NEW PATENTS by ALFONS PUISHES

In this Section of NUCLEAR APPLICATIONS we briefly describe some recently issued patents which we think are particularly interesting. The patents themselves, which contain all the detailed descriptions of the inventions, may be obtained from the Commissioner of Patents, Washington, D.C. for 50¢ each. They also may be read in patent libraries in major cities.

Granular graphite moderator. Moderator granules of graphite are poured around fuel assemblies to constitute the core. Fluidation of the bed by circulating the gas coolant aids in even distribution of the granules. Refueling is accomplished by dumping all or part of the moderator into a suitable hopper and then reintroducing it into core. Eliminates physical and mechanical problems accompanying use of solid graphite. 3 227 620, B. Cutts, J. M. Hutcheon, UKAEA.

Reactor control element. Instead of the conventional solid control rod, a flexible chain of neutron absorbing material is inserted into the control channel. Chain may be withdrawn by suitable cable and permitted to pile up in space above the core, or it may run over a sprocket and then drop into a pile. Advantages are indicated through elimination of much of the headroom required when using rods. 3 232 842, D. Costes, J. Lebey, Commissariat l'Enèrgie Atomique (France).

Ceramic fuel element. A layer of thin copper foil is inserted between the UO_2 pellets and the stainless-steel tubular sheath in an element of the type used in the EGCR. Practical elimination of the problem of axial deformation caused by thermal cycling is indicated. Application to the solution of other fuel element problems is suggested. 3 230 150, W. R. Martin, J. R. Weir, USAEC.

Borehole reactor. This small-diameter reactor (400 to 500 mm) is provided with an expandable shield of overlapping and telescoping metal plates. This permits lowering the reactor into a borehole of conventional size in connection with secondary petroleum recovery, and then expanding the shield to provide an additional 100 mm of shielding as required in an enlarged portion of the borehole, eliminating the disadvantages of previous reactors of this type requiring large boreholes. (See 3 214 343, *Nucl. Appl.*, April 1, 1966). 3 236 739, Deutsche Erdol-Aktiengesellschaft (Germany).

Rod mechanism. A gravity-type scram rod is connected by cable to a flywheel through a freewheeling clutch. Velocity of the rod toward the end of its downward travel is controlled. Excessive velocity is prevented without interfering with high initial speed by varying the inertia of the flywheel. This is accomplished by the flow of mercury by centrifugal force from a central concentric reservoir forming a part of the wheel to its outer hollow toroidal periphery. The clutch disengages the flywheel and permits it to coast to a stop when rod reaches bottom position. 3 232 841, P. Fortescue, F. R. Bell, A. M. Harris, General Dynamics.

Pressurized water reactor. Water under high pressure and temperature passes from the reactor to a special expansion and separation chamber.

Flashing into steam is accompanied by centrifugal action which separates the steam and delivers it to the prime mover. The kinetic energy of the water is reconverted to pressure of sufficient magnitude to permit reintroducing the water into the reactor directly without need of pumping. 3 234 103, O. H. V. Lange, Aktiebolaget Atomenergi (Sweden.)

Radioactivity measurement. Measurement of the radioactivity of a "whole body" such as a human being is effected in a specially constructed counting chamber comprised of several liquid scintillating detectors of modular construction. Balancing of individual scintillators for greater precision is made possible and greater simplicity of construction and operation is indicated, making such measurement now quite economical and commercially feasible. 3 233 013, L. E. Packard.

Thermal neutron radiography. A photoneutron source, such as beryllium, located in a special shielded chamber, provides a collimated beam to the specimen to be tested and a radiographic film. A gamma source such as ^{124}Sb is positioned in a shielded tube which communicates with the neutron source chamber. A safe means is provided for pushing the gamma source towards the neutron source. Compactness, portability, and safety are indicated for applications not permitting radiography by other methods. 3 237 009, E. A. Warman, W. D. Welte, A. T. Garvey, General Dynamics.

Reactor. Control and shutdown of the reactor are effected by relative movement of two separate core portions which are designed to dovetail. The portions are mounted on separate movable platforms inside the pressure vessel but movement is controlled from without. Critical and subcritical relations are obtained by changing the relative positions of the two portions. The design is especially adapted to fast reactors. 3 236 737, A. G. Frame, J. Webb, UKAEA.

Radiation resistant panel. Laminated panel consists essentially of a central portion comprising a combination of polyester resin in liquid form, fine sand, asbestos cement, and powdered lead with outer layers of resin-impregnated fiberglass fabric. Fire-resistant properties are obtained by adding a coating of an-

timony trioxide. Excellent resistance to low-energy gamma-ray radiation is indicated. 3 230 375. M. B. Van Wagoner, G. Testaguzza.

Breeder blanket. Steam is separated from water in a boiling water reactor by suitable separators located inside the pressure vessel. The steam is then passed through breeder blanket of fertile material which surrounds the core. Shifting blanket elements during loading period in accordance with burnup or conversion rate makes possible the maintenance of a rough control of the superheat in the steam. 3 228 846, R. T. Bryan, The Babcock & Wilcox Company.