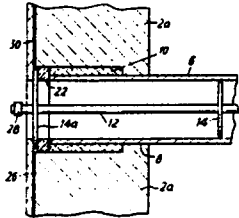


fluidizing air into the combustion chamber and the air flow therefrom can be controlled to afford a flexible turn-down capability.

**4449575**

### FLUIDIZED BED HEATING APPARATUS

William R Laws, Geoffrey R Reed, Worcester Park, Surrey, United Kingdom



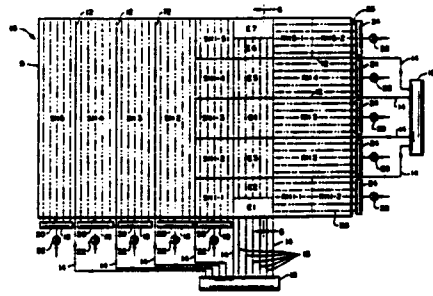
A heat exchanger for high temperature operation has a ceramic-walled chamber traversed by ceramic tubes and is capable of use inter alia in fluidised bed applications. The tubes are arranged in series of successive banks and to give a compact arrangement the successive banks of tubes at different levels are disposed transversely to each other. The tubes may have internal and external reinforcing means to allow them to withstand the loads imposed by the fluidised bed and generally to allow longer tubes to be used in ceramic constructions. The internal reinforcing means may also provide restrictions that in fluidised bed applications can function to minimise the effects of tube wall fracture by reducing carry-over of bed particles seeping into the tubes. For improved end sealing, means can be provided to hold resilient ceramic seals compressed against the tube ends while permitting axial thermal movement of the tubes.

**4453494**

### FLUIDIZED BED BOILER HAVING A SEGMENTED GRATE

Richard E Waryasz assigned to Combustion Engineering Inc

A fluidized bed furnace (10) is provided having a perforate grate (9) within a housing which supports a bed of particulate material including some combustibles. The grate is divided into a plurality of segments (E2-E6, SH1-SH5, RH1-

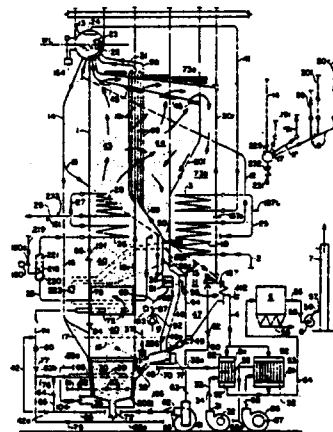


RH5), with the airflow to each segment being independently controlled. Some of the segments have evaporating surface imbedded in the particulate material above them, while other segments are below superheater surface or reheater surface. Some of the segments (E1, E7) have no surface above them, and there are ignitor combustors (32, 34) directed to fire into the segments, for fast startup of the furnace without causing damage to any heating surface.

**4453495**

### INTEGRATED CONTROL FOR A STEAM GENERATOR CIRCULATING FLUIDIZED BED FIRING SYSTEM

Charle Strohmeyer assigned to Electrodyne Research Corporation



The invention comprises an integrated control means, and particularly at partial loads, for a steam generator having a circulating fluidized bed combustion system wherein gas recirculation means is used to supplement combustion air flow to maintain gas velocity in the circulation

loop sufficient to entrain and sustain particle mass flow rate at a level required to limit furnace gas temperature to a predetermined value as 1550 F. and wherein gas recirculation mass flow apportions heat transfer from the gas and recirculated particles among the respective portions of the steam generator fluid heat absorption circuits, gas and circulating particle mass flow rates being controlled selectively in a coordinated manner to complement each other in the apportionment of heat transfer optimally among the fluid heat absorption circuits while maintaining furnace gas temperature at a predetermined set point.

**4454773**

**TIME INTERVAL AUTOMATIC  
WELL MULTI-PHASE FLUID  
SAMPLER**

Paul Brunner, Charles A Christopher, Robert G Pindell assigned to Texaco Inc

An automatic multi-phase well fluid sampler comprises an inlet solenoid valve means on each of a plurality of sample containers for receiving multi-phase well fluid such as a produced oil-water fluid from one of a plurality of wells, and each of the inlet valve means being responsive to a timing and stepping switch means for precisely filling its sample container periodically, in consecutive order, from the same well for providing an improved well sampler system that is more accurate, more precise, more readily adjustable, less complex, discharges less waste oil that damages the environment from the single well, and that indicates the arrival of the multi-phase well fluid at the production well from an injection well and/or the arrival of various chemical concentrations thereof thereafter.

**4455969**

**FLUIDIZED BED COMBUSTOR**

Derek Barker, Fleet, United Kingdom assigned to The British Petroleum Company Limited

A fluidized bed combustor has its fluidizing chamber in thermal contact with a surrounding heat exchanger. A lined base portion of the chamber capable of containing the bulk of bed material while the bed is slumped is adapted to retard heat transfer from the bed. Thermostat linked devices in the bed and external load are arranged to switch the fuel and gas supplies to the bed so as to enable normal bed temperature to be attained without excessive heat removal to the heat exchanger.

**4457289**

**FAST FLUIDIZED BED REACTOR  
AND METHOD OF OPERATING  
THE REACTOR**

Jako Korenberg assigned to York-Shipley Inc

A method of operating a fast fluidized bed reactor according to the invention comprises: (1) providing a fluidized bed reactor having an upper and a lower region, the upper region having a cylindrical shape; (2) feeding matter to be reacted into the lower region of the reactor; (3) supplying a first stream of pressurized air to the reactor in the lower region at a velocity to fluidize the granular material in the circulating regime, a portion of the granular material is continually entrained into the upper region; (4) tangentially supplying a second stream of pressurized air to the upper region wherein, at maximum operating capacity for the reactor, the second stream of air constitutes in excess of about 50% of the total pressurized air fed to the reactor; (5) maintaining a Swirl number of at least about 0.6 and a Reynolds number of at least about 18,000 in the upper region for providing a cyclone of turbulence which increases the rate of reaction in the reactor; and (6) permitting the reaction gases in the upper region to exit from the reactor through an exit throat, while retaining substantially all of the granular material within the reactor. In accordance with the invention, cyclone particle separators are not required. Apparatus suitable for use in practicing the above-recited method are also disclosed.

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