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O. L. BAUMBACH & A. KLITSCHE.

SLIDE RULE.

APPLICATION FILED FEB. 2, 1907.

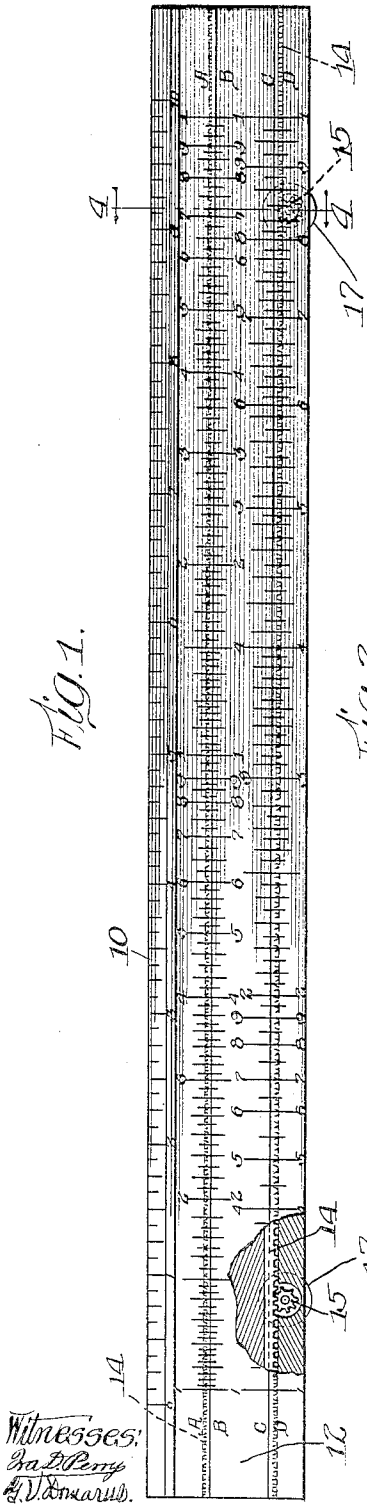

Fig. 1.

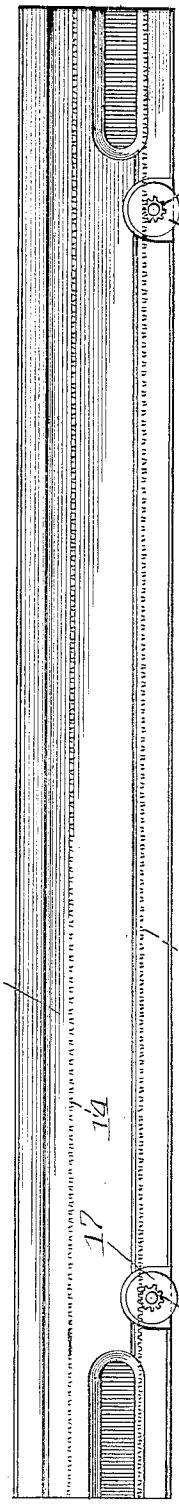

Fig. 2.

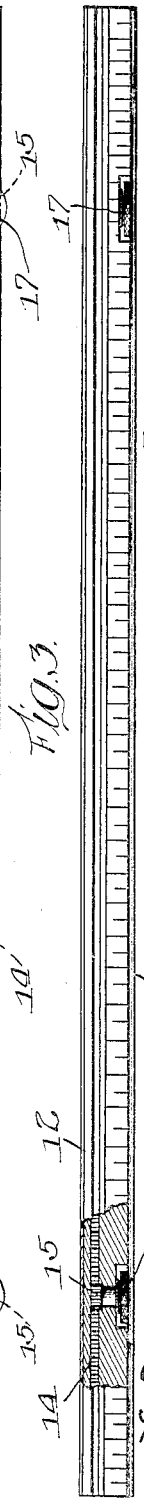

Fig. 3.

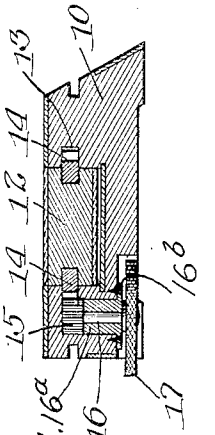

Fig. 4.

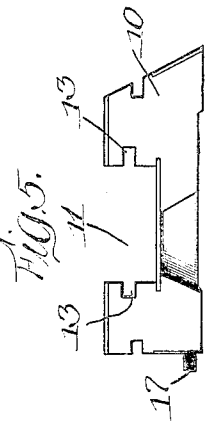

Fig. 5.

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UNITED STATES PATENT OFFICE.

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SLIDE-RULE.

No. 879,237. Specification of Letters Patent. Patented Feb. 18, 1908.

Application filed February 2, 1907. Serial No. 355,436.

To all whom it may concern:

Be it known that we, OSCAR L. BAUMBACH and AMANDUS KLITSCHE, citizens of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Slide-Rules, of which the following is a specification.

Our invention relates to slide rules such as those used by engineers, architects and draftsmen, for performing various computations, and the object of the invention is to provide means whereby the slide may be quickly and accurately adjusted to proper position within the rule.

