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.

Gaseous reactor. Gaseous nuclear fuel is introduced into a chamber provided with liquid coolant and solid moderator. The chamber is composed of material transparent to thermal radiation. An energy reflector surrounds the chamber and focuses high intensity radiant heat energy to the point of use for testing rocket exhaust nozzles, MHD generators, aircraft, and turbines. 3 223 591, G. H. McLafferty, United Aircraft Corp.

Nuclear blast detection. The heat wave from a nuclear blast causes charring of the surface of a sphere of special heat-sensitive material as well as some of several discs of similar material located radially below the sphere. The pressure wave ruptures some of a number of frangible membranes. The location of the charred surface on sphere gives direction from which the blast came. The numbers of discs charred and membranes ruptured are proportional to the intensity of the blast. Two or more devices located miles apart enable determination by triangulation of the location of ground zero. Calculations made from reference to tables which rely on properties of material used in device confirm the location of the blast. A nomograph is used to estimate the bomb yield in megatons. 3 226 546, D. W. Furman.

Nuclear reactor. Secondary recovery of petroleum contained in underground stratum is accomplished by lowering a fast reactor down the bore hole of an oil well. The stratum around the reactor is the only coolant and radiation shield employed. The reactor is controlled from the surface. Heat from the reactor may be used to liberate entrapped petroleum, or the reactor may be permitted to run away and cause an underground explosion. The high pressures and temperatures further aid recovery. 3 214 343, M. L. Natland, Richfield Oil Corporation.

Radioactive detection of contamination of metal surfaces. This method makes possible determination of very small amounts of contamination of metal surfaces by non-volatile organic compounds, such as cutting or threading oils, protective lubricants, or fuels, which may cause serious explosions when handling such materials as liquid oxygen. The suspected surface is contacted with a volatile solution in which a radioactive labled compound such as one of ^{14}C is dissolved; at the same time, an uncontaminated surface is covered. The solvent is then evaporated and radioactivity measurement of the control surface is compared with that of the tested surface. 3 215 839, J. L. Anderson, Cleanometer Corp.

Hardness measurement. Backscatter of beta particles is measured in a method similar to that used for flaw detection, etc., in 3 197 638 (**Nuclear Applications**, Dec. 1965). The specimen is subjected to a beam of beta rays of such energy that it effectively presents an infinite thickness to the beam. Backscatter is measured by a suitable detector circuit including a meter calibrated with a hardness scale. Continuous measurement of hardness of steel passing through strip mill is possible. A patentable improvement by first passing strip through a demagnetizing field is indicated. 3 223 840, D. E. Varner, Industrial Nucleonics Corp.

Measurement of biological effect of radiation of mixed types. A proportional counter having a linear sensing element is connected to a special circuit that measures the average squared value of the alternating current component of the output pulses. This is shown to be proportional to dose regardless of whether the radiation is due to protons, electrons, alpha particles, neutrons, high energy photons, or any combination of these. Application to aerospace technology is indicated. 3 221 165, E. E. Goodale, R. S. Rochlin, V. V. Verbinski, General Electric Co.

Radiation measurement using semiconductors. A crystal having a lithium-compensated intrinsic region between the P- and N-type regions is used to measure the electrical pulse generated between the regions. The method is applicable to both silicon and germanium. Elimination of high noise levels that have heretofore interfered with effective use of semiconductors for measurement of electrons or gamma rays is indicated. 3 225 198, J. W. Mayer, Hughes Aircraft Co.

Varying reactor moderation. Co-axial concentric moderator chambers separated by flexible walls are located between groups of fuel elements. D_2O is circulated through the outer chamber and H_2O through the inner chamber. Varying the pressure on the H_2O expands or contracts the flexible walls, thereby changing the ratio of H_2O to D_2O in the core and hence the amount of moderation. 3 212 984, L. H. J. Tollet and P. E. J. M. Maldague, Societe anglo-belge Vulcain, S. A. (Belguim)

Multi-region fuel element. An inner core of depleted uranium is surrounded by an outer section of enriched uranium. Cladding may be stainless steel, zircalloy or ceramic. The arrangement reduces the temperature gradient and the flux peaking, permitting operation at higher temperatures. Special advantage in the case of ceramic fuel elements is indicated. 3 215 607, M. E. Lackey, USAEC.

Self-limiting radiant reactor. A rectangular graphite core has separate holes for uranium fuel and for coolant tubes. The reactor is undermoderated by the graphite and moderation is completed by supplying water to the coolant tubes. The coolant tubes are designed so that a film of water is thrown against the inside of the tube, and reactor control is obtained by varying the thickness of this film. The water flashes to steam and superheat is obtained. Greater safety, reliability, and neutron economy are indicated, and the use of control rods is eliminated. 3 210 253, M. G. Huntington, RNB Corp.

Further progress towards controlled fusion. (See 3 171 788 **Nuclear Applications**, Aug. 1965.) A central plasma column is confined by a magnetic field in the center of a highly evacuated cylindrical vessel. Pulses of ionized gas are introduced radially into the outer circumference of the vessel to form successive annular rings. Successive discharges of tens of kilovolts impart centripetal movement to rings. The resulting implosions cause confinement of central plasma for as long as 1 μsec and produce deuterium, tritium, or deuterium-tritium-lithium fusion reactions. 3 214 342, J. G. Linhart, (Italy).

Turbo-compressor. A free-running concentric turbo-compressor is located in a duct between a helium-cooled reactor and a heat exchanger. The hot gas from the reactor drives turbine blades located on the inner part of the rotor. Compressor blades located on the outer part of the rotor compress the cooled gas on its way from the heat exchanger to the reactor. Gas-cooled bearings support the rotor; external seals and driver are eliminated. A motor-driven auxiliary compressor is utilized for start-up. 3 210 254, P. Fortescue, General Dynamics Corp.