Reedmeter: A Reed-Measuring Instrument

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Why a Reedmeter is Needed?

Reeds of high accuracy are a vital requiste to the production of high-quality textiles, but reeds in use today are lacking in accuracy, because hitherto they have been measured only with the naked eye in the absence of a reed-measuring instrument.

Reedmeter, just perfected, is a reed-measuring instrument. Emphasis in Reedmete is laid, first and foremost, on accurate measurement in a short time. Reedmeter measures, with remarkable accuracy and reapidity, irregularity of reed counts and other defects in reeds.

1. Mechanism of Reedmeter

As shown in Figures 1-a and 1-b, this instrument consists of two parts: the measuring part (A) and the basic lines (B), to retain a relative position to the reed. Further, it is equipped with cursors for count inspection.

Reedmeter, however, is not equipped with reed count irregularity-measuring cursors used by some buyers of textiles but which are not yet in common use.

Different Reedmeters have to be used for different reed counts. We have devised six different Resedmeters for six different count numbers advancing by 20, i.e., 20, 40, 60, 80, 100 and 120. However, Reedmeter for a particular count number can measure accuracy degrees up to 10 counts below or above that number, as well as reed counts up to 15 below or above the count number. For instance, Reedmeter for count No. 20 can measure accuracy degrees down to 10 counts or up to 30 counts—and also reed counts down to 5 or up to 35.

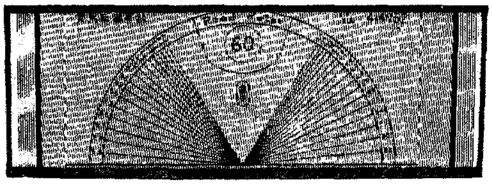
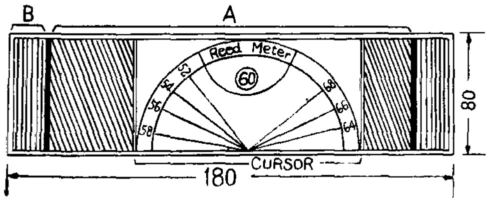


Fig. 1-a. Reedmeter.



A: Measuring part. B: Basic lines

Fig. 1-b. A sketch of Reedmeter.

2. Principles of Measurement

Group A of slanting parallel lines in Figure 1 is shown on a transparent panel attached to Reedmeter. Group B of vertical parallel lines is also shown on the same panel.

Group A is the reed-measuring part of the instrument. Group B shows the basic lines to keep reed wires to be measured in a proper position for measurement.

See Figure 2. With Reedmeter placed on reed, we can easily see some slanting black lines at the inter-section of the reed and group A of lines showing on the transparent panel of Reedmeter. Counts and irregularity of reeds can be easily detected by changing the angles of the slanting black and white lines shown in Figure 2.

Reed counts are read by reading the count graduations which are marked in the upper part of the radial lines of the cursors which are paralleled to the black lines showing on the transparent panel of Reedmeter. The sloping angles

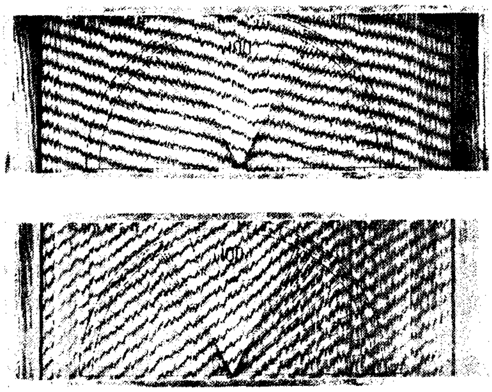


Fig. 2.

of the black lines are determined from the junction of two different groups of parallel ines.

In Figlre 3, a: pitches of paralles; b: pitches of reeds; θ: the angle of intner-section of reeds and the group of parallel ines; α: angle of slanting black lines. The relations among a, b, θ and α may be expressed by the following equation:

$$\cot \alpha = \frac{a - b\cos\theta}{\sin\theta}$$

α and θ are peculiar to each Reedmeter. The size of α determines the count.

