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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Blowing Columns for use in the production of Blown Asphaltic Bitumen

We, SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V. a Company organised under the Laws of The Netherlands, of 30 Carel van Bylandtlaan, The Hague, The Netherlands 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:—

This invention relates to blowing columns for use in the production of blown asphaltic bitumen, and is an improvement in the invention (herein termed the main invention) which is the subject of British Patent No. 908,280.

It is known to treat petroleum distillation residues by blowing them at elevated temperature (generally in the range 200°C to 400°C, usually 250°C to 350°C) with a gas containing free oxygen ("blowing gas", usually air) for the production of blown asphaltic bitumen.

Many plants are known for carrying out this blowing. According to the main invention use is made for this purpose of a blowing column comprising a feed intake system enabling the feed to be introduced, if desired, into the bottom part of the blowing column or just below the normal liquid level in the blowing column, a supply system for the blowing gas consisting of supply line entering the blowing column above the normal liquid level and running downwards inside the blowing column to a distributor positioned in the bottom part of the blowing column, and a discharge system for blown asphaltic bitumen consisting of a level control vessel outside the blowing column, partly above and partly below the normal liquid level in the blowing column, a line connecting the upper part of the level control vessel which is not filled with liquid blown asphaltic bitumen with the vapour space of the blowing column, a line for discharging liquid blown asphaltic bitumen from the bottom part of the level control vessel, a level controller which, by controlling the quantity of liquid blown asphaltic bitumen flowing through the latter line controls the liquid level in the level control vessel, a line open at both ends running inside the blowing column from the bottom part thereof up to above the normal liquid level in the blowing column and a line branching off from the latter line under the normal liquid level in the blowing column and opening into the bottom part of the level control vessel.

Although in general the above-mentioned blowing column functions excellently, disturbances sometimes occur in the control of the liquid level in the blowing column. This must be ascribed to clogging by carbon and/or solidified asphaltic bitumen, of the top opening of the line which is open at both ends and which runs inside the blowing column from the bottom part thereof up to above the normal liquid level in the blowing column. As a result of such clogging, air ascending together with the blown asphaltic bitumen in this line can no longer escape to the vapour space of the blowing column, but is passed together with the blown asphaltic bitumen into the level control vessel. The result of this is that foam can form in the level control vessel, and this makes accurate control of the liquid level in this vessel—and hence of the liquid level in the blowing column itself—impossible.

It is very important that the liquid level in the blowing column can be accurately kept at the correct height since, should the liquid level drop to below the mouth of a line through which feed is introduced into the blowing column, the feed would fall through the vapour space (i.e. through an oxygen-containing atmosphere), and this would involve an explosion hazard. Moreover, a fluctuating level strongly promotes the deposition of carbon on the wall of the blowing column, as a result of which the column has to be put out of operation much more often for maintenance work.

It has now been found that such a problem no longer arises if the line opening into the

[*Price 4s. 6d.*]

level control vessel, and the line connecting the upper part of the level control vessel, which is normally not filled with liquid blown asphaltic bitumen, with the vapour space of the blowing column, are interconnected outside the column by means of a line. Owing to the introduction of this latter line, clogging of the above-mentioned top opening of the line which starts in the bottom part of the blowing column no longer impedes the normal operation of the blowing column in any way whatever; this means that the said opening may be omitted, if desired.

According to the present invention, therefore, an improvement in the main invention consists in that the line opening into the level control vessel and the line connecting the upper part of the level control vessel, which is normally not filled with liquid blown asphaltic bitumen, with the vapour space of the blowing column are connected by means of a connected by means of a connection line outside the blowing column.

It should be noted that, in the thus improved blowing column, the position of the level control vessel relative to the blowing column is no longer of essential importance, so that this vessel may be placed at a height which is to be preferred from a technical or economic point of view. The level control vessel may very suitably be placed on a level with the bottom part of the blowing column and this may, for example, be effected by placing the level control vessel on the same base on which the blowing column is mounted. In this case the provision of the connection line has the additional advantage that complete or partial emptying of the blowing column by siphonage is prevented.

The invention also relates to an improved process for blowing bitumen in which use is made of the improved blowing column.

The invention also relates to blown bitumen obtained according to the improved blowing process.

Blowing in the blowing column according to the invention may be a batch-wise or a continuous process. In practice both processes are used, although from the point of view of operational economy the continuous process is much preferred.

A specific embodiment of the invention will now be described by way of example with reference to the single figure of the accompanying drawing, which is a vertical cross-section of a blowing column according to the invention.

Referring to the drawing, preheated liquid feed is supplied to the blowing column 1 through a line 2, which branches into lines 3 and 4 which are provided with valves 5 and 6 respectively. The line 3 opens into the bottom part of the blowing column 1. The line 4 opens into the blowing column 1 at a point just below the liquid level in the blowing column when the latter is in normal operation, the liquid level being indicated by the dotted line AB. When bringing the blowing column into operation (i.e. when it contains no feed) the valve 5 is opened and the valve 6 is closed, so that the feed is pumped through the line 3 into the bottom part of the blowing column. Once the quantity of feed introduced into the blowing column is such that the liquid starts flowing into the level control vessel 8 via a line 7, the valve 5 is closed and the valve 6 is opened. The blowing column is then put into normal operation, the feed being introduced through the line 4 into the blowing column at a point just below the liquid level.

