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RECTIFIER-CONTROL APPARATUS.

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This invention relates to apparatus for automatically controlling the operation of a rectifying column in such a way that the column will take care of any amount of crude liquor fed to it provided this amount does not exceed the maximum capacity of the column. My invention also includes means to automatically check the feed if it exceeds the capacity of the column, and to maintain it at the maximum rate.

One embodiment of my invention is exemplified in the following description and illustrated in the accompanying drawing, in which Figure 1 shows diagrammatically an elevation of the new apparatus and Figure 2 is an enlarged horizontal cross-sectional view of the weir box.

Reference being had to the drawings, the apparatus comprises a tank or reservoir 1 communicating by pipe 3 with the rectifier column 9. The pipe 3 is provided with a valve 2 which is actuated by a lever 4, the rod 15, and the float 5. The tank 6 contains liquid on which the float 5 rests, and communicates with column 9 through pipe 10. A valve 11 controlled by a thermostat 12 regulates the amount of steam admitted through the pipe 13, depending upon the temperature of some point 19. An exit pipe 14 leads from the bottom, and a pipe 8 from the top, of the column 9, the pipe 8 communicating with the condenser 7 which is directly connected, by the pipe B, with the double weir box 16. This box comprises the receptacle A and the divisions C and D which communicate with the receptacle A by the weir-dam openings E and F which are controlled by the adjustable gate I which may be moved backward and forward to change the effective size of the openings E and F, enlarging one as the other is decreased, and vice-versa. From the division C the pipe 18 leads to storage, and from the division D the pipe 17 leads back to the column, and thus the device 13 may be used to fix the ratio of distillate returned to the column to that withdrawn.

The operation of the invention will be made clear by the following explanation:—

Weak liquor to be rectified is fed to the column 9 from the tank 1. The tank 1 may be supplied with this weak liquor continuously or intermittently. The column 9, vapor lead 8 and condenser 7 may be of any

desired types. I have found that for the small sized columns in connection with which my invention is particularly useful a column filled with small glass rings 6 to 8 mm. diameter will be most economical.

This column must be capable of separating the weak liquor fed into two fractions of the desired composition, i. e., a heads product delivered from the line 18 and a tails product delivered from the line 14. In many cases it will be found convenient to control the composition of the heads product by fixing the ratio of liquid distillate returned to the column through the line 17 to that withdrawn through the line 18. This may be done by means of the reflux box or valve described above and also described in my application, Serial No. 635,338, filed April 28, 1923. The temperature at some point, 19, in the column is held constant by means of the thermostat 12 and the valve 11 acting on the steam supplied through the line 13. The steam may be supplied to coils in the base of the column or may be blown directly into the column.

As long as the correct temperature is held at the point 19 and the ratio of distillate returned to distillate withdrawn is maintained at the correct constant ratio, the distillate and slop will be of the desired composition. As the amount of feed run into the column through the line 3 is increased, the steam supply to the base of the column will be increased and the flow of distillate from the condenser 7 to the reflux box 16 will be increased as also will be the flow from the line 18 in proportion. However, at a certain rate of feed and steam supply the column will no longer handle the load but the up-rising vapors will blow the descending liquors up through the column into the condenser provided the trap 14 does not blow out first. In order to prevent this overloading, the valve 2 is placed in the feed line 3. This valve 2 is operated by the lever 4, the rod 15 and the float 5. The lengths of the lever and rod are so adjusted that before the pressure in the base of the column reaches the point which indicates overloading of the column, liquid will be forced through the line 10 into the tank 6 and will raise the float 5, thereby checking the flow of feed through the line 3. By properly adjusting the length of the rod 15 and the

position of the tank 6 with respect to the base of the column, the maximum amount of feed which the column will handle may be run to it as long as there is any liquor in the tank 1.

I claim:

1. In an apparatus of the character described, in combination, a column still, a controllable steam supply means and a thermostatic control device therefor coupled with the column and responsive to temperature changes therein to hold the temperature substantially constant, a pipe for feeding liquid to be distilled to the column, and means for controlling the liquid feed, such means comprising a valve in said pipe, a device responsive to pressure change in said column, and means connecting said valve and pressure responsive device and structurally coupled with said valve to move the same toward closed position upon increase of pressure in the column, thereby to prevent overloading of the column.

2. In an apparatus of the character described, in combination, a column still, a controllable steam supply means and a thermostatic control device therefor coupled with the column and responsive to temperature changes therein to hold the temperature substantially constant, a pipe for feeding liquid to be distilled to the column, and means for controlling the liquid feed, such means comprising a valve in said pipe, a

tank in communication with the column to receive liquid therefrom, a float in said tank to be supported by liquid therein, and linkage connecting said float and valve and assembled to move the valve toward closed position upon rise of the float due to rise of the liquid in the tank under increasing pressure in the column, thereby to prevent overloading of the column.

3. In an apparatus of the character described, in combination, a column still, means for dividing the distillate from the column into liquor for withdrawal and liquor for return to the column, thus to fix the ratio therebetween and control the composition of the distillate, a controllable steam supply means and a thermostatic control device therefor coupled with the column and responsive to temperature changes therein to hold the temperature substantially constant, a pipe for feeding liquid to be distilled to the column, and means for controlling the liquid feed, such means comprising a valve in said pipe, a device responsive to pressure change in said column, and means connecting said valve and pressure responsive device and structurally coupled with said valve to move the same toward closed position upon increase of pressure in the column, thereby to prevent overloading of the column.

In testimony whereof I affix my signature.
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