SCIENCE NEWS

ASTRONOMICAL APPARATUS FOR THE ECLIPSE

Science Service

MASSIVE astronomical equipment to be used in observing the total solar eclipse of September 10 is now being transported from the Mount Wilson Observatory here to the Fort Rosecrans Military Reservation on the very tip of Point Loma, off San Diego Harbor. This will be the location of the central station of the Mount Wilson Observatory party in charge of Dr. Walter S. Adams, director.

The large structural steel framework with the two 30-foot photographic telescopes and numerous smaller attachments when erected at the station will make a novel sight for ships coming into the harbor.

This apparatus was constructed in the shops of the observatory and before transfer to Point Loma was set, adjusted and tried out.

At the Point Loma station an attack will be made upon the outlying regions of the sun known as the corona, and photographs of the stars in the neighborhood of the sun will be secured for a study of the bending of the light rays. For this work a battery of ten or a dozen instruments, including long focus cameras, radiometers, interferometers and spectrographs, have been mounted temporarily on the equatorial framework designed originally for the new 50-foot interferometer for measuring the diameters of the stars. This framework forms an admirable mounting for the various instruments which are so arranged that each can be pointed directly at the sun and all moved together by a driving clock to follow the sun during the time of the eclipse.

Another Mt. Wilson party will be located at Lakeside, 20 miles east of San Diego, which is just within the region where the sunlight will be completely cut off. The observations at this edge-station will be quite different in character from those at Point Loma. At Lakeside a coelostat will be used to reflect the sunlight to the instruments, and by the use of several spectroscopes it is hoped to photograph in detail the spectrum of the gases in the sun's lower atmosphere throughout the entire visible spectrum.

The prospect for good weather and clear skies is very encouraging in Southern California at this time of the year.

In addition to the observations to be undertaken in the path of totality it is probable that valuable photographs of the spectrum of the chromosphere and edge of the sun can be made on Mount Wilson with the powerful instruments there available. Although the eclipse is not total on Mount Wilson and the corona will not be visible, the fact that over 98 per cent. of the sun's disk will be covered will afford an exceptionally favorable opportunity for accurate studies of the character of the spectrum of the sun in the narrow crescent still exposed.

AIRPLANE OBSERVATIONS OF THE ECLIPSE

Science Service

USE of airplanes to photograph the mysterious rippling shadows which will probably flit across the landscape before and after the complete eclipse of the sun in southern California on September 10 has been proposed to the superintendent of the U. S. Naval Observatory at Washington by Colonel John Millis, army engineer, astronomer and physicist, of Cleveland. Direct observation of the sun from the air is also suggested as valuable in case clouds or fog should obscure the view of astronomers working on the ground.

"Shadow bands," or a series of faint wavering parallel lines of light and shade a few inches wide, have been frequently noticed dancing swiftly over the ground and the sides of houses from a few seconds to five minutes before and after solar eclipses become complete. Repeated efforts have been made to photograph this phenomena, with little success. Colonel Millis, however, thinks that the use of the airplane may enable astronomers to obtain a record of these strange shadows.

He admits that the faintness of such shadows and their small size will diminish the prospects of success, but holds that by the use of films of a high degree of sensitiveness and such color screens or filters as are used in taking photographs from airplanes during twilight and on cloudy days may prove effective in obtaining the record. He also advises systematic preliminary drills and practice over both land and water in taking pictures which bring out such small details as small waves and ripples on water, shadows of picket fences on the ground, furrows of ploughed fields or shingles on roofs.

Astronomers do not know the cause of the shadow bands, but it has been supposed that they are due to undulations and disturbances of the density of the atmosphere caused by the drop in temperature within the cone of shadow formed when the moon passes between the earth and sun. More accurate records have long been sought in order to have more definite material on which to work out their cause than can be obtained from the vague and varying descriptions of observers of these fleeting shadows.

The suggestion for the use of airplanes to photograph the "shadow bands" made by Colonel Millis has been forwarded to the Navy's Bureau of Aeronautics which will conduct an airplane pageant at San Diego during the time of the eclipse of the sun September 10. San Diego is within the region where the eclipse will be total and the shadow bands may be observed.

