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(54) CONTROLLING A PLURALITY OF SOLVENT DEWAXING FILTERS

(71) We, TEXACO DEVELOPMENT CORPORATION, a Corporation organized and existing under the laws of the State of Delaware, United States of America, of 135 East 42nd Street, New York, New York 10017, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the control of a plurality of solvent dewaxing filters.

Heretofore, a fixed system wash ratio of a wash solvent to a charge mixture of waxy oil and solvent was maintained in operating a plurality of dewaxing filters. However, the filtering rates of the individual dewaxing filters varied from each other due to various reasons, such as maintenance procedures, thereby varying the charge mix intake of the individual dewaxing filters. However, the wash solvent was supplied to the plurality of filters through a manifold of parallel piping so that the wash solvent rate to any particular filter remained constant. As a result, the wash ratio for the individual dewaxing filters differed from the overall wash ratio, i.e. the ratio of total wash to the plurality of filters divided by total charge rate to the plurality of filters.

The optimum wash ratio depends upon a number of factors including the desired oil content of the wax, the availability of solvent, and the maximum amount of solvent which can be used without overtaxing the capacity of the filter. However, as long as none of the filters are flooded, the maximum yield for any specific amount of solvent wash supplied to the filters will result when the wash ratio of each filter is maintained equal to the overall wash ratio.

The invention provides a dewaxing filtration apparatus for filtering a charge mix comprising solvent and waxy oil, comprising a plurality of dewaxing filters for filtering wax from the mix, means for supplying a charge mix to each filter and means for supplying a wash solvent to each filter and control means associated with each filter for maintaining a predetermined wash ratio (i.e. amount of wash solvent applied to the filter: amount of charge mix supplied to the filter), each control means comprising means for providing a signal corresponding to the desired wash ratio, means for controlling the flow rate of the charge mix being received in use by the associated dewaxing filter, which means for controlling the flow rate of the charge mix is adapted to control the charge mix flow rate to the dewaxing filter as a function of the filtering rate of that dewaxing filter, means connected to the signal means for sensing the flow rate of the charge mix to the filter and means connected to the signal means for controlling the flow rate of the wash solvent to the associated filter, which means for controlling the flow rate of the wash solvent is adapted to control the flow rate of the wash solvent being received in use by the dewaxing filter in accordance with the flow rate of the charge mix being received in use by that dewaxing filter and the desired wash ratio signal.

The invention also provides a dewaxing filtration process for filtering a charge mix comprising solvent and waxy oil, comprising individually controlling a plurality of filters so as to maintain the wash ratio (that is amount of wash solvent applied to the filter: amount of charge mix supplied to the filter) of each filter at a predetermined value wherein each dewaxing filter receives a wash solvent and a charge mix and the charge mix is applied to each dewaxing filter in a manner so that the oil passes through the filter which intercepts the wax and wash solvent is applied to the intercepted wax to wash off oil that did not pass through the filter, and including the steps of providing for each filter a signal corresponding to the desired wash ratio, controlling the flow rate of the charge mix being received by that dewaxing filter, such that the charge mix flow rate to the dewaxing filter is controlled as a function of the filtering rate of the dewaxing filter, and controlling the flow rate of the wash solvent so that the flow rate of the wash solvent being received by that

dewaxing filter is controlled in accordance with the flow rate of the charge mix being received by the dewaxing filter and the desired wash ratio signal.

The objects and advantages of the invention will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawing wherein one embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawing is for illustration purposes only and is not to be construed as defining the limits of the invention.

The drawing is in part a simplified block diagram of a control system, constructed in accordance with the present invention, which control a plurality of dewaxing filters, also shown in part in schematic form.

