

U. S. Owes Helium Monopoly to Science

By Thomas M. Beck

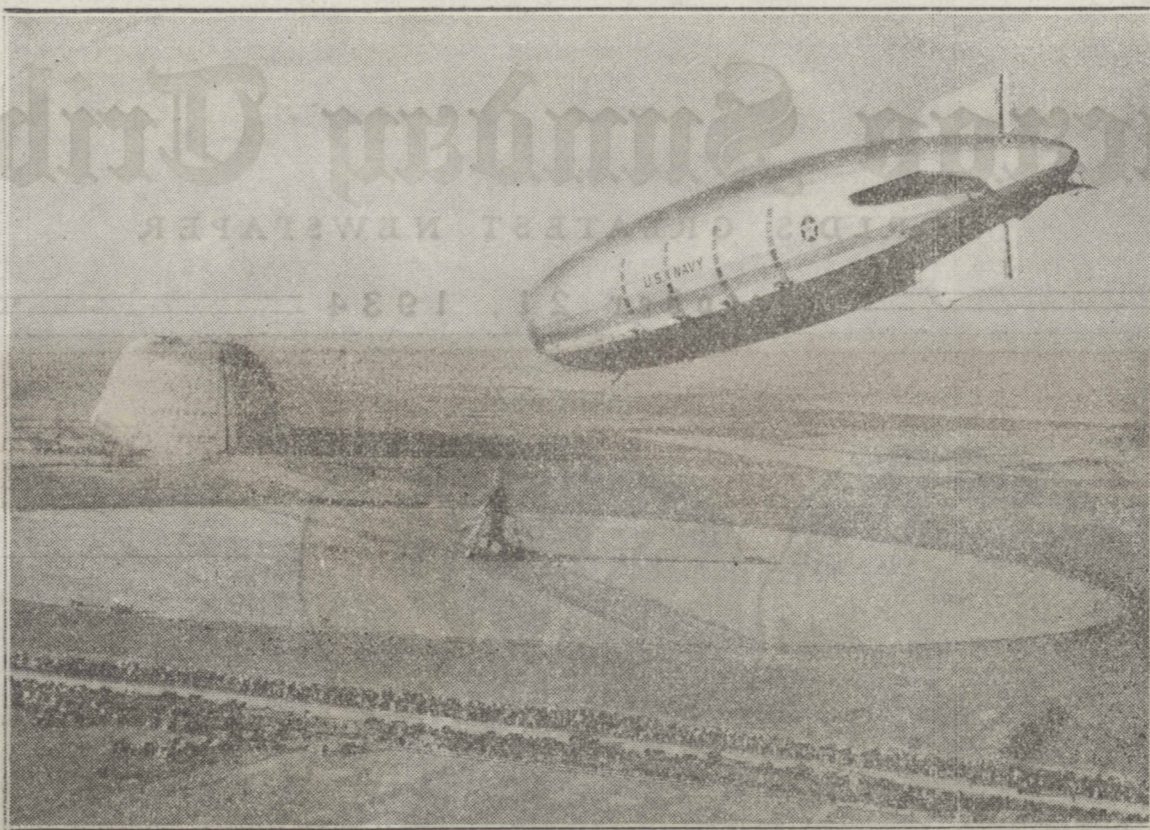
MOST of the chemicals used in modern industry owe their usefulness to their chemical reactivity; that is, their ability to undergo certain rather profound and permanent changes with the formation of new substances. However, there are on the market these days certain gases that are completely devoid of any sign of reactivity and are as eternally changeless as the Rock of Ages. Yet, in spite of this unpromising inertness, at least two of them have found important applications.

One of these gases, and perhaps the most useful one, is helium. If you were to see a bottle of helium you would be most highly unimpressed. It has no color, taste, nor smell. It does not burn nor support combustion. In fact, it does not react with anything, even at the highest temperatures obtainable. It has been liquefied, but only at a temperature much lower than is required for any other gas. It is virtually insoluble in all liquids. It even comes rather close to having no weight. In short, it bears a distinct resemblance to an absolute void. It lacks even the rather spirited personality of a vacuum.

