N° 24,078 A.D. 1897

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COMPLETE SPECIFICATION.

"Improvements in Calculating Scales."

I, RUDOLPH CHARLES SMITH, of No. 214 Woodworth Ave., in the City of Yonkers, County of Westchester, and State of New York, United States of America, Engineer—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:—

My invention relates to improvements in calculating scales or slide rules, by means of which computations are performed by sliding a slide and stationary scale, both marked with proper divisions to represent numbers, as is well known, into such position, that the result of the computation can be ascertained by the division marks.

The object of my invention is to make an instrument which is portable, light and cheap, but at the same time protected against wear and tear and of great handiness in its use.

I attain these objects by the construction illustrated in the accompanying drawing, in which Fig. 1 represents a top view of the scale; Fig. 2 is a side view showing the arrangement of the different clamps and plates and Fig. 3 gives the end view.

A modification of my invention is shown in Figs. 4, 5, 6, showing an auxiliary sliding unit scale and special guide clamps, as will be hereinafter described.

In Fig. 7, I show a further modification of a duplex scale of novel construction. Fig. 8 is the end view. Similar letters refer to similar parts through the several views.

I build the scale ordinarily as shown in Fig. 1, which shows a structure where a series of plates are united by the sliding clamps a, a, a. There is one cover piece or plate b of flexible transparent material, then underneath this transparent plate a stationary plate c containing the marks of the scale, leaving clearance enough for the slide to move between these plates b and c. Sometimes I add another transparent plate d between the slide and the stationary scale c, c. A transparent plate e on the back of the stationary plate protects it against wear and tear e, e.

All of these plates are held together by the sliding clamps a, a. These clamps are preferably made of metal, and slide loosely on the transparent cover and reach to the edges of the sliding scale. The ends are cut square, or the clamp is provided with a line n, n, so as to serve as index by either setting the edge of the clamp or the mark to fix the figures on the scale. In this manner the clamps serve to hold the whole structure together, and as a sliding index to fix the figures on the scale.

Fig. 4 represents a modification where two plates f and g forming an auxiliary scale are clamped to one of the transparent plates b. This plate b serves as a guide when sliding the auxiliary scales, and its transparency allows a reading of the main scale below. Some of the sliding clamps are formed with their ends bent in between the plates, see Figs. 5 & 6, a^1, a^1, and keep the slide in place. In some cases I prefer to use this arrangement when it is essential to keep the slides steady.

[*Price* 8*d*.]

Fig. 7 represents a duplex scale its parts being hinged together by means of the sliding clamps. One rod *m*, passes for this purpose, through all the loops of the clamps. This arrangement is of great use, as it combines a multiplicity of scales in a very portable shape. Any of these slides may be shifted to serve as index.

The sliding scale as well as the stationary one may be arranged with any of the well known scales. For instance, if the stationary scales as well as the sliding scales were marked with the ordinary scale of inches, we could add 3 inches to 4 inches by setting 3 inches on slide to 0 inches, or to the beginning of the stationary scale and then read above 4 inches on the stationary scale the answer 7 inches on the slide, as is evident and often done by mechanics.

In the drawing illustrating my invention, I have shown the scale having the exponents 2 or the upper scale divided with marks that the lengths $1—2^2$, $1—3^2$ and $1—4^2$ and so on are proportional to the logarithms of 2, 3, 4 and so on, but of double the length of the corresponding divisions of the other 3 scales, an arrangement well known since 1624 as the Gunter scale.

If with these divisions of scales, 10 on the slide is set, as shown, on 8 of the lower stationary scale, we find under 2^2 on the upper stationary scale the solution of 5, *viz*, 5 on the upper scale on the slide.

If many examples of a similar kind are to be solved it is convenient to help the memory by marking the number 8, by setting the mark on the sliding clamps on its edge to 8.

To perform at the same time different operations, an auxiliary scale *f*, *g*, Figs. 4, 5, arranged with any of the well known divisions is ready to be used. It is, as before described, attached to the transparent plate *b* with a clamp a^1, which allows the slide *f* and stationary plate *g* to slide on the transparent plate *b* and also an additional independent motion of the 2 plates. Also the slide of the main scale can slide in any position underneath, and all the clamps holding the structure of the main scales together can be moved to fix a number used in computation by sliding these clamps in the proper position.

The system of division of the different plates is immaterial, as I do not claim any particular division, as long as one plate slides on the other to perform the operation.

I am aware that it has been common to make slide rules variously graduated and marked, of two or more rigid sections, the main section having recesses in which the subsidiary sections slide longitudinally; and I am also aware that it is common to make rules or scales for engineers by printing the requisite numbers and graduations and marks upon slips of paper or pasteboard.

The ordinary slide rules of rigid material are objectionable because they are heavy; it is impossible to superpose a number of slides one upon the other. They are rigid and cannot well be applied to curved surfaces, and both the rigid and flexible rules are objectionable because when carried in the pocket they are apt to become soiled so that it is extremely difficult to decipher the fine graduated lines constituting the important features of their construction.

