily drop out in tank 15 is removed in suitable manner, as by a scraper shown as a rotating metal brush 17. Constituent matter of wool which has been secured, thus enters tank 15 and forms a solution with which we deem it of great importance to employ that solution in the replenishment or regeneration of the scouring liquid in vat A.

One of the advantages of the calcination of the effluent in an open furnace in the manner described, is that the effluent is caused to oxidize and certain undesirable volatile substances are driven off, leaving as a residue only the animal matter which is desirable in treating wool, and of course a certain quantity of dirt.
In order to remove dirt however we usually employ a filter 18 as by passing the solution through the pipe 19. Liquid from vessel 18 is passed as by pump 20 and pipe 21 into a tank 22 having a feed connection 24 into vat A; and there may be another outlet 24 from this tank for any convenient purpose.

If the filtrate obtained is in excess of what is required for further scouring, it may be drawn off as at 20° and evaporated, and its chemical contents may then be otherwise utilized at will.

When replenishing or regenerating solution in vat A we restore to it ingredients it has been deprived of by scouring, or we use the aforesaid filtrate to supply potassium carbonate and other animal matter the filtrate contains, so that the solution in vat A as added to becomes similar to original one but not identical, when the original solution did not contain filtrate secured by treating wool as described. This potassium carbonate and animal matter containing material from the wool itself, has advantages according to our results. We begin scouring wool initially with such liquid in some cases.

It is to be understood that so long as usually discarded animal matter from wool is re-utilized substantially as indicated for scouring the particular form of apparatus used is largely immaterial.

Having described this invention what is claimed by Letters Patent is:

1. The process of scouring wool which consists in subjecting the wool to the action of a solution containing potassium carbonate, sodium sulfate, and sodium chlorid.

2. The process of scouring wool which consists in subjecting the wool to the action of a solution containing potassium carbonate, sodium sulfate, sodium chlorid, and potassium chlorid.

3. The process of scouring wool which consists in subjecting the wool to the action of a solution containing, for each gallon of water, potassium carbonate approximately 2 to 3 ounces, sodium sulfate 2 to 5 ounces, approximately \( \frac{1}{4} \) ounce of potassium chlorid and \( \frac{1}{4} \) ounce of sodium chlorid.

4. The process of scouring wool which consists in subjecting the wool to a solution containing potassium carbonate and sodium sulfate in equal quantities, and sodium chlorid and potassium chlorid in the proportions of approximately \( \frac{1}{4} \) and \( \frac{1}{2} \) respectively.

5. The process of scouring wool which consists in subjecting the wool to a solution containing animal substances obtained from wool scouring.

6. The process of scouring wool, which consists in subjecting the wool to a solution containing calcined animal substances obtained from wool scouring.

In testimony whereof we affix our signatures.

ROBERT MURTON POOLE.
HENRY FREEMANTLE DAVIS.