Current Patents

MAGNETOHYDRODYNAMICS

Powerful Electric Pulse Generator

A compact power generator that can put out a 23-million-watt pulse of electricity was patented last week. The generator uses the principle of magnetohydrodynamic energy (MHD) to produce the electric pulse.

Inventor Robert C. Brumfield, who assigned patent No. 3,317,763 to the MHD Research Inc., a subsidiary of Hercules Power Co., claims the device could be used for high-power radar, sonar, laser light pumps, and emergency communications systems.

MHD generators produce electricity by sending a conducting stream of gas through a magnetic field. Electrodes in the generator draw off the current produced.

The patented generator has a small explosive surrounded by a cesium compound that gasifies easily when heated. When the explosive is set off, the cesium gas bursts through a diaphragm and into a chamber where magnets create the necessary field and electrodes draw off the current.

According to test models, the generator produces a pulse with a peak power of 23 megawatts, lasting about .00006 seconds. The gas moves through the chamber at 8,000 meters per second (600 miles per hour).

REACTOR ENGINEERING

Reactor Fuel Purified

Uranium dioxide, used in fuel elements for nuclear power reactors, has to be extremely pure to prevent corrosion of the fuel element containers.

Major problems are oxides of uranium that contain an excess of oxygen, such as U_3O_8 and U_4O_9. When the fuel is heated by fission in the reactor, these compounds

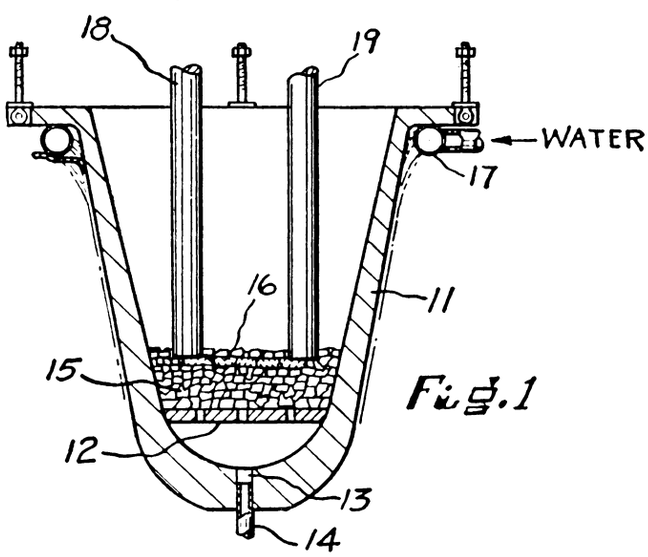

Fig. 1

release their excess oxygen as gas, with the danger of bursting the fuel container.

A new process for obtaining uranium dioxide without contaminating heavier oxides was patented. Inventors John J. Scott and Neil C. Turnbull assigned patent No. 3,317,284 to Norton Co., Worcester, Mass.

The process uses a tank with two electrodes connected to a 250 kilowatt power source. Uranium ore is placed in the tank and melted by the electric arc produced across the electrodes.

In conventional treatment of uranium, the melted ore is simply allowed to cool, but this allows too many contaminants to remain.

In the new process, an inert gas such as argon is pumped through the melted ore as it cools, purging out all free gases. Then hydrogen gas is pumped through. The hydrogen reacts with the excess oxygen in the undesired uranium oxides, forming water and leaving only the uranium dioxide, UO_2.

In tests using the new process, uranium ore with a ratio of 2.7 oxygen atoms to one uranium atom was reduced to uranium dioxide with a ratio of between 1.999 and 2.014 atoms of oxygen to one of uranium, well within acceptable limits.

HEAT SENSOR

High Temperature Thermocouple

A high temperature sensing device that does not break down in operation received patent No. 3,317,353 last week. Clifford R. Bingham assigned the patent to Honeywell, Inc.

The thermometer, which is designed to operate in the range of 3,000 degrees F., uses the principle of the thermocouple: a pair of strips of different metals joined at one end. When the joint is heated, an electric voltage is generated across the free ends of the strips that varies according to the temperature of the joint.

In practice, the joint is enclosed in an insulating jacket that usually expands at a different rate than the metal strips. This puts a strain on the joint that can cause the thermocouple to break.

The new thermocouple substitutes wire strands for the metal strips. The wires can be installed in the insulating jacket with a little play so they can expand and contract without undergoing a strain.

The sensor can be made less than a sixteenth of an inch in diameter and can be supplied in lengths up to 50 feet. Remote monitoring of temperatures in such hard-to-get-at places as nuclear reactors and space vehicles is possible with them, according to the inventor.

PAPER MANUFACTURE

Air Dryer Uses Coanda Effect

In the manufacture of paper, the final process is drying the compressed pulp between heated rollers of absorbent fabric. Some rollers are made with an open weave so moisture can escape through the fabric.

There is a tendency for pockets of moisture to form between the drying paper and the roller. To get rid of these, air blowers are sometimes used, but uneven temperatures cause trouble with the paper quality.

An invention using an improved type of air flow received patent No. 3,316,657. Inventor Oliver G. Haywood assigned it to Huyck Corp., Rensselaer, N.Y.

The device uses the Coanda effect, in which a jet of air passing a curved surface tends to attach itself to the surface. As the jet curves around the surface, a low pressure is created on the side away from the curve, sucking up air.

In the invention, a number of Coanda surfaces are placed above the absorbent rollers. The sucking action pulls up the moisture through the roller fabric.