F. & C. SHUMAN.

EXTRACTING GREASE AND POTASH SALTS FROM WOOL.

APPLICATION FILED DEC. 22, 1905.

899,339. Patented Sept. 22, 1908.

3 SHEETS—SHEET 1.

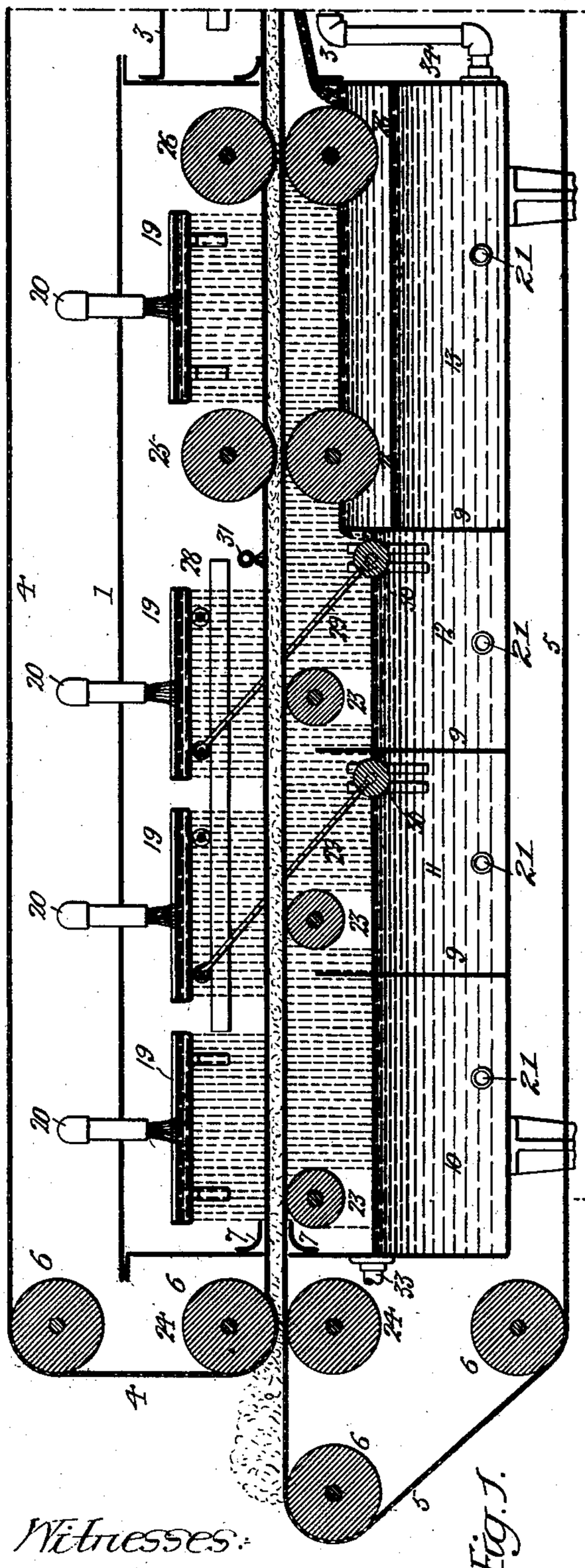

Fig. 1.