It will be seen that the construction of rules constituting the subject of this application is not open to the objections to the slide rules heretofore made. Inasmuch as all of the sections are of thin flexible material, the rule can be applied to curved surfaces as well as to flat surfaces, and what is more, the sliding rule can thus be applied, while the sliding rules heretofore made have invariably been rigid. Again, whether the rule is rigid or flexible, the transparent surface strips serve to protect the graduated face of the rule from dirt and wear, so that the operative condition of the article is preserved. Again, by means of the clamps sliding upon the graduated faces, I am not only able to hold the superposed pieces together, but I am also able to slide these clamps to different positions in respect to the graduations so as to serve as marks or starting points or division points as may be required. When a more complicated structure is required where there must be a number of sliding strips connected with each other, the said slides may be jointed together as before described, and at the same time may slide back and

forth confining the different portions or strips one to the other and at the same time serving to mark a division or starting point upon the rule.

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 rule having a main graduated body, one or more scales sliding thereon, flexible transparent pieces extending over the other parts, and clamps holding all the parts together and also sliding on the transparent covers, substantially as described.

2. A rule having a main graduated flexible body, one or more flexible scales sliding thereon, flexible transparent pieces extending over the other parts, and clamps holding all the parts together and also sliding on the transparent covers, substantially as described.

3. A rule having a main body, one or more scales sliding thereon, flexible transparent pieces extending over the other parts, sliding clamps holding all the parts together, and an auxiliary scale having one part sliding in respect to the other, and a clamp holding the auxiliary scale to one of the flexible pieces, substantially as described.

4. A scale consisting of separate series of graduated parts, each with transparent flexible covers, and clamps sliding thereon, the said clamps of different series jointed together but adapted to slide independently, substantially as described.

Dated the 19th day of Oct 1897.

BOULT & WADE,
Agents for the Applicant.

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SMITH'S COMPLETE SPECIFICATION.

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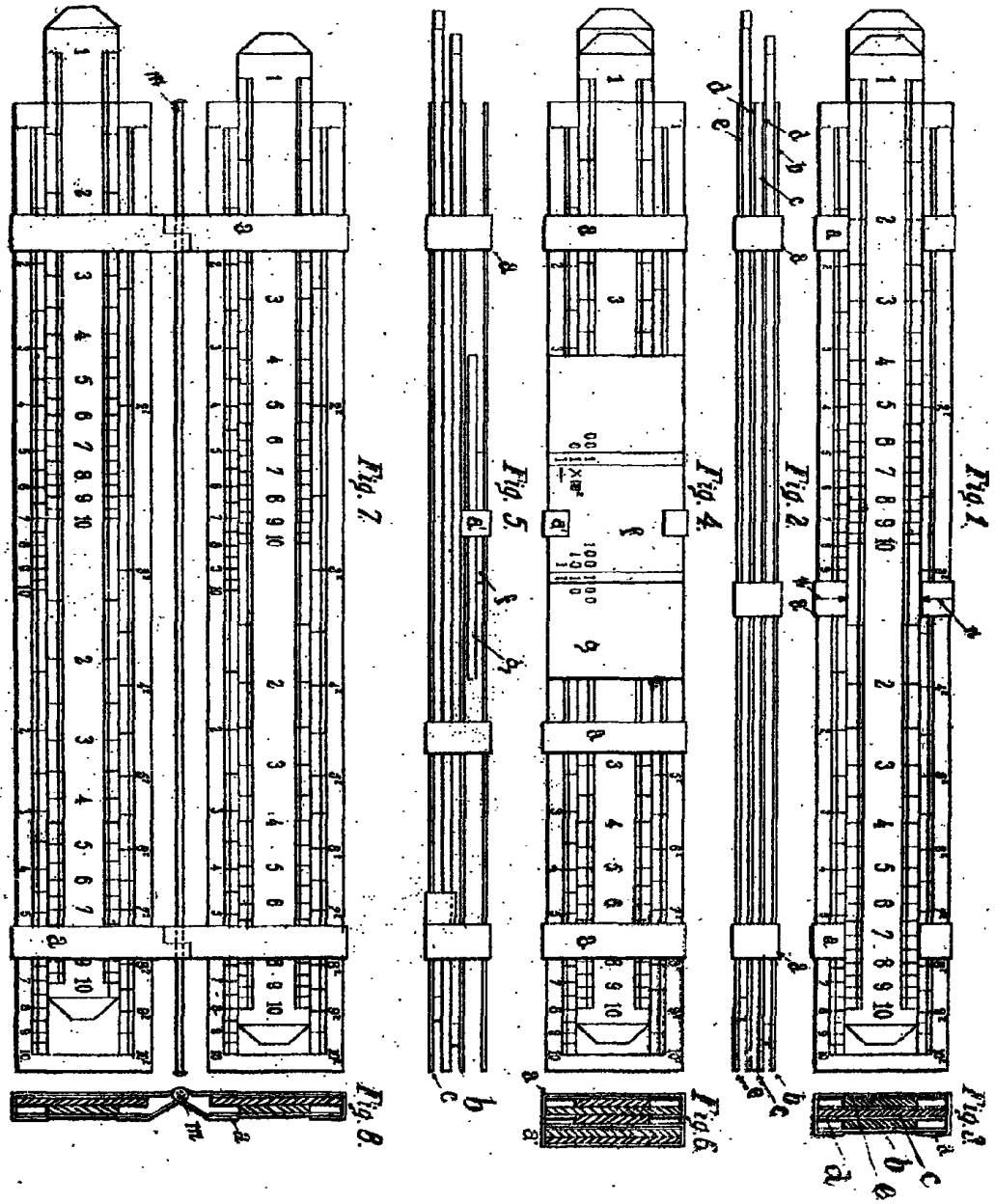

[This Drawing is a reproduction of the Original on a reduced scale.]

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