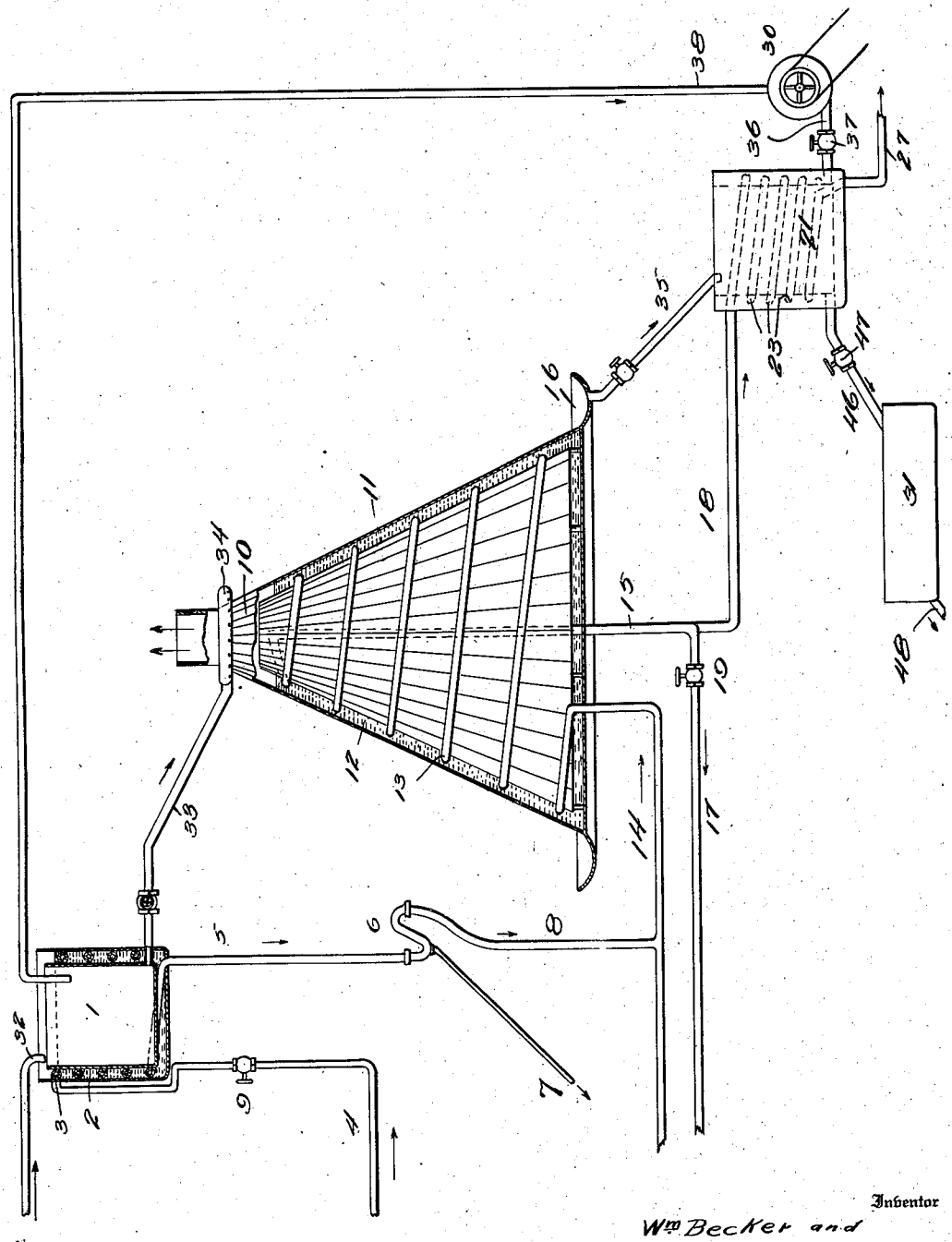
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METHOD OF DEALCOHOLIZING BEER.

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Witnesses

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METHOD OF DEALCOHOLIZING BEER.

1,171,306. Specification of Letters Patent. Patented Feb. 8, 1916.

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To all whom it may concern:

Be it known that we, WILLIAM BECKER and DANIEL HAYDEN MONTGOMERY, citizens of the United States, residing at Virginia, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Methods of Dealcoholizing Beer; 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.

This invention relates to alcohol, and more especially to the means for taking alcohol from beer, wine, spirits and other beverages containing it; and the object of the same is to effect the desired end without raising the beverage to a temperature which will impair its taste and other desirable qualities. We have found that while alcohol is liberated from beverages at a low temperature, and most of it very easily separated therefrom, it is not all removed at one time or at one passage through the apparatus, even when the latter includes means for spraying the beverage or for otherwise breaking it up and flowing it in the form of thin sheets or small streams while it is yet hot; and one feature of our invention consists in passing a given charge of the beverage repeatedly through the apparatus before it is cooled and led to the storage tank.

On the accompanying sheet of drawings is illustrated diagrammatically one form of apparatus for carrying out our method, the details of which latter will now be explained in connection with that illustration.

The numeral 1 designates an open tank surrounded by a jacket 2 for containing water which is heated by coils 3 within the jacket through steam supplied through pipe 4. From the outlet end of the coils 3 a pipe 5 leads to a trap 6 from which the water of condensation is drawn off through a waste pipe 7, and beyond the trap the live steam passes through the pipe 8 into another steam supply pipe 14 which latter leads into coils 13 located in a jacket 12.

The second element in the apparatus is an evaporator 11. This is a conical member surrounding the jacket 12 and having upright gutters or channels 10 diverging from its top to a collecting gutter 16 at its lower end. The outlet from the coils 13 is through a pipe 15 which may be branched to the waste 17 and also to the pipe 18 as shown; and by the provision of suitable valves 9 and 19 the supply of live steam and the exhaust of water of condensation, as well as the passage of steam from one element to another, may be controlled.

