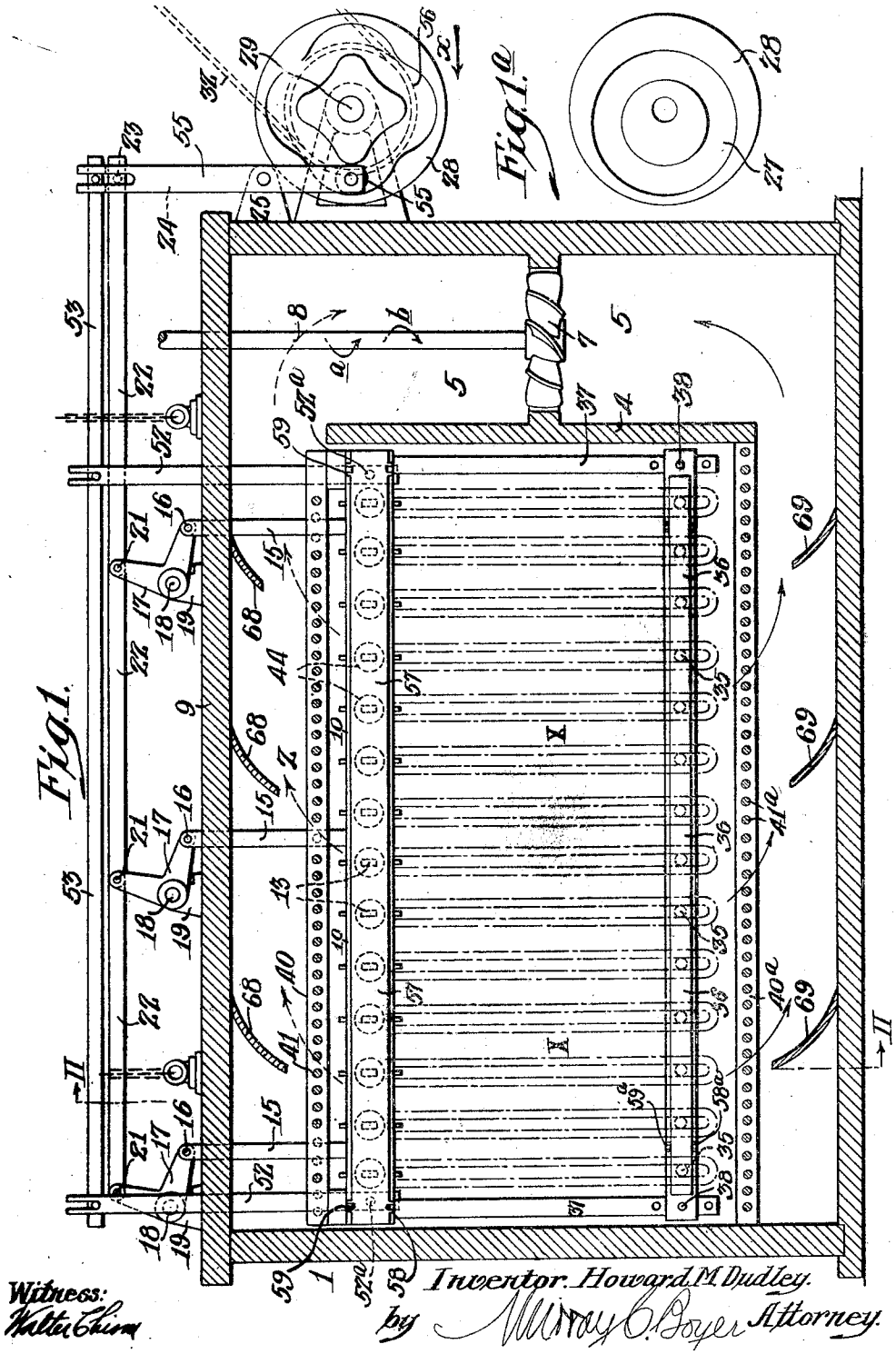
Oct. 6 1925. 1,555,837

H. M. DUDLEY

APPARATUS FOR DYEING, SCOURING, OR OTHERWISE TREATING YARN AND OTHER FIBERS IN THE HANK OR SKEIN

Filed Aug. 24, 1921 4 Sheets-Sheet 1



Witness:
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by Murray C. Boyer Attorney.

