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

or mechanical skill. Besides, it will generally be admitted that the construction of the simpler apparatus by the student himself is a most valuable and useful exercise, giving him a firm and lasting hold upon fundamental principles which he can attain in no other way. But this attention to detail does not stop with the instrument itself. All of various steps to be gone over in its use, its proper adjustments, the errors to be looked out for, etc., are carefully considered; and in nearly every instance a numerical example is provided, generally taken from real laboratory note-books, and the solution and reduction are gone through with.

In short, in this respect, as many others, the book comes as near taking the place of the living instructor as can well be imagined. It must not be understood that the book is for the beginner in the study of electricity. It must at least be taken in connection with, and better after, a course in some elementary text-book on the subject, and, in addition, may go along with a course of lectures upon fundamental theories. The recognition of this fact is shown in the plan of the book itself, in which, in the first three chapters, the student is introduced to the leading principles of the science, its nomenclature, units of measure, etc., that the less elementary chapters which follow may offer less difficulty.

The chapter on resistance measurement is naturally full and complete, nearly all important and useful methods being given. A full discussion of the tangent galvanometer is given, together with the methods of determining its constants. Related to this is the determination of the magnetic elements, and a good deal of space is devoted to a very complete description of the Kew magnetometer: its use is described, and a series of observations is completely worked out. Other parts of the work are equally worthy of commendation, especially the series of appendices at the end, containing among other things a number of valuable hints as to the manipulation of material used in the construction of apparatus.

Nearly all of the formulas used in the reduction of observations are derived from elementary propositions, but the mathematical treatment of the subject is elementary, and well suited to the character of the work. In addition to its adaptability to class-room work, the book can be highly recommended to private students of electricity and magnetism.

Introduction to a Historical Geography of the British Colonies By C. P. LUCAS. Oxford, Clarendon Pr. 12°.

THIS little book is the first instalment of a larger work, to be published in parts, and dealing separately with the various dependencies of the British Empire. It gives not only a brief history of the founding of the British colonies, but treats of colonization generally, ancient and modern, and gives some chapters to what may be called the philosophy of colonization. Mr. Lucas defines a colony as a body of persons who have left their native country and permanently settled in another, and who in their new home form the bulk of the inhabitants. He then proceeds to consider the motives of colonization, the chief of which he finds to be these four: "love of enterprise, desire of wealth, social or political discontent, and religion." He does not attribute so exclusive an influence to over-population in the mother-country as some writers do, but thinks that the other motives have in many cases been more important than this. He gives a brief but interesting account of the influence of religion in the founding of colonies and the conquest of dependencies, and also of the effects of climate and race. A colonizing race should be not only enterprising and inclined to emigrate, but also endowed with an aptitude for commerce, and especially for law and government. Of these characteristics the last named is the most important: "Colonizing on any large scale must imply dealing with subject races, and the past has shown, that, in spite of other defects, the people which can govern will in the end prevail" (p. 27).

The brief history of colonization, ancient and modern, which the book contains, and the special account of the English colonies with which it closes, contain a large amount of information in a small compass, and, though treating of matters that are familiar to most readers of history, will be useful for reference. If the projected historical geography of England's colonies is carried out as well as it is begun, it will prove a valuable addition to historical literature.

Electricity for Public Schools and Colleges. By W. LARDEN. London, Longmans, Green, & Co. 12°.

THE ceaseless activity in all matters pertaining to electricity is shown in the continued appearance of books relating to the subject, in all parts of the world and in all languages.

This book is intended, as its title implies, to serve as a text-book for high-class public schools, and for colleges in which a thorough training in the fundamental principles of electricity and magnetism is furnished, in the development of which the instructor is restricted to elementary mathematics.

Few institutions of learning in this country can offer to their students more than this, and, in fact, not very many have found it possible to make use of a separate treatise upon the subject, except, of course, in the way of special elective courses.

Of the several books containing an elementary treatment of electricity and magnetism which have appeared within the last ten or fifteen years, this by Larden has the advantage of being one of the most recent, and in breadth of treatment, and thoroughness of execution, one of the best.

Only elementary mathematics is made use of, and it is therefore necessary occasionally to state a proposition on authority. Frequent references are given, however, to treatises in which such propositions will be found fully discussed. In some instances where elementary demonstrations are presented, the author has not selected the easiest and most simple. An illustration of this statement is to be found in his proof of the condition under which a battery gives a maximum current. Some of his discussions are also open to the objection of an excessive conciseness and brevity of statement, thus presenting difficulties which the average student of the class for which the book is intended will have difficulty in overcoming. The diagrammatic illustrations have been drawn especially for the work, and are generally very clear. A number of cuts of complete and well-known forms of apparatus are also furnished.

Among the commendable features of the book may be mentioned a very full discussion of induction machines (electro-static), including the Voss machine, the Holtz machine, and others, the operation of which is often very perplexing to students.

The author is not fortunate in his chapter on atmospheric electricity, and especially where he attempts to account for the varying potential of the atmosphere.

The treatment of electric measurements is tolerably full, sufficiently so for a book of this kind, in which one ought not to expect to find all of the now nearly innumerable methods and devices. The chapter on Joule's law and the conservation of energy is especially complete, although not long; and other chapters, on electro-dynamic induction, the dynamo, induction coils, etc., will be found quite satisfactory. Many teachers and students of the science will welcome the book, and find it useful in their work.

The Science of Politics. By WALTER THOMAS MILLS. New York, Funk & Wagnalls. 12°.

IN taking up a book with the above title, we naturally expect to find it treating of the duties and functions of the State, or of its organization or its history; but these topics are scarcely touched upon in the work before us. The author himself states his subject to be the duties of citizenship and the means of performing them; but he confines himself mostly to the treatment of political parties. Mr. Mills, as he tells us on his titlepage, is a journalist; and the influence of his profession is a little too plainly visible in this work, the style showing some of that offhand infallibility which many journalists affect. As regards matter, the book is not specially profound or original, yet it nevertheless contains much that is good. The author has in the main very correct ideas as to the nature and functions of parties and the rights and duties of the citizen with regard to them. He sees clearly that a party without principles is worthless, and that the fact that a party has done well in the past is no guaranty that it will always do well in the future. He vigorously maintains the right to bolt a bad nomination, and the right and duty of leaving an old party and joining a new one in case the old one proves recreant to its trust. Such views as these are not yet so widely accepted in this country as they ought to be; and, if this book should be read by the right persons, it can hardly fail to