

engineering sciences

FUELS

Posting of octane ratings urged

A large consumer advisory organization says that the gasoline industry "seems determined to confuse rather than to inform the consumer" and calls for the posting of octane ratings on all pumps.

Consumers Union, in the October issue of its magazine, *CONSUMER REPORTS*, says buying a higher-octane gas than the car's engine requires is a waste of money. But CU points out that shopping for octanes is virtually impossible, and that the car owner is being deprived of the necessary information to help him decide what his car needs.

Federal or state regulations should require the posting of octane ratings, within reasonable tolerances, on all gasoline pumps, CU recommends.

Oil industry spokesmen have challenged the consumer organization's emphasis on octane ratings, claiming that additives make a difference.

AVIATION

Gold combats ice and fog on windows

Gold has always been prized for its beauty, imperishability and comparative rarity; it is also among the most reliable of electrical conductors.

Not too well known is that gold, because of its atomic structure, becomes transparent when reduced to microscopic thickness. For this reason, gold is being used on airliner windows and windshields to prevent ice and fog from accumulating on the glass.

Gold coating of acrylic windows and windshields for aircraft is being done by Goodyear Aerospace Corp., Akron, Ohio. The gold is heated, melted, vaporized and then condensed in an almost invisible film onto the window or windshield. The gold coating is 2.4 billionths of an inch thick. One ounce of gold covers 80 windows.

When an aircraft with gold-coated windows is flying, an electrical current is passed through the film of gold. The gold molecules convert the electricity into heat high enough to keep the exterior surface of the windshield or window above the freezing point of water. This temperature is maintained even though the plane may be flying at an altitude where the temperature may be minus 65 degrees F.

ELECTRICAL TRANSMISSION

Underground tunnels for power cables

Multi-purpose utility tunnels, carrying power lines and other facilities for long distances underground, may provide an economic way to rid the nation's landscapes of unsightly electric power poles and lines.

The Department of the Interior's Bureau of Mines suggests that boring large, relatively shallow tunnels with efficient machines such as those now used in the construction industry could cost less than excavating smaller ones with equipment now used by utilities. The large tunnels would be employed for several different purposes such as power transmission, fuel distribution, and communication networks.

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The bureau distinguishes between two kinds of power lines: relatively low-voltage distribution lines, which seldom run long distances and are commonest in urban areas; and high-voltage, long-distance transmission lines frequently carried cross-country on conspicuous steel towers.

Present techniques for burying distribution lines are adequate, says the bureau. But the state of the art in boring longer, larger holes through harder rocks for transmission lines is inadequate; better methods of underground guidance and obstacle detection are especially needed.

ELECTRONICS

Combination lock uses electric signals

A combination lock that uses ferroelectric ceramics has been patented by Dr. Otmar Stuetzler of Sandia Laboratories, Albuquerque, N. Mex., and assigned to the Atomic Energy Commission.

Principal advantages of the lock are its high resistance to tampering, its simple and rugged construction and its few moving parts.

The lock consists of several doughnut-shaped ceramic rings arranged around a central rod. The unit is inserted in a cylindrical sleeve—much like a conventional door bolt being slid into place—and locked by applying a combination of electrical pulses which cause the rings to expand or contract.

When the electrical field is applied through the ceramic ring in one direction, its diameter shrinks; if the field is applied in the other direction, it expands.

Because the device includes several ceramic rings, the user must know the correct combination of electrical signals in order to open the lock. The first ring may require a left-right voltage pulse, the second a right-to-left, and so on.

MEDICAL ENGINEERING

Space components make breathing easier

When the air passage to the lungs is blocked, surgeons frequently insert a small curved breathing tube into the windpipe. If the tube should become obstructed, and the nurse fails to detect the obstruction quickly, death by suffocation may occur.

This can be prevented by an automatic monitoring system, developed by the researchers at Children's Hospital Medical Center, Oakland, Calif., and the Ames Research Center, Mountain View, Calif., run by the National Aeronautics and Space Agency.

The system consists of an FM transmitter, a temperature sensing thermistor and a battery. The total system weighs about an ounce.

The thermistor extends slightly into the breathing tube and sends a signal to the transmitter, which shifts up and down in voltage as temperature changes regularly with each intake of cool air and exhalation of warm air. An FM aerial in the patient's room picks up the signals and sends them by wire to the nurses' station. An alarm sounds at the nurse's station when regular breathing is interrupted.