Oct. 6, 1925. 1,555,837

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APPARATUS FOR DYEING, SCOURING, OR OTHERWISE TREATING YARN AND OTHER FIBERS IN THE HANK OR SKEIN

Filed Aug. 24, 1921 4 Sheets-Sheet 2

Fig. 2.

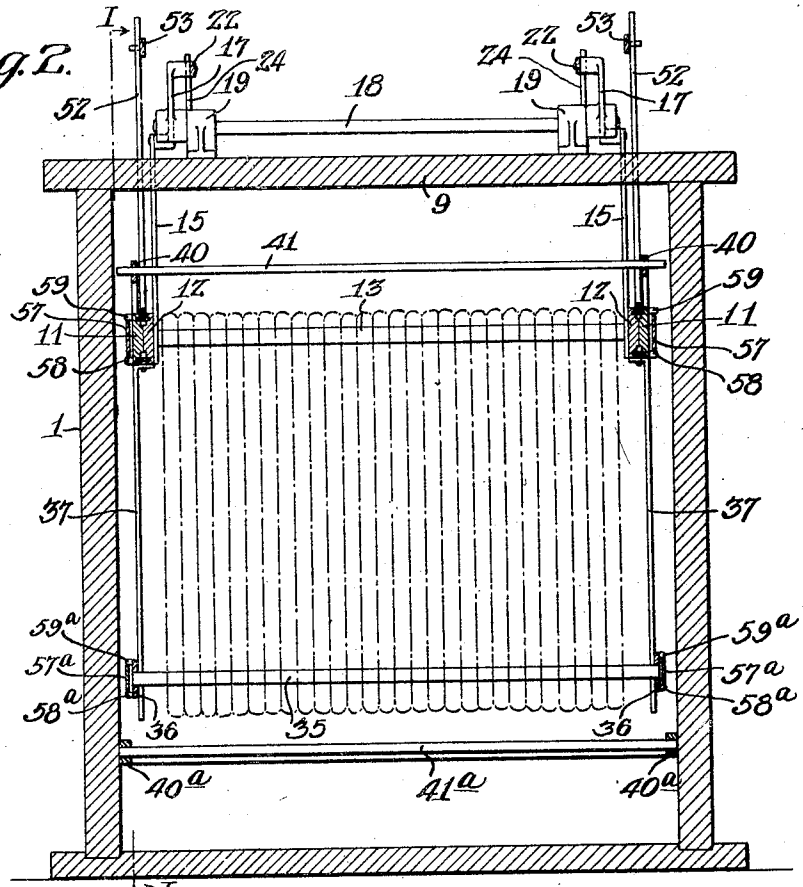
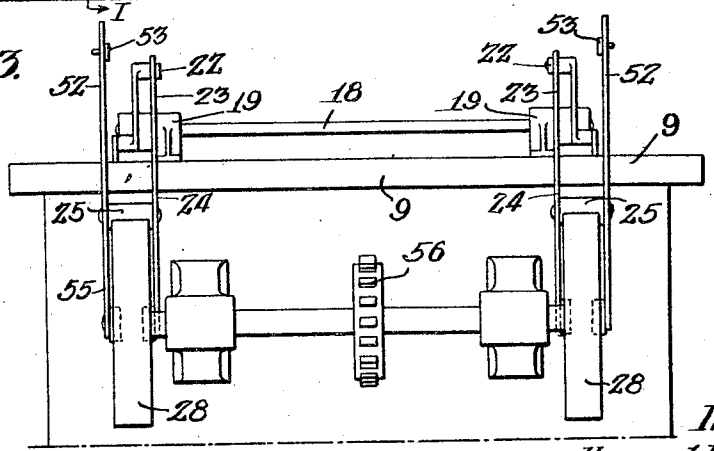


Fig. 3.



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APPARATUS FOR DYEING, SCOURING OR OTHERWISE TREATING YARN AND OTHER FIBERS IN THE HANK OR SKEIN

Filed Aug. 24, 1921 4 Sheets-Sheet 3

Fig. 15.

