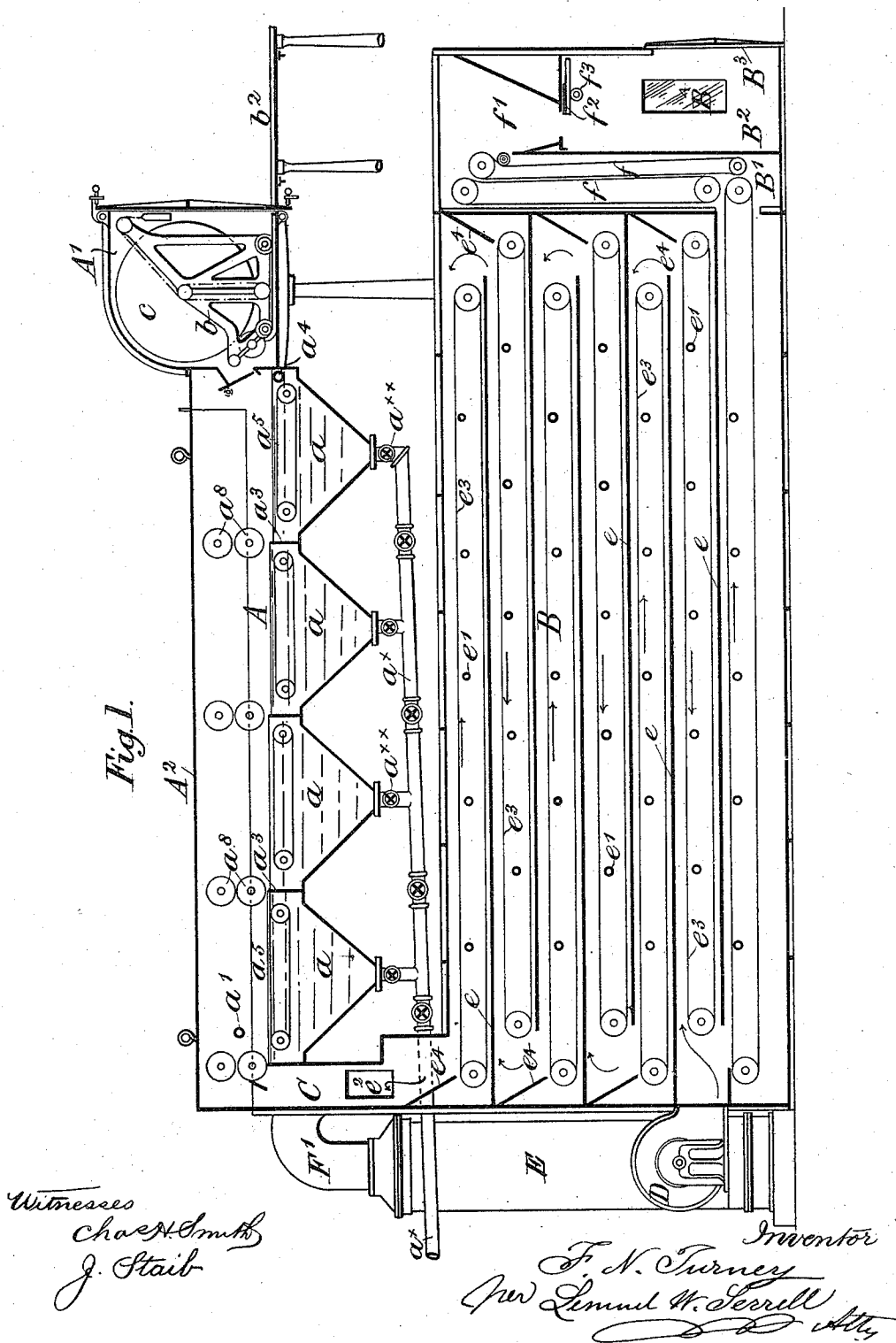


F. N. TURNEY.

DEGREASING AND CLEANSING WOOL, COTTON WASTE, &c., AND
APPARATUS THEREFOR.

No. 579,524.

Patented Mar. 23, 1897.



(No Model.)

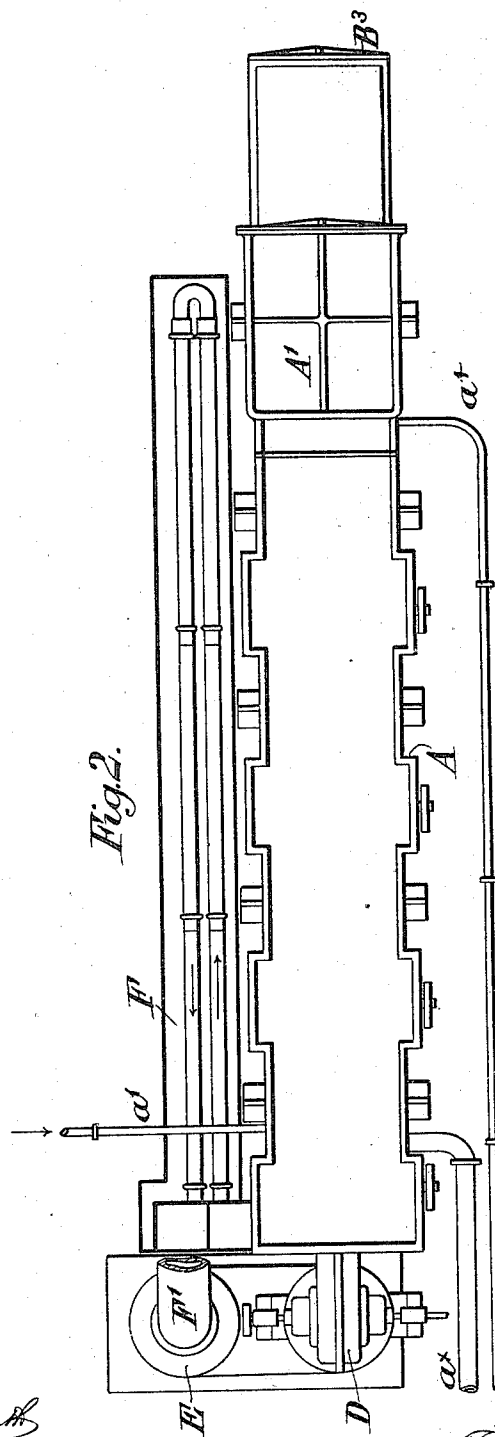
7 Sheets—Sheet 2.