The line 7 runs up inside the blowing column from the bottom part thereof to just below the normal liquid level AB in the blowing column and then opens into the level control vessel 8, in the case shown in the drawing into the bottom part of the control vessel which is normally filled with liquid asphaltic bitumen, but possibly instead into the top part which is normally not filled. The vessel 8 is installed outside the blowing column and is placed on a level with the bottom part of the blowing column, and rests on the same base on which the blowing column has been installed. A line 9 connects the top part of the level control vessel 8 with the vapour space of the blowing column. The lines 7 and 9 are interconnected through a connecting line 10 outside the column.

The blown asphaltic bitumen flows from the bottom part of the blowing column through the line 7 into the level control vessel 8 and then into a line 11 through which it is discharged. The blown asphaltic bitumen flowing through the level control vessel 8 fills the bottom part thereof. The liquid level in the level control vessel 8 is indicated by the dotted line CD.

The liquid surface AB in the blowing column is kept at a practically constant height by controlling the height of the liquid surface CD in the level control vessel 8. In order to control the height of the liquid surface CD in the level control vessel 8, use can be made of any suitable type of level controller 12 which acts by controlling the quantity of blown asphaltic bitumen running off through the line 11, as by controlling the operation of a pump 13 which is positioned in the line 11 to pump the blown asphaltic bitumen through the discharge system.

The blowing gas is introduced into the bottom part of the blowing column through a line 14 which debouches into a distributor 15. The blowing gas is forced into the blowing column under pressure, for which purpose the blowing gas line 14 is connected to a compressor (not shown).

The distributor 15 may be of any known type and may, for instance, consist of a hollow plate, an annular tube, a number of tubes or a

combination of such devices. The distributor is provided with a number of outlets (e.g. plain openings or nozzles) to introduce the blowing gas into the blowing column. These outlets preferably face downwards so that the blowing gas leaves the distributor in a downward direction.

Lines 16 and 17 with associated distributors are used for the injection of steam and water, respectively, into the vapour space of the column. A suitable injection method is described in British patent specification No. 780,156.

The blowing column is provided at the top with a discharge line 18 for the waste gases.

A line 19 which is provided with a valve 20 is secured to the bottom part of the blowing column and serves for draining liquid from the blowing column when it is desired to cease the operation thereof. In this event the valve 20 is opened, but normally the valve 20 is closed.

WHAT WE CLAIM IS:—

1. A blowing column for the production of blown asphaltic bitumen comprising a feed intake system enabling the feed to be introduced into the bottom part of the blowing column or just below the normal liquid level in the blowing column, a supply system for the blowing gas consisting of a supply line entering the blowing column above the normal liquid level and running downwards inside the blowing column to a distributor positioned in the bottom part of the blowing column, and a discharge system for blown asphaltic bitumen consisting of a level control vessel outside the blowing column, a line (line I) connecting the upper part of the level control vessel which is normally not filled with liquid blown asphaltic bitumen with the vapour space of the blowing column, a line for discharging liquid blown asphaltic bitumen from the bottom part of the level control vessel which is normally filled with liquid blown asphaltic bitumen, a level controller which, by controlling the quantity of liquid blown asphaltic bitumen flowing through the latter line, controls the liquid level in the level control vessel, a line (line II) running up inside the blowing column from the bottom part thereof up to just below the normal liquid level in the blowing column and then opening into the level control vessel, and a connection line outside the blowing column connecting the line I and the line II.

2. A blowing column as claimed in Claim 1 in which the level control vessel is placed on a level with the bottom part of the blowing column.

3. A blowing column for the production of blown asphaltic bitumen, substantially as described with reference to the accompanying drawing.

4. A process for blowing bitumen in which a blowing column as claimed in Claim 1 or Claim 2 or Claim 3 is used.

5. Blown bitumen which has been obtained by the process as claimed in Claim 4.

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combination of such devices. The distributor is provided with a number of outlets (e.g. plain openings or nozzles) to introduce the blowing gas into the blowing column. These outlets preferably face downwards so that the blowing gas leaves the distributor in a downward direction.

Lines 16 and 17 with associated distributors are used for the injection of steam and water, respectively, into the vapour space of the column. A suitable injection method is described in British patent specification No. 780,156.

The blowing column is provided at the top with a discharge line 18 for the waste gases.

A line 19 which is provided with a valve 20 is secured to the bottom part of the blowing column and serves for draining liquid from the blowing column when it is desired to cease the operation thereof. In this event the valve 20 is opened, but normally the valve 20 is closed.

WHAT WE CLAIM IS:—

1. A blowing column for the production of blown asphaltic bitumen comprising a feed intake system enabling the feed to be introduced into the bottom part of the blowing column or just below the normal liquid level in the blowing column, a supply system for the blowing gas consisting of a supply line entering the blowing column above the normal liquid level and running downwards inside the blowing column to a distributor positioned in the bottom part of the blowing column, and a discharge system for blown asphaltic bitumen consisting of a level control vessel outside the blowing column, a line (line I) connecting the upper part of the level control vessel which is normally not filled with liquid blown asphaltic bitumen with the vapour space of the blowing column, a line for discharging liquid blown asphaltic bitumen from the bottom part of the level control vessel which is normally filled with liquid blown asphaltic bitumen, a level controller which, by controlling the quantity of liquid blown asphaltic bitumen flowing through the latter line, controls the liquid level in the level control vessel, a line (line II) running up inside the blowing column from the bottom part thereof up to just below the normal liquid level in the blowing column and then opening into the level control vessel, and a connection line outside the blowing column connecting the line I and the line II.

2. A blowing column as claimed in Claim 1 in which the level control vessel is placed on a level with the bottom part of the blowing column.

3. A blowing column for the production of blown asphaltic bitumen, substantially as described with reference to the accompanying drawing.

4. A process for blowing bitumen in which a blowing column as claimed in Claim 1 or Claim 2 or Claim 3 is used.

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