F. & C. SHUMAN.

APPARATUS FOR EXTRACTING GREASE AND POTASH SALTS FROM WOOL.

APPLICATION FILED DEC. 29, 1905.

**899,440.**

Patented Sept. 22, 1908.

3 SHEETS—SHEET 1.

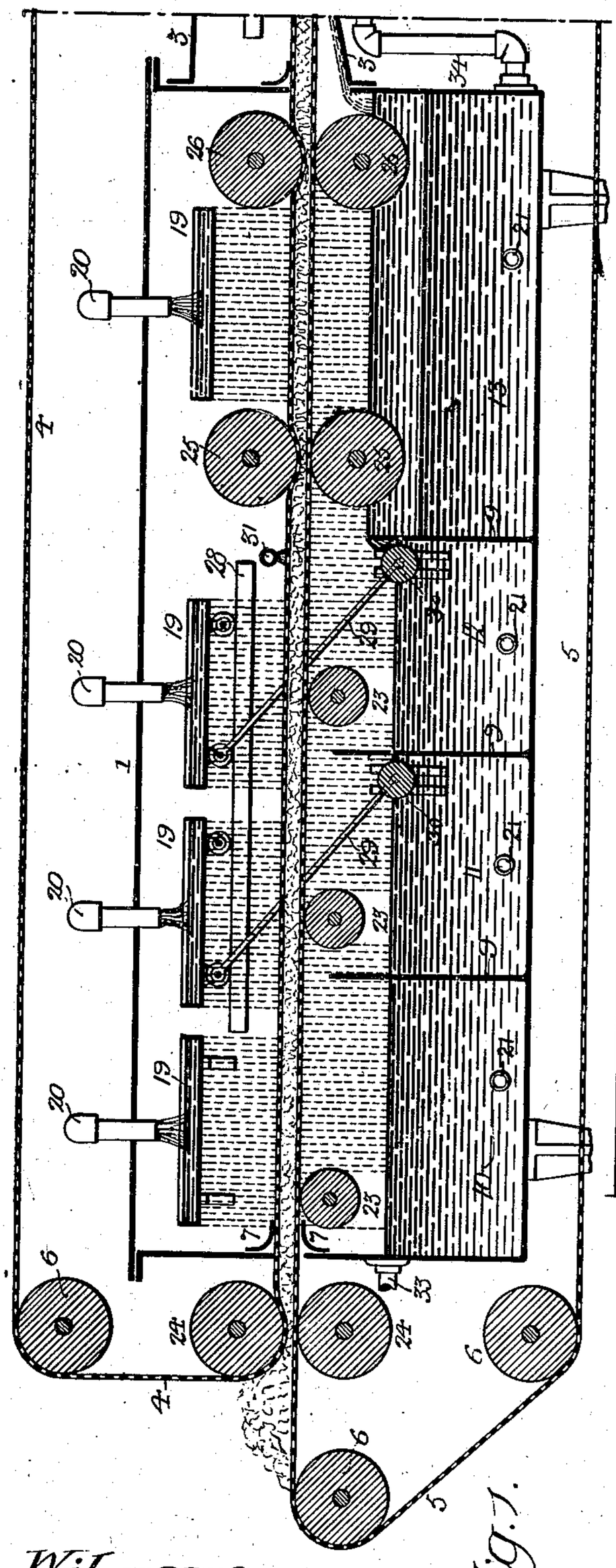

Fig. 1.