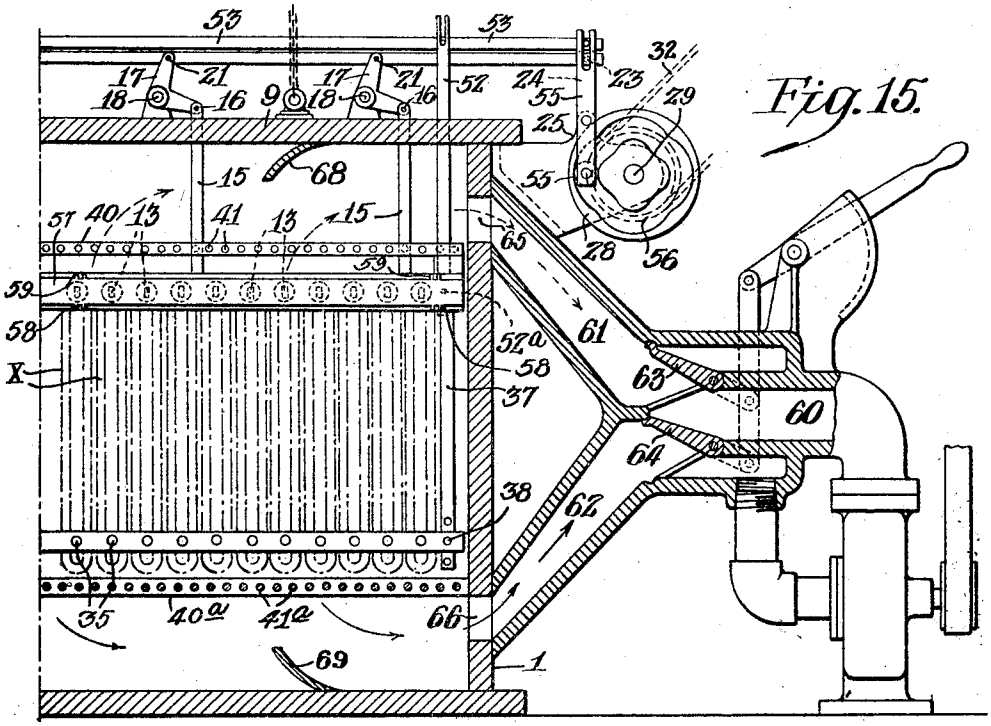


Fig. 4.

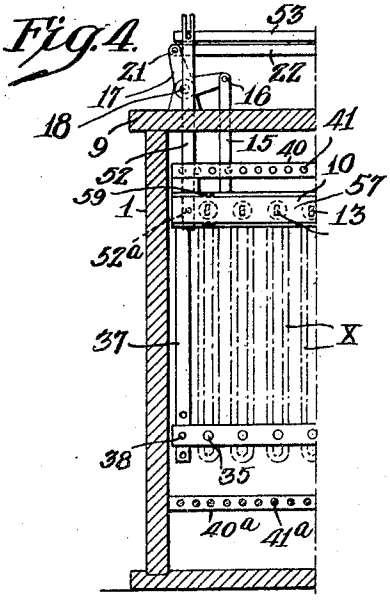


Fig. 13.

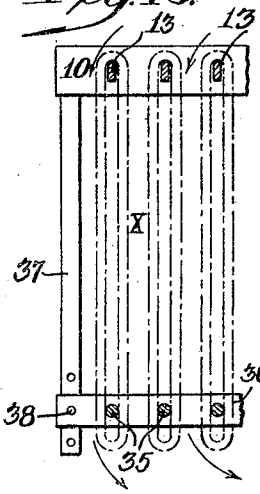
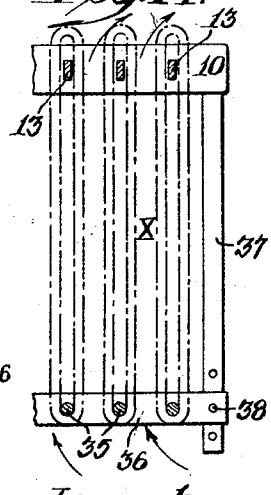


Fig. 14.



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APPARATUS FOR DYEING, SCOURING OR OTHERWISE TREATING YARN AND OTHER FIBERS IN THE HANK OR SKEIN

Filed Aug. 24, 1921 4 Sheets-Sheet 4

Fig. 5.