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Witnesses

Chas. H. Smith
J. Staib

Inventor

F. N. Turney
per Lemuel W. Perrell
Att'y

(No Model.)

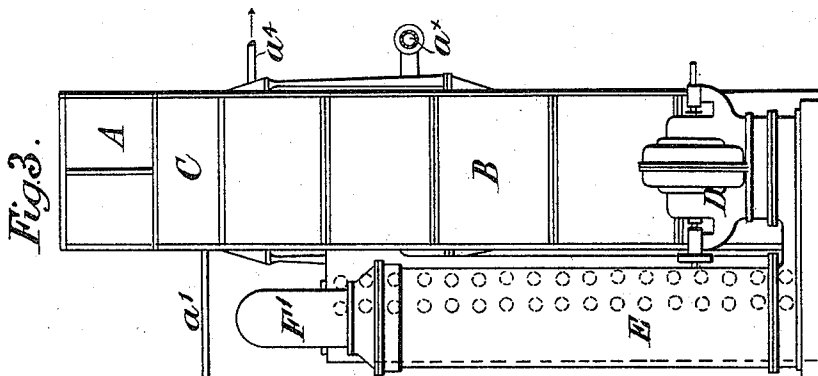
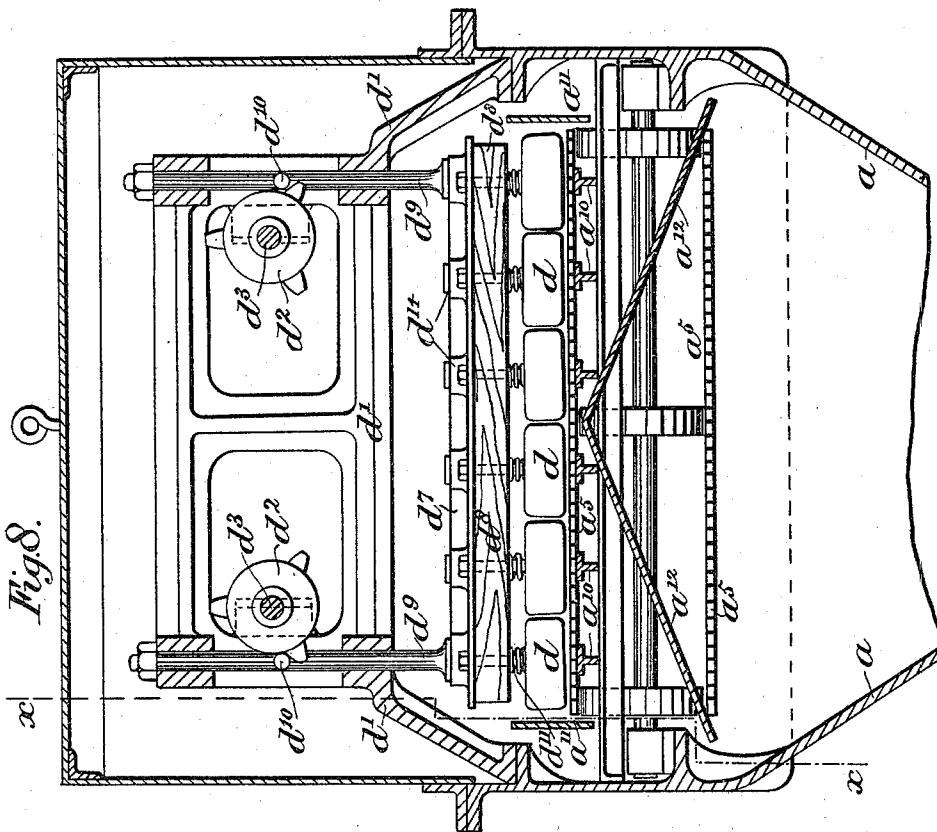
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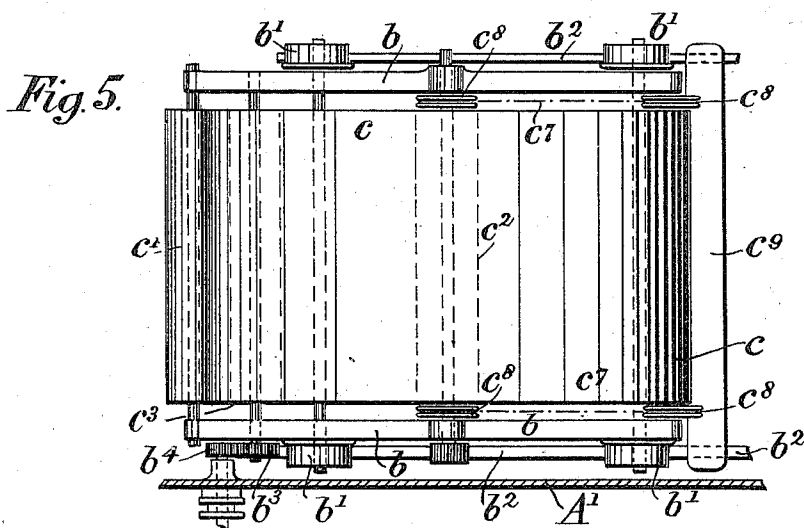
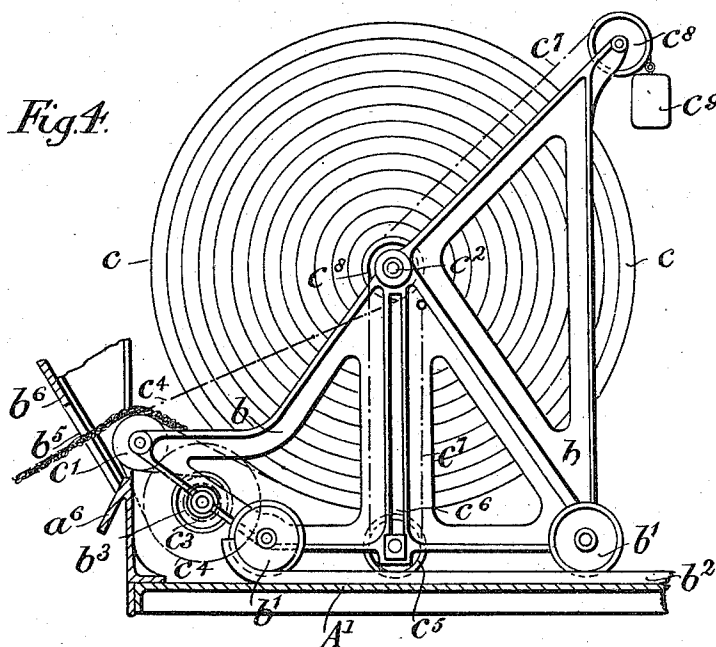
per Lemuel W. Serrell
Atty