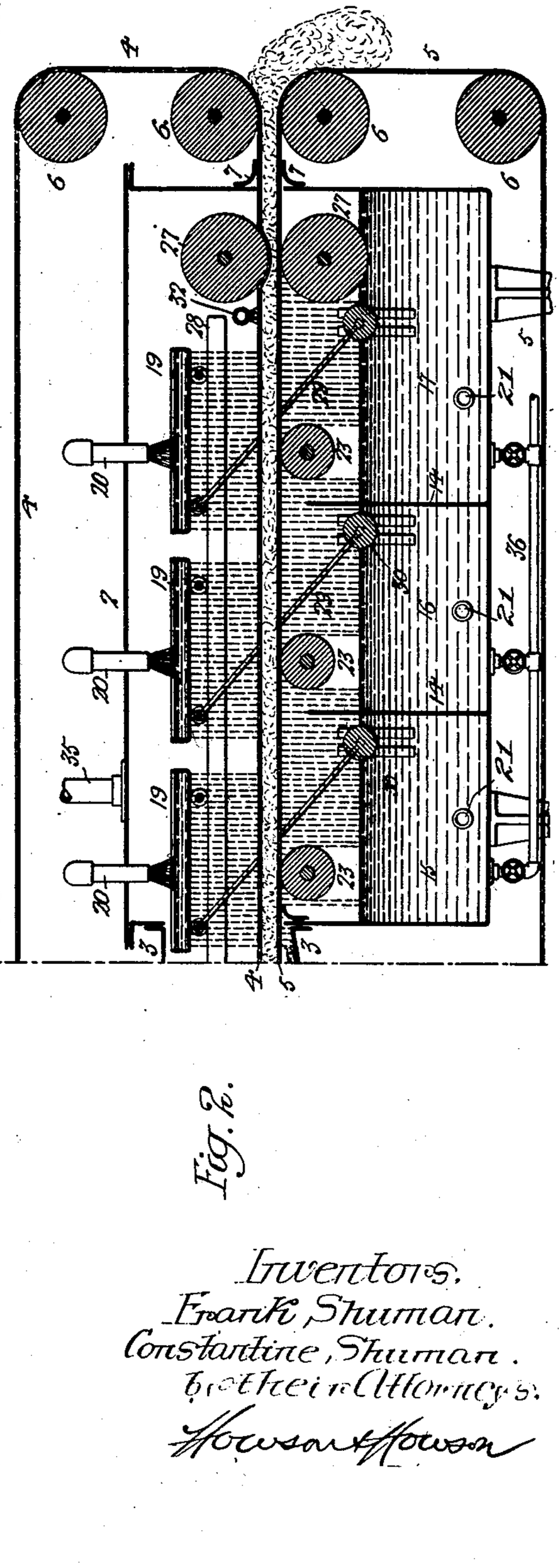

Fig. 2.

