EISSLER'S MODERN HIGH EXPLOSIVES.

The modern high explosives, nitroglycerine and dynamite: their manufacture, their use, and their application to mining and military engineering. By MANUEL EISSLER. New York, *Wiley*, 1884. 11+395 p., illustr. 8°.

IN this work the author has sought to acquaint the engineer, the contractor, and the chemist with the composition and characteristics of the high explosives, and with their adaptation to certain purposes. He has been led to do this from "the lack of authentic information on the subject, and the great increase in the use of these explosives;" yet we find the book to be largely a compilation from such well-known works as those of Abbot, Drinker, Mowbray, and Berthelot, together with others not so well known, and from various chemical books.

Such a compilation, if properly selected, digested, and arranged, would be highly creditable, and, in the present state of the art, very useful; but unfortunately, while the fundamental plan of Eissler's book is most excellent, it is badly carried out in detail, since subjects most closely connected are treated of in widely separated places, with a consequent loss of distinctness and consecutiveness, and the introduction of an annoying repetition and sometimes of conflicting statements. Besides, from his custom of copying many of his authorities *verbatim et literatim*, he has introduced examples of most of the many systems of nomenclature known to chemistry. Add to this an obscure style, and the use of words and phrases such as 'chlor-metals,' 'protoxide of azote,' 'resting acids,' 'parchemined paper,' and the like, and we have a confusion which is most puzzling to the reader, even if he be a skilled chemist; while, if he be not, the use of a '*trituration* of soda for the determination of nitric acid,' of chloride of *lime* for use in a drying-tube, of *ammonium* as a test for the solubility of silver chloride, and the method described for the *transmutation* of a gas into a burette, may well seem unintelligible.

Throughout the work, the author has sought to give due credit to the various investigators whom he quotes; yet we observe that in some instances he errs, as when he states that the experiments on explosive gelatine, which he describes, were made in France, when, in fact, they were made in Austria by Capt. Hess, the French account of them being simply a translation of Hess's paper by Paul Barbe. On the other hand, he erroneously credits Hess with the application of the various methods described for the quantitative analysis of nitroglycerine mixtures.

Many positive statements are made which may be questioned. Thus Eissler states that the explosions of the fulminates "are very sharp from the extreme rapidity of their decomposition, but, from the small amount of gas given off, the force exercised is not very great;" while Berthelot says, "Calculation will show that no other explosive known will give in contact an instantaneous pressure at all comparable to that of mercuric fulminate." Again: Eissler asserts that "nitro-compounds of cellulose with more than 41.89 % of NO_2 contain nitric acid in the pores which is not properly washed out." This percentage corresponds to the pentanitrocellulose, and the statement is probably based on Ecler's researches in 1879; but Vicille, in 1882, found that thoroughly nitrated cellulose yielded 44.27 %, corresponding to eleven atoms of NO_2 in the molecule. Other examples might be pointed out.

The above criticisms apply principally to the first third of the book. In parts ii. and iii., which are devoted to the mode of use and applications of the high explosives, the author appears more at home with his subject, which he presents in a clearer manner, and with greater precision of statement; and he has gathered material which must be of interest and use to the engineer and contractor. The perusal of this portion will also interest the general reader; as few realize to how great an extent, and for what a variety of purposes, explosive substances are used at the present day. Here he will learn that advantage is taken of the enormous potential energy of these bodies in the quarrying of stone; the mining of ores, coal, and oil; the driving of cuts and tunnels for roads; the deepening of our channels, and the removal of reefs and rocks from our harbors; the driving of piles; the clearing of fields for agriculture, and the shaking-up of the soil to prepare it for vegetation; the destruction of icy barriers, and the breaking-up of large masses of metal to fit them for the melting-furnace. The climax seems to be reached in the statement, that, in some of the hydraulic gold-mines of California, it is an almost daily occurrence to fire blasts in which twenty, thirty, or even fifty thousand pounds of explosives are used in a single charge, — an amount exceeding that used in the blowing-up of Hell Gate. Compared with this, the amount used for purely military purposes sinks into insignificance.