N° 25,109 A.D. 1903

Date of Application, 18th Nov., 1903

Complete Specification Left, 19th Sept., 1904—Accepted, 27th Oct., 1904

PROVISIONAL SPECIFICATION.

Improvements in Slide Rules and like Calculating Apparatus

I HEWLEY MORTIMER BAINES Executive Engineer Public Works Department Punjab India, with present address Bell Hall York do hereby declare the nature of this invention to be as follows:—

A slide rule in which the scales are connected to a parallelogram and move in given ratios to one another. The rule may consist of 3 or more scales according to the requirements of the formula under consideration. The rule may be made complete with scales and parallelogram for each formula required or it may be contrived with separate sets of scales and an adjustable parallelogram. The scales are designed on the Abacus principle (invented by M. Lalanne). An Abacus diagram is read by placing a straight edge across the various scales of the diagram, in any desired position. The slide rule under consideration works on the same principle as an Abacus diagram but the scales instead of being fixed, slide in various ratios with one another and the result is read off on a line at right angles to the scales. In this way a closer reading can be obtained than by means of a diagram. With the rule the scales may be placed at any convenient distance apart, it only being necessary to make them slide at given ratios to one another. The sliding is accomplished by means of a parallelogram which is fixed to the backs of the scales.

H. M. BAINES.

COMPLETE SPECIFICATION.

Improvements in Slide Rules and like Calculating Apparatus.

I, HEWLEY MORTIMER BAINES, Executive Engineer Public Works, Department, Punjab, India, with present address Bell Hall, York, 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

A slide rule in which the scales are connected to a parallelogram and move in given ratios to one another. The rule may consist of 3 or more scales according to the requirements of the formula under consideration. The rule may be made complete with scales and parallelogram for each formula required or it may be contrived with separate sets of scales and an adjustable parallelogram. The scales are designed on the Abacus principle (invented by M. Lalanne). An Abacus diagram is read by placing a straight edge across the

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various scales of the diagram in any desired position. The slide rule under consideration works on the same principle as an Abacus diagram but the scales instead of being fixed slide in various ratios with one another and the result is read off on a line at right angles to the scales. In this way a closer reading can be obtained than by means of a diagram. With the rule the scales may be placed at any convenient distance apart, it only being necessary to make them slide at given ratios to one another. The sliding is accomplished by means of a parallelogram which is fixed to the backs of the scales.

And in order that my invention may be clearly understood I will describe it in reference to the accompanying sheet of illustrative drawings which illustrate one arrangement for carrying it into practice.

Fig. 1. illustrates the improved slide rule moved to a calculating position for use, and,

Fig. 2 represents a back view of the device showing the parallelogram of levers.

The slide rule shown consists of four scale bars a a^1 a^2 a^3 marked in the required manner, each scale being so proportioned and arranged that as the scales move relatively to one another the desired calculations are given in the usual manner, the movements of the scales being constrained by the levers constituting the parallelogram.

As an example, the scales which are incompletely indicated on the scale bars a a^1 a^2 a^3 are designed for:

Scale bar a:—Velocity in feet per second.
Scale bar a^1:—Loss of head in feet per 1000 feet.
Scale bar a^2:—Diameter of pipe in inches.
Scale bar a^3:—Discharge in gallons per minute, and
Discharge in cubic feet per second.

The levers b b^1 b^2 b^3 are connected together and by the pivots c c^1 c^2 c^3 to the scale bars a a^1 a^2 a^3 so that a parallelogram of levers is provided whereby as two of the scale bars are moved according to the requirement of calculation the other scale bars take up positions which cause the required calculations to be given, and the movements are constrained so that there is always an invariable ratio between them.

If desired, the scales may be arranged a distance apart.

In applying the invention to slide rules for other purposes the arrangement will be similar.

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

(1) In a slide rule or like calculating apparatus, a series of scale bars adapted for movement relatively to one another in definite ratios to one another, substantially as described.

(2) In combination, in a slide rule or like calculating apparatus, a series of scale bars adapted for movement relatively to one another, and a parallelogram of levers whereby the ratios of movement of the said scale bars relatively to one another are governed in a definite manner, substantially as described.