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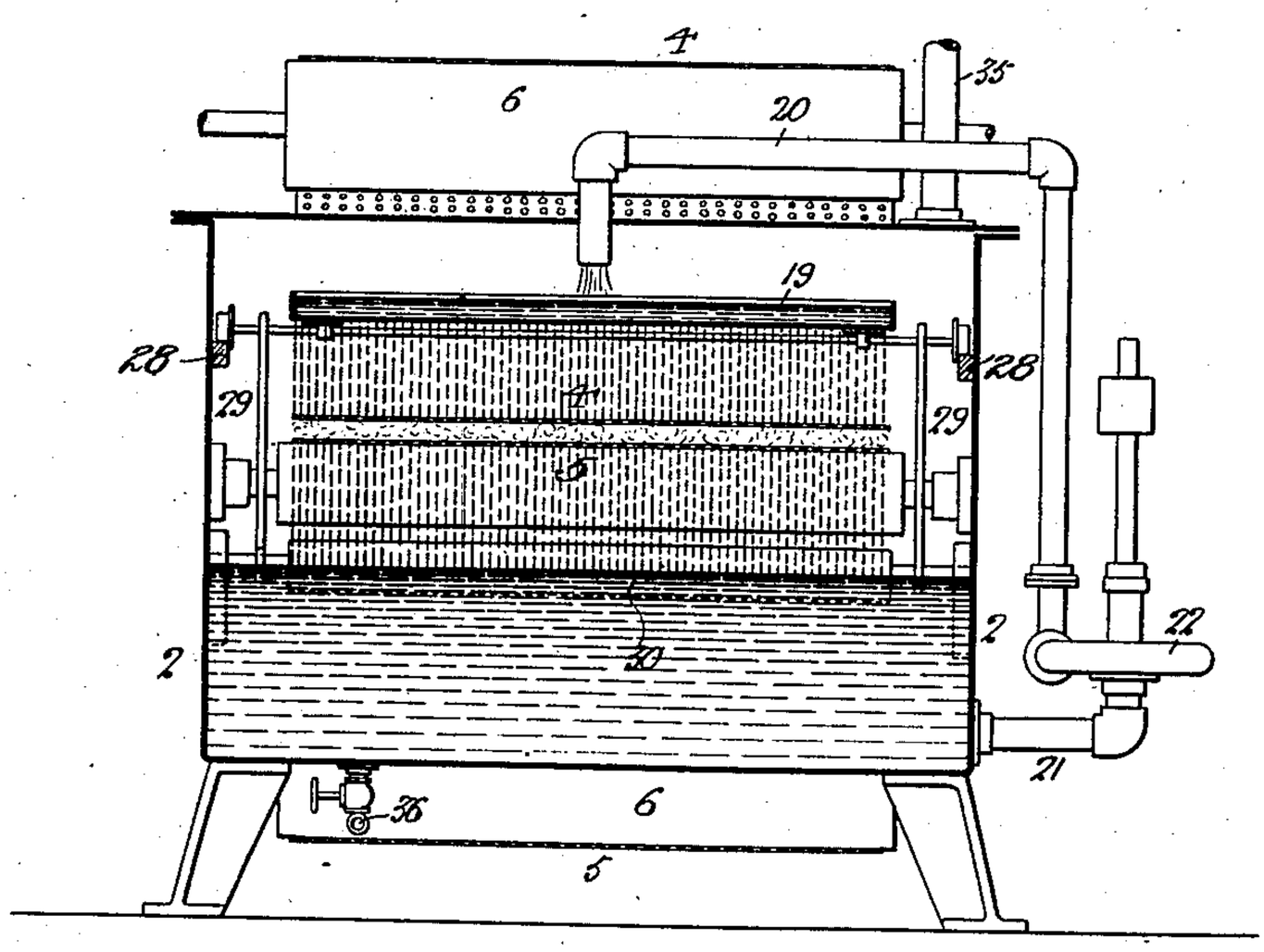
3 SHEETS—SHEET 2.

Fig. 3.



