No. 782,147. PATENTED FEB. 7, 1905.

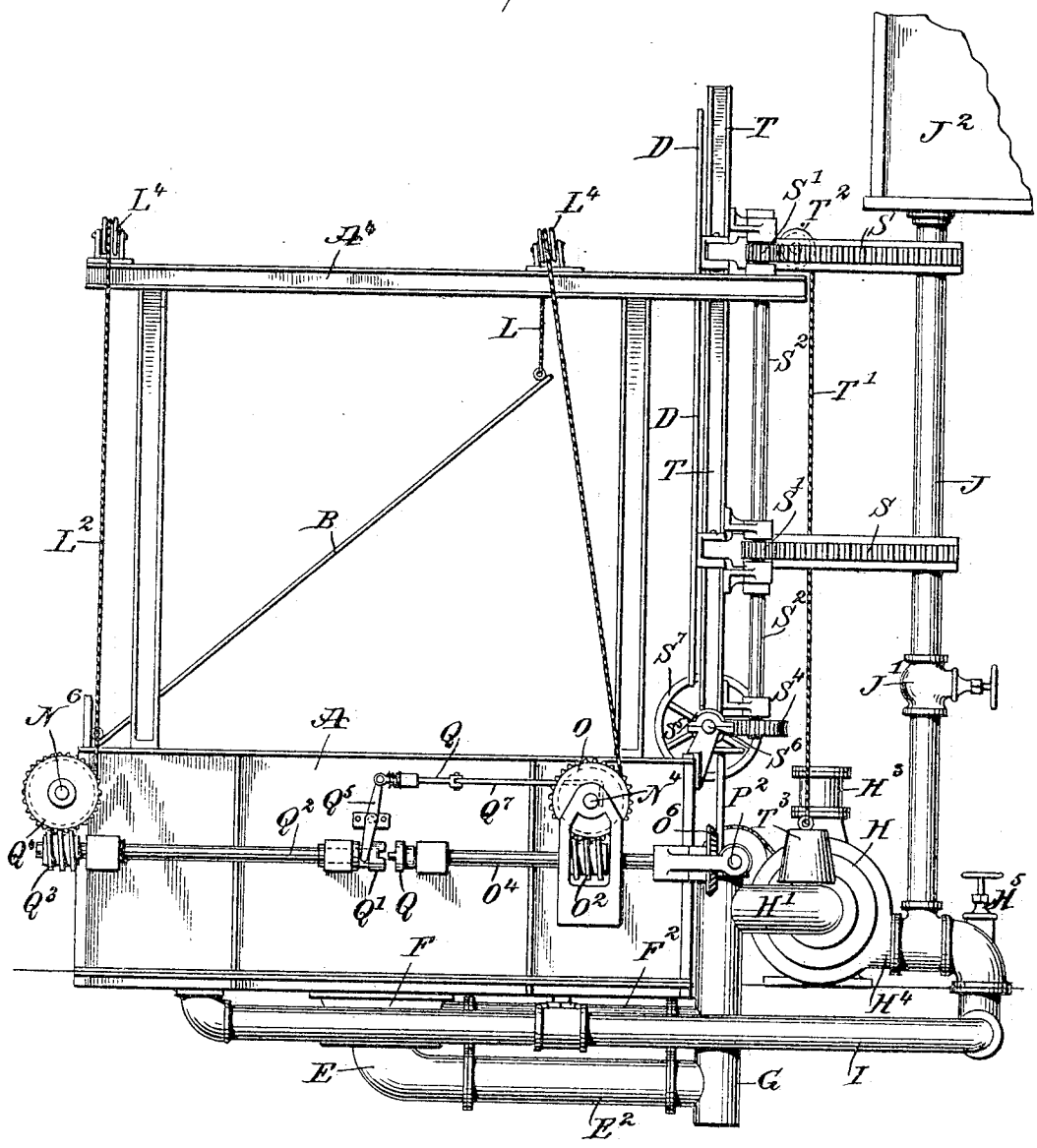
J. LEISEL.

DYEING MACHINE.

APPLICATION FILED APR. 8, 1904.

6 SHEETS—SHEET 1.

Fig 1



WITNESSES:

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Geo. G. Hoosten

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ATTORNEYS

No. 782,147. PATENTED FEB. 7, 1905.

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6 SHEETS—SHEET 2.

Fig 2

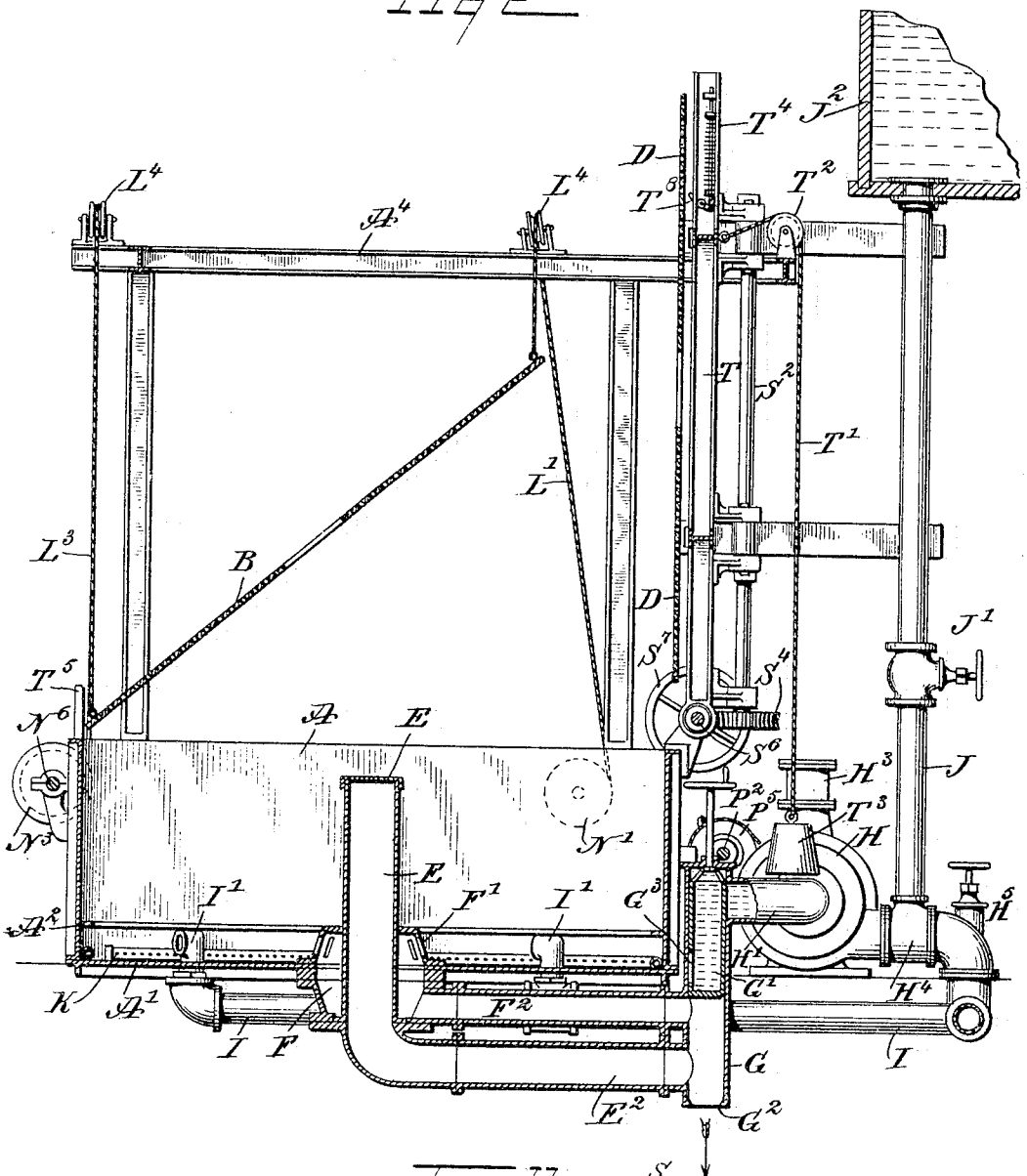
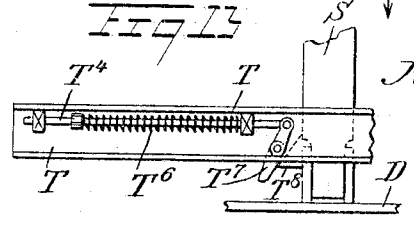


Fig 3



WITNESSES:

A. H. Walker

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No. 782,147. PATENTED FEB. 7, 1905.

