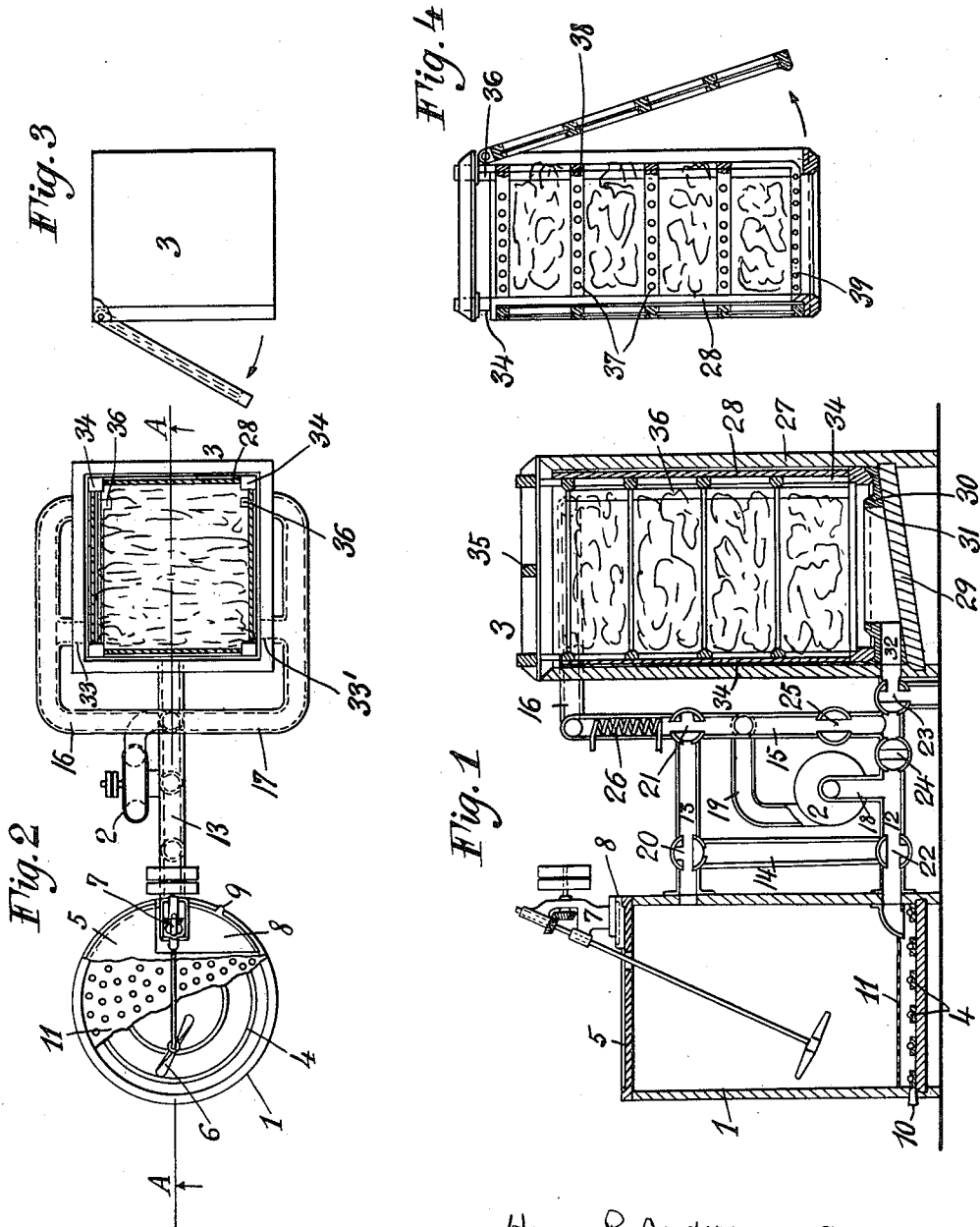


H. R. ANDERS & M. E. U. SCHOEDLER.
 APPARATUS FOR BLEACHING.
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Witnesses:
J. Koenigsberg
H. E. Le Gend

Hanno R. Anders
 Maximilian E. U. Schoedler
 Inventors
 By *Attorney*
Leahy & Co. Boston.

UNITED STATES PATENT OFFICE.

