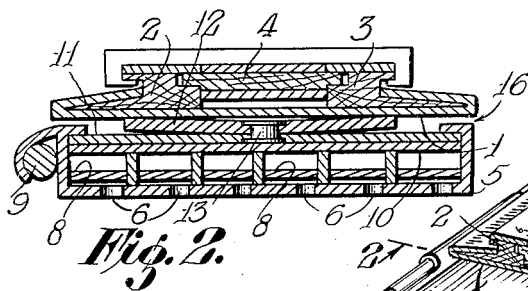Fig.2.
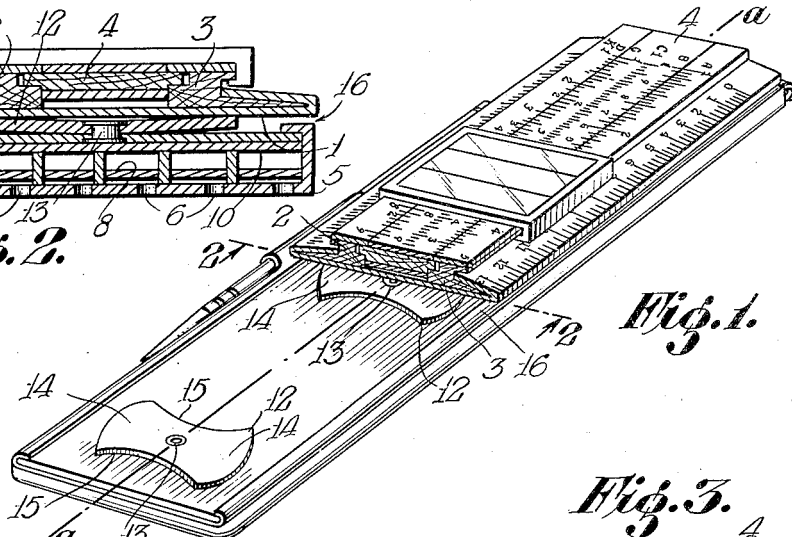
Fig.1.
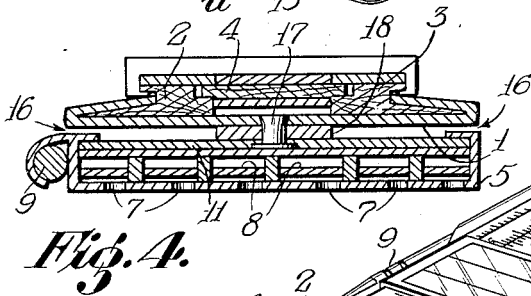