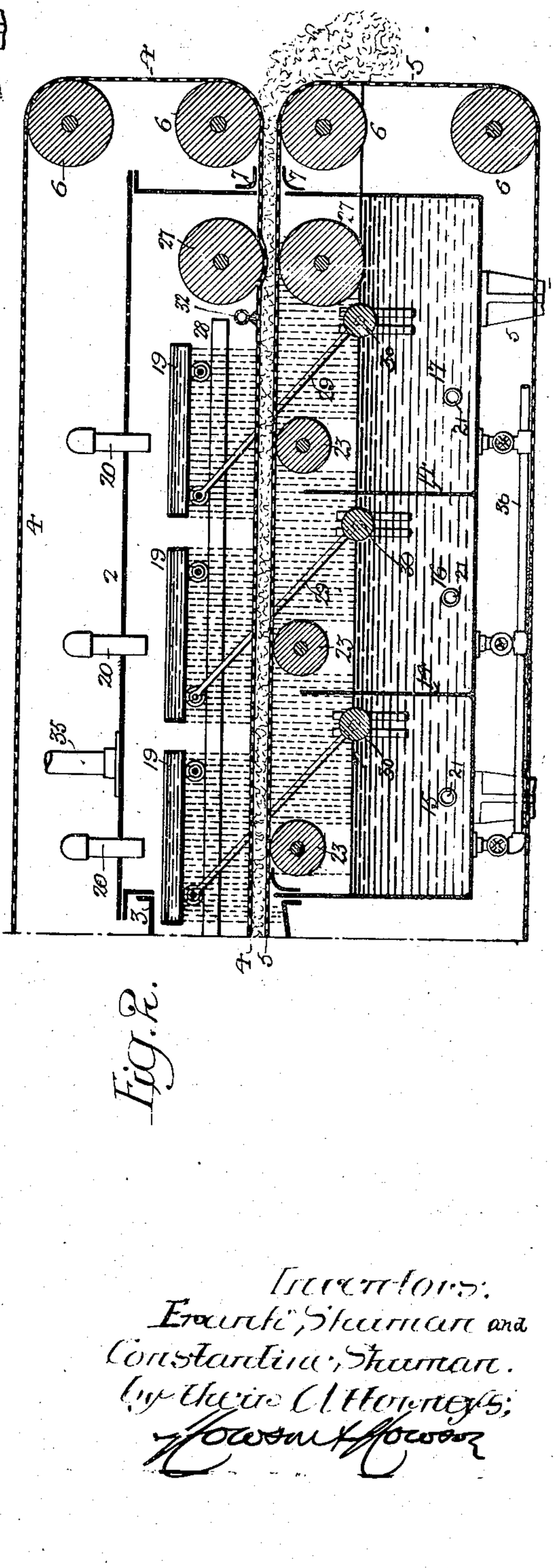

Fig. 2.

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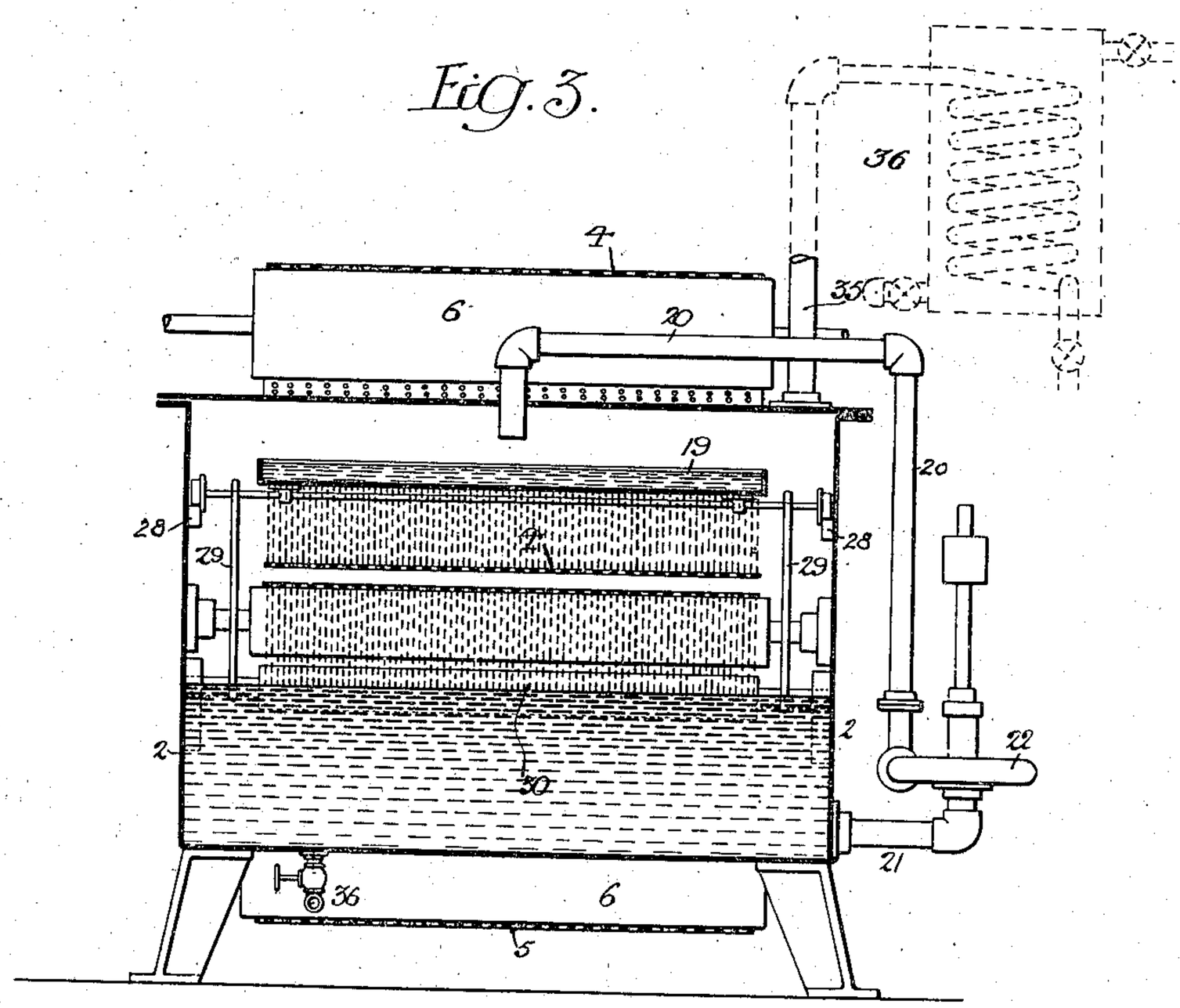
3 SHEETS—SHEET 2.