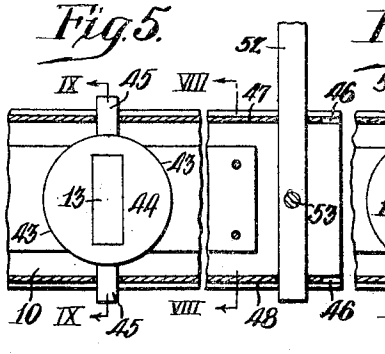


Fig. 6.

Fig. 7.

Fig. 8.

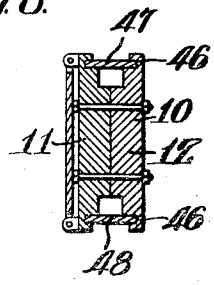


Fig. 9.

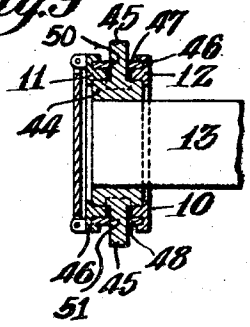


Fig. 10.

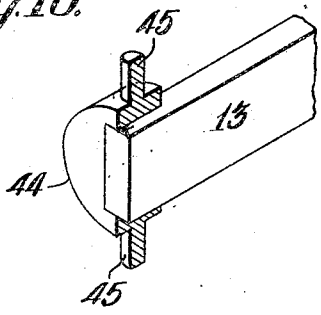


Fig. 11.

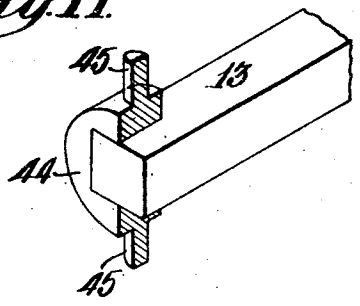
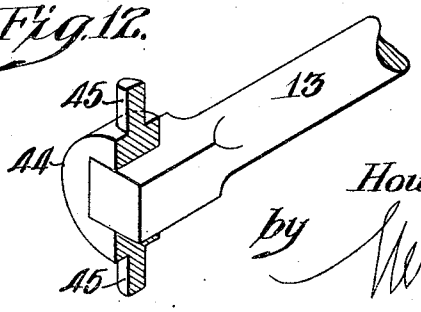


Fig. 12.



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Patented Oct. 6, 1925. 1,555,837

UNITED STATES PATENT OFFICE.

HOWARD M. DUDLEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE FIFTH AVENUE BANK OF NEW YORK, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

APPARATUS FOR DYEING, SCOURING, OR OTHERWISE TREATING YARN AND OTHER FIBERS IN THE HANK OR SKEIN.

Application filed August 24, 1924. Serial No. 494,913.

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, Pennsylvania, have invented certain new and useful Improvements in Apparatus for Dyeing, Scouring, or Otherwise Treating Yarn and Other Fibers in the Hank or Skein, of which the following is a specification.

My present invention relates to improvements in means for manipulating the yarn or fiber-carrying sticks in apparatus of the type set forth in my prior applications filed August 5, 1921, Serial Numbers 489,934 and 489,935, respectively.

One object in my present invention is to provide means for imparting a positive rise and fall to the yarn-carrying sticks whereby sufficient movement may be imparted to the hanks or skeins of yarn or other fiber supported by said sticks, to insure proper contact of the same with the dyeing, scouring or other treating liquid, thereby avoiding all stick marks or undyed or untreated portions, and insuring that all portions of the yarn or fiber shall be subjected to the dyeing or treating liquid.

A further object of my present invention is to impart a rocking movement to the yarn or fiber-supporting sticks during the rise and fall of the same, and a still further object of my invention is to continue the operation of the stick moving means while imparting movement to the body of dyeing or treating liquid through the yarn or fiber receiving chamber.

In carrying my present invention into effect, I may employ a frame in which the sticks are mounted and held against vertical movement with respect to said frame, and provide means for positively raising and lowering the frame at regular intervals.

In addition, the individual sticks may be mounted in bearing blocks carried by said frame which blocks may be rocked or partially rotated simultaneously with the rise and fall of the frame carrying such sticks. The means for effecting the respective movements of the frame and sticks are preferably disposed externally of the dyeing or treating tank.

These and other features of my invention are more fully disclosed hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, is a longitudinal sectional elevation of a dyeing or treating tank to which the improvements forming the subject of my present invention may be applied.