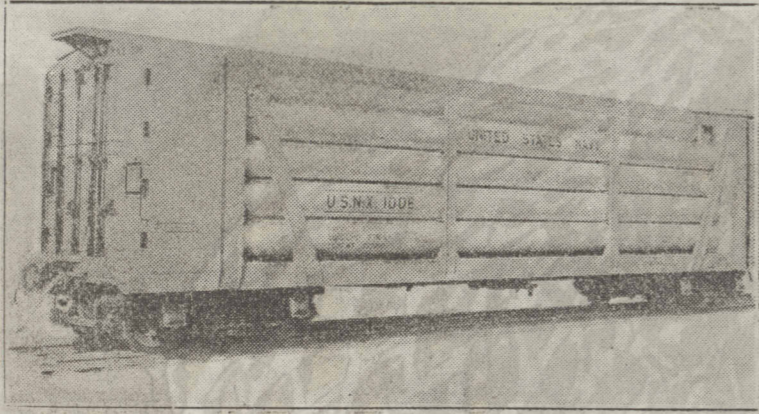
Yet its usefulness lies in two of the above mentioned properties; that it does not weigh much, and that it will not burn. In this country it has supplanted hydrogen as the lifting medium for airships. Hydrogen is the lightest substance known, and it is therefore the most efficient of gases for aeronautic

cial equipment and a different kind of navigation for helium filled ships. A hydrogen filled balloon may be made to descend by the simple expedient of releasing some of the gas, but helium cannot be thrown away in this manner. A helium filled ship must be driven toward the ground, much after the manner of a ship sailing into the wind. Furthermore, the burning of motor fuel presents a problem. As the fuel is consumed, the ship becomes lighter. Since burning oil produces, roughly, its own weight in water vapor the exhaust fumes on a helium filled ship are passed through an arrangement that condenses this vapor; the water then is stored as ballast.

One of the most interesting things about helium is the fact that it was discovered on the sun long before it was found to exist on the earth. Perhaps a little explanation is in order to show how this is possible. When any element is rather vio-



The giant dirigible Macon of the United States Navy. The huge gas bags of this airship are filled with non-explosive helium, the world supply of which is owned by the United States. (Acme photo.)



Tank car, designed especially for transporting helium gas for the United States Navy from the production plant in Texas.

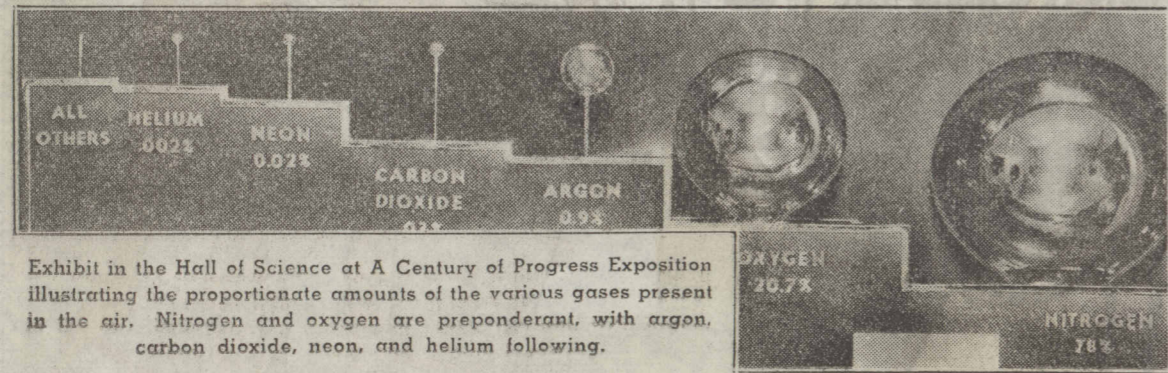


Exhibit in the Hall of Science at A Century of Progress Exposition illustrating the proportionate amounts of the various gases present in the air. Nitrogen and oxygen are preponderant, with argon, carbon dioxide, neon, and helium following.

purposes, but unfortunately it has the serious defect of being almost as explosive as gasoline vapor. Helium is perfectly safe in this respect. And while helium is twice as heavy as hydrogen, it does not follow that it is only half as good as a lifting agent. The buoyancy of a gas does not depend upon its weight, but rather upon the difference between its density and that of air. For example, a cubic foot of air weighs about 1.18 ounces, while one of hydrogen weighs .08 ounces, and one of helium weighs .16 ounces. Subtracting these latter two values from that for air, we find that a cubic foot of hydrogen can lift 1.10 ounces, while one of helium can lift 1.02 ounces, so that helium, although twice as heavy as hydrogen, is about 93 per cent as buoyant.

