

PHYSICS

Thick Concrete Walls Protect Against X-Rays

THICK concrete walls are being used at the Rock Island Arsenal instead of lead sheeting to protect workers from X-rays generated in a 300,000 volt tube used for studying possible flaws in welding repairs.

A. C. Hanson, M. P. Christensen and R. J. H. Cochran, technicians from the Rock Island Arsenal Laboratories, reported to the meeting of The Electrochemical Society in Cincinnati that a wall of concrete two feet thick corresponded to over an inch of lead in X-ray stopping power. Adequate protection, they found, was provided by such a wall.

The saving in cost over lead was considerable. The lead alone would have cost \$5,000 and labor costs to install it another \$2,000. The extra-thick concrete wall cost only \$1,000 more than the ordinary eight-inch wall which would have been used anyway.

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MEDICINE-AVIATION

Aeroneurosis, Disease of Airplane Pilots, Reported

NOW comes aeroneurosis, a new disease occurring only in airplane pilots.

Dr. Harry G. Armstrong, captain in the U. S. Army Medical Corps, stationed at Dayton, Ohio, describes this special form of functional nervous disorder in a long report. (*Journal, American Medical Association, April 18.*) He reports 18 cases of the disease in the 163 pilots who have been under observation for three years.

Unfortunately the disease is likely to attack the best men in the flying service. Usually a pilot has been flying ten or fifteen years before he develops aeroneurosis. The chief cause is profound emotional stress resulting from the accident hazards of flying and from economic and social insecurity. Possibly there is destruction of nerve tissue.

Chief among the symptoms of aeroneurosis are irritability, stomach distress, sleeplessness, ceaseless activity and depletion of the higher mental centers. It takes more than a doctor to treat the disorder properly, in Dr. Armstrong's opinion. The best medicine, he thinks, is suitable compensation, "either ego-stimulating or monetary."

Among the 163 men Dr. Armstrong has been studying, ten died—one from natural causes and the other nine in

airplane accidents. The hazard per hour while they were flying was 216 times the hazard per hour when they were not flying, he found.

Early in a pilot's service he begins to realize that his career is in jeopardy, Dr. Armstrong explains. Every minor accident or disease may mean he cannot pass the semi-annual physical examination. This brings emotional stress.

The pilot reaches the peak of efficiency early in life. The man of 30 or 40 sees a lad of 20 outmaneuvering, outlasting and outdaring him. This deflates his ego, for it means that he soon will be grounded, losing face or caste and taking a large cut in salary.

Other stresses plague the pilot: The powerful instinct for self-preservation buried deep in the unconscious; the instinctive fear of falling and of loud noises, and the required concentration unsurpassed by any other occupation.

The Army doctor's principal recommendation is not medical. It is that the pilot who is grounded from flying but otherwise fit should be given a flying disability retirement and allowed to assume an executive or administrative ground position. He believes that this plan, in conjunction with adequate pay for the risks involved, would allow the majority of pilots to pass through their flying career free from aeroneurosis.

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RADIO-ASTRONOMY

Solar Eruptions Affect Radio Transmission

VIOLENT eruptions on the surface of the sun occur at the same time the new-found short wave radio fadeouts take place, Dr. J. H. Dellinger, National Bureau of Standards, told the joint meeting of the Institute of Radio Engineers and the International Scientific Radio Union in Washington, D. C. Dr. Dellinger is the discoverer of the fadeout phenomenon which, up to now, has been a baffling problem in certain short wave communication. It appears every 54 days.

The radio fadeouts occur on the sunny, or daytime side of the globe, but not on the night side. Solar eruptions—but not necessarily the familiar sunspots—now appear to occur simultaneously.

The inference, in the new discovery, is that the ultraviolet light emitted from the sun affects the radio reflecting layers of charged particles (the ionosphere) which are miles above the earth's surface.

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IN SCIENCE

MEDICINE

Champion Blood Donor Gave 98 Transfusions in Year

RAYMOND BRIEZ works in the public markets of Paris, but he also has a thriving business of his own. He engages in the manufacture of blood, and since he entered the business in 1924 he has sold 257 quarts.

The output of Briez's human factory—his own body—is enormous when one considers that it takes only 7½ quarts of blood to fill the blood vessels of an adult man. During 1935, Briez manufactured enough blood to supply himself and to give 98 transfusions. Each transfusion averaged 10 ounces.

The champion blood donor of Paris started his manufacturing business in a small way. In 1924 he gave blood for four transfusions. The next year his orders jumped to 38. In 1927 the number of transfusions supplied by him attained the astonishing figure of 94 and from that time until 1935 he averaged from 50 to 60 a year.

No ill effects have been noted, and Briez is always ready for another call, according to the Paris correspondent of *The Journal of the American Medical Association* (April 25).

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BIOLOGY

Support For Birth Control Method in Chimp Studies

SUPPORT for the birth control method known as the "safe period" or rhythm method was given incidentally by observations on chimpanzees reported to the National Academy of Sciences meeting by Dr. Robert M. Yerkes of Yale University's Laboratories of Comparative Psychobiology. In hundreds of chimp matings the beginnings of life occurred only during a period of about six days at approximately the middle of the feminine sexual cycle. Because the chimpanzee is very close to the human in physiological processes, Dr. Yerkes expects that research upon human reproduction will benefit from the studies upon these simian creatures.

