

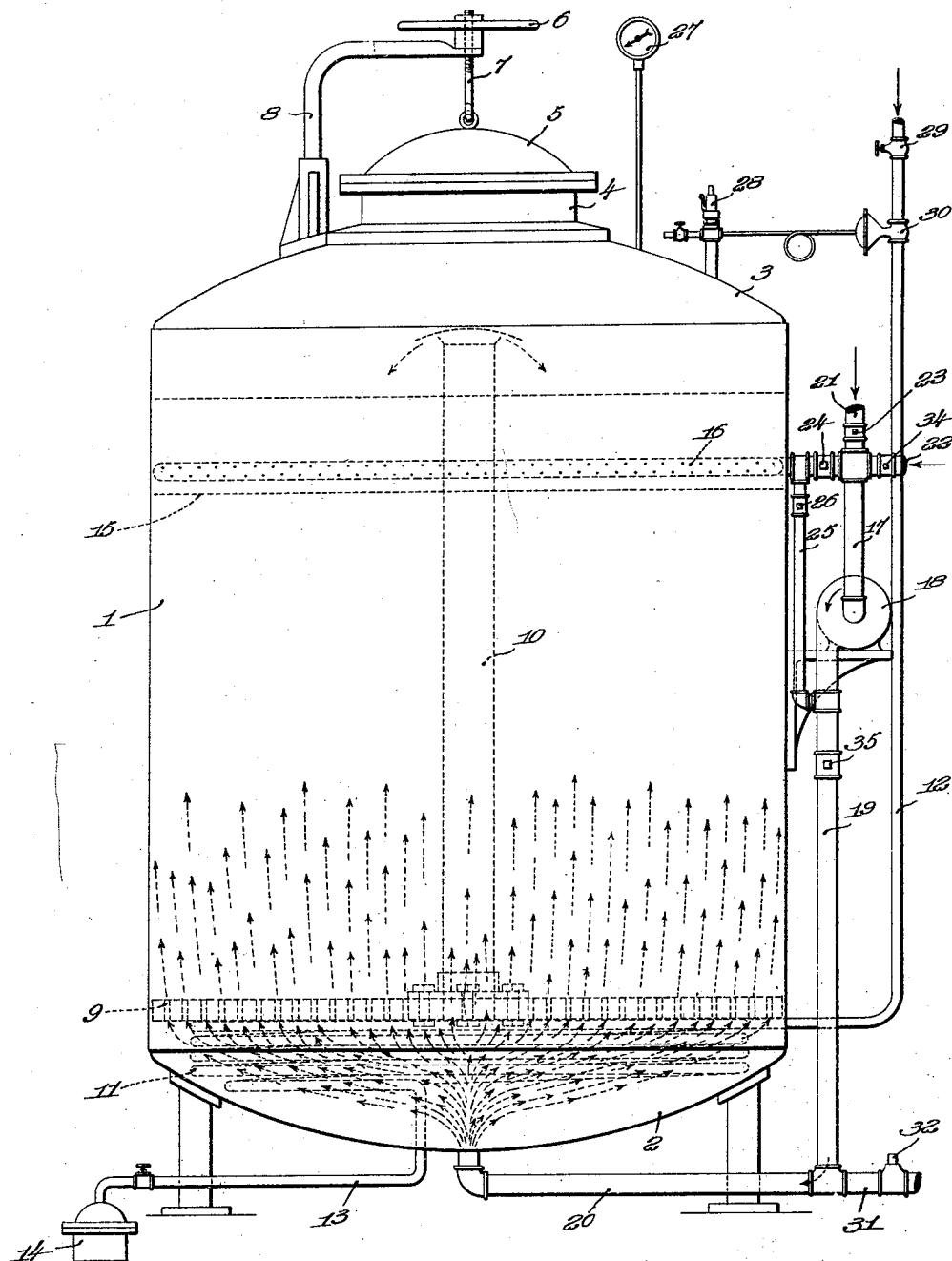
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KIER

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Witness

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UNITED STATES PATENT OFFICE

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The present invention relates to an improvement in kiers.

