H. M. DUDLEY.

SKEIN DYEING MACHINE.

APPLICATION FILED AUG. 22, 1917.

1,327,657.

Patented Jan. 13, 1920.

5 SHEETS—SHEET 1.

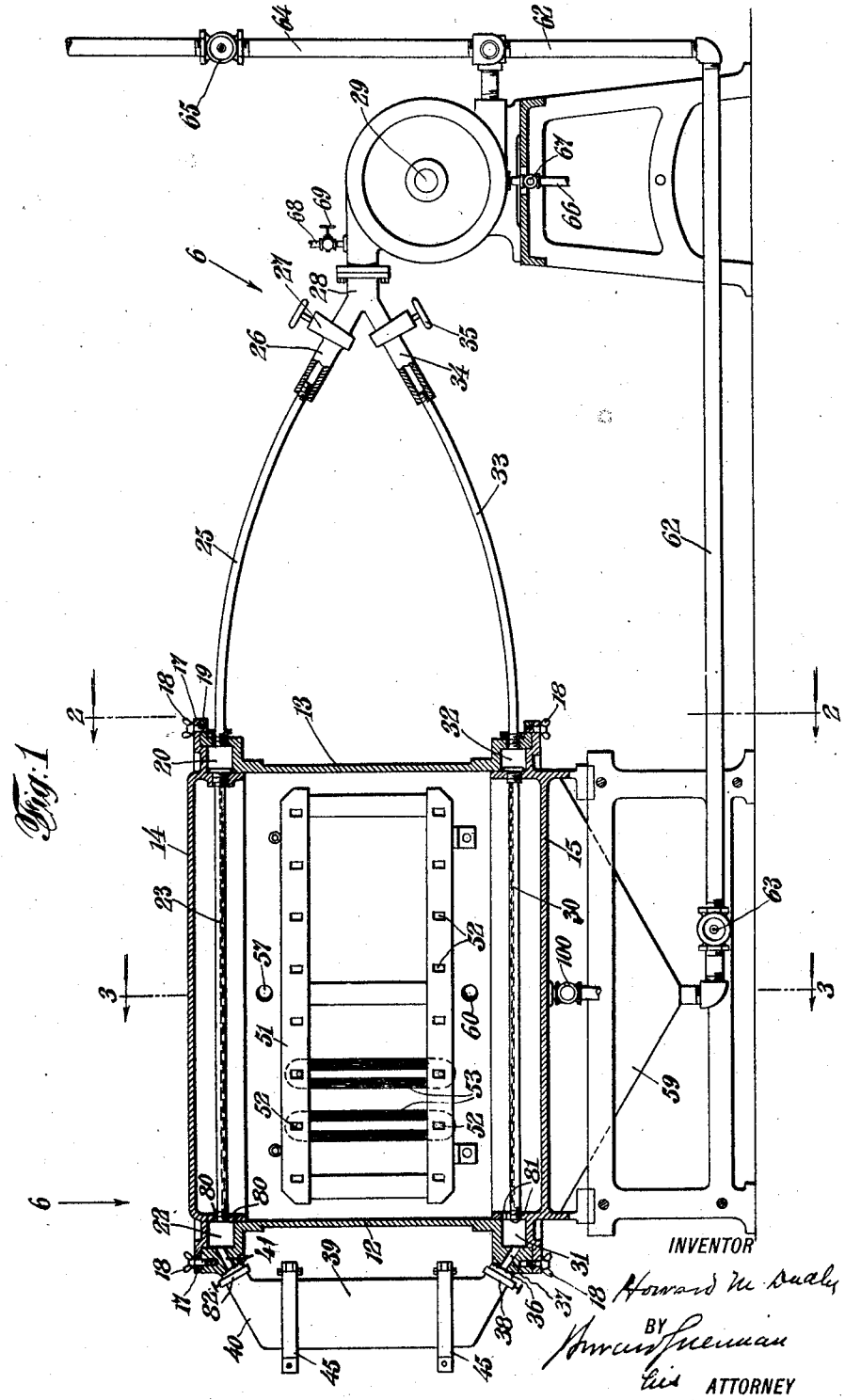


Fig. 1

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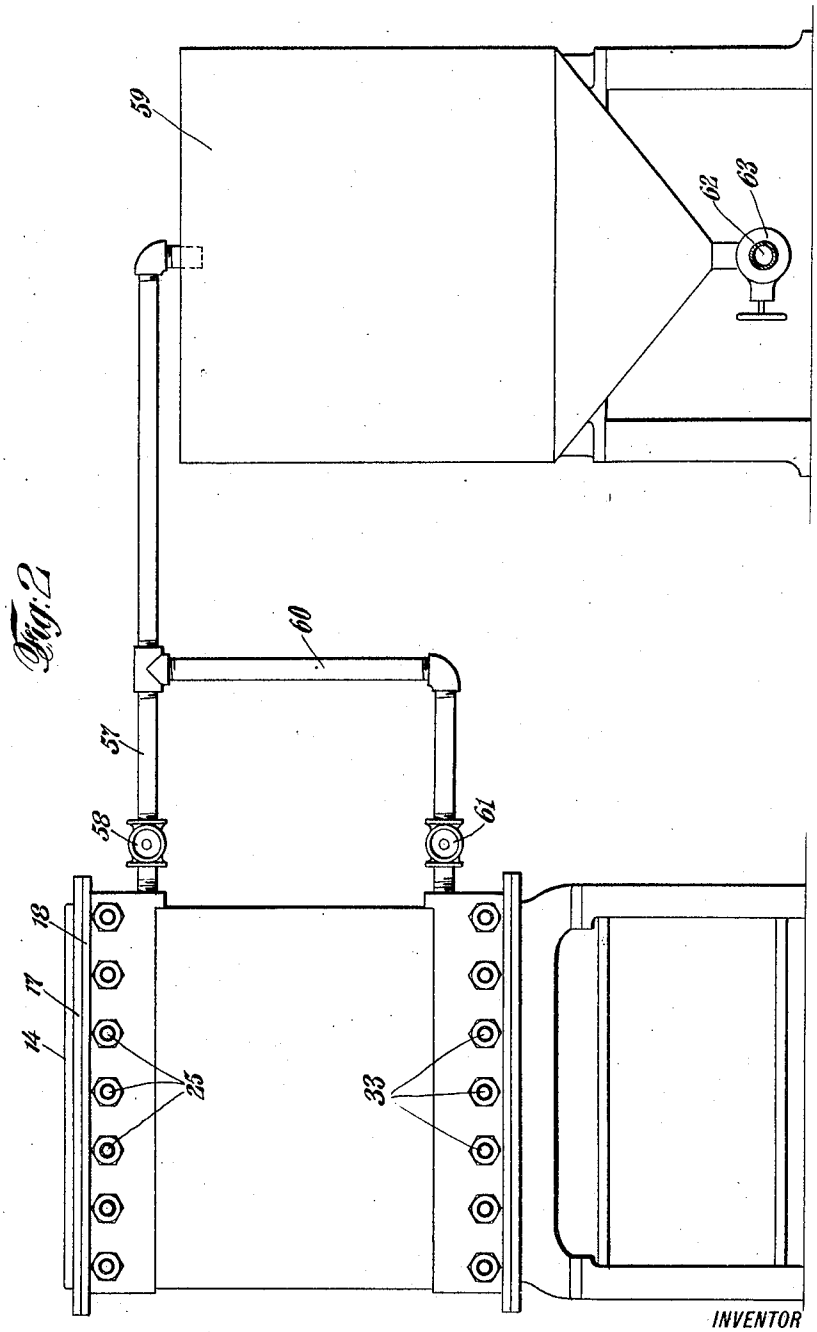


