

### HARD TO HIT

*This new type of cargo ship, the Sea Otter II, is designed to elude submarines. Loaded, she sits close to the surface of the water—only 10 feet above and 11 feet below water line. A torpedo must travel at a depth greater than 11 feet to escape wave action.*

Frequency modulated radio relay stations were successfully used.

A coaxial cable with an ultimate capacity of 480 conversations was put in service between Stevens Point, Wis., and Minneapolis, and an 800-mile television transmission was demonstrated through this cable.

Toll calls were made by dialling the number wanted in certain distant cities.

A new high-fidelity telephone circuit for radio programs that will transmit sound vibrations up to 15,000 per second was demonstrated.

Sound control in the theater was demonstrated by which voices and music emanate from space, humans speak with animal voices and sounds are made as desired.

Copper-plating of permanent magnets used in electrical meters was shown to shield them from demagnetizing effects.

New standards for abbreviations, eliminating periods and spaces, were adopted, for example: rpm for revolutions per minute, psi for pounds per square inch, 95 F for 95 degrees of temperature Fahrenheit.

Many plastics and other substitute materials used in automobiles and other machines as a result of the defense emergency gave promise of supplanting the older materials permanently because they are better.

Powder metallurgy, making metal parts from powdered metal under heat and pressure, came into wider use.

Static electrical charges up to 40,000 volts were demonstrated on running rubber-tired motor vehicles.

Generation of electrical power began from Columbia River water impounded by Grand Coulee Dam, Wash., mightiest man-made masonry structure.

A new record for low coal consumption per kilowatt-hour for steam-electric power plants was established.

The surface of steel was hardened by a new method using synthetic urea.

Manufacturing industries spent nearly \$120,000,000, on research during the year, according to a survey.

Dr. Edwin H. Armstrong, Columbia University, was awarded the gold Franklin Medal of the Franklin Institute, for his achievements in radio, including invention of frequency modulated radio.

### MATHEMATICS

## No Sure Fire Way To Solve All Arithmetic Problems

It was proved that one can never find a sure-fire way of solving all arithmetic problems; in other words, no matter how smart we get, there will still be arithmetic problems which we cannot solve.

It was proved that every whole number is the sum of not more than 73 sixth powers of whole numbers; this is the best possible result, since it takes exactly 73 sixth powers to add up to 703.

New arithmetic properties of the generalized Bernoulli numbers were found.

New methods were discovered by means of which at least 640 million diabolic magic squares of order seven can be constructed, in addition to the 40 million which can be constructed by older methods.

The significant connection recently discovered between finite groups of prime power order and corresponding Lie algebras over a field of characteristic  $p$  was energetically developed.

A proof was given for the famous conjecture of Minkowski asserting that two quadratic forms with integral coefficients will be semi-equivalent if they are locally equivalent at every ( $p$ -adic) prime divisor.

The general theory of ideals and rings of continuous functions was considerably developed in several ways, with the proof of various representation theorems and a new proof of Wiener's theorem on the reciprocal of an absolutely convergent trigonometric series.

An important question in algebraic geometry was answered by the development of a method for smoothing out the irregularities of an algebraic structure of three dimensions.

Information was obtained regarding the structure of those subsets of a space which are unchanged by the operations of a group of transformations on the space.

There were developed numerous properties and applications of the newly-invented "fibre-bundles," figures which can be cut up into smaller pieces in certain systematic ways.

Cauchy's classical formula, expressing a function of a complex variable in terms of an integral, was significantly extended.

A generalization of the celebrated Problem of Plateau was formulated and solved, the problem in which it is required to prove the existence of a surface having a prescribed boundary and a minimum area with respect to all surfaces with this boundary.

A solution was found for the difficult inverse problem of the calculus of variations, the problem of finding conditions under which a given family of curves in space can be regarded as the family of extremals arising from minimizing an integral.

A new system of postulates for the theory of probability was formulated, based on Boolean algebra.

Problems connected with the bending and buckling of elastic plates were studied, and solutions obtained for various special cases.

### MEDICAL SCIENCES

## Bread Given Vitamin for Defense of Your Health

Standards for "enriched" white flour were announced by the U. S. Food, Drug and Cosmetic Administration, to become effective Jan. 1, 1942, and production of this flour and of "enriched" bread made with such flour, or with high vitamin yeast or with ordinary flour plus added amounts of nicotinic acid, thiamin and iron was started.

A scientific yardstick for planning an adequate daily diet was announced at the National Nutrition Conference for Defense called by President Roosevelt.

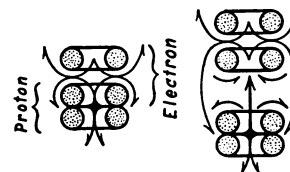
"Cure" of gray hair in humans by daily doses of a member of the vitamin B complex, para-aminobenzoic acid, was announced in a report of more than 300 cases, believed to be the first scientific announcement of cure of gray hair in humans.

Influenza A virus was photographed, for the first time, with the aid of the electron microscope which showed it to be one of the smallest disease-causing substances yet isolated, a spherical particle 11 millimicrons in diameter.

Prospects for control of influenza were improved by development of a new relatively quick test for influenza virus-neutralizing antibodies, by success in protecting against influenza A 50% of several thousand persons in six institutions by influenza A vaccine given six months before an epidemic and by development of a new vaccine against influenza A which proved even more effective in mouse trials.

First announcement of sulfadiazine spray treatment of burns showed that it promoted healing of burns more rapidly than any other method of treatment, reduced infection to less

### ESSAYS ON THE NEW VORTEX ATOM



(Neutron and Hydrogen Atom)

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