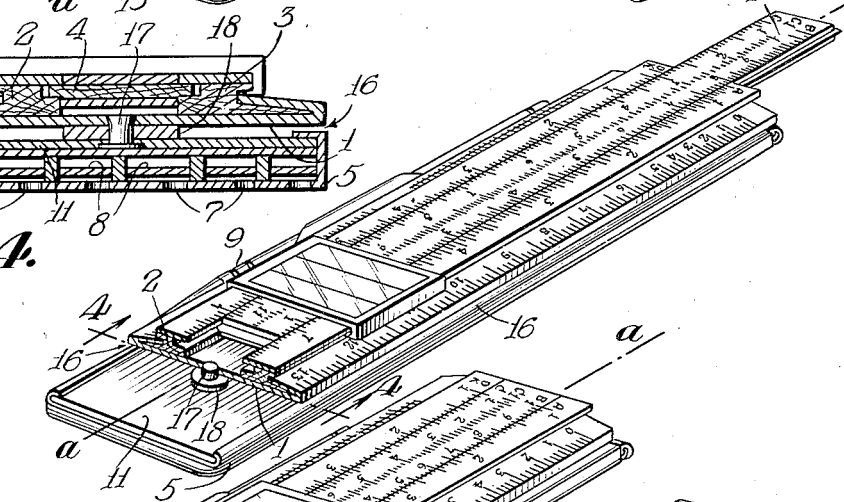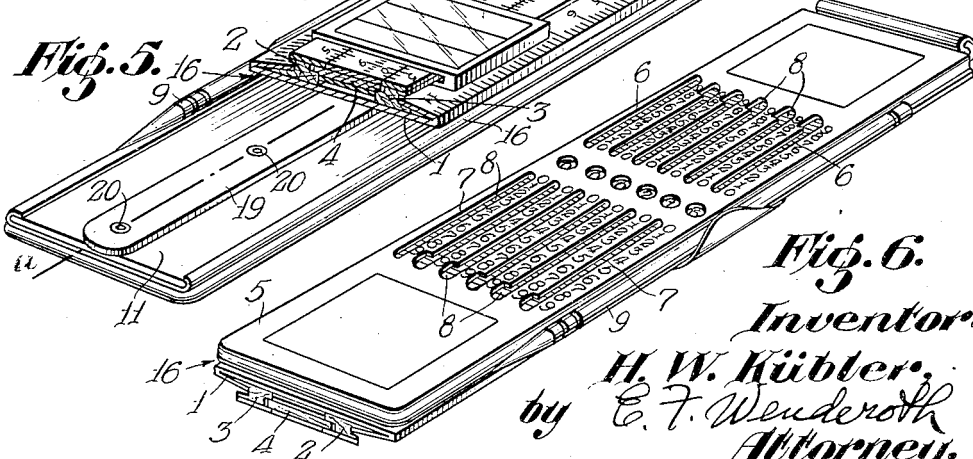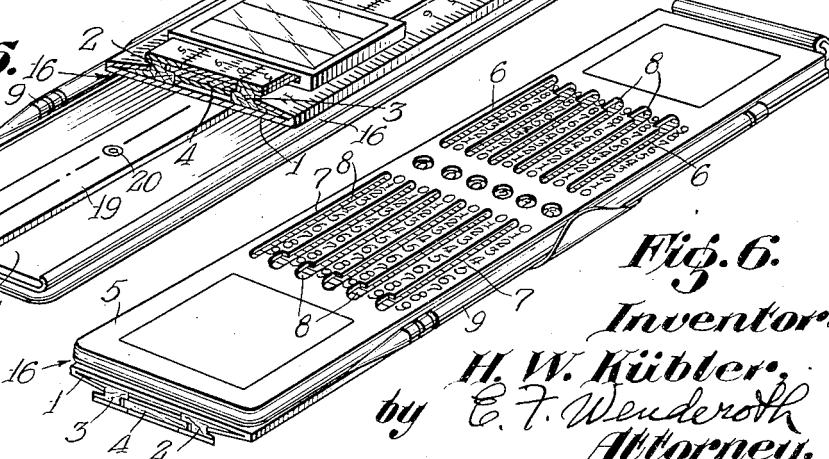
Fig.3.