Fig. 2

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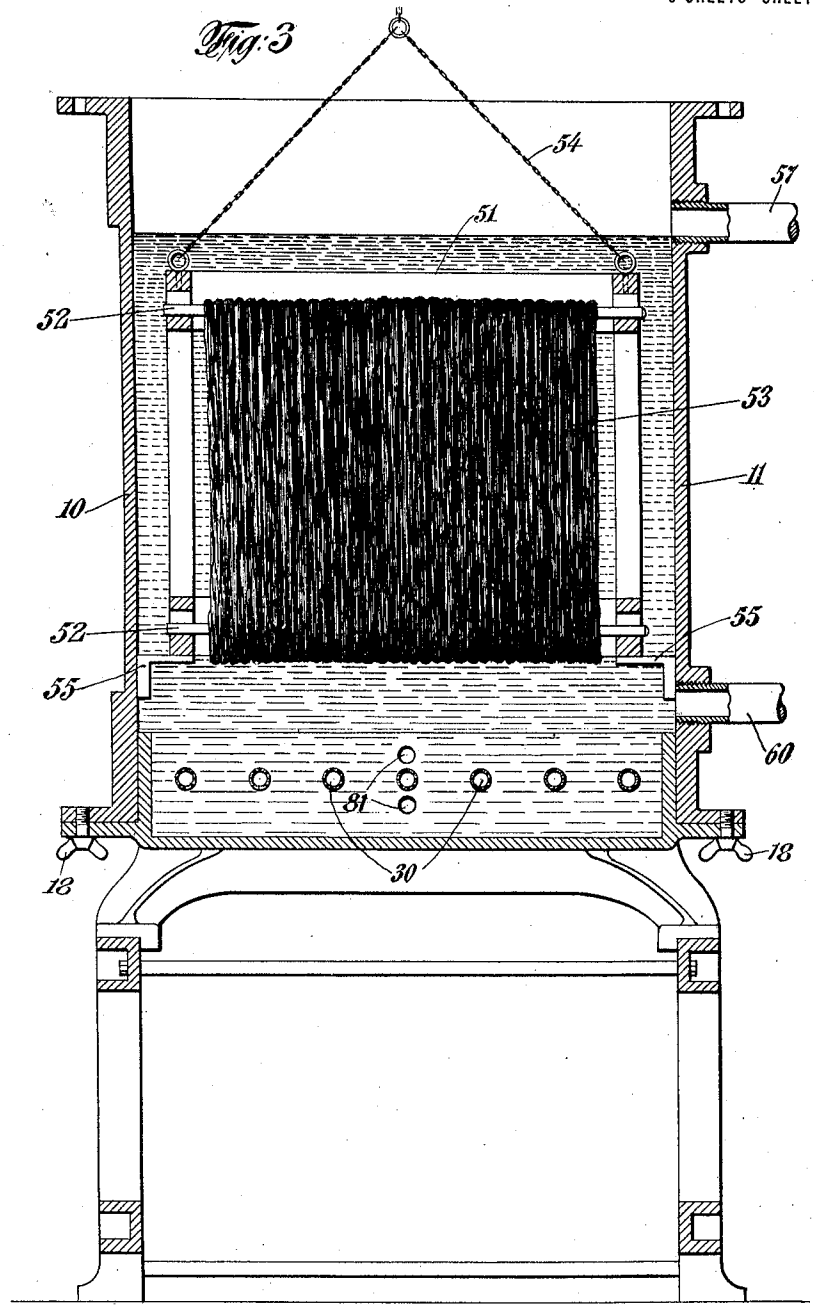
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5 SHEETS—SHEET 3.

Fig. 3



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5 SHEETS—SHEET 4.

Fig. 4

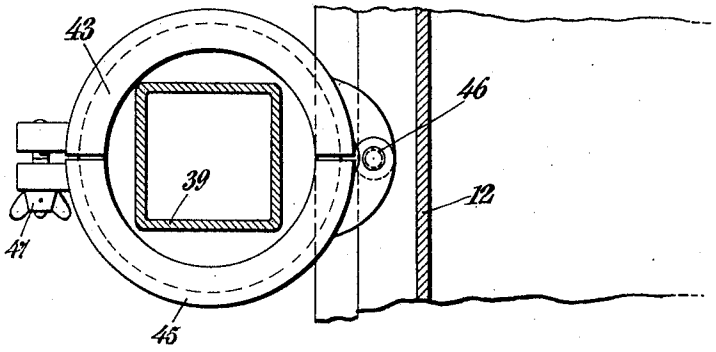
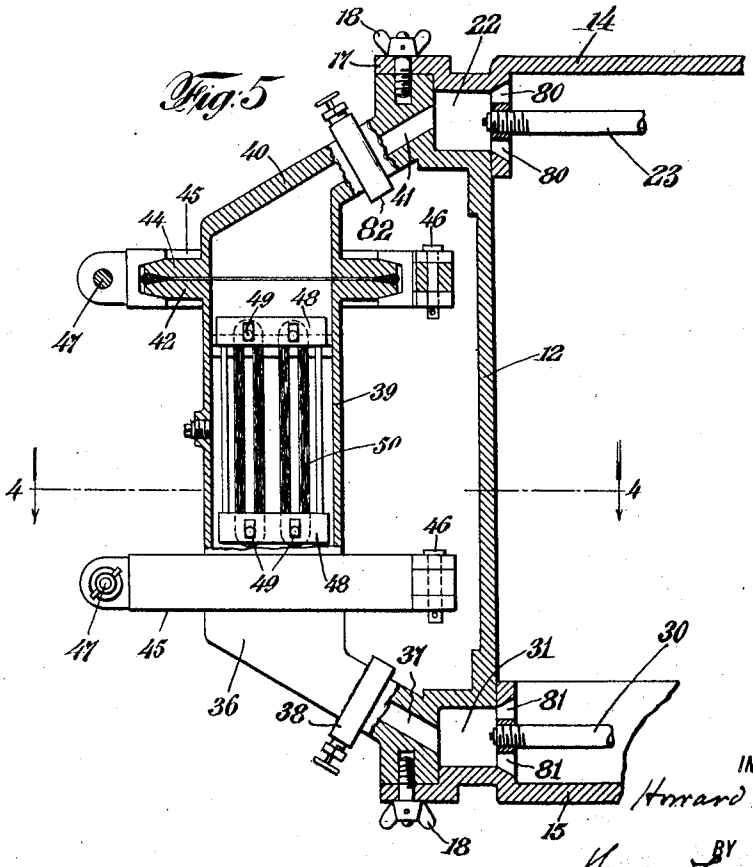