A charge mix of solvent and waxy oil is provided to line 1 and by way of lines 8, 8n to dewaxing filters 5 and 5n, respectively. The break in line 1 indicates that although the drawing shows only two dewaxing filters, any number may be used. The charge mix forms a liquid bath in tanks 12 and 12n, respectively. Drums 14 and 14n, covered with a filtering material, are rotating through the charge mix bath in tanks 12 and 12n, respectively, acquiring a coating of wax on the filtering material. Non-waxy oil, plus solvent, which has passed through the filtering material, is removed from the drums 14 and 14n by way of lines 19 and 19n, respectively.

The level of charge mix in each tank is controlled by level sensors 23, 23n providing signals L_1 and L_n, respectively, corresponding to the levels of the charge mix. Signals L_1 and L_n are used to control valves 26 and 26n, respectively, to control the quantity of charge mix going into tanks 12 and 12n, respectively.

Wash solvent is provided in line 30 again having breaks to show the capability of having more than two dewaxing filters and is applied to the dewaxing filters 5 and 5n by way of lines 32 and 32n, each having a respective valve 33. Passing through the valves 33 the wash solvent is sprayed on rotating drums 14 and 14n by way of heads 38 and 38n, respectively. The wash solvent passes through the wax cake and the filtering material, carrying oil still remaining in the wax cake along with it. The larger the amount of wash solvent used the greater the amount of the oil which is recovered from the wax cake. The flow rates of the wash solvent are controlled by valves 33 individually as a function of a desired overall wash ratio. The wash ratio is defined as the ratio of the wash solvent to the charge mix.

A voltage V1, which corresponds to a desired overall wash ratio, is applied to multipliers 40 and 40n. Flow transmitters 44 and 44n in lines 8 and 8n, respectively, sense the flow rates of the charge mix going to dewaxing filters 5 and 5n, respectively, and provide corresponding signals F1 and Fn to multipliers 40 and 40n, respectively. Multipliers 40 and 40n multiply signals F_1 and F_n, respectively, with voltage V_1 to provide set point signals SP_1 and SP_n, to flow controllers 50 and 50n provide signals E_1 just the set point of the flow controllers in accordance with the set point signals. Flow controllers 50 and 50n prvide signals E_1 and E_n, respectively, to control valves 33 respectively, according to the positions of the set points of controllers 50 and 50n, respectively, so as to control the flow rates of the wash solvent in lines 32 and 32n.

Over a period of time the filtering material on drum 14 or 14n becomes partially plugged or "blinded" with resinous material or fine particles. Thus the flow rate of the charge mix in line 8 or 8n decreases. Signal F_1 or F_n decreases causing signal SP_1 or SP_n to decrease. As a result, a respective valve 33 is controlled by signal E_1 or E_n to decrease the wash solvent flow rate so that dewaxing filter 5 or 5n maintains the desired wash ratio.

The invention as hereinbefore described controls the in wash ratio individually, for two or more dewaxing filters, in accordance with a desired overall wash ratio.

WHAT WE CLAIM IS:

1. A dewaxing filtration apparatus for filtering a charge mix comprising solvent and waxy oil, comprising a plurality of dewaxing filters for filtering wax from the mix, means for supplying a charge mix to each filter and means for supplying a wash solvent to each filter and control means associated with each filter for maintaining a predetermined wash ratio (i.e. amount of wash solvent applied to the filter: amount of charge mix supplied to the filter), each control means comprising means for providing a signal corresponding to the desired wash ratio, means for controlling the flow rate of the charge mix being received in use by the associated dewaxing filter, which means for controlling the flow rate of the charge mix is adapted to control the charge mix flow rate to the dewaxing filter as a function of the filtering rate of that dewaxing filter, means connected to the signal means for sensing the flow rate of the charge mix to the filter and means connected to the signal means for controlling the flow rate of the wash solvent to the associated filter, which means for controlling the flow rate of the wash solvent is adapted to control the flow rate of the wash solvent being received in use by the dewaxing filter in accordance with the flow rate of the charge mix being received in use by that dewaxing filter and the desired wash ratio signal.