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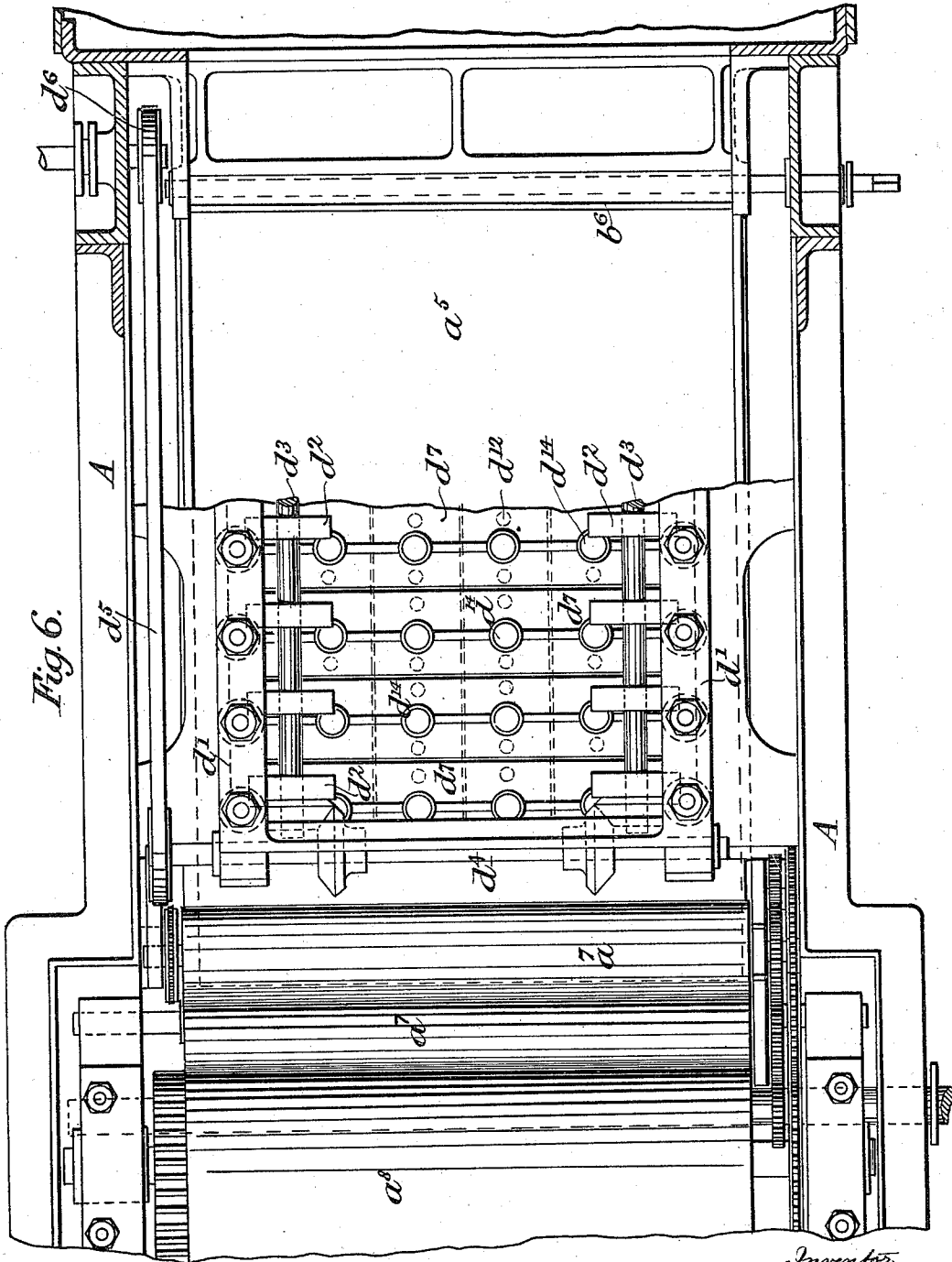
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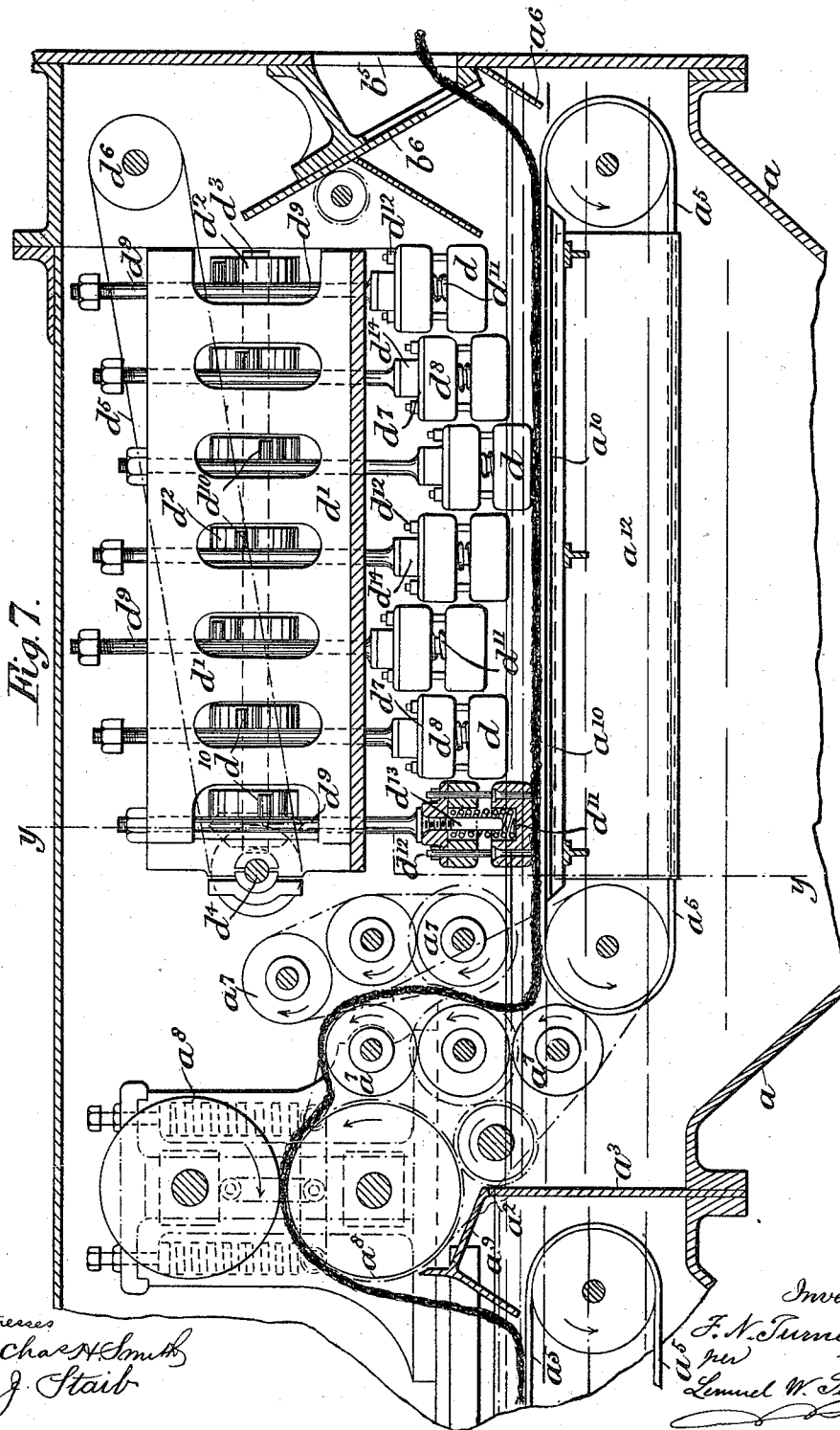