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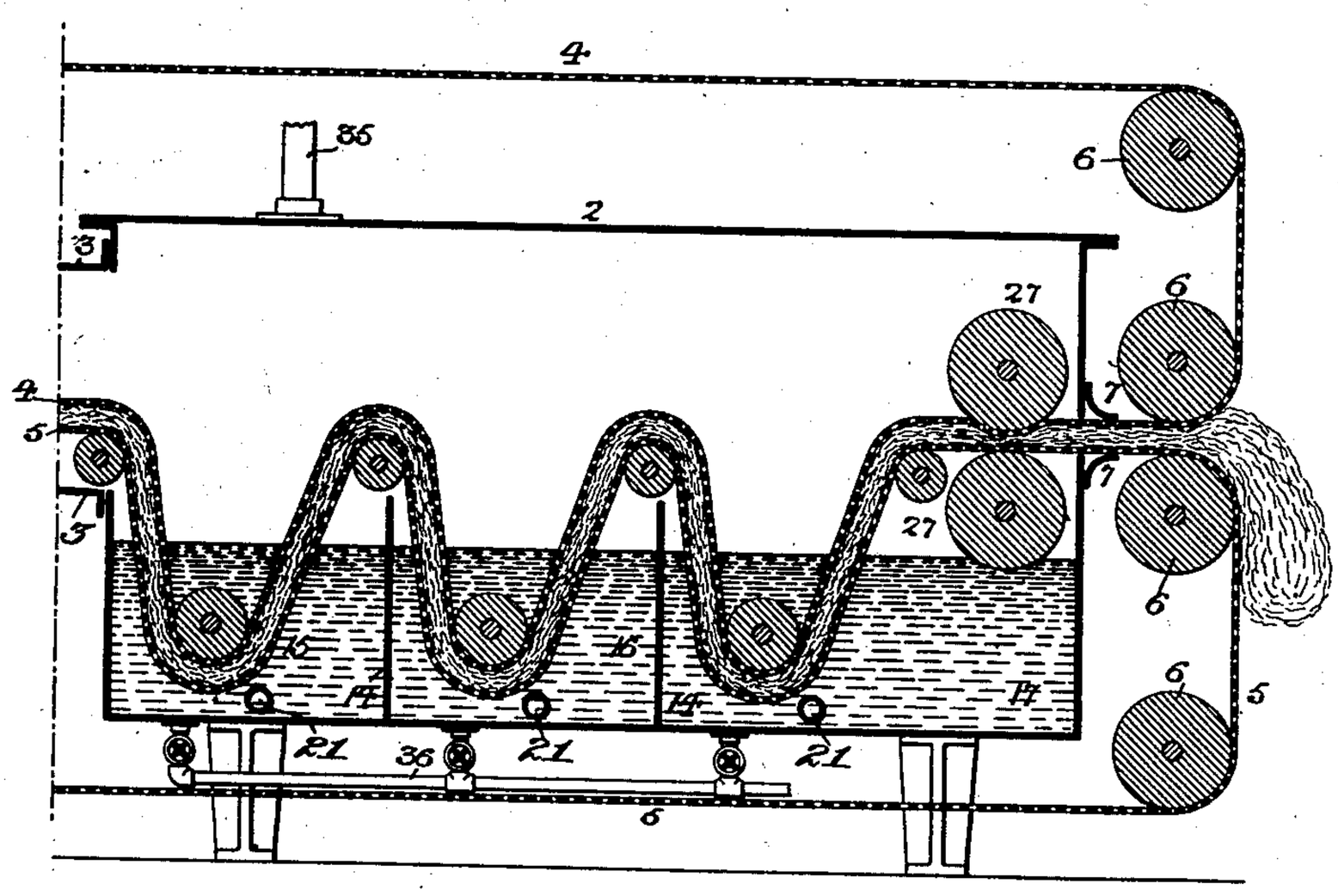
3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK SHUMAN AND CONSTANTINE SHUMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO SAID FRANK SHUMAN, ONE-THIRD TO WALTER ERBEN, AND ONE-THIRD TO CHARLES H. HARDING, OF PHILADELPHIA, PENNSYLVANIA.

EXTRACTING GREASE AND POTASH SALTS FROM WOOL.

No. 899,339. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed December 22, 1905. Serial No. 292,988.

To all whom it may concern:

Be it known that we, FRANK SHUMAN and CONSTANTINE SHUMAN, both citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Extracting Grease and Potash Salts from Wool, of which the following is a specification.

Our invention relates to that method of degreasing wool which consists in first subjecting it to the action of a liquid solvent of the grease, and then to a washing operation, one object of our invention being to provide for the rapid and effective removal of the grease and potash salts from the wool and the effective recovery and re-use of the solvent employed, and a further object being to accomplish these results in such manner that simpler and cheaper means than those now employed for the purpose are available.

These objects we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which

Figure 1, is a longitudinal sectional view of one end of apparatus adapted for carrying out our invention; Fig. 2, is a similar view of the other end of the apparatus; Fig. 3, is a transverse section of the apparatus, and Fig. 4 is a sectional view illustrating a modification of one feature of the invention.

1 and 2 represent a pair of closed tanks located end to end and connected by a neck 3, which provides communication between the tanks, and 4 and 5 represent endless belts of wire cloth, perforated sheet metal, or the like, which pass through these tanks from end to end, and also pass around suitable external guide rollers 6, so disposed that in their passage through the tanks the perforated belts or aprons follow parallel courses, separated from each other to the extent required to accommodate the mass of wool, which is carried forward from the receiving end to the delivery end of the apparatus, the lower apron 5 being, by preference, extended so as to form a table or platform upon which to deposit the wool which is to be treated.

