



PROF. LAY AND HIS BOX-CAR TEST AUTOMOBILE

ENGINEERING

## "Floating Body" Carries On Studies of Streamlining

**A** GALLON of gasoline will drive a properly streamlined automobile with suitable gear ratio twice as far as it carries the conventional car of today.

This is the opinion of Prof. W. E. Lay of the University of Michigan. He recently made what is probably the first direct measure of the air resistance of an automobile on the road under actual operating conditions and reported his discoveries to the Society of Automotive Engineers.

The power used by an automobile to make its way through the air had been determined by towing the test vehicle, by measuring its deceleration on a level road and by coasting down a uniform grade; but these methods, as well as those which employ models in wind tunnels, have many disadvantages.

Prof. Lay made a full-size "floating" body and mounted it on the chassis of a standard low-priced car. It was delicately set on ball bearings so that slight air pressure would shove it back. This force is restrained only by a piano wire and is measured by a draw bar dynamometer in the rear of the car.

This floating body, made for preliminary tests, is not streamlined, but rectangular in shape with rounded edges and corners.

Tests were run over a four-mile course of approximately level and smooth concrete. A mile of this road in

the middle of the course was accurately measured. Red lights were placed at each end of the measured mile. At one end of the course a miniature weather station was set up to measure the velocity and direction of the wind, and the temperature, pressure and humidity of the air. The best results on the runs were obtained from 3 to 7 a. m. because periods of calm air occur most frequently at that time.

Air resistance of the box-car automobile was found to vary from about six pounds at 15 miles per hour to about 140 pounds at 70 miles per hour. These results were compared with those obtained from an eighth size model tested in a wind tunnel. Prof. Lay said the work has been very difficult and that the technique of the test has been developed by tedious trial and error.

While the reduction of air resistance by streamlining effects notable fuel economies, Prof. Lay believes that full advantage cannot be obtained from streamlining without improvement of the transmission so that the engine will operate at the most efficient speeds for all car speeds. A gearshift with more than three forward speeds is a step in this direction, but a clumsy one.

Prof. Lay suggested the perfection of variable speed automatic or semi-automatic transmissions.

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MINING

## Phosphate Supply Assured For Next 500 Years

**D**EVELOPMENT of flotation methods for saving the fine material in Florida's extensive phosphate mines assures the American farmer a supply of this fertilizer essential at a reasonable price for the next 400 to 500 years, Charles E. Heinrichs of the International Agricultural Corporation assured the American Institute of Mining and Metallurgical Engineers at their meeting in New York this week.

Research has placed the phosphate industry of Florida in a secure position despite depression in agriculture, he said. Phosphate, he declared, is the most important of all the common fertilizers from the standpoint of quantity consumed. Although mined in Florida since 1881, only recently have operators been able to escape enormous losses in recovery of the fine sizes, because no suitable method of concentration was known.

The development of flotation, however, came at a critical time in the industry, and permitted operators to step up recovery from 50 per cent. to better than 90 per cent. By floating the fine material that was formerly discarded, it is possible to mine profitably many high-grade areas of limited extent, and so supply the demand for a superior quality of superphosphate, at a price that the farmer can afford to pay today.

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MEDICINE

## Cancer Cell Distinguished By Size of Nucleus

**A** METHOD of distinguishing cancer cells from normal cells, long sought by medical scientists, has been reported by Dr. W. C. MacCarty of the Mayo Clinic. It is hoped that this method will aid in detecting cancer in its early stages when treatment by surgery or radiation has most chance of success.

Dr. MacCarty distinguishes between the normal and the cancer cell by the size of the nucleus and nucleolus in the cell. He and his associates have carefully measured these microscopic bits of tissue in hundreds of cases. They find that both nucleus and nucleolus are consistently larger in mean area in the cancer cells than in the normal cells.

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