It will be understood that the accuracy of the result depends upon the accuracy with which the slide is set. In order that the slide may not move too easily, the rules are usually so constructed that there is considerable friction between the moving parts. This friction, while an advantage in maintaining the parts in proper relation after they are set, increases the difficulty with which the slide may be adjusted in the ordinary type where such adjustment is done directly by hand, and also decreases the rapidity of such manual adjustment.

Our improvement consists in providing in a rule of this kind, means for quickly and accurately bringing the slide to the required position in the rule. We obtain this object by the mechanism illustrated in the accompanying drawing, in which—

Figure 1 is a top face view of the slide; Fig. 2 is a bottom view; Fig. 3 is an edge view, partly in section, to show the operating wheels and rack; Fig. 4 is an enlarged sectional view, taken on line 4—4 of Fig. 1; Fig. 5 is an end view showing the slide removed.

Similar numerals refer to similar parts throughout the several views.

The body 10 of the rule proper has a longitudinal space 11 for receiving the slide 12 in the ordinary manner. Extending lengthwise in the rule at the sides of space 11 are the longitudinal grooves 13, 13, for receiving the tongues 14, 14, arranged longitudinally along said slide. In this respect the rule is of the ordinary construction. But in our improved rule, the tongues 14 consist of toothed racks extending the entire length of the slide, and adapted to be engaged by the toothed pinion 15, rotatively mounted in rule 10. Pinion 15 is rigidly secured to shaft 16, which, in turn, is rigidly secured to thumb-wheel 17, as clearly shown in Fig. 4. In the preferred construction shaft 16 is journaled in the bushing 16^a secured to the rule by means of the plate 16^b. Pinion 15 is entirely inclosed within the rule, but wheel 17 projects, preferably at the rear edge of the rule sufficiently to be readily engaged by the finger of the operator. Wheel 17 has a milled or knurled head, in order that it may be more readily operated, and is of a considerably larger diameter than pinion 15.

The object in making wheel 17 larger than pinion 15 is to reduce the motion of the slide from the motion of the periphery of the thumb-wheel, with the result that a large movement of the thumb-wheel produces a smaller, hence more accurate, movement of the slide. By means of this construction, the operator may produce exactly the right amount of movement of the slide in the rule, and bring a line on the slide exactly opposite to the required line on the rule, without making several attempts, and without permitting himself to be satisfied with an approximately close adjustment.

It is frequently necessary in making computations to draw the slide almost entirely out of the rule. In order that the slide may not, under such conditions, be entirely disengaged from the pinion, we provide two pinions and operating wheels, one near each end of the rule, as indicated in the drawings. This has another advantage in that the slide when occupying an intermediate position may be operated from either one of the two thumb-wheels 17.

It will be understood that the teeth on the rack and pinion are cut fine enough so as to practically eliminate back lash, but the pinions and thumb-wheels are mounted loosely enough so that the slide may, when desired, be moved by the finger of the operator directly; that is to say, the slide may be moved in the rule without the opreator's touching the thumb-wheels 17. This permits the slide to be quickly moved to an approximately accurate position, after which the thumb-wheels may be employed to perfect the adjustment.

In the best rules the slide is reversible; that is to say, has markings on both its upper and under surfaces, so that either surface may be exposed, thereby permitting the rule

to be employed in more than one system of calculation. It is for this reason that we prefer to provide rack teeth upon each one of the tongues 14. It is obvious, however, that with a more limited use, teeth need be formed upon only one of said tongues.

What we claim as new and desire to secure by Letters Patent, is:

1. In a device of the class described, the combinatoin of a rule body, a slide longitudinally movable therein, a rack on the edge of said slide, said rule body having a groove for receiving said rack, a pinion mounted upon the rule body in position to engage said rack and a thumb wheel for operating said pinion, said thumb wheel having a greater diameter than said pinion and being countersunk within said rule body and having an edge projecting beyond the edge of the rule body for the purpose described.

2. In a slide rule, in combination, a substantially flat rule body, a slide longitudinally movable therein, a rack upon said slide, a pinion for operating said rack, and a thumb wheel for rotating said pinion, said thumb wheel rotating in a plane parallel to the plane of the rule body, and being counter sunk into said rule body to admit of the rule being laid flat upon a table or other surface.

3. In a device of the class described, a rule body having a longitudinal space with a longitudinal groove opening thereinto, a slide having a tongue on its lateral edge adapted to enter said groove to hold the slide in position in the rule body, rack teeth formed on said tongue, a pinion located within said rule body in position to engage said toothed rack, and a thumb wheel having a portion projecting from the rule body to facilitate manipulation.

4. In a slide rule the combination of a slide, and a tongue arranged along the edge thereof with rack teeth formed therein, a rule wherein said slide is longitudinally movable, said slide having a groove for receiving said toothed tongue, a pinion rotatably mounted upon said rule in position to engage the teeth upon said tongue and an operating wheel for rotating said pinion, the diameter of said operating wheel being greater than the diameter of said pinion for the purposes described.

5. In a slide rule the combination of a slide having longitudinally arranged tongues on the opposite edges thereof, rack teeth formed in said tongues, a rule recessed to receive said slide, and having symmetrical longitudinal grooves for receiving the aforesaid tongues whereby said slide is reversible in the rule; an operating wheel and reducing gear-connections between said wheel and one of said toothed tongues.

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