No. 784,274. PATENTED MAR. 7, 1905.

K. M. PAULI.

MULTIPLE SCALE RULER.

APPLICATION FILED MAY 14, 1904.

2 SHEETS—SHEET 1.

Fig. 2.

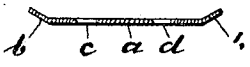


Fig. 1.

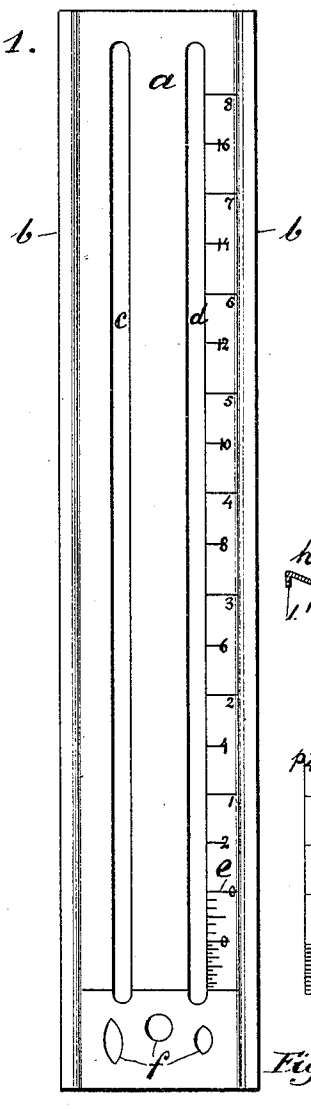




Fig. 3.

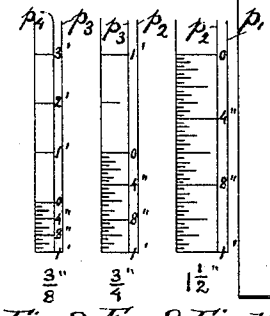


Fig. 8. Fig. 9. Fig. 10.

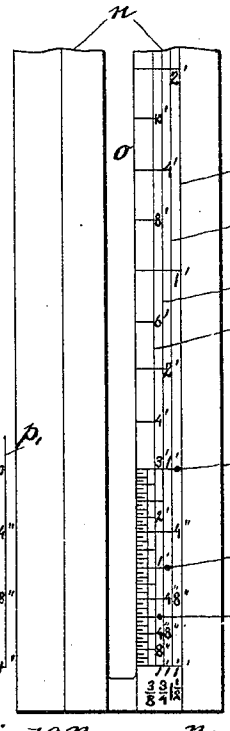


Fig. 4.

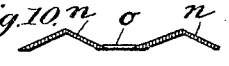


Fig. 5.

Inventor

Knut M. Pauli

Witnesses

L. M. Revelle.

L. A. Rosell

By Knut M. Pauli

Attorney

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2 SHEETS—SHEET 2.



Fig. 7

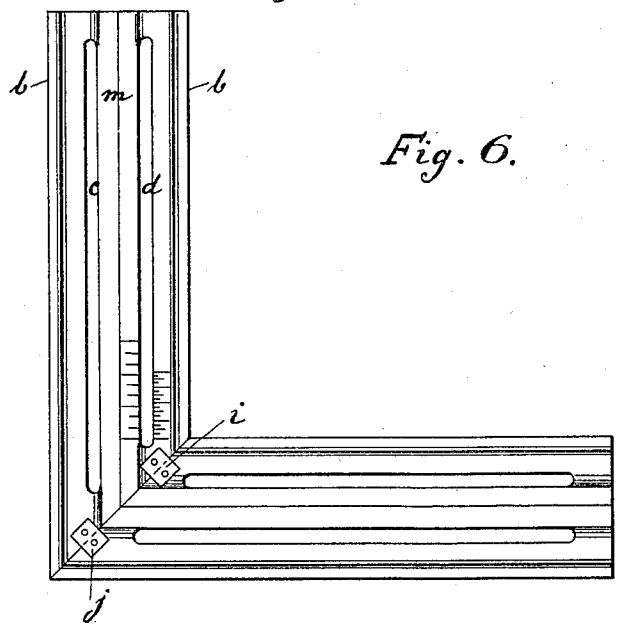


Fig. 6.

Witnesses

L. M. Revill.

L. A. Krouell

Inventor

Kurt M. Pauli

By Kurt M. Pauli

Attorney

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No. 784,274. Patented March 7, 1905.

UNITED STATES PATENT OFFICE.

KNUT M. PAULI, OF WASHINGTON, DISTRICT OF COLUMBIA.

MULTIPLE-SCALE RULER.

SPECIFICATION forming part of Letters Patent No. 784,274, dated March 7, 1905.

Original application filed February 6, 1904, Serial No. 192,388. Divided and this application filed May 14, 1904. Serial No. 207,988.

To all whom it may concern:

Be it known that I, KNUT M. PAULI, a subject of the King of Sweden and Norway, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Multiple-Scale Rulers, of which the following is a specification.

This invention is a division of an application on drafting instruments by myself filed February 6, 1904, Serial No. 192,388.

The object of this invention is to save time in making mechanical drawings and constructions and for this purpose to use rulers, triangles, and squares graduated in different divisions or scales, whereby the draftsman is able to set off or measure a certain line on the drawing quickly.

