CLAIMS

[Claim 1] A fluidized-bed heat recovery apparatus comprising:

a fluidized-bed reactor having a fluidized bed disposed therein;

a gas diffuser disposed at a furnace bed of the fluidized-bed reactor, the gas diffuser being configured to give different fluidizing velocities in the fluidized bed; and

a heat recovery device having a heat transfer surface,

wherein a first weakly fluidized region, which is given a relatively small fluidizing velocity, is formed to generate a downward flow of the fluidized medium in the first weakly fluidized region, and a strongly fluidized region, which is given a relatively large fluidizing velocity, is formed to generate an upward flow of the fluidized medium in the strongly fluidized region, thereby forming a swirling flow of the fluidized medium in the fluidized bed, and

a second weakly fluidized region, which is given a relatively small fluidizing velocity, is formed outside the strongly fluidized region to generate a downward flow of the fluidized medium in the second weakly fluidized region such that a part of the fluidized medium flows from the strongly fluidized region into the second weakly fluidized region, and

the heat transfer surface of the heat recovery device is located in the second weakly fluidized region;

wherein the gas diffuser comprises:

a first gas diffuser including a gas diffusion plate configured to give the relatively small fluidizing velocity in order to form the first weakly fluidized region; and

a second gas diffuser including a plurality of gas diffuser tubes configured to give the relative large fluidizing velocity in order to form the strongly fluidized region, the plurality of gas diffuser tubes being arranged in multiple stages along a vertical direction; and

wherein a passage for returning the fluidized medium from the second weakly fluidized region to the strongly fluidized region is provided between an upper stage and a

lower stage of the multiple stages of the plurality of gas diffuser tubes constituting the second gas diffuser.

[Claim 2] The fluidized-bed heat recovery apparatus according to claim 1, wherein the gas diffuser further comprises a third gas diffuser configured to give a relatively small fluidizing velocity in order to form the second weakly fluidized region, the third gas diffuser including a plurality of gas diffuser tubes or a gas diffusion plate, the plurality of gas diffuser tubes being arranged in a single stage or multiple stages along a vertical direction, the gas diffusion plate being inclined downwardly.

[Claim 3] The fluidized-bed heat recovery apparatus according to claim 1 or 2, wherein solid materials as object to be treated are fed into the first weakly fluidized region, and incombustibles included in the solid materials are discharged by a fluidized-medium withdrawing conveyor provided below the gas diffuser.

[Claim 4] The fluidized-bed heat recovery apparatus according to any one of claims 1 through 3, wherein a partition wall is provided between the strongly fluidized region and the second weakly fluidized region.

[Claim 5] The fluidized-bed heat recovery apparatus according to claim 1, wherein the first gas diffuser includes a gas diffusion plate inclined downwardly toward the strongly fluidized region.