

J. A. BUTLER & L. FLICK.

KEIR.

APPLICATION FILED APR. 17, 1908.

958,591.

Patented May 17, 1910.

3 SHEETS—SHEET 1.

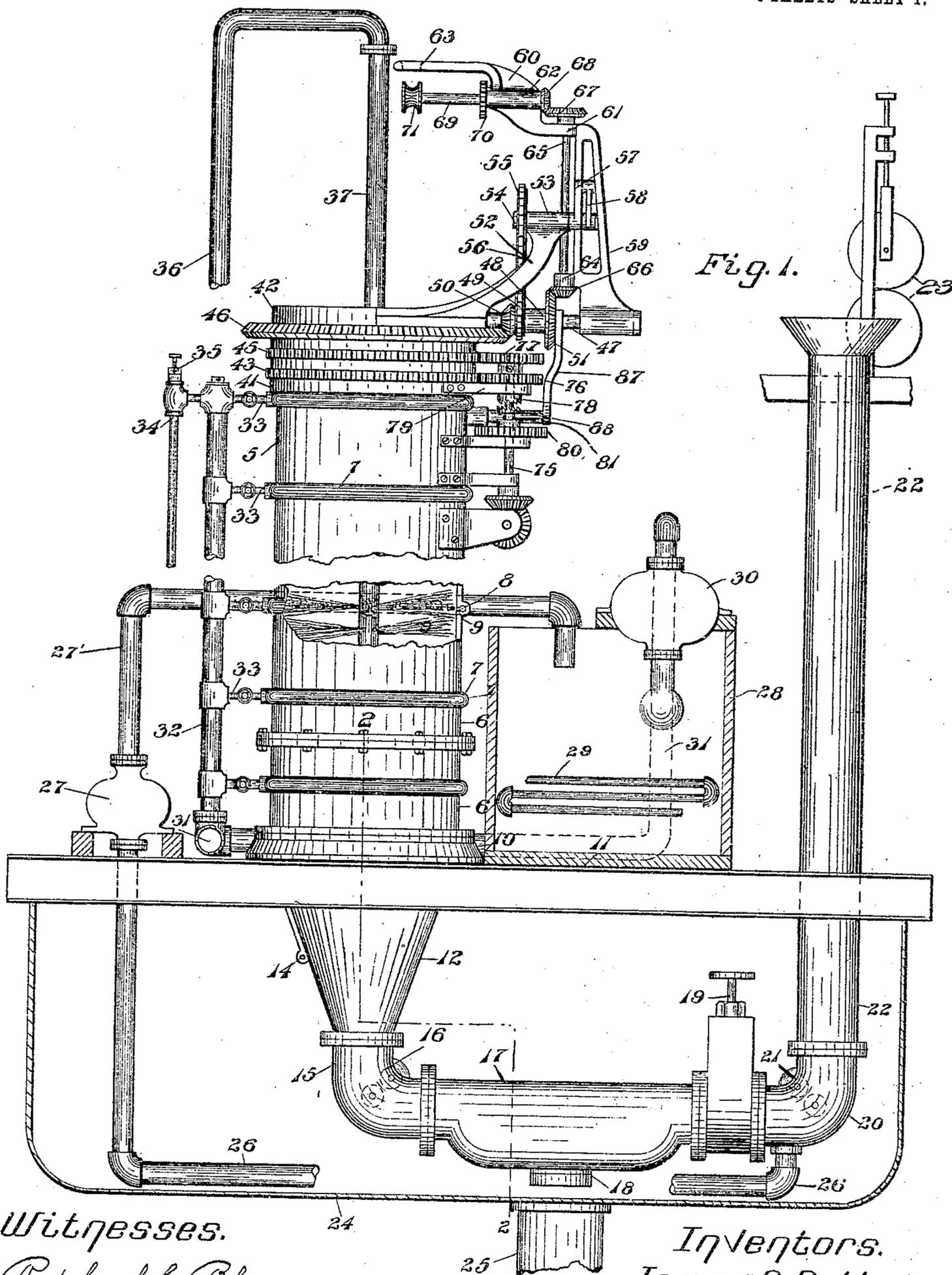


Fig. 1.

