was found to be a maximum when the soil was dry and the order of cohesion for the dry soil followed the order of dissociation for the ions, *i.e.*, Li > Na > K > Mg > Ca.

An apparatus for measuring the capillary force of sand was devised which also serves for a rough and ready determination of the mean diameter of sand. Experiments have not indicated that the discharge of a tube-well is proportional to the area of the strainer, but there appears to be an optimum size of the shrouding material with respect to the grade of the water-bearing sand. An attempt has been made to detect cavities under weirs by means of an apparatus causing vibration by impact, the amplitude of vibration being naturally greater for unsound work.

A mud plaster, non-erodable under rainfall or flowing water has been got at, by the addition of 5 per cent. cement by weight to the Punjab soil generally containing about 15 per cent. of clay. Lining of some minors and water courses on two large farms with mud plaster, has considerably reduced leakage.

Factors contributing to the formation of Thur were studied during the year and several areas were taken for reclamation. Data were collected regarding the discharge of open wells, water requirements of crops and cost of this form of irrigation. It has been shown that generally a farmer gets a higher profit per acre on the introduction of tube-well irrigation than in the case of open well irrigation.

Frictional drag exerted by different grades of sand bed on the flow of water in a channel, and movement of silt in a tilting flume are being studied. Examination of the hydraulic observations on the Mississippi river published by the U.S. Waterways Experimental Station, Vicksburg, has shown that the slope-discharge-silt formula of the Irrigation Research Institute agreed well with the observed values.

Experiments on a model of the river downstream of Panjnad weir with a view to control erosion indicated that a two T-head spurs properly disposed would arrest erosion. Work is also in progress on models of the River Chenab in connection with problems connected with river training and silt entry into canals. Silt surveys of the Upper Bari Doab Canal, the Lower Chenab Canal and the Western Jumna Canal were also undertaken.

After a small shower of rain or after irrigation, a rise in water-table much greater than can be accounted for, takes place. A study is being made to determine the cause of this phenomenon, probably the result of negative pressures developed in water films surrounding soil particles. A survey of wheat soils with reference to yield and the chemical constituents of the soil indicates that soils having a high yield of wheat have a low manganese and high available phosphate content.

The Research Institute has been engaged during the year on a variety of useful and important engineering problems.

C. GOPALAKRISHNAN.

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**The Indian Cotton Textile Industry** (1941 *Annual*). (Gandhi & Co., Calcutta), 1941. Pp. 150. Price Rs. 3 or 9*sh*.

The 1941 Annual of the Indian Cotton Textile Industry has been published by Messrs. Gandhi & Co., and is a handy and useful reference book for all that are engaged in the cotton textile industry. As in the previous year, the statistical figures for imports and exports of cotton, yarn and cloth are incomplete as their official publication is withheld owing to war conditions. The various details are arranged in a systematic and clear manner as in previous issues of the Annual.

A more detailed survey of the working of the Handloom Weaving Industry in various Provinces and States might, perhaps, have been much appreciated, particularly in view of the fact that the Handloom Weaving Industry occupies such an important part in the economics of the Indian cotton industry and is passing through a period of acute depression for want of adequate supply of yarn and other raw materials at reasonable prices.

B. K. MURTHY.

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