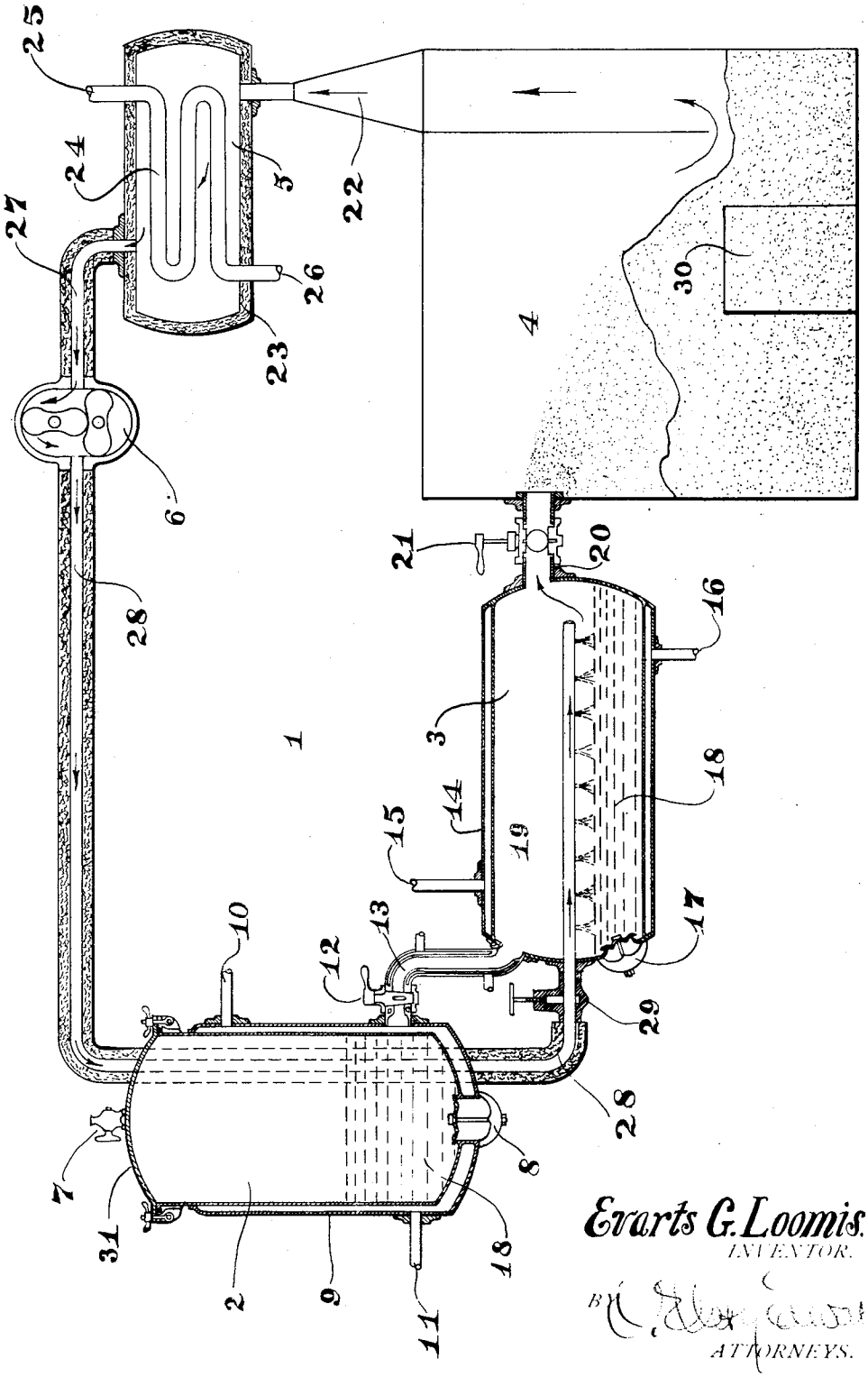
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METHOD AND APPARATUS FOR PURIFYING CAMPHOR AND SIMILAR VOLATILE SUBSTANCES

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METHOD AND APPARATUS FOR PURIFYING CAMPHOR AND SIMILAR VOLATILE SUBSTANCES.

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The object of my invention is to provide a method of treating camphor and similar readily volatilized materials so as to remove undesirable impurities and also to provide an apparatus which is suitable for carrying out this method. This object is accomplished by my invention, one embodiment of which is hereinafter more particularly set forth.

For a more particular description of my invention, reference is to be had to the accompanying drawing, forming a part hereof, in which the figure shows an apparatus suitable for carrying out my improved method.

My improved apparatus 1, in the embodiment shown, is provided with a preliminary heating vessel 2, a retort 3, a condensing chamber 4, a gas heater 5, a blower 6 and suitable valves and pipes, as will appear below. Briefly stated, the camphor, or other material, the term camphor being used throughout to indicate any material suitable for the apparatus, is first loaded in the preliminary heating vessel 2 by removing the cover 31. It is then heated so as to drive off all water vapor and low temperature volatile impurities which can escape through a valve 7 at the top which may be opened by hand for this purpose. Heavy and nonfusible impurities are also separated in this preliminary heating vessel by their being allowed to settle to the bottom, below the outlet pipe 13. The vessel 2 is preferably provided with a steam jacket 9, or other heating means, with steam entering at 10 and escaping at 11, in the conventional manner. After the camphor has been inserted through the cover 31, and this cover has been closed and heat has been applied so as to vaporize such impure volatile products which have been allowed to escape, as above set forth, and the camphor liquefied, a valve 12 in outlet pipe 13 may then be opened so as to permit drainage from the vessel 2 through the pipe 13 which may also be steam jacketed so as to prevent its becoming clogged with solidified material. This pipe 13 runs to the retort 3 which is heated by means of a steam jacket 14 which receives steam at 15 and allows it to escape at 16, in the conventional manner. The retort 3 is provided with a hand hole 17 which corresponds to a hand hole 8 in the heating vessel 2 and is closed in the same manner. It permits ready access for the purpose of cleaning and removing residual impurities from time to time, as may be necessary. After the retort 3 has received its charge valve 12 is closed and a new lot of crude camphor may be loaded into chamber 2 which in turn may be treated as the first in preparation for the retort when it is ready for its second charge.

