

**POWERFUL**

Surpassing all theoretical magnification limits, this microscope, designed by Drs. L. C. Graton and E. C. Dane, Jr., of Harvard University, make possible pictures of objects only 100 times as large as an atom. Motor-driven adjustments combine extreme fineness of control with speedy operation. The instrument weighs about a ton.

AVIATION

Gasoline-Fueled Motors May Be Banned From Airplanes

Diesel Engines Are Already Operating With Lower Fuel Consumption and Less Weight per Horsepower

"THE public will some day be no more required to fly in gasoline-fueled airplanes than in hydrogen-filled airships," government aviation scientists predicted at the meeting of the Society of Automotive Engineers in Detroit.

Ernest G. Whitney and Hampton H. Foster of the Langley Field laboratories of the National Advisory Committee for Aeronautics based this forecast of aviation's future on their study of Diesel engines for airplanes as a potential replacement for present gasoline-fueled motors. The almost negligible ability of Diesel fuels to burn except under the special high pressure and temperature conditions within a Diesel engine is the reason for their startling statement.

The use of super-gasolines of 100 octane, anti-knock rating will bring an improvement in gasoline-fueled airplanes, state the N.A.C.A. experts, but the Die-

sel engines used in German airplanes today are accomplishing what enthusiastic engineers are only predicting for gasoline motors five years hence.

"Well qualified authorities," they state, "predict for the 100 octane gasoline engine in the next five years specific fuel consumptions no better than 0.38 pound of fuel per brake horsepower hour and specific engine weights in a 2,000 horsepower unit no less than one pound per horsepower, whereas, the Junkers Jumo engines are operating today at specific fuel consumptions as low as 0.36; and a 2,000 horsepower engine development is in progress to weigh less than one pound per horsepower."

Forgetting about the technical terms used, the scientists are saying that five years from now gasoline fuel engine advocates predict a certain fuel consumption (0.38) with engines weighing 2,000

pounds that can create 2,000 horsepower. And they add that present-day Diesel engines are already operating with a lower fuel consumption (0.36) and that there is now being built a Diesel engine generating 2,000 horsepower which will weigh less than 2,000 pounds.

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PHYSICS

Powerful Microscope Makes Very Tiny Objects Visible

NEW inroads into the world of the small are envisioned now as a result of the construction at Harvard University of a microscope more than four times as powerful as any microscope ever built before.

Designed by two Harvard geologists, Drs. E. C. Dane, Jr., and L. C. Graton, Harvard's new instrument can magnify up to 50,000 diameters, enough to enlarge the period at the end of this sentence to the size of a two-story house. Its effective magnification—the limit at which no new details are shown—is 6,000 diameters, more than four times the previous limit.

So powerful is it in comparison to its smaller contemporaries that it far surpasses what was believed by scientists a year ago to be the theoretical limit of the usefulness of a microscope.

Much of this magnification is "empty," resembling that of a large photographic print produced from a miniature negative. Effective magnification, producing more visible detail as it increases, up to 6,000 diameters, is secured with this instrument.

Weighing about a ton, this microscope is mounted on the steel bed of a lathe, to secure stability. So fine are the focusing screws that it would take 25 minutes of rapidly turning them by hand to produce a motion of $1/400$ of an inch. Motors, with several speeds, do the turning more quickly.

Used chiefly for examining ores, this microscope catches images too small to be detected by ordinary instruments. Objects only 100 times as large as an atom can be seen and photographed.

With the theoretical limits already passed, there seems to be no reason why even greater magnifications, with lenses designed according to revised theories, cannot be made. Already, another of these microscopes, patterned after the original model, but slightly improved, has been installed by the Canadian Department of Mines, in Ottawa, to be used in the minute study of ores.

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