The third element of our apparatus is a second open tank 21 preferably of the same size and construction as the first open tank 1, and the coils 23 in its jacket may well be supplied with steam through the pipe 18, and the water of condensation led to waste through the pipe 27. We do not wish to be limited to the detail construction of these elements, the jackets or other devices for heating them, or the system of pipes for supplying steam and handling the waste.

The fourth element of our apparatus is a pump 30, and the fifth element is a cooler 31. The beer, wine, or other beverage to be treated is admitted to the preliminary heating tank 1 at the point 32, and from this tank it is led through the pipe 33 to a spray ring 34 at the top of the element 11, which ring is provided with fine perforations so that the heated beverage is sprayed into the channels 10 and allowed to run down the same in the form of a thin film or sheet and collect in the gutter 16, meanwhile being acted on by the heat in the jacket 12. From this gutter the beverage is carried through a pipe 35 to the second heating tank 21 wherein its temperature is raised to the same degree as that in the preliminary tank. From the tank 21 the beverage is carried through a pipe 36 controlled by a valve 37 which when open puts this tank into communication with the pump 30, and by the latter the beverage is driven back through pipe 38 to the preliminary tank 1 for retreatment. From the tank 21 there also leads a pipe 46 controlled by a valve 47 which, when open, permits the beverage to flow into the cooler 31 wherein it is subjected to brine or other means for reducing its temperature; and from the cooler a pipe 48 leads to casks, vats, or other devices for storing the liquid in the cellar as usual.

The carrying out of our method by the use of this apparatus is as follows: The charge of beer, for instance, is admitted to the preliminary tank 1 through the pipe 32, and then the supply of beer is cut off. The

jacket 2 being full of water, steam is now admitted through pipe 4 to raise the temperature of the jacket to such a degree that the charge of beer is raised to a suitable temperature, but not over 167° F. The valve in the outlet pipe 33 is now opened and the charge of beer at this temperature is allowed to flow to and through the ring 34 by which it is sprayed onto the evaporator 11, the water in the jacket 12 having been meanwhile raised in temperature by admission of live steam through the supply pipe 14. As the sheet of beer flows down the channels the heat from the jacket 12 will evaporate a large percentage of the alcohol which the charge contains, the alcohol fumes passing off either into the air or into a pipe for collecting them for subsequent treatment if desired. As the alcohol is thus drawn off, the temperature of the charge is decreased, and as the beer gathers in the gutter 16 and flows through the pipe 35 to the third element or tank 21 it will not be at the temperature to which it was heated in either of the first two elements. In said tank 21 it is again heated to a suitable temperature, not over 167° F., and this tank is of such size that the entire charge may collect therein. The valve 37 is now opened and the pump 30 set in motion, with the result that the charge is driven back through the pipe 38 to the preliminary tank 1 for retreatment, and as retreatment means simply its passage through the same course a second time, it need not be described in detail. After retreatment the charge accumulates a second time within the tank 21, and if a test shows an undesirable percentage of alcohol is yet present, it is quite possible to give a third treatment. Otherwise the valve 37 is closed and the valve 47 opened, when the charge runs down the pipe 46 into the cooler 31; and from the cooler it runs through the pipe 48 to the vat or other container within the cellar. Meanwhile a second charge is admitted to the preliminary heater through the pipe 32, and the same method is carried out with respect to this charge.

In the construction of apparatus for carrying out this method, it will be clear that the various elements diagrammatically illustrated in the drawings might be replaced by those of standard equipment well known in the handling of malt liquors and spirituous liquors; and it will be obvious that the admission of the live steam (if indeed steam be used as a heating agent) and the discharge of the used heating agent itself, as well as the arrangement of elements and the piping between them, is susceptible of wide modification. Therefore we do not wish to be limited in this respect. We have found that a beverage so treated retains its brilliancy and flavor and is of a very palatable taste and pleasing aroma. We have stated 167° F. as being the maximum temperature which will not destroy the character of the beer if beer be the beverage, but as to this exact temperature we also do not wish to be limited. We prefer decidedly that the temperature be below 168° F., and not so high that the beer or other beverage will be vaporized as it is not our intention to vaporize it at any point in its treatment.

What we claim is:

1. The herein described method of dealcoholizing beverages, the same consisting in raising the temperature of a charge of such beverage to substantially 167° F., then converting the charge into spray to permit it to give off its alcohol, then raising the charge again to a temperature no higher than at first, then repeating this process, and finally cooling the product and conducting it to a point of storage.

2. The herein described method of dealcoholizing beverages, the same consisting in raising the temperature of a charge of such beverage to not over 167° F., then spraying the charge into a sheet and subjecting the sheet to substantially the same temperature to permit it to give off its alcohol, then collecting the charge and raising it again to substantially the same temperature, then repeating this process, and finally cooling the product and conducting it to a point of storage.

3. The herein described method of dealcoholizing beverages, the same consisting in raising the temperature of a charge of such beverage to not over 167° F., then spraying the charge into a sheet and subjecting the sheet to substantially the same temperature to permit it to give off its alcohol, then collecting the treated beverage, cooling it, and finally conducting it to a point of storage.

4. The herein described method of dealcoholizing beverages, the same consisting in spraying the beverage, collecting the spray into a flowing sheet and subjecting it to heat to raise its temperature to not over 167° F. and cause it to give off the alcohol, then collecting the beverage without its alcohol vapors and again heating it to substantially the same temperature, then pumping it back and retreating it, and finally conveying the de-alcoholized beverage to a point of storage.

In testimony whereof we affix our signatures.

WILLIAM BECKER.
DANIEL HAYDEN MONTGOMERY.