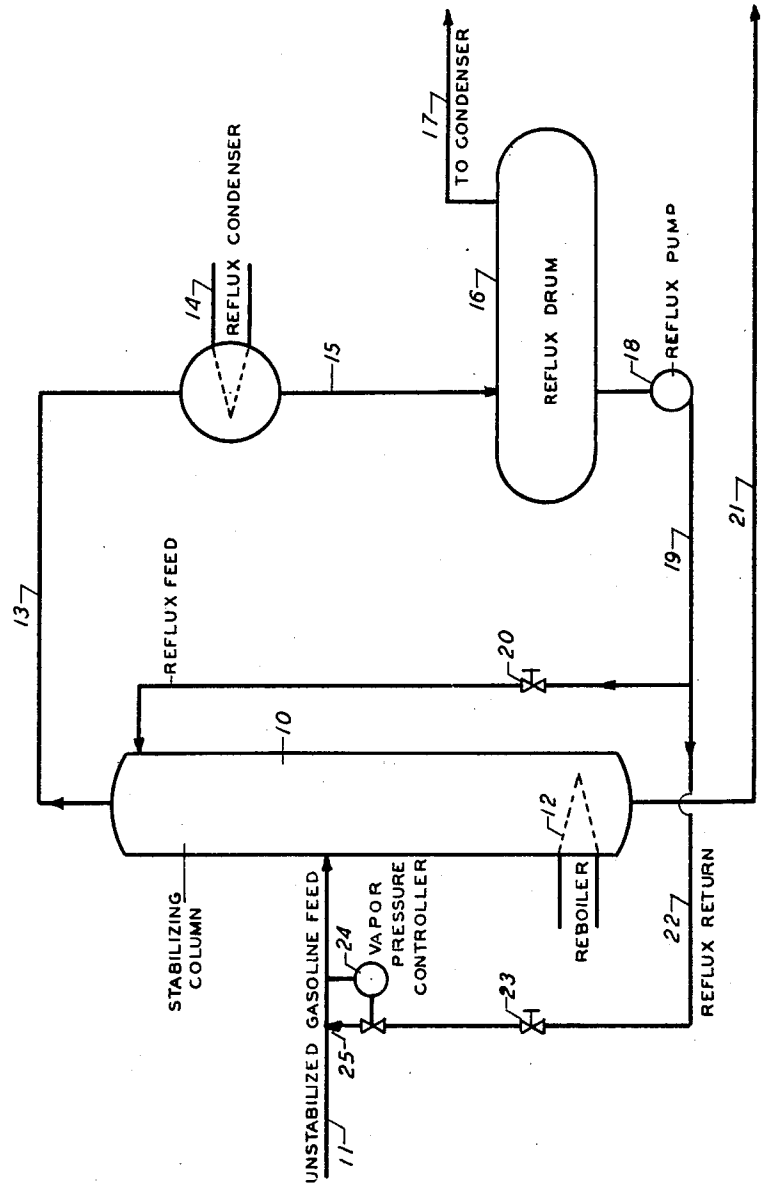
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METHOD OF CONTROLLING GASOLINE STABILIZER OPERATION

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METHOD OF CONTROLLING GASOLINE STABILIZER OPERATION

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4 Claims. (Cl. 196—11)

The gasoline stabilizing column, as is well known, is a distilling and dephlegmating column arranged and controlled to remove from gasoline only such volatile components as to leave a residue of a desired and constant vapor pressure.

Such columns must fractionate very closely in order to maintain the specification vapor pressure without removing any excess of volatile constituents. In the present highly developed state of the art, modern columns operate in the most satisfactory manner possible, with one exception. That exception is, that if the composition of the feed changes suddenly, as by an increase or reduction in the content of propane or butane, the column becomes unbalanced and the vapor pressure of the residue (which is the principal product) rises or falls as the case may be, and departs temporarily from the desired figure. This having occurred, the operation of the column must be rebalanced by varying the supply of reflux to the top of the column, or the input of heat to the reboiler, or both. This rebalancing may occupy an undesirably long period during which the residual gasoline is at least slightly away from the optimum.

