PHYSICS

Germanium Transmits Heat

Lenses of germanium which will transmit invisible heat rays have been developed. This promises spectacular improvement in infrared equipment.

➤ LENSES that will transmit invisible heat radiation, promising spectacularly improved infrared equipment for scientific and industrial use, can be made out of pure germanium and silicon metals as the result of researches made known to the American Physical Society at Chicago, Ill., by scientists from Purdue University.

Even though the metals are opaque to ordinary light and may be an inch thick, they transmit the infrared rays over a broad portion of their spectrum. Heretofore, rock salt and other materials softer than metal and attacked by moisture have been used for optical work with infrared radiation, which war applications showed was important for many uses.

The researches were done by a group of scientists headed by Dr. Karl Lark-Horovitz of the Purdue physics department and including K. W. Meissner, M. Becker and H. Y. Fan.

These researches are the outcome of electrical measurements on germanium alloys, which Dr. Lark-Horovitz and his colleagues in 1942 produced in such a way that it was possible to make them semiconducting either negatively or positively. Semiconductors with known and predictable properties were available then for the first time.

Investigation of the optical properties of these materials followed. Dr. Lark-Horovitz found that the material with high conductivity in the very far infrared has much higher reflectivity than the material of high resistance. It also has a smaller transmission of infrared radiation.

Pure germanium and silicon metals have been prepared which transmit 50% of the infrared "light" beyond 2 microns in wavelength. The loss that occurs is primarily due to the reflections and not to absorption.

Filters as well as lenses will be made of these stable materials. Grinding the metals to dimensions will be easier than with softer materials now used, and Dr. Lark-Horovitz predicts that the new development will result in a wider investigation and use of infrared phenomena in the future.

Science News Letter, December 10, 1949

AERONAUTICS-ENGINEERING

Dual Turbo-Prop Engine

➤ TWO horsepower per pound of weight is developed by a new gas turbine engine for airplanes unveiled in Washington, D. C. It is of the type known as the turbo-prop, and is claimed to be the most powerful propeller-type engine ever cleared for flight.

The engine was developed for the U. S. Navy by the Allison Division of General Motors, Indianapolis. This company builds the widely used J35 turbo-jet engine which has acquired fame in speedy military fighter planes. The new engine is a different affair. The jet from its combustion chambers operates a turbine which in turn operates conventional propellers.

Turbo-props are already in use. Britain claims leadership in their development and application. The new engine is said to produce more power for its size and weight than any similar engine in the world.

Fuel economy is another feature of the new Allison turbo-prop. In this it exceeds that of recently revealed foreign engines. It matches the fuel economy of the best American reciprocating engines and produces twice as much power for each pound of weight. This XT40, as it is designated, rounds out the military requirement for an engine of the gas turbine type which will transport payloads over long distances at high speeds and altitudes.

The XT40 is a completely new design which consists of two axial-flow gas turbine power sections driving a dual-rotation propeller through a common reduction gear. The power sections are connected together so that in effect they form a single unit. However, each power section may be operated independently.

This feature permits takeoff at full power with both power sections operating. In flight at reduced power for cruising speeds, maximum fuel economy can be obtained by cutting out one power section. The engine operates on the same fuel as used in ordinary turbo-jets. Four of them are now being installed in a Convair XP5Y flying boat for early flight.

Science News Letter, December 10, 1949

ENGINEERING

Windowless Textile Mills Aid Air-Conditioning

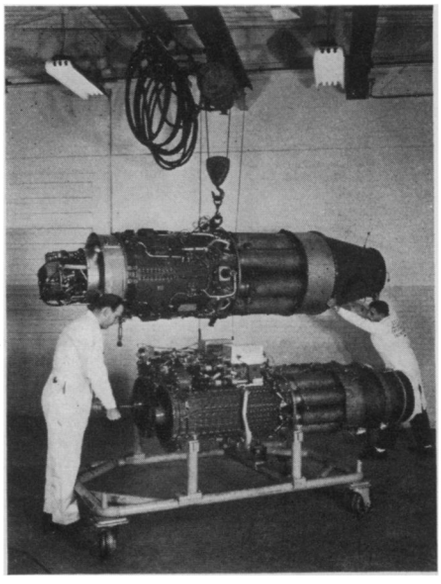
➤ MODERN textile mills should be built without windows and the roof should be insulated from sun heat, the American Society of Mechanical Engineers was told by P. L. Davidson, consulting engineer of Philadelphia. Both steps are required to maintain the air within at proper temperatures and humidity for good weaving, he indicated.

From a functional point of view, windows have only two excuses for existing, he stated. These are for light and ventilation or cooling. Daylight construction fails to give the light required as measured by today's standards, and the volume of air required for cooling can not be obtained through open windows.

Proper air-conditioning in a textile mill is a number one requirement to proper processing of fiber. Temperature and humidity must be controlled. The strength of cotton fiber, he said, is approximately 50% greater, the elasticity 20% greater, and the strength before rupture more than double at 75% relative humidity than at 40%. Beyond a relative humidity of 75% the strength falls off and the elasticity increases rapidly, so windows which interfere with temperatures by drafts and humidity by condensation should be eliminated.

Air cleanliness is another essential in a textile mill. Electrostatic filters were recommended by Mr. Davidson to replace present inadequate air washers and oil and cloth filters. In these newer filters, foreign matter in the air is given a static charge as it passes through them and is removed by electrical attraction to electrically charged plates.

Science News Letter, December 10, 1949



TURBO-PROP ENGINE — The small size of the new Allison XT40 turbo-prop engine is compared here (foreground) with the J35 turbo-jet engine. This engine will first be used in the Navy XP5Y Convair flying boat.