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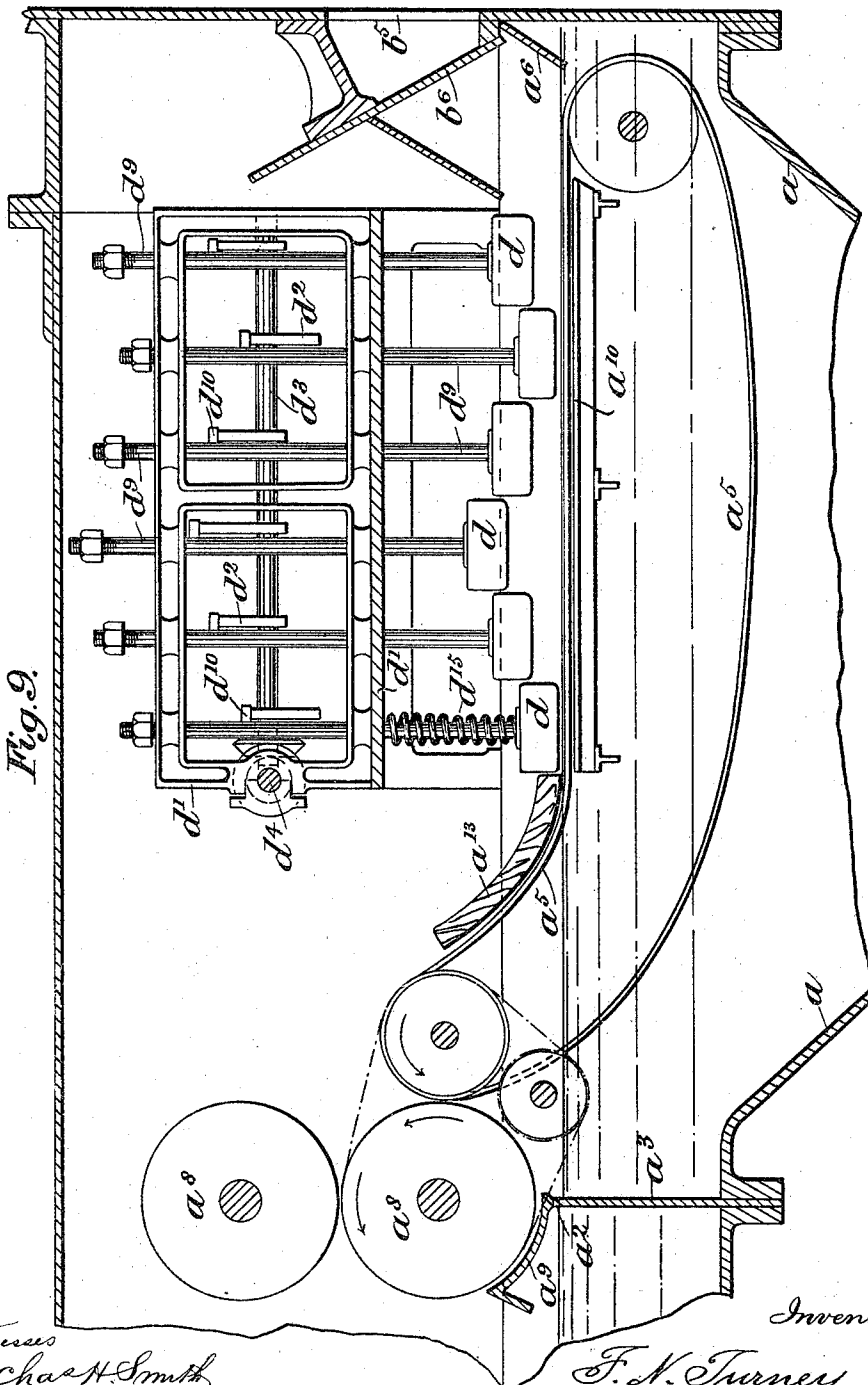
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UNITED STATES PATENT OFFICE.

