



WHAT IS INSIDE?

This high-speed X-ray photograph made by Dr. Slack, shows what happens inside a vacuum cleaner. The nozzle is at the lower left.

path of the dust particles in a vacuum cleaner. Since they are shown as if stationary while they are rushing through the blower, it is possible to observe the distribution of the air currents.

Another remarkable photograph appears on the front cover of this week's SCIENCE NEWS LETTER. It shows what seems to be a skeleton's foot kicking a transparent football. However, the football was of the ordinary kind, and the foot was that of a man fully clothed in muscle and skin.

The extremely rapid operation of the special X-ray tube used in these experiments is attained by giving it a momentary "jolt" with very heavy electric currents. The ordinary tube uses about half an ampere of current at a pressure of several hundred thousand volts. With the high speed tube, the voltage is 90,000 or 100,000, but the amperage is about 2,000, though it lasts for only a millionth of a second.

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● RADIO ●

Dr. Leonard Carmichael, president of Tufts College and director of the National Roster of Scientific and Specialized Personnel, will tell about "Mobilizing the Nation's Expert Brains" as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Nov. 23, 3:45 p.m. EST, 2:45 CST, 1:45 MST, 12:45 PST.

Listen in on your local station. Listen in each Thursday.

PHYSICS—SEISMOLOGY

Super-Speed Seismic Waves Cause Revision of Theories

Push Waves Are Faster Than Shake Waves, and They Travel 1500 Miles an Hour Faster Than Was Thought

SCIENTISTS are going to have to revise their present picture of conditions deep beneath the surface of the earth, Dr. L. Don Leet, director of Harvard's Seismograph Station, indicated.

Here's the reason: Dr. Leet has just completed new measurements of the speed at which earthquake waves travel underground and has found that some of them go about 1500 miles an hour faster than experts had thought. The new figure, the highest ever recorded, cannot be explained in terms of any familiar geological material or present theories about conditions of heat and pressure 21 miles below the earth's surface, he said.

Obviously, these new measurements indicate that the physical laws and conditions applying deep underground are still imperfectly known, he said.

Dr. Leet made his clockings from the records of some 50 earthquakes which have nudged New England and vicinity during the past six years as tabulated on the first good-sized network of seismograph stations to employ a new type of extremely sensitive quake-detector.

Special attention was paid to the waves traveling in the upper layer of the so-called mantle of the earth, about 21 miles underground, and Dr. Leet found that the "push" waves in this layer, that is, those which give a back-and-forth motion, scud along at 5.2 miles a second. The previously accepted velocity was 4.8 miles a second.

Most Sensitive Instruments

The instruments used in the study were Benioff seismographs, the most sensitive yet devised, which were developed by Prof. Hugo Benioff of the California Institute of Technology. Harvard has six of these quake-recorders and others are located at the Dominion Observatory, Ottawa, Williams College, Weston College, Fordham and the Massachusetts Institute of Technology, all of which participated in the study.

The investigation involved the determination of the location and exact time of occurrence of the earthquake

and of the arrival of the various wave forms at these observing stations, from which data the speed of the waves could be derived.

The research also enabled Dr. Leet to map for the first time the surface layers of the earth in New England down to the mantle. The top layer, he found, is dominantly granitic and extends down about nine miles. Then comes a second layer of heavier minerals which is six miles thick and probably basaltic. A third layer, also about six miles thick, is of undetermined composition.

Dr. Leet measured the speed of both "push" waves and "shake" waves, which give a side-to-side motion, in each of these layers. The "push" waves, he found, travel 3.8 miles a second in the top layer; 4.2 miles a second in the second layer; 4.45 miles a second in the third layer and 5.2 miles a second still further down at the top of the mantle. The "shake" waves are slower than the "push" waves.

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PHYSICS

U. S. Calls for Physicists Needed in Defense Program

UNEMPLOYMENT among professional physicists, if any exists, should soon be unknown, for the United States Civil Service Commission is endeavoring to secure them to fill positions in connection with the national defense program. Five grades are to be filled, with annual salaries ranging from \$2,600 to \$5,600.

Applicants must have completed a four-year college course and have had professional experience in physics. No written examination will be required for the three higher grades, but applicants will be rated on their qualifications.

For states east of Colorado, applications, which can be secured at any first or second class post-office, or from the Commission in Washington, D. C., must be sent in by Dec. 12. Residents of western states have until Dec. 16.

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