To all whom it may concern:

Be it known that I, WILHELM ADOLF MEYER, a citizen of the German Republic, and resident at Hersfeld, Hesse-Nassau, Germany, have invented certain new and useful Improvements in Processes for Scouring of Fibrous Material; and I 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.

This invention relates to a process for scouring fibrous material of any kind, for instance wool or similar material with the aid of organic solvents. The known methods of fat extraction have not proved practical. They generally require too much solvent in comparison with the weight of the material to be treated so that the loss of solvents is excessive. None of the known scouring methods ensures an absolutely uniform scouring of the material. Almost all fibrous material comprises knots and clots of fibres and dirt into which the solvent can penetrate only with difficulty so that they are scourcd much more slowly than the loose fibres. The material must therefore be submitted for a comparatively long time to the action of the solvent if an approximately uniform scouring has to be effected from which the economy of the method suffers. There remains usually too much solvent in the fibrous material even after the scouring so that much time is required to free the material from this solvent. The known extraction methods further do not take into account sufficiently the peculiarity of the material.

The loose elastic textile fibre permits of a thorough and uniform scouring and drying in a very short time if the working method is carried through according to this invention in the manner which will be hereinafter described and if for instance the apparatus is used which will be also hereinafter described.

As the fat is only thinly distributed upon the loose fibrous material it will be sufficient if, in order to separate the fat from the material, the spread out material is moistened with the solvent for a short time. If the moistening is effected by means of a strong jet of solvent a considerable part of the mechanical impurities can be washed out at the same time. The fibrous material could further be exposed to a strong pressure in order to crush the knots and clots so that a rapid and uniform impregnation of the material and consequently a rapid and uniform scouring is ensured. The fat containing solution can further be pressed out of the fibrous material by strong pressure, whereby the process of scouring and finally that of drying could be accelerated also.

In the accompanying drawing an apparatus for carrying out the improved process is illustrated in vertical section.

The loose fibrous material is led into the apparatus through the charging hopper a with feeding rollers b, b to drop upon the conveyor band e of fine wire mesh to be moved towards the right hand side of the apparatus. The conveyor band e is guided over rollers c, c. During the conveying organic solvent is squirted upon the material e to be scoured from perforated tubes f 1, f 2, g 1, g 2 arranged above and below said conveyor e. The solvent drops from the material upon conveyor e into the collectors h 1 and h 2 after having dissolved the fat and washed off a considerable part of the dirt. From the collectors h 1 and h 2 the solvent is pumped again as by pumps u 1, u 2, respectively into the perforated tubes f 1, g 1 and f 2, g 2 respectively. Coarse impurities are intercepted by the sieves i 1 and i 2 and the heavy dirt particles collect upon the bottom of the receptacles h 1 and h 2 from which they can be purged by means of the cocks k 1 and k 2.

The material to be scoured is delivered from the conveyor net o to a pair of cylinders l, l, where it is compressed. After the pressing the same procedure is repeated; the material is received by the conveyor net m, guided over rollers n, n, sprinkled with solvent from the tubes f 3, f 4 and g 3, g 4 and conveyed, after it has been compressed again by cylinders o, o into the drying chamber.
ceptacles $h_i$ and $h_j$ with sieves $i$, and $i'$. Pumps $u, u'$ convey the solvent from these receptacles to the tubes $f', g'$ and $f', g'$ respectively.