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E FIELDS

PSYCHOLOGY

Brain Injuries Change Rats' Way of Learning

HOW injuries to the brain may interfere with learning is indicated by experiments with rats reported to the Midwestern Psychological Association meeting in Evanston, Ill., by Dr. I. Krechevsky, of the University of Chicago.

The manner in which learning takes place in the injured animals was the subject of the study rather than their ability to solve any given problem.

The injured animals tend to do the same thing over and over and to lack versatility or variety in their responses even though the injury may be a relatively minor one.

They also show a loss of ability to work out some general method of attack for a problem. According to an analysis of the normal learning process previously made by Drs. Krechevsky and E. C. Tolman, of the University of California, these two factors are all-important—first, the ability to hit upon some generalized mode of attack for the problem and second, a versatility or plasticity that will enable the individual to try first one possible solution and then another until the best answer is found.

Apparently, even slight injuries affect both these factors and the loss is in proportion to the size of the injury.

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GEOLOGY

Geology Knowledge Needed For Building Safe Dams

FLOOD destruction and peril, this spring as in many other past springs, were greatly increased by dams giving way under unprecedented loads of water. Yet their safety could have been assured, and the safety of dams now planned simply must be assured, by calling into council the bedrock knowledge of the geologist.

So contended Dr. Charles P. Berkey, professor of geology at Columbia University, speaking to the American Philosophical Society in Philadelphia.

"Experiences in connection with re-

cent destructive floods," said Dr. Berkey, "have re-emphasized the importance of the safety factor in large engineering structures. As usual, the destructiveness of recent floods was greatly increased by failure of dams, and consequent emptying of large reservoirs into already swollen streams.

"An occasional instance of this kind in past history has had tragic consequences, but out of the reaction has come marked improvement in the placing and treatment of such works. No longer are the shortcomings of human planning charged wholly against nature. Safe structures can be built if the natural physical conditions are accurately known and if the design and construction methods take full account of these conditions.

"Modern engineering structures have developed to larger and larger proportions, and as a consequence the question of public safety has become a vital element in their planning. In this field, the geologist, with knowledge of foundation conditions, is a large contributor."

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SEISMOLOGY

Earthquake Shakes Honduran Seacoast

A MODERATELY severe earthquake shook the northern coast of Honduras early on Monday morning, April 27, seismologists of the U. S. Coast and Geodetic Survey announced, after studying reports gathered from a number of seismological observatories by Science Service. The epicenter was located in approximately 16 degrees north latitude, 87 degrees west longitude, and the earthquake began at 1:30.8 a.m., eastern standard time. This location is not far from the Honduran port of La Ceiba.

Observatories reporting to Science Service were those of the Franklin Institute in Philadelphia, the University of Wisconsin, Georgetown University, Fordham University, Canisius College, and the stations of the U. S. Coast and Geodetic Survey at Chicago, Ill., and San Juan, P. R.

The North Pacific ocean southward from the Aleutian Islands was rocked by a submarine earthquake Thursday afternoon, April 23, at six hours and 14.4 minutes, eastern standard time, it was announced by the U. S. Coast and Geodetic Survey.

The epicenter of the shock was at latitude 48 degrees north and longitude 179 degrees west.

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AVIATION

Discovered New Type Of Airplane Vibration

A SEVERE type of vibration, of a kind hitherto unknown in airplanes, has been discovered in a fast, high-performance combat plane of the Nation's air forces. The cure for the vibrations—which "rattle the pilot's teeth"—has already been found and should result in improved pilot operation of the aerial fighting forces of the United States.

Dr. L. B. Tuckerman and Dr. Walter Ramberg of the National Bureau of Standards in Washington were the scientists who found, and cured, the fault. Before the meeting of the American Physical Society they told how they discovered it.

The two-blade propeller of the fighting plane, they indicated, sets up air impulses with a frequency of 3,200 per second. The wings of the airplane take up a vibration, due to air impulses, of just half as much—1,600 vibrations a second. The wings, in turn, set up vibrations in the airplane tail structure of 800 vibrations per second.

Vibrations between wing and tail, in the ratio of two to one, would be dangerous if they stayed exactly that. Actually the ratio is not quite two to one steadily, so that beat frequencies occur which sometimes cancel and at other times augment each other. It is the addition of the wing and tail vibrations which "rattle the pilot's teeth," said Dr. Tuckerman.

Two Changes

Two things cured the plane of its vibrations. The wing and tail surfaces were slightly altered so that the vibrations were less near the critical two to one ratio, and further, a three-blade instead of a two-blade propeller was installed.

The vibration discovery, said Dr. Tuckerman, probably is not a serious problem in a large airplane of the commercial transport type but seems to appear only in the tiny, powerful combat planes.

Solving the problem was of tangible importance, however, not because there was any particular danger of the airplane shaking itself apart but rather that the removal of the annoying vibration brought greater comfort to the pilot. And increased comfort means that the pilot can fly better, shoot better and do all his other flight tasks in an improved fashion.

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