*Fig. 3.*

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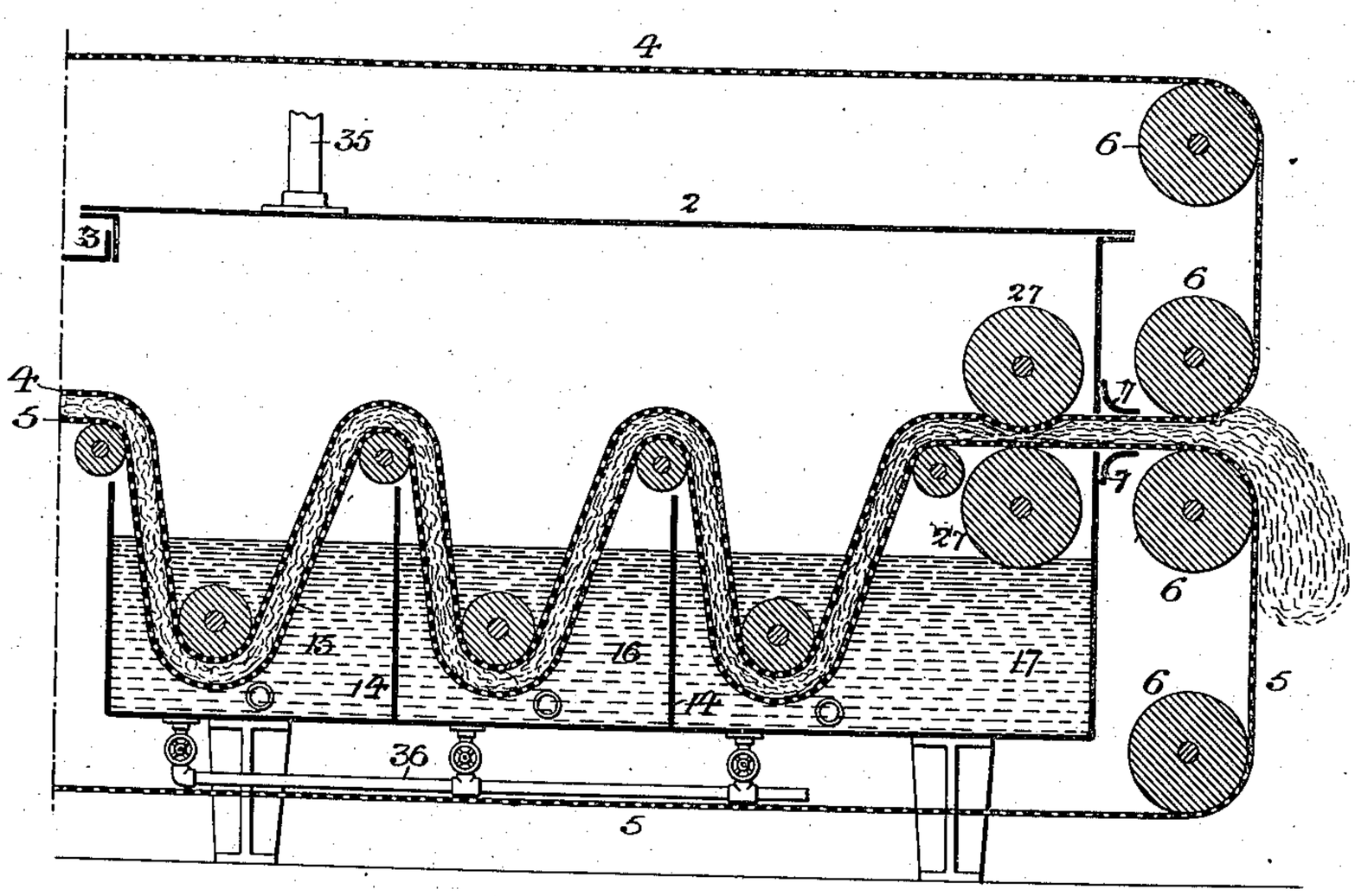
3 SHEETS—SHEET 3.

