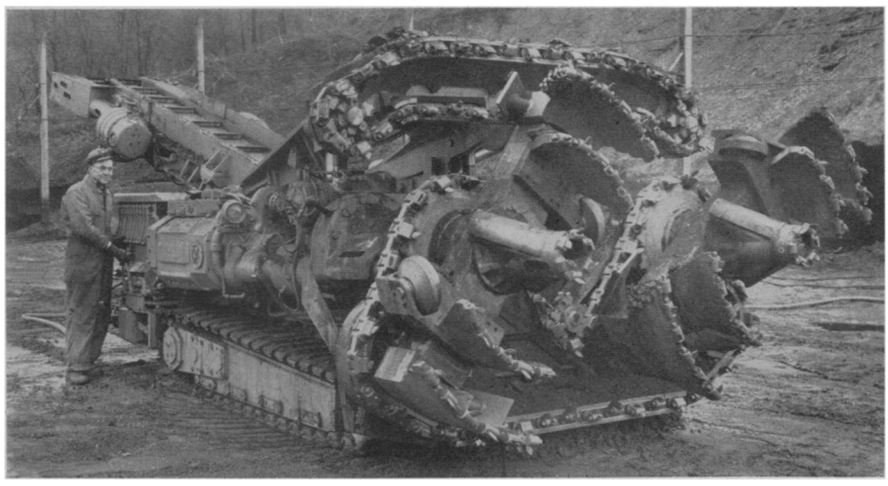

FORTY-TON COAL MINER—This monster machine can chew eight tons a minute from a block of coal. Using two boring arms and top and bottom trim-cutting chains, it removes the full face of the coal seam in one operation. Made by the Joy Manufacturing Company and called the Twin Borer, its cutting pattern is 13 feet wide and from six to eight feet high.

INVENTION

Reactor Plans for 25c

➤ THE COMPLETE plans of the first nuclear reactor, including details which until very recently were top secret, can be bought from the Commissioner of Patents for 25 cents.

The first patent ever issued for the device that made use of atomic energy possible was granted to the late Dr. Enrico Fermi, Nobel Prize-winner, and Dr. Leo Szilard of the department of biophysics at the University of Chicago. They were awarded patent No. 2,708,656, assigned to the Atomic Energy Commission.

Drs. Fermi and Szilard originally filed application for a patent on the "neutronic reactor," on Dec. 19, 1944, nearly nine months before the atomic bomb was dropped on Hiroshima.

Containing 27 sheets of drawings and 30 sheets of printed matter, the reactor patent is comparable to a textbook on atomic energy. From it can be constructed a nuclear reactor similar to the first such device built at the University of Chicago, or the X-10 at Oak Ridge.

Drs. Fermi and Szilard's patent contains details, heretofore unpublished, concerning several facets of the nuclear reactor. Among these are:

An explanation of "danger coefficients," which are those factors that might be dangerous or inhibiting to the continuation of the chain reaction, necessary for fission.

Explanation of "exponential pile," that is, the geometry of the nuclear pile that must be constructed so that the neutron density declines exponentially with distance from the source. This is necessary, the inventors stated, to increase the neutron ratio above one, that is, produce more neutrons than are absorbed or wasted.

The method for calculating the size of the pile.

Another method of calculating pile design.

The design for a specific reactor, with a solid moderator.

Another design with a liquid moderator.

Still another design with a beryllium moderator.

In their ten-and-one-half-year-old application, Drs. Fermi and Szilard stated, "we have discovered certain essential principles required for the successful construction and operation of self-sustaining neutron chain reacting systems (known as neutronic reactors) with the production of power in the form of heat."

In concluding the description of their invention, the eminent atomic scientists made known the scientific potentialities of such a reactor or reactors and said, "with modifications, the reactors herein described can also be used as sources of power in useful form."

Science News Letter, May 28, 1955

BOTANY

Grow "Wall Flowers" in California Experiments

➤ THEY ARE growing "wall flowers" now in California.

This is a research project of Austin Enright, a horticulturist at the University of California at Los Angeles, who is growing orchid plants on redwood boards.

The boards are arranged in a clapboard effect on a vertical frame. Water and necessary minerals trickle down the boards from an overhead pipe, keeping the boards moist. Redwood is used because it resists rot.

The orchid plants are stapled to the boards and tied to a nail to hold them erect. Roots run along the surface of the boards.

At the present time approximately 48 plants are putting out new growth and look healthy. But the final verdict on the success of the method awaits the blooms scheduled for next Christmas.

If successful, the technique may be a boon to the sagging orchid industry. Strapless gowns and other factors have decreased the demand for orchid corsages. The cost of producing quality flowers is still high due to the constant care that must be lavished upon the rare flowers under present techniques.

These involve constant repotting in an expensive medium from the Florida everglades known as osmunda. The redwood board method eliminates the osmunda and repotting. It also solves space problems by its vertical arrangement, and may enable growers to produce six times as many plants in the space now required by conventional growing methods.

Science News Letter, May 28, 1955

MEDICINE

Floating Cancer Cells Give Research Tool

➤ CANCER CELLS floating in the fluid accumulated in the chest and abdomen in one kind of cancer are giving scientists a tool for studying the genetics of cancer cells and the effects of various chemicals on cancer cells.

The cells used in this research come from a mouse cancer called the Ehrlich ascites tumor.

This phenomenon is an association of two disease conditions, Dr. Horace Goldie of Meharry Medical College, Nashville, Tenn., explained at a New York Academy of Sciences Conference in New York.

The two conditions are: 1. ascites, or fluid accumulation, due to implantation of tumor cells into the lining of the abdomen; 2. growth of the tumor cells in the fluid.

When the cells are implanted in the abdomen lining, fluid leaks from the tiny blood vessels in this lining tissue faster than it can be removed by lymph vessels and veins.

The leakage of fluid can be considerably decreased by chemicals or other agents affecting the small blood vessels called capillaries. It can be increased by blocking the lymph and blood vessels responsible for fluid drainage.

The volume of fluid, therefore, can be considered as a reflection of tumor cell growth only in its early stage and only in untreated mice.

In the ascites tumors, Dr. Goldie concludes from his research, growth of free malignant cells and their spread are inseparably associated. Both are suitable as test objects for investigating, on quantitative lines, the mechanism of malignant, or cancerous, conditions and the effect of various agents on malignant cells.

Science News Letter, May 28, 1955