Witnesses.  
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3 SHEETS—SHEET 2.

Fig. 2.

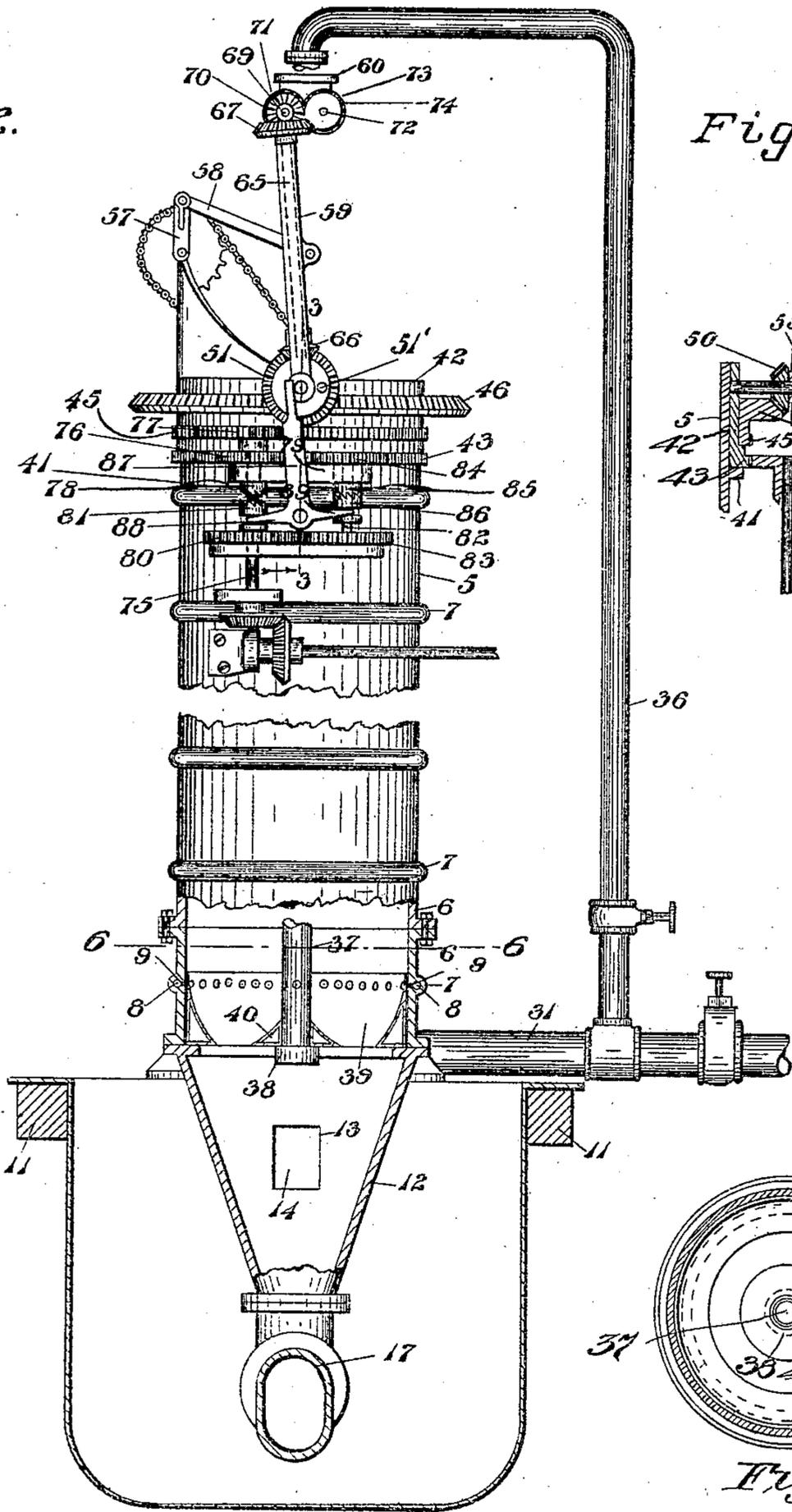


Fig. 3.

