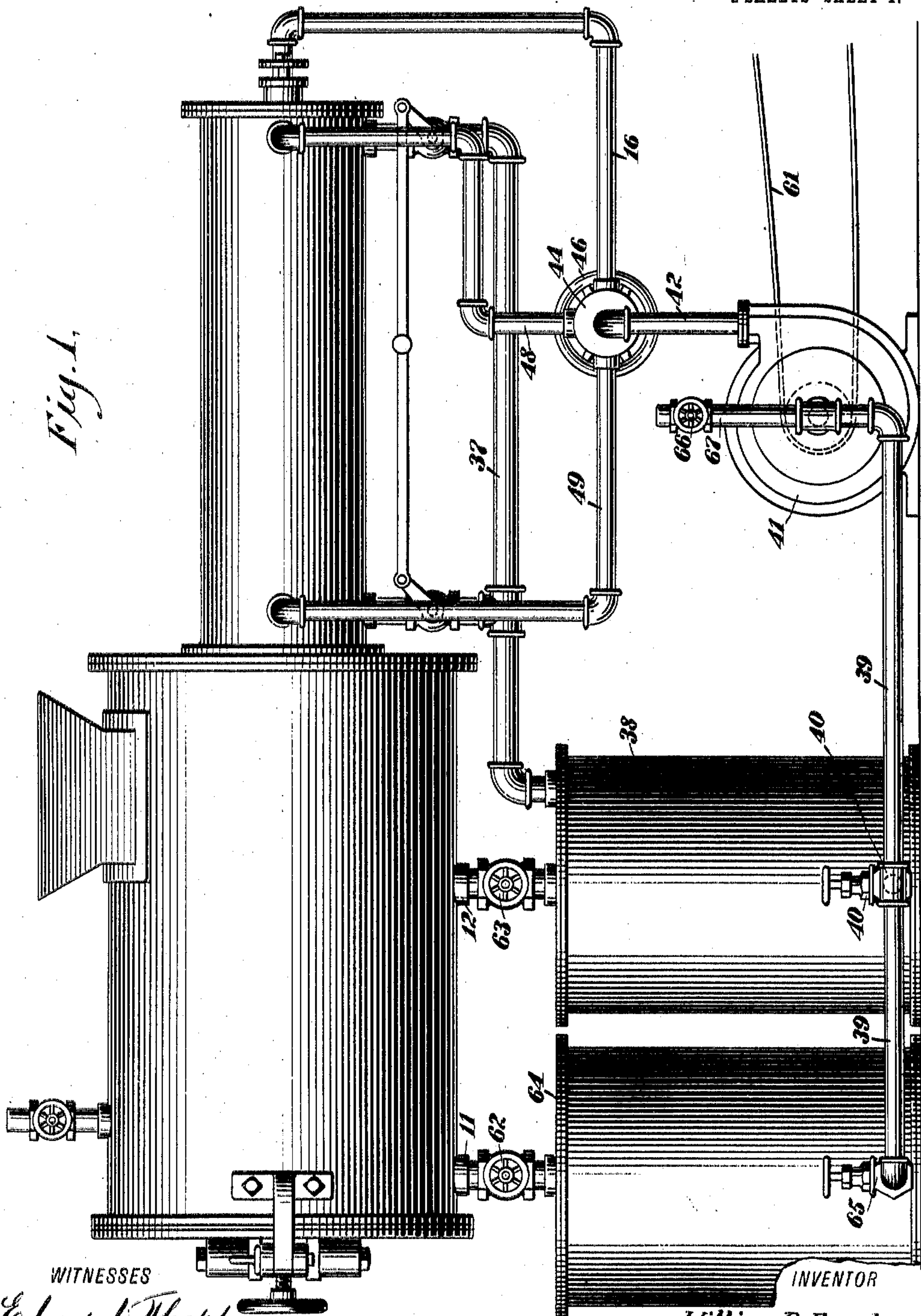


965,625.

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DYEING MACHINE.  
APPLICATION FILED MAY 26, 1909.

Patented July 26, 1910.