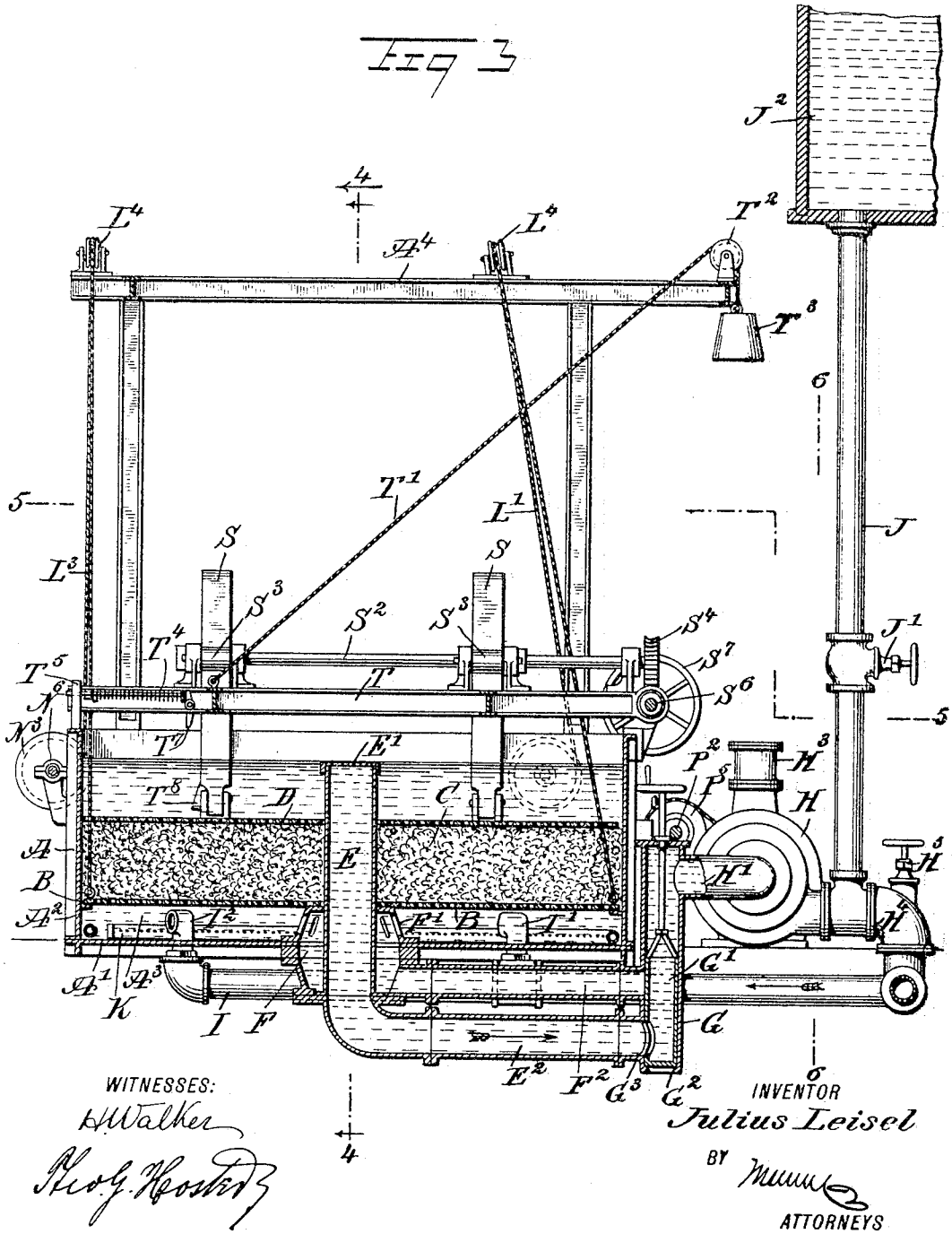
J. LEISEL.

DYEING MACHINE.

APPLICATION FILED APR. 8, 1904.

6 SHEETS—SHEET 3.

Fig 3



WITNESSES:

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No. 782,147. PATENTED FEB. 7, 1905.

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DYEING MACHINE.

APPLICATION FILED APR. 8, 1904.

6 SHEETS—SHEET 4.

Fig 4

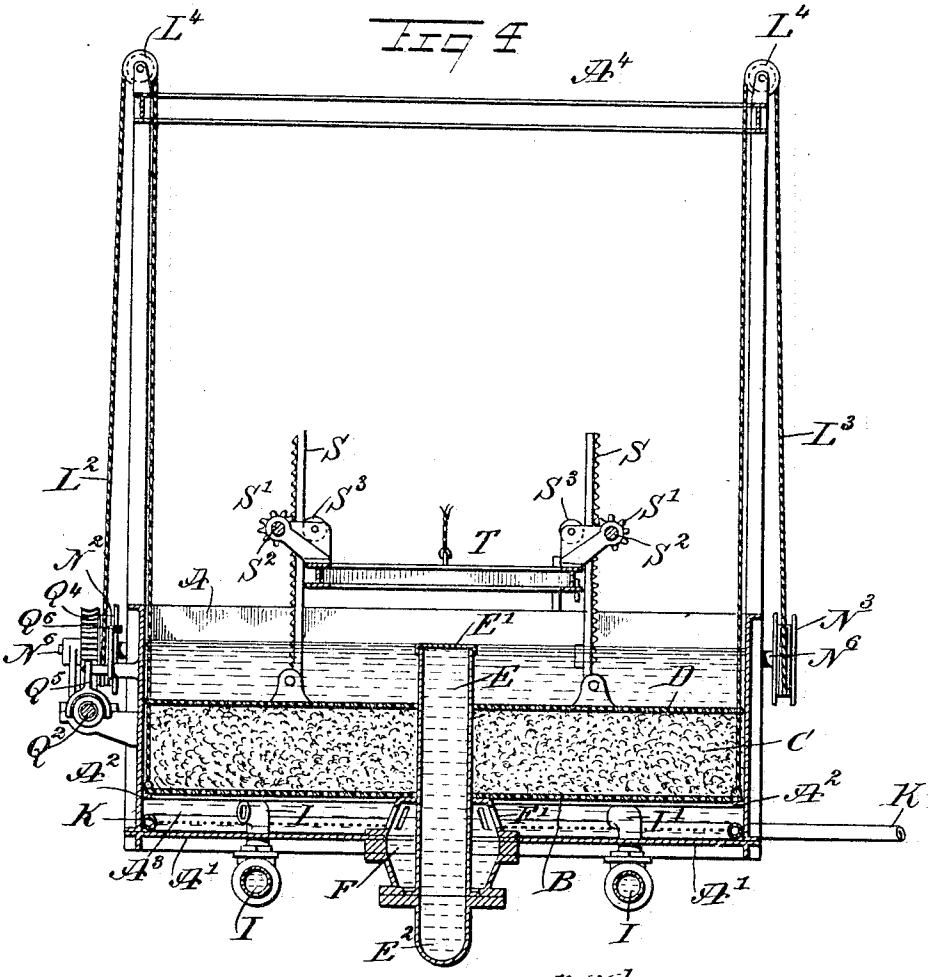


Fig 9

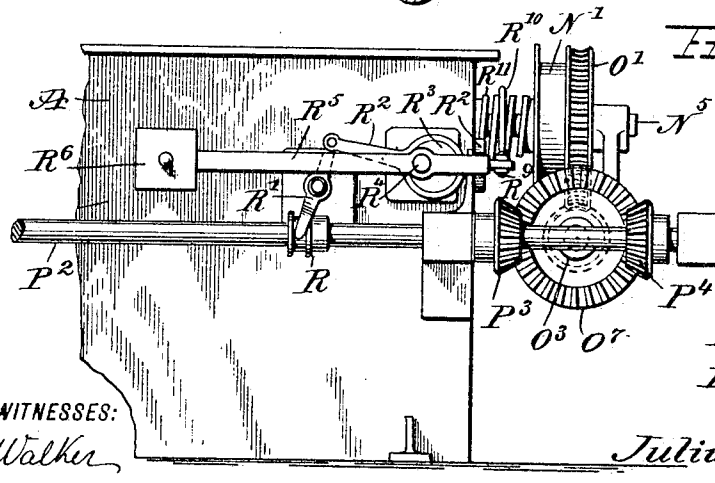
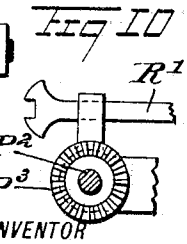


