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(54) Title: GAS-LIQUID SEPARATION DEVICE FOR AN EBULLATED BED REACTOR

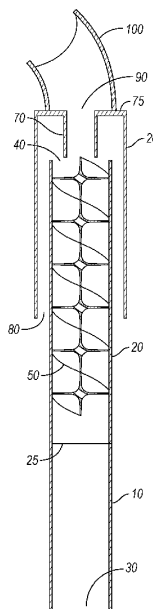


FIG. 1

(57) Abstract: A gas-liquid separator, adapted for separating liquid and gas in an ebullated bed reactor under operating conditions, is disclosed. The device may be used in the petroleum and chemical processing industries in catalytic reactions of hydrocarbonaceous feedstocks in the presence of hydrogen, at an elevated temperature and pressure, to separate gas and liquid from gas and liquid mixtures within the reactor. The device is generally vertically oriented and may be installed in the flow through pan of an ebullated bed reactor. The device comprises a transfer conduit for transferring a gas-liquid mixture stream from a lower section of an ebullated bed reactor to an upper section of the reactor, a vortex separation section having gas-rich and liquid-rich stream outlets, and a gas-rich stream outlet conduit located on top of and adjacent to the vortex separation section. The transfer conduit includes internal means to produce a spiral flow in the gas-liquid mixture, such as a helical or spiral insert. The vortex separation section is located at the top of the transfer conduit and includes separation means to separate the gas-liquid mixture stream into a liquid-rich stream and a gas-rich stream. A separator conduit extending from the top of the vortex separation section to the transfer conduit upper opening, aligned with and having substantially the same cross-sectional dimensions as the gas-rich stream outlet, may be used as the separation means. Among the benefits provided are improved efficiency of gas and liquid separation and reduced gas holdup within the reactor.

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