2 SHEETS—SHEET 1.



WITNESSES

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INVENTOR

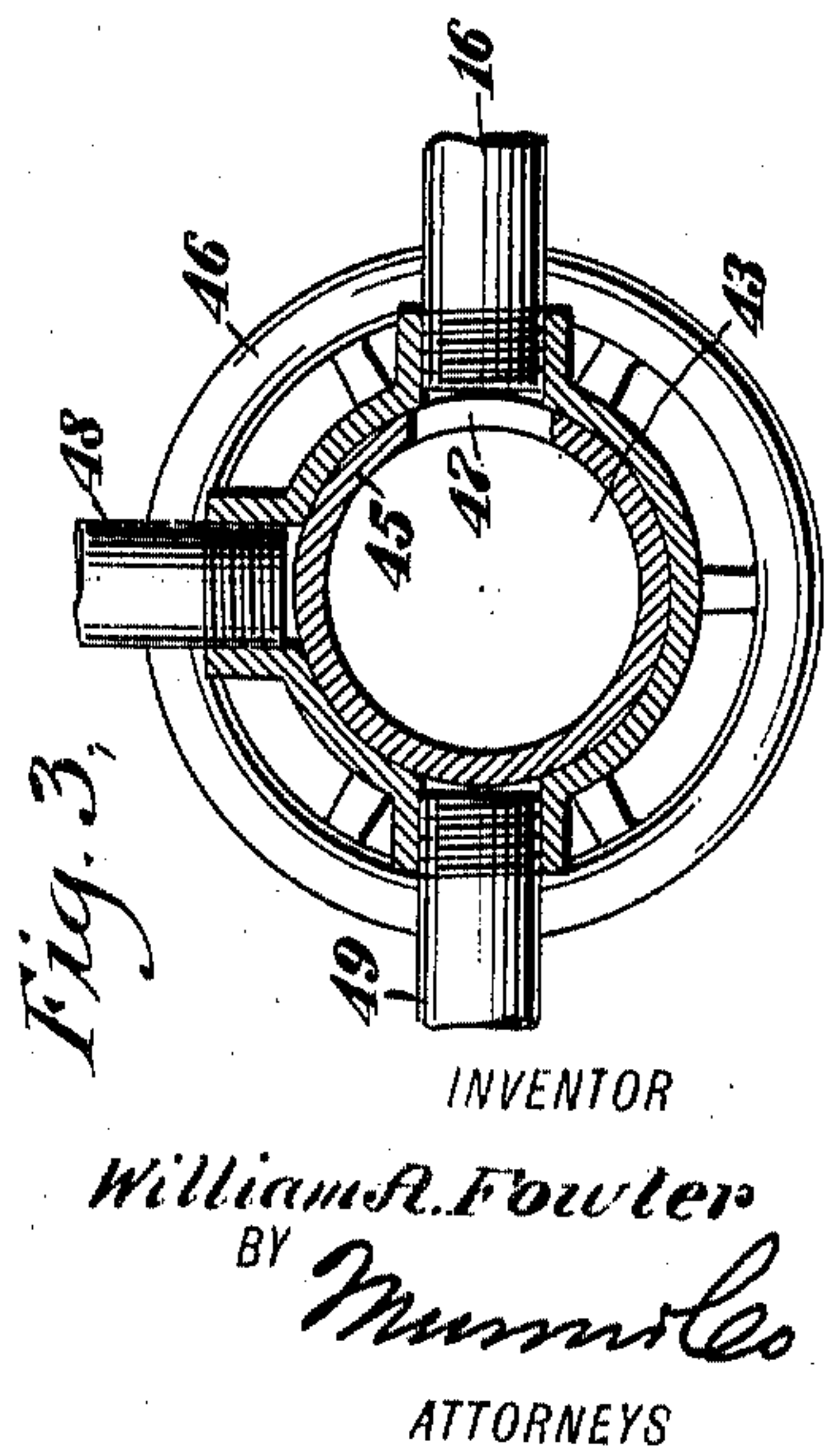
