

What is claimed is:

1. A distillate two-phase hydrogenation reactor, characterized in that, the size of an upper space of the reactor is greater than that of a lower catalyst bed part, and the reactor comprises at least 2 catalyst beds, an inner component for gas replenishment and for stripping a liquid-phase stream containing impurities is arranged between at least one adjacent catalyst bed, the inner component comprises a separator plate and exhaust pipes, the separator plate is connected with a plurality of exhaust pipes, the top parts of the exhaust pipes are in contact with the lower part of the upper catalyst bed.

2. The distillate two-phase hydrogenation reactor according to claim 1, characterized in that, the reactor comprises 2 to 4 catalyst beds.

~~3. The distillate two-phase hydrogenation reactor according to claim 1, characterized in that, an inner component for gas replenishment and for stripping a liquid-phase stream containing impurities is arranged between at least one adjacent catalyst bed.~~

~~43. The distillate two-phase hydrogenation reactor according to claim 31, characterized in that, the inner component comprises a gas-liquid contact component and a stripping component.~~

~~54. The distillate two-phase hydrogenation reactor according to claim 43, characterized in that, the gas-liquid contact component and the stripping component are arranged together.~~

~~6. The distillate two-phase hydrogenation reactor according to claim 3, characterized in that, the inner component comprises a separator plate and exhaust pipes.~~

~~75. The distillate two-phase hydrogenation reactor according to claim 61, characterized in that, the separator plate is provided with multiple downcomer through holes.~~

~~8. The distillate two-phase hydrogenation reactor according to claim 6, characterized in that, the separator plate is connected with a plurality of exhaust pipes.~~

96. The distillate two-phase hydrogenation reactor according to claim 61, characterized in that, the exhaust pipes are vertically arranged above the separator plate.

~~10. The distillate two-phase hydrogenation reactor according to claim 6, characterized in that, the top parts of the exhaust pipes are in contact with the lower part of the upper catalyst bed.~~

447. A liquid-phase hydrogenation method, characterized in using the reactor according to any one of claims 1 to 6.

428. The liquid-phase hydrogenation method according to claim 447, characterized in that, the method includes: circulating a portion of a hydrogenated liquid-phase product, and mixing it with fresh raw material into a liquid-phase material, forming, after dissolving hydrogen, a saturated liquid-phase stream, which is introduced into the reactor from the upper part, carrying out a hydrogenation reaction on a hydrogenation catalyst bed at the upper part of the reactor, passing an effluent after the reaction through the internal component to be mixed with hydrogen gas, to supplement the amount of hydrogen gas dissolved in the liquid-phase material, introducing the liquid-phase material supplemented with dissolved hydrogen into the next hydrogenation catalyst bed; introducing gas-phase hydrogen into the catalyst bed through the exhaust pipes of the stripping component, forming a gas-liquid countercurrent on the catalyst bed, so that the concentration of hydrogen gas on the catalyst bed is increased, and the hydrogen gas strips hydrogen sulfide and ammonia impurities produced in the reaction.

439. The liquid-phase hydrogenation method according to claim 447, characterized in that, the volume ratio of the circulated liquid-phase product to the fresh raw material is 0.1:1 to 10:1.

4410. The liquid-phase hydrogenation method according to claim 447, characterized in that, the amount of hydrogen gas supplemented among the catalyst beds is 0.5:1 to 10:1 in terms of hydrogen-oil volume ratio.

4511. The liquid-phase hydrogenation method according to claim 4410, characterized in that, the reaction temperature, at which the liquid-phase material is

passed through the catalyst bed, is 130 to 450°C.

~~16~~12. The liquid-phase hydrogenation method according to claim ~~11~~7, characterized in that, the reaction pressure, at which the liquid-phase material is passed through the catalyst bed, is 1 to 20MPa.

~~17~~13. The liquid-phase hydrogenation method according to claim ~~11~~7, characterized in that, and the liquid hourly space velocity (LHSV), at which the liquid-phase material is passed through the catalyst bed, is 0.5 to 15h⁻¹.