Fig 10



WITNESSES:

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No. 782,147. PATENTED FEB. 7, 1905.

J. LEISEL.

DYEING MACHINE.

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6 SHEETS—SHEET 5.

Fig 5

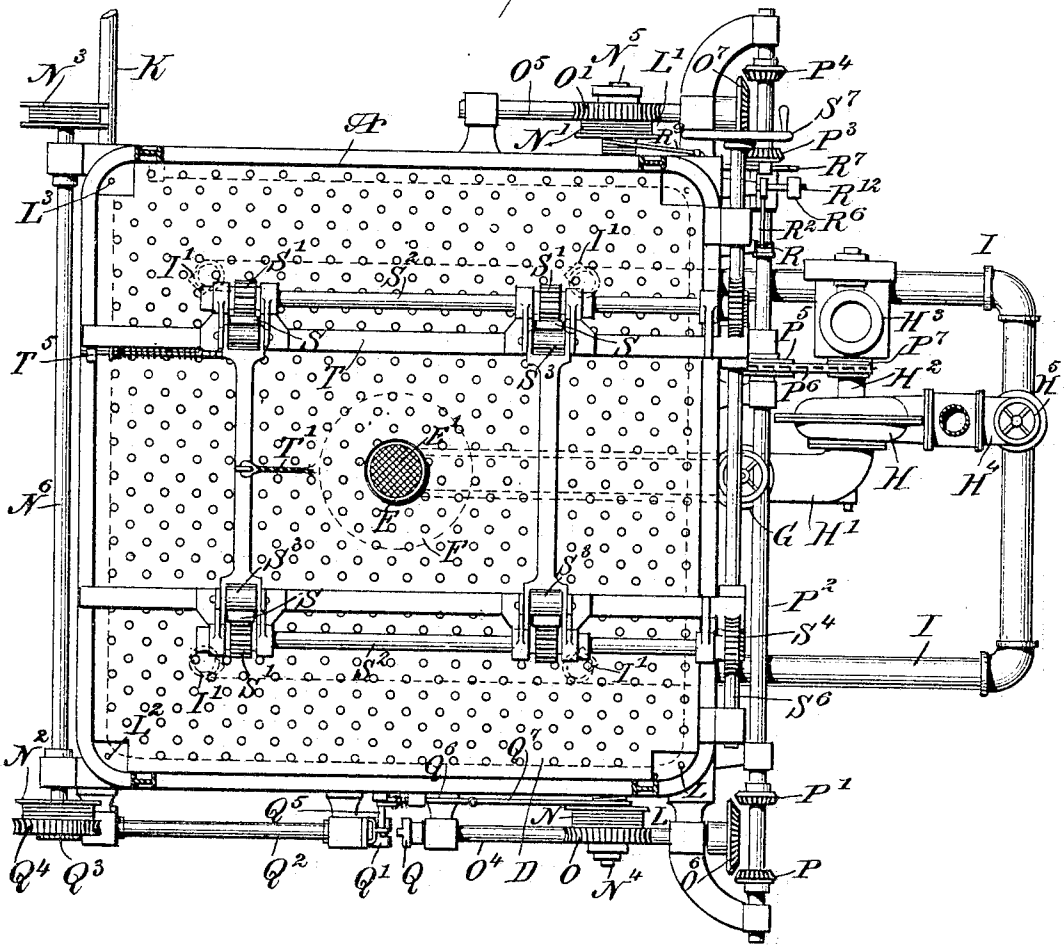


Fig 11

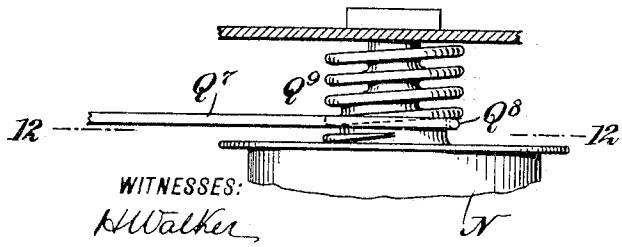
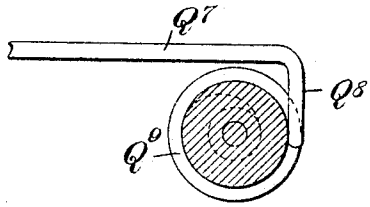


Fig 12



WITNESSES:

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No. 782,147. PATENTED FEB. 7, 1905.

J. LEISEL.

DYEING MACHINE.

APPLICATION FILED APR. 8, 1904.

