COMPLETE SPECIFICATION.

Improvements in and relating to the Graduation of Logarithmic Slide Rules.

I, Lieutenant HOWARD VERNON PERCY WESTON, Royal Navy, H.M.S. Indus, Devonport, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement;—

5   This invention relates to logarithmic slide rules and has for its object to provide a slide rule by means of which various values of a particular known mathematical function may be ascertained by one operation instead of three operations as heretofore.

According to this invention a slide rule of usual construction is provided at
10 one edge with graduations indicating the logarithmic values of the function $\cot \left(45° + \frac{\theta}{2}\right)$ or its reciprocal.

Referring to the accompanying drawings,
Figure 1 is a face view of the front of the stock and slide,
Figure 2 is a back view of the slide, and
15   Figure 3 is an edge view of the stock.

The stock A is graduated at a and b to indicate the logarithms of logarithms of numbers, and c and d to indicate the logarithms of numbers. The front of the slide B is graduated at e and f to indicate the logarithms of numbers and the back of the slide is graduated at g to indicate the logarithms of tangents of
20 angles from $\tan^{-1}.1$ to $\tan^{-1}10$, at h to indicate the logarithms of sines of angles from $\sin^{-1}.01$ to $\sin^{-1}1$ and at j to indicate the logarithmic values of the function $\cot \left(45° + \frac{\theta}{2}\right)$ or its reciprocal between the limits $\theta = 1°$ to $\theta = 90°$

To obtain the actual values of this function the stock is provided with a scale of equal parts k, only a few of the divisions being shewn on the drawing.
25   The graduations at c are the same as those at d except that they are half size and are marked twice, and the graduations at e and f are identical with the graduations at c and d respectively.

The graduations at a and b are so arranged on the stock relatively to the graduations at c that the graduation representing the mathematical value of the
30 constant e (2.7183) and its reciprocal are exactly in line with the centre of the graduations at c.

By the use of a slide rule graduated in accordance with this invention not only can algebraic, trigonometric and exponential functions be read off as heretofore, but also the hyperbolic functions and the function $\log_a \cot$
35   $\left(45° + \frac{\theta}{2}\right)$ or its reciprocal. This last function is used for determining the hour angle and true bearing of any heavenly body and by the above described slide rule may be obtained by a single operation.

[*Price 8d.*]

Improvements in and relating to the Graduation of Logarithmic Slide Rules.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is;—..

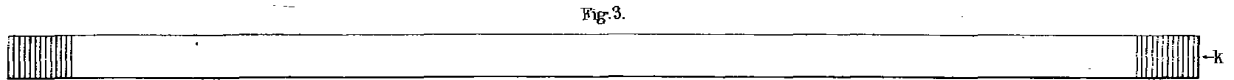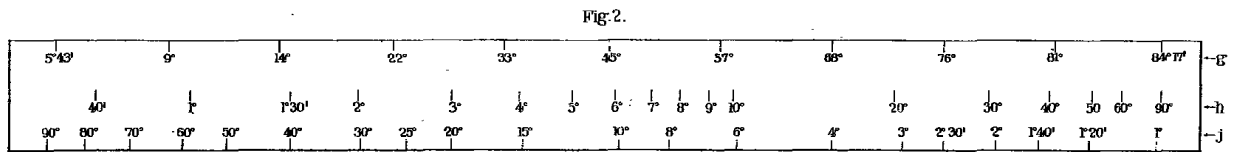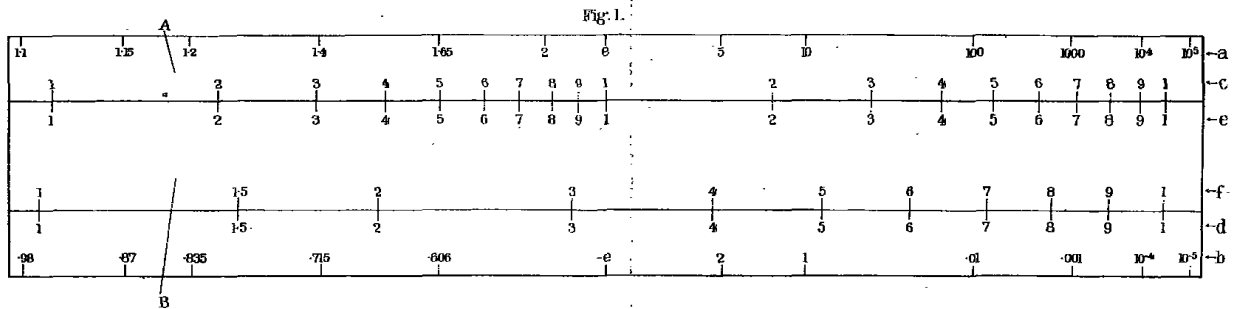1. A slide-rule provided with graduations indicating the logarithmic values of the function $\cot (45^\circ + \frac{\theta}{2})$ or its reciprocal.   5

2. A slide rule graduated substantially as and for the purposes set forth with reference to the accompanying drawings.   }

Dated this 23rd day of April, 1910.

<div align="right">

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A.D. 1910. April 28. Nº 10,482.
WESTON'S Complete Specification.

(1 SHEET)

Fig. 1.

A

| 1·1 | 1·15 | 1·2 | 1·4 | 1·65 | 2 | 3 | 5 | 10 | 100 | 1000 | 10⁴ | 10⁵ | ←a |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | ←c |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | ←e |

| 1 | 1·5 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | ←f |

| 1 | 1·5 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | ←d |

| ·98 | ·87 | ·835 | ·715 | ·606 | ·e | 2 | 1 | ·01 | ·001 | 10⁻⁴ | 10⁻⁵ | ←b |

B

Fig. 2.

| 5°43' | 9° | 14° | 22° | 33° | 45° | 57° | 68° | 76° | 81° | 84°17' | ←g |

| 40' | 1° | 1°30' | 2° | 3° | 4° | 5° | 6° | 7° | 8° | 9° | 10° | 20° | 30° | 40° | 50° | 60° | 90° | ←h |

| 90° | 80° | 70° | 60° | 50° | 40° | 30° | 25° | 20° | 15° | 10° | 8° | 6° | 4° | 3° | 2°30' | 2° | 1°40' | 1°20' | 1° | ←j |

Fig. 3.

←k

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1

A

| 1·1 | 1·15 | 1·2 | 1·4 | 1·65 | 2 | e |

a

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 |

| 1 | 1·5 | 2 | 3 |
| 1 | 1·5 | 2 | 3 |

| ·98 | ·87 | ·835 | ·715 | ·606 | -e |

B

Fig. 2

5°43'	9°	14°	22°	33°	45°
40'	1°	1°30'	2°	3°	4°	5°	6
90°	80°	70°	60°	50°	40°	30°	25°	20°	15°

Fig. 3

5 10 100 1000 10⁴ 10⁵ ←a

2 3 4 5 6 7 8 9 1 ←c

2 3 4 5 6 7 8 9 1 ←e

4 5 6 7 8 9 1 ←f

4 5 6 7 8 9 1 ←d

2 1 ·01 ·001 10⁻⁴ 10⁻⁵ ←b

57° 68° 76° 81° 84° 17′ ←g

7° 8° 9° 10° 20° 30° 40° 50 60° 90° ←h

8° 6° 4° 3° 2° 30′ 2° 1° 40′ 1° 20′ 1° ←j

←k