Apparatus for a heterogeneous fluidized bed contains two guide inserts arranged one above the other. The gas distribution device contains two parallel stationary grates, each of which is shaped like a triangular prism with a vertical outer wall and a horizontal bottom wall. The right grate is positioned at a specified distance from the lower base of the left grate; the guide inserts are mounted so that their height relative to the bed of granular material can be adjusted. An elastic mesh is installed above the upper guide insert in the apparatus chamber. A specially shaped plate is positioned between the left and right grates, forming the first outlet slot between the plate and the left grate, and the second outlet slot of the gas distribution device between the plate and the right grate. The outlet cross-section of the first outlet slot is oriented horizontally and is located at a distance from the left wall of the device chamber equal to the gas flare penetration height Z_ϕ, while the outlet cross-section of the second slot is oriented vertically and is located at a distance from the right wall of the device's chamber equal to Z_ϕ, and at a height Δ from the lower horizontal plane of the chamber, where $\Delta \approx Z_\phi/2$.