6 SHEETS—SHEET 6.

Fig 6

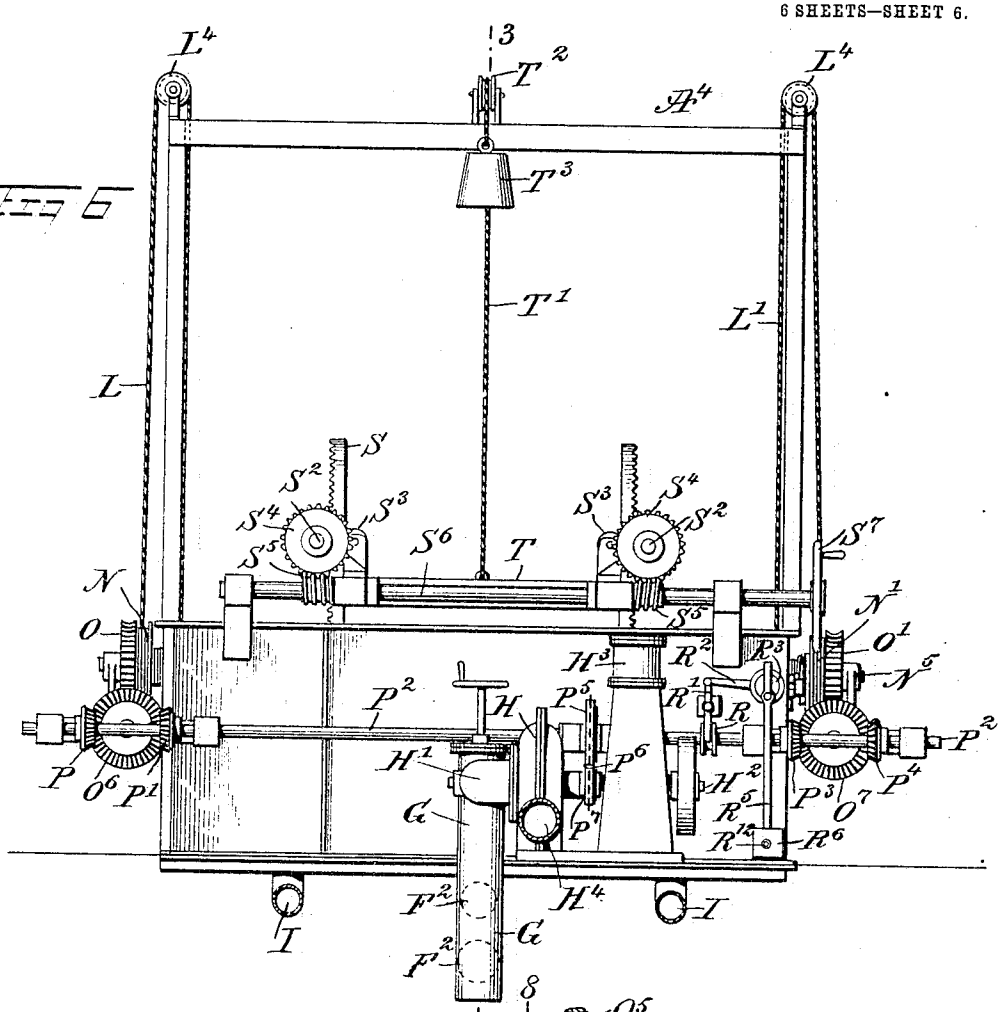


Fig 8

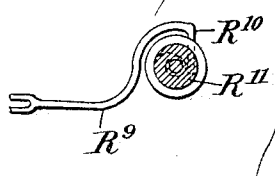
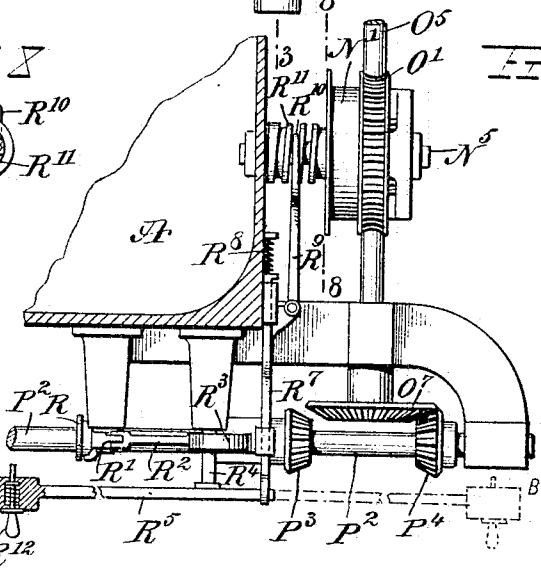


Fig 7



WITNESSES:

A. M. Walker

Rud. J. Koster

INVENTOR

Julius Leisel

BY

ATTORNEYS

No. 782,147. Patented February 7, 1905.

UNITED STATES PATENT OFFICE.

JULIUS LEISEL, OF CHARLOTTE, NORTH CAROLINA.

DYEING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 782,147, dated February 7, 1905.

Application filed April 8, 1904. Serial No. 202,131.

To all whom it may concern:

Be it known that I, JULIUS LEISEL, a citizen of the United States, and a resident of Charlotte, in the county of Mecklenburg and State of North Carolina, have invented a new and Improved Dyeing-Machine, of which the following is a full, clear, and exact description.

The invention relates to machines for dyeing cotton and wool in the raw or in the manufactured state.

The object of the invention is to provide a new and improved dyeing-machine arranged to keep the material submerged, to prevent the material from coming in contact with the air during the dyeing operation, to carry on the dyeing operation economically both in time and labor, to expedite unloading of the machine after the material is dyed and to remove foreign and insoluble matter from the dyeing liquor during the process of dyeing, to facilitate the circulation of the dyeing liquor through the material, and to prevent uneven and spotted shades in the dyed material.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement as more especially designed for dyeing raw cotton or cotton hosiery and yarns, the parts of the machine being in position for unloading. Fig. 2 is a sectional side elevation of the same. Fig. 3 is a like view of the same on the line 3 3 of Fig. 6, showing the parts in position during the dyeing operation. Fig. 4 is a transverse section of the same on the line 4 4 of Fig. 3. Fig. 5 is a sectional plan view of the same on the line 5 5 of Fig. 3. Fig. 6 is a transverse section of the improvement on the line 6 6 of Fig. 3. Fig. 7 is an enlarged plan view of the driving-gear for the drums. Fig. 8 is a tranverse section of part of the same on the line 8 8 of Fig. 7. Fig. 9 is an enlarged face view of the driving-gear for the drums. Fig. 10 is a side elevation of the retaining-arm for the shifting-lever. Fig. 11 is an enlarged plan view of the shifting mechanism for connecting and disconnecting the two sets of drums. Fig. 12 is a sectional side elevation of the same on the line 12 12 of Fig. 11, and Fig. 13 is an enlarged side elevation of the locking device for the swing-frame supporting the cover.

A vat A of rectangular or other suitable shape is provided a distance above its bottom A′ with lugs A^2 for supporting a false perforated bottom B, which forms with the said vat-bottom A′ a circulating space or chamber A^3 for the water, dye liquor, or other liquid, as hereinafter more fully described. The material C to be dyed rests on the false perforated bottom B and is engaged on top by a perforated cover D to confine the material C between the false bottom B and the said cover D a distance below the level of the liquor in the vat, as plainly indicated in Figs. 3 and 4. An overflow-pipe E rises through a well F in the bottom A′ of the vat and its circulating-space, and this overflow-pipe passes loosely through the false perforated bottom B, the material C, and the cover D to extend with its upper end a distance above the said cover and a short distance below the top of the vat A. A perforated cap E′ closes the upper end of the overflow-pipe E to allow ready passage of the water or dye liquor, but to prevent the material C from falling into the overflow-pipe on placing the material in position in the vat and onto the false bottom B at the time the cover D is out of the vat and stands in a vertical position, as indicated in Figs. 1 and 2.

The overflow-pipe E is connected at its outer or discharge end E^2 with a valve-casing G, containing a valve G′, and connected with the inlet H′ of a circulating-pump H of any approved construction. The circulating-pump H shown in the drawings is of the rotary type, and its shaft H^2 is driven by an engine or other motor H^3. The discharge H^4 of the circulating-pump H is connected with circulating-pipes I, from which extend nozzles I′, passing through the bottom A′ into the circulating-space A^3. The nozzles I′ are preferably four in number and are grouped around the well F, as indicated in Fig. 5, and ar-

ranged to discharge horizontally into the circulating space or chamber A^3 in such a manner that the liquid in the circulating-space A^3 is caused to travel in a circular path around the well F for the foreign, insoluble, or other extraneous matter in the liquid to gravitate toward the well F to finally drop into the same. As shown in Fig. 5, the outlets of the nozzles I′ stand at angles one to the other so that one nozzle discharges in an oblique outward direction against one side of the tank for liquid to travel toward the next adjacent side and to the next adjacent nozzle, which by its discharge, acts on the liquid in the same manner to force the latter around in the circulating space or chamber A^3. The outlet H^4 of the circulating-pump contains a valve H^5 for closing the outlet to the nozzle-pipes I and from the said outlet leads a pipe J, having a valve J′, to an overhead tank J^2 for storing the dye liquor.

The well F has an annular perforated wall F′, rising in the circulating-space A^3, and the top of the said wall forms a rest or support for the middle portion of the false bottom B to assist in sustaining the load on the said false bottom. The lower portion of the well F is connected by an outlet F^2 with the valve-casing G a distance above the discharge end E^2, and when it is desired to discharge the extraneous matter from the well F the valve G′ is raised by the operator to an uppermost position, as shown in Fig. 2. The lower end of the valve-casing G is provided with a valve-seat G^2, opening to the outside for discharging the extraneous matter from the valve-casing G at the time the valve is in the uppermost position mentioned. The valve G′ is hollow, closed at the bottom and open at the top, and provided in its side with a port G^3 for registering either with the discharge end E^2 of the overflow-pipe E or with the outlet F^2 of the well F. When the valve G′ is in the position shown in Fig. 3, the overflow-pipe E is connected by way of the valve-casing G and its valve G′ with the circulating-pump, and when the valve H^5 is now opened, the valve J′ closed, and the circulating-pump started then the liquid flowing into the overflow-pipe E is forced by the circulating-pump H, pipes I, and nozzles I′ into the circulating-space for the liquor to rise through the material C to dye the same and again overflow into the pipe E to be returned into the vat by the circulating-pump H. When the valve H^5 is closed, the valve J′ opened, and the valve G′ raised to bring the port G^3 in register with the outlet F^2 of the well F, then the circulating-pump draws the liquor from the vat by way of the well F and forces it up into the storage-tank J^2 for further use.

