REMOVAL OF OIL FROM WOOL.

This method of separating oils, fats, and resins, from the solid substances with which they are mechanically combined has been heretofore in use for the purpose of removing the animal oil from wool, and also for the purpose of cleansing and restoring to use those portions of fleeces which have been made unavailable by marking the sheep with tar or other resinous material. It has been employed for supplementing the mechanical process of separating oil from seeds or olives by operating on the solidified residues which are known under the name of oil cake, *marc*, etc. At the International Exposition of 1862, Mr. E. Deiss, of Paris, exhibited specimens of superior oils extracted in this manner from the *marc* of olives. Mr. Payen, in his report on that exposition, has described the process as originally applied successfully to the cleansing of wool by Mr. Moison, of Mouy, Department of the Oise, in France; and as this process illustrates the principle of the operation in other cases, though the details may be different, Dr. Barnard, in his report, gives it in abridged form.

It is to be observed, in the first place, that the case of wool presents a difficulty, which is not encountered when the object in view is only to obtain the oil which the substance operated on happens to contain.

The wool itself is in this case the important material, and the value of the oil separated from it is a trifle of secondary consequence. In the original experiments the point of difficulty in the practical problem was found to be how to expel the bisulphide from the wool after the operation of solution had been completed, without injury to the wool itself. Too great heat, in whatever manner applied, was found to have the effect of hardening the fibers, making them cohere, and giving them a tinge of a yellowish brown color, which was variable in intensity according as the material had been a longer or shorter time in contact with the fatty matters removed. The mere volatilization of the bisulphide was effected without difficulty. It sufficed for this to introduce, into the vessel containing the material to be operated on, either boiling water or steam; but the injurious effects above described invariably followed. Mr. Moison discoveredat length that with proper arrangements a current of air heated to a temperature considerably below that of boiling water, 70° or 80°C=160° to 175° F., would remove the liquid entirely, and leave the fiber of the wool wholly uninjured.

The apparatus employed in conducting this process is shown in the engraving. The wool to subjected to the operation is introduced into a cast iron cylinder, A, surrounded by a jacket into which steam may be conducted when it is necessary to raise the temperature. One hundred kilogrammes, say two hundred and fourteen pounds, of wool are placed in this cylinder at once.

There is within the cylinder a false bottom perforated with numerous holes, with a small free space beneath it. Upon the top of the wool is placed a circular follower or compressor, fitting the interior of the cylinder, and perforated also with holes like the false bottom. Three rods connected with this follower pass through stuffing boxes in the lid, and may be driven downward by means of fixed screw nuts, the rods having screw threads cut upon their prolongations above the cylinder. The object of this arrangement is to compress the wool to a certain extent, since the success of the operation is always most satisfactory when the mass of the material is reduced in advance to about one half its original volume.

The lid is secured air tight by means of bolts and screws, a leaden washer being introduced into the joint. Matters being thus prepared, liquid bisulphide of carbon is thrown into the cylinder beneath the false bottom by means of a forcing pump, C, which draws the liquid from a reservoir, D. This liquid rises through the perforations and completely immerses the confined wool, reaching at length a point above the perforated follower, where it finds a lateral overflow tube. This conducts it into the still or alembic B. Here the bisulphide is volatilized by the heat of steam, which is introduced into the double bottom of the vessel and also into the midst of the liquid mass itself by means of a spiral tube within the alembic, not shown in the figure. When the process is complete and the oil in the alembic is entirely free from the bisulphide, the stopcock beneath permits to withdraw the product. Before this is done, however, steam is introduced into the mass of the impure oil by means of a second spiral tube, which is also not shown, and which is perforated with numerous holes. The design and the effect of this part of the process is to remove the last traces of the solvent.

The vapor of the bisulphide is conducted from the alembic to the refrigerator J, where it is condensed in the spiral L, and is finally returned to the reservoir D.

There is a stopcock in the overflow tube which leads from A to B, through which may be withdrawn at any time a few drops of the liquid passing through the tube. When the specimen thus withdrawn, on evaporation upon glass, leaves no trace of oil or other residuum, the operation of the pump C, may be suspended. For a short distance, this tube is of glass for the purpose of enabling the attendant to observe the color of the passing liquid.