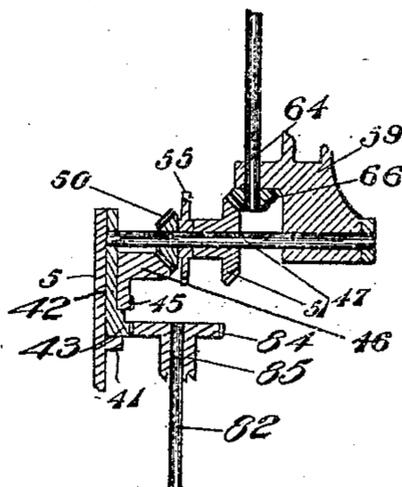
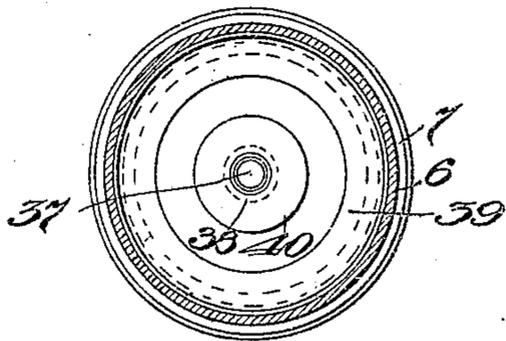


Fig. 6.



Witnesses.

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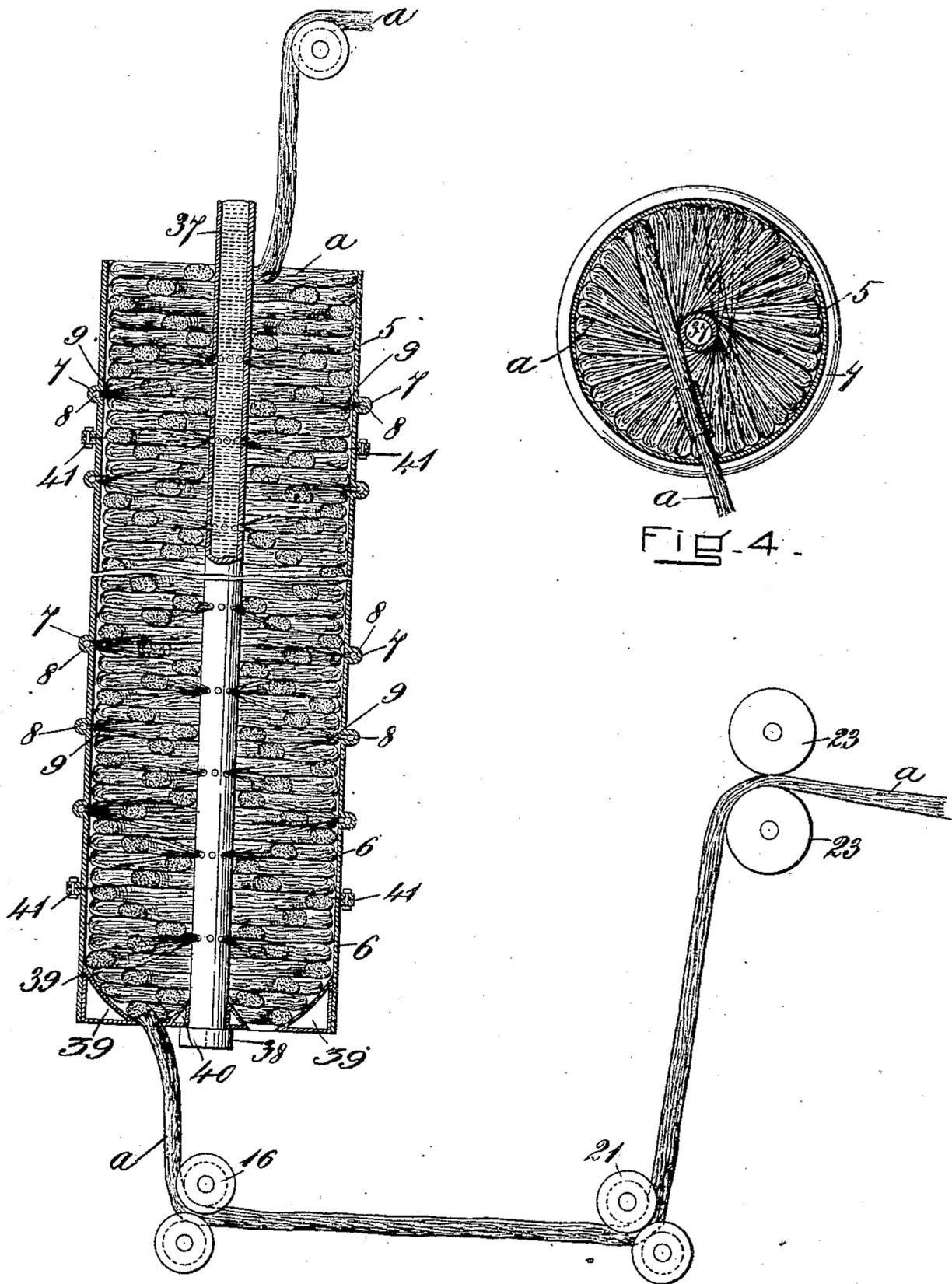


