

# engineering sciences

## COMPUTERS

### Fireless fire

In an attempt to understand better how a fire spreads scientists at the National Bureau of Standards are simulating fires with a computer. Different building configurations can be represented, and information on the amount and type of combustible material present, room geometry and spatial relationships are programmed into the computer along with positions of sprinkler valves. Fire spread and air movements can be predicted.

It is hoped that the computer studies will result in a better understanding of the physical changes occurring during a fire and ultimately to better ways of fire fighting.

## OPTICS

### Light-focusing conductor developed

The Japanese reportedly have succeeded where all others have failed. Electrical engineers at Nippon Electric Company, Tokyo, joined forces with the Nippon Sheet Glass Company and devised a light-focusing conductor made of glass fibers. The key to their success was in bundling a number of glass fibers with different indices of refraction.

Called SELFOC, the refractive powers of the fibers bend back all light trying to escape and channel it along the fiber axis. In this way, the light is focused and can be used in optical laser communications systems as well as in the data processing industry, which is now using the laser in combination with holography for information retrieval.

## METALLURGY

### Granulating iron for shipment

Steel companies try to avoid shipping or storing iron in large solid lumps because it must be remelted later. In the United States, solid iron is shipped or stored in 100-pound oblong castings called pigs.

But the Swedes have developed a method of granulating iron so that the remelting is 30 to 40 percent cheaper than remelting pigs would be. The principle behind this difference can be seen by dissolving a lump of sugar in coffee and then by dissolving granules of sugar.

Developed by Uddeholm Company's Hagfors steelworks, the method is simply to pour streams of molten iron into water. When the streams hit, they break up into granules, which sink and are fed into a storage area by conveyor belt. The granules can then be melted quite easily. The method is applicable to steel and other iron-containing metals as well.

## MINING

### X-rays pick out diamonds

Undergoing tests at the De Beer's Finsch mine in South Africa is an instrument that spots diamonds in and separates them out from gravel and waste. The device works by playing an X-ray beam on freshly mined gravel as it passes over a special sorting table in a tunnel.

The X-rays cause any diamond present to twinkle, and the emitted light actuates a photoelectric cell. The cell in turn controls compressed air jets, which focus on the diamond and blow it off the table into a container.

The instrument is expected to save the industry over \$12 million a year by preventing the waste from the present method, which involves washing the gravel over tables coated with grease to which diamonds stick. When encrusted with other minerals, diamonds get swept away.

## RADIOCHEMISTRY

### Making molybdenum 99

Scientists at the Atomic Energy Commission's Oak Ridge National Laboratory have devised a technique for the rapid preparation of the radioactive isotope molybdenum 99. The isotope is vital to the preparation of another isotope, technetium 99m, a short-lived isotope which is used in medicine as an aid in the detection and diagnosis of diseases such as brain tumors and liver cancer.

The new technique is a solvent extraction process whereby molybdenum 99, made from irradiated uranium, is recovered by separating it out from two immiscible liquids, rather than from an ion exchange column.

## MATERIALS

### Lighter bulletproof vest

A new, lighter bulletproof armor has been developed by Norton Company, Worcester, Mass. Composed of boron carbide fibers, a member of the new breed of engineering fibers, the armor is the lightest known, capable of stopping a .30 caliber bullet.

Although exact figures are classified by the Department of Defense, the armor weighs about six pounds per square foot compared to previous boron carbide armor of seven pounds per square foot. The amount may seem small, but just a fraction of an ounce can mean the difference between rejection or acceptance by the military. The weight reduction was achieved by a combination of improved processing and fabrication methods, which led to the elimination of impurities.

Until now boron carbide armor has been used mainly to protect vital helicopter parts, but the lighter weight means it could be worn by ground troops.

## HIGHWAY SAFETY

### To catch a car

Safety engineers at the Texas Transportation Institute of Texas A&M University have tested a highway car trap that prevents out-of-control autos from crossing over the median dividing strip into oncoming traffic. The trap consists of two parallel guardrails spaced about a car width apart and tilted so they bow toward each other along their entire lengths like sides of a triangle.

When a car jumps the road, it hits a rail and collapses a piece of it, passing into the space between the two rails. There it is trapped, unable to collapse the tilt-designed rails from between them.

The guardrail system is designed to contain cars traveling up to 60 miles per hour.