engineering sciences

ARTILLERY

Accident-proof mortar shells

The premature explosion of mortar shells can be prevented by a miniaturized automatic arming device invented by Dr. Boas Popper. Dr. Popper is a member of the Technion faculty in Jerusalem and of the Israel Defense Establishment's Weapon's Development Authority.

Although artillery shells, which rotate because they are fired through rifled barrels, have had such a device, none had been made practical for the nonrotating mortar shells, with the result that there have been accidents during the manual arming process.

An artillery shell can be armed automatically because the rifled barrel permits it to rotate just before firing so that the projectile locks into the casing.

With suitable adaptations, the new invention can be applied to aerial bombs, allowing their fuses to be armed only after they are dropped from a plane.

POWER TRANSPORTATION

Electricity for Quebec

Twelve hundred giant towers, 170 feet high, weighing 37,000 pounds, will be stretched 126 miles from Labrador to northern Quebec to transport electricity from the Churchill Falls hydroelectric plant under construction in central Labrador. The towers, called V-type guyed towers, resemble inverted triangles supported by guy wires running to the ground. About 400 of the structures will be needed for each of the three 375,000-volt lines, which will be completed by 1976.

The V-shaped towers are better for construction purposes than the conventional 4-legged towers because they have one base instead of four to be precisely located. They also cost less because they have less steel, and are easier to transport.

TELEVISION

Thinner color sets

Japanese electronics engineers at Toshiba (Tokyo Shibaura Electric Co.) have come up with a TV picture tube that will permit thinner color TV sets to be built. The tube deflects the electron beam over a wider area, 110 degrees, thus reducing the distance between the electron gun and the face plate of the TV screen. Ordinary sets, which can deflect the beam only 90 degrees, require the electron gun to be set farther back to get a wide enough picture.

The Japanese development is good for screens of 16 inches. Two major problems overcome were those of the color distortion along the outer edges of the screen and the lack of uniform focusing of the screen.

HOVERCRAFT

Half and half

Britain's newest contribution to the sea is half hovercraft and half ship. Called the Vosper Thornycroft VT 1, it is designed to combine the speed of an ordinary hovercraft (SN: 2/3/68, p. 108) with the stability of a ship with submerged keel surfaces, which afford the vessel low wave resistance.

The design is aimed at providing a full skirted vessel propelled by a water screw rather than an air propeller. It would be substantially cheaper to buy and operate than a fully amphibious craft.

The craft can carry two rows of five average-sized autos and 146 passengers or 300 passengers without cars. It is powered by two gas turbine engines with an air-cushion system similar to that of an ordinary hovercraft.

TRANSPORTATION

Hot breath on the rails

A new device for trains will enable them to stop and accelerate faster. Called the plasma jet adhesion boosting system, it consists of jets of hot gas on the rails ahead of the front wheels. The highly ionized gas eliminates grease and other particles that reduce friction and thus interfere with traction.

The device was developed by Tetronics Research and Development of Faringdon, England. Field testing is expected to start in January 1970 to ascertain that the device is compatible with railroad and mass transit environments and operating procedures.

SHIPPING

Maintenance on the high seas

Ship repairmen will soon be making house calls to ships at sea instead of having the ship come to port. A team of 18 boilermakers, electricians, fitters and welders based at a Southhampton ship repair yard will be flown with their equipment by helicopter. The service will operate up to 170 miles out to sea and service ships approaching the English Channel from the Atlantic Ocean. Eventually the service will be expanded to a number of takeoff points so that ships anywhere in northern Europe can be served.

In a demonstration, a helicopter with a repair crew of four lifted and replaced 1.5 tons of equipment from a 54,000-ton ship.

INTERNAL COMBUSTION

Novel rotary engine developed

An experimental rotary-cylinder engine has been built that promises better operating efficiency than its conventional two-stroke counterpart. Built by the Mercer Engineering Company of Yorkshire, England, the rotary-cylinder engine is constructed with two opposable, double-ended pistons but without any crankshaft or connecting rods.

Heart of the liquid-cooled, 50-cubic-centimeter experimental model is a rectangular, square-section cylinder block bored straight through and centrally pivoted on two hollow shafts. The pistons share a common combustion chamber formed between their heads. They fire outward against rollers, which thrust against a cam device to rotate the block.

The engine differs from other rotary engines in that the compressed incoming gas is transferred into the combustion chamber through the piston. In standard rotary engines, the gas comes into the chamber as the pistons rotate, uncovering inlet ports.