In order to heat the liquid in the vat A, I prefer to use a steam-heating pipe K, arranged in the circulating space or chamber A^3 and connected with a suitable steam-supply.

The false perforated bottom B is adapted to be raised and lowered in the vat and swung into an inclined or discharging position, as shown in Figs. 1 and 2, and for this purpose the following device is provided: The right-hand side of the false perforated bottom B is hung at or near its corners on the ends of ropes or chains L and L′, and similar ropes or chains L^2 and L^3 are connected with the corners at the left-hand side of the said bottom. The ropes or chains L, L′, L^2, and L^3 extend upwardly and pass over pulleys L^4, carried by an overhead framework A^4, attached to the vat A, and the said ropes or chains then extend downward and wind on drums N, N′, N^2, and N^3, respectively, as plainly indicated in Fig. 5. The winding-drums N and N′ are secured on shafts N^4 and N^5, journaled in suitable bearings carried by the front and rear sides of the vat A, and the drums N^2 and N^3 are secured on a shaft N^6, extending transversely and journaled in suitable bearings attached to the left-hand side of the vat A, as plainly indicated in Fig. 5. On the drums N and N′ or on their shafts N^4 and N^5 are secured worm-wheels O and O′ in mesh with worms O^2 and O^3, secured on longitudinally-extending shafts O^4 and O^5, journaled in suitable bearings on the front and rear sides of the vat A. The shafts O^4 and O^5 are provided with bevel gear-wheels O^6 and O^7, of which the bevel gear-wheel O^6 is adapted to be engaged on alternate sides by either a bevel-pinion P or a bevel-pinion P′, secured on a transversely-extending shaft P, journaled in suitable bearings attached to the right-hand side of the vat A. Similar pinions P^3 and P^4, secured on the shaft P^2, are adapted to engage opposite sides of the bevel gear-wheel O^7, and the said shaft P^2 is provided with a sprocket-wheel P^5, connected, by a sprocket-chain P^6, with a sprocket-wheel P^7, secured on the shaft H^2 of the circulating-pump, so that when the machine is in operation a rotary motion is given to the shaft P^2, which by either of the sets of bevel-pinions P P^3 or P′ P^4 imparts a forward or backward rotary motion to the bevel gear-wheels O^6 and O^7 and their shafts O^4 and O^5. Thus when the shaft P^2 is shifted transversely from the front toward the rear then the pinions P and P^3 move in mesh with the bevel gear-wheels O^6 and O^7 to rotate the shafts O^4 and O^5 in one direction, and when the shaft P^2 is shifted transversely from the rear toward the front then the bevel-pinions P′ and P^4 move in mesh with the bevel gear-wheels O^6 and O^7 to rotate the shafts O^4 and O^5 in the opposite direction. Normally, however, the bevel-pinions P, P′, P^3, and P^4 are out of mesh with the bevel gear-wheels O^6 and O^7, as plainly indicated in Fig. 5, and consequently the shafts O^4 and O^5 are at a standstill. When the bevel-pinions P and P^3 are in mesh with the bevel gear-wheels O^6 and O^7 and the shafts O^4 and O^5 are rotated in one

direction, then the worms O^2 and O^3, secured on the said shafts, rotate the worm-wheels O and O′, and consequently the drums N and N′, to wind up the ropes or chains L and L′ to lift the right-hand side of the false perforated bottom B, and when the pinions P′ and P^4 are in mesh with the said bevel gear-wheels O^6 and O^7 then the drums N and N′ are rotated in an opposite direction to lower the right-hand end of the false bottom B. Now the drums N^2 and N^3 rotate in unison with the drums N and N′ to lift the left-hand end of the false bottom B simultaneously with the lifting of the right-hand end thereof, as above mentioned, until the false perforated bottom B reaches the top of the vat A, and when the false perforated bottom reaches this position then the rotation of the drums N^2 and N^3 ceases, while the drums N and N′ keep on rotating to swing the false perforated bottom B into an inclined or discharging position, as shown in Figs. 1 and 2, the connecting ends of the ropes L^2 and L^3, with the false perforated bottom B, then serving as a fulcrum for the said bottom to swing on. In order to accomplish this result, the following device is provided: On the shaft O^4 (see Figs. 1 and 5) is secured a clutch member Q, adapted to be engaged by a clutch member Q′, secured on a longitudinally-extending shaft Q^2, journaled in suitable bearings attached to the front side of the vat A. On the shaft Q^2 is secured a worm Q^3 in mesh with a worm-wheel Q^4, fastened on the shaft N^6 adjacent to the drum N^2, so that when the shaft Q^2 is rotated the worm Q^3 and worm-wheel Q^4 impart a rotary motion to the shaft N^6, and consequently to the drums N^2 and N^3, secured on the said shaft. Now the clutch member Q′ is mounted to slide on and to turn with the shaft Q^2, and the said clutch member is engaged by a shifting-lever Q^5 for moving the clutch member Q′ in and out of engagement with the clutch member Q, secured on the shaft O^4, as above mentioned. The shifting-lever Q^5 is pivotally connected with a spring-pressed sliding bar Q^6, pivotally connected with an arm Q^7, having a curved end Q^8 (see Figs. 11 and 12) engaging the peripheral face of a spiral cam Q^9, secured on or forming part of the drum N.

Now when the false bottom B is in working position in the vat A and it is desired to lift the said bottom out of the vat and then swing it into an inclined position for discharging the dyed material then the shaft P^2 is shifted to bring the pinions P and P^3 in mesh with the bevel gear-wheels O^6 and O^7 for turning the shafts O^4 and O^5 and the drums N and N′, as previously described, and at the same time the shaft Q^2 is turned from the shaft O^4, as at this time the clutch member Q′ is in mesh with the clutch member Q. The curved end Q^8 at the beginning of the rotation of the drum N is in engagement with the small end of the cam Q^9 to hold the clutch member Q′ in engagement with the clutch member Q. During the time the clutch members Q′ and Q are in mesh with each other the several drums N, N′, N^2, and N^3 are rotated in unison to wind up their ropes or chains L, L′, L^2, and L^3 for lifting the false perforated bottom B in the vat A, and when the said bottom has reached the top of the vat then the curved end Q^8 of the arm Q^7 travels on the large end of the cam Q^9 to impart a swinging motion to the shifting-lever Q^5 to move the clutch member Q′ out of mesh with the clutch member Q. When this takes place, the rotation of the shaft Q^2, and consequently that of the drums N^2 and N^3, ceases, while the rotation of the drums N and N′ proceeds for the ropes or chains L and L′ to pull up the right-hand end of the false perforated bottom B—that is, to swing the same into an inclined discharging position for discharging the dyed material to one side of the machine. When the false perforated bottom B reaches the desired inclined position, (described and shown in Figs. 1 and 2,) then the shaft P^2 is shifted automatically in a transverse direction from the front to the rear to move the pinions P and P^3 out of mesh with the gear-wheels O^6 and O^7. When it is desired to return the false perforated bottom B back into the vat for dyeing another batch of material, then the shaft P^2 is shifted transversely from the rear toward the front to move the pinions P′ and P^4 into mesh with the bevel gear-wheels O^6 and O^7 for rotating the shafts O^4 and O^5 and their drums N and N′ to unwind the ropes or chains L and L′. The latter now lower the right-hand side of the false perforated bottom B until the latter assumes a horizontal position at the upper end of the vat A, and when this takes place the shifting-lever Q^5 is actuated by the arm Q^7 and cam Q^9 to again move the clutch member Q′ in mesh with the clutch member Q, so that the shaft Q^2 is now rotated, and with it the drums N^2 and N^3, for unwinding the ropes or chains L^2 and L^3. As the several drums N, N′, N^2, and N^3 now unwind their ropes or chains in unison, it is evident that the false perforated bottom B is lowered in the vat A until it finally rests on the lugs A^2. When this position is reached, the shaft P^2 is shifted transversely from the front toward the rear to move the pinions P′ and P^4 out of mesh with the bevel gear-wheels O^6 and O^7, so that the rotation of the shafts O^4 and O^5 and that of the shaft Q^2 ceases.

