to admit that we expect very little new light. Hitherto our efforts have been devoted to bringing together the facts, and to arranging and comparing them, and we have as yet given but little consideration to this final question. It will, however, shortly engage our attention; and, in anticipation of this, we prefer to remain silent for the present, fearing that if we commit ourselves here to any preference for a particular view, we may find ourselves encumbered with a bias arising from the intensely human propensity to defend, through thick and thin, utterances which have once been formally given.

C. E. DUTTON.
EVERETT HAYDEN.

WAGNER'S ANNUAL REPORT ON THE PROGRESS OF GEOGRAPHY.

IT is always with some impatience that we expect the publication of Wagner's report on the progress of geography (*Geographisches Jahrbuch*), because we know that we shall find there a full report of the work done in the field and in the study, and that we shall have a never-failing book of reference. We do not know of any similar publication, — except the fragmentary notes published by the Smithsonian institution and in the journals of many societies, — and therefore it is indispensable to the geographer. Though *Petermann's Mittheilungen*, the leading German geographical journal, contains regular reports on recent publications, their character is different from those in the *Jahrbuch*, the reports in the journal giving a more detailed review of the single publications, and being more disconnected. The list of reviewed books is consequently not so full as that of the annual report. The latter gives a comprehensive account of the work done during the last two years. The present volume is the eleventh of the series. The editor, Prof. H. Wagner of Göttingen, has preferred to divide the material, and to publish alternating volumes, one containing the various branches of geography, the other the progress of explorations, methods and teaching of geography, etc. Through this division, the book has increased in volume and the report has become more exhaustive. The present volume contains the special part, geophysics, geognosy, oceanography, climatology, geography of plants and animals, and ethnology. The place of the late Professor Zöppritz is taken by Dr. Hergesell and Dr. Rudolph; the former report on deep-sea explorations has been enlarged so as to cover all problems of oceanography, and is given by Professor Krümmel; F. Toula reports on geognosy; the other parts are in the hands of the same specialists who gave the valuable reports of former years.

In looking at the long series of reports, we find that each number served more satisfactorily the purpose of being a reliable book of reference to all interested in geography. At the present time there are few branches of geographical study which are not embraced in the book. The steady development of the plan, by dropping unnecessary parts, including in one part what belongs together, and adding new departments which had developed into important branches of science, encourages us to hope that within a few years the whole domain of geography will be represented in it. We should wish, for instance, to have an additional report on the history of geography. That on terrestrial magnetism is promised for next year. Among the important additions in the volume of 1887 is the first report of the geography of ancient Greece and the neighboring countries. The ancient geography of other countries, except that of the birthplace of our culture, is so little studied, that the contents of a biennial report would be very meagre. We hope, with the development of these studies, which are principally carried on by ethnographers, we shall find an account of these also. In 1882 Egli's reports on the study of geographical names, and S. Günther's on the theory of map-projections, were added to the book. We consider it a waste of time and work, that the Physical society of Berlin continues its reports on physical geography in the way they were given before the *Jahrbuch* had attained its present importance. It is true that they contain some material not included in the *Jahrbuch*, for instance, measurements of heights, etc.; however, these would far better find their place in the latter publication than in the reports on the progress of physics.

The rapid development of the *Jahrbuch* and the fact that every department is intrusted to the care of a specialist, make it an extremely reliable and useful book, which is a valuable help to the student of geography.

Geographisches Jahrbuch. Vol. xi. 1887. Ed. by HERMANN WAGNER. Gotha, Justus Perthes, 1887.

THE MECHANICS OF MACHINERY.

PROFESSOR KENNEDY is well known as one of the ablest among British workers in this field, and this volume contains a series of lectures delivered by him to his classes during the period of his connection with the University college, on a subject with which he is especially familiar. As was to be expected, the work is one of exceptional value.

The mechanics of machinery. By ALEX. B. W. KENNEDY. London, Macmillan. 16°.

The subject is the mechanics of constrained motion, and is purely kinematics.