FREDERICK NICHOLSON TURNEY, OF NOTTINGHAM, ENGLAND.

DEGREASING AND CLEANSING WOOL, COTTON-WASTE, &c., AND APPARATUS THEREFOR.

SPECIFICATION forming part of Letters Patent No. 579,524, dated March 23, 1897.

Application filed November 1, 1895. Serial No. 567,637. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK NICHOLSON TURNEY, a subject of the Queen of Great Britain and Ireland, residing at Nottingham, England, have invented certain new and useful Improvements in Apparatus for Degreasing and Cleansing Wool, Cotton-Waste, and Like Materials, of which the following is a specification.

10 This invention relates to improvements in means for degreasing and cleansing wool, cotton-waste, and like materials, the object being to effect these operations in a less troublesome and more economical and efficient manner
15 than heretofore with solvents such as petroleum-spirit or bisulfid of carbon in tanks arranged in vapor-tight apparatus provided with air-locks at its entrance and exit.

20 An essential feature of my invention consists in introducing the material to be treated into the apparatus in a continuous or practically continuous layer wound between the convolutions of a canvas or other band arranged in a specially-constructed winder or
25 winding apparatus, whereby a sufficiently large quantity of material can be introduced at a time into the entrance air-lock to keep the apparatus supplied for a considerable period.

30 A further essential feature consists in means for subjecting the material to a beating or stamping operation while in the solvent to facilitate the degreasing and cleansing, I having ascertained from experiment that this can
35 be effected, even in the case of wool, in solvents of the kind mentioned without fear of such wool becoming felted or having its quality impaired. To further diminish the risk of injury to the material, I may provide the
40 beaters or stamps with specially-constructed adjustable heads having cushioning-springs to deaden the force of impact.

45 In order that my invention may be readily understood, I will describe the same fully with reference to the accompanying drawings, in which—

50 Figure 1 is a vertical section, Fig. 2 a plan, and Fig. 3 an end view, showing the general arrangement of apparatus constructed according to this invention. Fig. 4 is a side elevation, and Fig. 5 a plan, of the specially-constructed winder above mentioned. Fig.

6 is a plan; Fig. 7, a longitudinal vertical section taken on the line $x x$ of Fig. 8; and Fig. 8 is a transverse section on the line $y y$ of Fig. 7, showing, to a larger scale, one of the tanks for the solvent and means for beating or stamping the material while immersed in the solvent. Fig. 9 is a transverse section showing a modified arrangement of certain
60 of the parts illustrated in Fig. 7.