3. The combination of parts constituting the improvements in slide rules and like calculating apparatus, arranged and adapted for operation, substantially as described with reference to the accompanying drawings and for the purposes specified.

Dated this 18th day of September 1904.

ALBERT E. ELLEN,
For Applicant
Billiter Buildings E C

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BAINES' COMPLETE SPECIFICATION.

1 SHEET

Fig. 1.

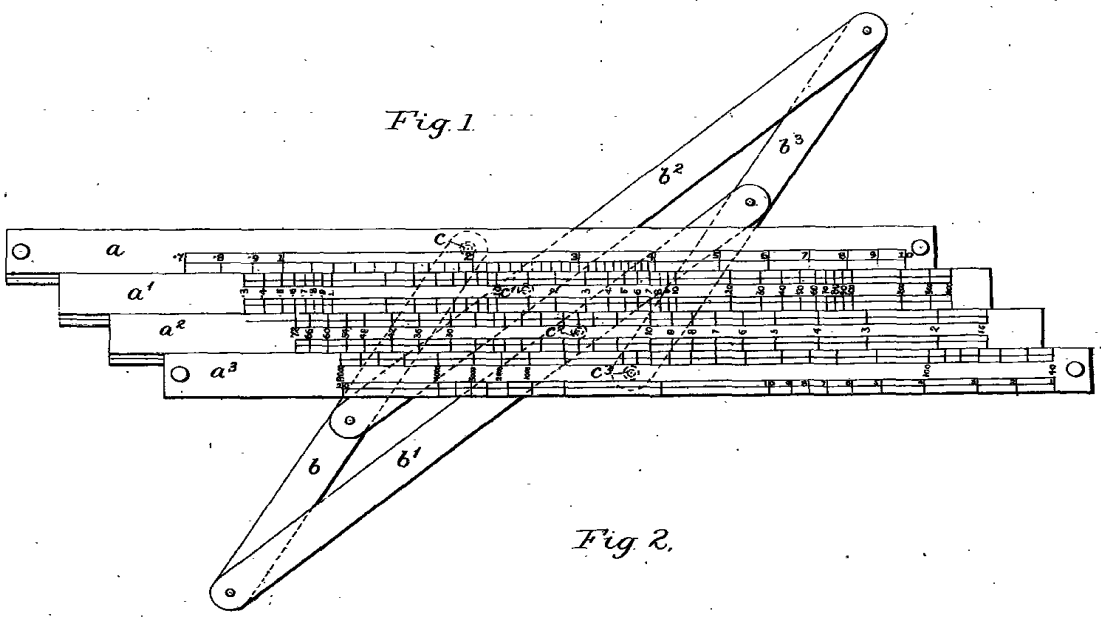


Fig. 2.