2. Apparatus according to Claim 1 wherein the filters are in a parallel arrangement, and said wash solvent supply means and said charge mix supply means being adapted to apportion a charge mix and a wash solvent received in use by the apparatus to each filter.

3. Apparatus according to Claim 1 or Claim 2 in which each dewaxing filter has a charge mix bath receiving the charge mix whose level corresponds to the filtering rate of the dewaxing filter, wherein each charge mix flow rate control means includes means for sensing the level of the charge mix bath in a corresponding dewaxing filter and providing a signal corresponding thereto, and means connected to the level sensing means for controlling the flow rate of the charge mix to that dewaxing filter in accordance with the sensed level signal.

4. Apparatus according to any one of Claims 1 to 3 in which each wash solvent flow rate control means includes means for sensing the flow rate of the charge mix being received in use by a corresponding dewaxing filter and providing a signal corresponding thereto, and regulating means connected to the flow rate sensing means and to the desired wash ratio signal means for controlling the flow rate of wash solvent being received in use by that dewaxng filter in accordance with the charge mix flow rate signal and the desired wash ratio signal.

5. Apparatus according to Claim 4 in which each regulating means includes multiplier means connected to the desired wash ratio signal means and a corresponding flow rate sensing means for providing a product signal in accordance with the desired wash ratio signal and the charge mix flow rate signal, and flow controller means connected to the multiplier means for controlling the flow rate of the wash solvent being provided to the dewaxing filter, associated with the corresponding flow rate sensing means, in accordance with the product signal.

6. A dewaxing filtration process for filtering a charge mix comprising solvent and waxy oil, comprising individually controlling a plurality of filters so as to maintain the wash ratio (that is amount of wash solvent applied to the filter: amount of charge mix supplied to the filter) of each filter at a predetermined value wherein each dewaxing filter receives a wash solvent and a charge mix and the charge mix is applied to each dewaxing filter in a manner so that the oil passes through the filter which intercepts the wax and wash solvent is applied to the intercepted wax to wash off oil that did not pass through the filter, and including the steps of providing for each filter a signal corresponding to the desired wash ratio, controlling the flow rate of the charge mix being received by that dewaxing filter, such that the charge mix flow rate to the dewaxing filter is controlled as a function of the filtering rate of the dewaxing filter, and controlling the flow rate of the wash solvent so that the flow rate of the wash solvent being received by that dewaxing filter is controlled in accordance with the flow rate of the charge mix being received by the dewaxing filter and the desired wash ratio signal.

7. A process according to Claim 6 in which said filters are in a parallel arrangement, each dewaxing filter receiving a portion of wash solvent and a portion of charge mix received by the filtering system.

8. A process according to Claim 5 or Claim 7 in which each dewaxing filter has a charge mix bath receiving the charge mix whose level corresponds to the filtering rate of the dewaxing filter, and each charge mix flow rate control step includes sensing the level of the charge mix bath in a corresponding dewaxing filter, providing a signal corresponding to the sensed level, and controlling the flow rate of the charge mix to that dewaxing filter in accordance with the sensed level signal.

9. A process according to any one of Claims 6 to 8 in which each wash solvent flow rate control step includes sensing the flow rate of the charge mix being received by a corresponding dewaxing filter, providing a signal corresponding to the sensed flow rate, and controlling the flow rate of wash solvent being received by that dewaxing filter in accordance with the charge mix flow rate signal and the desired wash ratio signal.

10. A process according to Claim 9 in which the last mentioned controlling step includes providing a product signal in accordance with the desired wash ratio signal and the charge mix flow rate signal, controlling the flow rate of the wash solvent being provided to that dewaxing unit in accordance with the product signal.

11. A dewaxing filtration apparatus substantially as hereinbefore described with reference to, and as illustrated in the accompanying drawing.

12. A dewaxing filtration process substantially as hereinbefore described with reference to the accompanying drawing.

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1586675 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale