Those Farthest Away Can Hear the Best

Acoustics

New Sound Reflector Makes Pin Drop Audible

TWENTY-FIVE thousand people can now hear a pin drop in Hollywood Bowl.

In trying out the audibility of the new sound reflector on the Bowl stage engineers devised an even more delicate test than the proverbial pin drop. They let one number ten bird shot, which weighs slightly more than one one-thousandth of an ounce, fall eight inches on a kettledrum. The sound was heard in every part of the Bowl. Even when dropped only one-quarter inch, listeners in three-quarters of the Bowl distinctly heard the shot strike.

This reflector is the half shell of a huge cone, 45 feet high at the front of the stage and 18 feet high at the rear. It is made of 36 tons of structural steel and is padded inside and out with asbestos sheets. So carefully has it been designed that it directs more sound to those seated 550 feet away in the rear of the huge Bowl than to the occupants of "bald head row," because the close-up audience gets enough sound from direct waves. No electrical amplifiers are used.

The great reflecting cone is mounted on a portable stage, 105 feet wide and 45 feet deep, which is rolled aside 400 feet out of sight of the audience, when pageants are given. The cone was designed by Elliot, Bowen and Walz, consulting engineers of Los Angeles, Calif.

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Interferometer Finds New Use

Plant Physiology

THE growth of plants can be seen with a new form of interferometer devised by Prof. K. W. Meissner of Frankfort, Germany.

The instrument is a modification of the interferometer invented by Prof. A. A. Michelson, of the University of Chicago, and used by him in his epoch-making experiments with light.

The interferometer is a device which permits the measurement of very tiny distances, far beyond the reach of the most powerful microscopes, by means of light-waves. A beam of light from a lamp is separated into two rays at a lightly silvered glass plate, and each of the two beams is reflected from a mirror, the two being reflected back to the plate, where they reunite and fall into an observing telescope. When two such beams are properly superposed, they are capable of "interfering," and we have the curious situation of light added to light giving darkness at certain points. For what one sees in the telescope is not a uniformly illuminated field, but a series of alternating bright and dark bands, or "interference fringes."

If, now, one of of the mirrors be slightly displaced, the fringe pattern moves to one side, and the distance it moves is a measure of the motion of the mirror. So sensitive is the method that it is readily possible to measure a displacement of the mirror of a millionth of an inch.

Prof. Meissner mounted the entire instrument vertically, thus bringing a whole new range of measurable phenomena within its scope. The movable mirror is carried by one arm of a trip-scales arrangement which permits a vertical motion of the mirror. The scales are very nearly balanced, and the mirror arm allowed to rest very lightly on the stem of the plant whose rate of growth is to be measured. As the plant grows, it pushes up the movable mirror, and the interference bands in the telescope are seen to wander across the field. Simply counting the number which pass a given mark in a certain time gives the rate of growth, which is of the order of one hundred-thousandth of an inch per second for most plants, so that a single line would move more than its own width in a second.

Ether fumes are wafted over the plant, almost immediately the growth ceases; a mercury lamp, rich in ultraviolet rays, is switched on, and the rate of growth increases many fold. It is such investigations as these which the botanist Prof. Laibach is carrying out with the new instrument.

Prof. Meissner, in demonstrating his device before the Congress of Physicists and Mathematicians in Prague, pointed out, among other uses of the instrument, the measurement of crystal growth and the analysis of musical tones and vibrations.

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