pages; it would have been advisable to split up the subfamilies into sections, and so to subdivide the keys into more handy form. A word of special praise must be accorded to the general editing and indexing of these two volumes, a task that has been most efficiently and conscientiously carried out. R. S.

COAL MINING.

Practical Coal Mining. By Leading Experts in Mining and Engineering, under the Editorship of Prof. W. S. Boulton. Divisional Vol. VI. Pp. viii+177-449. (London: The Gresham Publishing Company, n.d.)

THIS volume forms the final instalment of the above-named book, and brings to a conclusion this somewhat heterogeneous collection of articles relating to coal mining. The fifth volume was noticed in NATURE of October 1, 1908, and it concluded in the midst of an article by Mr. A. H. Cooke on mine surveying, the entire article consisting of five chapters; for reasons best known to themselves the publishers have here again given an example of their irritating practice of concluding a volume in the midst of a paragraph.

Mr. Cooke's contribution maintains throughout a high standard, and in the absence of any modern British text-book on the subject is more especially welcome. He quite rightly lays stress upon the importance of triangulation for the purpose of surveying the surface of mining royalties, and his description of the field work of triangulation is very good and complete; the only omissions that we have noted, and these are not very important, are those of the use of such modern alloys as "invar" for bands for baseline measurements, and some reference to the employment of satellite stations, when trigonometrical stations, otherwise highly suitable, are not accessible for setting up the theodolite. It would have been well to have devoted some space to the office work and calculations required, especially to the methods for calculating the coordinates of the triangulated points direct by the use of traverse tables alone.

It might also be pointed out that whereas a chapter has been devoted to the correlation of underground and surface surveys, there is no mention made of the important portion of the mine surveyor's duties that is comprised under the general head of "setting out," e.g. the laying out of surface and underground roadways, curves, &c.; yet the latter is almost a daily part of the surveyor's routine work, whilst the former, important though it certainly is, constitutes an exceptional operation that has only to be performed at long intervals.

The second article, by Mr. S. W. Price, deals with the preparation of coal for the market. It is a great pity that more space was not devoted to this subject, in view of its great and daily increasing importance, and of the fact that the literature on the subject is so scanty. This latter reflection justifies the expression of some surprise that the author has not made use of the best—almost the only—contribution to his subject in modern British literature, namely, the report of the committee of the Mining Institute of Scotland on coal

cleaning, which he might have consulted with much advantage. The present article contains three chapters, the first on the handling and tipping of coal-tubs, the second on screening and picking coal, and the third on washing coal. The first two are entirely satisfactory, but the third is too short and sketchy, and is decidedly weak, especially in the theoretical portion. Thus the author seems to rely almost wholly on the principle of equal falling in order to explain the action of the jig or bash, without making it at all clear that in these appliances the *régime* of equal falling (when the particles are falling with practically uniform velocity) is never really reached; it is, moreover, not quite correct to say with Pernolet that a particle reaches this ultimate velocity in the first second of its fall, because the time required to reach this condition depends upon the size and density of the particle, and may be much more than a second or only a fraction of that time. The author quotes Maurice and Bring with equal approval, or, if anything, lays more stress on the conclusions of the former, although Bring reaches his as the result of a vast amount of experimental work, whilst those of Maurice are mainly deduced from mathematical reasoning, which is, moreover, vitiated by the fact that it is all based on the assumption that the resistance offered by the water (or viscosity, as Maurice wrongly calls it) varies always as the square of the velocity of motion of the particle, whereas this relation is only approximately correct when a certain velocity has been attained, and is therefore not true in the initial stages of falling.

Prof. W. Galloway contributes an excellent article on coke ovens, dealing exclusively, however, with retort and by-product ovens. He has gone almost exclusively to Germany for his data, and has succeeded in condensing a large amount of very valuable and not generally accessible information into his article.

The last article is on the economics of coal, by Messrs. H. S. Jevons and David Evans. This difficult subject is dealt with here far too briefly, and the writers do not seem to have the intimate technical knowledge that is required to discuss this subject thoroughly, though it is only right to say that in dealing with a subject like this, on which every writer has views of his own, wide differences of opinion are naturally to be expected. Thus to many it would seem that the authors' classification of the demand for coal is not satisfactory, and that a sharp line should be drawn between the demand for furnaces, factories, and the like, and the demand for transport purposes, by railways, and, above all, by steamships, the economic effects of these two requirements being quite different. The authors have included the requirements for manufacturing and for transport under one head, and thus obscure the results of certain conditions that are economically of distinct importance, as, for example, the effect that the annual closing of the Baltic Sea to navigation in winter has upon the price of coal. Further, it might be objected that the question of the life of a colliery and the necessity of the corresponding amortisation of the capital invested in the shafts and other permanent works has not received the consideration which this very important subject deserves. HENRY LOUIS.