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.

Pressure tube reactor with cross-latticed arrangement. Each row of horizontal tubes containing fuel and conducting the coolant is arranged at right angles to the adjacent row. Alternate rows are, of course, in parallel as are the planes of all the rows. Such crosswise arrangement permits the necessary close lattice without congesting the manifolding arrangement at the tube ends. 3 190 807 F. Bevilacqua, Combustion Engineering, Inc.

Simple and compact radiation meter. A two-part cylindrical housing is adapted so that the upper part can rotate with respect to the lower part. The lower part is equipped with an eyepiece and has one of many available scintillating materials positioned within it. The upper part carries a series of light-absorbing filters, which may be successively interposed between the scintillaing material and the eyepiece by relative rotation of the two parts. Rotation is continued until no light from the scintillating material is visible through the eyepiece, and the intensity of the radiation is then read directly in roentgens per hour on a logarithmic scale mounted on the upper part. 3 191 033, H. Greer, R. W. Slocum.

Steam cooled heterogenous reactor. Saturated steam is passed over fuel elements surrounded by a D_2O moderator maintained at temperature and pressure substantially equal to that of saturated steam, e.g. 660 lb/in.^{2} and 500° F. The arrangement permits use of thin-walled zirconium or Zircaloy steam tubes with concentric stainless-steel-clad fuel elements and annulus for steam passage. An exit steam temperature of 970°F under these conditions is indicated. 3 183 168, A. Bell, Foster Wheeler Corp.

Endothermic chemical process utilizing a thermal reactor. A more or less conventional thermal reactor having a graphite moderator is operated without the usual coolant. Fuel elements are withdrawn and materials to be heat processed are introduced into holes through the moderator. Temperatures as high as 2200° C facilitate production of such materials as calcium carbide and phosphorous. 3 181 999, Rudolf Schulten, Brown, Boveri & cie Aktiengesellschaft, Germany.

Steam superheating reactor. Saturated steam from a boiling-water reactor is fed to a separate reactor for superheating. Low-enrichment (2.5%) UO_2 fuel elements are encased in a tube having an annular space for steam. A separate cooling system for the water moderator is outside the tubes, and a boiling-water jacket between reactor core and pressure vessel prevents overheating of the cooling system. Two-directional flow gives final steam conditions of 500°C at 70 atm. Superiority over Calder-Hall and best-known US and Russian practices is indicated. 3 188 277, H. Kornbichler, E. Fischer, H. Klunge, Licentia Patent-Verwaltung G.m. b.H., Germany.

Rapid, continuous and accurate determination of negative reactivity. A neutron-sensitive ionization chamber is positioned at the reactor core. The signal received is amplified and then filtered to isolate signals of two discrete frequency channels. The spectral densities of each of said isolated signals are measured and are used to compute the negative reactivity or shutdown margin, since negative reactivity is a function of the ratio of neutron densities, N_1/N_2, at frequencies, ω_1 and ω_2. An electronic computer may be utilized. The results indicate no need for shutdown and no operator participation, as is the case with measurement of reactor response based on intentionally applied system disturbances such as neutron bombardment and oscillating neutron absorbers; greater accuracy than these older methods is also indicated. 3 188 470, C. W. Richer, A. L. Colomb, E. R. Mann, USAEC.

Coin testing device. A coin, such as a dime, travels across a path of beta and x-ray radiation from a source, such as ^{85}Kr and a high-Z material. Backscatter radiation of beta rays from the coin and bremsstrahlung radiation of x-rays transmitted through the coin are measured by suitably positioned detectors. The former establishes the atomic number of the principal chemical element contained in the coin, e.g. silver, copper, nickel, etc. The latter establishes the weight per unit area. A "no-go" signal is transmitted to a suitable mechanism whenever a coin which does not correspond in composition and density to that for which the detectors were set passes by. This rejects the coin. Applicability to all US and foreign coins and tokens is indicated as well as superiority over exisiting mechanical testers. 3 188 471, C.W. Hansen, P.J. Clack, Laboratory for Electronics, Inc.

Plutonium production and separation. The basic plutonium patent filed in 1945 has finally been issued. While primarily of historical interest now, it still has educational value also and makes a welcome addition to a complete patent library of nuclear technology along with other basic patents such as Lawrence, 1 948 384, Fermi, 2 206 634, Szilard, 2 161 985, Chilowsky, (French) 861 390, Fermi and Szilard, 2 708 656, and others. (See "Patents and Atomic Energy", A. Puishes, *Nucleonics*, October 1958.) 3 190 804, G. T. Seaborg, J. W. Kennedy, A. C. Wahl, USAEC.

Stabilization of organic compounds against radiation damage. A wide variety of polyphenyls are rendered much more effective as moderators and coolants in accordance with two recent patents. Ellard accomplishes this by blending polyphenyls with 50% of bitumens such as asphalt, coal tar, and petroleum residue, while Gutzke and Yanko do it by mixing with 50% fused-ring aromatic hydrocarbons and utilizing a predetermined degree of hydrogeneration. Both patents indicate substantial reduction in residue from radiolytic damage. 3 184 390, J. A. Ellard; 3 183 165, M. E. Gutzke, W. H. Yanko, Monsanto Co.

Molecular and atomic models. "Building-block" type of device useful as a visual aid in lecturing, demonstration, and teaching. Various embodiments having generally spherical or circular geometries represent such items as the hydrogen atom, oxygen atom, deuterium atom, water molecule, and heptavalent chlorine atom. Spherical beads of two different colors in a central circular housing represent protons and neutrons in a nucleus. Additional beads travelling in a succession of concentric outer grooves represent electrons in their orbits. Magnetic plugs attached to the periphery denote valence state and permit physical bonding between various atomic models to illustrate combinations of atoms. Models are easily assembled and disassembled and offer a wide variety of illustrative combinations. 3 183 608, R. R. B. Jierree.

Portable monitor for detection of radiation in airborne particles. A compact main housing encloses a scintillating phosphor and photomultiplier tube and is connected to a conventional count-rate meter and power supply. A hinged cover over one end of the main housing adjacent to the phosphor embodies an auxiliary housing enclosing a filter paper with an air-inlet orifice on one face and a connection to a vacuum pump on the opposite face. An electrical interlock energizes the circuit when the hinged cover is closed, causing particles to be sucked against the filter paper and within range of the detection and counting system. Problems of mounting and removing filter papers for radiation measurement are eliminated. 3 189 742, R. J. Leuba, Laboratory for Electronics, Inc.

Continuous refueling means for heterogeneous reactor. Fuel elements arranged in special bundles are caused to move along a spiral track from the outside to the center of the reactor core. Ingress to and egress from the pressure vessel is through suitable pressure locks. Fuel bundles and supports are covered by patent number 3 167 484 (*Nuclear Applications*, June 1965). 3 190 806, J. B. Mangieri, P. Hall, J. A. Hunter, Martin-Marietta Corp.

Apparatus for adjusting relative position of vertical fuel elements and reflectors. Two sets of guide bars are located in two parallel horizontal planes, one over the other above the core, the bars of one set being at right angles horizontally to the bars of the other. The bars are parallel I sections spaced apart to permit support of moving carriages between them, each carriage carrying a fuel element or reflector. The ends of the bars are connected to a system of articulated rhombuses or accordian-like devices that permit lateral movement of the elements or reflectors in two directions at right angles to each other. Superiority over previous devices through greater simplicity, more precise adjustment, and lighter weight is indicated. 3 188 276, E. Aranovich, G. Mollica, Communaute Europeennee de l'Energie Atomique, Belgium.