Fig. 5



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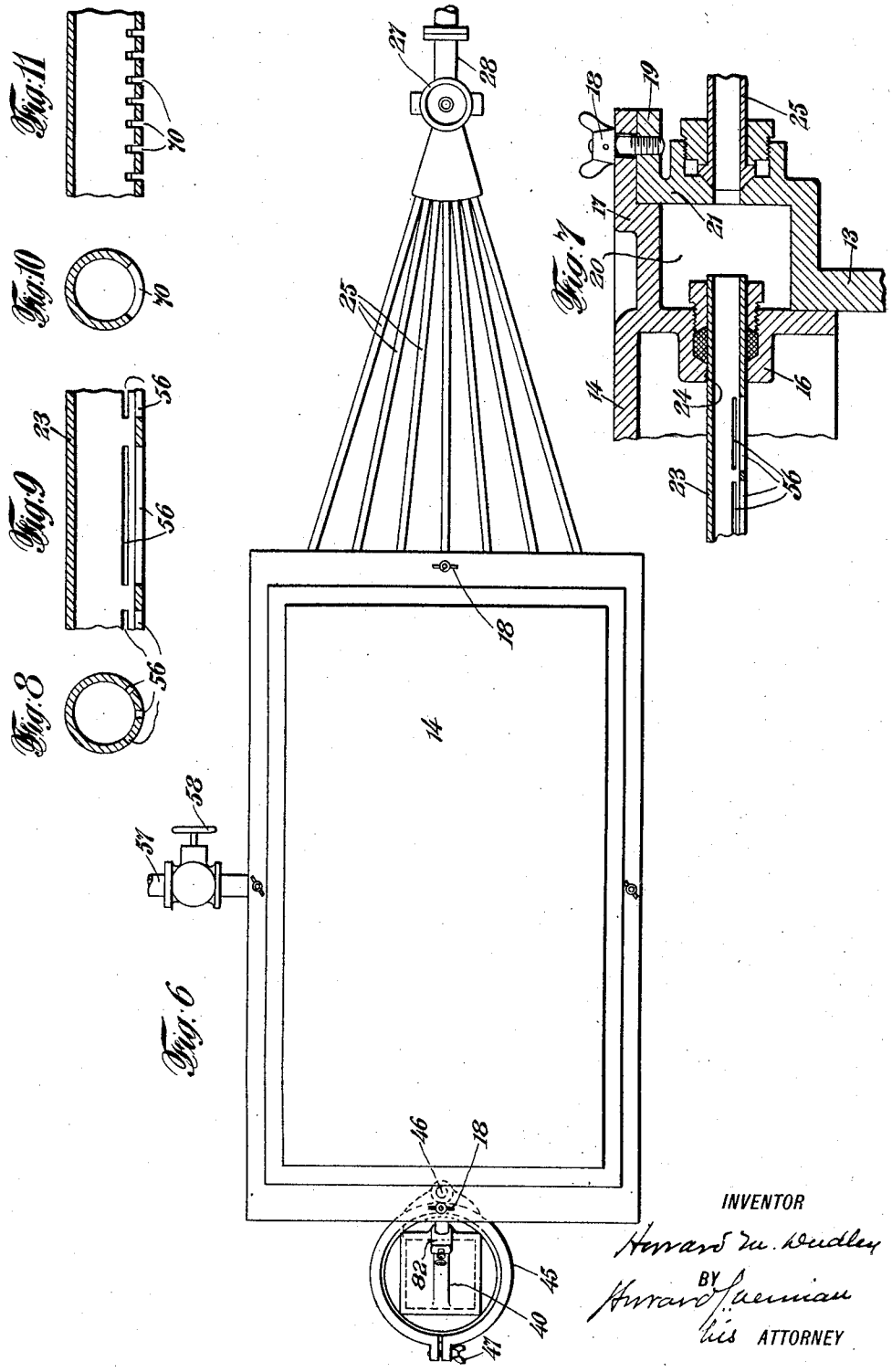
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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SKEIN-DYEING MACHINE.