Fig. 5.

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# UNITED STATES PATENT OFFICE.

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KEIR.

958,591.

Specification of Letters Patent.

Patented May 17, 1910.

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*To all whom it may concern:*

Be it known that we, JAMES A. BUTLER, of Winthrop, in the county of Suffolk, State of Massachusetts, and LORENZ FLICK, of Saylesville, in the county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Keirs; and we hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings forming part of this specification.

This invention has reference to improvements in keirs in which certain steps in the processes of bleaching, dyeing or scouring textile fabric are carried out.

The invention relates particularly to those improvements in keirs of this general nature whereby textile fabric, preferably in rope form, may be continuously fed into the keir in cross loops staggered with relation to each other, to form a stack of such material, there to be subjected to the action of heated fluid injected into said stack radially outward from its central portion, and inward from its periphery, and for continuously drawing the fabric so treated from said keir.

One object of the invention is to so construct a keir of this nature that fabric continuously fed thereto and drawn therefrom may be subjected, in a single keir chamber, to the action of constantly supplied chemical fluid.

Another object of the invention is to so construct a keir in which a column or stack of fabric arranged in transverse laps may be continuously maintained in an immersed condition that additional fresh fluid may be injected at intervals into said stack of fabric whereby the fluid in the keir is caused to circulate between the folds and layers of fabric forming said stack and the chemical action is increased by the addition of the fresh fluid.

Another object of the invention is to so construct a keir of this nature that fabric fed thereto may be received and supported from entanglement.

Another object of the invention is to so construct a keir of this nature that fabric may be fed thereto and folded therein in a series of layers of transverse laps arranged in staggered relation.

The invention consists in the peculiar

construction of the keir, and the combination therewith of the novel means for feeding the textile material to the keir and folding such material therein.

The invention also consists in such peculiar features in the construction of certain parts of the mechanism and in such novel combinations of parts as shall hereinafter be more fully described and pointed out in the claims.

Figure 1, represents a side elevation of the improved keir portions of the same being broken away and other portions thereof being shown in section. Fig. 2, represents a similar view taken at right angles to that shown in Fig. 1, on line 2—2 of said Fig. 1. Fig. 3, represents a vertical sectional view of portions of the keir taken on line 3—3 Fig. 2. Fig. 4, represents a cross section of the keir showing a plan view of the stack of material approximately as it is arranged in the keir. Fig. 5, represents a vertical sectional view of portions of the stack of material approximately as it appears in its passage through the keir and illustrating, diagrammatically, the method of subjecting said stack of cross folded material to the action of cross currents of the bleaching or other fluid. Fig. 6, represents a cross sectional plan view of the keir taken on line 6—6 Fig. 2.

Similar characters of reference designate corresponding parts throughout.

