These relations are derived from the equation $W = Mg$, the source of all confusion in Dynamics, and it is gratifying to find from Prof. Mendenhall that a crusade against it is in progress in America.

It is needless to repeat here the objections against this equation, but it is easy to see how it arose.

Mathematicians now measure mass in pounds, so that the mass of a body is the number of pounds of matter in the body (*the weight* in the vernacular); and the equation $W = Mg$ means that the weight of M pounds is Mg poundals, according to their definition that "the weight of a body is the force with which it is attracted by the earth"; but this was not so originally.

Early writers on Dynamics, before Gauss invented the absolute unit of force, always employed the statical gravitational unit, and then if a weight of W pounds was acted on by a force of P pounds, the equation of linear motion was $\frac{W}{g}\frac{d^2x}{dt^2} = P$.

To avoid the necessity of writing and printing $\frac{W}{g}$, it was replaced by the letter M, and called the *mass*; the unit of mass being thus g pounds. But now the invariable quantity, the mass, is measured in terms of a variable unit, while the variable unit of force is the attraction of the earth on a 1-pound weight.

Although such words as "a force equal to the weight of the mass of 10 pound weights" do not occur in Prof. MacGregor's book, they are strictly derived from his own definitions; and so is the following, "the weight of 32 pound weights on the Earth is at the surface of Jupiter a force of 71 pounds' weight." I bring forward these illustrations to show that the fine distinction between "10 pound weights" and "10 pounds' weight" is not workable; and to show that the addition of the word *weight* to *pounds* does *not* convey the idea of *force* in ordinary language, and is not clear even in the language of the precisionists.

Nor can the equation $p = gpz$ in Hydrostatics be defended, as capable of expressing a pressure in pounds on the square foot (or more commonly on the square inch); for, if Prof. MacGregor applies this equation to a numerical example, he will find himself dividing by g in one operation, only to multiply by g in the next. The unreal character of these changes of units is apparent when we come to numerical examples; the defect of our dynamical teaching is that the student is so rarely brought before a practical numerical illustration on a large scale.

The rest of Prof. MacGregor's remarks I must answer very briefly, for fear of occupying too much space.

The *kilometre* was designed to be the centesimal minute of latitude, to replace the *geographical or sea mile*, which is the sexagesimal minute of latitude; the quadrant of the earth is therefore 10,000 kilometres, or 10^9 centimetres, and $90 \times 60 = 5400$ geographical or sea miles.

The cosmopolitan unit of speed at sea is the *knot*, which is a *velocity* of one geographical mile an hour; if 10 knots, spaced about 50 feet apart, pass over the taffrail in half a minute, the vessel is said to be going 10 knots. All civilized nations measure speed at sea in *knots*, in French *nœuds*, German *knoten*, Dutch *knoopen*, Italian *nodi*, Spanish *nudos*, &c. In precision *knots an hour* is on a par with *atmospheres per square inch*.

It is unfortunate that we have not yet reached uniformity in the use of the words *elongation* and *extension*. The French treatises, and our practical writers, Rankine, Unwin, &c., use *tension* and *extension*, *pressure* and *compression*, to denote simple longitudinal stresses and their corresponding strains; the ratio of *tension* to *extension*, or of *pressure* to *compression*, being the *modulus of elasticity*. This variation in terminology must be settled by some arbitrator, say Prof. Karl Pearson.

In conclusion, speaking on behalf of engineers and practical men, I beg to say that the treatment of the subjects of weight, mass, and force, in our ordinary text-books of Mechanics, is by no means clear or satisfactory, and requires careful revision.

Woolwich, May 4. A. G. GREENHILL.

Density and Specific Gravity.

