PHYSICS-NAVIGATION

Electronic Navigator Is Adaptation of Radar

➤ AN ELECTRONIC NAVIGATOR for ocean, lake and river ships, that will detect by radar above-water obstacles such as other vessels, icebergs, land, lighthouses and buoys, is under test on shipboard by the U. S. Maritime Commission, it is now announced. It will detect these obstacles through darkness, fog and storm at distances up to 30 miles, depending on the size of the object.

The tests are being made on the SS American Mariner, training ship of the WSA's Maritime Service training program. Additional sets will be placed soon on other vessels. When materials are available the equipment will be obtainable by commercial shipping, both on inland waters and on the sea.

The device operates on the radar principle of radio waves which are reflected from objects and are measured to give true bearing and distances of the object from the point of sending. It has a rotating antenna, located on top deck of the vessel, sending out powerful radio micro-waves capable of penetrating fog or other atmospheric conditions. If these pulses hit an object, some of them are reflected back to the rotating antenna, which also contains a receiving antenna.

The apparatus is an adaptation of radar equipment that has served a valuable war purpose. The set under test was developed by the General Electric Company laboratories at Schenectady, N. Y.

Science News Letter, August 25, 1945

ENGINEERING

"Canning" Uranium Slugs Difficult Bomb Problem

➤ HOME CANNERS preserving the harvest of their Victory Gardens who may have an occasional failure don't know what real canning problems are. Learning how to "can" uranium slugs was one of the most difficult problems encountered in making atomic bombs, Dr. H. D. Smyth, of Princeton University and consultant on the project, relates in the technical report released by the War Department. The failure of a single "can" might have caused an entire operating unit to be shut down.

The most efficient way of cooling the uranium would have been to let the water flow in direct contact with the radioactive metal in which the heat was being produced. This seemed out of the question, however, since uranium would react chemically with the water. It was feared direct contact between the two would put a dangerous amount of radioactive material into solution and probably even disintegrate the uranium slugs.

No one who lived through the period of design and construction of the Hanford, Wash., plant is likely to forget the problem of sealing the uranium slugs in protective metal jackets, states Dr. Smyth. The state of the "canning problem" could be roughly estimated by the atmosphere of gloom or joy to be found around the laboratory.

A sheath had to be found that would protect uranium from water corrosion, keep fission products out of the water, transmit heat from the uranium to the water and not absorb too many neutrons.

Metal jackets or cans of thin aluminum were feasible from the nuclear point of view and were chosen early as the most likely solution of the problem, but alternative ideas continued to be explored. Both the problem of getting a uniform heat-conducting bond between the uranium and the surrounding aluminum, and that of effecting a gas-tight closure for the can proved troublesome.

Even up to a few weeks before it was time to load the uranium slugs into the pile there was no certainty that any of the processes under development would be satisfactory. A final minor but apparently important modification in the canning process was adopted in October, 1944, and up to the time of the report there had been no canning failures.

Science News Letter, August 25, 1945

INVENTION

New Milling Method Makes Aseptic Flour

➤ FROM an inventor in France, in pre-liberation days, came the application that eventuated in patent 2,379,677, on a milling method which the inventor, Voldemar Borsakovsky, claims will produce a flour so nearly free of bacterial life that its keeping qualities are better.

The wheat is first moistened, then tumbled in a rotor having abrasive inner walls, to "peel" off its indigestible cellulose outer coat. After the loosened bran and abrasive particles have been separated out, the grain is sterilized with a germ-killing gas, and finally milled in an atmosphere of a non-toxic gas.

Because rights in patents issued to citizens of formerly enemy-occupied countries have not yet been unscrambled, this patent is vested in the Alien Property Custodian.

Science News Letter, August 25, 1945

IN SCIEN

ELECTRONICS

Lighthouse Tube Used To Make Radar Effective

See Front Cover

➤ THE FAMOUS lighthouse tube, known to engineers as a megatron tube, in which the grid, anode and cathode are of unconventional design (*See SNL,* August 19, 1944), was developed for use in radar, it is now revealed.

As frequencies in use became higher and wavelengths shorter, electronic tubes to produce the radio signals had to be smaller and the ability of the conventional type of tube to produce the necessary radio power became less. The new lighthouse tubes shown on the front cover of this SCIENCE NEWS LETTER are extremely compact and yet they have a high power output. The larger tube on the left is a transmitting tube; the others are receiving tubes.

Now that the war is over, it is anticipated that these tubes will be useful in television and FM systems as well as navigation aids.

Science News Letter, August 25, 1945

INVENTION

Separate Sterilizing For Cans and Contents

➤ SOMETHING new in canning methods for fruit and vegetable juices and other liquids is offered in patent 2,380,964, obtained by R. H. C. Mueller of Oak Park, Ill. In conventional canning practice, the cans are first filled and sealed, then placed in steam sterilizers for processing. This offers some disadvantages, especially when the juices are liable to injury by the prolonged high temperature necessary.

In Mr. Mueller's process, the cans are sealed empty, then cooled by passing quickly through a chilling bath, then conveyed to the filling machine. In the meantime, the juice or other liquid has been sterilized in bulk and is awaiting the cans in a reservoir, under a sterile atmosphere.

A hole is punched in the end of each can, the sterile liquid is forced in under pressure and the opening is quickly sealed while the can is still in the sterile atmosphere.