See Table 1 which shows two slanting lines, (Ⅰ) and (Ⅲ), which cross the horizontal line. For conviniene's sake, the slopes of the two slanting lines are expressed by the symbols x_1 and x_2.

$$\text{(I)} \quad \tan x_1 = \frac{a}{b}\operatorname{cosec}\theta - \cot\theta$$

$$\text{(III)} \quad \tan x_2 = \cot\theta - \frac{a}{b}\operatorname{cosec}\theta$$

The relationships between a/b and angle x_1 and between a/b and angle x_2 under the assumed conditons of $\theta = 5°$, $10°$, $15°$ and $20°$, are shown in Figure 5. The relationship between angle x_1 and the counts by Reedmeters for count Nos. 20, 40, 60, 80, 100 and 120, as well as the relationship between x_2 and such counts, is shown by Figure 6.

Reedmeter for each count number has an accuracy of 1/1,000 mm of the pitch and thickness of lines.

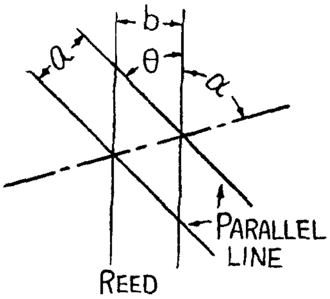


Fig. 3.

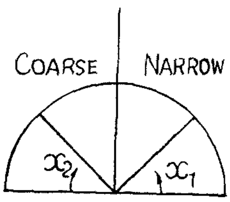


Fig. 4.

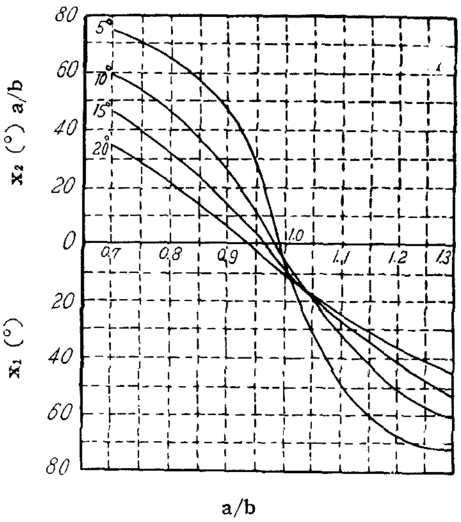


Fig. 5.

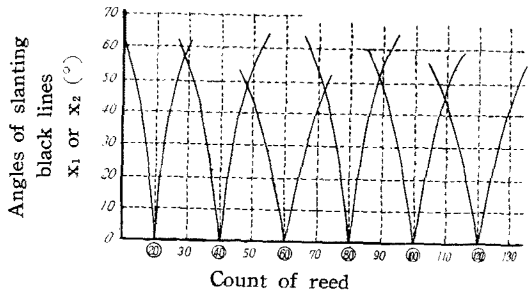


Fig. 6. Relation between count of reed and angle of slanting black lines.

Table 1.

	Angle α	Direction of apparent slanting black lines	b	Comparison which standard count of Reedmeter
Ⅰ	$0° < \alpha < 90°$	Right high ↗	$b < \frac{a}{\cos\theta}$	Large (fine)
Ⅱ	$\alpha = 90°$	Horizontal ⟷	$b = \frac{a}{\cos\theta}$	Same
Ⅲ	$90° < \alpha < 180°$	Left high ↖	$b > \frac{a}{\cos\theta}$	Small (coarse)

3. How to Mersure Counts and Count Irregularity

(1) Apply Reedmeter to the surface of a reed, taking care that the vertical lines at both ends of Reedmeter come parallel with the dents of the reed. What look like black lines—we will call then apparent black lines—will come into view through the intersecting of the slanting lines of Reedmeter and the yarns on the reed.

(2) Find the most straight apparent black line and the cursor line most parallel to it. Slide Reedmeter's cursor until the two lines coincide. The figures printed above the cursor lines are reed count numbers.

Procedure 2, however, will not work if a reed is irregular. A reed is *b* if:

(a) Its upper or lower corns are not parallel with Reedmeter, even in which case the reed count can be measured, but also dents of the reed slant.

(b) The upper and lower corns, although parallel with Reedmeter, do not coincide with the slanting line.

(c) The dents at the left or right end of the reed are partly bent, in which case some of the apparent black lines will project upward or downward twisted.

(d) The wires of the reed are not uniform in count, in which case the apparent black lines will change somewhat in their angles of slants.

(e) The wire of one of the dents is different from the wire of the other dents, or the dents are not uniform in pitch, in which case the apparent black lines will not come into full view but appear in black or white strands which stretch long upward or downward.