1,327,657. Specification of Letters Patent. Patented Jan. 13, 1920.

Application filed August 22, 1917. Serial No. 187,531.

To all whom it may concern:

Be it known that I, HOWARD M. DUDLEY, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Skein-Dyeing Machines, of which the following is a specification.

My invention relates to skein dyeing machines and refers particularly to machines suitable for the dyeing of skeins by means of a circulating dye liquor.

One object of my invention is a device whereby skeins of textile fibers may be dyed evenly without manual manipulation.

Another object of my invention is a device in which a dye liquor may be passed in opposite directions through fiber skeins.

Another object of my invention is a device in which those portions of the skein which rest upon the supporting bars are dyed evenly with other portions of the skein.

Another object of my invention is a device in which the dye liquor is distributed evenly throughout the dyeing chambers.

Another object of my invention is a device in which the skeins may be washed and oxidized after dyeing, the oxidation being accomplished by means of an oxidizing solution or by means of air or a suitable gas.

Another object of my invention is a testing device whereby the condition of the fiber in the dyeing chamber may be determined without opening the dyeing chamber or disturbing or injuring the skein yarns therein.

These and other objects of my invention will be evident upon a consideration of my specification, drawings and claims.

In the dyeing of skein yarns it is necessary that the skeins be moved continuously through the dye liquor or that the dye liquor be passed continuously through the skeins in order that all portions of the yarn receive equal treatment to produce even dyeings.

It is further necessary in the dyeing of fibers of this character, to suspend or support each skein separately in order that the fibers may not become tangled and thus interfere with the further operations. There is a tendency toward uneven dyeings at those portions of the skein which rest upon these supporting means, and which are usually not subjected to the same treatment as those portions which are subjected to free treatment of the dye liquor.

My device overcomes all of the above and other difficulties and presents a method whereby uniform and even dyeing results may be obtained with a minimum of time, labor and expense.

In the drawings forming a part of this specification, and in which several forms of the device of my invention are illustrated, similar parts are designated by similar numerals.

Figure 1 is a vertical cross-section of one form of my device.

Fig. 2 is a view looking in the direction of the arrow 2 of Fig. 1.

Fig. 3 is a cross-section through the line 3—3 of Fig. 1 with the top of the dyeing chamber removed.

Fig. 4 is a cross-section through the line 4—4 of Fig. 5.

Fig. 5 is an enlarged vertical cross-section of the testing device.

Fig. 6 is a view in the direction of the arrows 6, 6 of Fig. 1.

Fig. 7 is a broken cross-section showing the end connection of the top and ends of the dyeing chamber.

Fig. 8 is an end view of one of the foraminous pipes.

Fig. 9 is a vertical cross-section of one of the foraminous pipes.

Fig. 10 is an end view of a modified form of one of the foraminous pipes.

Fig. 11 is a vertical cross-section of the foraminous pipe shown in Fig. 10.

