substituted for mathematical formulae.

Roughly, Dr. Graton believes in performance tests, instead of sales talk. No matter how good the formula, he states, the lenses and other equipment should be tested to see exactly what they will and will not do. A mining man would say that Dr. Graton placed more faith in assayer's report than in prospectus.

Not long ago, magnifications of more than 1500 diameters were regarded as impossible. Recently, Dr. Graton, with his new instrument, got useful magnifications of 6000 diameters—making images cover sixteen times as much area—and empty magnifications, making things bigger, but showing no additional detail, of as much as 50,000 diameters.

The microscopist today is in somewhat the same situation as the explorer just after America was discovered—he knows of new kingdoms of conquer, but hasn't mapped them yet.

What will he find?

Science News Letter, October 1, 1938

PHYSICS

Soap Bubbles Aid Explosion Studies

AT THE National Bureau of Standards in Washington Uncle Sam's scientists have been blowing soap bubbles in the laboratory and learning new secrets of how explosions occur in gases. Particularly they have been seeking to learn how fast a flame from an explosion will speed through space, a matter intimately tied up with explosive fires and indirectly with the efficiency of internal combustion engines.

Scientists Ernest F. Fiock and Carl H. Roeder, in a report prepared for the National Advisory Committee for Aeronautics, outline their methods of soap-bubble blowing and why it has value in combustion research.

The trick is to blow a soap bubble with an explosive gas, such as carbon monoxide, and make it form around a gap between two metal wires. Across this gap an electric spark can be made to jump, ignite the gas and create the explosion. Just as the explosion is to occur a high speed motion picture camera, taking over 1,600 frames a second, goes into operation and photographs the progress of the flame.

Key point of the soap bubble method is that it occurs essentially in free, or unconfined, space, because the soap film expands very easily to any pressure increase. As a matter of fact, the method is said to give results under constant pressure and at the same time enables the direct observation of the relative speeds of the flame and the expanding, but yet unburned, gases.

For explosions of carbon monoxide it was found that flame speeds reached values of 900 centimeters per second or about 20 miles an hour.

The soap bubble method has been a pioneering effort in the broad study of gaseous explosions. The general project is being continued, says Mr. Fiock, by additional methods which should have an even wider range of applications.

Science News Letter, October 1, 1938

ENGINEERING

Racing Sailboats Fitted With Streamlined Rod Rigging

Borrowed From Aviation Design, New Rigging Is Aiding Boats To Victory By Reducing Drag

THREE racing sailboats which have compiled impressive race records during the 1938 yachting season owe part of their success to the newest thing in sailboat equipment, streamlined rod rigging — borrowed directly from the streamlined struts of airplanes.

Using rigid streamlined rods that resemble the struts widely used on aircraft before the introduction of internal bracing, the Goose, Venture and Foo, three racing craft in the six-meter, eight-meter and Star classes respectively, have scored again and again on Long Island Sound and elsewhere this summer.

They gain reduced wind resistance from the novel type of rigging, used in place of the more conventional steel cable. More important, they gain rigidity of mast setting, an important fine point in racing design, where a minor improvement will mean the difference between a place and a victory.

Developed by E. Burke Wilford, a Philadelphia aeronautical designer, and the Pennsylvania Aircraft Syndicate, the streamlined rod rigging stems directly from the rigid round rods with which the yacht Ranger, successful defender of the America's Cup a year ago, was equipped by Mr. Wilford.

The novel type of rigging may add perhaps a tenth of a knot (a knot is a rate of one mile and a sixth per hour) to a boat's speed, but that adds up to a quarter to half a mile in a race lasting several hours, no mean addition to any racing vessel's performance.

Use of the rods instead of cables means less stretching of the rigging. This, Mr. Wilford told Science Service, spells a mast more rigidly centered. Improper positioning of the mast can seriously affect the boat's performance. When cable is used, constant "fussing" is required. On the other hand, a single adjustment of the rod rigging may do for a season.

Drag of the streamlined rod rigging ranges between one-eighth and one-third that of the cable, depending upon wind direction and the boat's particular sailing maneuver, according to Mr. Wilford. The rigging was wind-tunnel tested insofar as possible.

Another gain in reducing drag comes from the fact that less rigging is needed. Not all the rigging consists, however, of streamlined rods. In some places round rods are used for convenience; in the case of moving cables, cable must still be used. A flat tape is, however, being studied as possible replacement.

Although the rod rigging required by the Ranger was very expensive, cost of a set of rods and accessories for the smaller sized boats is said to be very little more than the conventional rigging.

Science News Letter, October 1, 1938

GEOLOGY

Valley of Dead Sea Was Pushed Down

THE DEAD SEA and the valley in which it lies, famous in Biblical history, did not merely drop to their present position far below sea level. They were actually pushed down, Dr. Bailey Willis of Stanford University has reported to the Geological Society of America.

The Dead Sea area started its downward movement early in the age of dinosaurs. It continued as a catch-basin for sediments until mammals began to dominate the earth. Then its borders rose into high hills, rimming the region with a mass of complexly folded rock.

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