sugar-sirup are made in the neighborhood of Florence. The oranges imported into Leghorn, whether for consumption or for candying, are nearly all brought from the islands of Sicily, Sardinia, and Corsica. In all the countries contributing the raw fruit for this industry, it is treated in the same manner for the over-sea passage. The fruit is simply halved and placed in hogsheads or large casks filled with a fairly strong solution of brine, the fruit being halved merely to insure thorough preservation of the rind by an equal saturation of the interior as well as the exterior surface. In these casks it arrives at the doors of the manufactory. The first process to which it is then subjected is the separation of the fruit from the rind. This is done by women, who, seated round a large vessel, take out the fruit, skilfully gouge out the inside with a few rapid motions of the forefinger and thumb, and, throwing this aside, place the rind unbroken in a vessel alongside them. The rind is next carried to large casks filled with fresh cold water, in which it is immersed for between two and three days to rid it of the salt it has absorbed. When taken out of these casks, the rinds are boiled, with the double object of making them tender and of completely driving out any trace of salt that may still be left in them. For this purpose they are boiled in a large copper caldron for a time varying from one to two hours, according to the quality of the fruit and the number of days it has been immersed in brine. When removed from this caldron, the peel should be quite free from any flavor of salt, and at the same time be sufficiently soft to absorb the sugar readily from the sirup in which it is now ready to be immersed. The next process to which the rind is subjected is that of a slow absorption of sugar, and this occupies no less than eight days. The absorption of sugar by fresh fruit, in order to be thorough, must be slow, and not only slow but also gradual; that is to say, the fruit should be at first treated with a weak solution of sugar, which may then be gradually strengthened, for the power of absorption is one that grows by feeding. The fruit has now passed into the saturating-room, where on every side are to be seen long rows of immense earthenware vessels, about four feet high and two feet and a half in extreme diameter, in outline roughly resembling the famed Etruscan jar, but with a girth altogether out of proportion to their height, and with very short necks and large open mouths. All the vessels are filled to the brim with citron and orange peel in every stage of absorption; that is to say, steeped in sugar-sirup of about eight different degrees of strength. This process almost always occupies eight days, the sirup in each jar being changed every day; and with vessels of such great size and weight, holding at least half a ton of fruit and sirup, it is clearly easier to deal with the sirup than with the fruit. To take the fruit out of one solution and to place it into the next stronger, and so on throughout the series, would be a very tedious process, and one, moreover, injurious to the fruit. In each of these jars, therefore, there is fixed a wooden well, into which, a simple hand suction-pump being introduced, the sirup is pumped from each jar daily into the adjoining one. A slight fermentation next takes place in most of the jars; but this, so far from being harmful, is regarded as necessary, but is not allowed to go too far. There is yet another stage, and that perhaps the most important, through which the peel has to pass before it can be pronounced sufficiently saturated with sugar. It is now boiled in a still stronger sirup of a density of forty degrees by the testing-tube; and this is done in large copper vessels over a slow coke fire, care being taken to prevent the peel adhering to the side of the vessel by gently stirring with a long paddle-shaped ladle. This second boiling occupies about an hour. Taken off the fire, the vessels are carried to a large wooden trough, over which is a coarse open wire netting. The contents are poured over this, and the peel distributed over the surface of the netting, so that the sirup, now thickened to the consistency of treacle, may drain off the surface of the peel into the trough below. The peel has now taken up as much sugar as is necessary. Next comes the final process, — the true candying, or covering the surface of the peel with the layer of sugar-crystals which is seen on all candied fruits. To effect this, a quantity of crystallized sugar (at Leghorn the same quality of sugar is used as is employed in the preparation of the sirup) is dissolved in a little water; and in this the now dried peel, taken off the wire netting, is immersed. The same copper vessels are used, and a mixture is again boiled over a slow fire. A short boiling will suffice for this the last process; for the little water will quickly be driven off, and the sugar, upon cooling, will form its natural crystals over the surface of the fruit. Poured off from these vessels, it is again dried upon the surface of the wire netting, as before described. The candying is now complete, and the candied peel is ready for the packing-room, to which it is carried in shallow baskets. In the packing-room may be seen hundreds of boxes of oval shape and of different sizes, for each country prefers its boxes to be of a particular weight; Hamburg taking the largest (of 15 and 30 kilograms), the United States preferring smaller (of 10 and 12 kilograms), while England takes the smallest (of 5 kilograms), and one containing about 7 English pounds.

## BOOK-REVIEWS.

*Force and Energy. A Theory of Dynamics.* By GRANT ALLEN. New York, Longmans. 8°. $2.25.