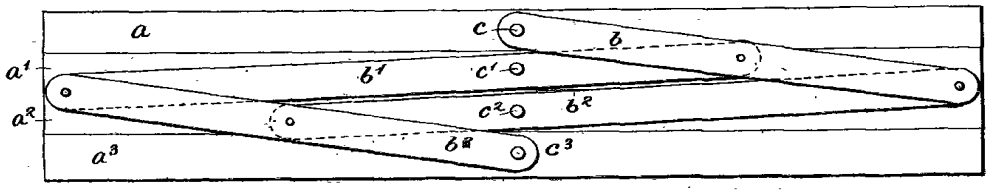
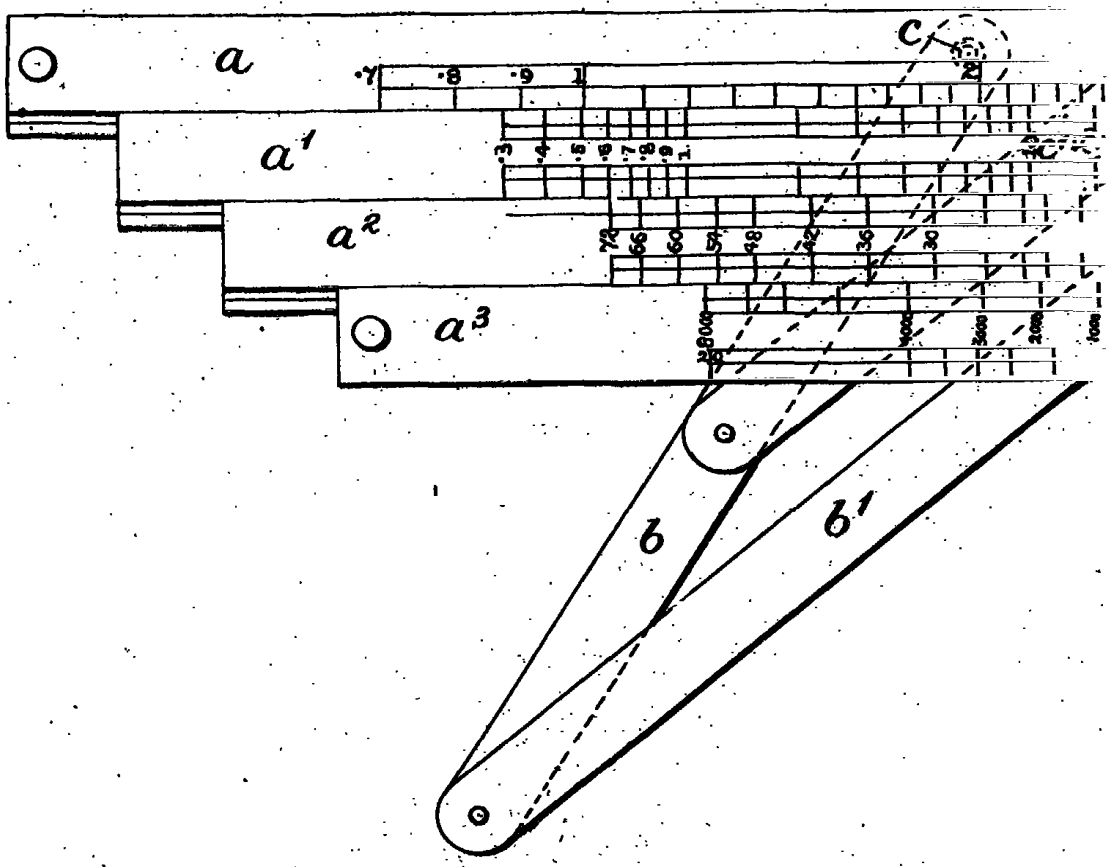
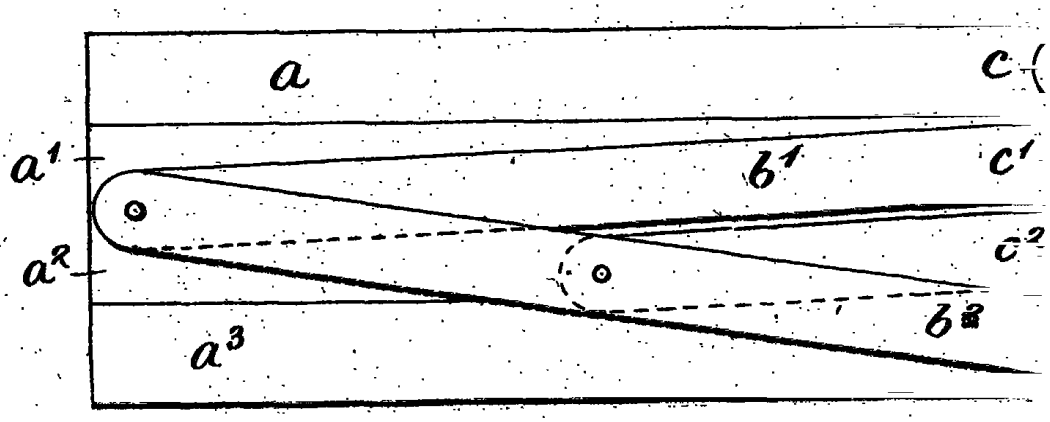


Fig. 1.





