

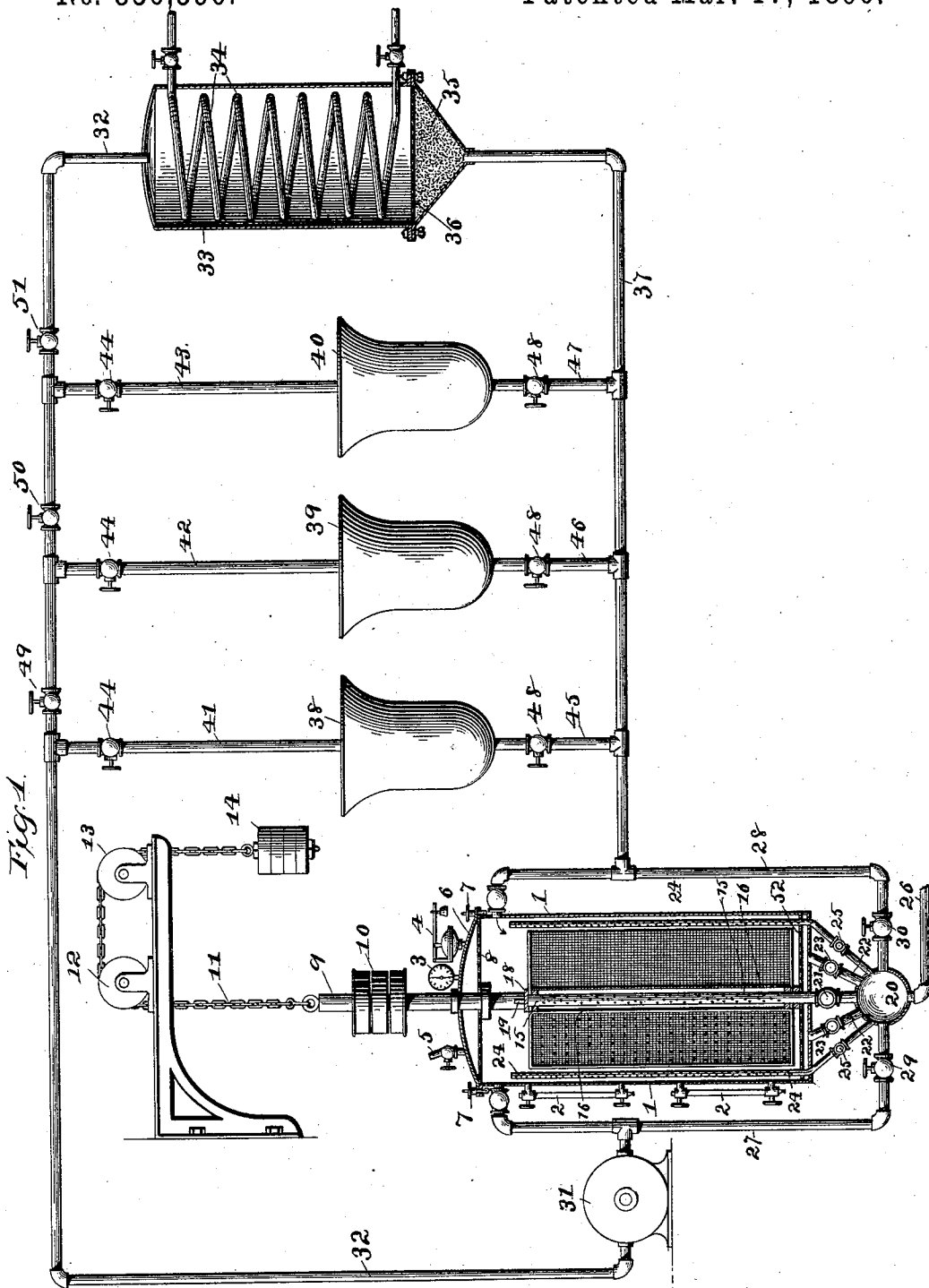
(No Model.)

