

to the cylinders and maintained for three hours to re-establish pressure in the wood and increase the fluidity of the remaining creosote. A vacuum is then drawn again and held for an hour, during which time more of the creosote comes to the surface and drips off. The vacuum is then broken and the cylinders are opened. Any liquid creosote on the surface of the poles is quickly reabsorbed, and the poles are reasonably clean. The first charge treated in this way completely satisfied all requirements. Approximately 50,000 full-length pressure-creosoted lodgepole pine poles have been treated according to the process described, with a high degree of conformity to the desired results in terms of penetration, consumption of creosote and cleanliness of the poles.

X-Ray Reflexion and Scattering with Frequency Change

THEORY and experimental work on the quantum reflexion and quantum scattering of X-rays are dealt with by Sir C. V. Raman in two papers (*Proc. Roy. Soc., A*, 179, 289; 1942). The quantum or modified scattering is due to the excitation of the elastic solid or low-frequency vibrations of the crystal lattice by the X-ray photon. It has a very low specific intensity proportional to N (the number of lattice cells) and is distributed over a wide range of solid angles. The quantum or modified reflexion is due to the excitation of the infra-red or characteristic high-frequency vibrations of the crystal lattice by the X-ray photons. Its intensity, like that of the classical or unmodified reflexions, is of the order N^2 , though usually smaller in absolute value than the intensity of the classical reflexions. The frequency changes which play a fundamental part in the theory of both phenomena appear as necessary consequences of both the classical and quantum theoretical points of view, but the law of intensity variation with temperature is quite different in the classical and quantum formulations. Experimental studies at low temperatures are specially important for the differences between the two theories. The influence of the modified X-ray reflexions on the intensity of the classical reflexions and their variation with temperature are discussed and shown to be of even greater importance than the effect on the same of the X-ray scattering by the elastic solid vibrations. In the second paper experimental results on diamond are reported agreeing with the theory.

An Improved Capacitance Bridge for Precision Measurements

To meet the demand for increased precision a new standardizing capacitance bridge, known as the No. 12 type, has recently been developed by the Bell Telephone Laboratories and is now described by W. D. Voelker (*Bell Lab. Rec.*, 20, No. 5; 1942). This bridge, operating at frequencies up to 200 kc., has a range of from 0 to 1.11 $\mu\text{F.}$, and from 0 to 1000 $\mu\text{mhos.}$ It is of the equal-ratio-arm type, the arms being of woven-wire resistance. A slide wire at the junction of the two resistances and an air condenser that allows capacitance to be shifted from one arm to the other, permit a small amount of adjustment that may be required at infrequent intervals to offset the effects of ageing. The resistances form the adjacent ratio arms of the bridge, and permit an unknown capacitance in a third arm to be measured against an adjustable standard capaci-

tance in the fourth. This is the basic principle of the bridge. Conductance standards are included in the bridge. For measuring the larger values of capacitance silvered-mica condensers are employed as standards, while for smaller values of capacitance, air condensers are more convenient. The air-condenser standard consists of three decades of fixed capacitance and a movable plate condenser for fine adjustment. The control dial is calibrated to indicate directly the capacitance of the unknown for each position of the dial.

Medical Services in Sweden

THE March issue of the *Anglo-Swedish Review* gives an interesting account by Torsten Trietz of the organization of medical services in Sweden. Preventive medicine is administered by public health officers, of whom there is one in each of the twenty-four counties and larger cities. Outdoor medical treatment is provided by the following groups of physicians: (1) in the provinces the district doctor is a State official appointed for the medical care of the population in rural districts, who receives a fixed salary and retiring allowance; (2) urban physicians, who are also salaried physicians but are paid by the municipality; (3) private practitioners who are also paid a salary. Owing to their social importance tuberculosis and venereal diseases are compulsorily notifiable and free treatment is provided. There is a panel service national health insurance, of which the cost is borne partly by the State and partly by the fees of the insured. The public indoor service is mainly provided in general hospitals and is administered by the county councils or municipal councils, and paid for by the taxpayers. The hospital treatment of tuberculosis is organized in sanatoria, of which there are about 100 with about 8,000 beds. Care of infectious diseases in fever hospitals is compulsory for certain diseases and is free. Radiological treatment of malignant growths and similar diseases is organized in special cancer clinics at Stockholm, Gothenburg, Lund and Uppsala. All indoor relief of mental cases is administered by the State in some twenty hospitals containing 17,000 beds. The nurses in Sweden receive three years training in the larger hospitals in co-operation with the Swedish Red Cross. Midwives are trained at two colleges, and treat the vast majority of cases of childbirth.

Courses of the Lower Ganges

THE November issue of *Science and Culture*, which is conducted by the Indian Science News Association with the aim of advocating the application of scientific knowledge to the national welfare of India, contains an interesting article on the antiquity of the Lower Ganges and its courses. Mr. N. K. Bhattacharya approaches the subject from the historical point of view. Little that is very definite emerges from Mahabharata and Pauranic literature, though a certain amount of evidence as regards the various mouths of the river suggests relatively few major changes. Ptolemy in A.D. 150 gave a full account of the Lower Ganges, and Mr. Bhattacharya finds that, allowing the necessary corrections for Ptolemy's longitudes, the five mouths of the river are in approximately the same longitudes to-day as about nineteen hundred years ago. There are several maps in the article, including Rennell's map of 1761 and van den Broucke's of 1660.