Fig.4.

Fig.5.

Fig.6.

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2,238,529

CALCULATING INSTRUMENT

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11 Claims. (Cl. 235—70)

The need for a simple and handy calculating instrument with which the four kinds of calculation, namely multiplication, division, addition and subtraction can be carried out is very great. The size of the instrument should be such that 5 it can be carried in the pocket. For calculating purposes flat slide-rules and also flat adding and subtracting instruments are known. Neither of these instruments can, however, be used by itself for making all of the four aforesaid kinds of 10 calculation.

If an attempt be made to combine a logarithmic slide-rule with an adding machine so as to form a unitary calculating instrument with which the four above-mentioned kinds of calculation 15 can be made, the great difficulty arises of avoiding the disadvantageous effect which the rigid adding machine, which is made of metal, has on the guides of the slide of the slide-rule which must necessarily be elastic, having regard to the 20 fact that the adding machine must be fitted to the back of the logarithmic slide-rule in order to satisfy the requirement that the complete instrument should be handy and of pocket size.

The body of the slide-rule and also the slide 25 are usually made of a material which undergoes considerable alterations under the effect of heat and atmospheric moisture, namely materials such as Celluloid, artificial resin, wood and so forth. Slide-rules usually have a resilient base-plate by 30 which the guides in which the tongues of the slide run are pressed gently against the tongues. This is necessary in order that, if contraction or expansion of the material of which the slide-rule is made occurs, the slide may still be moved 35 regularly and uniformly.

If now the adding machine which is made of metal is attached rigidly to this resilient base-plate, the important resiliency of the base-plate of the slide-rule would be completely eliminated, 40 the consequence of which would be that the slide could not be moved evenly in its guides.

In order now to provide a combined instrument which is of pocket size and as handy as possible and in which the slide can be moved evenly along 45 the slide-rule and, at the same time, not to endanger the strength of the connection between the slide-rule and the adding machine, according to the present invention the adding and subtracting machine is fixed to the middle part of 50 the back of a logarithmic slide-rule having a resilient base, in such a manner that the side edges of the slide-rule can bend freely in both directions about the points at which the slide-rule is fixed to the adding machine.

The metallic adding machine is preferably provided with a separate additional rear wall which has no direct connection with the interior mechanism of the adding machine and is rigidly connected only to its casing. The adding machine can then be fixed to this additional wall in such a manner that the places of attachment are located only in the central longitudinal part of the slide-rule.

In order that the invention may be readily understood and carried into effect several forms of construction of a calculating instrument in accordance with the invention are illustrated by way of example in the accompanying drawing, in which

Figure 1 is a perspective view of one form of the instrument, one half of the slide-rule being cut away.

Figure 2 is a section on the line 2—2 of Fig. 1.

Figure 3 is a perspective view of a second form of construction in which a part of the slide-rule is also cut away.

Figure 4 is a cross-section on the line 4—4 of Fig. 3.

Figure 5 is a perspective view of a third form of construction in which a part of the slide-rule is again cut away, and

Figure 6 is a view showing the front of the adding machine part of the instrument.

Referring to the drawing, the general construction of the logarithmic slide-rule is well known. It consists of a resilient base-plate 1, two lateral guides 2 and 3 and a slide 4. The guides 2 and 3 are rigidly attached to the resilient base-plate 1. The base-plate 1 is usually made of Celluloid.

The flat adding and subtracting machine is also well known as regards its general construction. It is, for example, of the kind described in the U. S. Patent specification No. 1,596,108. The adding and subtracting machine is provided with a casing 5 having slots 6 for adding and slots 7 for subtracting. Below these slots there are numeral slides 8 which can be shifted by means of a pointed instrument 9. The numeral slides 8 are supported and guided on a back wall 10.

In the form of construction illustrated in Figs. 1 and 2 an additional back wall 11 is arranged over the back wall 10 of the adding machine. This back wall is fixed only to the casing 5 of the adding machine; it has no direct connection with the interior of the adding machine.

The back wall 11 extends over the entire length and width of the adding machine. To the back wall 11 there are riveted three plates 12 of which

in Figure 1 the plate at one end is wholly visible while only half of the second centre plate can be seen in this figure. The third plate is located on the other end of the back wall 11 in a similar position to the first plate 12. The rivets 13 by which the plates 12 are fixed to the wall 11 are situated in the longitudinal centre line of the wall 11. The plates are so shaped that their ends 14 will easily bend at right angles to the surface of the wall 11. The plates are preferably made of a material which can easily be stuck on, for example of Celluloid, artificial resin, glazed cardboard and the like.

The resilient base-plate 1 is stuck to the resilient ends 14 of the plates 12. The resiliency of the plates 12 can be increased by reducing their cross-section in the vicinity of the central axis a—a of the additional wall 11, for example by means of recessed or cut out portions 15.

By sticking the resilient base-plate 1 of the slide-rule to the ends 14 of the plates 12 in this way the additional advantage is obtained that the resilient base-plate 1 of the slide-rule can be kept very thin in the middle. When any adhesion is effected with a Celluloid or Bakelite or similar solution, which is necessary for the purpose, it is found that expansion occurs at the place of adhesion if the materials are too thin. This expansion which is of course harmful, cannot occur when the adherence is effected in the manner described since the adhesion takes place only at the thickest parts of the slide-rule namely at the place where the guides 2 are situated.