The object is, further, to make such an instrument as light and strong as possible and adapt it for use with pencil and ink. The graduations must be made in such a combination as to give the largest number of different scales with the fewest possible lines.

Figure 1 of the drawings is a plan view of such a graduated multiple-scale ruler, the cross-section of which is seen in Fig. 2. Fig. 3 is a cross-section modified somewhat from Fig. 2 in appearance, but not in principle; and Figs. 4 and 5 are similar modifications of a graduated ruler built upon the same general principles. Fig. 6 with cross-section Fig. 7 represent a draftsman's square made of two graduated rulers riveted together. Figs. 8, 9, and 10 are three scales shown separately, the same scales shown in combination on Fig. 4.

The parallel multiple-scale ruler shown in Fig. 1 is stamped out of a sheet of suitable material *a*, the edges *b* being turned up a little to be used with ink. Two long slots *c* and *d* with parallel edges are formed and the four latter provided with graduations *e*. The bending of the outer edges of the ruler makes the instrument strong, and it is hence possible to use a thin sheet of metal or other material in the manufacture of the instrument. Fig. 3 shows another way of bending the outer edges *b*, which are turned down, as at *b'*.

Figs. 4 and 5 show a scale-ruler stamped out of a thin sheet, having only one long slot *o* and two branches *n*, with angular cross-section. Upon the inclined four edges graduated scales are placed. These scales shown here are of a multiple type specially adapted for instruments of the kind just described in order to get many scales on few edges. On one of the edges in Fig. 4 three different scales are placed, "$1\frac{1}{2}'' = 1$ foot," "$\frac{3}{4}'' = 1$ foot," and "$\frac{3}{8}'' = 1$ foot." These scales are shown separately in Figs. 8, 9, and 10, and laid one upon the other they form the combined scale of Fig. 4. If those scales are so chosen that one is twice the other and the inches "4"" and "8"" are specially marked, no confusion will happen at the reading on the different scales. The smallest scale is nearest to the edge, then the next one in size, and so on. Longitudinal lines p_1, p_2, p_3, and p_4 form the boundaries for the grades or division-lines, and the spaces contained between two longitudinal lines contain the numbering of the special scales. The length of a certain grade is in proportion to its value in a certain scale. The "0's" of each scale may be marked by a dot *q* in order to quickly discern the beginning of each scale from a distance. The main division-lines and figures should be made in a special color—for instance, red—for the sake of clearness. The coincidence of the lines of the different scales is important, so that a line running through several fields marked by the longitudinal lines has a different value in simple proportion in each field. No line belonging to a larger scale should be allowed to run through a smaller scale without coincidence with some line of the smaller scale. Hereby great simplicity is attained, and it is possible to adapt one single edge with a great number of scales, whereby the number of edges can be kept relatively low. A multiple-scale ruler with four edges is able to carry conveniently twelve different scales.

Figs. 6 and 7 represent a square or angle composed by two rulers somewhat similar to that in Fig. 1, cut off at forty-five degrees and riveted together at *i* and *j*. The middle branch *m* instead of being flat, as at *a*, Fig. 1, is here pressed with angular cross-section,

thus showing another of the many possible modifications of the same general principles.

Having thus described my invention, I claim—

1. Scales or rulers of oblong shape with one or more long parallel slots of greatest possible length and pressed or formed of one piece of material, so as to form a solid and fixed frame, for the purpose of having a large number of longitudinal straight-edges, upon which graduations of different scales are placed for accurate and rapid measurement of lines or distances; the material so shaped that the cross-section of one or more of the strips thus formed is approximately angular, whereby strength of such strips is combined with saving of material, and sloping surfaces formed for said graduations; the edges of the slots touching the surface upon which the ruler is resting when the graduations are read off.

2. Scales or rulers of oblong shape with one or more long parallel slots of greatest possible length and pressed or formed out of open sheet material, so as to become a solid and fixed frame, for the purpose of having a large number of longitudinal straight-edges, upon which graduations of different scales are placed for accurate and rapid measurement of lines or distances; the material bent or corrugated parallel to the slots, so that one or more strips with approximately angular cross-sections are formed, whereby strength of such strips is combined with saving of material, and sloping surfaces formed for graduations; the edges of the slots touching the surface upon which the ruler is resting when the graduations are read off.

3. Scales or rulers provided with several graduated double scales on the same edge and face, in such a way that all double scales on the same face and edge start on the same place at one end of the scale-ruler with the same unit or figure, which is not the zero; from this point the different zeros belonging to said unit in the different double scales being placed consecutively in the same direction of the ruler, in different rows or fields on the surface of the edge, and each double scale extended on the other side of its zero arbitrarily, so that each such double scale is read to both sides of its zero, the side between the zero and the first starting-point being reserved for smaller divisions of the unit; the different double scales on the same edge and face being chosen in a simple relationship to each other, like 1 to 2, 3, &c., so that the zero of each double scale can be placed upon some main division-line of the next higher scale, and coincidence exists between the graduations of each such group of double scales, the same graduations in running through the different rows or fields having different values in each field, depending upon the choice of scales, whereby it is possible to combine a great number of different scales on the same edge and the same face of a ruler, and at the same time read the values rapidly.

In testimony whereof I affix my signature in presence of two witnesses.

KNUT M. PAULI.

Witnesses:
L. M. REVILLES,
L. A. KROELL.