

RADIO

Magnetic Storms Trouble Radio, Survey Indicates

Height and Strength of Charged Layers 150 to 200 Miles Above Earth Intensively Studied From England and Norway

MAGNETIC storms surging around the polar cap of the earth are the cause of radio communication troubles. This fact is brought out by Drs. Edward V. Appleton, Wheatstone Professor of Physics at the University of London, R. Naismith and G. Builder in a communication sent to *Nature*, as the second International Polar Year ends.

Prof. Appleton and his co-workers have made an intensive survey of the height and strength of the electrically charged layers existing from 150 to 200 miles above the surface of the earth. Their apparatus could be called an electrical ladder that stretches up to these enormous heights, allowing them to determine exactly how these layers drift about and fade away from time to time.

Comparative measurements were made at Tromso, Norway, at the very northerly latitude of 69 degrees and in southeast England, 51 degrees north latitude. Radio waves of various wavelengths from 20 to 500 meters were shot vertically upwards to these layers. If the ionosphere layers are sufficiently strong the waves are reflected back to the earth and are picked up by the sending station. The time necessary for the waves to make the round trip, about one 500,000th of a second, allows the measurement of the height of the layer. The strength of the reflected signal tells the strength of the charge of the layer.

From the lower or F layer of the ionosphere, the English measurements showed the strongest signals from 8 p. m. on through the early part of the night. The Norwegian signals were strongly reflected about noon. But these were also the times that magnetic conditions were least disturbed.

When the magnetic conditions became greatly disturbed, a condition called a magnetic storm, the reflected signals vanished entirely. This means that the layers themselves became so weakly charged electrically that they were not able to reflect the radio signal.

Prof. Appleton has concluded that the electrical charging agency that pro-

duces magnetic storms influences the ionosphere. He states that this mechanism consists of both ultraviolet light and high speed material particles shooting into the upper regions of the earth's atmosphere. The particles appear to electrify the atmosphere in the region below the F or lower layer. The research thus suggests that these high speed particles are the most important cause of electrification of these high altitude layers whose shifting and disappearance has bothered scientists and radio engineers for many years.

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ENGINEERING

Waste Gas Analysis Tests Auto Efficiency

TESTING of car performance has become scientific by determining the amount of unburnt gas lost through the exhaust. An instrument that will enable a mechanic to make an accurate exhaust gas analysis that will allow prediction of combustion troubles was described by L. T. White of the Cities Service Oil Company before the Society of Automotive Engineers meeting in Chicago.

This electrical instrument is calibrated to read directly the motor's efficiency in burning up the mixture of gasoline and air drawn into the cylinders from the carbureter. Combustion efficiencies of between 75 and 80 per cent. are claimed to give the best performance and economy. If the meter of the instrument records an efficiency outside this range the mechanic is given a positive indication of the location of the trouble.

Better servicing is claimed when this power prover is used because the mechanics do not release a car until the proper efficiency is attained although it might seem to perform perfectly.

Improvement of combustion efficiency would decrease the amount of carbon monoxide emitted from the exhaust and so increase the quality of the air in a closed car.



HONEY-BAITED TRAP

Some plants, like the Venus' flytrap and the sundew, capture insects which become their food. Their mechanisms are so ingenious that it is difficult to refrain from calling them purposeful, as modern bi-philosophers insist we must do. But there are others that trap insects by obvious inadvertence. Some milkweed flowers, for example, have their inner structure deeply and narrowly cleft, and insects slipping an incautious foot into one of these slits often find themselves unable to pull free again. This picture, by Cornelia Clarke, shows an unlucky nectar-sipping fly in such a predicament.

Gas from the exhaust is mixed with an excess of air and passed through a combustion chamber of the testing device to burn the waste fuel. An electrically heated platinum wire in the combustion chamber becomes hotter because of the heat released by the burning gas. The hotter the wire, the more resistance it offers to the flow of electricity through it. By measuring this resistance the operator obtains a measure of the heat released by burning the wasted fuel and so a measure of the efficiency of the engine in consuming a certain fuel mixture.

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The beautiful African antelopes known as bongos have vertical white stripes on their sides, and strangely enough these stripes are unequal in number on opposite sides.