IN this work the author presents a new view of some of the concepts of physical science. The current views he holds to be erroneous, and, though he says that he puts forth his work with profound diffidence, it is evident that he feels great confidence in its correctness. The essential point in his theory is the distinction he draws between force and energy, both of which he includes under the term "power." Power he defines as "that which initiates or terminates, accelerates or retards, motion." He then goes on to divide power into two varieties, — force, or aggregative power; and energy, or separative power. Among forces he reckons gravitation, cohesion, and chemical affinity; and among energies, heat, muscular power in many cases, and, in short, whatever separates bodies or particles from one another. This theory he first states in an abstract form, and afterwards proceeds to an account of the various actual concrete forces and energies in the universe, mechanical, chemical, and vital, endeavoring to show that his views are not only consistent with the known facts and laws of physical science, but are essential to a correct understanding of them.

As to the merits of Mr. Allen's views, we shall not now enter on any elaborate criticism; but certainly his use of terms is not accordant with the common practice either of scientists or of writers generally. The term "power" has always been used in philosophy to denote causality viewed hypothetically; as when we say that fire has power to melt wax, meaning that it will melt wax if the two are brought into contact. Force, on the other hand, is commonly used to mean what Mr. Allen calls power; namely, any cause that in any way affects motion. The distinction Mr. Allen draws between separative and aggregative powers is of course a real distinction; and yet he himself finds it impossible to maintain it with perfect consistency. Thus, he calls the motion of a falling body and the contraction of a cooling body, energies, although they are obviously aggregative; and his attempt to remove the inconsistency does not seem successful. We commend the work, however, to the attention of our readers, as it is well written and with earnestness of purpose, and will doubtless be provocative of thought.

*Life of Charles Blacker Vignoles.* By his son, Rev. OLINTHUS J. VIGNOLES. New York, Longmans. 8°. $5.

THE subject of this memoir was one of the pioneers in railroad engineering, a work which in its early development required far more inventiveness and fertility of resource than is the case now; and his son has done well in laying an account of his life before the public. The book is well written, and with as much impartiality as could be expected in so near a relative of the hero. Vignoles was born in the last decade of the eighteenth century, and lived to the ripe age of eighty-two. He lost his parents in early life, and went to live with his maternal grandfather, with whom he afterwards had an irreconcilable quarrel. On reaching manhood, he entered the army, and by the aid of influential friends and his own merits rose in a few years to the position of lieutenant; but the conclusion of peace after Waterloo deprived him of the hope of further advancement, and he came over to America, and went to work as a civil engineer. He was employed in South Carolina and other Southern States, and by his experience there prepared himself for the more difficult work of railroad engineering, in which

he was soon to engage. Returning to England, he was in a few years employed to assist in laying out and building the Liverpool and Manchester Railway, on which Stephenson's locomotive engine attained its memorable success. After a while he quarrelled with Stephenson, and parted from him; but he speedily found employment elsewhere, and for many years was occupied on various railroads in Great Britain and Ireland, and afterwards in Germany, Spain, and Brazil. He also built the suspension-bridge over the Dnieper River at Kief, — a structure half a mile long, the construction of which occupied seven years.

Such were the works performed by Vignoles; and they entitle him, as his biographer justly says, to a high position among the pioneers of modern engineering. The man had also some excellent personal qualities, such as honesty, energy, and conscientiousness in work; he had considerable literary skill, as the extracts from his diary and letters show; and he was considered a pleasant companion in society. On the other hand, as his biographer admits, his temper was not the best; and besides his quarrel with his grandfather, which is left unexplained, he had others with Stephenson and Brunnel, which are passed over lightly in this book, but which were evidently not to his credit. He was also unskilful financially, and at one time lost eighty thousand pounds through his own imprudence, with the result that he had to begin all anew. In spite of his faults, however, he was a useful man; and the record of his life is an interesting story, particularly for members of the engineering profession and for all persons interested in railway history.

## AMONG THE PUBLISHERS.

THE Catholic Publication Society Company will publish immediately "An Explanation of the Constitution of the United States of America," prepared for the use of Catholic schools and academies, by Francis T. Furey.

— Professor Max Müller's new book on "Natural Religion," being the Gifford lectures which he delivered at Glasgow last year, will be issued here in a few days by Longmans, Green, & Co.

— Lee & Shepard will publish shortly "Pens and Types, or Hints and Helps to Those who Write, Print, Speak, Teach, or Read," a volume full of new and original matter, by Benjamin Drew.

— The Forest and Stream Publishing Company have published a book on "Log Cabins and How to Build and Furnish Them," by William S. Wicks, illustrated with many plans and other illustrations.

— Messrs. Ginn & Co. have issued a catalogue and announcements for 1889. Although this catalogue is complete, yet, as it is primarily designed for high-school and college instructors, it gives but very little space to their common-school publications.

