

CORRESPONDENCE

SIR,

Work By One Apprentice

Surely there is some error in the caption to the illustration on page 461 of the October issue (Vol. 8, No. 4).

To make the twenty-six articles shown, in thirteen weeks, while learning ' the rudiments of workshop practice ' seems to be quite beyond what could reasonably be expected.

(Sgd.) HUGH CLAUSEN.

Author's reply :—

SIR,

Referring to Mr. Clausen's letter, it is confirmed that the work illustrated was completed by one apprentice during his first three months workshop training. There is, however, some flexibility to cater for varying aptitudes and normally only one of the two scribing blocks is made ; with this exception, the work shown is the minimum done by all apprentices.

It might be of interest to mention that, in addition to lectures on workshop practice, apprentices have a course of twenty-four non-technical lectures and/or films on such subjects as loyalty, courage, health, good manners, money, citizenship and national service. All these lectures, together with the manual work, are completed in the first three months training in the apprentice training school, at the works of Messrs. Yarrow and Company.

(Sgd.) P. HOUNSELL,
Commander, R.N.

SIR,

Permability

The article in the October *Journal* (Vol. 8, No. 4) contains much that H.M.S. *Phoenix* tries to bring home in basic English, rather than in the long words which hide Mr. Wright's meaning. He has the right idea on the whole, but is quite wrong in thinking his permability is any new concept, though it may be a new, and certainly is, a horrible word.

He seeks to prove that a combined boiler and engine room is the best arrangement to ensure mobility after damage. His argument depends on the doctrine that cross-connections must not be provided because they are incompatible with the isolation of units. To my mind, it is taking too low a view of our own competence to suggest that we cannot use cross-connections intelligently. I write with feeling, as I, and a great many others, would not be alive today but for propulsion units and the ability to cross-connect them when necessary.

Accepting Mr. Wright's thesis that a direct hit in a machinery space will put it out of action, two hits, one in each machinery space of a light fleet carrier will immobilize her, while a 'Weapon' Class destroyer could be hit in one boiler room, and either engine room and still steam at nearly half power.

I fully sympathize with the author in wishing to provoke discussion, but he is too dogmatic on a complex subject.

(Sgd.) H. FARQUHAR ATKENS,
Captain, R.N.

SIR,

A Review of Fundamentals

The article 'A Review of Fundamentals', by Lieutenant Commander N. K. Bowers, is an excellent and timely reminder. However, I would like to see it followed by one on the basic mechanical devices which were discovered long before the art of writing itself. I should list these as :—

- (a) The lever.
- (b) The inclined plane, or perhaps (in basic English) the wedge, which of course, leads to the screw.
- (c) The wheel and axle.

Every designer has to use various combinations of these devices.

There are some more fundamentals which would be of great interest and which are worthy of your pages, Sir. I refer to nuclear engineering, reactor design, and reactor heat transfer. Perhaps some able author could assist in this matter.

Recently I dined with the American Society of Mechanical Engineers before a meeting on nuclear gas turbine developments. Opposite me was a Commander of the U.S. Coastguard Service, which is a very fine seagoing small ship navy. We discussed technical publications in our two countries, and he particularly praised 'the small blue Journal'—a copy of which I send to the Headquarters of the Coastguard in Washington.

(Sgd.) P. D. TATTON-BROWN,
Commander, R.N.

SIR,

Fundamentals of Dynamics

I would like to reply to Commander Sidgwick's letter by discussing the concept of 'two sorts of force', in some detail.

The subject of Newtonian dynamics is based on two entirely separate experimental laws which may be stated briefly as follows :—

- (1) The force required to accelerate a given quantity of matter (mass) is equal to the product of the mass and the acceleration.
- (2) The force of attraction between two masses is equal to the product of the masses divided by the square of the distance between their centres of gravity.

In symbols : $F_{(1)} = ma$

$$F_{(2)} = \frac{m_1 m_2}{d^2}$$

The mass of the earth is virtually constant and for relatively small bodies on the earth's surface 'd' is also sensibly constant. Consequently, the attractive (or gravitational) force, due to the earth's attraction on a small body on its surface, may be considered proportional to the mass of the body.

Whence, on the earth's surface,

$$F_{(2)} \text{ (gravitational force) } = \text{constant} \times \text{mass of body.}$$

$F_{(2)}$ is then known as the weight of the body, the units being Lb Wt or Grms Wt.

The units of $F_{(1)}$ (acceleration or 'inertia' force) are poundals or dynes.

$$(1 \text{ Poundal} = 1 \frac{\text{ft}}{\text{sec}^2} \times 1 \text{ lb mass}).$$

The ratio between these two types of force is given by the relations $1 \text{ Lb Wt} = 32.2 \text{ poundals}$ and $1 \text{ Grm Wt} = 981 \text{ dynes}$. This relation is determined experimentally and the 'constants' 32.2 and 981 vary slightly over the earth's surface due to the variation in 'd'.

In any problem involving accelerations, the answer usually arrives in poundals and is then converted to Lb Wt by multiplying by the relation

$$\frac{1 \text{ Lb Wt}}{32.2 \text{ Poundals}} = 1$$

and cancelling the units.

Similarly if, in a problem involving accelerations, a force is given in Lb Wt it is only necessary to convert it to poundals before proceeding with the problem.

Commander Sidgwick states that the relation

$$\frac{1 \text{ Lb Wt sec}^2}{1 \text{ lb mass. } 32.1725} = 1$$

is not confusing providing we do not confuse 1 Lb Wt with the weight of 1 lb mass. He is, of course, perfectly right.

Nevertheless, it is in trying to make this distinction that the confusion often arises and in general it is easier to abandon the concept of a gravitational field and to think instead in terms of the fundamental experimental laws outlined above.

If the two sorts of force are kept entirely separate by introducing the term 'poundal' and thus giving them separate labels no confusion can arise, no matter how involved the problem may be.

It is a pity one cannot colour them red and blue.

(Sgd.) N. K. BOWERS,
Lieutenant-Commander, R.N.

SIR,

Automatic Control of Steam Turbine Machinery

In his article on this subject, in the January edition of the *Journal*, Commander Tyrrell refers to the Grove regulator. One of these valves was fitted to the forward section of the reduced saturated steam system in H.M.S. *Liverpool*, when she was in the United States for repair of her bow, about 1943.

The valve was still in use when I was a watchkeeper in the ship in 1946-7, and very reliable it was too. The other unit was fitted with the usual Auld's valve which suffered from ruptured diaphragms at monthly intervals, while the Grove remained fully serviceable. We did once renew the Grove diaphragm with a piece of rubber insertion coated with graphite, but were otherwise impressed with its performance and made efforts to obtain another.

It is possible that the ship is still so fitted and can give 'user' information to back up the Pametrada trials.

(Sgd.) J. H. C. MOSSE,
Lieutenant-Commander, R.N.

Editor's Note : FIGS. 4 and 5, on pages 42 and 44 are transposed.