Referring more particularly to Figs. 1 to 3, the apparatus is divided into two main portions or vapor-tight chambers A and B, arranged one above the other and communicating with each other by a vertical vapor-tight shaft or trunk C. The upper portion A forms a degreasing and cleansing chamber and has an inlet air-lock A', while the lower portion, B, forms a drying-chamber and has an exit air-lock B'. The apparatus also comprises settling-tanks and a still (not shown) for the purification and recovery of used solvent, and a fan or blower D, air-heater E, and a condenser F for the purpose of causing
75 a current of heated air to pass through the drying-chamber and for condensing and recovering the solvent carried off by such air.

The degreasing-chamber A is provided with a removable roof or cover A² to permit of 80 access to the interior.

a are the solvent-tanks, which are arranged in cascade or step-by-step fashion, the one farthest from the air-lock A' being at the highest level, so that the solvent, entering it
85 by an inlet-pipe a' , flows down from tank to tank through overflow-openings a^2 , Fig. 7, in the partitions a^3 between the tanks to the outlet-pipe a^4 , by which it passes to the recovery apparatus. It will thus be seen that
90 when the apparatus is at work the tank at the highest level contains the cleanest solvent and that each succeeding tank contains cleaner solvent than the next lower one. The tanks are preferably of hopper shape or are
95 formed with converging sides and communicate at their lower ends with a draw-off pipe a^x for the removal of sediment to settling-tanks. (Not shown.) Suitable valves a^{xx} are provided, so that each tank can be cleaned
100 separately without interfering with the others.

The winder or winding apparatus I employ for the purpose of winding the material between the convolutions of the canvas band

comprises a frame *b*, (see Figs. 4 and 5,) mounted on wheels *b'*.

c is the canvas band, which is adapted to be wound to and fro over a guide-roller *c'* between rollers *c²* and *c³*, the former of which receives it when the material is wound up in it, while the latter receives it in its ordinary state, as indicated by the chain-line *c⁴*. The material to be degreased and cleansed is spread upon the band by hand and can, if desired, be sorted while the said band is being wound from the roller *c³* onto the roller *c²*.

c⁵ is a pressure-roller for keeping the band tight and compressing the material. This roller *c⁵*, which rises and falls in guides *c⁶*, is held up against the band on the roller *c²* by chains *c⁷*, passing around loose pulleys *c⁸* on the roller-axle and attached to a weight *c⁹*, the other ends of the chains being secured to the frame *b*.

When the winder is full, it is run into the entrance air-lock on the rails *b²*, and means are provided for causing the band to be unwound from outside the apparatus. In the present case this is effected by a pinion *b³* on the axle of the roller *c³*, which pinion comes into engagement with a pinion *b⁴* inside the air-lock *A'*, whose axle passes out through the wall of this air-lock, and is driven by differential gear or any other suitable means. This arrangement enables the band *c* to be unwound at a uniform rate from the roller *c²* onto the roller *c³* when the winder is inclosed in the air-lock, and during this unwinding the material falls off the band over the guide-roller *c'* through an opening *b⁵* (provided with a sliding door *b⁶*, operated through a rack and pinion from outside) to the first of the tanks *a* in the degreasing-chamber over a ledge *a⁶*.

In each tank *a* is provided a perforated endless apron or sheet *a⁵*, (driven by any suitable means,) onto which the incoming material falls, and by which it is conveyed to the other end of the tank, where there are arranged rollers *a⁷*, (driven by any convenient means,) which receive the material from the perforated endless apron or sheet *a⁵* and raise it to a pair of squeezing-rolls *a⁸*, which squeeze the solvent out of it before it finally leaves the tank, the said solvent being conducted back into the tank by means of a drip-guide *a⁹*.

The perforated endless aprons *a⁵* are of suitable material and travel over suitable supports *a¹⁰*, and are submerged only to such an extent as is necessary to cause the material on them to be properly covered with solvent. *a¹¹* are guard-plates arranged at each side of the apron to prevent any material on the said apron falling into the tanks. To prevent the dirt falling upon the lower portion of the endless apron *a⁵*, an inclined guide *a¹²* is arranged within the apron to conduct the dirt to the converging sides of the tank.

Instead of the aprons perforated rollers may be employed, and the material may be lifted up to the squeezing-rolls by bands, if desired.

The beaters or stamps, which are made of

wood or other suitable material, are in the arrangement shown in Figs. 6 to 8 provided with adjustable heads *d*, and are arranged in sets in a suitable framing *d'* above each of the aprons, (or perforated rollers.) They are operated by wipers *d²*, mounted on shafts *d³*, driven by bevel-gear from a transverse shaft *d⁴*, which derives its motion, by means of a belt (or chain) *d⁵*, from a pulley *d⁶*, whose axle passes out through a stuffing-box in the outer wall or casing of the apparatus, and is driven by any suitable means. The beater-heads are arranged in transversely-disposed sets, each set being carried by a plate *d⁷*, having a wooden facing-block *d⁸*. At each end the carrying-plate *d⁷* is secured to a vertical lifting-rod *d⁹*, working in the framing *d'* and having a pin *d¹⁰*, upon which the wipers *d²* act to lift the beaters or stamps. Between the beater-heads *d* and the carrying-plate *d⁷* are arranged springs *d¹¹* (see Fig. 7) to cushion or deaden the blow or impact of the beaters upon the material, and each head is connected with the plate by rods *d¹²*, having adjusting-nuts, while down the center of each spring extends a steadying-pin *d¹³*, the outside steadying-pins of each set being continuations of the lifting-rods *d⁹*, and the intermediate ones being secured in enlargements or bosses *d¹⁴* on the said carrying-plate.

The wipers *d²* serve to impart to the beaters short rapid strokes, so that they beat out the dirt and cause the solvent to thoroughly permeate the material.