Flexible lips 7 secured to the casings of the tanks at the receiving and delivering ends of the same serve to maintain relatively tight joints at the points of entrance and exit of the aprons, so as to prevent the escape of gases or vapors from either tank.

The tank 1 is divided by means of partitions 9 into a series of compartments 10, 11, 12 and 13, and the tank 2 is divided by a series of partitions 14 into compartments 15, 16 and 17, the number of compartments in either tank being dependent largely upon the extent and character of the treatment to which the wool is to be subjected.

Each tank contains a series of perforated vessels or trays 19, one for each compartment, these trays being located above the lower run of the apron 4, and each tray being in communication with its respective compartment through pipes 20 and 21, and a centrifugal or other suitable pump 22, whereby liquid may be withdrawn from each compartment and delivered into the corresponding tray 19, through whose perforated bottom it escapes and flows on to the lower run of the upper perforated apron 4, so as to pass through the same, through the mass of wool confined between it and the upper run of the lower apron 5, and through the latter, as shown in Figs. 1 and 2. The two aprons, with their interposed mass of wool are supported in their passage through the tanks upon rollers 23, and they also pass between a number of pairs of squeezing rollers 24, 25, 26 and 27.

The perforated trays 19, corresponding to the compartments 11, 12, 15, 16 and 17 are provided with rollers running upon rails 28 on the opposite sides of the tanks, so they can be moved longitudinally, one of the axles of each tray being connected by rods 29 to a float 30, suitably guided vertically in the compartment corresponding to said tray, so that as the level of liquid in said compartment rises and falls the float will have corresponding movement and the tray will be moved back and forth upon its supporting rails.

A perforated transverse pipe 31, located above the compartment 12 and also above the lower run of the upper apron 4, serves to supply naphtha or other available solvent of grease, and a similar transverse pipe 32 located above the compartment 17, and also above the lower run of the upper apron 4, serves to supply wash water.

An overflow pipe 33 provides for the discharge of liquid from the compartment 10, and an overflow pipe 34 provides for discharge from the lower portion of the compartment 13, and the latter compartment can also overflow into the compartment 12, because of the fact that the partition 9, separating these compartments, is lower than the partitions separating the other compartments of the apparatus.

The tank 2 has, at the top, a vapor escape pipe 35, and each of the compartments 15, 16 and 17 of said tank is in communication with a steam pipe 36 through a suitably valved branch, as shown in Fig. 2.

Supposing that a mass of wool is being carried through the apparatus between the aprons 4 and 5, that the various pumps 22 are in operation, and that the proper supplies of naphtha or other solvent and of wash water are being admitted through the pipes 31 and 32, the operation of the apparatus is as follows. The fresh solvent from the pipe 31, after passing through the mass of wool which is being carried beneath it, enters the compartment 12 and is conveyed therefrom to the tray 19, above the said compartment, from which it again flows through the wool into the compartment. As the level of liquid in the compartment rises, however, longitudinal movement is imparted to the tray 19, so that a portion of the solvent will be directed into the adjoining compartment 11, this movement of the tray continuing until the amount of solvent thus deflected equals the amount of solvent entering the compartment 12 from the pipe 31, and overflowing into the same from the compartment 13, whereupon a normal level will be maintained in said compartment 12. In like manner a normal level of liquid will be produced and maintained in the compartment 11, the level in the compartment 10 being determined by the location of the overflow pipe 33. In the same manner a normal level of wash water is produced and maintained in each of the compartments 15, 16 and 17.