2 Sheets—Sheet 1.

M. W. SUMMERSGILL.
APPARATUS FOR TREATING VEGETABLE FIBER.

No. 556,590.

Patented Mar. 17, 1896.



Witnesses
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(No Model.)

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Fig. 2.

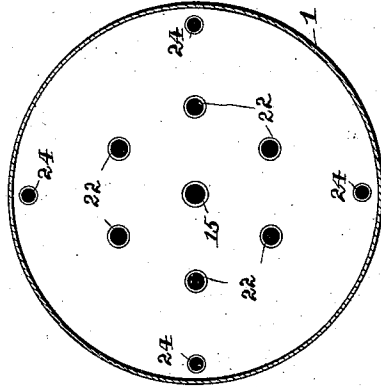


Fig. 4.

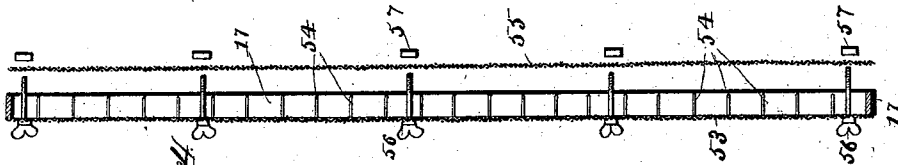
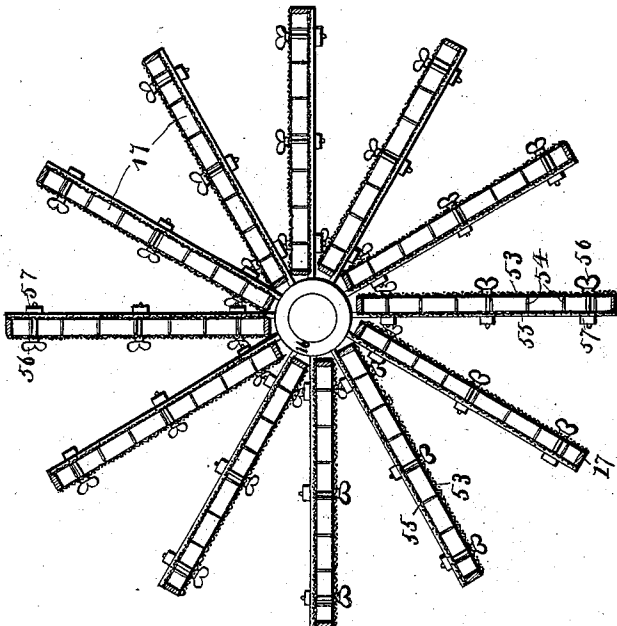


Fig. 3.



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UNITED STATES PATENT OFFICE,

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APPARATUS FOR TREATING VEGETABLE FIBER.

SPECIFICATION forming part of Letters Patent No. 556,590, dated March 17, 1896.

Application filed August 8, 1895. Serial No. 558,631. (No model.)

To all whom it may concern:

Be it known that I, MARK W. SUMMERSGILL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Treating Vegetable Fiber, of which the following is a full, clear, and exact specification.

10 My invention relates to a new and useful improvement in apparatus for treating vegetable fibers to free them from bark, pulp, and gum, whereby they may be rendered fit for use in the production of fabrics and the like, and has for its object to produce such an apparatus that shall greatly facilitate and cheapen the process of treatment and in which the action of the reducing solutions will be brought to bear upon all parts of the fiber uniformly.

With these ends in view the invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

25 In order that those skilled in the art to which my invention appertains may understand how to make and use the same, I will describe its construction and operation in detail, referring by number to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional elevation of my improved apparatus and the several devices used in connection therewith; Fig. 2, a horizontal section of the digester proper, the removable parts being omitted in order to show more clearly the relative position of the entrance of the several tubes to said digester; Fig. 3, a horizontal section of the receiver-frame; and Fig. 4, a vertical section of one of the receivers, the removable wire screen being shown in position prior to clamping.

Similar numbers denote like parts in the several views of the drawings.