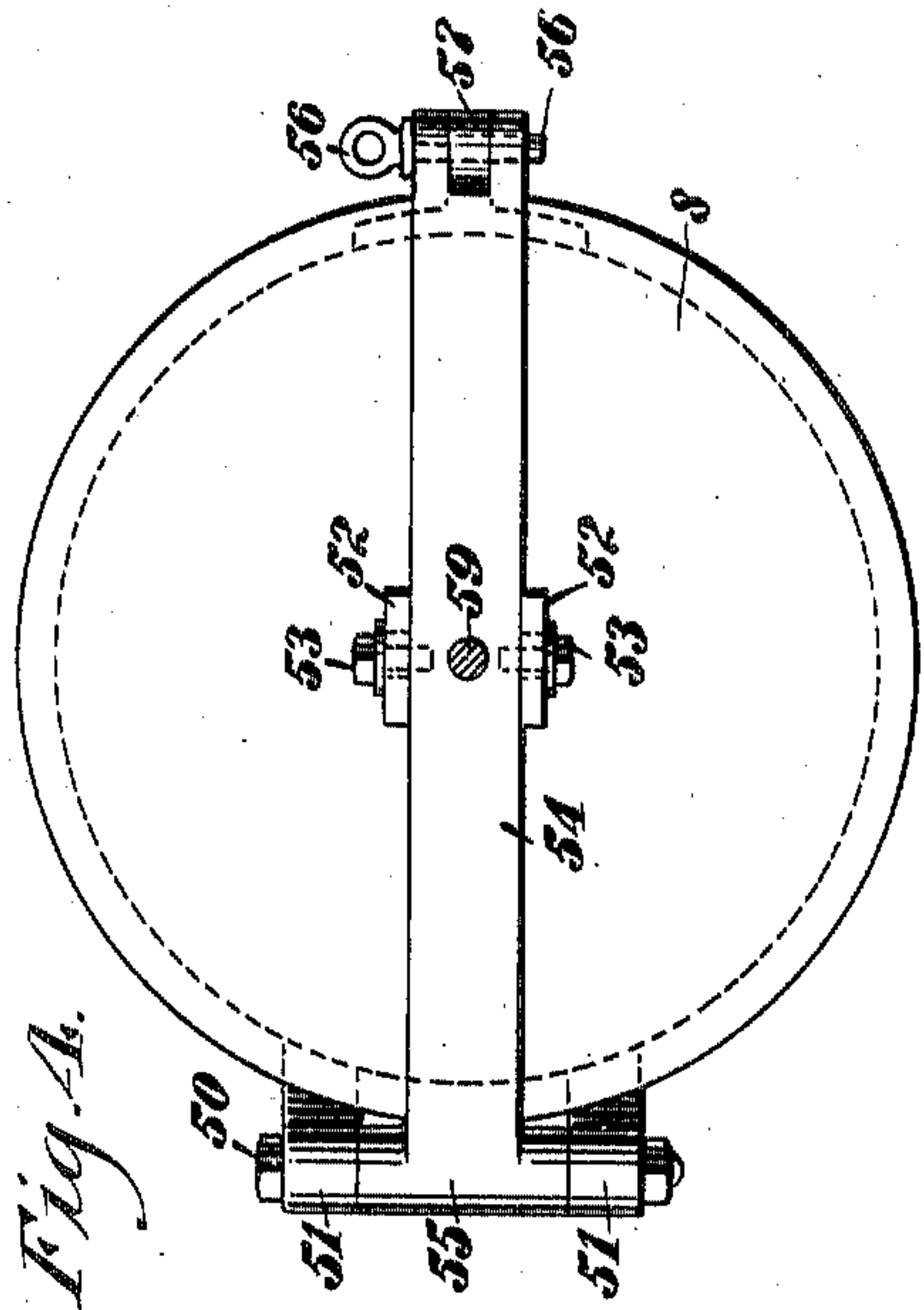
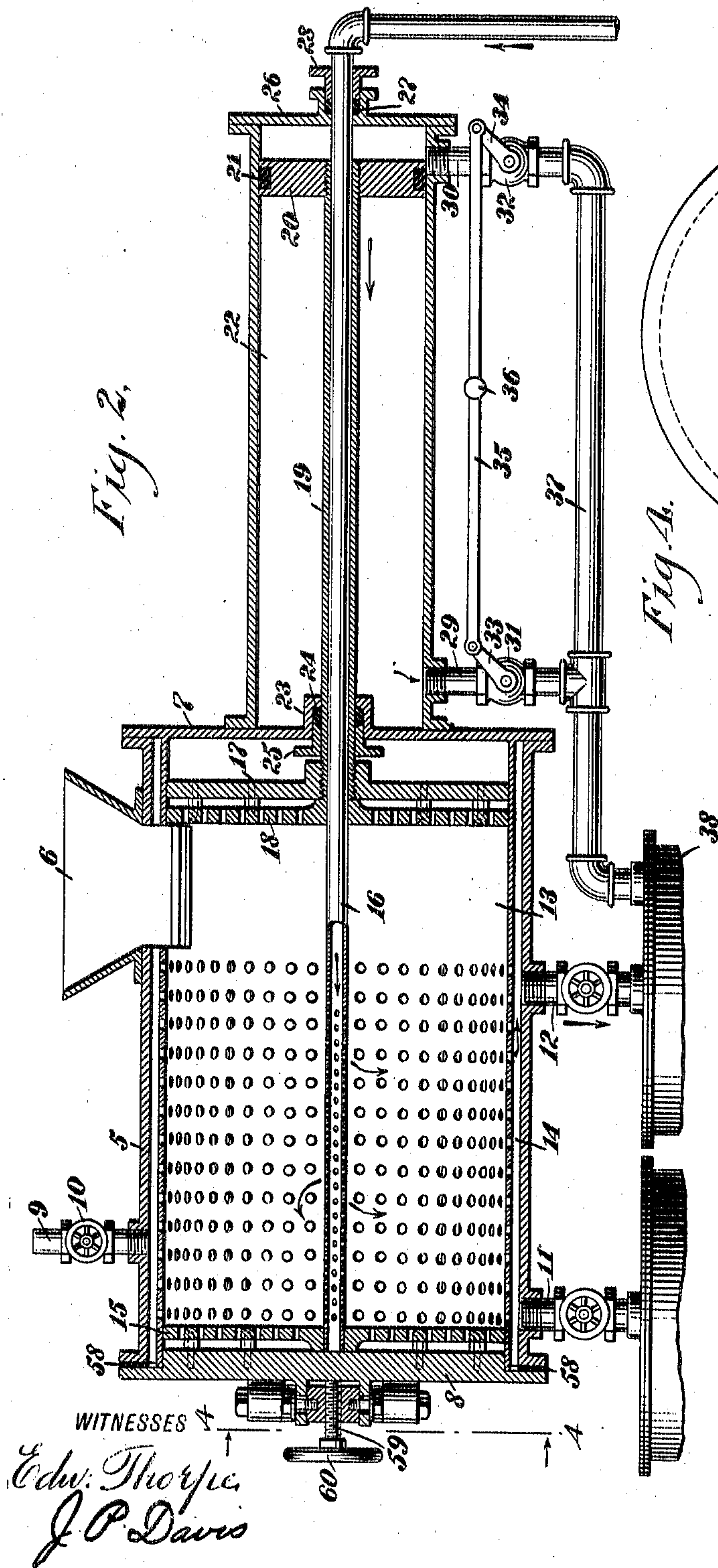
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2 SHEETS—SHEET 2.