Fig. 1ª, is a view illustrating one of the cams which I may employ with my improved apparatus.

Fig. 2, is a cross-sectional view on the line II—II, Fig. 1.

Fig. 3, is a partial end elevation of the structure shown in Fig. 1, looking in the direction of the arrow *x*.

Fig. 4, is a sectional view of one end of the tank or vat, illustrating the yarn or fiber-carrying frame in the raised position.

Figs. 5, 6 and 7, are views on a larger scale, illustrating more or less diagrammatically details of the stick-supporting frame and the manner in which the sticks may rock therein.

Figs. 8 and 9, are cross sectional views on the lines VIII—VIII, and IX—IX, respectively, Fig. 5.

Figs. 10, 11 and 12, are perspective views illustrating the rockable bearing blocks receiving the ends of the yarn or fiber-carrying sticks.

Figs. 13 and 14, are diagrammatic views showing the manner in which the skeins or hanks of yarn or other fiber are free to rise and fall under the influence of the pressure exerted by the moving liquid, and

Fig. 15, is a longitudinal sectional view, partly broken away, of a chamber or tank containing my improved stick supporting and operating means, and illustrating modified means for effecting movement of the dyeing or treating liquid therein.

In the drawings, 1 represents a suitable tank or vat, containing a chamber 2, in which the hanks or skeins of yarn, are suspended. This tank or vat is in general respects, similar to that shown in my pending applications before referred to, and the hanks or skeins of yarn or other fiber are indicated at X. The tank may contain a partition 4, providing an additional cham-

ber 5, in which may be located a suitable propeller wheel 7, carried by a shaft 8, passing through the cover 9, of said tank.

To this shaft may be applied any suitable driving mechanism, which should be arranged to drive the propeller wheel in both directions so as to move the liquid in two directions in the tank or vat for contact with the hanks or skeins of yarn disposed in the chamber 2. As may be readily understood, movement of said propeller wheel in the direction of arrow *a* will cause the liquid to move downwardly in the chamber 2 and upwardly in the chamber 5; passing under the partition 4, while movement of said propeller wheel in the direction of the arrow *b* will reverse the direction of flow of the dyeing or treating liquid.

Within the tank, I provide a frame for supporting the yarn sticks, which frame may comprise a pair of compound rails 10, suitably connected together; each rail being preferably made up of sections 11 and 12, the cross sectional contour of which is clearly shown in Figs. 8 and 9. These rails, which are disposed on opposite sides of the chamber, are arranged to receive the yarn supporting sticks 13 in the manner hereinafter described.

The respective rails are supported at each end by links 15, connected at 16 to bell crank levers 17, which may be pivoted at 18, to brackets 19, carried by the top or cover of the tank. The opposite ends of said bell crank levers may be connected at 21, to an actuating bar 22, operatively connected at 23, to a lever 24, pivotally hung in brackets 25, and carrying on its lower end a roller 26, adapted to a cam path 27, formed on the face of a rotatable cam member 28, mounted upon a shaft 29, which may be journaled in suitable bearings 30, at the end of the tank and to which motion may be applied in any usual manner. In the present instance, the shaft is shown as carrying a chain wheel 31, to which power may be applied by means of a driven chain 32.

The cam so provided is of such a character that the frame carrying the yarn-supporting sticks will be raised and lowered to a suitable extent at regular intervals which, in addition to the motion imparted to the yarn by the movement of the liquid within the tank, provide such an up and down motion for the hanks or skeins of yarn, as will insure proper contact of the dyeing or treating liquid therewith.

I also provide sticks 35 for the lower ends of the hanks or skeins, which sticks may be carried by side rails 36, which are adjustably supported by members 37, depending from the compound rails 10, such rails 36 being held to the members 37 by pins 38. Above and below the rails 10 carrying the yarn supporting sticks I may provide foraminous partitions, which may comprise side bars 40 and 40ª, and paralleling cross bars 41 and 41ª, extending between the same. The foraminous frame above the yarn-carrying sticks is preferably connected to the rails 10 supporting said sticks so as to rise and fall with the same and be bodily removable therewith, while the side bars of the lower foraminous frame may be fixed to the sides of the tank and connected at one end to the partition 4.