I have discovered that the undesirable effect produced by changes in composition of the feed may be minimized and the rebalancing time correspondingly shortened by returning to the feed of unstabilized gasoline a material quantity of the overhead condensate used also as reflux liquid for the column, the leveling effect of this return being roughly proportionate to the quantity returned.

I have also discovered that a controlled return of reflux liquid to the feed, whether the control be manual or automatic, provides a more rapid and effective means for rebalancing the column after a change in feed composition than is afforded by control of the quantity of reflux liquid returned to the top of the column or by control of the heat supply to the reboiler.

The modification of the conventional stabilizing apparatus required to put this control into effect is illustrated in a highly diagrammatic manner in the attached drawing. In this figure, 10 indicates the stabilizing column, which may be of any preferred type, 11 is a pipe supplying unstabilized gasoline and 12 the reboiler by which distillation is produced. A vapor line 13 conducts overhead vapors to a reflux condenser 14 and a pipe 15 passes uncondensed vapors and a partial condensate to a reflux collecting drum 16. From this drum the vapors pass through pipe 17 to a final condenser not shown, while reflux liquid is impelled by a pump 18 to the upper end of the column through pipe 19 which is controlled by a manual or automatic valve 20. Stabilized gasoline is withdrawn from the column through pipe 21. The above arrangement is wholly conventional and the diagram covers only the bare essentials of the apparatus as customarily used.

I add to this conventional apparatus a branch pipe 22 through which a return supply of reflux liquid is continuously introduced into the feed of unstabilized gasoline entering the column through pipe 11. This return supply may be controlled by a manual valve indicated at 23, or by a vapor pressure recorder and controller indicated at 24, or by both. If the automatic controller is used, it should be actuated by the vapor pressure of the mixed feed, downstream from the point 25 at which reflux liquid is introduced, and should be of such character as to maintain the mixed feed at a substantially constant vapor pressure. The vapor pressure recorder and controller manufactured by Industrial Engineers, Inc., Los Angeles, California, and known commercially as "Industrial Vapor Pressure Recorder," has been used for this purpose with good results, but any controller capable of maintaining the feed at a constant vapor pressure may be used.

While a constant vapor pressure does not indicate of necessity a constant composition of feed, the maintenance of the feed at a constant vapor pressure reduces the unbalancing effect of a change in composition to a minute fraction of that which may follow such a change without such maintenance, and therefore permits the column to be rebalanced by changes in reflux supply to top of column or heat input to the reboiler in a correspondingly minimized time.

When a constant quantity of reflux is recycled to the feed, the desirable results obtained are less marked, as the change in vapor pressure produced by change in feed composition is reduced in extent only in proportion to the relation between feed of unstabilized gasoline and quantity of reflux liquid mixed with it.

I claim as my invention:

1. The method of minimizing variations in the operation of a gasoline stabilizing column following changes in composition of the feed of unstabilized gasoline, which comprises: condensing and returning into direct intermixture with said feed and prior to its entry into said column, a portion of the vapor effluent from said column,

and so controlling the quantity so returned as to maintain said intermixture at a substantially constant vapor pressure.

2. The method of minimizing variations of the operation of a gasoline stabilizing column following changes in composition of the feed of unstabilized gasoline, which comprises: forming a reflux liquid by condensing a portion only of the vapor effluent from said column; withdrawing the uncondensed vapor from the system; returning a portion of said condensate to the top of said column to reflux said column, and returning another portion of said condensate, in liquid form, into intermixture with said feed of unstabilized gasoline.

3. The method of minimizing variations in the operation of a gasoline stabilizing column following changes in composition of the feed of unstabilized gasoline, which comprises: condensing and returning into direct intermixture with said feed, prior to its entry into said column and in liquid form, a portion only of the vapor effluent from said column.

4. The method of minimizing variations in the operation of a gasoline stabilizing column following changes in composition of the feed of unstabilized gasoline, which comprises: condensing and returning into direct intermixture with said feed and prior to its entry into said column, a constant liquid-volume portion of the vapor effluent from said column.

HORACE C. GORMLY.