if this line should belong to the invisible region of the solar spectrum, as in the case of the important *H* and *K* lines of ionised calcium. The rapid movements may also be recorded by instantaneous photographs or by moving-picture exposures.

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[1] G. E. Hale, *Astrophys. J.*, **70**, 265, 1929; **71**, 73, 1930; **73**, 379, 1931; **74**, 214, 1931.

Structure of the Crystals of 12-Phosphotungstic Acid

IN a recent communication[1], the structure of the molecule of 12-phosphotungstic acid was described. The formula of the acid was found to be $H_3PW_{12}O_{40}.nH_2O$. This structure was worked out from powder photographs of the partially dehydrated acid, containing 6 or 7 molecules of water per molecule of acid, which is obtained by drying the more highly hydrated crystals to constant weight over P_2O_5 *in vacuo*.

The structure of the crystals of 12-phosphotungstic acid, which crystallise from aqueous solutions at room temperature as colourless octahedra, has since been investigated. Chemical evidence indicates that this hydrate contains 30 molecules of water per molecule of $H_3PW_{12}O_{40}$. The powder method was again used. The structure is cubic, the edge of the unit cube being $23{\cdot}281 \pm 0{\cdot}002$ A. There are 8 molecules of acid in the unit cube, the centres of the acidic anions being arranged in positions corresponding to the diamond structure. Comparison of observed and calculated intensities of reflection proves that this hydrate also is composed of the anions $PW_{12}O_{40}^{-3}$ which were described recently in NATURE. This work will shortly be published in more detail.

J. L. Hoard[2] has recently published an investigation of the structure of similar hydrates of some salts of the 12-phosphomolybdic and 12-silicomolybdic acids. He was able to show that the unit cell is cubic, with an edge of approximately 23 A., containing 8 molecules. He also suggested, as a possibility, the diamond-like arrangement of the units which I have confirmed, but he was unable to find a structure for the acid radical which would explain the experimental results.

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Aug. 1.

[1] NATURE, **131**, 908, June 24, 1933.
[2] J. L. Hoard, *Z. Krist.*, **84**, 217; 1933.

Measurement of Frequency of Longitudinal Vibration of a Steel Wire by Magneto-Striction Effect

IN a recent investigation of the relationship of stress and magnetic permeability for steel wires, the following experiment was made.

A steel wire $\frac{1}{4}$ in. in diameter was suspended in a solenoid, the upper end of the wire being rigidly fixed. A search coil of 3,100 turns surrounded the wire and was arranged at the middle of the solenoid, which was excited with direct current, the magnetic intensity in the neighbourhood of the search coil being 68 gauss. The search coil was connected in circuit with an oscillograph through a valve amplifier. When the wire was stroked by means of a resin-coated piece of soft leather, longitudinal vibrations were set up and the oscillogram reproduced as Fig. 1 shows a record of these vibrations. The sine curve which is also shown in Fig. 1 was obtained from a 50-frequency supply and provides the time scale. It is found from the oscillogram that the frequency of the longitudinal vibrations is 626 cycles per second. The free length of the wire was 204 cm.

For the gravest mode of longitudinal vibration of a wire which is clamped at one end the frequency is related to the velocity of sound c by the expression $f=c/4l$ cycles per second where l is the length of the wire.

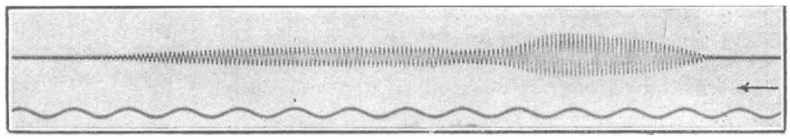

FIG. 1.

By substituting $f=626$ in this formula, it is found that $c=5{,}110$ m. per sec., that is 16,800 ft. per sec. Since the velocity c is related to Young's modulus by the formula $c^2=E/\rho$, where ρ is the density, it is found that $E=2{\cdot}05\times10^{12}$ dynes per sq. cm. or $29{\cdot}5\times10^6$ lb. per sq. inch.

It is hoped that a detailed account of this investigation of the relationship between stress and magnetic permeability will be available for publication shortly.

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Influence of a Magnetic Field on a Glow-Discharge

IN continuation of the work on the intermittent emission of the anode spot in a neon tube[1], we have been studying the effect of a longitudinal magnetic field on the glow discharge, in the case of helium as well as neon.

We found that, within a certain range of pressure, both the cathode glow and the anode spot increased their intensity considerably when subjected to a magnetic field, and, further, the use of a falling-plate camera has shown that the number of stronger flashes shot out from the anode spot per unit time was thereby greatly increased[2].

An interesting change takes place at the anode of a helium tube, namely, the sudden appearance of a bright pink-coloured ring around the anode spot as soon as the magnetic field is applied.

The experimental arrangements were nearly the same as before, except that each of the electrodes, or at times the anode part only, was placed between the gap of a large electromagnet giving fields up to a few thousand gauss.

A photograph of the discharge taken with 1/15 sec. exposure is reproduced in Fig. 1. The distance between the electrodes was 11 cm., the diameter of the tube being 4 cm. The pressure of helium was 35 mm., and the field strength, which was fairly uniform along the axis of the tube, was about 1,800 gauss. The current in the tube, supplied from a 2 kw. direct-current generator, was 185 ma. with a terminal voltage of 425 volts.