HANNS R. ANDERS AND MAXIMILIAN E. U. SCHOEDLER, OF PERTH AMBOY, NEW JERSEY, ASSIGNORS TO THE ROESSLER & HASSLACHER CHEMICAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

APPARATUS FOR BLEACHING.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, HANNS R. ANDERS, a subject of the Emperor of Austria-Hungary, and MAXIMILIAN E. U. SCHOEDLER, a citizen of the United States of America, both residents of Perth Amboy, county of Middlesex, and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Bleaching; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention, which is a division of a pending application filed March 30, 1912, Serial #687,426, relates to new and useful improvements in apparatus for bleaching and more particularly to that class adapted to be used in connection with bleaching agents, such as peroxids or persalts, in aqueous solution, from which agents oxygen may be easily obtained *in statu nascendi* in which state it has its greatest bleaching effect.

The apparatus which we use for carrying out our method is also adapted to be used for dyeing, scouring, washing and rinsing purposes.

A further object of the invention is to provide means for a most economical utilization of the applied bleaching materials.

Other objects and advantages will hereinafter be referred to and more particularly pointed out in the specification and claims.

In the accompanying drawings, which illustrate one way of carrying out the invention, Figure 1 is a vertical sectional view on line A, A of Fig. 2, of an apparatus in operative position; Fig. 2 is a top view of the same, parts being broken away or removed. Fig. 3 is a top view of the container of the bleaching vat removed from the vat and Fig. 4 is a vertical sectional view of the same.

Similar numerals of reference indicate similar parts throughout the several views.

The apparatus comprises three main parts, a mixing vat 1, a pump 2 and a bleaching vat 3. A system of pipes and other minor appurtenances complete the apparatus. In the drawings we have shown the mixing vat 1 as being cylindrical in

shape. It is preferably constructed of wood. We have shown the pump 2 as being of the centrifugal type.

A lead coil 4 is suitably supported near the bottom of the mixing vat 1 by means of which the bleaching liquor may be heated with steam; the lead coil is preferably so disposed that none of its windings crosses any other; furthermore the inlet and outlet (not shown) of the coil are preferably placed close to each other to allow easy handling. The cover 5 shown in Fig. 2 as being partly broken away, is of sufficiently strong construction to carry a stirring apparatus, preferably in the form of a propeller 6, shown as mounted on a support 7 on a base 8 carried by cover 5. The propeller 6 is shown as inclined toward the bottom of the vat as is obvious from the drawing. An advantageous feature in connection with this form of stirring apparatus consists in the means for preventing even the least traces of lubricating oil from entering the vat, as any drop of oil, falling from the lower arm of support 7, is caught in a groove 9 in base 8 directly below the support, and may be drained off.

The vat is emptied through a side outlet 10, and the bottom of the vat may if desired be slightly sloped toward this outlet to facilitate emptying. It has also been found advantageous to provide mixing vat 1 with a perforated false bottom 11, preferably made of wood, suitably supported above the lead coil 4.

A pipe 12 extends from the lower portion of vat 1 and connects the same with bleaching vat 3 through the means hereinafter described; another pipe 13, preferably parallel to pipe 12, connects the upper parts of vat 1 and vat 3 as hereinafter described. Pipes 12 and 13 are connected with pipe 14 and another pipe 15 extends from pipe 12, joining pipe 13, and forming a connection to vat 3 near its top where it branches off into two arms 16 and 17. Centrifugal pump 2 serves for moving the liquids within the apparatus and is therefore connected with the above mentioned pipe system by means of short joint-pipes 18 and 19 respectively, and, by means of three-way stop cocks 20, 21, 22 and 23 and plain cocks 24 and 25, the path of the liquid may be controlled very conveniently

to divert the same in various directions. By means of cock 23 the exhausted bleaching, dyeing, scouring, or washing liquor, etc., may be run off. The upper part of pipe 15 is provided with heating means, such as a coil 26, to control the temperature of the liquor while passing through the pipe system during the operation of the apparatus; this coil may be made from some material suitable for the purpose of the machine, such as lead or copper.