In carrying this invention into practice the keir is formed as a cylindrical chamber preferably comprising a series of sections and 6—6 having flanges, which are secured together, and annular tubular ribs 7—7 the channels 8—8 of which communicate with the inner surfaces of said sections by means of the perforations 9—9. The lowermost of said sections 6 is supported on the base which is mounted on beams 11—11 or any other suitable foundation. Depending from the lowermost section 6 is the inverted conical chamber 12 having the man hole closed by the door 14 and this chamber 12 is connected by the elbow 15, furnished with the guide roll or pulley 16, with the settling compartment 17 having the normally closed drain outlet 18 and communicating through the chamber of the gate valve 19, with the elbow 20 having the guide roll or pulley 21 and connected with the outlet 22 above

which is placed the set of squeeze rolls 23 of any ordinary construction and adapted to be operated in any ordinary manner. This outlet 22 may extend any suitable distance above the elbow 20, so that as it is desired to operate the keir with the valve 19 open the mouth of said outlet will be above the water level in the keir. Those portions of the mechanism located below the beams 11—11 are preferably contained within the chamber 24 having the outlet 25 and in the chamber is preferably located the pipe 26 which is connected at one end with the elbow 20 while the other end of said pipe extends above said chamber 24 and communicates with the pump 27 from which the delivery pipe 27' extends to the heating tank 28 furnished with steam pipes 29 and supplied with the pump 30 which is connected by the pipe 31 with the riser 32 extending upward alongside of the keir and communicating at intervals by means of the valved pipes 33—33 with the channels 8—8 of the ribs 7—7 and is furnished with the outlet pipe 34 supplied with the relief valve 35, whereby constant pressure may be maintained in said pipe 32. The pipe 31 also connects with the pipe 36 which extends above the upper end of the keir and bends inward and downward to connect with the depending pipe 37 perforated at intervals, which extends downward through the axis of the keir sections 5 and 6—6 and has at its lower end the shoulder 38. Slidably mounted on said pipe 37 within the keir is the annular hollow float pan 39 slidably within the casing 6 and having a wall extending toward the pipe 37 which pipe is embraced by the annular hollow collar 40 slidably on said pipe, the pan 39 and the collar 40 being, by reason of their construction, of less specific gravity than the fluid they displace whereby these parts 39 and 40 may float upward with the rise of fluid in the casing 5.

Rotatably supported on the flange 41 of the upper cylindrical keir section 5 is the annular member 42 on which is mounted the fabric folding or plaiting mechanism. The lower portion of this member 42 is furnished with the annular gear 43 and supported on said gear 43 is rotatably mounted the annular gear 45 having the bevel gear 46. On said member 42 is secured a hub having the pivot stud 47 on which is journaled the sleeve 48 having the sprocket 49 and the bevel gears 50 and 51 the former of which is engaged with the annular bevel gear 46 and the latter of which has the pin 51'.

Mounted on the rotatable annular member 42 is the arm 52 having at its upper end the bearing 53 in which is journaled the shaft 54 of the sprocket 55. This sprocket is driven by the chain 56 from the sprocket 49, and the crank arm 57 on said shaft 54 is connected by the pivoted rod 58 with the

arm 59 which is pivotally mounted on the pivot stud 47 and, at its upper end, has the member 60 which extends over the top of the keir and has the bearings 61, the hub 62 and the guide eye 63. In the bearings 64, of arm 59, and 61 of the member 60 is journaled the shaft 65 having the bevel gears 66 and 67 of which the gear 66 is driven from the bevel gear 51 while the gear 67 drives the bevel gear 68 on the shaft 69 which is journaled in the hub 62 and has the pinion 70 and the feed roll 71. In the hub 62 is also journaled the shaft 72 which has the feed roll 73 and the pinion 74 which is driven from the pinion 70.

The drive shaft 75 is preferably journaled in bearings which are supported by the keir and any usual mechanism is provided to drive such shaft. At its upper end said shaft 75 is furnished with the gears 76 and 77 of which the latter meshes with and drives constantly the annular gear 45 while the gear 76 meshes with the gear 43 of the rotatable member 42. This gear 76 with its clutch member 78 is free to rotate independently of the shaft 75 and is rotatably supported by the bracket 79 extending from the keir section 5. On said shaft 75 is also mounted the gear 80 above which is the slidable clutch member 81. In the bracket 79 is also journaled the shaft 82 having at its lower end the gear 83 which is driven from the gear 80, and at its upper portion the loose gear 84 which meshes with the gear 43 and is furnished with the clutch member 85 complementary to the clutch member 86 slidably on said shaft 82 and adapted, when moved into engagement with the member 85, to connect said shaft and the gear 84. On the bracket 79 is pivotally mounted the clutch actuator 87 having the levers 88 and 89 engaged with the clutch members 78 and 85 the stem of said actuator 87 extending to a position to be acted upon by the pin 51' of the gear 51 at times.

