

penicillin plus fever 80% effective, they report from six months studies at the Chicago Intensive Treatment Center.

The fever treatment does not cut down on the time required for penicillin treatment of syphilis. Neither does giving larger amounts of penicillin without fever prove more effective.

The 80% effective method consisted of an injection of sodium penicillin every three hours for 60 doses plus three sessions,

each three hours long, of artificial fever on alternate days beginning 23 hours after the first injection of penicillin.

The doctors reporting the study with Dr. Bundesen are: Drs. George X. Schwemlein, Kettering Foundation for Medical Research, Cincinnati; Theodore J. Bauer, U. S. Public Health Service; Robert M. Craig, Dayton, Ohio; and Jack Rodriguez, Chicago.

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## AERONAUTICS

## Cross-Wind Landing Gear

► LIGHT AIRPLANES, equipped with relatively new types of cross-wind landing gears, can take off and land across the wind as safely and with no more skill required than in ordinary into-the-wind operations, the Civil Aeronautics Administration revealed in a recent report.

This government agency initiated an investigation of the possibilities of cross-wind landing gears for airplanes in 1945. One objective is to save costs in airport construction. Modern ports at the present time must have sufficient runways to enable airplanes to be landed directly into the wind, or not more than 22.5 degrees from directly into the wind, for all winds in excess of four or 10 miles per hour. This means extensive tracts of land for airfields and much heavy expensive construction.

The report, entitled Cross-Wind Landing Gears, covers tests made with two light planes, a Fairchild PT-19 and the Piper J-3. Several other planes with cross-wind landing gears have also been tested and will be covered in a later report.

Basically this cross-wind landing gear consists of castered wheels with castering restraint. The idea is not new. The Bleriot

plane, which made the first flight across the English Channel, in 1910, was equipped with one type. An American patent was issued Bleriot in 1911 for his so-called undercarriage.

Also some early planes were equipped with the tricycle type undercarriage which incorporated main fixed wheels behind the center of gravity of the plane and a castered nose wheel. This might be termed a cross-wind landing gear.

Prior to World War I, the castered and tricycle type undercarriages had been almost universally discarded in favor of undercarriages having two fixed wheels ahead of the center of gravity and a castered or steerable tail-skid or V-wheel.

The present cross-wind landing gears were not designed by the government but by individual airplane manufacturers at the suggestion of the CAA. The two covered in the present report have been flown by some 200 pilots, none of whom gave an unfavorable report on either landing or take-off characteristics. Cross-wind landing gears for heavier planes, including transports, are expected soon.

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## ENGINEERING

## Home Heating Studied

► A SPECIAL BUILDING to study home heating stoves and furnaces now in operation, in London, has many unique features all designed to provide accuracy in the research activities. It is called a calorimeter building because calorimeter cabinets, in which individual heating appliances can be installed and tested, constitute its principal feature.

The building is a four-story brick structure occupying a ground area of about 3,000 square feet at Greenwich. Its four calorimeter cabinets, about the size of living rooms in small houses, are centrally mounted within larger rooms in which the temperature can be kept constant. The cabinets are designed so that heat from within passing through the walls, floor and ceiling is automatically measured.

The cabinets are of air-tight construction with specially balanced draft arrangements

to eliminate leakage and to enable the amount of incoming air to be measured. The total useful heat from the heating appliance can thereby be determined by direct measurement. It is also possible to measure separately radiant heat, warmed air from convection jackets, and heat to the boiler water.

These calorimeter chambers are on the ground floor. Above them are smoke-testing rooms. The chimneys from the cabinets pass through these upper rooms. They are equipped for smoke measurements. The rest of the building is occupied largely by laboratories and the equipment to keep the constant temperatures required surrounding the calorimeter cabinets. For summer-time use, and for appliances of high heat output, cooling is provided by a refrigerator system.

The calorimeter cabinets are constructed

of quarter-inch plywood panels, covered on both sides with copper sheeting divided into two by 1.5 foot sections. Differential thermocouples are embedded at the mid-points of each copper section, directly opposite each other on the inside and outside of the plywood panels. This permits the temperature difference across the walls, floor and ceiling to be measured and recorded electrically.

In order to measure the smoke in the smoke-testing rooms, a beam of light is sent through each flue through special windows for the purpose. The intensity of the smoke is measured by a photocell. Smoke samples can be taken from each flue for other tests by means of a smoke sampler which can be inserted into the flue and then removed.

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## PHYSICS

## "Superfluid" Is Neither Liquid, Solid Nor Gas

► A "SUPERFLUID" which leaks through the tiniest openings and apparently defies gravity by flowing uphill was described by a Massachusetts Institute of Technology scientist.

The "superfluid" is helium, the second lightest element, cooled to 457 degrees below zero Fahrenheit. At that temperature, within a degree of absolute zero, helium is neither a liquid like water, a gas like steam, nor a solid like ice. It is a fourth state of matter, called superfluid.

Prof. Laszlo Tisza, Hungarian physicist at M. I. T., describes the strange behavior of helium at very low temperatures in *Physics Today* (August), a publication of the American Institute of Physics.

Here are some of the startling properties of this superfluid:

It conducts heat better than any other known substance.

It leaks between two pieces of optically-ground glass pressed together.

Slightly heated, by a flashlight bulb, it squirts out of a tube to form a fountain eight inches high.

Part of it will creep up the side of a container.

Unlike any other known substance, it will not freeze at temperatures near absolute zero.

Prof. Tisza suggests that this fourth state of matter might also be called "quantum liquid," because it supports the quantum theory that molecules move at absolute zero. Classical theory held that all motion should cease at absolute zero.

Helium with an atomic weight of three instead of the usual four should, according to the laws of quantum physics, prove even more weird in its behavior. It may not form a liquid at all or may form a liquid with entirely strange properties. Attempts are being made to obtain rare helium three in large enough quantities to make experiments.

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