

tions are only such simple diagrams as are required to elucidate the text. Besides being an advantage in other respects, this plan sets free a vast amount of space which can be utilized in the more thorough presentation of the principles of the science. For illustrations of these principles, by experiment or from facts drawn from observation, the instructor is held responsible, as he is also for their practical application.

In adopting this plan, the authors have unquestionably made a decided advance. Although the treatment is mathematical wherever desirable, it is assumed that the student has no knowledge of the differential and integral calculus. In several instances the method of limits has been used, however, and students who are familiar with the calculus will have no difficulty in its application. The subject is treated in the usual five grand divisions, mechanics, heat, magnetism and electricity, sound, and light.

Many physicists will not be able to agree entirely with the authors in some of their fundamental definitions and statements in the chapters upon mechanics. A close examination of these reveals several inconsistencies, into which they appear to have been led by the adoption of certain time-honored definitions and terms. Some of these questions have received a good deal of attention during the past few years, in the columns of this journal and elsewhere, and probably the disputants are no more nearly in agreement than they were in the beginning; but it seems tolerably certain that even the average student will experience a certain turbidity of mind when he places the definition of 'momentum' (viz., "the *momentum* of a body is its quantity of motion") and that of 'motion' (viz., "the change in position of a material particle is called its *motion*") a very little nearer together than they are now found on the pages of the book. The first sentence of the introduction, "Every thing which can affect our senses we call *matter*," has a ring of materialism about it which one would hardly expect from at least one of the two famous institutions of learning from which the book comes.

If these and other similar statements are admitted to be defects, they are of minor importance, and do not materially detract from the general excellence of the treatise. It is to be greatly regretted, however, that the publisher has not done his part as well as the authors have done theirs. In mechanical execution the book is substantial, but very far from attractive in its appearance.

Industrial Peace. By L. L. F. R. PRICE. New York, Macmillan. 8°.

THOSE who have given attention to the treatment of the labor-question in England have heard of Arnold Toynbee, the young Oxford graduate who founded an institution in the eastern part of London for the purpose of bringing young men of education into contact with the ignorant poor. After the death of Toynbee at an early age, a memorial fund was raised in his honor, and devoted to the work of spreading information by lectures and publications on the subjects in which he was interested; and the volume before us is the first to be issued by the trustees of that fund. The greater part of the work was first read before the Statistical Society of London, and was published in the journal of that society for March, 1887.

Mr. Price opens his work by remarking, what is sometimes lost sight of by enthusiastic reformers, that "there is not, nor indeed is it probable that there can be, any single panacea for social ills. . . . So diversified are the details of even contemporaneous industrial society, that any scheme which professes to cure all economic maladies by an uniform unalterable method of treatment may almost be said to carry with it its own condemnation" (p. 1). Some persons, he remarks, think that co-operation is destined to remove all industrial difficulties; but upon this point he thinks that experience is not encouraging. Co-operative distribution has prospered in England to a surprising extent; but in co-operative production there were in 1884 only £800,000 of capital employed, and only 6,300 men. He believes, therefore, that whatever advance may be made in co-operation and profit-sharing, the old relation of wage-payer and wage-receiver will still continue; and the object of his essay is to inquire by what means this relation can be made more harmonious.

The means that he relies on are the creation of boards of conciliation and arbitration, and the establishment of sliding scales of

wages. As an example of the former class, he describes the formation and working of the board of conciliation organized in 1869 in the iron trade of the north of England, which he considers an excellent test of the system, since the fluctuations of wages in the iron trade are greater than in most others, and also because before the board was organized the relations between workmen and employers was very unfriendly. In spite of these difficulties, however, the method of conciliation has proved a great success. The machinery consists of a board comprising representatives of both sides and a standing committee appointed by the board. All questions are first investigated by the committee, and, if they cannot agree, the matter is laid before the board; and, if an agreement is not reached there, an arbitrator is called in to render a decision. The system is similar to the *conseils de prud'hommes* that exist in France and Belgium; but Mr. Price objects to these on account of their legal character, which is contrary to the traditions of English, and, we may add, of American life. He examines at length the working of the boards of conciliation, and then proceeds to consider the method of sliding scales, by which wages are made to vary with the price of the product. The establishment and maintenance of such scales have been attended with considerable difficulty, owing to disagreements as to what standard of prices and wages should be taken as a basis; but nevertheless they have proved successful in many English collieries, and are still in force there. The special advantages of these scales, in Mr. Price's opinion, are their elasticity and their automatic action; but he does not fail to point out at considerable length the difficulties attending the working both of the sliding scales and of the boards of conciliation. The chief of these are, "the possibility that the decision might fail to secure loyal adherence, the contentiousness connected with the preparation and discussion of elaborate arguments, and the difficulty of determining upon a satisfactory basis and of ascertaining accurate data" (p. 89).

Such is a brief analysis of the methods of 'industrial peace' that have been tried with no little success in England; and we would earnestly recommend a study of them to the leaders of our American trade-unions and to the employers with whom they are perpetually contending. It is the duty as well as the interest of both parties to maintain peace, and any methods that have been successfully employed for this purpose ought to be carefully considered by them, and, if possible, put into practice. They will not, of course, solve all industrial problems; but the substitution of peaceful methods for contentious ones would of itself be a great gain, and would pave the way for further improvements in the future.

Elementary Practical Physics. By B. STEWART and W. W. H. GEE. Vol. II. Electricity and Magnetism. New York, Macmillan. 16°.

ALL who are familiar with the contents of the first volume of this work will extend a hearty welcome to the second. Every teacher of physics by laboratory methods has felt the need of a good handbook or guide, which, in the hands of the student, would afford some relief from the labor of giving individual instruction in the details of manipulation, which, when the number of students is large, becomes simply enormous.

Since the publication of Pickering's 'Physical Manipulations' fifteen years ago, the pioneer in this field, a number of attempts have been made to supply the want. It is safe to say that none have been more successful in producing a book at once satisfactory in plan and material than Professors Stewart and Gee, in this series, the second volume of which has now appeared.

In its general character it resembles the first volume. One of the leading features of the series, very prominent in this volume, is the fulness of detail concerning all operations, the making of every experiment, and the nature and construction of every piece of apparatus used. Nearly all of the instruments described are such as were constructed in the laboratory of the authors: they are simple in design, and instructions for their reproduction are so clear that even the unskilful can hardly fail. The amateur instrument-maker is also greatly aided by the numerous diagrams and cuts illustrating methods of construction.

The value of this feature of the work can hardly be overestimated, for it is a fact that many good teachers have little inventive