# UNITED STATES PATENT OFFICE.

WILLIAM ARLEND FOWLER, OF SALISBURY, NORTH CAROLINA.

## DYEING-MACHINE.

965,625.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed May 26, 1909. Serial No. 498,447.

*To all whom it may concern:*

Be it known that I, WILLIAM ARLEND FOWLER, a citizen of the United States, and a resident of Salisbury, in the county of Rowan and State of North Carolina, have invented a certain new and useful Dyeing-Machine, of which the following is a full, clear, and exact description.

The principal objects which the present invention has in view are: to provide a mechanism wherein the material being dyed may be compressed to eliminate the liquid therefrom within the same machine in which it is subjected to the dyeing fluid; to provide means whereby the material after being dyed may be submitted to heated dry air, within the chamber in which the dyeing was effected; to provide means for extracting the dyed articles from the dyeing machine with rapidity and despatch; to provide means for introducing the dyeing fluid to the articles being treated, and in the center thereof; and to provide a driving mechanism whereby the pressure mechanism and the dye injecting mechanism are arranged to utilize the same motor.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, wherein like characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a side elevation of a machine constructed in accordance with the present invention; Fig. 2 is a vertical longitudinal section of the same; Fig. 3 is a cross section of a four-way valve employed by me for distributing the various materials as received from the motor; and Fig. 4 is an elevation of the cylinder head employed in this machine, the pressure screw being in section on the line 4—4 in Fig. 2.