*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.

## APPARATUS FOR EXTRACTING GREASE AND POTASH SALTS FROM WOOL.

No. 899,440. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed December 29, 1905. Serial No. 293,799.

*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 Apparatus for Extracting Grease and Potash Salts from Wool, of which the following is a specification.

Our invention relates to that type of apparatus in which the wool is first subjected to the action of a 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 reuse of the solvent employed, and a further object being to accomplish this result by the use of simpler and cheaper means than those now employed for the purpose. 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 wool degreasing apparatus constructed in accordance with 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 of the features of our 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 through 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 that 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 the wool the potash salts which are not soluble by the solvent employed to extract the grease, and vaporizing the small percentage of solvent which still remains in the wool after the same has passed the squeeze rolls 26, this vaporized solvent passing off through the pipe 35 to a suitable condenser 36, clearly shown in Fig. 3.

The final pair of squeeze rolls 27 serves to express from the wool the greater portion of the wash water, so that the cleaned wool will be 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 machine 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 can be raised 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.

We employ water of high temperature to vaporize the solvent contained in the 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.

The fresh solvent supplied by the pipe 31 may be either cold or heated as desired.

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 combination, in a wool degreasing apparatus, of a pair of traveling aprons between which wool is held and continuously fed forward through flowing streams of solvent having a less and less percentage of grease, movable distributers for delivering said streams of solvent, means for continuously feeding such successively purer solvent in the opposite direction, and means for supplying pure solvent to said wool in its travel and after it passes said flowing streams.

2. The combination, in a wool degreasing apparatus, of a tank having a series of solvent compartments, movable solvent distributers located above each compartment and overlapping the next so as to discharge simultaneously into both compartments, and means for conveying the wool through streams of solvent flowing from each distributer into the compartments below.

3. The combination, in a wool degreasing apparatus, of a tank having a series of solvent compartments, a solvent distributer located above adjoining compartments, means operated by the level of solvent in one compartment whereby a solvent distributer will be caused to direct a predetermined portion of its discharge into an adjoining compartment, and means for carrying the wool through the flowing streams of solvent.

4. The combination, in a wool degreasing apparatus, of a tank having a series of solvent compartments, a series of solvent distributers above the same, means for conveying the wool through the solvent flowing from the distributers into said compartments, means for mounting the distributers so as to permit of movement of the same above the compartments, and a float con-

tained in a compartment and connected to a corresponding distributer and serving by its rise and fall to cause to-and-fro movement of said distributer.