As may be seen from Figure 2 when the instrument is assembled there are gaps 16 at the side edges between the slide-rule and the adding machine. Since now the two parts of the instrument are connected together only along the centre line a—a, side edges of the slide-rule can bend freely towards both directions, that is to say they can bend both upwardly and downwardly.

In the form of construction illustrated in Figs. 3 and 4 the slide-rule and the adding machine are of similar construction to that illustrated in Figs. 1 and 2. The two parts of the instrument are in this case connected directly together by means of rivets 17, which pass through the spring base 1 of the slide-rule. The rivets 17 are again situated in the centre line a—a of the instrument. The intermediate space between the slide-rule and the adding machine which is necessary for enabling the side edges of the slide-rule to bend, is obtained by means of small washers 18 which are interposed between the base 1 and the separate wall 11. This form of construction is suitable for an instrument in which the base 1 of the slide-rule has sufficient strength or thickness.

In the form of construction according to Figs. 5 and 6 a narrow strip 19 of Celluloid, artificial resin, glazed cardboard or the like is used for fixing the slide-rule to the separate additional wall 11 of the adding machine. This strip is again situated in the centre line a—a of the instrument. The strip 19 is fixed by means of rivets 20 to the separate wall of the adding machine. The base 1 of the slide-rule is stuck to the strip 19. This form of construction is also preferably employed when the base 1 is not excessively thin in the middle.

I claim:

1. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising means secured to said rigid wall of said casing and means connecting said first mentioned means and said resilient base so as to space said resilient base from said casing to permit flexing of said resilient base about its longitudinal axis.

2. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an auxiliary wall secured to said rigid wall and flexible means connecting said auxiliary wall and said resilient base.

3. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an auxiliary wall secured to said rigid wall and means whereby said auxiliary wall is attached to the back of said resilient base in such a manner that the side edges of the slide rule are able to bend transversely to the longitudinal axis of said rule.

4. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing and plates which are fixed to said additional back at points along its longitudinal center line and are attached to the back of said resilient base at points outside said center line, so that the plates are able to bend transversely with respect to said center line.

5. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing and plates which are fixed to said additional back at points along its longitudinal center line and are attached to the back of said resilient base at points outside said center line, so that the plates are able to bend transversely with respect to said center line, and the width of said plates being decreased transversely of said center line from the outside towards the center.

6. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing and plates which are fixed to said additional back at points along its longitudinal center line and are attached to the back of said resilient base at points outside said center line, so that the plates are able to bend transversely with respect to said center line, and rivets securing said plates to said additional back.

7. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing, plates which are riveted to said additional back

at points along its longitudinal center line and of which the width decreases from the outside towards the center, said plate being attached to the back of said resilient base at points away from said center line.

8. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing, plates which are riveted to said additional back at points along its longitudinal center line and of which the width decreases from the outside towards the center, said plates being attached to the back of said resilient base at points away from said center line by adhesive and the central portions of said plates being free from said resilient base.

9. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing, rivets disposed in the longitudinal center line of

said resilient base, whereby said additional back is fixed to said resilient base and washers around said rivets whereby said additional back is spaced away from said resilient base.

10. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing, a strip attached to said additional back along its longitudinal center line and means whereby said strip is attached to the back of said resilient base.

11. A mounting means for attaching a slide rule or similar construction having a resilient base to a substantially rigid wall of the casing of a calculating mechanism and the like so as to retain the inherent flexibility of said slide rule about its longitudinal axis comprising an additional back fixed to said rigid wall of said casing, a strip attached to said additional back along its longitudinal center line and means whereby said strip is attached to the back of said resilient base, and said strip being riveted to said additional back.

/HANS WOLFGANG KÜBLER.