IF Mr. Cumming's definition of *specific gravity* be accepted, the confusion, already serious enough, in the minds of beginners in physics between mass and weight will be much increased. Surely the best and clearest definitions of *density* and *specific gravity* are those given in Glazebrook and Shaw's "Practical Physics," p. 105. These make *density* a quantity having dimensions in mass and space, and *specific gravity* a pure number. There are many advantages in defining *specific gravity* as a ratio, and not the least among them is that the numbers in tables of specific gravities are independent of any system of units, while in a table of quantities having dimensions the numbers given depend on the system of units used. Thus the *density* of platinum would have to be given in an English table as 1343·75 pounds, or in a metrical table as 21·5 grammes. Again we should lose the very useful analogies between the definitions of *density* and *thermal capacity* and *specific gravity* and *specific heat*, to which I drew attention in a letter to NATURE, vol. xxxiii. p. 391.

Prof. Carey Foster seems to think it would be useful to have a table telling us the force with which unit volume of any body is attracted towards the earth, and that this should be called a table of *absolute* specific gravities. But I fail to see any advantage in this, for it is adding a totally new definition to be remembered, and one which would certainly create confusion in a beginner's mind; and the objection applies to this, that the numbers given would depend on the system of units used, to say nothing of the value of gravity at the place for which the table was calculated. Supposing even that the latter were ignored, it is not more troublesome to convert, with the aid of the known weight of unit volume of water, the specific gravity of any material into the weight of a given volume of it, than to convert a number given in one system of units into the number representing it in the system we may happen to be using.

If we are to take Mr. Cumming's definition as he expresses it, I would submit that a pound avoirdupois is a quantity of matter and not a force; and to say that the specific gravity of water is 62·5 *pounds avoirdupois* is simply taking the density of water and calling it specific gravity. *Pace* Mr. Greenhill and the engineers, it is hard enough to eradicate the notion that the quantity of stuff in a body and the force with which it is pulled towards the earth are one and the same without having the task made more difficult by our definitions.

50 City Road, E.C. HARRY M. ELDER.

The Cornish Blown Sands.

IN the description of the raised sea beach at Newquay, which Sir Henry De la Beche has given in his "Survey of Devon and Cornwall," he makes no reference to a curious feature observable in a part of the beach, and to which I should like to direct attention, with a view to obtaining some explanation of the cause of its formation. As far as I know, the appearance is only to be found at one spot, on what is known as Little Fistrel, to the westward of the town. It consists of a number of *cylinders* of indurated sand, separated from each other by thin walls, often only an inch or two thick, and forming the base of the cliff or bank, which is perhaps 10 or 15 feet high at the place. These cylinders rest upon a bed of rock (argillaceous slate?), which runs down from the bottom of the bank to the sea in a series of shelving ledges. The cylinders, which are locally known as *Pixie Holes*, weather out from the bank, but unfortunately few or none of them are now to be seen in a perfect state, their walls having been broken down by people scrambling up the bank, and also by quarrying operations, which I learn have recently been carried on close by. I am told that formerly the cylinders were very perfect, and often of large size; I myself have seen them, fifteen or sixteen years ago, standing up like little towers along the base of the cliff, and I have often sheltered myself perfectly from a shower of rain by standing in one and covering myself with my umbrella. I have recently had a photograph taken of the best group to be found, and a copy of this, together with a piece of the wall of one of the cylinders, is with Mr. Goodchild, of the Geological Survey, Jermyn Street, who will show it to anyone interested in the matter; the size of one of the cylinders photographed is 51 inches deep and 28½ inches in diameter.

R. H. CURTIS.

[The sand in question is well known to geologists as an example of blown sand agglutinated into a compact stone by carbonate of lime derived from the solution of calcareous organisms, which here on the surface consist largely of land-snails. The tubular cavities are no doubt due to the removal of the calcareous cement by percolating water, and are thus of the same nature as the pot-holes in chalk, and the cavernous holes and tunnels in hard limestone.—ED.]

Self-Induction in Iron Conductors.

MR. SUMPNER quotes (NATURE, May 10, p. 30), in support of the idea that iron conductors may have less self-induction than copper ones of the same dimensions, a suggestion of mine that