

and the type is excellent in both books—the text and the key.

(4) Mr. Chignell's book is planned on the wise modern method of beginning trigonometry with a numerical treatment of the ratios, and postponing the addition theorem and other formulas until the student has thoroughly grasped the meaning of the ratios. The solution of the oblique triangle is effected by dividing it into two right-angled triangles, a simple method which is in every way sufficient for non-specialists; the half-angle formulas were invented for astronomical use, and may very well be left to astronomers and other specialists. The quantity of exercises is ample for all purposes, and the wise schoolmaster will use only a minimum number of the introductory tests and pass rapidly on to the "problems" of human interest.

(5) For the students who use Mr. Abbott's book the bad old rule-of-thumb days are over. Vulgar fractions are introduced in most practical fashion, fractions of lengths and areas being shown in diagrams. Then follow decimals in equally practical fashion by means of the paper abacus which served merchants up to the time of the invention of the zero; and so on in corresponding treatment throughout the range of mensuration.

The relation $(a+b)^2 = a^2 + b^2 + 2ab$ we are pleased to see treated as the algebraic expression of a property which is fundamentally geometrical; too often the relation is taken to be fundamentally algebraic, and the geometrical property reduced to the status of an illustration. The square-ruled diagrams are sometimes in tenths of an inch and sometimes in millimetres. The former are better, the latter being trying to the eye; and for many purposes quarter-inch or half-centimetre ruling would be better than either. The bulk of the exercises have the great merit of being drawn from human life.

D. B. M.

OUR BOOKSHELF.

Practical Irrigation and Pumping. By B. E. Fleming. Pp. xvi+226. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1915.) Price 8s. 6d. net.

It is somewhat difficult for the inhabitants of a country intersected by numerous streams and characterised by an ample and fairly uniform rainfall, to realise the disabilities under which agriculturists labour in other lands less favoured with automatic supplies of natural moisture. The great plains of India, the immense tract of Egypt and the Sudan, and the vast expanse of North America lying west of the rooth meridian, comprising some dozen States and forming about one-third of the total area of the United States, are instances of those arid regions in which it is im-

possible, without artificial aid, to render the soil productive in any effective degree. What this means may be gauged from a statement in the prefatory note of the volume before us, that up to July, 1910, it is estimated that a sum of more than 60,000,000*l.* had been sunk in the reclamation, by irrigation, of 14,000,000 acres in the Western States of America.

The purview of Mr. Fleming's book is limited to a consideration of irrigation by means of pumping underground water, as practised in the United States, and in so far as this aspect of the subject is concerned, it is treated fairly comprehensively. The author enters succinctly, and at the same time with some degree of detail, into the various problems connected with the sinking of wells and the installation of a pumping plant. Considerable space is devoted to a discussion of the merits and capabilities of the centrifugal pump, and a noticeable feature is the number of performance diagrams of various-sized pumps of this type. Reciprocating pumps are only lightly touched upon. Prime movers and windmills are described. There is a chapter on the cost of pumping operations which contains some useful information; the governing conditions, as already stated, are those prevailing in the Western States, and, consequently, the facts are not generally intended for wider application. Within the limits set down by the author, this little volume is an interesting and practical handbook, based on his personal experience, some of which, he remarks, has been "rather bitter."

B. C.

Brazil (1913). By J. C. Oakenfull. Fifth Edition. Pp. viii+604. (Frome: Butler and Tanner 1914.) Price 7s. 6d. net.

THIS account of Brazil is the fifth revised edition of a handbook originally published in 1909, and distributed at the cost of the National Government. It discusses in detail the geography, history, natural productions, and economic resources of a country including an area of $8\frac{1}{2}$ million kilometres and an estimated population of 24 millions. The book is well arranged, the information is based on the most recent official reports, and it is provided with good maps and illustrations. Brazil in its geographical features presents the most varied characteristics—the great river basins of the Amazon-Tocantins and La Plata, a shapeless mass of highlands, and a narrow coastal region. In its highland region suited for an agricultural and pastoral life, its vast forests providing unlimited supplies of valuable timber, its coffee, sugar, tobacco, and other useful products, it remains one of the few areas suitable for extensive development by settlers from Europe, a fact which has been fully grasped by the German Government, ever in search of new colonies and desirous of securing a footing on the continent of America.

The book is admittedly intended to press the claims of Brazil on the colonist. Since 1820 $3\frac{1}{4}$ millions of emigrants, of whom the majority are Italians, have reached its shores, and progress has recently been made in attracting Japanese