45 1 represents the digester-tank, made preferably in boiler shape, and provided with water-gages 2, steam-gage 3, safety-valve 4, and blow-off 5, all of usual construction and for well-known purposes.

50 6 is a cap or head adapted to be secured steam and water tight to the top of the boiler for the purpose of closing the latter by means

of the swing-bolts 7. This cap is provided with a false head 8, perforated so as to arrest the passage of froth or foreign substances to the safety-valve or steam-gage, whereby the same might become clogged and rendered useless.

9 is a vertical shaft journaled in the cap 6 and false head 8, so as to revolve therein, and secured to this shaft are pulleys 10 for imparting motion thereto by means of a belt connected with any suitable motive power.

11 is a chain secured to the upper end of the shaft 9 and passing over suitable pulleys 12 and 13 and having secured to its opposite end weights 14 of sufficient heft to counter-balance the weight of the shaft, cap and parts carried thereby, for the purpose presently explained. Extending up through the bottom of the digester is a pipe 15 and around this is journaled the receiver-frame 16, composed of a number of receivers 17, radiating from the center to within close proximity to the sides of the digester.

18 is a cap secured to the upper end of the frame 16 and provided with a flattened extension 19, over which fits the slotted lower end of the shaft 9. Thus it will be seen that upon the rotation of said shaft the frame and receivers carried thereby will be caused to revolve upon and around the pipe 15, the object of which will presently appear. The lower end of the pipe 15 terminates in a globe distributing-chamber 20 and is provided with the valve 21 by which communication with said chamber may be established or cut off. Radiating from this chamber 20 are the tubes 22, each provided with a valve 23. They are preferably six in number and communicate with the bottom of the digester. Also radiating from the chamber 20 are the steam-tubes 24, provided with the valves 25. These tubes extend up within close proximity to the top of the digester and are provided with a number of small perforations throughout their vertical length, for the purpose hereinafter explained.

26 is a steam-pipe entering the under side of the chamber 20 and supplied from any convenient source with live steam.

27 and 28 are pipes connected with the digester at or near its top and extend downward, terminating in the chamber 20 and

provided with the valves 29 and 30. The pipe 27 is connected with a suitable pump 31, from which leads a pipe 32, which extends upward, then horizontally, and finally terminates in the filter 33, which is provided with a coil-pipe 34, connected with a steam source by which the contents of the filter may be heated. The bottom of this filter is made funnel-shaped and filled with any suitable filtering material 35, over which is placed a sieve 36. The pipe 28 is connected with the bottom of the filter by the pipe 37.

38, 39, and 40 are reservoirs disposed between the pipes 32 and 37 and connected with the former by pipes 41, 42 and 43, respectively, which are provided with valves 44, and the latter by pipes 45, 46 and 47, respectively, also provided with the valves 48, the object of which will be hereinafter set forth.

From the foregoing description the operation of my improvement will be as follows: The receivers 17 are filled with the fiber to be treated in its natural state, and the frame 16 carrying said receivers is placed within the digester around the tube 15, and the cap or head 6 is lowered into place and secured by the bolts 7, when by applying power to the pulleys 10 the shaft 9 will be caused to revolve, rotating the frame 16 and receivers 17. Now by opening the valve 48 of the tube 45 and the valve 30 the chemical which is contained in the reservoir 38 will flow into the digester until the latter has been sufficiently filled, when by admitting steam through the pipe 26 and pipes 15 and 24, by the proper manipulation of their valves, the contents of the digester will be thoroughly heated and acted upon by the steam-jets, which will issue from the perforations of the pipes 15 and 24, and when this has been carried to a sufficient degree the pump 31 will be put into action and the valves 48 and 30 closed and the valves 29, 49, 50, and 51 opened, which will set up a circulation of the liquid within the digester through the tubes 22, 27, and 32 and the filter 33, where the liquid will be further heated and returned again to the digester through pipes 37 and 28 and be discharged at the upper end of the latter, as shown by the arrow. When this operation has been carried on to a sufficient degree to free the fiber of its grosser incasement, such as bark, the liquid will be pumped back into the reservoir 38 by the proper manipulation of the valves and the material in the condenser subjected to the cleansing action of water by connecting the reservoir 39, which contains such water, with the condenser, by the manipulation of its valve 48, and repeating the process just described in connection with the reservoir 38, and when the water has accomplished its purpose it will be again returned to the reservoir 39 by the proper manipulation of the valves, after which the chemical contained in the reservoir 40 will be utilized to further remove the objectionable substances from the fiber under

