A Slide Rule to Handle Five Factors Simultaneously

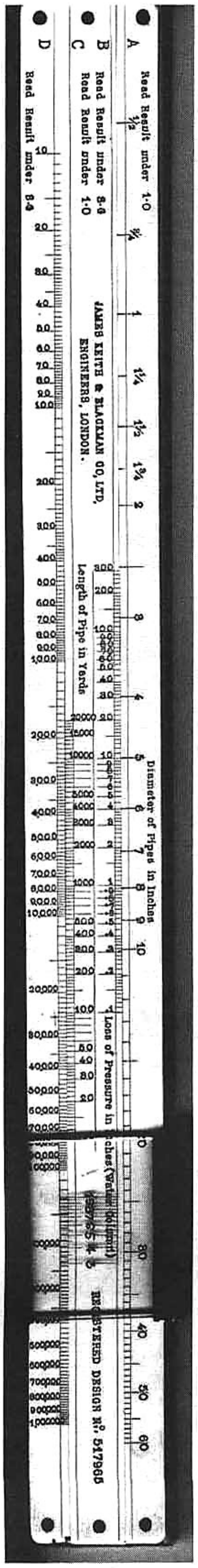

Figure 1.

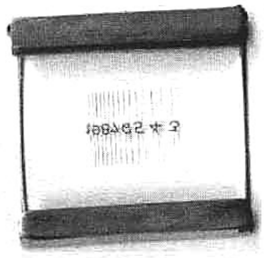

Figure 2. Cursor (from back).

Conrad Schure

A recent acquisition turns out to be a rather ingenious special-purpose slide rule. It was used for determining the flow of air and gas in pipes, in accordance with a formula devised by a Dr. Pole. This slide rule was made in France by Tavernier-Gravet, for an English firm of engineers in London. The English firm, James Keith & Blackman Co., Ltd. in turn appears to have registered the design as No. 517965. If our theory of dating Tavernier-Gravet Slide Rules is valid, this slide rule would appear to have been made in 1909.

Physically described, this slide rule is celluloid mounted on some variety of fruitwood, and is 12 inches long, by 1.065 inches wide, by 0.375 inches thick, with one slide (see Fig. 1). It has only five scales, as follows: "A" (on the upper portion of the frame), for the diameter of pipes, in inches; "B" (on the slide), for the loss of pressure, in inches (water column); "C" (on the slide), for the length of pipes, in yards; and "D" (on the lower portion of the stock), for discharge of gas or air per hour at 1.0 specific gravity (air = 1.0), with no pressure at the outlet. The fifth scale, which has no label, is the most intriguing part of this unusual slide rule. It is the specific gravity scale, a logarithmic scale that is engraved into the underside of the cursor glass (see Fig. 2). This scale starts with 0.3 at the rightmost position, and proceeds from right to left, up to 1.0 (the specific gravity of air).

In use, it follows Dr. Pole's formula for determining the flow of air and gas in pipes. Dr. Pole's formula deals with five factors. When any four of these factors are known, this slide rule enables the user to find the fifth, in one setting of the slide and cursor.

In any problem of this type, it will be noticed that of the four known factors two of them will always be on either the "A" and "B" or the "C" and "D" scales. Then, the operation is to move the slide until these two known factors are opposite each other. When dealing with air, the result will be found opposite the third factor. However, when dealing with a gas of less specific gravity than air, the fifth scale (the specific gravity scale that is engraved on the underside of the cursor glass) comes into use.

For example, if we are using Dr. Pole's formula to determine the diameter of the pipe to be used for a given set of factors, we would place the known specific gravity on the cursor scale over the known third factor on the "B" scale, and read the pipe size on the "A" scale opposite 1.0 of the specific gravity scale. As another example, if we wanted to know the discharge rate (in cu.ft./hr.) for a gas of known specific gravity, through a pipe of known diameter and length, with a known loss of pressure, we would only need to place 1.0 on the specific gravity scale (the scale on the underside of the cursor glass) over the known third factor on the "C" scale, and read the result under the known specific gravity factor, on scale "D".

This is yet another excellent example of a slide rule specifically designed to solve a repetitive problem, or as in this case, a repetitive set of problems, that occur frequently enough to justify the design and production of a special-purpose slide rule—this one with the unique and ingenious extra dimensional scale on the cursor glass, allowing for the solution of problems involving five interactive factors, with just one setting of the slide rule