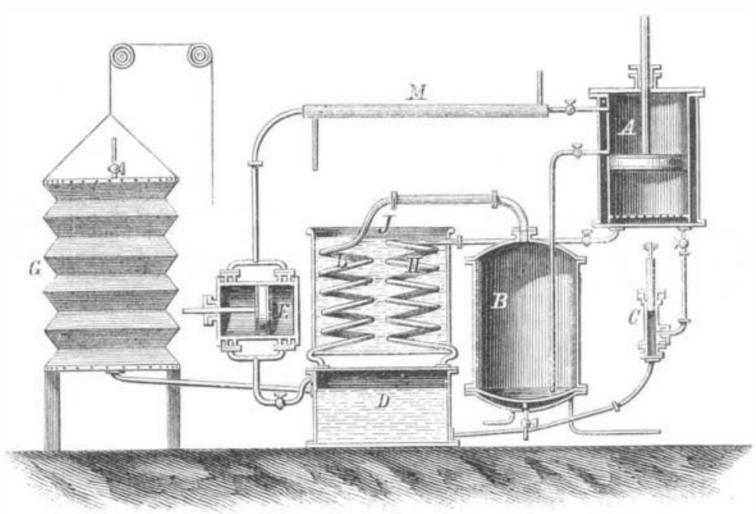
The process of solution being complete, communication with C, is cut off by means of a stopcock, and two other stopcocks are opened. One of these permits the liquid, in A, to descend through the spiral H, to the reservoir D. The other allows air to be introduced into the upper part of A by means of the double acting piston blower, E. The air, as the figure shows, may be drawn from D; but the stop cock beneath E is a three way cock, and it allows the supply to be taken also from the atmosphere. In passing from E to A, the air is conducted through the jacketed tube, M, and steam is introduced into the jacket to heat it to a degree sufficient to complete the volatilization of the bisulphide in A. But the first part of this operation, which consists in the mechanical expulsion of the bulk of the liquid in A, may be conducted without heat. The cock in the tube leading from A to H is a three way cock, as well as that beneath E. At the close of the operation, the air blown through may be discharged into the atmosphere without passing through H. In that case it is conducted, by a long tube not shown, out of the building, in order that any disagreeable odor which may accompany it may not annoy the attendants. The two spiral tubes, H and L, pass out of the refrigerator J, before entering the reservoir D. At these points they are provided with small stopcocks not shown, to permit the examination of the substances passing through them. Into each of these tubes, also, as into the one leading from A to the alembic, is introduced a short glass tube as a part of its length, so that the interior of any one of them may be inspected.

There remains one additional portion of the apparatus to be mentioned, which is the gasometer G. While the process is proceeding without any communication with the atmosphere, the volume of the confined air may vary with the temperature, or with the compression in A, and the volatilization of the bisulphide will also add something to the bulk of the aeriform mass. The gasometer, which may be as represented of the bellows form, or may be the ordinary bell and cistern, will serve to keep the capacity of the apparatus properly adjusted to the varying volume of the contents.

The boiling point of the bisulphide of carbon is 48°C=118° F. If the air introduced into A is therefore heated to 70° or 80° C., the volatilization will be rapid; and this temperature does not effect injuriously either the structure or the color of the wool.

A considerable economical advantage is obtained by this process, in the mere recovery to use of considerable quantities of wool which have been ruined by the pitch employed in marking. The animal oil separated has also some value.

But the same process employed to dissolve the oils contained in the strippings of machine cards in factories, which amounts to one third of the entire weight, is the source of a considerable saving. This oil is what has been added in



previous stages of the manufacture; and, after being thus recovered, it may be used again.

The wool which has been freed from oil by the process above described, on being subjected to the operation of the picking and beating machines preliminary to carding, yields a large proportion of fine fragments, or what may be called wool dust, said by Mr. Payen to amount to forty-two per cent of the total weight. This is valuable as a fertilizer in in agriculture, and is so turned to account. Under former modes of treatment, it was a total loss.

But the application of the process above described has been more recently extended to a great variety of purposes. Thus, when the pitchy glycerin deposits formed during the saponification with sulphuric acid—which is made a preliminary to the distillation of fatty bodies—are acted upon by the bisulphide, they yield a considerable quantity of stearin amounting to eighteen or twenty per cent of their weight. The waste grease of the kitchen, the exudations which take place from the axles of vehicles or the journal boxes of machinery, and all similar forms of oils and fats, contaminated by impurities which, though they form but a small part of the weight, destroy entirely the value, are completely restored by this process, which recovers the valuable portion, and leaves the impurities behind. Rags, swabs, and fibrous materials of any kind, which have been employed in cleaning machinery or the parts of locomotives which it is necessary to oil, soon become saturated to such an extent that they are commonly thrown aside as useless; but these give up a large amount of oil to the solvent employed in the new process, which is in itself a gain; and the process also gives to the rags themselves a value which they had lost, since it permits them to be re-employed for the same purposes as before, or to be used in the manufacture of paper.