The bleaching vat 3 comprises a wooden shell 27 and a container 28, the latter carrying the goods to be bleached. The wooden shell 27 is substantially in the form of an oblong box set up on one short end; for reasons which will be more fully explained below, it has a sloping bottom 29. A rectangular frame 30 rests on the sloping bottom 29 and around the inside opening is provided with a rim 31. An opening 32 in the bottom portion of vat 3, here shown as extending through one side of frame 30, serves as an inlet or outlet for the bleaching, dyeing, scouring, washing or rinsing liquor from the pipe system to the lower part of the bleaching vat or vice versa. Openings 33 and 33' are provided near the top of shell 27 at the front and rear sides thereof to furnish a passage way for the liquor conducted through the branches 16 and 17 of pipe 15 to said vat 3, the liquor entering the vat at about the level of the top of container 28. The container 28 is in the form of a wooden box of such dimensions as to slide loosely into the vat. Container 28 is held in position by the support afforded by frame 30 resting on the sloping bottom 29, container 28 resting over rim 31, as shown in Fig. 1. It is obvious that frame 30 in connection with rim 31 forms an opening over which container 28 is slipped thus forcing all the liquor from whatever side it may enter the bleaching vat to pass through the container. The corner-posts 34, forming the main parts of the frame-work of the container 28, reach just up to the brim of the bleaching vat whereas the walls of the container reach only to about six inches below said brim; suitable cross-pieces 35 are attached in any convenient manner to these corner posts to serve as a brace when the container is set in or taken out by means of a hoisting device. Two of the opposite side-walls of the container are hinged to the container and when the latter is removed from the vat, said walls may swing like doors, but they do so in different directions as shown in Figs. 3 and 4, the front wall for instance, being hinged at the upper short side and swinging upwardly and the rear wall being hinged at the right hand long side and swinging backwardly to the right. By means of this arrangement the container may be emptied in a most con-

venient way. Ledges 36, (Figs. 2 and 4) are shown as extending downward on the inside of both the front and rear walls of the container, parallel to and at a suitable distance from the adjacent side wall of the container, remote from the pump, to serve as a rest for the yarn sticks.

It is the usual custom at present, to charge the containers of bleaching apparatus by laying in the goods loosely in rows, but by this method, the bleaching liquor readily forms channels through the goods, whereby the parts adjoining these channels are bleached more readily and thoroughly than those more remote from the same. The goods are sometimes laid crosswise, to overcome, at least to some extent, this great defect in bleaching apparatus as used at the present time, but this method gives only a partial effect which must be made up by continuing the bleaching process for a considerably longer time than when the goods are laid loosely in rows and if finally the goods are evenly bleached the goods adjoining the channels through the goods laid crosswise are then very often seriously weakened in texture by over-oxidation, *i. e.* in case of an oxidizing bleaching process. All these defects are avoided by carrying out the bleaching process in our apparatus which is adjusted to take the best advantage of the many subtle properties of the bleaching materials.

The operation of our apparatus is substantially as follows: The bleached liquid is prepared in mixing vat 1 and in the meantime the bleaching vat 3 is made ready for its part in the process. The container 28 is hoisted out of the bleaching vat and while it is arranged to stand upright during the bleaching process proper, the success of the latter is based on some advantages obtained only when the container is filled with the goods when lying in a horizontal position. The skeins of yarn are put on the yarn sticks and there should preferably be as many skeins on each stick as is sufficient to fill the entire width of the container; precaution should be taken that the yarn neither hangs so loosely as to allow any interstices, nor should it be too densely crowded so as to be submitted to even inconsiderable pressure. The yarn skeins fill the entire depth of the container when the same is in the horizontal position. It has furthermore been found advantageous not to fill the yarn into the container as one solid body, but to intermittently separate a limited number of sticks carrying the yarn, by inserting perforated trellises 37, sliding or fitting in grooves 38, formed on the side walls of the container, parallel to the bottom 39 of the container, which for the reason that the liquor must pass through this bottom should also be perforated: it is convenient there-

fore to use a like stationary trellis for the bottom of the container, said trellis being substantially at right angles to the side walls of the container. It is obvious that it depends very much on the nature of the yarn as to how many sticks may be lined up before a trellis is put in to be followed again alternately by the same number of sticks and a trellis.

It has been ascertained that our apparatus furnishes the best results if about six sticks constitute one block and each block be separated by a trellis from the next following block. It is to be understood, of course, that there cannot be a positively fixed rule about this, and although it is best to adhere to the practice pointed out above, as closely as possible, different kinds of yarn may be simultaneously treated requiring a deviation from the general course.