With the above stated objects in view, the machine employs a cylinder 5, provided with a hopper 6, a fixed head 7, and a removable head 8. The cylinder 5 is also provided with an escape pipe 9 provided with a valve 10. The pipe 9 may lead to and be provided with a safety valve, if such is desired. From the cylinder, and on the lowermost section of the same, are extended outlet pipes 11 and 12. The cylinder 5 is provided with an inner wall 15, suitably suspended within the cylinder 5 to provide a clearance 14. The wall 13 is thickly perforated as shown in

Fig. 2 of the drawings. Within the wall 13 is extended the perforated facing 15 of the removable head 8. The facing 15 is held away from the body of the head 8 to avoid interrupting the passages of the perforations contained in the said facing. The facing 15 is provided with a suitable perforation to receive the end of a pipe 16, which is extended lengthwise of and through the cylinder 5. The end of the said pipe may be independently closed, or may depend for closure upon the abutment with the head 8 as shown in Fig. 2 of the drawings. Slidably mounted within the wall 13 and surrounding the pipe 16 is a plunger 17, provided with a facing 18 similar to the facing 15 of the removable head. The plunger 17 is mounted upon a tube 19, being held in screw thread engagement therewith, as seen in Fig. 2 of the drawings, the facing 18 being bolted to the plunger 17. At the opposite end of the tube 19 is a piston head 20, which is mounted upon the said tube in screw thread engagement. The piston head 20 is provided with suitable packing 21, and is mounted to be reciprocated in a race 22, separated from the cylinder 5 by the stationary head 7, the head being pierced to pass the tube 19, there being provided a stuffing box 23 in which is mounted a packing 24, compressed and held in position by a gland 25. The opposite end of the race 22 is closed by a stationary head 26 which is pierced to receive the pipe 16, the piercing being suitably packed by a packing 27 which is compressed by a gland 28. In the extreme ends of the race 22 there are introduced into said race the pipes 29 and 30, which are controlled by valves 31 and 32, the crank handles 33 and 34 of which are connected by a rod 35 which is provided with a handle 36. The valves 33 and 34 are connected with a main 37 which delivers into a tank 38, provided to contain water for operating the piston head 20. The water is drawn from the said tank by means of a pipe 39 when a valve 40 is open to furnish communication between the pipe 39 and the tank. The pipe 39 is adapted to deliver to a centrifugal pump 41. The pump 41 delivers to a pipe 42 which opens into the interior chamber 43 of a valve 44, said chamber being formed within a plug 45, which is fixedly attached to a hand



wheel 46, and is provided with an outlet 47 adapted to register with the pipes 16, 48 and 49. By turning the hand wheel 46, the outlet 47 of the chamber 43 into which the  
 5 pipe 42 constantly opens, may be regulated to register with any of the pipes 16, 48 and 49, thereby regulating the delivery from the pump 41. Thus, when it is desired to move the piston head 20 toward the cylinder 5,  
 10 the outlet 47 is brought into line with the pipe 48, which is disposed in such manner as to open within the race 22, between the said piston head and the closed head 26. The pressure now introduced between the  
 15 piston 20 will move it toward the cylinder 5.

To permit the water contained in the race 22 to flow from the said race, the connecting rod 35 is thrown to open the valve 31 and close the valve 32. This permits the  
 20 water to flow from the race through the pipe 29 and the main 37 to the tank 38. To reverse the action and move the piston head 20 in the opposite direction, the outlet 47 is moved to register with the pipe 49 which  
 25 introduces the water in the race 22 on the side of the piston 20 opposite to that which has just been described. Simultaneous with the movement of the hand wheel 46 the operator, by means of the handle 36, shifts the  
 30 valves 31 and 32 to close the former and open the latter, closing the pipe 29 and opening the pipe 30 to the main 37. With the actions just described, of the piston head 20, the tube 19 and the plunger 17 are  
 35 reciprocated within the cylinder 5 and within the wall 13 thereof. This action is called into play when it is desired to press the material being dyed within the cylinder 5 or when it is desired to eject the said material from the said cylinder. Pressure is applied upon the material by forcing it against the stationary head 8 and the facing 15 thereof.