In addition to imparting an up and down movement to the rails 10 carrying the yarn-supporting sticks, I desire to impart a slight rocking or rotative movement to said sticks in the compound rails in which they are mounted. For this purpose said rails may be provided with seats 43, in which circular blocks 44, receiving the ends of the sticks, may rock. These sticks may be rectangular in cross section, square, or round with squared ends, as clearly indicated in Figs. 10, 11 and 12, and these rockable blocks are apertured to properly receive the ends of the sticks. In addition, these blocks are provided with pins 45, in line with the cross axis of the sticks. Slidably mounted in grooves 46 formed in the compound rails 10, are bars 47 and 48, at top and bottom of the same, which bars are apertured at 50 and 51, to receive these pins or projections 45, so that when longitudinal movement is imparted to the bars 47 and 48, they will effect a rocking movement of the circular blocks in the bearings provided for the latter in the compound rails, and thereby rock the sticks.

To effect movement of the bars 47 and 48, I may provide levers 52, pivoted at 52ª, to the compound rails, which levers project through the top or cover of the tank for engagement with connecting members 53, which in turn may be operatively connected to levers 54, pivotally hung in the brackets 25, and carrying rollers 55 adapted to cam paths 56, on the opposite faces of the cam members 28, which carry the cam paths 27; such cam paths 56 being irregular as indicated in Fig. 1, so that a plurality of rocking movements will be imparted to the sticks during the rise and fall of the frame carrying the same.

In Figs. 13 and 14, I have illustrated the action of the moving liquid upon the sticks when mounted as indicated in Figs. 1, 2, 3, et seq., and it will be noted that when the liquid is moved upwardly in the chamber in which the hanks or skeins of yarn are suspended, the pressure of the same will tend to raise the yarn from the sticks so that such pressure of the yarn normally in engagement with the sticks and not receiving under usual conditions sufficient amount of dyeing or treating liquid, will be subjected to the full action of the moving liquid no mat-

ter what the character of the same may be. This action of the liquid upon the skeins or hanks of yarn is in addition to the up and down movement applied to the rails 10 carrying the yarn- or fiber-supporting sticks 13, and the rocking movement applied to said sticks.

In order to prevent endwise movement of the sticks 13 with respect to the rails 10, I may provide retaining means therefor such as those illustrated in my companion application, which may comprise cover plates 57, extending the length of said rails 10, and hinged thereto at 58. Suitable securing means indicated at 59, may be employed to hold these cover plates in the closed position, as indicated in Figs. 1, 2, 4, 8, et seq. In addition, the rails 36, supporting the sticks 35 for the lower ends of the skeins or hanks of yarn or fiber, may be provided with cover plates 57ª, hinged to said 36 at 58ª, to prevent endwise movement of said sticks 35, and provided with securing means 59ª, to hold said cover plates 57ª in the closed position, as clearly indicated in the drawings.

In the structure shown in Fig. 15, the means for effecting circulation of the dyeing or treating liquid within the tank are shown as disposed externally of the same, and they may comprise a conduit 60, communicating with a pair of passages 61 and 62, provided with valves 63 and 64, and forming alternately inlet and discharge passages in registry with the ports 65 and 66 of the tank, whereby the liquid may be moved in either direction in the dyeing or treating chamber as may be desired; a rotary pump 67 suitably driven, being preferably employed to move the liquid. The arrangement of the yarn-carrying sticks and accessories is substantially the same as illustrated in Figs. 1, 2, 3, et seq.

In order that the moving liquid may be prevented from setting up currents or eddies which would tend to pass through one portion of the hanks or skeins and omit other portions of the same, the interior of the dyeing or treating chamber is preferably provided with a series of baffle plates 68 and 69; those indicated at 68 being carried by the top or cover 10, of the dyeing or treating chamber, while those indicated at 69, may be carried at the bottom of the same. It will be understood, of course, that a greater or less number of baffle plates, capable of performing the desired function, may be employed, as desired.

While I have referred to my apparatus as applied to the dyeing of hanks or skeins of yarn or other fibers, it will be understood, of course, that such apparatus may be employed in the washing of hanks or skeins of yarn or other fibers, or such other treatment with a liquid body to which it may be desirable to subject such hanks or skeins.

I claim:

1. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or fiber may be suspended, a pair of rails, and fiber-carrying sticks arranged to rock in said rails.

2. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or fiber may be suspended, a pair of rails, rockable members carried by said rails, and fiber-carrying sticks adapted to said rockable members.

3. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or fiber to be dyed or otherwise treated may be suspended, a pair of rails, fiber-carrying sticks arranged to rock in said rails, and means for rocking said sticks.

4. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or fiber to be dyed or otherwise treated may be suspended, a pair of rails, rockable members carried by said rails, fiber-carrying sticks adapted to said rockable members, and means for rocking said members.

5. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or fiber to be dyed or otherwise treated may be suspended, a pair of vertically movable rails, fiber-carrying sticks arranged to rock in said rails, and means for rocking said sticks.

6. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or fiber to be dyed or otherwise treated may be suspended. a pair of vertically movable rails, rockable members carried by said rails, fiber-carrying sticks adapted to said rockable members, and means for rocking said members.

7. In fiber-treating apparatus, the combination with a tank or vat in which skeins or hanks of yarn or other fiber may be treated and means for circulating liquid in said tank, of a plurality of rails disposed in parallel relation, yarn-carrying sticks supported by said rails, means for imparting a positive vertical movement to said rails and the yarn-carrying sticks supported thereby, and means for rocking the yarn-carrying sticks in said rails during the vertical movement of the latter.

8. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or other fiber may be treated, means for circulating liquid in said tank, a plurality of rails, rockable members carried by said rails, yarn-carrying sticks supported in said rockable members, and means for rocking the members supporting the skein or hank-carrying sticks.

9. In fiber-treating apparatus, the combi-

nation of a tank or vat in which skeins or hanks of yarn or other fiber may be treated, means for circulating liquid in said tank, a plurality of rails, rockable members carried by said rails, yarn-carrying sticks supported in said rockable members, means for positively raising and lowering said rails, and means for rocking the members supporting the skein or hank-carrying sticks.

10. In fiber-treating apparatus, the combination of a tank or vat in which skeins or hanks of yarn or other fiber may be treated, means for circulating liquid in said tank, a plurality of rails, yarn-carrying sticks supported by said rails, means for rocking the skein or hank-carrying sticks in said rails, and means for simultaneously raising and lowering said rails.

11. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber are suspended, a pair of rails, rockable members mounted in said rails, sticks supported in said rockable members, sliding elements carried by said rails and in operative engagement with said rockable members, and means for moving said sliding elements.

12. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber are suspended, a pair of compound rails having longitudinal grooves, rockable members mounted in said rails, sticks supported in said rockable members, sliding elements carried by said rails and disposed in said longitudinal grooves, and means disposed externally of the tank or vat for reciprocating said sliding elements; the latter being operatively connected to the rockable members.

13. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber are suspended, a pair of rails, rockable members mounted in said rails, sticks supported in said rockable members, sliding elements carried by said rails and in operative engagement with said rockable members, levers for moving said sliding elements, and means for positively actuating said levers.

14. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber are suspended, a pair of compound rails, rockable members mounted in said rails, sticks supported in said rockable members, sliding elements carried by said rails, levers for reciprocating said sliding elements, and means disposed externally of the tank or vat for positively actuating said levers.

15. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber are suspended, a pair of rails, rockable members mounted in said rails, sticks supported in said rockable members, sliding elements operatively connected with said rockable members carried by said rails, levers for reciprocating said sliding elements, a rotating cam disposed externally of the tank or vat, cooperating means between said cam and levers for positively actuating the latter, and means for actuating said cam.

16. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber are suspended, a pair of compound rails, rockable members journaled in said rails, sticks supported in said rockable members, sliding elements operatively connected with said rockable members carried by said rails, levers for reciprocating said sliding elements, a rotating cam disposed externally of the tank or vat for positively actuating said levers, means for actuating said cam, and means for simultaneously raising and lowering said rails.

17. In fiber treating apparatus, in combination, a tank for containing a body of treating liquid, a supporting rail, yarn sticks mounted on said rail for supporting hanks or skeins of material in the liquid, driving means and connections thereto for continuously reciprocating said yarn sticks within said treating liquid, means operatively connected to said driving means for turning said yarn sticks simultaneously with reciprocation thereof and additional yarn sticks for said hanks or skeins adapted to cooperate therewith at points spaced from said first mentioned yarn sticks and being reciprocable with the latter.

18. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber may be suspended, a pair of rails, sticks mounted in said rails for supporting said yarn, means for rocking said sticks, bell crank levers carried by said tank and in operative connection with said rails, and means for operating said bell crank levers whereby the rails may be raised and lowered to move the hanks or skeins of yarn or other fiber in the treating liquid.

19. In fiber-treating apparatus, the combination of a tank or vat in which hanks or skeins of yarn or other fiber may be suspended, a pair of rails, rockable sticks mounted in said rails for supporting said yarn, bell crank levers carried by said tank and in operative connection with said rails, and means disposed externally of the tank for operating said bell crank levers whereby the rails may be raised and lowered to move the hanks or skeins of yarn or other fiber in the treating liquid and simultaneously rocking said sticks.

20. In fiber-treating apparatus, the combinaton of a tank or vat in which hanks or skeins of yarn or other fiber may be suspended, a pair of rails, sticks mounted in said rails for supporting said yarn, a fo-

raminous frame carried by the rails above said sticks, bell crank levers carried by said tank and in operative connection with said rails, means including a rotating cam for operating said bell crank levers whereby the rails may be raised and lowered to move the hanks or skeins of yarn or other fiber in the treating liquid, means for actuating said cam, and means for circulating liquid in both directions through said tank or vat.

21. In fiber-treating apparatus, the combination of a pair of rails, rockable blocks journaled in said rails, yarn-carrying sticks mounted in said blocks, said sticks being movable through said blocks for insertion or release, and means for holding said sticks in position.

22. In fiber-treating apparatus, the combination of a pair of rails, rockable blocks journaled in said rails, yarn-carrying sticks mounted in said blocks, said sticks being movable through said blocks for insertion or release, and means carried by the rails for holding said sticks in position.

23. In fiber-treating apparatus, the combination of a pair of rails, rockable blocks journaled in said rails, yarn-carrying sticks removably mounted in said blocks, and displaceable means for holding said sticks in position.

24. In fiber-treating apparatus, the combination of a pair of compound rails, rockable blocks journaled in said rails, yarn-carrying sticks removably mounted in said blocks, and displaceable means carried by the rails for holding said sticks in position.

25. In fiber-treating apparatus, the combination of a pair of rails, rockable blocks journaled in said rails, yarn-carrying sticks mounted in said blocks, said sticks being movable through said blocks for insertion or release, and guard plates hinged to the rails for holding said sticks in position.

26. In fiber-treating apparatus, the combination of a pair of compound rails, rockable blocks journaled in said rails, yarn-carrying sticks mounted in said blocks, said sticks being movable through said blocks for insertion or release, guard plates hinged to the rails for holding said sticks in position, and means for holding said guard plates in stick-retaining position.

27. In fiber treating apparatus, in combination, a tank for containing a body of treating liquid, a supporting rail, yarn sticks mounted on said rail for supporting hanks or skeins of material in the liquid, driving means and connections thereto for continuously reciprocating said yarn sticks within said treating liquid, means operatively connected to said driving means for turning said yarn sticks simultaneously with reciprocation thereof, additional yarn sticks for said hanks or skeins adapted to cooperate therewith at points spaced from said first mentioned yarn sticks and being reciprocable with the latter, and means for circulating the liquid in said tank in currents approximately parallel to the movement of said yarn sticks.

28. In fiber treating apparatus, in combination, a tank or vat in which the treated material may be suspended in a body of treating liquid, a supporting rail and material supporting members mounted thereon, levers connected to said rail for suspending the latter in said treating liquid, means disposed externally of the tank for operating said levers whereby the rail and supporting members may be vertically reciprocated to move the treated material in the treating liquid, and means for moving said supporting members on said rail to vary supporting contact with said material.

29. In fiber treating apparatus, in combination, a tank or vat in which the treated material may be suspended in a body of treating liquid, a supporting rail and material supporting members mounted thereon, levers connected to said rail for suspending the latter in said treating liquid, means disposed externally of the tank for operating said levers whereby the rail and supporting members may be vertically reciprocated to move the treated material in the treating liquid, means for circulating the liquid in said tank approximately parallel to the movement of said supporting members, and means for moving said supporting members on said rail to vary the supporting contact with said material.

In witness whereof I have signed this specification.

HOWARD M. DUDLEY.