The body of solvent contained in the compartment 12 will, therefore, be the purest or least saturated with grease, that in the compartment 11 will contain a larger percentage of grease, and that in the compartment 10 will contain the maximum percentage, and will be withdrawn therefrom to the still. The wool in its passage will, therefore, be subjected to the action of solvent of greater and greater purity until it finally reaches the pure solvent delivered by the pipe 31 and precisely the same operation in respect to the wash water takes place in the tank 2, the fresh water flowing from the pipe 32 through the wool and into the compartment 17, so that the water in said compartment contains the least percentage of potash salts which have been washed from the wool, the water in the compartment 16 containing a greater percentage of such salts, that in the compartment 15 a still higher percentage, and that in the compartment 13 a maximum percentage.

Before passing under the action of the wash water from the tray 19 above the compartment 13 the wool has the greater percentage of the solvent expressed from it by the action of the squeeze rolls 25, and after being subjected to the washing action of the water from said tray 19, the wool is again subjected to the action of the pair of squeeze rolls 26, whereby the greater percentage of the water and solvent then remaining in the wool is expressed therefrom and flows into the compartment 13, the solvent, owing to its lesser specific gravity, floating upon the water and overflowing into the compartment 12, as shown in Fig. 1.

The water in the compartments 15, 16 and 17, is heated by steam from the pipe 36, or in any other available manner, the water in the compartment 17 being, by preference, heated to a higher temperature than that in the compartment 16, and the water in the latter compartment being heated to a higher temperature than that in the compartment 15. The water consequently performs the double function of washing from wool the potash salts which are not soluble by the solvent employed to extract the grease, and vaporizing the solvent which still remains in the wool after the same has passed the squeeze rolls 26. The final pair of squeeze rolls 27 serves to express from the wool the greater portion of the wash water, the cleaned wool being discharged in a relatively dry condition.

The method of treating wool which we have described provides for treating a maximum quantity in a given time since the wool can be passed through the apparatus as rapidly as is consistent with the thorough elimination of the grease and potash salts therefrom, the process being a continuous one, and no handling of the wool being necessary during the process.

When it is not desired to remove the potash salts in so thorough a manner as by flowing streams of wash water, the wool may be passed through a quiescent body or bodies of water, as for instance, by properly deflecting the course of the endless carrier belts in the compartments 13, 15, 16 and 17, as shown in Fig. 4, or in any other appropriate way, but in any case it is preferable to maintain that body of water which completes the washing operation at a higher temperature than that which begins said operation, in order to prevent the yellowing or rotting of the wool which is likely to result from subjecting the same to water of high temperature while said wool contains strong potash salts.

In the process as conducted in our ma-

chine the first supply of wash water used in connection with the compartment 13 is of relatively low temperature, and as the wool is carried forward and the potash salts are washed therefrom the temperature of the wash water increases, since, with the decreasing percentage or strength of potash salts such increase of temperature can be adopted without risk of injury to the wool, for instance, the temperature of the wash water used in connection with compartment 15 may be sufficient to start the vaporization of the solvent contained in the wool, and the temperature of the wash water in the final compartment 17 may be at or near the boiling point.

So far as we are aware, we are the first to employ water of high temperature to vaporize solvent contained in wool which has been previously subjected to the action of said solvent for the purpose of removing grease from the wool, and we find that the solvent can be removed more thoroughly and with less loss by this means than if its vaporization is attempted by means of hot air or gas or if it is washed from the wool by the use of cool or moderately warm water.

The solvent vapors driven off from the wool by the action of the heated water are, together with such water vapor as may be combined therewith, carried off through the pipe 35 to be recovered in any suitable way.

We are aware that it has before been proposed to effect the degreasing of wool by confining same between perforated aprons and carrying it thereby through successive tanks of solvent and successive tanks of wash water; the aprons with the wool confined between them being also carried between press rolls in passing from one compartment to another, but this process differs from ours in failing to provide for a positive flow of the solvent through the mass of wool, and it also fails to employ heated wash water for the purpose of vaporizing the solvent remaining in the wool.