The head 8 is provided with extensions  
 45 52, 52, between the sides of which and pivotally connected therewith by bolts 53, 53, is a locking bar 54. The locking bar 54 is hingedly mounted upon a hinge pin 50 which is extended through the hub 55 of the locking bar 54 and the hinge wings 51, 51 that are extended from the side of the cylinder 5. The locking bar 54 is perforated at the outer end to receive a pin bolt 56, the end of the bar being bifurcated and  
 55 perforated as shown in Fig. 4 of the drawings. Between the bifurcated members is received an extension 57 which is likewise perforated to receive the bolt 56. This construction permits of a certain amount of pivotal action of the head 8 upon the bolts 53, 53, which accommodates the introduction of the facing 15 within the said cylinder 5. The head 8 is forced against a yielding gasket 58, to form at this point a waterproof

joint. The necessary play between the perforations of the extension 57 and the bifurcated end of the bar 54, does not allow for the necessary pressure upon the gasket 58 to close the joint sufficiently to render it water tight. It is for this reason that I use  
 70 a screw 59 which is provided with a hand wheel 60, said screw being extended through a threaded perforation in the bar 54. When the bar 54 bearing the screw 59 is placed in position, and the bolt 56 is extended  
 75 through the bifurcated end thereof and through the extension 57, then the head 8 may be forced against the gasket 58 by setting up the screw 59, the end of which bears against the head 8. It will be understood  
 80 that in the extensions 52 and 57 the bolt holes, carrying the bolts 53 and 56 are enlarged sufficiently to permit of a slight independent movement on the part of the head 8.

The pump 41 shown in the drawings is of the type known as centrifugal; but any form of pump may be employed by me. The pump is also shown as being belt driven, but I do not wish to limit myself to any  
 90 form or method for driving the pump, as a direct connected electric motor may be used in conjunction with a suitable pump. In the present instance, the belt 61 is connected with any suitable source of power.  
 95 The pipes 11 and 12 are provided with valves 62 and 63 respectively, which valves control the pipes 11 and 12 to open communication with the tanks 64 and 38 respectively. The outlet from the said tanks  
 100 is controlled by valves 65 and 40, between which is extended the pipe 39 which feeds the pump 41. In the usual equipment for this present machine, the dye material is carried in the tank 64 and water is carried  
 105 in the tank 38.

With a machine constructed as herein described and as shown in the accompanying drawings, the operation is as follows:—The machine is intended for the dyeing of various sorts of materials from wool or cotton, in the raw form, or finished articles of clothing. The articles to be dyed are introduced into the cylinder 5 through the hopper 6. When the introduction of the materials through the hopper 6 becomes clogged, the plunger 17 is advanced to move the materials against the facing 15 of the head 8. When the material has been thus disposed of, the plunger 17 is returned to its initial position, to the far side of the hopper 6, when again the process of loading proceeds. Should the passage become again clogged, the plunger is again advanced to pack the second installment of material against the facing. This action continues until the space between the hopper and the facing 15 is packed as tightly as desired. When this