The book is a volume of about 650 pages, and is divided into a dozen chapters. The first six chapters consider purely geometric problems in the elements of kinematics and mechanism, introducing some interesting methods of solution involving 'virtual' rotations; securing a means of treating all mechanisms, whether of rotational or of rectilinear movement, by the same system; and greatly simplifying the work. In the seventh chapter, accelerations and retardations are considered; and in the succeeding chapter, static equilibrium and work-diagrams. Then follow chapters on problems in machine dynamics, and on parallel and other familiar mechanisms, and various trains. The last chapter considers the modifications introduced by the action of friction. In these applications we find the motions of the steam-engine and its accessories, of the fly-wheel, connecting-rod, and governor, and the various sorts of gearing. The author is one of the few writers who have yet had the courage to drop the fallacious and misleading so-called laws of friction, as enunciated by earlier writers, and to introduce the results, even though very briefly, of recent research, with correct statements of the enormously differing, lately discovered laws of friction of lubricated surfaces.

Professor Kennedy follows Reuleaux, in the earlier part of his lectures, as far as opportunity and necessity dictate, but soon gets out into a field all his own, and develops his treatment in his own logical and fruitful manner.

The book is well illustrated, pictorially and by examples; the references are conscientiously introduced throughout; and the volume, as a whole, is remarkably well adapted for use as a text-book in technical schools, and will also be found very useful to the practitioner. R. H. THURSTON.

A MODEL FOR AMATEUR ASTRONOMERS.

BARON VON ENGELHARDT has recently published, in a handsomely printed and bound volume of two hundred and twenty quarto pages, a series of astronomical observations made at his private observatory in Dresden from 1879 to 1886. The observations were all made by Baron von Engelhardt himself, and they give evidence of a good observer, while the reductions have been made in a most thorough manner. It is rarely, indeed, that we find work of this character systematically carried on for so many years by an amateur; and it implies, moreover, a good deal of careful preliminary training. The field chosen is not the 'new astronomy,' with its many fascinations, but the more prosaic 'old astronomy,' the astronomy of the elder Struve and of Bessel, — painstaking measurements of double stars, comets, asteroids, nebulae, and clusters, observations of moon-culminations, occultations, etc., all valuable contributions to our knowledge of the positions and motions of the heavenly bodies. Here is an excellent example for the amateur astronomers of this country. There are plenty of fine instruments in the hands of amateurs, and only a moderate amount of industry is called for, yet hardly one of these instruments is doing any thing for the advancement of science. In England there are several private observatories of world-wide reputation, in which the owner either carries on regular observations himself, or employs a competent assistant; while here, since the death of Dr. Henry Draper, the field is almost deserted.

Baron von Engelhardt built a small observatory in 1877, in which was mounted an 8-inch Grubb equatorial; but, finding this at an inconvenient distance from his home, he put up a more elaborate building connected directly with his villa on the outskirts of Dresden.

The new observatory is a three-story tower, the upper story being surmounted by a cylindrical 'dome' containing a 12-inch Grubb equatorial. The second floor connects with the transit-room, in which is a 'broken-back' transit by Bamberg of 2.7 inches aperture. The observatory is also thoroughly equipped with subsidiary apparatus, clocks, chronometers, chronograph, etc. Upon the roof of the villa is a little 'comet observatory,' where were formerly two telescopes, one of 6.4 inches aperture, and the other of 3.7 inches. The larger instrument, which is patterned after the Strassburg comet-seeker, is of somewhat novel construction: the telescope is fastened by two long arms to the back of a comfortable chair, so that the eye-end of the telescope is just at the height of the observer's eye; the arms are pivoted to the chair-back, permitting a motion in altitude, while the chair turns about a vertical axis, like an ordinary office-chair, so that the astronomer can examine the whole sky rapidly and without fatigue. The mounting for this instrument is now at the University of Kiel.

The volume before us contains a full description of the instruments, illustrated by several plates. The observations and reductions are given in some detail, and the whole work would reflect credit upon any observatory.

Observations astronomiques. Par B. D'ENGELHARDT. Première partie. Dresde, 1886. 4°.

WORK will begin in June next on the Holstein canal, to connect the Baltic with the North Sea.