In bleaching raw stock or small fabric in this apparatus a similar course is followed, inasmuch as first a trellis is set in parallel to the stationary bottom trellis, at such a distance from the same as to form a compartment of such dimensions as to hold a block of goods of reasonable volume in view of the spirit of our invention; said block is then separated from the adjoining one by a trellis, to be followed alternately by like layers of goods and trellises, until the container is properly charged with the goods. Yarn and raw stock or small fabric may simultaneously be bleached by this method of using our apparatus as the situation may require.

Of all the goods which are subjected to the bleaching process, yarns constitute a very considerable part and it is in their treatment where an essential feature of our new apparatus comes in. When the container is filled in the horizontal position the yarn hangs loosely down vertically and is held firmly by the trellises which are alternately inserted; but when the container is then brought into the vertical position the yarn lies horizontally and is kept in this horizontal position by the trellises, all through the bleaching process.

In our apparatus we practically prevent the yarn from floating, contrary to all other bleaching apparatus, thereby avoiding the knotting of the threads of the skeins. Anyone skilled in the art will see that these latter advantages render our bleaching apparatus very much different from and far superior to any other heretofore known; there are, however, some further points which make for the better and greater success of our apparatus.

If the container is charged with the goods while in a horizontal position as described and it is then turned into a vertical position, the entire container is most evenly filled. The trellis laid on top of each block adjusts

and controls even the smallest pressure all over the upper surface and throughout the entire block of goods confined between two trellises and since the skeins are put in without exerting any force, it is obvious that the resistance offered to the liquor by the goods is bound to be the same all over, and that therefore no chances for the formation of channels are given, thus evenly exposing all the goods to the bleaching action of the liquor with the most desirable result.

Our new bleaching apparatus is especially adapted to carry out the process with the view of getting a final product conforming in every way with the demand for an even quality of the finished goods. It is a great defect in the bleaching apparatus heretofore used, that the bleaching liquor passing through the apparatus does so exclusively in one direction. In constructing our apparatus special stress is laid on establishing a reliable arrangement to overcome this handicap, and by means of the pipe system with the various cocks connecting vats 1 and 3 as well as pump 2, the greatest facilities are provided to permit or cause the liquor to move and pass in any possible direction whatsoever; it is obvious that the many possible changes permit the bringing about of a more effective saturation of the goods by the liquor, resulting thereby in a more thorough and even bleach. This effect is furthermore greatly facilitated by inserting the coil 26 or other suitable heating system in the pipe 15, thus heating the liquor more conveniently and suitably than may be done in the bleaching vat itself, where the heating action is more or less local, whereas, in passing through pipe 15 all the liquor may be heated to just such particular temperature as is necessary to moderately and gradually liberate the oxygen required for the actual bleaching process.

The sloping bottom 29 of the bleaching vat serves very effectively to give the liquor an upward trend when entering the vat at the bottom, or to serve as a guide when running off the liquor.

After the goods have been bleached as hereinabove described, the bleaching liquor is drawn off and the goods are finished, without necessarily removing the same from the vat, by passing water or other suitable cleaning liquid through the vat by the means described, it being obvious that the scouring, washing or rinsing steps may be most advantageously carried out in this manner.

It is also obvious without further description that our apparatus is equally well adapted for the purpose of dyeing and we do not restrict ourselves to the use of the apparatus for the purposes described, further than the scope of the appended claims demand.

Where we use the word "bleaching" in the claims we mean to also include dyeing, cleaning, scouring, washing and rinsing as well.

5 We do not restrict ourselves to the exact details of the apparatus as above described further than the scope of the appended claims demand.

10 What we claim and desire to secure by Letters Patent is:

1. In an apparatus for bleaching and the like a mixing vat, a bleaching vat, a pump and a pipe system consisting substantially of a pipe connecting the lower parts of both
15 the mixing and the bleaching vats, a pipe extending from the upper part of the mixing vat and terminating a short distance from the bleaching vat, a pipe communicating with both the aforesaid pipes adjacent
20 the mixing vat, a pipe communicating with both the first mentioned pipes and the bleaching vat, and pipes between the pump and the pipe system.