condition has been arrived at, the plunger is held in the position just forward of the hopper 6. By now moving the connecting rod 36 so as to close both valves 31 and 32, the plunger 17 is held immovably in this position. The valve 40 is then turned to close communication between the tank 38 and the pipe 39, and the valve 65 is opened to establish communication between the said pipe and the tank 64, and the hand wheel 46 is turned to cause the outlet 47 in the valve 44 to register with the pipe 16. In this position, the pump 41 operates to extract the dye fluid from the tank 64, delivering the same through the valve 44 to the pipe 16, and by means of the said pipe 16 into the cylinder 5. The pipe 16 is perforated, as shown in Fig. 2 of the drawings, within the forward end of the said cylinder, to permit the fluid to pass freely from the said pipe. It will be noted that the pipe 16 passes through the center of the material held within the cylinder, and therefore the dye fluid is caused to permeate the entire mass, from the center outward, escaping from the inner chamber formed by the wall 13 through the perforations therein, into the outer chamber or clearance 14. If the operation requires a continuous flow of the dyeing fluid, the valve 62 is turned to open communication with the clearance 14 and the tank 64, and the dye fluid will then pass immediately to the tank 64. By maintaining all parts in this described position, the flow of the dyeing fluid will be unbroken and continuous. Sufficient time having been given for the thorough saturation of all of the material contained within the cylinder 5 the flow of the fluid is discontinued by closing the valve 65. The valve 40 is now opened to establish communication between the tank 38 and the pipe 39, permitting the water in the said tank to flow to the pump 41 and from it to the valve 44. It is now desired to put the material contained within the cylinder under pressure. This is accomplished by turning the hand wheel 46 of the valve 44 to cause the outlet 47 to register with the pipe 48, when the water from the tank 38 is introduced through the pump 41 behind the piston 20. The piston 20, the tube 19 and the plunger 17, are now carried forward against the mass of material contained within the cylinder 5, compressing the same hard against the facing 15 of the head 8. This pressure causes the elimination of all the superfluous dyeing fluid from the articles contained in the said cylinder 5, through the pipe 11 into the tank 64. When pressure has been thus exerted and maintained on the materials being treated, sufficiently long, the plunger 17 is removed from the said material by causing the outlet 47 of the valve 44 to register with

the pipe 49, shifting the valves 31 and 32 to permit the flow of water through the pipe 29 in front of the head 20. It will be observed that an operator can, by regulating the flow through the valves 31 and 32, control the speed of advance or retraction of the plunger 17.

As above mentioned, it is thought advisable in some instances to subject the materials being treated, to a column of air introduced therethrough, or in some cases, of steam. This is accomplished by introducing the same through the pipe 16 as above described. When the air or steam is introduced, the valves 40 and 65 are closed, while the valve 66 upon the pipe 67 is open, the pipe 67 being extended to any source of supply for hot or cold air, or steam. If, however, this step in the operation is not followed, instead of retracting the plunger 17 the head 8 is withdrawn by first releasing the pressure on the bar 54, by reversing the screw 59 until the bolt 56 may be withdrawn from the bar 54 and the extension 57. The bar 54 with the head 8 is then thrown back, while the driving mechanism is operated to advance the plunger 17, and force the wad of compressed material from out the cylinder 5. Upon returning the plunger 17 to its initial position and closing the head 8 upon the cylinder 5, the machine is again in position to repeat the operation just described.

It is desired at times that the cylinder 5 shall be washed with water. When this is to be accomplished, the valve 65 is opened, and the valve 40 is opened to establish communication with the pipe 39, which delivers to the pump 41 and the valve 44, the water contained in the tank 38. By now turning the hand wheel 46 so that the outlet 47 of the valve 44 registers with the pipe 16, the water from the tank 38 will be introduced through the said pipe 16 to be sprayed from the perforations in the innermost end thereof, throughout the cylinder 5. The water, passing through the perforations in the wall 13 will be carried by the pipe 12 back into the tank 38. Should it be desired to flood the cylinder 5, this is accomplished by closing the valve 63 while the water is being introduced through the pipe 16. In this manner the water is trapped within the cylinder 5 while being withdrawn from the tank 38, when, after having flooded the said cylinder 5, by discontinuing the flow through the pipe 16, and opening the valve 63, the water may be drained from the said cylinder 5.

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

1. A dyeing machine comprising an elongated solid walled cylinder; a perforated



cylinder mounted within the said first mentioned cylinder and separated therefrom to form an annular space; a removable end closure for said first mentioned cylinder; a  
 5 perforated face mounted upon said closure and extended therefrom within the said perforated cylinder; a plunger guidably mounted within said perforated cylinder; a perforated facing for said plunger mounted  
 10 upon the said plunger and spaced therefrom; a hydraulic pressure engine directly connected with said plunger to reciprocate the same within said perforated cylinder; an inlet pipe extended through said plunger  
 15 and throughout the said perforated cylinder, said pipe being perforated in that portion to be surrounded by the articles to be treated; and a dye fluid circulating system embodying a reservoir for dye fluid, a delivery  
 20 pump connected therewith, connections for the said pump and said inlet pipe, and return connections communicating between the said reservoir and said solid walled cylinder.