In order to automatically shift the shaft P^2 in the manner described, the following automatic device is provided, special reference being had to Figs. 7, 8, and 9: On the shaft P^2 is secured a shifting collar R, engaged by a shifting-lever R′, pivotally connected with the eccentric-rod R^2 of an eccentric R^3, having its shaft R^4 journaled in suitable bearings attached to the vat A. On the shaft R^4 is secured an arm R^5, carrying at one end a weight

R^6, to automatically swing the arm R^5 when released, as hereinafter described, from a horizontal position into a vertical position, thereby turning the eccentric-shaft R^4 for the eccentric to actuate the shifting-lever R′ to move the shaft P^2 either from the front toward the rear or from the rear toward the front, as hereinafter more fully described. The arm R^5 when swung by the operator into a horizontal position either to the right or to the left is adapted to be engaged with a notch formed in the end of a slide R^7, mounted to slide longitudinally in suitable bearings carried by the vat A, at the rear side thereof, and the said slide R^7 is pressed on by a spring R^8 to normally hold the slide in engagement with the arm R^5. The slide R^7 is pivotally connected with a cam-arm R^9, having its curved end R^{10} (see Fig. 8) in peripheral engagement with a spiral cam R^{11}, secured on the shaft N^5. When it is desired to lift the false perforated bottom B out of the vat A and to swing the same into the discharging position previously mentioned and shown in Figs. 1 and 2, then the operator swings the arm R^5 from its normal vertical position shown in Fig. 6 to the right (see dotted lines, Fig. 7) until the arm is in a horizontal position and in engagement with the notch in the slide R^7. Now by moving the arm R^5 into this position the shaft P^2 is shifted from the front toward the rear to move the bevel-pinions P and P^3 in mesh with the bevel gear-wheels O^6 and O^7 to rotate the several drums N, N′, N^2, and N^3, as previously explained, for the ropes or chains to wind up on the said drums. When the false perforated bottom B has reached the top of the vat, then the shaft Q^2 is thrown out of gear, as previously explained, so that the drums N^2 and N^3 cease to rotate, while the drums N and N′ keep on rotating until the false perforated bottom B has reached the inclined discharging position shown in Figs. 1 and 2. When the false perforated bottom B about reaches this position, then the cam-arm R^9 is moved longitudinally from the right to the left by the cam R^{11}, so that the slide R^7 is drawn from the right to the left against the tension of the spring R^8 and out of engagement with the arm R^5 to allow the weight R^6 thereof to swing the arm back into a vertical position. In doing so the shaft P^2 is shifted transversely from the rear toward the front to move the bevel-pinions P and P^3 out of mesh with the bevel gear-wheels O^6 and O^7, and consequently the rotation of the drums N and N′ now also ceases. When it is desired to return the false perforated bottom B back into the vat, then the operator swings the arm R^5 to the left, as shown in full lines in Figs. 7 and 9, until the arm reaches a horizontal position and engages the notch in the slide R^7. By moving the arm R^5 in this position the shaft P^2 is shifted transversely from the rear toward the front to move the bevel-pinions P′ and P^4 into mesh with the bevel gear-wheels O^6 and O^7 to rotate the shafts O^4 and O^5 in a reverse direction for the drums N and N′ to unwind their ropes or chains. When the false perforated bottom B reaches its horizontal position on the top of the vat A, then the clutch member Q′ is thrown in mesh with the clutch member Q for now starting the drums N^2 and N^3 in a reverse direction to unwind the ropes or chains L^2 and L^3 simultaneously with the ropes or chains L and L′. The false perforated bottom is now lowered in the vat A, and when it about reaches the lugs A^2 the cam-arm R^9 is acted on by the cam R^{11} to withdraw the slide R^7 for the arm R^5 to swing back to its vertical position and to thereby move the shaft P^2 transversely from the front toward the rear to move the pinions P′ and P^4 out of mesh with the bevel gear-wheels O^6 and O^7. The rotation of the shafts O^4 and O^5 now ceases.

As indicated in Fig. 5, the corners of the cover D are cut out to allow a ready passage of the ropes or chains L, L′, L^2, and L^3.

It is understood that the cams Q^9 and R^{11} are so arranged as to properly actuate the corresponding parts Q^7 and R^9 at the proper time and as above described.

The shifting of the shaft P^2 in a transverse direction does not affect the position of the sprocket-wheel P^5, as the shaft P^2 has a key engaging a keyway in the sprocket-wheel P^5, held against transverse movement by bearings on opposite sides of its hub.

The weight R^6 on the arm R^5 is preferably provided with a spring-catch R^{12} to lock the arm to the vat A at the time the arm is in the vertical position shown in Fig. 6.

In order to move the cover D out of the way when raising or lowering the false perforated bottom B and for vertically adjusting the said cover to properly engage the top of the material C, the following device is provided: The cover D is hung on a plurality of racks S, in mesh with pinions S′, secured on shafts S^2, extending longitudinally and journaled in suitable bearings attached to a swing-frame T, the said racks S being held in engagement with their pinions by friction-rollers S^3, journaled on the swing-frame and engaging the backs of the said racks. Each of the shafts S^2 is provided with a worm-wheel S^4, in mesh with a worm S^5, secured on a shaft S^6, extending transversely and journaled in suitable bearings attached to the upper end of the right-hand side of the vat A, as plainly illustrated in the drawings. The shaft S^6 forms the fulcrum for the frame T to swing on, and on the said shaft S^6 is secured a hand-wheel S^7, adapted to be taken hold of by the operator for turning the shaft S^6 to impart a rotary motion to the shafts S^2 and their pinions S′ for moving the racks S upward or downward with the cover D, according to the direction in which the hand-wheel S^7 is turned. The free end of the swing-frame T is connect-

ed with one end of a rope or chain T', extending upwardly in an inclined direction and passing over a pulley T^2, journaled on the overhead frame A^4, previously mentioned. A counterweight T^3 is secured on the rope T' for conveniently swinging the swing-frame T from the normal horizontal position shown in Fig. 3 to the vertical position shown in Figs. 1 and 2. Normally the swing-frame T is locked in its horizontal position by a spring-catch T^4 of any approved construction and arranged on the free end of the swing-frame, the said spring-catch being adapted to engage a suitable keeper T^5, fastened to the upper end of the left-hand side of the vat A. (See Fig. 3.) The spring-catch T^4 is preferably in the shape of a bolt (see Figs. 3 and 13) pressed on by a spring T^6 and mounted to slide in suitable bearings on the swing-frame T. The inner end of the bolt is pivotally connected with a tripping-lever T^7, fulcrumed on the swing-frame and adapted to be engaged by a wedge T^8, secured to or formed on one of the racks S. Now when the cover D is raised and the wedge T^8 engages the tripping-lever (see Fig. 13) the bolt is withdrawn, and hence the swing-frame is automatically unlocked. The wedge T^8 holds the bolt in a withdrawn position until the cover is again lowered at the next operation, it being understood that when the wedge T^8 moves out of engagement with the tripping-lever T^7 then the spring T^6 moves the bolt outward into engagement with the keeper T^5. When the spring-catch T^4 is disengaged from its keeper T^5, as above described, then the counterweight T^3 imparts an upward swinging motion to the frame T, on which the cover D is suspended, by the racks S engaging the pinions S'. It is understood that the swing-frame T when locked in its horizontal position is not swung upward into a vertical position until the cover D has first been raised close up to the swing-frame by the operator turning the hand-wheel S^7 correspondingly—that is, not until the cover D is practically out of the upper end of the vat and the swing-frame T is automatically unlocked, as above described.