Science News Letter, August 25, 1945

CE FIELDS

CHEMISTRY

Permanents Achieved By Splitting Molecules

➤ THE TRANSFORMATION of straight, lank hair on a woman's head into soft curls and ringlets by the cold wave method of permanent waving turns out to be another triumph of modern chemistry.

Even the cracking of petroleum for the production of ethylene gas is involved, since substances synthesized from this may be used in the process. Details of the chemistry of cold waving are reported in *The Technology Review* (June), edited at the Massachusetts Institute of Technology.

Briefly, the cold wave method consists in applying chemicals which split certain protein molecules in hair. Among the chemicals that may be used at this stage are sodium sulfide, ammonium thioglycollate, and beta-hydroxyethylmercaptane, synthetic from ethylene gas. The unpleasant odors from these are camouflaged by perfumes.

The atoms of the split molecules are pulled into another pattern by the winding process familiar to those who give and get permanents. Then other chemicals are applied to recombine the atoms. Your hairdresser may refer to this last step as the "neutralizing" process. Chemically, it is an oxidizing process.

Science News Letter, August 25, 1945

PHYSICS

Defense Planned Against Radioactive Poison Gas

➤ DISCLOSURE of a hair-raising war danger now happily passed but which must have given a handful of scientists and top government officials many sleepless nights appears in technical information about the atomic bomb released by the War Department.

The possibility that the Nazis might make a surprise use of radioactive poisons in a "particularly vicious form of poison gas" was considered early in the American scientists' atom splitting experiments. Defensive measures were planned.

Radioactive poisons resulting from atom splitting were first mentioned in May, 1940, in a report of a National Academy of Sciences committee. They develop as the chain reaction of uranium splitting proceeds and have, in practice, turned out to be "the most troublesome feature of a reacting pile." They differ chemically from uranium, so it was believed it might be possible to extract them and use them "like a particularly vicious form of poison gas."

This idea was developed in a report written by Dr. E. Wigner and Dr. H. D. Smyth of Princeton University on Dec. 10, 1941, the day before we declared war on Germany. These scientists concluded that the fission, or atom-split, products "produced in one day's run of a 100,000 kilowatt chain-reacting pile might be sufficient to make a large area uninhabitable."

The use of these poisons was not recommended by the scientists, nor has it been seriously proposed since by the responsible authorities. The scientists and authorities, however, knew that the Germans were also racing to produce atomic power for military use.

"Serious consideration was given," the report states, "to the possibility that the Germans might make surprise use of radioactive poisons and defensive measures were planned."

Radioactive xenon, radioactive iodine and some 28 other chemical elements, all highly radioactive, are produced when uranium is split by fission. The safe disposal of these poisonous gases, so as to avoid endangering the territory surrounding the uranium-splitting plants, was a troublesome problem. The scientists were able to solve this as well as to plan for defense against possible use by the enemy of radioactive poisons produced by uranium fission.

Science News Letter, August 25, 1945

ENGINEERING

Glass-to-Steel Fusing Makes Airtight Seals

➤ GLASS-TO-STEEL fusing, to make a permanent airtight seal for metal electron tubes, is now possible through a method developed by engineers of the tube division of the Radio Corporation of America. It permits the use of a staple metal for the glass-to-metal seal in place of special alloys.

The new method depends upon the control of processing so as to secure good "wetting" of the steel by the glass. Also it incorporates a mechanical design which provides compression strains at the glass-metal boundary, thus compensating for the difference in expansion of the metals.

Science News Letter, August 25, 1945

RADIO

Television Broadcasting From the Sky to Be Tested

➤ TELEVISION broadcasting from stations in the sky six miles above the earth, in airplanes slowly cruising in circles, will be tested as soon as permits and equipment can be obtained, it is just announced by the Westinghouse Electric Corporation. Initial flight tests of the system, known as Westinghouse Stratovision, are expected to be made this fall.

The system would employ a low-powered ground transmitter to send television, and frequency modulation broadcast waves, to a specially designed high-altitude plane circling overhead. The plane would be equipped with receivers and transmitters for re-broadcasting the programs back to the earth.

The advantages to be gained by this television broadcasting from the stratosphere are wide coverage and relatively low cost over other systems proposed. Television and FM waves travel in a straight line and for all practical purposes, according to Walter Evans of Westinghouse, stop at the horizon. This means, he says, that television broadcasts from the highest practical tower erected on the ground cannot be received much more than 50 miles away.

"The Stratovision system," he explains, "simply puts the antenna and transmitter in an airplane flying in lazy circles 30,000 feet above the earth, out of sight of human eyes. The shortwaves sent out from this airborne antenna would blanket the earth's surface like a great inverted ice cream cone, covering an area 422 miles across or equal to the combined area of New York, Pennsylvania and New Jersey."

Eight such Stratovision planes properly positioned would give television and FM coverage from coast to coast.

"To provide comparable service by ground installations," Mr. Evans declares, "would require approximately 100 costly relay towers and hundreds of transmitters; or a coast-to-coast coaxial cable network which is estimated to cost at least $100,000,000."

The addition of six more planes in the right places would provide Stratovision coverage for 51% of the nation's area and 78% of its population.

A special slow-speed plane, almost as large as the B-29, has been designed for the stratovision system by the Glenn L. Martin Company of Baltimore.

Science News Letter, August 25, 1945