In the modification shown in Fig. 9 each beater consists of a single board or head *d*, the length of which is about equal to the width of the endless band or apron, instead of consisting of a set of heads or square blocks provided with separate springs and guide-rods. This board or head is secured at each end to a vertical lifting-rod *d⁹*, working in the framing *d'*, and around the lower end of said rod *d⁹* may be arranged a helical spring *d¹⁵* between the board *d* and the framing *d'*, or the boards may be weighted to fall upon the material by gravity. The apron *a⁵* in this case hangs loosely over rollers arranged at different levels, as shown, and conveys the material directly up to the squeezing-rolls *a⁸* without the intervention of rollers, such as *a⁷*. A guide-plate *a¹³*, fixed to the walls of the tank and suitably curved to the sag of the apron *a⁵*, is arranged at each side thereof to maintain the apron even and of uniform curve.

The material on leaving the squeezing-rolls of the last tank falls down the vertical shaft *C* into the drying-chamber *B*, which is divided by horizontal staggered partitions *e* into a number of compartments, through which warm air is caused to circulate in the direction indicated by the curved arrows by the fan *D*, as hereinbefore mentioned. Steam-pipes *e'* may be arranged inside the drying-chamber to increase or to maintain the temperature, as required. The said air after

leaving the drying-chamber passes through an aperture e^2 to the condenser F, and thence by a pipe F' to the air-heater E previous to being again forced through the drying-chamber. In each of the said compartments of the drying-chamber is an endless belt e^3 , formed advantageously of chains carrying slatwork, the belt in one compartment traveling in the opposite direction to that in the next, as indicated by the straight arrows, and a space is left at the end of each belt and partition to allow for the passage of the material from one belt to the other.

The material falls down the vertical shaft C onto the uppermost belt, by which it is carried along to the opposite end of the drying-chamber, and falls onto the belt below, and so on until it arrives at the lowest belt of all. Guide boards or plates e^4 are arranged, as shown, to guide the material in its passage through the drying-chamber.

The lowest belt of the drying-chamber projects through an opening into a vertical compartment B', in which the material is caught between a pair of vertical endless belts f , which raise it to the upper part of the vertical compartment and drop it into a hopper f' , having a vapor-tight door f^2 , worked from outside by a rack-and-pinion arrangement f^3 or otherwise. This door is normally open, so that the material falls through the hopper into the exit air-lock B² and collects therein.

When a sufficient quantity of degreased, cleansed, and dried material has accumulated in the air-lock B², the door f^2 is closed; the outer door B³ of the air-lock B² is opened, and the accumulated material removed. This does not interfere with the working of the apparatus, as the material delivered from the drying-chamber is meanwhile being collected in the hopper, from which, however, it passes into the air-lock B² immediately the latter has been emptied, the door B³ closed, and the door f^2 opened. A glazed aperture B⁴ may be provided in the exit air-lock to enable the attendant to see what quantity of material has accumulated.

In some cases, as, for instance, when the material is to be taken direct from the exit air-lock to preparatory or to combing machines, the vertical bands and the hopper may be dispensed with, and a winder similar to that hereinbefore described may be placed in the exit air-lock, and the material may pass directly to it and be wound up thereon.

The entrance air-lock and the exit air-lock, if necessary, can be connected with condensing-coils by means of piping, and an exhaust-fan can be used to withdraw the vapor and to blow a current of cool air through the air-locks or through the entire apparatus to avoid danger to the attendants on opening the washing-chamber or repairing the apparatus.

The solvent for the degreasing and cleansing operations is admitted to the last or highest of the series of tanks and flows successively from tank to tank through the openings a^2 in

a direction contrary to that in which the material is passing through said tanks. From the lowest or first of the tanks the solvent flows to a still, wherein it is recovered for reuse.

Having fully described my invention, what I claim is—

1. In the process of degreasing and cleansing wool, the step which consists in immersing such wool in a volatile solvent and beating it therein whereby the grease and foreign substances are separated and the felting of the fibers prevented substantially as set forth.

2. In the degreasing and cleansing of wool, the process which consists in beating it in successive quantities of volatile solvent, each of which is cleaner than the preceding quantity, substantially as set forth.

3. In degreasing and cleansing wool, cotton-waste or other fibrous material, the process which consists in winding up said material in a roll or spiral, then unwinding it and passing it repeatedly through a volatile solvent, beating it during each immersion in the solvent, squeezing it after each immersion, and drying it by passing over it a current of warm air, substantially as described.

4. In apparatus for degreasing and cleansing wool, cotton-waste or other fibrous material, the combination of an entrance air-lock, a winder for winding up the material into a roll or spiral, a band on the winder for receiving said material, a pair of rollers to which said band is connected, a pinion on said winder for rotating the rollers, and a second pinion adapted to engage with the latter when the winder is in position, the axle of this latter pinion passing out through the wall of the air-lock to enable the roll to be unwound from outside said air-lock, substantially as described.

5. In apparatus for degreasing and cleansing wool, cotton-waste or other fibrous material, the combination of a drying-chamber, an exit air-lock for removing material dried in said chamber, a compartment between the drying-chamber and the air-lock, a pair of endless belts in said compartment for raising the dried material, a hopper to receive the material so raised, and an air-tight door for controlling the passage of the material into the air-lock, substantially as described.