The main objection to the use of helium for this purpose is its cost. This problem makes necessary spe-

cially treated by certain agencies, such as high temperature or electrical energy, it gives off light. Such light, when passed through a prism, does not give a continuous band like a rainbow, but rather a series of lines of different color. The lines of any element are different from those given off by any other, and thus provide a convenient method of finger printing the various elements. Consequently when Janssen and Lockyer, in 1868, discovered certain lines in sunlight that did not correspond to those of any known substance, they correctly announced the discovery of a new element, which they named helium, from the Greek word "helios," meaning sun.

For about thirty years after this, helium remained merely an astronomical curiosity. Then, in 1895, Rayleigh and Ramsay discovered it on the earth, as a gaseous constituent of a certain rare mineral.

Shortly afterward these same two men detected it in air, where it is present in small quantities. But it remained too rare and expensive for any practical use until 1906, when Cady discovered its presence in certain natural gases in Kansas.

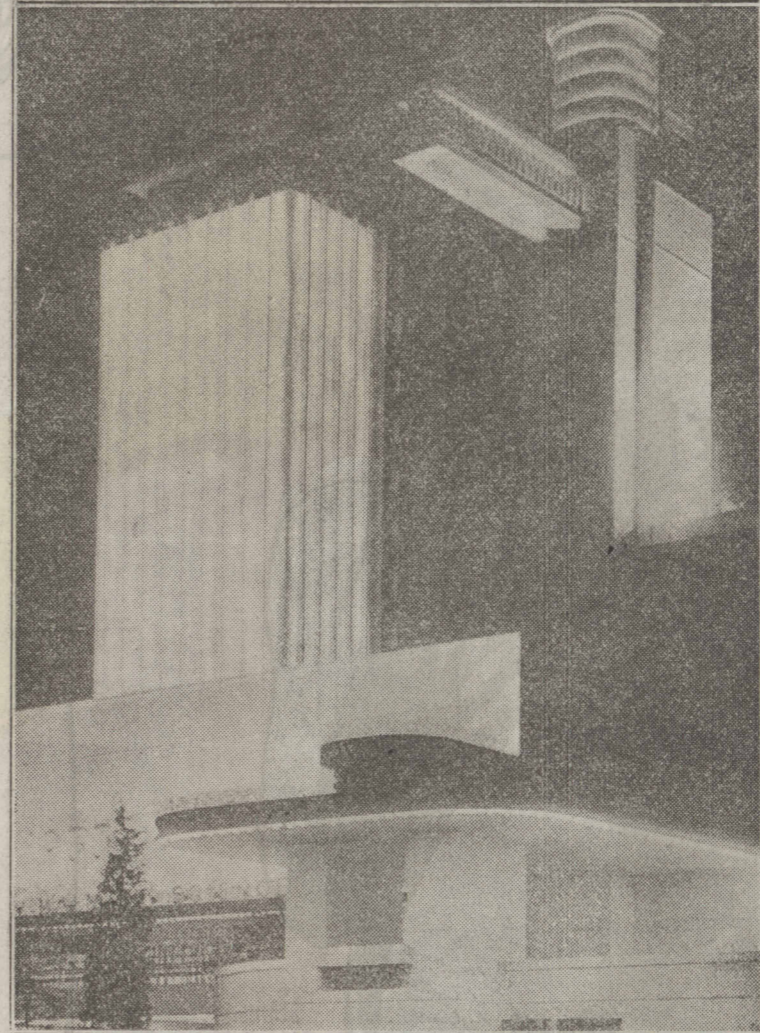
At present, the sole commercial source of helium is natural gas. But only a few natural gases contain enough of it to be worth while exploiting. In fact, the United States has a complete monopoly on the stuff, and since it is a war material of possibly limited supply, its export is forbidden; so, for the present, the rest of the world must get along without it. And there is not much of it present in even the best sources; a natural gas containing only one or two per cent of helium is considered a very good raw material.

