clusions of much interest. He was also able to show, both in the frog and mammal, the influence of the mid-brain upon those movements.

One of the most important pieces of work here recorded is that in which Martin experimentally determined that the internal intercostal muscles are expiratory in their function throughout their whole extent, thus finally settling a question which had divided physiologists ever since physiology was recognised as a science. This he was enabled to do not by experiments upon models, nor upon the cadaver, but by direct observation in the living animal; a method which will always remain the only satisfactory one for solving such problems.

The physiologists of this country owe a debt of gratitude to their American colleagues for having provided them in so handsome a form with this important collection of monographs. E. A. SCHÄFER.

OUR BOOK SHELF.

Atlas d'Ostéologie. Articulations et Insertions Musculaires. By Prof. Ch. Debierre. Pp. viii + 92. (Paris: Alcan, 1896.)

THIS atlas contains 88 plates with 251 figures illustrating the human skeleton. Figures are also given to illustrate the ligaments of the various joints, and, further, for each bone the muscular attachments are indicated by red printing. The mode of development and microscopic of bone are illustrated by five figures, and in a few cases a certain amount of comparative osteology is introduced. The figures are by no means better than those given in the standard text-books, and it is a pity that no mention is made in each case of the amount of reduction or magnification made in the drawing. Some of the figures are very confused, and the individual parts difficult to recognise. This is especially the case with such figures as the base of the skull with the soft parts left attached (Fig. 82). In many cases it seems a mistake that the figures have not been drawn on a larger scale, as much room is often wasted on the plates.

Mechanics for Beginners. By W. Gallatly, M.A. Pp. 253. (London: Macmillan and Co., Ltd., 1896.)

THE special characteristics of this book are stated to be (1) the large number of examples—eight hundred—of which one hundred and sixty are worked in full; (2) the great attention given to work, power and energy; (3) the classification, in small sections, of problems of the same type, the method of dealing with each section being explained by a worked example. Teachers of elementary theoretical mechanics will know how to appreciate these important qualities of the book. The descriptions are very clear, and the diagrams are helpful. The student who uses the treatise as a text-book, familiarising himself with the illustrative examples, and working through only a part of the well-selected and comprehensive exercises, will be equipped for almost any examination in elementary theoretical mechanics. And he will, at the same time, lay up in his mind a fund of useful knowledge.

Engineer Draughtsmen's Work. By a Practical Draughtsman. Pp. 96. (London: Whittaker and Co., 1896.)

STUDENTS in technical schools will find in this book a number of valuable hints on the use of mathematical instruments and the work of drawing-offices. The information is very elementary, but its character is such that it will train young draughtsmen to be accurate and methodical in their work.

Forty-eight pages of advertisement are bound up with the ninety-six pages of text.

LETTERS TO THE EDITOR.

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Flying Engines.

IN the summer of 1893, I made some experiments on the effect of steam-jacketing small steam-engine cylinders by placing the whole of the cylinder and valve chest inside the boiler; the increase of economy was so marked, that I was led to try whether a small toy engine could be made to sustain its own weight in the air by the lifting power of an air screw on the crank-shaft.

Fig. 1 shows this little engine. The boiler is of seamless steel $2\frac{1}{2}''$ diameter, 14″ long, and ·01″ to ·015″ in thickness; the steam cylinder, single acting, $1\frac{1}{4}''$ diameter by 2″ stroke, and about ·03 thickness of tool steel; the piston is of thin cup form, also of tool steel; the admission valve is cylindrical, $\frac{5}{16}''$ diameter, cutting off at $\frac{3}{4}$ stroke. The whole of the valve and cylinder are within the boiler. Some parts of the engine were soft soldered, and some hard soldered; the screw is of cane covered with silk. The working pressure was limited to about 50 lb. per square inch. The total weight of the apparatus, with water, as in Fig. 1, is $1\frac{1}{4}$ lb.

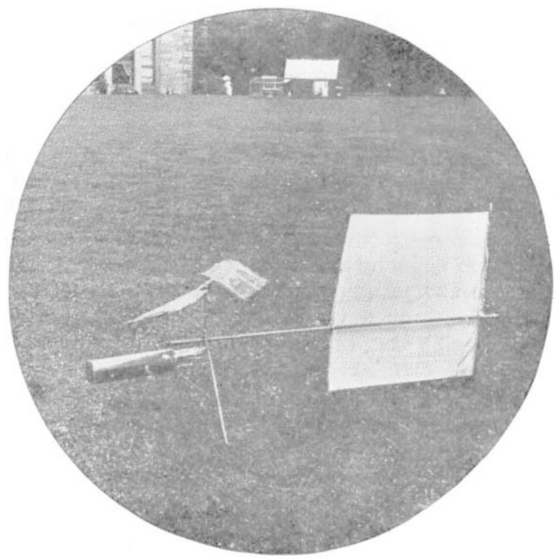

FIG. 1.—Steam engine and boiler working lifting screw; large plane to prevent rotation of boiler; total weight $1\frac{1}{4}$ lb. I.H.P. developed, $\frac{1}{4}$. Raised itself about 12 feet in the air, with steam contained in boiler. No firing after start. Initial pressure 50 lb. Maximum revolution about 1200 per minute.

Steam was raised by placing the boiler over a spirit-lamp, and when 50 lb. was registered on the gauge, and the engine started, it raised itself in the air vertically to a height of several yards. The revolutions of the engine were about 1200 per minute, and the i.h.p. $\frac{1}{4}$ horse-power.

The same engine was then mounted on a framework of cane, covered with silk, forming two wings of 11 feet span, and a tail, the total area being about 22 square feet. The total weight was now $3\frac{1}{2}$ lb., and when launched gently from the hand in an inclined horizontal direction it took a circular course, rising to a maximum height of about 20 feet. When the steam was exhausted, it came down, having traversed a distance of about 100 yards.

Fig. 2 shows the machine in mid-air. The photographs were taken by Mr. Gerald Stoney.

Considering the primitive construction of the apparatus, the result clearly showed that flights of considerable distance, possibly some miles, were quite possible with a small economical steam-engine mounted on aeroplanes.

The boiler was also found to be able to steam the engine continuously by using methylated spirits intead of water in the boiler,