TITLE

A SEPARATOR

FIELD OF THE INVENTION

This invention relates to a separator, and is particularly, although not exclusively, concerned with a rotary separator for separating phases of a multiphase mixture.

BACKGROUND OF THE INVENTION AND PRIOR ART

Centrifugal separators for separating multiphase mixtures into their component phases are well known.

Existing centrifugal separators often rely on a batch separation process. This involves separating phases of a mixture into different regions of the separator. Once separation is complete, the separator is stopped and each phase can be removed from the separator. A batch process is often undesirable since it involves periodic interruption of the separation process.

Alternatively, each phase may be removed continuously via separate outlets from a separator. With such methods, removal rates of each phase need to be constantly monitored to ensure that the separation process remains effective. Furthermore, solids and emulsion can build up during the separation process and fill the separator and swamp the rotor.

The term "phase" may refer, in the context of this specification, to the particular state of a substance, for example, whether a substance is a solid, liquid or gas. The term "phase" may also be used to distinguish different substances, for example, immiscible liquids or solids from liquids.

SUMMARY OF THE INVENTION

According to one aspect, there is provided a separator for separating a multiphase mixture comprising: a sealable casing; a pressure vessel, which defines a separator axis, the pressure vessel being rotatably mounted within the sealable casing; a

support for supporting the pressure vessel for rotation about the separator axis; at least one vane disposed within and coupled for rotation with the pressure vessel; and a flow regulator, wherein the pressure vessel has an inlet, a first phase outlet and a plurality of second phase outlets disposed radially outwardly of the first phase outlet with respect to the separator axis, and wherein the flow regulator comprises a plurality of non-return valves disposed respectively at each of the second phase outlets to regulate flow through the second phase outlets, the non-return valves being actuable by regulating a pressure difference between the pressure within the vessel and the pressure within the sealable casing.

TAccording the present invention there is provideddisclosed a separator for separating a multiphase mixture comprising a pressure vessel, which defines a separator axis, a support for supporting the pressure vessel for rotation about the separator axis, at least

At least one emulsion outlet may be disposed radially outwardly of the first phase outlet and radially inwardly of the second phase outlets. The or each emulsion outlet may comprise a tube which extends radially outwardly with respect to the separator axis, wherein the or each tube is in fluid communication with an emulsion discharge passage which extends along the separator and which exhausts through an end of the separator for removing emulsion from the separator.

The separator may further comprise a rotor shaft provided with spray nozzles for supplying fluid into the interior of the pressure vessel. The spray nozzles may be arranged such that they are directed towards the second phase outlets.

The separator may further comprise a third phase outlet disposed radially outwardly of the first phase outlet and radially inwardly of the second phase outlets.

The separator may further comprise a sealable casing within which the pressure vessel is rotatably mounted. The casing may comprise a sump in the lower region of the casing from which the second phase is discharged.

Means may be provided for introducing fluid under pressure between the casing and the pressure vessel. The fluid may be a gas.

The separator may comprise a pressure regulator for regulating pressure between the casing and the pressure vessel.

According to another aspect, there is provided a method of separating a mixture comprising a first phase and a second phase using a separator for separating a multiphase mixture comprising a sealable casing; a pressure vessel, which defines a separator axis, the pressure vessel being rotatably mounted within the sealable casing; a support for supporting the pressure vessel for rotation about the separator axis, at least one vane disposed within and coupled for rotation with the pressure vessel and a flow regulator, wherein the pressure vessel has an inlet, a first phase outlet and a plurality of second phase outlets disposed radially outwardly of the first phase outlet with respect to the separator axis, and wherein the flow regulator comprises a plurality of non-return valves disposed respectively at each of the second phase outlets to regulate flow through the second phase outlets, the non-return valves being actuable by regulating a pressure difference between the pressure within the vessel and the pressure within the sealable casing, comprising the steps:

(a) generating a positive pressure difference across the second phase outlets such that flow through the second phase outlets is prevented by the non-return valves;

(b) spinning the pressure vessel such that the second phase accumulates in the vicinity of the second phase outlets;

(c) generating a negative pressure difference across the second phase outlets such that flow through the second phase outlets is permitted by the non-return valves.

There is ~~present invention~~ also ~~provides~~disclosed a method of separating a mixture comprising a first phase and a second phase using a separator for separating a multiphase mixture comprising a pressure vessel, which defines a separator axis, a support for supporting the pressure vessel for rotation about the separator axis, at least one vane disposed within and coupled for rotation with the pressure vessel and a flow regulator, wherein the pressure vessel has an inlet, a first phase outlet and a plurality of second phase outlets disposed radially outwardly of the first phase outlet with respect to the separator axis and the flow regulator is arranged to regulate flow through the second phase outlets comprising the steps:

(a) generating a positive pressure difference across the second phase outlets such that flow through the second phase outlets is prevented;