No. 621,348. Patented Mar. 21, 1899.

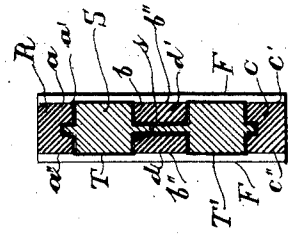
W. L. E. KEUFFEL.

SLIDE RULE.

(Application filed Apr. 27, 1898.)

(No Model.)

Fig. 2.



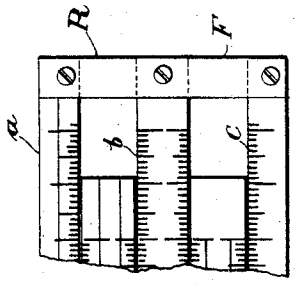
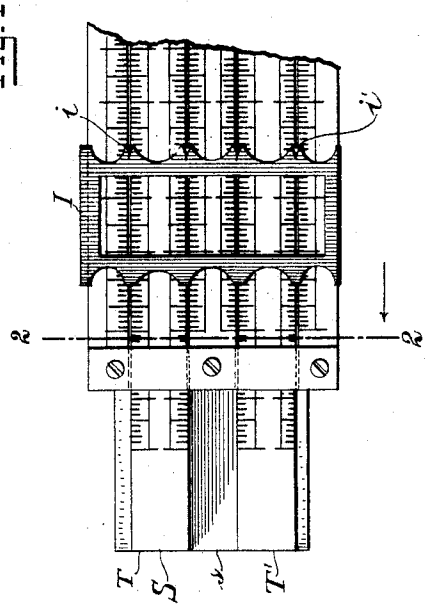


Fig. 1.



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UNITED STATES PATENT OFFICE.

WILLIE L. E. KEUFFEL, OF HOBOKEN, NEW JERSEY.

SLIDE-RULE.

SPECIFICATION forming part of Letters Patent No. 621,348, dated March 21, 1899.

Application filed April 27, 1898. Serial No. 678,960. (No model.)

To all whom it may concern:

Be it known that I, WILLIE L. E. KEUFFEL, of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Slide-Rules; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to slide-rules; and its novelty consists in the construction, arrangement, and adaptation of the parts, as will be more fully hereinafter pointed out.

In Letters Patent of the United States No. 460,930, dated October 6, 1891, is described and claimed a slide-rule composed, in brief, of a rule consisting of an upper bar and a lower bar rigidly joined together, each bar having two faces logarithmically and identically graduated, and a slide placed intermediate the upper and lower bars of the rule, which slide is suitably graduated on each face and adapted to be used in connection with the rule in solving mathematical problems. That invention constituted a distinct advance in the art over the Mannheim rule then commonly employed and has met with commercial success.

My invention is an improvement upon Cox's slide-rule described in the patent referred to. It was, for instance, found desirable in using the Cox rule sometimes simultaneously to use two rules differently graduated for similar or related series of calculations or simultaneously to use two rules identically graduated. In order to obviate the necessity for thus using a number of rules simultaneously or in succession, I conceived the idea of inclosing two slides within the same rule and practically making a duplicate or duplex slide-rule in one piece of mechanism. To this end I have made a rule of three bars rigidly joined together. The upper one of said bars is suitably graduated at its lower edge, the lower one is suitably graduated at its upper edge, and the middle one is suitably graduated on both its upper and lower edges. These graduations are either identical or suitably diversified, in accordance with the principles governing the use to which the rule is to be put. The bars are placed apart a distance about equal to their own width, and between the upper and middle bar and the middle and lower bar are placed slides connected together and suitably graduated, so as to be used in connection with the graduations on the bars of the rules.

In the drawings, Figure 1 is a plan view of one of my improved slide-rules broken apart for convenience, so as not to show its entire length, and with the slides rigidly connected and partly extending beyond the rule. Fig. 2 is a vertical section of the same on the plane of the line 2 2 in Fig. 1.

In the drawings, R is a rule consisting of three parallel bars—an upper one a, a middle one b, and a lower one c—connected at their extremities by cross-pieces F, secured to the bars in any suitable manner. The bars a and c are double-faced—that is, they are identically and logarithmically graduated on each face a' and a'', b' and b'', c' and c''. The upper bar a is graduated at its lower edge on each face, the lower bar c is graduated on its upper edges, and the middle bar b is graduated on both its upper and lower edges. The middle bar is double and is composed of two rods d and d' to admit of the passage between them of the connecting-rib s of the slide S. The slide S is composed of two bars—an upper bar T and a lower bar T'—connected by the vertical rib s. The bars T and T' are double-faced and each graduated on their lower and upper edges to correspond with the graduations on the rule R. The bars T and T' of the slide and the corresponding bars a and c of the rule are provided with means to keep them in proper alinement when they are caused to be moved past each other—for instance, corresponding tongues and grooves or flutings.

The slide-rule is provided with an indicator I to promote ease in reading corresponding graduations on each side of the rule and in different parts thereof. This indicator may be provided with fins or projections, or it may be made of transparent material suitably ruled.

Having described my invention, what I claim as new is—

1. A slide-rule composed of a plurality of

parallel bars, a slide consisting of a plurality of parallel bars interposed between and separated from each other by said former parallel bars, and a fixed connection between the bars composing said slide, as set forth.

2. A slide-rule composed of a plurality of parallel bars held in fixed relation to one another, a slide consisting of a plurality of parallel bars interposed between said former parallel bars, and a fixed connection between said parallel bars composing the slide, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIE L. E. KEUFFEL.

Witnesses:
H. REICHE,
H. H. STUTZ.