We are also aware that in that class of wool degreasing apparatus in which the wool is treated in cylinders or keirs, the wool has been subjected to treatment with flowing solvent, then squeezed to express the surplus solvent therefrom, then treated with flowing wash water, either cold or moderately heated and then again squeezed to express the wash water therefrom, but in such apparatus the solvent is not vaporized by the wash water, and the operations cannot all be carried on simultaneously, hence the process is, as compared with that which we have devised, necessarily a slow one. In apparatus of the latter class, the solvent has also been floated from the wool by a slowly rising column of moderately heated water, and then has been distilled from the surface of the water by raising the temperature of the latter to the point of vaporization of the solvent, but this process is essentially different from that of driving the solvent from the wool by vaporizing it in the mass of wool by direct contact with water of the proper temperature, and especially from that embodiment of our process in which the solvent-vaporizing water is caused to flow through the wool in streams so as to have the most effective washing action upon the wool.

We are further aware that flowing streams of solvent have been passed through masses of wool lying loosely on a perforated conveyer, but the treatment of loose masses of wool in this way is both wasteful and ineffective, a much more economical and effective use of the solvent being possible if the wool is subjected to the action of the solvent while in a relatively confined mass.

We claim:

1. The mode herein described of treating wool, said mode consisting in first subjecting the wool to the action of a solvent of the grease, washing the wool with a body of water of a relatively low temperature, and then with another and independent body of water, of a temperature sufficiently high to effect vaporization of solvent contained in the wool.

2. The mode herein described of treating wool, said mode consisting in carrying the wool forward through streams of solvent containing a less and less percentage of grease, then applying a stream of pure solvent to the wool, then subjecting the wool to pressure to express the surplus solvent therefrom, and then washing the wool with water that gradually increases in temperature until sufficiently high to effect vaporization of the solvent remaining in the wool.

3. The mode herein described of treating wool, said mode consisting in first subjecting the wool to the action of a solvent of the grease, then expressing surplus solvent from the wool by pressure, and then washing the wool, first with water of a relatively low temperature, and then with water of a temperature sufficiently high to effect vaporization of solvent contained in the wool.

4. The mode herein described of treating wool, said mode consisting in carrying the mass of wool forwardly through flowing streams of solvent, and then through water first of a relatively low temperature and then of a temperature sufficiently high to effect vaporization of solvent contained in the wool.

5. The process herein described of extracting grease and potash salts from wool, said process consisting in feeding the wool continuously forward through flowing streams of solvent to remove the grease, then passing clear solvent through the wool, then removing the potash from the wool by water at such a temperature that it will not discolor

the wool, and then raising the temperature of the water to a point sufficient to volatilize the solvent.

6. The mode herein described of treating wool, said mode consisting in carrying the mass of wool forwardly, first through flowing streams of solvent and then through flowing streams of wash water which successively increase in temperature.

7. The mode herein described of treating wool, said mode consisting in carrying the mass of wool forwardly, first through flowing streams of solvent, and then through flowing streams of wash water which successively increase in temperature, until the latter is finally high enough to vaporize the solvent.

8. The process herein described of extracting grease and potash salts from wool, said process consisting in feeding the wool continuously forward through flowing streams of solvent which contain a less and less percentage of grease, then passing pure solvent through the wool, then squeezing the wool, then passing the wool through flowing streams of water at a low temperature, again squeezing the wool, passing it through flowing streams of water gradually increasing in temperature until high enough to vaporize the solvent contained in the wool, and then squeezing the wool so as to remove the surplus water.

9. The mode herein described of treating wool, said mode consisting in carrying the mass of wool forwardly, first through a solvent of the grease and then through bodies of wash water which successively increase in temperature.

10. The mode herein described of treating wool, said mode consisting in carrying the mass of wool forwardly, first through a solvent of the grease, and then through bodies of wash water which successively increase in temperature until the latter is finally high enough to vaporize the solvent.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

FRANK SHUMAN.
CONSTANTINE SHUMAN.

Witnesses:
ALAN CRAIG CUNNINGHAM,
THOS. MACKELLAR.