THE ADJUSTMENT OF CARBURETORS

Science Service

SUBSTANTIAL savings of gasoline by the periodical adjustment of carburetors based on the results of analysis of exhaust gases from automobile engines are declared to be feasible by the Department of the Interior

following experiments made by the Bureau of Mines on the fleet of motor trucks used by the Government Fuel Yard in Washington. As the result of carburetor adjustments made by gas analysis in the bureau's experiments, an actual increased efficiency in mileage and saving of gasoline amounting to 22 per cent. was attained in the following month. The tests demonstrate that a portable carbon dioxide indicator for testing the exhaust gases of a motor vehicle gives a positive indication of the carburetor adjustment, removes all guesswork of such adjustment, is perfectly feasible practically, and is almost indispensable to a company having ten or more large trucks in service, especially if supplied with adjustable carburetors.

The Government Fuel Yard trucks tested by the Bureau of Mines ranged in capacity from 2½ to 7½ tons. During the winter months, when the demand for coal is heavy, from 30 to 35 trucks are used. Samples of the exhaust gas were taken on the trucks kept in service for summer hauling in order to determine the carburetor adjustment as used. Changes were then made to a more economical adjustment wherever possible, without sacrificing flexibility of operation and power. In every case the adjustments were maintained for maximum power, but were adjusted to the leanest position to give that power. In all but one case the carburetors were found to be adjusted too rich for maximum power and economy.

The actual increase in mileage and saving of gasoline due to the carburetor adjustments made by gas analysis, when the month previous and following the adjustments are compared, showed an increase in mileage of 22 per cent.; for the second month after adjustment, 16 per cent.; and for the third month, 9 per cent. When the mileage is compared truck for truck, and not taking into consideration the distance each traveled during the month, the increased mileage equaled 24.7, 21.2 and 16.2 per cent., respectively.

The adjustment of carburetors by analysis of exhaust gas is based upon the fact that the carbon dioxide in the exhaust is a direct indication of the air-fuel ratio and completeness of combustion. In turn, the air-fuel ratio and completeness of combustion tells whether the carburetor is properly adjusted for maximum power and gasoline economy.

Other conditions being constant, the mileage obtainable varies as the percentage of carbon dioxide in the exhaust gas and air-fuel ratio. This has been little realized by most garagemen in the past. The other factors are carefully watched and guarded against, while carburetor adjustment is usually left to the mechanic or driver who adjusts according to his own notions. Usually the adjustment is far too rich for maximum economy. There are, however, exceptions to this rule. A determination of the carbon dioxide content of the exhaust gas while the vehicle is being operated on the road gives a positive indication of the carburetor adjustment, and removes all guesswork.

The results of the Bureau of Mines experiments show that adjustable carburetors tend to become more richly adjusted with lapse of time, and that the adjustments should be checked at least every two months to maintain the most economical adjustments. If the monthly mileage is recorded, it becomes only necessary to check the adjustment of those that fall below the usual mileage which should be obtained when properly adjusted. The carbon dioxide indicator used for making the adjustments while the trucks were operated was found to be practical and easily operated by the laymen inexperienced in the handling of chemical apparatus.

SOFTWOOD FORESTS

Science Service

ALTHOUGH one fifth of the earth's surface is still covered with forests and there are over four acres of woodland for every man, woman and child on the globe, yet Raphael Zon and William N. Sparhawk, economists of the U. S. Forest Service, in a survey of the forest resources of the world just published, point out that the coniferous "softwood" forests of the northern hemisphere hold the fate of a world-timber supply problem in their depths.

Whether these coniferous forests that now supply more than three fourths of the lumber of the world will be able to meet the demands of the next two or three generations depends upon what steps are taken in the next few years to put them on a permanently productive basis.

Only 80 per cent. of the pine, spruce and other softwood timber cut is being replaced by growth. Softwoods, because of their light weight and ease of working are particularly adapted for construction use and a multitude of industrial uses for which the harder, heavier woods are not so suitable.

The best of the hardwoods of the temperate zone, including oaks, maple, ash, walnut, birch, beech and other kinds, are also being rapidly depleted. But the forest economists find that in the tropics there are vast reserves of hardwoods which can be substituted for any of those now used, and that the extreme rapidity of tree growth in the tropics makes it exceedingly unlikely that these supplies will be inadequate for centuries, if ever.

Fifty-six billion cubic feet of wood a year is used by the world, according to their estimates. Almost half, or 26 billion feet, is saw-timber, and nearly 30 billion feet is firewood. The firewood is equivalent in heating value to approximately one fifth of the world's consumption of coal.

ITEMS

Science Service

THE growing of limes in Dominica, the principal industry of that island, is threatened for the first time in its history with serious curtailment from the withering tip disease.

BIRD censuses covering a period of seven years indicate that there is a little more than one pair of birds to the acre of farm land in that section of the United States lying north of Maryland and the Ohio River and east of the Great Plains.