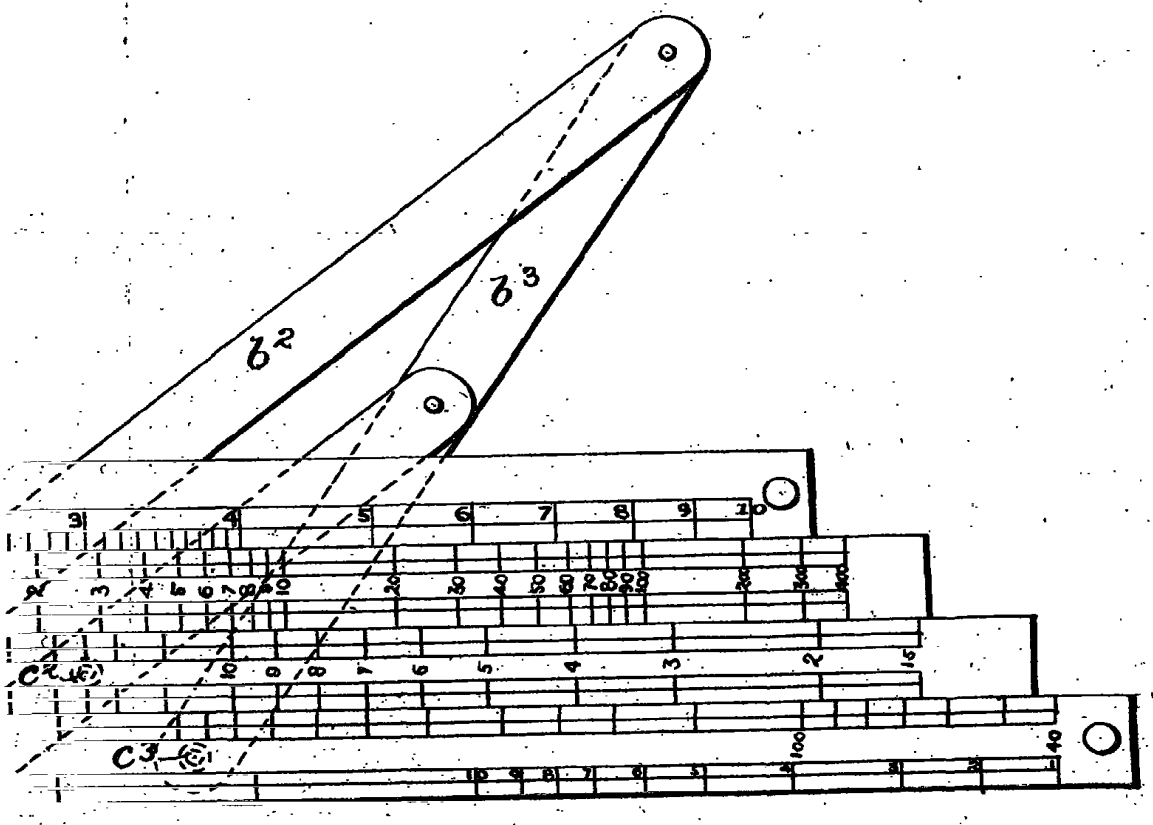
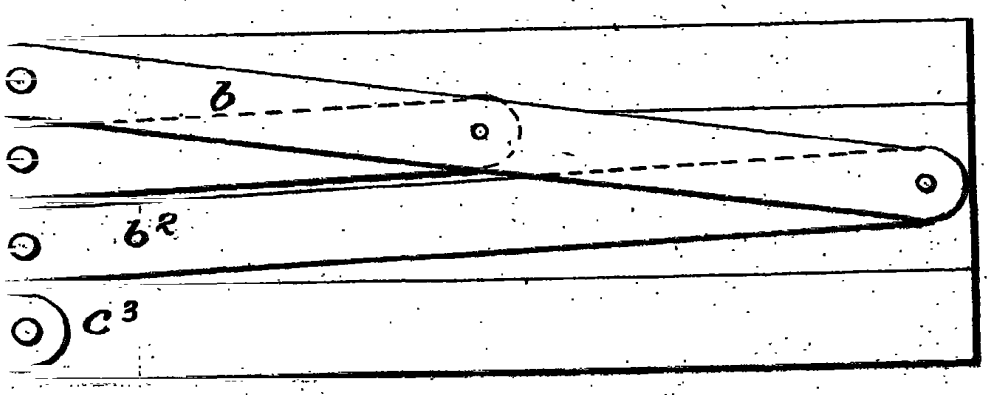


Fig. 2.



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