Fabric to be treated in this keir usually consists of a large number of pieces sewed end to end and ropy in form, from having been drawn through a succession of guide eyes. This fabric or a leader therefor is led through the guide eye 63 and between the rolls 71 and 73 and thence through the keir to and through the opening in the float pan 39 and through the chamber 12, the compartment 17, the chamber of the valve 19, and the elbow 20 being guided through the elbows 15 and 20 by the respective rolls 16 and 21, to and between the squeeze rolls 23.

The tank 28 is of any suitable dimensions to contain the fluid to be used in the keir. Such dimension may vary somewhat in accordance with the capacity of the pumps 27 and 30 for if the capacity of such pumps about equal it is obvious that the tank 28

should not necessarily be of a larger capacity than is sufficient to maintain a body of fluid therein until it has become heated.

If now the pump 30 is started, fluid from the tank 28 will be pumped through the pipe 31 to the riser 32 from which it will be supplied, through those of the pipes 33—33 whose valves are open, to the channels 8—8 of the ribs 7—7 and will then enter the keir through the perforations 9—9 under any suitable pressure. A portion of the fluid will pass to the depending pipe 37 from the perforations in which such fluid will enter the keir.

After the chambers below the keir are filled with the fluid and the level of the fluid in the keir rises, the float pan 39 will rise with such fluid to any desired height in said keir.

In the position shown in Fig. 2, if the shaft 75 is now operated, motion will be imparted directly from said shaft through its gear 80 to gear 83 of shaft 82 and, if the parts are in position as shown in Fig. 2 of the drawings, through gear 84, temporarily connected with said shaft 82, to the annular gear 43 to rotate said gear 43 and its member 42 in a direction opposite to that in which gear 45 and its bevel gear 46 are driven, the relative motion between the parts 42 and 46 effecting the rotation of shaft 47 through its gear 50.

By the rotation of the member 42 the parts mounted thereon are caused to move in a circular path and the bevel gear 50 will be rotated, through its engagement with the annular bevel gear 46 to drive the sleeve 48 with its sprocket 49 and gear 51. From the sprocket 49 motion is transmitted by the chain 56 to the sprocket 55 to rotate the shaft 54 and its crank arm 57 and to effect the constant vibration of the arm 59, pivoted on the stud 47. At the same time the rotation of the gear 51 drives the gear 66 of the shaft 65 whereby the gear 67 drives the bevel gear 68 on the feed shaft 69 from which motion is imparted through the pinions 70 and 74 to the shaft 72 and both of said shafts and their feed rolls 71 and 73 are driven in a direction to feed the cloth *a—*a** into the keir.

The effect of the vibration of the arm 59 is that fabric fed forward between the rolls 65 and 71 is carried back and forth transversely of the keir and laid in cross laps or folds while, by reason of the rotation of the member 42 and the parts carried thereby the direction of such cross laps of the fabric changes constantly whereby the successive folds assume staggered positions and overlap the preceding laps at different angles, as approximately shown in Figs. 4 and 5 of the drawings. When, in the rotation of the member 42 the stud 47 is carried around sufficiently that the pin 51' of its bevel gear 51 strikes the other side of the

clutch actuator 87 this actuator will be swung to effect the release of the clutch member 86 from the clutch member 85 and the engagement of the clutch member 81 with that marked 78 whereby the gear 76 is connected with the shaft 75 and the gears 76 and 77 drive the annular gears 43 and 45 in a reverse direction, during which movement the feeding and folding of the fabric ceases until the pin 51' again actuates the clutch lever 87 and the clutch 86 is again moved to connect the gear 84 with its shaft.