The camphor 18, which has first been heated in the vessel 2 is, as above described, drained into the retort 3 to substantially the extent indicated, that is below the air or gas inlet pipe 19. This pipe has downwardly disposed openings through which air or an inert gas, such as nitrogen or carbon dioxide, is admitted under slight pressure. The purpose of substituting an inert gas instead of air is to avoid the danger of forming explosive mixtures.

The term air is used with the understanding that for the purposes of this case such an inert gas is equivalent. This air is allowed to play on the liquid camphor 18 at a temperature below the boiling point of the camphor. If the camphor heated to a higher temperature and made to boil, bubbles would be given off, which in bursting would throw up dirt and impurities in the current of air, which impurities would be liable to escape from the retort 3. It is intended that these impurities should remain in the retort 3 and be removed from time to time through the hand hole 17. The air from the pipe 19 enters under pressure and in impinging against the hot surface of the liquid camphor 18, it comes in intimate contact with and more or less saturated with the camphor in the form of vapor which it carries away in a very pure form as it passes out of the vessel through an exhaust pipe 20 which contains a valve 21 by which the passage through this pipe may be controlled. This pipe 20 runs to the condensing chamber 4 which is a large chamber with metal walls and a large radiating surface on the exterior of the metal so that the heat of the air with the camphor vapor is rapidly dissipated so that the camphor will fall in flakes something like snow upon the bottom of the chamber 4, leaving the air free to pass out of the chamber through a chimney or flue 22 to the heating chamber 5 which has its exterior carefully insulated, as indicated at 23, and its interior provided with a heating pipe 24 with a steam inlet 25 and outlet 26 so that the air passing about this heating coil regains the heat lost in the condensing chamber 4 and thereupon this heated air passes through a lagged pipe 27 to the blower 6 which puts this

air under pressure and forces the same into the lagged pipe 28 and through a valve 29 to the pipe 19 in the retort 3.

The action of this apparatus, as above described, is carried on until all the camphor in the retort 3 has been evaporated, when the blower 6 is stopped and a new charge of melted camphor is introduced from heating chamber 2, as heretofore described and the operation repeated. When the impurities in the heating vessel 2 or retort 3 require removal, this may be done through the manholes 8 and 17, respectively. Also the door 30 of the condensing chamber 4 may be opened and the camphor removed whenever sufficient has collected. This may be done most conveniently when the retort has become empty when the blower 6 is stopped and the valves 12, 29 and 21 are closed. The above sequence of operations may be repeated indefinitely. The action of this process depends on a flow of the air or gas which acts as a vehicle to carry the pure camphor from the retort 3 to the condensing chamber 4. It will be noted that the camphor is vaporized without the necessity of boiling and without any agitation of any consequence so that impurities will not be released through violent boiling, or in any similar manner.

While I have shown and described one embodiment of my invention, it is obvious that it is not restricted thereto, but that it is broad enough to cover all structures that come within the scope of the annexed claims.

Having thus described my invention, what I claim is:

1. The process of purifying camphor and similar substances which consists in reducing the camphor to a liquid form, forcing a current of gas below the boiling point of the camphor upon the surface of the same and thereby causing the gas to become saturated with the camphor vapor and then evacuating the mixture into a condensing chamber at a lower temperature where the gas and camphor will separate and the camphor condense.

2. The process of purifying camphor which consists in heating a gas below the boiling point of the camphor and then passing the gas upon the surface of melted camphor, whereby the camphor and gas will mix, and thereafter evacuating the mixture into a condensing chamber where the camphor will condense and separate from the gas and then passing the gas to the heating means, whereby a repetition of the cycle of the gas may be had.

3. The process of purifying camphor which consists in giving a preliminary heating to the camphor and driving off volatile impurities and thereafter subjecting this melted camphor to a flow of gas heated below the boiling point of the camphor, whereby the gas and camphor vapor will mix and thereafter evacuating the mixture to a condensing chamber.

4. In an apparatus of the class described, means for heating camphor to a liquid state, a chamber into which said heated camphor is passed, means for passing gas upon the surface of the camphor in said chamber and means for evacuating the mixture and causing the same to cool.

5. In an apparatus of the class described, a heating chamber having a steam jacket for melting camphor or similar material, a second chamber into which said heated camphor is passed, means for passing a current of gas upon this melted material in said second chamber, means for receiving and cooling this mixture, means for heating said gas and means for passing said heated gas back into said second chamber of melted camphor.

6. In an apparatus of the class described, a preliminary heating chamber adapted to receive camphor or similar material and means for heating said chamber so as to drive off volatile impurities, means for permitting the escape of such impurities, a second heating chamber and means for passing melted camphor or similar material from the first to the second chamber, means for heating said second chamber, means for passing a heated gas upon the surface of said melted camphor, means for evacuating the mixture and a condensing chamber connected to said evacuating means, a heating chamber for receiving said gas, a blower connected to said heating chamber for drawing the gas from said chamber and a pipe connected to said blower for conducting the heated gas to said second chamber.

In testimony whereof, I have hereunto set my hand this 25th day of August, 1925.

EVARTS G. LOOMIS.