A SLIDE-RULE FOR CLIMBERS.

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It is many years now since attention was drawn to the empirical rule given by Naismith for connecting time with the distance and altitude covered by a climber. (*S.C.M.J.*, ii, 136, and *C.C.J.*, viii, 19.) His rule is:—

$$t = \frac{2000m + 3f}{6000}$$

where t is the time in hours, m the distance in miles, and f the height climbed in feet, or as the formula is usually expressed in words:—A climber in good condition can go at the rate of 3 miles per hour, with half-an-hour added for every thousand feet climbed. This allows for normal rests, but not for abnormally difficult climbing. That is to say, if an excursion covers 15 miles and 5,000 feet of climbing, it will require five hours to cover the ground, supposed level, and 2½ hours to allow for the climbing, in all 7½ hours.

The remarkable accuracy with which the formula works is illustrated by instancing the Peter Hill–Mount Battock Excursion on May 20, 1933. A party of climbers left the Sawmill and ascended Mount Battock by the Glaspits path, returning to the Sawmill, having walked 9 miles and climbed 2,855 feet. If Naismith's formula is applied, it will be seen that the estimated time is 4 hours 25 minutes, which is exactly the time taken by the party. Even the record climb of the six Cairngorms works out with an error of 25 minutes only in 13 hours' climbing.

While it is easy to calculate the time to be taken for an excursion by means of the formula, a pencil, and a piece of paper, it is not as easy to work the formula backwards, so to speak, and find out how many feet one has climbed if one has covered 5½ miles in 9 hours. It is to do this that the slide-rule to be described in this article was devised.

As will be seen from Fig. 1, it consists of two full length

scales and a shorter scale that moves between the other two, referred to as the " Hour " and " Mile " scales, while the movable scale is referred to as the " Feet " scale. To make a working model of the rule, these scales are cut out and pasted on to cardboard as shown in the accompanying section (Fig. 2), so that the " Feet " scale moves freely between the " Hour " and " Mile " scales, the latter two being fixed relative to one another.

Consider the " H " scale first. It will be seen that this scale is divided into ten units and each unit into four units. This scale represents the number of hours required for an excursion, a ten-hour excursion being the maximum allowed by this rule. The "M " scale is divided into thirty units and again into quarters, representing the number of miles covered, the maximum being thirty. Lastly, the " F " scale is marked up to 10,000, this being the number of feet climbed.

Now for a few examples to show how the rule is used (Fig. 3). Suppose a climb is to be six miles long with 1,000 feet of climbing, how long will be required ? The method of using the rule is this. Set the arrow at the beginning of the " F " scale to six, the number of miles on the " M " scale, and look along the " F " scale until the number representing the feet to be climbed is reached, namely, 1,000 feet. Then look at the number on the " H " scale opposite 1,000 and this is the time required, $2\frac{1}{2}$ hours. Of course such a simple example could have been worked mentally, but if one intends covering $5\frac{1}{4}$ miles and 2,500 feet it isn't so easy.

The next example (Fig. 4) shows the usefulness of the rule. Suppose a party has been out for $3\frac{1}{2}$ hours but has only covered $7\frac{1}{2}$ miles—how many feet has it climbed ? To calculate this, set the arrow on the " F " scale at $7\frac{1}{2}$ and (this time) look along the " H " scale until the time $3\frac{1}{2}$ is reached. Then opposite it on the " F " scale is the number of feet ascended, in this case 2,000 feet.

A third and last application can be illustrated on the same figure. It is really the reverse of the previous example. Suppose a party have been out for $3\frac{1}{4}$ hours

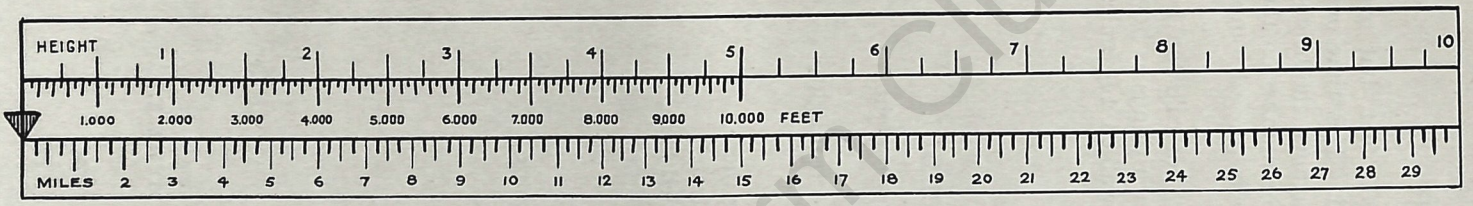

FIG. 1.

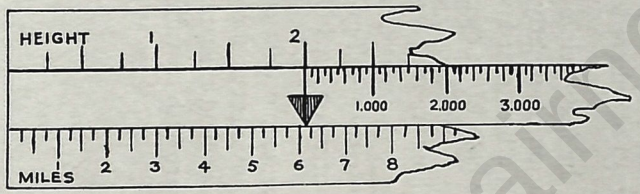

FIG. 3.

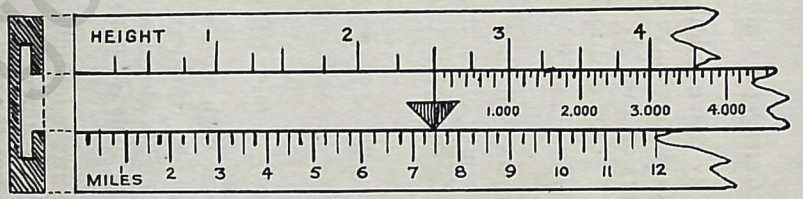

FIG. 2.

FIG. 4.

TIME - DISTANCE - ALTITUDE CALCULATOR

and know that they have climbed 1,500 feet, but are unsure of the distance they have covered. This time one sets the time in hours on the " H " scale against the height climbed on the " F " scale, and looks at the number on the " M " scale opposite the arrow. This is the distance travelled—7½ miles.

These few examples will show that a slide-rule can be used to ease the difficulty of finding out such things as how many feet one has ascended if one has walked 14¾ miles in 6¾ hours.

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THE GHOST OF BEN MACDHUI.

Will you come with me for a tramp to-night
To the hill o'er trackless snow,
Where far heights gleam with a spectral light,
In the pale, cold starlight glow ?

We'll hear strange footfalls passing there,
And our nerves may thrill with fear,
Though 'tis but the rush of a startled hare,
Or the tread of wild red deer.

We'll hear the fox's yelping bark,
When out on his nightly prowl,
And note of a bird that loves the dark,
The eerie calls of an owl.

And something we may see to-night,
Would keep our nerves a-thrill,
A ghostly presence—elf or sprite—
May haunt us on the hill.

Or can it be, as old folks say,
That fairies meet at night
On heights to hold their revels gay,
And depart with dawning light ?

WILLIAM STEWART.