6. In apparatus for degreasing and cleansing wool, cotton-waste or other fibrous material, the combination of a degreasing-chamber, an air-lock for permitting the supply of material to said chamber without loss of solvent vapor, solvent-tanks in said degreasing-chamber, beaters for beating the material, squeezing-rolls situated between the tanks, a drying-chamber divided into horizontal compartments, a trunk leading from the degreasing to the drying chamber, endless belts in said drying-chamber for carrying the degreased and cleansed material, means for causing a current of warm air to flow over the material on said belts, means for recovering the vapor of solvent carried off by said air, a

second air-lock for removing the dried material, a vertical compartment between the drying-chamber and the air-lock, vertical endless bands in said compartment for raising the dried material, and a hopper above the air-lock to receive the material raised by the bands during the time the air-lock is being emptied, substantially as described.

7. In an apparatus for degreasing and cleansing wool and other fiber, the combination with the tanks containing the solvent, of an inclosure for retaining vapors from such solvent, a chamber at the receiving end and a movable door forming an air-lock, a carriage and rollers and a belt carried by such carriage for receiving and inclosing the fibrous material to be cleansed, means for unwinding such belt and delivering the fibrous material progressively into the solvent, belts for carrying such material along through the solvent and beaters acting upon such material to remove the grease or soluble substances, substantially as set forth.

8. The combination with the tanks for holding the solvent and an inclosure for retaining the vapors from such solvent, of a chamber and air-lock at the receiving end, a belt and roller upon which such belt is wound for holding the fibrous material between the convolutions of the belt, means for unwinding the belt and delivering the fibrous material progressively after the belt has been introduced into the air-lock, means for carrying the fibrous material along progressively through the tanks and for subjecting the same to beating and squeezing operations in the successive tanks, substantially as set forth.

9. The combination with the tanks for holding the solvent and an inclosure for retaining the vapors from such solvent, of a chamber and air-lock at the receiving end, a belt and roller upon which such belt is wound for holding the fibrous material between the convolutions of the belt, means for unwinding the belt and delivering the fibrous material progressively after the belt has been introduced into the air-lock, means for carrying the fibrous material along progressively through the tanks and for subjecting the same to beating and squeezing operations in the successive tanks, a drying-chamber substantially air-tight having belts within the same for receiving the fibrous materials and exposing them to the action of heated air, means for forcing into such chamber heated air, and a condenser through which the heated air is caused to pass for condensing the solvent, substantially as set forth.

10. The combination with the tanks for holding the solvent and an inclosure for retaining the vapors from such solvent, of a chamber and air-lock at the receiving end, a belt and roller upon which such belt is wound for holding the fibrous material between the convolutions of the belt, means for unwinding the belt and delivering the fibrous material progressively after the belt has been introduced into

the air-lock, means for carrying the fibrous material along progressively through the tanks and for subjecting the same to beating and squeezing operations in the successive tanks, a drying-chamber substantially air-tight having belts within the same for receiving the fibrous materials and exposing them to the action of heated air, means for forcing into such chamber heated air, and a condenser through which the heated air is caused to pass for condensing the solvent, a chamber for receiving the fibrous material after it has been dried, and a removable door for the discharge of the material periodically, substantially as set forth.

11. In an apparatus for removing grease and other materials from wool and other fibrous substances, the combination of a range of tanks containing a solvent, a substantially air-tight case and a chamber and air-lock at the reception end, mechanism within that chamber for supplying the fibrous material progressively into the solvent, mechanism for conveying such fibrous material through the solvent, squeezing-rollers for acting upon the material before it passes from one tank to the next, beaters for acting upon the fibrous material while in the solvent, a substantially air-tight chamber and conveying-belts within that chamber for receiving the fiber and subjecting the same to the action of heated air, means for forcing heated air into such chamber, delivery belts and rollers and a receiving-chamber and air-lock at the delivery end, substantially as set forth.

12. In an apparatus for removing grease and other materials from wool and other fibrous substances, the combination of a range of tanks containing a solvent, perforated aprons for carrying along the material, supports below the aprons, a range of beaters and mechanism for actuating such beaters and subjecting the wool or similar material to a beating operation while in the solvent, substantially as set forth.

13. In apparatus for degreasing and cleansing wool and other fibrous material in a volatile solvent, the combination of a solvent-tank, a vapor-tight chamber containing said tank, an endless band for carrying the material, beaters for beating the material and means for operating said beaters from outside the vapor-tight chamber, substantially as described.

14. In apparatus for degreasing and cleansing wool and other fibrous material in a volatile solvent, the combination of a series of tanks containing successively cleaner and cleaner solvent, a vapor-tight chamber inclosing said tanks, beaters for beating the wool while immersed in the solvent and means for operating said beaters from outside the vapor-tight chamber, substantially as described.

15. In apparatus for removing grease and other materials from wool and other fibrous substances, the combination of a range of

tanks containing a solvent, aprons, and means for moving the same and for carrying along the material progressively, supports below the aprons, a range of beaters and mechanism for actuating such beaters progressively above and directly upon the fibrous material, and subjecting the wool or similar material to a beating operation while in the solvent, substantially as set forth.

10 16. In an apparatus for removing grease and other materials from wool or other fibrous substances, the combination of a range of tanks containing a volatile solvent, a case and cover with the tanks forming a vapor-tight chamber, aprons, and means for moving the same and for carrying along the mate-

rial progressively, supports below the aprons, a range of beaters and mechanism for actuating such beaters progressively above and directly upon the fibrous material and connections therefrom to a source of power outside the vapor-tight chamber for subjecting the wool or similar material to a beating operation while in the solvent, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FREDERICK NICHOLSON TURNEY.

Witnesses:

ERNEST DE PASS,
C. D. HEARNPUR.