Since helium does not react with anything and is so hard to liquefy, the engineers do not try to extract

this 2 per cent directly from the rest of the gas. Instead, by various absorptions and liquefactions, they remove the 98 per cent of assorted impurities, leaving the pure helium. At the government helium plant at Amarillo, Texas, they are so efficient at this that helium has fallen from its pre-war price of about a dollar a cubic inch to its present cost of a few cents a cubic foot.

From a chemist's viewpoint, helium is not unique. In the community of 92 elements it has several brothers, which bear the delightful names of neon, argon, krypton, and xenon. These are all

gases, considerably heavier than helium, but all showing the family trait of being completely inert. Together with helium, they make up about 1 per cent of the total volume of air. Their individual proportions vary from that of argon, which makes up nine-tenths of one per cent, to that of xenon, which is present to the extent of only one part in ten million. These gases may be obtained pure by the careful distillation of liquid air. Although this is a rather expensive method, three of these gases, neon, argon, and krypton, are now available commercially.



Tower of the Hall of Science at A Century of Progress Exposition illuminated by neon light tubes.



Wreckage of the giant British dirigible R-101, which crashed and exploded at Beauvais, France. It was filled with hydrogen gas.

The use of neon is visually known to all except the blind. It so happens that when this gas is excited by means of an electric spark, it gives off a brilliant red light. While neon is quite costly, its use is made possible by the fact that not much of it is needed in a neon sign. In fact, the glass tubes of these signs contain almost a complete vacuum; but the minute amount of gas pres-

ent happens to be neon, which is sufficient to do the work. Krypton is also used in signs. Its light is of a delicate pastel shade which does not seem to have achieved the popularity of the more spectacular neon light. The only sad note is the fact that argon, which probably is the cheapest of the three is so far a completely useless material.

Scientific Queries Answered

Mr. Beck will be glad to answer questions of scientific nature. Address Thomas M. Beck, Graphic Section, Chicago Tribune. For personal reply, inclose stamped, addressed envelope.

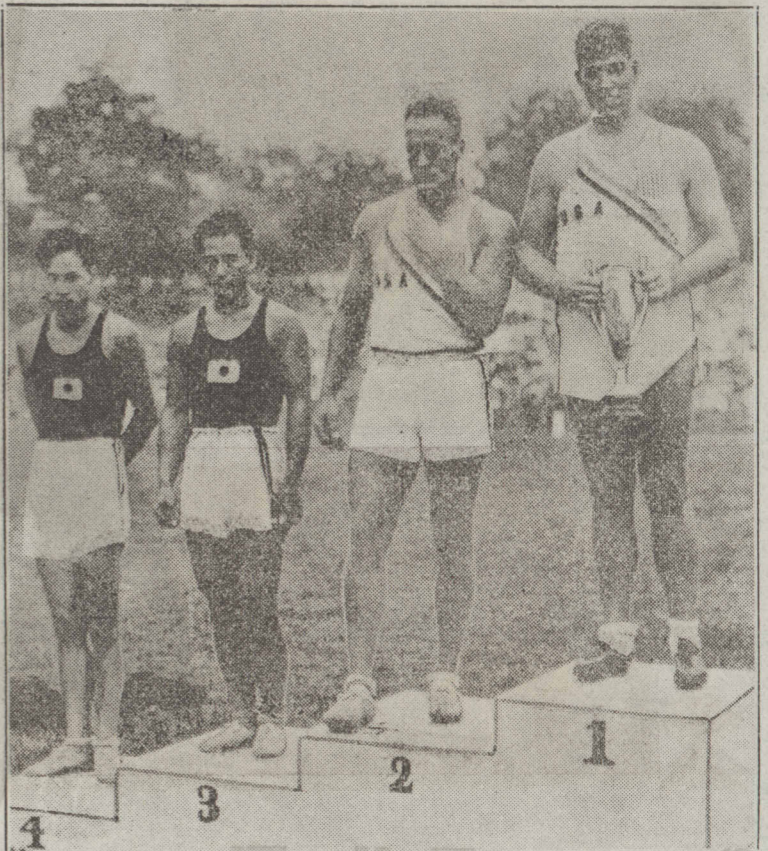
Someone was telling me that water can be cooled nine degrees below its freezing point without freezing. Is this possible?—J. F. O. Dayton, O.