treatment in the same manner as described in connection with the reservoirs 38 and 39, when the water will be again brought into action to thoroughly rinse and remove all foreign substances and chemicals from the fiber before removing the latter from the digester. Thus it will be seen that when the fiber has once been placed in the digester it will be treated in the several steps necessary to prepare it for use in the production of fabrics without the annoyance and loss of time attendant upon its frequent removal from said digester, which greatly lessens the cost of treatment as well as produces a better article, since the fibers are not disturbed when once placed in the receivers and therefore do not become entangled or broken.

I have found in practice that to hasten the operation of digesting or decomposing the objectionable substances surrounding the fiber it is advantageous to cause the circulation of the several liquids in various directions from the digester, and this is readily accomplished by the proper manipulation of the numerous valves, so that the liquid may be first fed in at the top of the digester upon one side and exhausted at the bottom, or exhausted at the top and supplied at the bottom, which would facilitate the action of said liquid upon all the contents of the digester.

To remove the fiber after its reduction, it is only necessary to unbolt the cap 6, when said cap, shaft and parts carried thereby may be elevated through the counterbalancing of the weight 14 and the frame and receivers carried thereby withdrawn from the digester, so as to be emptied and refilled.

During the process above described the tubes 22 are prevented from becoming choked by the false perforated bottom 52, which will check and retain any particles of bark or other substances which have not been decomposed sufficiently to pass through these perforations, and all of said foreign substances will be caught and retained by the sieve 36 and filtering material 35, which may be removed and cleansed at the termination of each complete operation.

To facilitate the placing of the fiber within the receivers, I form the latter by making a rectangular frame and securing thereto a wire netting 53, from which project a number of pins 54, around and among which may be wound the fiber, so as to prevent it from becoming entangled or falling to the bottom of the receivers, and when the fiber is thus placed a wire screen 55 incloses each receiver and is held in position by the thumb-screws 56 and any suitable nuts 57.

Heretofore the reduction of fiber has been a slow and tedious process, from the fact that it was placed in a stationary manner in a vat or digester, and the only action had upon it by the decomposing liquid was that occasioned by the circulation of said liquid; but by the use of my improvement I greatly reduce the length of time necessary to decompose the

foreign substances—such as bark, pulp and gum—and remove the same from the fiber by causing said fiber to be rapidly rotated within the decomposing liquid while said liquid is being circulated, and also increasing the action of said liquid upon the fiber by filtering and heating, so that it comes in contact with the fiber in a more pure and active state than would otherwise be the case.

10 Having thus fully described my invention, what I claim as new and useful is—

1. The herein-described combination of a digester-tank, a cap arranged on the top thereof and provided with a perforated false head, 15 a perforated pipe leading upward from the bottom, receivers radiating from the center consisting of rectangular frames with wire-netting secured thereon having pins to receive the fiber, a wire screen inclosing each receiver and a thumb-screw for retaining the 20 frame and screen in position, means for rotating the receivers and connections for ad-

mitting steam to the tank as and for the purpose described.

2. In combination, a digester, a shaft journaled centrally thereof, perforated pipes extending upwardly around the tank, fiber-receptacles radiating from the shaft and taking motion therefrom, the receptacles consisting of frames of wire-netting provided with pins, 30 a wire screen inclosing each receiver, screws for securing the parts together, means for rotating shaft, a distributing-chamber arranged below the tank and connected therewith by a series of pipes by which a circulation of the 35 liquid is obtained, as and for the purpose described.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

MARK W. SUMMERSGILL.

Witnesses:

S. S. WILLIAMSON,
ALLISON W. McCURDY.