engineering sciences

POLYMERS

Holey plastic

The simple device of putting holes in plastic tubing has opened up new possibilities for increased crop yield, water pollution control and oil-slick containment, says Borg-Warner Corp. of Chicago. Hundreds of microscopic pores are manufactured into each foot of the acrylonitrile-butadiene-styrene tubing. Tests have shown that when the tubing is buried underground and water and nutrients are fed through it, crop production increases and plant disease, weeds, insect damage and water usage decreases.

Because the holes are microscopic, the tubing can function like a semipermeable membrane and thus be used for desalting in the reverse osmosis process or even for purifying industrial wastes, says the developer. And tests suggest that by pumping air through the tubing a curtain of bubbles can control oil slicks.

MINING

Mechanical salt harvester

The Central Salt and Marine Chemicals Research Institute at Bhavnagar, India, has designed a mechanical salt harvester that will halve harvesting costs. The rotors of the harvester wash and push the scraped salt. Then the cutting blades remove and loosen it without disturbing the beds where the salt crystallizes. Floating conveyors of the harvester, which is pulled by a tractor, lift the salt for dumping into trailers.

BIOENGINEERING

Stress record

Dr. Bernard E. Ross of the University of South Florida and co-worker Jerry Morriss have been able to produce a permanent record in an epoxy plastic of the stresses to which the human femur is subjected. They were able to do this because the epoxy is transparent and photoelastic; it bends light according to the stresses to which it is subjected. The trick is to keep it cool as it is being made, so that no heat stresses will show up. This is accomplished by cooling its container and metal mold with water.

After removal from the mold, loads are placed on it to duplicate the stresses on a living femur. As the plastic hardens, the stresses become frozen into it. When sliced into thin sections and backlighted with polarized light, a photograph of the stress patterns can be obtained. This development has implications for making better prosthetic devices and insight into bone healing.

HOLOGRAPHY

Credit card validator

A credit card validator that uses holography to supply immediate information about a purchaser's credit status has been developed by ICV California, Inc. The advantage of this device over similar kinds is that the film can be used for data storage and retrieval, thus providing an inexpensive and quick method of updating a person's records from week to week.

The device works by having a grating on the credit card deflect the laser beam to the purchaser's tiny hologram in an array of holograms, explains ICV's K. K. Sutherlin. The hologram contains coded information about the purchaser's current credit status. The beam displays the information onto a photodetector, which translates the coded information into a readout displayed on a viewing screen.

ION IMPLANTATION

Mass production method

Ion implantation is an emerging technique for making semiconductor material (SN: 2/14, p. 174). Hitachi Ltd. and Japan's New Technology Development Project Corp. in Tokyo have brought it to the point that it can be used to mass-produce transistors and diodes.

In the new commercial process, impurity atoms such as boron and phosphorus, which make a material semiconducting, are ionized, accelerated by a 200,000-volt ion accelerator and fired into a silicon substrate. Prof. Susumu Namba of Osaka University developed the process, which Hitachi says can be completely automated and computer-controlled.

CONTAINERIZATION

America gets the LASH

With the inauguration of a new route, a special containerization method called LASH has crossed from Europe to America. LASH stands for Lighter Aboard Ship; lighter refers to a 380-ton, 61-foot-long barge, which carries the cargo. The barges—73 of them—are transported by a carrier ship and unloaded by it into a harbor, where tugs push them upriver to the final port. For fast turnaround nuclear-powered freighters to carry the barges are envisioned (SN: 3/29/69, p. 316).

The inaugurated route runs from Rotterdam to New Orleans. At present, timing is such that while one load of barges is going up the Mississippi, the carrier ship is heading back to Rotterdam to meet another load of barges coming up the Rhine.

SUBMERSIBLES

Down to the sea in NEMO

This week a new underwater vessel is to go down off Grand Bahama Island. Called NEMO (Naval Experimental Manned Observatory), the transparent submersible can hold two men and operate at depths of 600 feet, deeper than any transparent hull to date. It weighs about 8,000 pounds and consists of a spherical crew compartment made of acrylic plastic, sitting atop a cylindrical metal support-equipment module that houses the main power supply.

In operation, NEMO is lowered from a surface ship, and at the desired depth lowers an anchor to the sea floor to keep itself stationary. It was designed and built by the Southwest Research Institute, San Antonio, Tex., as a control and observation center for underwater construction and research.