examination for commercial certificates, a chapter on exchange and foreign money has been added (in a worked-out example on p. 151 there is an error of some pecuniary magnitude), and the chapter "On Recurring Decimals, not required by Commercials," finds a place at the close of the text. Mr. Lock is generally so careful in his explanations that we are surprised at his omitting all reference to brokerage in his account of the transferment of stock. Numerous examples are given in the text, and six examination-papers and answers to all questions complete a capital hand-book.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Weight and Mass.

PROF. GREENHILL, in his letter which appears in NATURE of May 17 last (p. 54), has again repeated his views on the use of the word *weight*. He has not, however, replied to the criticisms of those who differ from him (see NATURE, vol. xxxvi. pp. 221, 317).

His opponents wish to know how practical engineers who use the word *weight* as synonymous with the physicists' mass, treat a problem involving inertia. Prof. Greenhill has not yet given us an example of such a problem taken from some modern text-book of the practical engineer; nor has he yet given us in simple language a definition of weight. Prof. Greenhill some time ago referred me to Kennedy's "Mechanics of Machinery" for such a definition, but I venture to say that there is no such definition to be found in that standard work.

My own idea is as follows: Matter has many properties—inertia, weight (the force with which the earth pulls it), volume, &c.—and Newton's great discovery consisted partly in seeing clearly that the universal property of matter by which it must be measured is its *inertia*, defined as its capacity for resisting change of velocity.

The *mass* of a body is that which can be ascertained by the operation of *massing*; such an operation, that is, as the following: To a given lump of matter apply some strain or force, and observe the acceleration produced in the matter by that force; then ascertain by experiment to how many lumps of matter called pounds this same force will communicate an equal acceleration.

The *weight* of a body is that which is ascertained by the operation of *weighing*. To weigh a body it is placed on a spring balance, and the force of the earth's attraction is observed by showing the compression of the steel spring of the machine.

It happens, however, that the mass of a body is proportional to its weight; consequently it is sufficient to ascertain whether the weights of two masses are equal in order to ascertain that their masses are equal. The weights of two masses are ascertained to be equal by putting them each on one side of a balance, and observing that the force of the earth's attraction on each is the same. Hence the very difficult operation of *massing* as described above is replaced by the easy operation of weighing.

Prof. Greenhill tells us that "now the invariable unit, the mass, is measured in terms of a variable unit." Is this so? Is it not a fact that those who use exclusively the force of the earth's attraction as the measure of matter, rarely if ever have any conception of the idea of inertia? When the practical engineer has to do with inertia, as in cases of "*centrifugal force*," he works by formulæ or rule of thumb.

Prof. Greenhill's sentences, "a force equal to the weight of the mass of 10 pound weights," and "the weight of 32 pound weights on the Earth is at the surface of Jupiter a force of 71 pounds' weight," are entirely original.

I believe he means to express "the weight of 10 pounds," and the weight of 32 pounds on the earth is a force equal to the weight of 71 pounds on the surface of Jupiter.

Caius College, May 21. JOHN B. LOCK.

Work and Energy.

WHILE a discussion of the nomenclature of mechanics is going on in NATURE, I would venture to suggest that an effort should be made to get rid of the practice of expressing energy in foot-pounds or foot-poundals. There are certain quantities of work, not of energy. To speak of a foot-pound of energy is quite as incorrect as it would be to speak of a pint of velocity, a yard of acceleration, an acre of momentum, or a pound of duration. There is great need of a short name for the unit of $\frac{1}{2}mv^2$.

Bardsea, May 21. EDWARD GEOGHEGAN.

On the Reappearance of Pallas's Sand Grouse (*Syrrhaptes paradoxus*) in Europe.

I BEG to add the following statements to my communication of May 12 concerning Pallas's sand grouse in Central Europe (see NATURE, May 17, p. 53):—

April 22, Cernozitz, Bohemia.
,, 26, Portitz, near Leipzig, Saxony.
,, 27, Güttmannsdorf, near Reichenbach, Silesia.
,, 27? near Hanover.
,, 27–28, near Hermannstadt, Transylvania.
,, 29, Marmarosch-Comitate, Hungary.
Last days of April: Alsofehér-Comitate, Transylvania.
Gebhardsdorf, Silesia.
Brod, Bohemia.
First days of May: Tullner-field, near Vienna.
Moravia.
Hungary.
Enzersdorf, near Vienna.
Anclam, Pomerania, Prussia.
May 6, Haida, Bohemia.
,, 6, Eidelstedt, near Hamburg.
,, 7? near Schweinitz, Silesia.
,, 7, Oederan, Saxony.
,, 7, 6.30 a.m., near Oederan, Saxony.
,, 8, Wiener Neustadt, Austria.
,, 8? Dalmatia.
,, 8? Grossvoigtsberg, Saxony.
,, 8? near Leipzig, Saxony.
,, 8? near Herrenhut, Saxony.
,, 9, Oederan, Saxony, and nearly every following day there.
,, 13, Selb, Saxony.
,, 13? Grossvoigtsberg, Saxony.
,, 13, Schluckenau, Bohemia.
,, 16, 5 p.m. Oederan, Saxony.

A. B. MEYER.

Royal Zoological Museum, Dresden, May 20.

A FARM in this neighbourhood was visited yesterday by a flight of about forty sand-grouse (pin-tailed). They were first seen about 6 p.m. feeding on a ploughed field. On rising they took a north-westerly course. A pair which were shot by a gamekeeper are in my possession. The presence of these birds in our country is, I believe, of sufficiently rare occurrence to justify me in asking whether they have been noticed in other districts during the last few days. F. M. CAMPBELL.

Rose Hill, Hoddesdon, Herts, May 21.

Tables of Reciprocals.

IN investigating spectral phenomena it is often necessary to convert wave-lengths in frequencies. Can any of your correspondents inform me if there exist in England tables of reciprocals, by which this may be done easily and with sufficient accuracy? V. A. JULIUS.

Delft, Holland, May 19.

On the Veined Structure of the Mueller Glacier, New Zealand.

THE Mueller Glacier, in the Mount Cook district, has a total length of between six and seven miles, with a breadth of one mile in its lower portion. Like most, if not all, of the New Zealand glaciers of the first order, the lower mile or two is so thickly covered with rock debris that the ice can only be seen in the crevasses. All through the lower portion of the glacier the veined or ribboned structure is well marked, running nearly in the direction of the glacier. But at the terminal face there are two systems of veined structure, with the same strike but crossing one another at angles between 15° and 20°. In one system the blue bands are small, from a half to one inch thick, and separated from each other by bands of white ice, with large air-