The operation is as follows: In starting, the valve G' is in a lowermost position, (see Fig. 3,) the valve H^5 is open, and the valve J' closed, and the shaft P^2 is in the intermediate position, with the weighted arm R^5 locked in a vertical position. The material—say a bale of cotton in loose condition—to be dyed is placed into the empty vat at the time the false perforated bottom B rests on the lugs A' and the cover D and its supporting-frame are in an uppermost vertical position. After the material is in place on the false perforated bottom B the frame T is swung downward into a horizontal position, and then the operator turns the hand-wheel S^7 to move the cover D down into firm contact with the top of the material to confine the same in the vat between the false perforated bottom B and the said cover D, as shown in Figs. 3 and 4. Water is now run into the vat A from any suitable source until the water flows into the top of the overflow-pipe E and fills the same, so that the level of the water is about flush with the top of the overflow-pipe E. Steam is now admitted to the pipe or coil K to heat the water approximately to the boiling-point. The engine H^3 is now started to rotate the shaft P^2 and to actuate the circulating-pump H for the latter to draw the water out of the overflow-pipe E and force the water, by way of the pipes I and nozzles I', into the circulating space or chamber A^3 for the water to move in a circular path around the well F and force the dirt from the material or other extraneous matter into the well F. The water also rises through the perforations in the false bottom B and through the material C and the perforations in the cover D to finally flow back into the overflow-pipe E to be returned to the circulating-space A^3 by the circulating-pump. The dissolved dyestuff is added to the water in the tank to form a dye liquor, which is now circulated through the vat A and the material C, the same as the water and as above described. This operation is continued until the dye liquor has dyed the material and is sufficiently exhausted to warrant its removal, which is done as follows: The circulating-pump H is temporarily stopped and the valve G is raised until its port G^3 is in register with the well-pipe F^2 to allow the liquor in the overflow-pipe E to drain out at the seat G^2. The valve H^5 is now closed and the valve J' opened and the circulating-pump H is restarted to draw the dye liquor from the vat A by way of the well F, pipe F^2, and valve G', and force it up the pipe J into the overhead storage-tank J^2 for further use. The valve J' is then closed. When the vat A is empty of the dye liquor, the valve G' is again moved into a lowermost position and water is again run into the vat A and circulated through the material C until the latter is thoroughly rinsed. The valve G' is now raised to an uppermost position—that is, until the bottom of the valve G' clears the pipe F^2 to allow the water to completely drain the vat A, the overflow-pipe E, and the well F. The operator now turns the hand-wheel S^7 in a reverse direction to lift the cover D into its uppermost position for the catch T^4 to automatically disengage its keeper T^5 to allow the frame T, and with it the cover D, to swing into a vertical position by the action of the counterweight T^3 and the assistance of the operator. The weighted arm R^5 is now unlocked and swung upward toward the right, as indicated in dotted lines in Fig. 7, to shift the shaft P^2 until the pinions P and P^3 are in mesh with the bevel gear-wheels O^6 and O^7 for rotating the several drums N, N', N^2, and N^3 to simultaneously

wind up the ropes or chains L, L′, L^2, and L^3 to raise the false perforated bottom B and the dyed material C thereon until the said bottom reaches the top of the vat. The drums N^2 N^3 are now thrown automatically out of gear by the shifting of the clutch member Q′, as previously explained, so that the false perforated bottom B now swings into an inclined discharging position for the dyed material to slide off the said bottom to one side of the machine into a suitable support, receptacle, or other device. When the false perforated bottom B reaches its discharging position, the arm R^5 is automatically released and swings back to its normal vertical position to shift the shaft P^2 to its intermediate position, and the drums N and N′ now cease to rotate. When it is desired to return the false perforated bottom into the vat A, the arm R^5 is swung over to the left (see Fig. 9) to run the drums N and N′ in a reverse direction until the false perforated bottom has reached a horizontal position on the top of the vat, and then the drums N^2 and N^3 are set in motion to lower the bottom B into the tank. The above-described operation is then repeated for dyeing another batch of material.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A dyeing-machine, comprising a vat, a false perforated bottom movable in the vat for supporting the material to be dyed, and means for automatically raising the said false bottom to the top of the vat and then tilting it into a discharge position.

2. A dyeing-machine, comprising a vat, a false perforated bottom in the said vat for supporting the material to be dyed and forming with the bottom of the vat a circulating-space for the dye liquor, a perforated cover resting on the material in the vat, an overflow-pipe extending upward through the bottom of the vat, and a circulating-pump connected at one end with the said overflow-pipe and at the other end with the said circulating-space.

3. A dyeing-machine, comprising a vat, a false perforated bottom in the said vat for supporting the material to be dyed and forming with the bottom of the vat a circulating-space for the dye liquor, a perforated cover resting on the material in the vat, an overflow-pipe extending upward through the bottom of the vat, and a circulating-pump connected at one end with the said overflow-pipe and at the other end with the said circulating-space by a plurality of discharge-nozzles set at angles to each other to cause the liquor discharged by the nozzles to travel a circular path in the said circulating-space to force the sediment and the like to the center of the said circulating-space.

4. A dyeing-machine, comprising a vat, a false perforated bottom in the said vat for supporting the material to be dyed and forming with the bottom of the vat a circulating-space for the dye liquor, a perforated cover resting on the material in the vat, an overflow-pipe extending upward through the bottom of the vat, a circulating-pump connected at one end with the said overflow-pipe and at the other end with the said circulating-space by a plurality of discharge-nozzles set at angles to each other to cause the liquor discharged by the nozzles to travel a circular path in the said circulating-space to force the sediment and the like to the center of the said circulating-space, and a central well in the said circulating-space for receiving the sediment.

5. A dyeing-machine, comprising a vat, a false perforated bottom in the said vat for supporting the material to be dyed and forming with the bottom of the vat a circulating-space for the dye liquor, a perforated cover resting on the material in the vat, an overflow-pipe extending upward through the bottom of the vat, a circulating-pump connected at one end with the said overflow-pipe and at the other end with the said circulating-space by a plurality of discharge-nozzles set at angles to each other to cause the liquor discharged by the nozzles to travel a circular path in the said circulating-space to force the sediment and the like to the center of the said circulating-space, a central well in the said circulating-space for receiving the sediment, and a manually-controlled valve on the discharge of the said well.

6. A dyeing-machine, comprising a vat, a false perforated bottom in the said vat for supporting the material to be dyed and forming with the bottom of the vat a circulating-space for the dye liquor, a perforated cover resting on the material in the vat, an overflow-pipe extending upward through the bottom of the vat, a circulating-pump connected at one end with the said overflow-pipe and at the other end with the said circulating-space by a plurality of discharge-nozzles set at angles to each other to cause the liquor discharged by the nozzles to travel a circular path in the said circulating-space to force the sediment and the like to the center of the said circulating-space, and a central well in the said circulating-space for receiving the sediment, the said well having a perforated side wall rising in the circulating-space, the top of the wall forming a central support for the said false perforated bottom.

7. A dyeing-machine, comprising a vat, a false perforated bottom in the said vat for supporting the material to be dyed and forming with the bottom of the vat a circulating-space for the dye liquor, a perforated cover resting on the material in the vat, an overflow-pipe extending upward through the bottom of the vat, a circulating-pump connected at one end with the said overflow-pipe and at the other end with the said circulating-space by a plurality of discharge-nozzles set at angles to each other to cause the liquor discharged by

the nozzles to travel a circular path in the said circulating-space to force the sediment and the like to the center of the said circulating-space, a central well in the said circulating-space for receiving the sediment, and a valved connection between the inlet of the said circulating-pump and the discharge of the said well, for draining the vat of the liquor.

