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.