The particular form of the device of my invention illustrated in the drawings, comprises a dyeing chamber formed by the side members 10 and 11, the end members 12 and 13, the top 14 and the bottom 15. The end construction of the top 14 is shown in Fig. 7 and comprises a downwardly extended end member 16, the upper extended member 17 having a series of holes through which the wing nuts 18, 18 may be inserted to thread with threaded holes in the flange 19 of the end members 12 and 13 and the side members 10 and 11 of the dyeing chamber, the wing nuts thus serving to fasten the top 14 upon the side and end members of the dyeing chamber; the lower portion of the member 16 abuts upon the inner surface of the sides and ends of the dyeing chamber, thus forming a tight joint. A chamber 20 extends along the end between the member 16 and the upwardly extended portion 21 of the end mem-

ber 13 and a similar chamber 22 is formed along the upper portion of the other end of the dyeing chamber.

A series of foraminous pipes 23, 23 extends across and within the top member 14 and open into the chamber 20, the pipes 23, 23 passing through the holes 24, 24 in the members 16, 16 of the top 14 as shown in Fig. 7. A series of pipes 25, 25 connect the chamber 20 with the pipe 26, having the valve 27, the pipe 26 being connected with the pipe 28, which is in turn connected with the delivery chamber of the pump 29.

The bottom 15 contains a series of foraminous pipes 30, 30 extending within and across the bottom member and opening into the chamber 32. A series of pipes 33, 33 connect the chamber 32 with the pipe 34 having the valve 35; the pipe 34 is connected with the pipe 28.

A series of openings 80, 80 connects the interior of the top 14 with the chamber 22 and a similar series of openings 81, 81 connects the interior of the bottom 15 with the chamber 31.

A testing device whereby the condition of the fiber in the dyeing chamber may be determined without opening the dyeing chamber or interrupting the operation therein, is shown in detail in Fig. 5. A member 36 containing the conduit 37 and having the valve 38, connects the chamber 31 with the lower end of the fiber chamber 39, the upper end of the fiber chamber being connected to the chamber 22 by means of the member 40 containing the conduit 41 and having the valve 82. The fiber chamber 39 has the upper and lower extended flanges 42 and 43, the member 40 having the extended flange 44 capable of abutment upon the flange 42 and the member 36 has a similar flange abutable upon the lower flange 43 of the fiber chamber 39. The fiber chamber is retained in the position shown in Fig. 5 by means of the collar clamp members 45 45, hinged at 46 46 and capable of being clamped by means of the two wing bolts 47 47. Within the fiber chamber 39 is a yarn skein supporting frame 48, having a series of rods 49, 49 upon which the yarn skeins 50, 50 may be retained.

Within the dyeing chamber there is a removable yarn support frame 51, carrying a series of upper and lower rods 52, 52 upon which the yarn skeins 53, 53 may be retained. The support may be removed from the dyeing chamber by means of the chain 54. The supporting frame 51 rests upon the angle members 55, 55 which are integral with the sides 10 and 11 of the dyeing chamber.

The foraminous pipes 23, 23 30, 30 have a series of interrupted longitudinal openings 56, 56 positioned inwardly toward the dyeing chamber.

A pipe 57 having the valve 58, connects the upper portion of the dyeing chamber with the top of the reserve tank 59.

A pipe 60, having the valve 61 is connected with the pipe 57.

The bottom of the reserve tank 59 is connected with the pipe 62 having the valve 63, the pipe 62 being connected to the receiving chamber of the pump 29.

The pipe 64, having the valve 65, connects the pump 29 with a dissolving tank not shown.

The pipe 66 having the valve 67 connects the pump 29 with a source of water supply.

The pipe 68 having the valve 69 is connected with a source of air supply.

In the modification of the foraminous pipes shown in Figs. 10 and 11, the openings 70, 70 are transverse of the pipe.

The operation of the device is as follows:—

The yarn support 51 is loaded with the yarn skeins 53, 53, care being taken that the skeins do not bind between the upper and lower rods 52, 52, and then placed within the dyeing chamber. The top 14 is then placed upon the device and clamped thereto. The testing device is similarly charged with the skeins 50, 50 and placed in position. All of the valves are then closed with the exception of valves 65, 35, 38, 82 and 58, and the pump 29 started. The dye liquor from the dissolving tank, not shown, passes through the pipe 64, the pump 29, the pipe 28, pipes 33, 33, the chamber 32, the foraminous pipes 30, 30, the dyeing chamber, and the pipe 57 into the reserve tank 59.