Pure water, or any other liquid, for that matter, may be cooled an indefinite number of degrees below its freezing point and still remain liquid if it is cooled slowly and handled gently. Such a liquid is known as supercooled. It is an unstable form, and if it is shaken or touched with a crystal of its solid form it rapidly freezes.

What is cellophane?—J. A. H. Chicago.

Cellophane is prepared from cellulose, the fibrous material of most plants, which is available chiefly in the form of cotton or wood pulp. The cellulose is converted into a soluble form by chemical treatment, and then, while in solution, is forced through slits to form sheets of cellophane. The material is then given a waterproof coating. Cellophane is much the same as rayon, except that it is molded into sheets instead of fibers.

East-West Comparison



(Associated Press photo.)

WHEN east meets west in an athletic meet, there is a vast difference in the statures of the opposing competitors. This picture shows members of American and Japanese teams which recently competed at the Meiji Shrine stadium. The Americans won.

Kidney Acidity Curbed Quickly This Easy Way

Doctors Praise Cystex—Works in 15 Minutes

Cleans Out Acids and Poisons—Purifies Blood—Brings New Energy in 48 Hours.

There are 9 million tiny, delicate tubes or filters in your kidneys which must work every minute of the night and day cleaning out acids, poisons, and wastes from your blood. If your kidneys or bladder do not function right, your body gradually becomes poisoned, you feel old and worn-out before your time, and may suffer from any of these energy-killing symptoms: Getting Up Nights, Loss of Vigor, Leg Pains, Nervousness, Lumbago, Swollen Joints, Rheumatic Pains, Dizziness, Dark Circles Under Eyes, Headaches, Frequent Colds, Burning, Smarting, Itching, and Acidity.

But you need not suffer another day from poorly functioning kidneys or bladder without the benefits of a Doctor's special prescription called Cystex (pronounced Siss-tex).

Dr. T. J. Rastelli, famous Doctor, Surgeon and Scientist of London, says: "Cystex is one of the finest remedies I have ever known in my medical practice. Any doctor will recommend it for its definite benefits in the treatment of many functional kidney and bladder disorders. It is safe and harmless."