— The delegates of the Clarendon Press will shortly issue Mr. Oliver Aplin's "Birds of Oxfordshire;" the second volume (treating of electro-dynamics) of Messrs. Watson and Burbury's "Mathematical Theory of Electricity and Magnetism;" and a new edition of the fourth volume (on the dynamics of material systems) of Professor Bartholomew Price's "Treatise on Infinitesimal Calculus."

— Messrs. Trübner & Co. will publish, probably in October, "An Account of the Aborigines of Tasmania, their Manners, Customs, Wars, Hunting, Food, Morals, Language, Origin, and General Characteristics," by Henry Ling Roth, assisted by E. Marion Butler. The work will contain a chapter on the osteology, by Dr. J. G. Garson, and a preface will be contributed by Dr. E. B. Tylor. Numerous autotype plates, from original drawings made by Edith May Roth, will illustrate the text. The edition will be strictly limited to subscribers.

— Funk & Wagnalls have in preparation an "Encyclopædia of Missions." The encyclopædia proposes to give the history, geography, ethnology, biography, and statistics of missions, from the apostolic times to the present. There will be full maps, diagrams, and a copious index. The best authorities on missions in this country and in England have been consulted, and the materials are being furnished from all parts of the mission-field, by those best qualified to give the most accurate and complete information.

— Rand, McNally, & Co. have just issued the "Globe Series of School Maps," an entirely new series, newly engraved on a large scale, and corrected by the latest official and private data. The series comprises seven maps, — the United States, North America, South America, Europe, Asia, Africa, and the world on Mercator's projection. All excepting the map of the world (which is 58 by 41 inches) are 66 by 44 inches, — a size which permits of their use in the largest schoolrooms, where the details can be seen by the entire class.

— The annual report of the Ohio Agricultural Experiment Station will hereafter be issued in the form of a monthly bulletin, the issues of each calendar year constituting a volume. These bulletins will be consecutively paged, and the December number will contain an index to the entire series of the year, thus putting them in convenient shape for preservation for reference. By this change the results of the station's work for each season will be placed before the farmers of the State nearly or quite a year earlier than was possible when the annual report was issued in a single volume at the close of the year. The bulletins will be sent to any resident of Ohio free of charge, on application to the Experiment Station, Columbus, O.

— Messrs. Ginn & Co. announce for publication Sept. 1 the "Common School Song-Reader: A Music-Reader for Schools of Mixed Grades," by W. S. Tilden, teacher of music in the State Normal School, Framingham, Mass. This book is designed to adapt and apply the principles of the national system of musical instruction to those schools where the special conditions and grading are such that the full and regularly graded series cannot be so conveniently and effectively used. While containing an interesting repertory of school-songs, new and old, which fits it for use where systematic instruction in music is not attempted, it is especially intended for those schools in which the principles of elementary instruction and singing by note are to be taken up according to the most approved methods. Very full instructions for teachers are given at each step. Besides the work in the reading course, a collection of easy pleasing songs in one, two, and three parts (with bass clef), will be found.

— Robert Grant, the author of "The Confessions of a Frivolous Girl," has written the third article in *Scribner's* Fishing Series for the August issue, entitled "Tarpon Fishing in Florida." Mr. Grant, during the past winter, made a special trip to St. James City, Fla., to gather material for this article, and had the good fortune during the second day's fishing to capture an enormous tarpon, six feet long, and weighing 132 pounds. His description of his three-hours' fight with this tremendous fish is one of the most graphic pieces of sportman's literature of recent years. The article is fully illustrated from photographs made at the time, which have been carefully redrawn by Burns, Woodward, and others. President Henry Morton, in his article on "Electricity in Lighting," will describe the actual processes of manufacturing dynamos and incandescent lights as carried on in some of the largest factories in this country. The illustrations add very much to these descriptions, as they are made from instantaneous photographs taken while the men and women are at work.

— Messrs. Ginn & Co. announce for publication in the College Series of Greek authors, "Euripides, Iphigenia among the Taurians," edited by Professor Isaac Flagg. Professor Flagg's "Iphigenia" is not based upon any other commentary, but is an independent work, adapted to the needs of American colleges, and designed to facilitate the sympathetic study of this most charming and justly celebrated drama of Euripides. Since the play is well suited to be taken up as a first tragedy in a course of Greek reading, both the introduction and the notes have been written with especial regard to the enlightenment of beginners in the dramatic literature. At the same time, the finer insight and higher cravings of the advanced reader are constantly remembered. The introduction sets forth the celebrity of the play, with quotation in full of the most memorable classical passages that bear upon it; sketches the legend in its literary and popular development; ex-