In the direct extraction of wax by pressure, there is left in the solid residue a proportion of twenty per cent of valuable material which may be recovered by solution in bisulphide of carbon. This does not render the residue unfit for use as a fertilizer (the purpose to which it is commonly applied), but rather improves it. Sawdust, which has been used for the filtration of oils purified by sulphuric acid, yields to this process fifteen or eighteen per cent of its weight. The acid impurities separated from oils in the process of purification by agitation with a small proportion of sulphuric acid, furnish by proper treatment with bisulphide of carbon half their weight of pure oil.

Bones of animals obtained from shambles, from the streets, from kitchens, and from various other sources, are used to the extent of many millions pounds annually in every country, for the manufactures of glue and of animal charcoal. These are usually to some extent exhausted of their oils by boiling, before being used in the manufactures for which they are intended; but the boiling separates only six or seven per cent, while the bisulphide process extracts ten or eleven. The oil cakes, which are formed in the mechanical process of the expression of oils from seeds of various kinds, furnish, as mentioned above, a large proportion of oil which the press has left behind. These cakes are sometimes broken up, reduced to powder, and pressed again with the aid of heat. But the labor of the second compression is greater than that of the first, and the product is less, while it still leaves the residue unexhausted. The cakes have a value as food for animals. It was at first supposed that the complete removal of their oil would injure them for this use, but experience has shown this impression to be an error. It is asserted by Messrs. Schlinck and Rutsch, the exhibitors, to have been fully proved by experiments on a large scale already made, that in regard to the production of milk, butter, and flesh, the residua from which the oil has been thoroughly extracted are far superior to the pressed cakes, and that they retain their good qualities as food for animals though kept long in store.

The compacted masses, left in the extraction of tallow or lard by pressure, furnish twenty per cent additional when treated with bisulphide of carbon. The residue from the compression of cacao gives a similar increase of product on similar treatment. Finally, the *marc* of olives, as exemplified in the exposition of Mr. Deiss, furnishes quantities of excellent oil, which the press fails to separate.

The peculiarity of the industry of Messrs. Schlinck and Rutsch is that they do not take the trouble to use the compression process at all in their treatment of the oleaginous seeds from which their oils are obtained; that is to say, they do not first extract a portion of the oil by pressure, and then subject the residuum to the action of the solvent, as has been done by others before them.

Cleaning Watches and Clocks.

This invention consists in immersing the "movements" of clocks and watches in naphtha or some equivalent volatile liquid, and exposing them to heated air, thereby, it is claimed, saving much time and expense.

The inventor thus describes his process: "In carrying out my invention and discovery, I in the first place take the "movement" of the watch or the clock from its case; and in case the watch has a "dust-proof cap," that also is removed, so that the liquid will have a free circulation through the works. I now hold the movement with a pair of pliers or other instrument, and immerse it in pure naphtha or other pure volatile liquid of a similar nature. While the movement is immersed it is moved about or twirled in the liquid, so that all parts will be exposed to its action, and so that the liquid will pass rapidly through the works, and wash the dust and clean away the old oil. This operation is completed in a few minutes, after which the movement is exposed to air heated to a temperature a little above that of the surrounding atmosphere.

The evaporation of the naphtha or other volatile liquid is so rapid, after the movement is taken from it, that, unless it is exposed to artificial heat, the moisture of the common atmosphere will be condensed upon it, giving it the appearance of "sweating." From this higher temperature, the movement is cooled down gradually to that of the surrounding atmosphere. The pivots or frictional points are touched with lubricating oil, and the work is done.

The whole process necessarily occupies not more than six or eight minutes of time. The result is satisfactory in every particular, as frequent experiments have proved, while the actual cost is almost nothing when compared with the price ordinarily charged for cleaning watches and clocks. No taking to pieces and brushing can make the parts more perfectly clean and bright than my process."

Mr. William W. Thompson, of Smithville, Ga., has just patented this invention through the Scientific American Patent Agency.

BLEACHING.—The residues from the manufacture of chlorine, consisting chiefly of chloride of manganese, are treated with chalk to precipitate the iron; after separating the liquid from this precipitate by decantation, the manganese is precipitated as sesqui-oxide by lime. This last, by heating with soda in a current of air, gives the green manganate of soda. The mass contains 50 to 60 per cent of pure manganate. On mixing it with sulphate of magnesia and adding water, a solution of permanganate is obtained. The principle on which the bleaching depends is the deoxidation of the permanganate in contact with the coloring matters accompanying vegetable or animal fibers. A deposit of oxide of manganese is formed on the goods, which, by the action of sulphurous acid, is converted into sulphate of the protoxide, and may be washed out, leaving the goods white. The sulphurous acid is prepared by heating dry copperas with sulphur to a low red heat.—*Tessie du Motay.*