The material is treated successively from the tubes $f, g, f'$ and $g'$, with the solvent which contains gradually less and less fat according to the contents of receptacles $h_i$ to $h_j$. These receptacles are arranged in such a manner that the receptacle $h_i$ is situated at the highest plane, the receptacle $h_j$ being situated at the lowest plane. The levels of the solvent in the receptacles $h_i$ to $h_j$ can be regulated by the admission of solvent through the supply pipe $p$ with the aid of the overflow tubes $q, q'$. The sediments collecting upon the bottoms of receptacles $h_i$ to $h_j$ can be removed from time to time with the aid of the overflow pipe $q$ and the valves $s_i, s_j$ in said pipe. With the aid of the valves $k_i, k_j$ in the connecting tubes and of the valves $s_i, s_j$, in the overflow pipe the receptacles $h_i$ to $h_j$ can be temporarily emptied into special reservoirs. The fat which has been extracted is separated from the solvent by filtration and distillation. The apparatus is enclosed in a casing $t$ which has an opening only at the point where the material is supplied, namely between the feeding cylinders $b, b$. At the outlet for the material the apparatus is airtightly connected with the drying chamber, not shown in the drawings.

The drying is effected in a continuously or intermittently working apparatus which is built in accordance with the principle of the drying apparatuses which are usually employed for drying textile fibres. The solvent is recovered from the air sucked off from the drying chamber by one of the well-known methods.

According to the working method which has just been described a thorough scouring can be effected as the material to be scoured is washed finally only with a solvent which contains only very little fat, this solvent being substantially all pressed out. The material to be scoured is moistened with the solvent only for a short part of its travel and every quantity of solvent is utilized always until it is absolutely saturated with fat whereby the result is obtained, that the quantity of solvent in use is considerably smaller in proportion to the quantity of material to be scoured than is the case with the scouring methods hitherto applied. It is impossible that the material to be scoured should get entangled or entwined as it is never exposed to a rotating motion or moved towards the material fed in. A large part of the mechanical impurities is washed off by the sprinkling with the solvent whereby the further treatment is greatly facilitated.

The clots and lumps which are always found in the fibrous material are crushed by the pressure cylinders at the middle of the apparatus and removed at once by the solvent so that a renewed clogging or caking together is prevented, the dirt being easily washed off the fibres. By conveying the material in a thin layer it is easy to free the material from the solvent after the scouring so that the small quantity of solvent which remains in the material can be also removed very rapidly so that a great efficiency of the method is ensured.

It is immaterial what kind of solvent be used for this improved scouring method as even easily combustible liquids can be used when certain precautions are observed. The fat and the normal content of water of the material to be scoured prevent the production of electricity from friction.

Now what I claim and desire to secure by Letters Patent is the following—

1. An improved process for scouring fibrous material and the like, which process consists in conveying the material in a thin layer, sprinkling the same with a non-aqueous solvent in such a manner, that the liquid dripping off is made to traverse the material repeatedly in circulation, and submitting the material during the process of sprinkling with solvent, to pressure for the purpose of crushing knots and clots in the fibrous material and continuing the sprinkling operation on the material after such crushing step, substantially as described.

2. An improved process for scouring fibrous material and the like, which process consists in conveying the material in a thin layer, sprinkling the same with a solvent in such a manner, that the liquid dripping off is made to traverse the material repeatedly in circulation in counter current and submitting the material during the process to pressure for the purpose of crushing knots and clots in the fibrous material and continuing the sprinkling with solvent after the said pressure treatment, substantially as described.

3. An improved process for scouring fibrous material and the like, which process consists in conveying the material in a thin layer, sprinkling the same with an organic solvent for fats, in such a manner, that the liquid dripping off is made to traverse the material repeatedly in circulation in counter current and submitting the material during the process to pressure repeatedly for the purpose of crushing knots and clots in the fibrous material and continuing the sprinkling after each of the crushing steps, substantially as described.

4. An improved process for scouring fibrous material and the like, which process consists in conveying the material in a thin layer upon an endless conveying sieve, sprinkling the same with a solvent in such a
manner, that the liquid dripping from successive portions in the length of such travel is collected separately, and causing such separate batches of solvent to traverse the material repeatedly in circulation in counter current and submitting the material during the process at least once, between successive washing steps, to the action of mechanical pressure for the purpose of crushing knots and clots in the fibrous material, substantially as described.

In testimony whereof I affix my signature this 23rd day of Aug., 1921.

WILHELM ADOLF MEYER.