8. A dyeing-machine comprising a vat, a false perforated bottom in the said vat for supporting the material to be dyed and forming with the bottom of the vat a circulating-space for the dye liquor, a perforated cover resting on the material in the vat, an overflow-pipe extending upward through the bottom of the vat, a circulating-pump connected at one end with the said overflow-pipe and at the other end with the said circulating-space by a plurality of discharge-nozzles set at angles to each other to cause the liquor discharged by the nozzles to travel a circular path in the said circulating-space to force the sediment and the like to the center of the said circulating-space, a central well in the said circulating-space for receiving the sediment, a valved connection between the inlet of the said circulating-pump and the discharge of the said well, for draining the vat of the liquor, an overhead tank connected with the discharge of the said circulating-pump, and a valve in the said discharge of the circulating-pump to connect the discharge with either the said nozzles or the overhead tank.

9. A dyeing-machine provided with a vat having a circulating-space, and a well approximately central in the said circulating-space, and nozzles connected with a liquid-supply and grouped around the said well in the said circulating-space.

10. A dyeing-machine provided with a vat having a circulating-space and a well approximately central in the said circulating-space, and nozzles connected with a liquid-supply and grouped around the said well in the said circulating-space, the nozzles discharging the liquid horizontally into the circulating-space and the nozzles being set at angles to each other to cause the discharged liquid to travel in a circular path around the well to force the sediment in the liquid toward and into the well.

11. A dyeing-machine having a vat, a false perforated bottom in the vat and forming with the vat-bottom a circulating-space, a perforated cover for engaging the top of the material to be dyed and resting on the said false bottom, and an overflow-pipe passing upwardly through the bottom of the vat, the said circulating-space, the false bottom, the material therein, and the said cover.

12. A dyeing-machine having a vat, a false perforated bottom in the vat and forming with the vat-bottom a circulating-space, a perforated cover for engaging the top of the material to be dyed and resting on the said false bottom, and an overflow-pipe passing upwardly through the bottom of the vat, the said circulating-space, the false bottom, the material therein, and the said cover, the upper end of the overflow-pipe extending a distance above the said cover to maintain liquor above the cover.

13. A dyeing-machine having a vat, a false perforated bottom in the vat and forming with the vat-bottom a circulating-space, a perforated cover for engaging the top of the material to be dyed and resting on the said false bottom, an overflow-pipe passing upwardly through the bottom of the vat, the said circulating-space, the false bottom, the material therein, and the said cover, the upper end of the overflow-pipe extending a distance above the said cover to maintain liquor above the cover, and a perforated cap for the upper end of the said overflow-pipe.

14. A dyeing-machine, comprising a vat, a false perforated bottom in the vat for supporting the material to be dyed, means for suspending the false perforated bottom at opposite sides, and a mechanism connected with the said means for raising the said false perforated bottom first to the top of the vat and then swinging the false perforated bottom into an inclined position to discharge the dyed material.

15. A dyeing-machine, comprising a vat, a false perforated bottom in the vat for supporting the material to be dyed, means for suspending the false perforated bottom at opposite sides, a mechanism connected with the said means for raising the said false perforated bottom first to the top of the vat and then swinging the false perforated bottom into an inclined position to discharge the dyed material, the said mechanism comprising two sets of drums for the said suspending means to wind on, a drive-gear for driving the said drums in unison until the false perforated bottom reaches the top of the vat, and a clutch mechanism for throwing one set of drums out of gear to allow the other or second set of drums and its suspending means to swing the false perforated bottom into an inclined position.

16. A dyeing-machine, comprising a vat, a false perforated bottom in the vat for supporting the material to be dyed, means for suspending the false perforated bottom at opposite sides, a mechanism connected with the said means for raising the said false perforated bottom first to the top of the vat and then swinging the false perforated bottom into an inclined position to discharge the dyed material, the said mechanism comprising two sets of drums for the said suspending means to wind on, a drive-gear for driving the said drums in unison until the false perforated bottom reaches the top of the vat, a clutch mechanism for throwing one set of drums out of gear to allow the other or second set of drums

and its suspending means to swing the false perforated bottom into an inclined position, and an automatic shifting device for finally throwing the said second set of drums out of gear at the time the false perforated bottom reaches a tilting position.

17. A dyeing-machine provided with a vat, a cover movable up and down in the vat and adapted to rest on top of the material in the vat, a swing-frame fulcrumed on the top of the vat at one side thereof, and means for movably supporting the cover from the said swing-frame.

18. A dyeing-machine, provided with a vat, a cover movable up and down in the vat and adapted to rest on top of the material in the vat, a swing-frame fulcrumed on the top of the vat at one side thereof, means for movably supporting the cover from the said swing-frame, and means for imparting a swinging motion to the said swing-frame.

19. A dyeing-machine provided with a vat, a cover movable up and down in the vat and adapted to rest on top of the material in the vat, a swing-frame, a shaft journaled on the top of the vat at one side thereof, the shaft forming the fulcrum for the said frame, and raising and lowering means on the frame and connected with the said cover to lower or raise the cover in the vat.

20. A dyeing-machine, provided with a vat, a cover movable up and down in the vat and adapted to rest on top of the material in the vat, a swing-frame, a shaft journaled on the top of the vat at one side thereof, the shaft forming the fulcrum for the said frame, raising and lowering means on the frame and connected with the said cover to lower or raise the cover in the vat, and a catch on the free end of the frame for locking the same in position over the vat.

21. A dyeing-machine, provided with a vat, a cover movable up and down in the vat and adapted to rest on top of the material in the vat, a swing-frame, a shaft journaled on the top of the vat at one side thereof, the shaft forming the fulcrum for the said frame, raising and lowering means on the frame and connected with the said cover to lower or raise the cover in the vat, a catch on the free end of the frame for locking the same in position over the vat, and a counterweight connected with the frame for swinging the same into a vertical position on unlocking the catch.

22. A dyeing-machine provided with a vat, a cover movable up and down in the vat and adapted to rest on top of the material in the vat, a support for the cover, means for raising and lowering the cover, and a locking device for locking the cover-support to the vat and automatically controlled on raising or lowering the cover.

23. A dyeing-machine provided with a vat, a cover movable up and down in the vat and adapted to rest on top of the material in the vat, a swing-frame, a shaft journaled on the top of the vat at one side thereof, the shaft forming the fulcrum for the said frame, and raising and lowering means on the frame and connected with the said cover to lower or raise the cover in the vat, the said means being controlled by the said shaft.

24. A dyeing-machine provided with a vat, a cover for the material in the vat, a swing-frame, a shaft journaled on the top of the vat at one side thereof, the shaft forming the fulcrum for the said frame, raising and lowering means on the frame and connected with the said cover to lower or raise the cover in the vat, the said means being controlled by the said shaft, and a hand-wheel on the said shaft for turning it.

25. A dyeing-machine provided with a vat, a cover for the material in the vat, a swing-frame, a shaft journaled on the top of the vat at one side thereof, the shaft forming the fulcrum for the said frame, raising and lowering means on the frame and connected with the said cover to lower or raise the cover in the vat, the said means comprising racks connected with the said cover, a pinion-shaft journaled on the said frame and geared with the said first-named shaft, and pinions on the said pinion-shaft and in mesh with the said racks.

26. A dyeing-machine provided with a vat having a circulating-space, and nozzles in the said circulating-space, connected with a liquid-supply, the outlets of the nozzles standing at angles one to the other.

27. A dyeing-machine provided with a vat having a circulating-space, and nozzles in the said circulating-space, connected with a liquid-supply, the outlets of the nozzles standing at angles one to the other and obliquely to the adjacent sides of the vat.

28. A dyeing-machine provided with a vat having a circulating-space, a well in the said circulating-space, and means in the circulating-space and connected with a liquid-supply, for discharging the liquid into the said circulating-space and causing it to travel in a circular path around the well.

29. A dyeing-machine provided with a vat, a well in the bottom of the vat, an overflow-pipe passing through the well and rising in the said vat, nozzles in the vat, grouped around the well, and a circulating-pump connected with the nozzles and the said overflow-pipe.

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

JULIUS LEISEL.

Witnesses:
SOLON C. KEMON,
J. MIDDLETON.