25 2. A dyeing machine comprising an elongated solid walled cylinder; a perforated cylinder mounted within the said first mentioned cylinder and separated therefrom to form an annular space; a removable end  
 30 closure for said first mentioned cylinder; a perforated face mounted upon said closure and extended therefrom within the said perforated cylinder; a plunger guidably mounted within said perforated cylinder; a  
 35 perforated facing for said plunger mounted upon the said plunger and spaced therefrom; a hydraulic pressure engine directly connected with said plunger to reciprocate the same within said perforated cylinder;  
 40 an inlet pipe extended through said plunger and throughout the said perforated cylinder, said pipe being perforated in that portion to be surrounded by the articles to be treated; a dye fluid circulating system embodying a reservoir for dye fluid, a delivery  
 45 pump connected therewith, connections for the said pump and said inlet pipe, and return connections communicating between the said reservoir and said solid walled cylinder; and a feed hopper for the articles to  
 50 be treated opening into said holding receptacle in the path of said plunger.

3. A dyeing machine comprising an elongated solid walled cylinder; a perforated  
 55 cylinder mounted within the said first mentioned cylinder and separated therefrom to form an annular space; a removable end closure for said first mentioned cylinder; a perforated face mounted upon said closure  
 60 and extended therefrom within the said perforated cylinder; a plunger guidably mounted within said perforated cylinder; a perforated facing for said plunger mounted upon the said plunger and spaced there-

from; a hydraulic pressure engine directly 65 connected with said plunger to reciprocate the same within said perforated cylinder; an inlet pipe extended through said plunger and throughout the said perforated cylinder, said pipe being perforated in that por- 70 tion to be surrounded by the articles to be treated; a dye fluid circulating system embodying a reservoir for dye fluid, a delivery pump connected therewith, connections for the said pump and said inlet pipe, and 75 return connections communicating between the said reservoir and said solid walled cylinder; a feed hopper for the articles to be treated opening into said holding receptacle in the path of the said plunger; and means 80 for removing the said end closure from said cylinders.

4. A dyeing machine comprising an elongated solid walled cylinder; a perforated 85 cylinder mounted within the said first mentioned cylinder and separated therefrom to form an annular space; a removable end closure for said first mentioned cylinder; a perforated face mounted upon said closure and extended therefrom within the said 90 perforated cylinder; a plunger guidably mounted within said perforated cylinder; a perforated facing for said plunger mounted upon the said plunger and spaced therefrom; a hydraulic pressure engine directly 95 connected with said plunger to reciprocate the same within said perforated cylinder; an inlet pipe extended through said plunger and throughout the said perforated cylinder, said pipe being perforated in that por- 100 tion to be surrounded by the articles to be treated; a dye fluid circulating system embodying a reservoir for dye fluid, a delivery pump connected therewith, connections for the said pump and said inlet pipe, and 105 return connections communicating between the said reservoir and said solid walled cylinder; a feed hopper for the articles to be treated opening into said holding receptacle in the path of the said plunger; and a water 110 circulating system embodying a water reservoir, a circulating pump in open communication with said reservoir, an inlet pipe connected with said pump and opening into said solid cylinder, an outlet pipe from said 115 solid cylinder opening into said reservoir, and suitable valves for closing the said inlet and outlet pipes.

5. A dyeing machine comprising a solid 120 walled cylindrical chamber; an elongated holding receptacle for the articles to be treated, said receptacle having perforated side walls separated from the walls of said chamber; a reciprocating pressure head 125 mounted within said receptacle and guided to move longitudinally therein; a removable end closure for said receptacle in line with said pressure head; a feed hopper for the



articles to be treated opening into said receptacle at near the retracted position of said head; an inlet pipe, the side walls whereof are perforated, extended within  
5 said receptacle and through a perforation in the said pressure head; a dye fluid injecting mechanism embodying a pump and operatively connected with said inlet pipe; a hydraulic pressure mechanism to reciprocate the said pressure head; and means for locking and releasing said end closure.

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

WILLIAM ARLEND FOWLER.

Witnesses:

K. CRAIGE,

JNO. B. MANLY.