After a sufficient length of the fabric has been folded into the float pan 39 to overcome the buoyancy thereof this pan will gradually descend through the fluid until the bottom of the keir is reached and by this time a stack of the fabric will be formed in the keir but, it is apparent that the several constituent layers or folds of the fabric forming said stack will not be compacted to any marked degree owing to the comparatively small difference in specific gravity of the fabric and the fluid in which it is immersed. The extension of the cross folds of the fabric and their staggered relation assists in preventing the compacting of the material and the lateral disposition of the layers formed by each series of folded laps conduces to the access between said layers and between the laps of said layers of the currents of fluid created by the pressure of the lateral jets issuing from the perforations in the central pipe and in the walls of the keir.

With the valve 19 open, it is to be noted that the fabric may be continually pulled from the base of the stack while additional layers are added to the top thereof and the manner of folding the fabric in staggered laps prevents the entanglement of one layer with another so that the various laps are readily drawn off. This prevention of entanglement of the fabric is greatly assisted by the use of the float pan 39 which is always in position to receive and sustain the first laps and layers of the fabric and preventing their disarrangement in floating downward to the bottom of the keir.

At the completion of the bleaching or other process, or during the process if desired, the pump 27 is started to pump out the fluid passing to the elbow 20 and to deliver such fluid to the tank 28. When desired the closure to the compartment 17 may be removed to permit the fluid to drain away without operating the pump.

As the fabric *a—*a** is drawn through the squeeze rolls 23 the surplus fluid is squeezed therefrom and drains back into the outlet 22.

Attention is particularly called to the constant or controlled supplies of additional fluid to the keir from the series of perforations 9—9 as the column or stack of fabric moves downward thus maintaining the

strength of the fluid throughout the keir. If desired the fluid may be supplied mainly through the lowermost of the channels 8—8 and their perforations 9—9 whereby the fabric is subjected to the action of fluid of greatest strength just before leaving the keir.

Having thus described our invention we claim as new and desire to secure by Letters Patent.

1. A vertical keir furnished with fluid supply means, in combination with a bodily floatable fabric receiver.

2. A keir furnished with fluid supply means, in combination with a float bodily movable within said keir and having an opening through which fabric may be drawn from said float.

3. A keir furnished with fluid supply means, in combination with a fabric sustaining float bodily movable within said keir and having a guide opening through which fabric may be drawn.

4. A keir furnished with fluid supply means, in combination with a fabric sustaining float bodily movable within said keir and having an opening in its bottom through which fabric may be drawn.

5. A keir furnished with fluid supply means, in combination with a fabric sustaining float bodily movable within said keir and having an opening in its bottom and a wall inclined toward said opening.

6. A keir having an open lower end and a float supporting shoulder at said end, and fluid supply means for said keir, in combination with a fabric sustaining float adapted to be limited in its downward movement by said shoulder and having an opening in its bottom through which fabric may be drawn.

7. A keir having a vertically disposed fluid supply pipe forming a guide, in combination with a fabric sustaining float embracing said pipe and having an inclined upper wall and an opening in its bottom through which fabric may be drawn.

8. A keir having a vertically disposed fluid supply pipe forming a guide and fur-

nished at its lower portion with an enlargement, in combination with a fabric sustaining float slidable longitudinally of said pipe and having a member adapted to be supported at times by such enlargement and having an opening embracing said pipe.

9. The combination with a keir, of an oscillating fabric feeding means movably mounted with respect to the keir and means for effecting simultaneously the rotative movement of the fabric feeding means and its oscillation.

10. The combination with a keir, of a supporting member rotatably mounted thereon, driving means for such member, fabric guiding means pivotally mounted on said member, and means for effecting the oscillation of said fabric feeding means.

11. The combination with a keir, of a supporting member rotatably mounted thereon, driving means for said member, an arm pivotally mounted on said member, fabric feeding rolls rotatably mounted on said arm, means for effecting the oscillation of said arm simultaneously with rotation of said supporting member, and means for driving said fabric feeding rolls.

12. The combination with a keir, of a supporting member rotatably mounted thereon, an annular gear journaled on said member, means for driving said supporting member and said gear independently, a shaft mounted on said supporting member, an arm pivotally mounted on said shaft, fabric feeding means rotatably mounted at the upper portion of said arm, a sleeve journaled on said shaft and having a gear meshing with said annular gear, a sprocket and a drive gear, means actuated by the rotation of said sprocket for effecting the oscillation of said arm, and means operated by said drive gear for driving said fabric feeding means.

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