When sufficient dye liquor has been introduced, valve 65 is closed and valve 63 is opened, thus allowing a continuous circulation of the liquid through the dyeing machine, the reserve tank and the pump. From time to time valves 38 and 82 are closed and the testing device 39 removed, the yarn 50 examined and the testing device replaced. The flow of the liquid through the device is reversed by closing all of the valves with the exception of valves 63, 27, 82, 38 and 61. In this case the liquor is forced by the pump 29 through the pipe 28, pipe 26, pipes 25, 25, chamber 20, top 14, foraminous pipes 23, 23, the dyeing chamber and pipe 60 into the reserve tank 59, at the same time the liquid passes downwardly through the testing device 39. It is to be noted that if the skeins 53, 53 are not held tightly by the bars 52, 52, the skeins will be floated away from the bars, and thus, that portion of the skeins which normally rests upon the bars will be dyed. When the dyeing operation is completed, all of the valves are closed with the exception of valve 100, thus drawing the liquor from the dyeing chamber.

In order to wash the skeins without removing them from the dyeing chamber, all of the valves are closed with the exception

of valves 67, 35, 38, 82, and 58, fresh water thus passing through the pipe 66 into the pump 29 and from thence being forced through the dyeing chamber in the same manner as the dye liquor was forced. When the goods are sufficiently washed, all of the valves are closed with the exception of valves 69, 35, 38, 82 and 58 and air forced through the pipe 68 and from thence through the dyeing chamber in the same manner as the liquid was previously forced. In this manner the skeins are dried or oxidized as desired. After these operations are completed, the top 14 is removed and the frame 51 carrying the skeins 53, 53 is withdrawn by means of the chain 54.

I do not limit myself to the particular size, number, form or arrangement of parts as shown and described, all of which may be varied without going beyond the scope of my invention as described and claimed.

What I claim is:—

1. In a fiber treating device, in combination, a dyeing chamber, a removable frame adapted to carry fiber skeins within the dyeing chamber, a series of foraminous pipes below the frame, means whereby a liquid may be removed from the dyeing chamber above the frame, a removable top carrying a series of foraminous pipes, means whereby a liquid may be removed from the dyeing chamber below the frame, and means for forcing a liquid through either series of pipes and the dyeing chamber.

2. In a fiber treating device, in combination, a dyeing chamber, a removable frame adapted to carry fiber skeins within the dyeing chamber, a series of foraminous pipes below the frame, means whereby a liquid may be removed from the dyeing chamber above the frame, a removable top carrying a series of foraminous pipes, two chambers into which the two series of foraminous pipes enter, a pump, a series of pipes connecting the pump with the chambers, means whereby a liquid may be withdrawn from the dyeing chamber below the frame and means whereby the liquid may be returned to the pump after its passage through the dyeing chamber.

3. In a fiber treating device, in combination, a dyeing chamber, a removable frame adapted to carry skeins within the dyeing chamber, means within the dyeing chamber for supporting said frame, a series of foraminous pipes between the bottom of the frame and the bottom of the dyeing chamber, a chamber into which the pipes of the series enter, a removable top carrying a series of foraminous pipes between the top of the frame and the top of the dyeing chamber, a chamber into which the pipes of the upper series enter, a pump, means for connecting the two pipe chambers with the pump, means for withdrawing a liquid from the bottom of the dyeing chamber, and means for withdrawing a liquid from the top of the dyeing chamber.

4. In a fiber treating device, in combination, a dyeing chamber, a removable frame adapted to carry fiber skeins within the dyeing chamber, a series of foraminous pipes below the frame, means whereby a liquid may be removed from the dyeing chamber above the frame, a series of removable foraminous pipes above the frame, means whereby a liquid may be removed from the dyeing chamber below the frame, means for forcing air through either series of pipes and the dyeing chamber, and means for forcing a liquid through either series of pipes and the dyeing chamber.

5. In a fiber treating device, in combination, a dyeing chamber, a removable frame adapted to carry fiber skeins within the dyeing chamber, a series of foraminous pipes below the frame, means whereby a liquid may be removed from the dyeing chamber above the frame, a removable top carrying a series of foraminous pipes, means whereby a liquid may be removed from the dyeing chamber below the frame, means for forcing air through either series of pipes and the dyeing chamber and means for forcing a liquid through either series of pipes and the dyeing chamber.

Signed at New York city, in the county of New York and State of New York, this 6th day of August, 1917.

HOWARD M. DUDLEY.