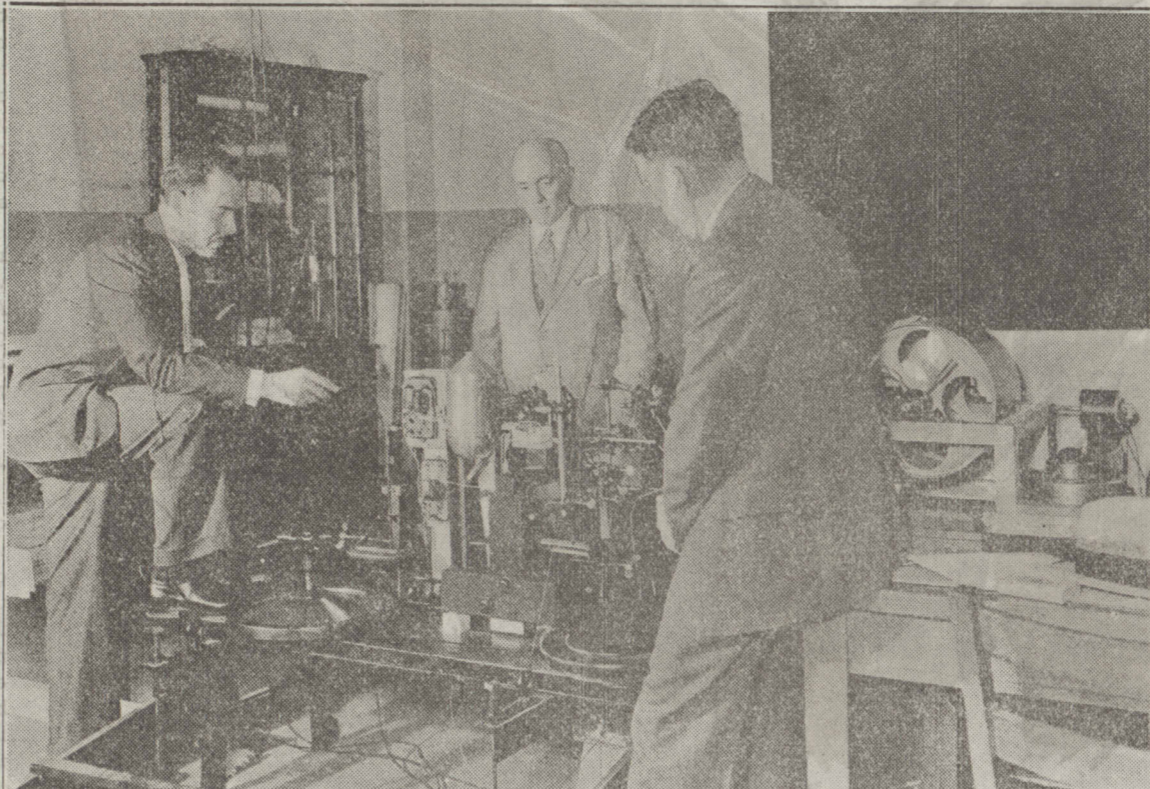
Dr. T. A. Ellis, who has used Cystex in his practice for many years with excellent results. Cystex hastens the passage of over-acid irritants thereby overcoming a frequent cause of burning, itching, getting up nights and frequent urination.

Because it is a special prescription for kidneys, Cystex starts work in 15 minutes to tone and soothe sore membranes and brings a new feeling of energy and vitality in 48 hours.

Dr. C. Z. Rendelle, well-known Physician and Medical Examiner of San Francisco, recently wrote: "Since the kidneys purify the blood, the poisons collect in these organs and must be promptly flushed from the system; otherwise, they re-enter the blood stream and create a toxic condition. I can truthfully commend the use of Cystex."

Because of its world-wide success, in even the most stubborn cases, the Doctor's prescription called Cystex is offered to sufferers from poorly functioning kidneys and bladder under the fair guarantee to fix you up to your Dr. C. Z. Rendelle complete satisfaction or your money back on return of empty package. Get Cystex from any druggist and try it under the money-back guarantee. See for yourself how much younger, stronger, and healthier you will feel by using this special prescription. Cystex must fix you up and do the work to your entire satisfaction in 8 days, or you get nothing under the money-back guarantee. Beware of substitutes and remember that the kidneys are endangered by drastic irritating drugs or neglect. Cystex is the only specially-prepared Doctor's prescription guaranteed for kidney dysfunctions. Tell your druggist you must have Cystex (pronounced Siss-tex). Look for it in the black and red striped package.

Creating Miniature Earthquakes



(Acme photo.)

METHODS of protecting public water supplies in earthquake zones are being studied at the laboratory of seismology in the department of civil engineering at the Massachusetts Institute of Technology, Cambridge, Mass. This picture shows officials of the laboratory studying the effects of seismic disturbances on elevated water tanks by means of miniature tanks and apparatus to simulate the destructive shrinking

of the earth. A miniature scale model of a 60,000 gallon water tank is shown in the center of the apparatus, which has sensitive devices for measuring the effects of shocks set up by the shaking table on which it stands. The men in the picture are (from left to right) Arthur C. Ruge, research seismologist; Commander N. H. Heck, official of the United States Coast and Geodetic survey, and A. L. Brown.

A Hospital for Birds



(Acme photo.)

WHEN a bird in Portland, Ore., breaks a leg, twists a wing, or suffers any other ailment, Miss Mallina Routledge, ornithologist, is ready at her bird hospital to mend the damage. Last year she treated 1,500 birds.