Heretofore some kiers have been operated by pumping the liquor from the bottom of the kier and vomiting it upon the top of the goods. In others the liquor has been forced by steam pressure up through a vomiting pipe on top of the goods, where it has been vomited upon them. In both of these cases the liquor is percolated down through the goods to the bottom where it accumulates again, and is again pumped or forced to the top of the kier. Incident to the operation of these kiers has been a considerable loss of steam required in order to keep up an effective circulation. They have been also somewhat objectionable because of the tendency to channeling, that is to say, the tendency of the liquor to form channels through the goods which prevent full percolation to all of the goods in the kier.

According to the present invention the circulation of the liquor through the goods is from the bottom upwards in the major part, which effects an economy of steam required, and tends to decrease the amount of channeling, as the liquor seeps upward through the goods owing to its being hot and tending to rise. At the top of the goods the liquor is drawn off and flows downward to the bottom of the kier, where it is heated and again rises through the goods.

The present invention comprises the improvement in kiers hereinafter described and particularly defined in the claim.

In the accompanying drawing illustrating the preferred form of the invention is shown an elevation of a kier, with connections and parts for its operation.

The preferred embodiment of the invention is described as follows: The kier proper consists of the usual boiler having a dome bottom 2 and a dome head 3. The top of the kier is provided with the usual manhole 4, closed by a cover 5 adapted to be lifted off for filling and emptying, the usual cover lifting wheel 6 and bolt 7 being provided for this purpose. The swing arm 8 is adapted to be swung to one side after the cover has been lifted, and is provided to take the cover

away from the manhole. Near the bottom of the kier is provided the usual grating 9, and rising from its center is the equalizing pipe 10. Under the grating there is provided the steam coil 11, which is supplied with steam by a steam pipe 12, and from which condensation is conducted by a pipe 13 to the trap 14.

The goods to be treated are piled in the kier on the grating to about the level of the chain 15, which is put in place after the goods have been put in the kier, to hold the goods from rising in a mass. A suction pipe 16 is provided which extends around the inside of the kier close to the wall, provided with holes so that the liquor which rises through the goods may be drawn off from the kier through this suction pipe, whence it passes through the pipe 17 to the pump 18, and is discharged through the pipes 19 and 20 into the bottom of the kier. The water pipe 21 is provided by which water may be pumped into the bottom of the kier to wet the goods or to wash them. The pipe 22 is a liquor pipe by which the treating liquor may be pumped into the bottom of the kier. The water pipe 21 is provided with a cock 23, the suction pipe with a cock 24, and the bypass pipe 25 connecting the suction pipe with the pump discharge pipe 19 is provided with a cock 26.

The kier is provided with a gauge 27, and with a blow-off or pop valve 28, which opens in case of excessive pressure in the kier. The steam pipe 12 is provided with a cock 29 and with a regulating valve 30 controlled either by hand or automatically by the pressure in the kier.

A drain pipe 31 connected with the liquor inlet pipe 20 and having a cock 32, is provided to afford means for draining the kier of its liquor or water, as the case may be.

The suction pipe 16 may be located somewhat below the top of the goods instead of above their top, if desired. There is no liability of clogging the holes in the suction pipe as the holes extend completely around the pipe and the goods cannot reach the holes in the side of the pipe next to the walls of the kier.

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The goods chain may be omitted, as with the quiet flow of the liquor up through the goods there is substantially no rise and fall of the goods in the kier. But if desired by the operator, the goods chain may be used without prejudice to the successful operation of the kier.