2. In an apparatus for bleaching and the like a mixing vat, a bleaching vat, a pump,
25 a pipe system, a three-way cock at each of the two upper pipe joints and at the lower pipe joint adjacent the mixing vat, a three-way cock in the lower horizontal pipe adjacent the bleaching vat, a plain cock in the
30 upper arm and one in the left arm of and adjacent the joint of the lower horizontal pipe and the vertical one extending from the same adjacent the bleaching vat and
35 finally connecting with the bleaching vat at its upper end, and pipes to connect the pump with the pipe-system.

3. In an apparatus for bleaching and the like a mixing vat, a bleaching vat, a pipe
40 system connecting said mixing and said bleaching vats, a pump with connection-pipes to join said pipe system, and means for heating the liquors in the upper part of the pipe connecting by its branches with the upper
45 part of the bleaching vat.

4. In an apparatus for bleaching and the like the combination of a mixing vat, a bleaching vat, a pipe system connecting said
50 mixing and said bleaching vats, a pump with connections to said pipe system, and passage-ways for the liquors through both the front and rear walls of the bleaching vat near the brim of the bleaching vat.

5. In an apparatus for bleaching and the like the combination of a mixing vat, a bleaching vat, a pipe system connecting said
55 mixing and said bleaching vats and a pump with connections to said pipe system, said bleaching vat having its bottom sloping toward the pump and passageways for the liquors through both the front and rear
60 walls of the bleaching vat near the brim of said bleaching vat.

6. In an apparatus for bleaching and the like the combination of a mixing vat, a

bleaching vat, a pipe system connecting said mixing and said bleaching vats and a pump with connections to said pipe system, said
65 bleaching vat having its bottom sloping toward the pump with a framelike support on said sloping bottom having a rim around the
70 inside opening, a hole in the framelike support and wall to afford communication with the lower horizontal pipe and passageways for the liquors through both the front and
75 rear walls of the bleaching vat near the brim of said bleaching vat.

7. In an apparatus for bleaching and the like a bleaching vat having a sloping bottom, a framelike support provided with a
80 rim carried by said bottom, passageways for the liquors near the top and bottom of the bleaching vat, and a container sliding loosely within and resting on the support above the sloping bottom of said bleaching
85 vat.

8. In an apparatus for bleaching and the like a bleaching vat having a sloping bottom, a framelike support provided with a
90 rim carried by said bottom, passageways for the liquors near the top and bottom of the bleaching vat and a container sliding loosely within and resting on the support above the sloping bottom of the bleaching vat, the
95 side-walls of said container terminating somewhat below the brim of the bleaching vat.

9. In an apparatus for bleaching and the like a bleaching vat having a sloping bottom, a framelike support provided with a
100 rim carried by said bottom, passageways for the liquor near the top and bottom of the bleaching vat, a container sliding loosely within and resting on the support above the sloping bottom of the bleaching vat, the
105 side-walls of said container terminating somewhat below the rim of the bleaching vat and a ledge on the front and rear walls of the container running parallel to and at a distance from the side-wall most remote
110 from the pump.

10. In an apparatus for bleaching and the like a bleaching vat having a sloping bottom, a framelike support provided with a
115 rim carried by said bottom, passageways for the liquors near the top and bottom of the bleaching vat, a container sliding loosely within and resting on the support above the sloping bottom of the bleaching vat having
120 side-walls lower than the rim of the bleaching vat, ledges on the opposite front and rear walls, one side-wall of the container being constructed as a door hinged at the upper short side to be opened by swinging upward, the side-wall opposite to the last
125 named one being also constructed as a door and hinged at either of its long sides to be opened by swinging backward toward the side to which it is hinged.

11. In an apparatus for bleaching and the

like a bleaching vat having a sloping bottom, a framelike support provided with a rim carried by said bottom, passageways for the liquors near the top and bottom of the bleaching vat, a container sliding loosely within and resting on the support above the sloping bottom of the bleaching vat, the side-walls of the container terminating somewhat below the brim of the bleaching vat and a plurality of trellises arranged horizontally at a distance from each other

and substantially at right angles to the side-walls of the container.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

HANNS E. ANDERS.

MAXIMILIAN E. U. SCHOEDLER.

Witnesses:

ARTHUR L. GARDNER,

OTTO K. ZWINZENBERGER.