5. The combination, in a wool degreasing apparatus, of a tank having one or more compartments each with a solvent distributer above the same, a pair of traveling aprons between which the wool is held and carried through streams of solvent containing a less and less percentage of grease flowing from the distributers to the compartments, a pipe for continuously discharging pure solvent onto and through the mass of wool after its passage through said streams, and means for automatically feeding the successively purer bodies of solvent in a direction opposite to the movement of wool.

6. The combination, in a wool degreasing apparatus, of means for continuously conveying wool forward first through flowing streams of solvent having a less and less percentage of grease, and then through flowing streams from independent bodies of wash water, means for automatically feeding such successively purer solvent in the opposite direction, and means for heating said successive bodies of wash water until a temperature sufficiently high to volatilize the solvent is reached.

7. The combination, in a wool degreasing apparatus, of means for continuously carrying the wool through successive bodies of solvent, and then through successive bodies of wash water, and means for independently heating said bodies of wash water.

8. The combination, in a wool treating apparatus, of a pair of traveling aprons between which the wool is held and continuously carried forward through flowing streams of solvent and then through flowing streams of wash water, means for squeezing the wool after it is passed through the streams of solvent and before it reaches the streams of wash water, and means for heating said successive bodies of wash water until a temperature sufficiently high to volatilize the solvent is reached.

9. The combination, in a wool degreasing apparatus, of means for continuously passing the wool through successive bodies of solvent and then through independent bodies of wash water, means for squeezing the wool after it has passed the solvent and before it reaches the wash water, and means for independently heating the bodies of wash water.

10. The combination, in a wool degreasing apparatus, of a tank or casing containing a series of compartments, some for containing solvent and others for containing wash water of varying degrees of temperature, movable distributers above said compartments for delivering the solvent and wash water in flowing streams to their corresponding compartments, means for delivering said solvent and wash water to the respective distributers, and a pair of traveling aprons between which wool is compacted and fed first through the streams of solvent and then through the streams of wash water.

11. The combination, in a wool degreasing apparatus, of a tank containing a series of compartments, some for containing solvent and others for containing wash water of varying degrees of temperature, movable distributers above said compartments for delivering the solvent and wash water in flowing streams to their corresponding compartments, means for delivering said solvent and wash water to the respective distributers, a pair of traveling aprons between which the wool is compacted and fed first through the streams of solvent and then through the streams of wash water, means for supplying pure solvent to the wool after it has passed the flowing streams of solvent, and means for imparting pressure to the wool after it receives such purer solvent and before it reaches the flowing streams of wash water.

12. The combination, in a wool degreasing apparatus, of a tank having a series of compartments for containing wash water, distributers for the wash water located above said compartments and receiving their supplies from their respective compartments, means for carrying the wool in a compacted state through streams of water flowing from the distributers to their respective compartments, and means communicating directly with the wash water compartments for heating the water contained therein.

13. The combination, in a wool degreasing apparatus, of a tank having a series of compartments for receiving wash water, distributers for wash water located above the said compartments and receiving their supplies from their respective compartments, means for carrying the wool through streams of water flowing from the distributers to their respective compartments; and means for independently heating the wash water in the successive compartments.

14. The combination, in a wool degreasing apparatus, of a tank containing a series of compartments, some for containing solvent and others for containing wash water, distributers located above said compartments and receiving their supply therefrom, means for conveying wool through the streams of solvent and wash water flowing from the distributers to their respective compartments, and means for independently heating the wash water in successive compartments.

15. The combination, in a wool degreasing apparatus, of a tank containing a series of compartments, some for containing solvent and others for containing wash water, distributers located above said compartments and each receiving its supply from its re-

spective compartment, means for conveying the wool through the streams of solvent or wash water flowing from the distributers to their respective compartments, means for imparting pressure to the wool while it is passing from the streams of solvent to the streams of wash water, and means for independently heating the wash water in successive compartments.

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

FRANK SHUMAN.
CONSTANTINE SHUMAN.

Witnesses:
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THOS. MACKELLAR.