The operation of this kier is as follows: The kier being opened, the goods are laid in 10 on the grating until the kier is filled to the chain level at 15, after which the chain is put in place. Thereupon the kier is closed by putting on the cover 5 and bolting it in place in the usual manner, the usual swing head 15 bolts not being shown. Then water is admitted to the kier through the water pipe 21, the cock 23 being opened, and the cocks 24, 26 and 35 being opened. The cock 32 in the drain pipe 31 being closed, water is pumped 20 into the kier through pipes 19 and 20 and the pipe 25, most of the water entering through the bottom of the kier. After the goods are well wet up, the water is drawn off through the drain pipe 31, and any water remaining 25 in the kier on top of the goods is drawn down through the suction pipe, the remainder of the water in the goods seeping down through the goods to the bottom of the kier, from whence it flows off through the pipe 20 and 30 the drain pipe 31. Thereupon, the water having been shut off by the cock 23 in the water pipe, the water is drawn off through the drain pipe and then the cock 32 is closed, and treating liquor is admitted through the 35 pipe 22, the cock 34 in such pipe being opened. This liquor is pumped into the bottom of the kier and rises through the grating into the goods. At the same time the steam valve 29 is opened, and steam is admitted through the 40 steam pipe 12 to the steam coil 11 in the bottom of the kier. This heats the liquor in the bottom of the kier, and such liquor being heated, rises through the mass of goods in the kier and collects at the top of the goods, 45 from which place it is drawn off by the suction pipe 16 and forced through the pipe to the bottom of the kier again.

Some liquor will rise through the equalizing pipe 10 and be vomited upon the top of the goods, but the principal flow of liquor through the goods will be from the grating up through the goods, and the principal function of the equalizing pipe is to maintain the pressures at the top and bottom of the goods substantially the same, so that there is comparatively slight tendency for the liquor to be forced up through the equalizing pipe.

In the operation, the steam continues to flow into the steam pipe until the pressure in 50 the kier reaches a predetermined point, after which the automatic valve 30 operates to shut off the steam supply until the pressure in the kier falls to a predetermined point desired, whereupon it again opens, and circulation of 55 the liquor through the goods is resumed.

If desired, an automatic time valve such as that described in my Patent No. 1,278,154, may be used in place of the pressure controlled valve 30.

The foregoing description of the operation of the kier is that employed when the kier is closed. The kier may also be operated as an open kier by leaving off the cover. In such case, automatic operation of the steam supply is omitted, or recourse may be had to an automatic time valve, or the steam valve 29 may be availed of to reduce the supply to such an amount as to permit the proper heating of the liquor at the bottom of the kier to cause it to rise through the goods.

When operated as a closed kier, the operation is continuous and economical of steam because the steam is shut off from time to time by the building up of pressure in the kier, or by time control, whereas in the continuous operation of the kier as an open kier, a continuous supply of steam may be used. The kier, therefore, is advantageous of operation as a closed kier, and is susceptible of use as 90 an open kier as well.

It is an important feature of the kier that the treating liquor seeps upward through the goods and reaches all the goods in a uniform manner so that they are uniformly treated and no part of them is burned or over-treated by the liquor. Besides, the rising of the liquor through the goods being due to its less specific gravity when it is heated, movement of the liquor is not forced or rapid, and channelling is reduced in amount.

It is to be understood that this kier is adapted for use with various bleaching liquors such as peroxide or soda, and may also be used in dyeing, to which it is well adapted by reason of the seeping flow of the liquor upward through the goods.

Having thus described the invention, what is claimed is:

A kier body having a grating near the bottom of the kier, a steam coil under the grating, a suction pipe extending around the inside of the kier adjacent the top level of the goods, a pump, connections between the suction pipe and the intake of the pump, and from the outlet of the pump to the bottom of the kier for pumping the liquor from the top of the goods to the bottom of the kier, a steam supply for the steam coil, and a steam controlling valve for intermittently admitting steam to the coil and for shutting off the steam supply to the coil at the bottom of the kier.

In testimony whereof I have signed my name to this specification.

EUGENE D. JEFFERSON.