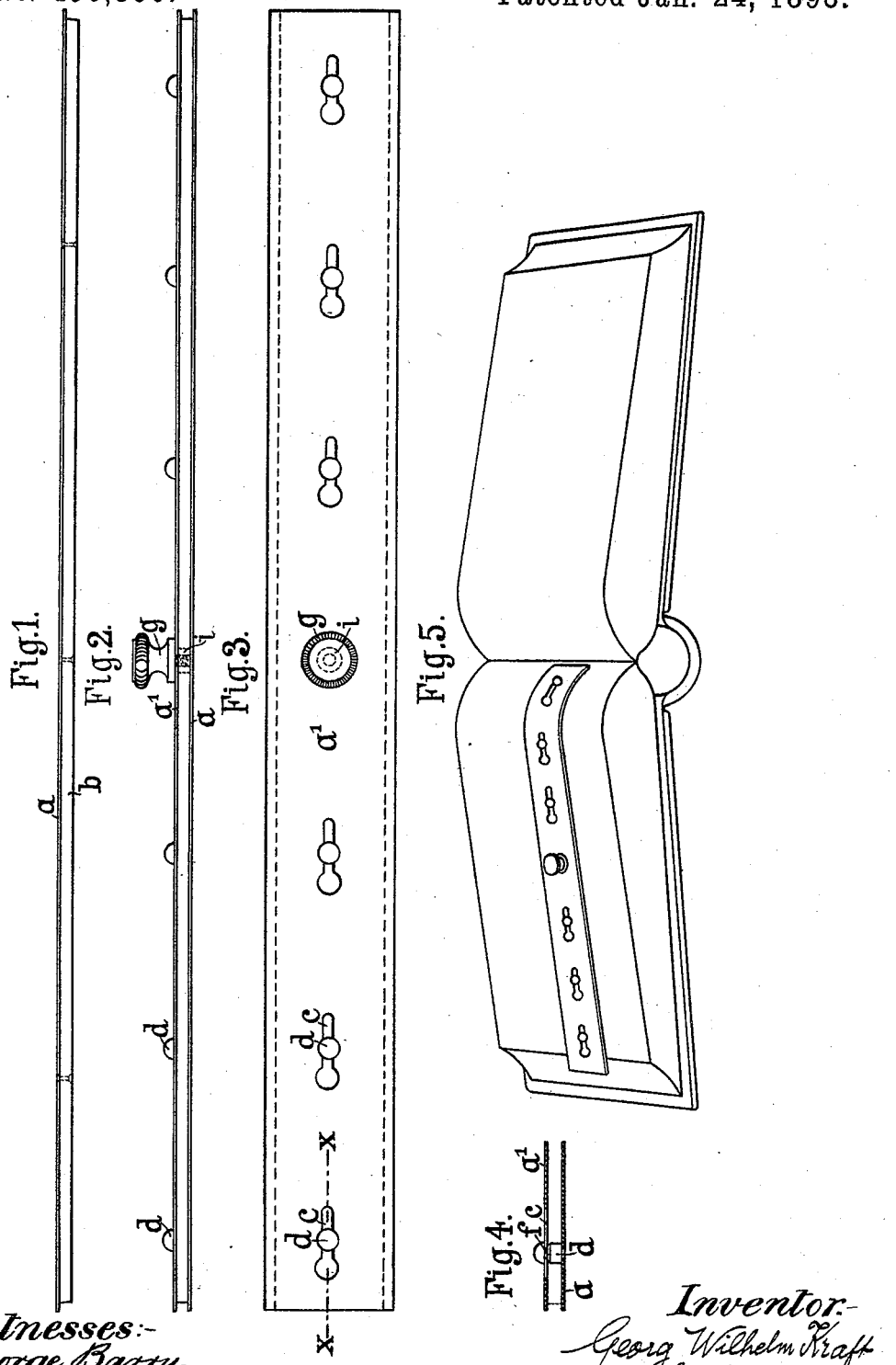
(No Model.)

G. W. KRAFT.

FLEXIBLE RULER.

No. 490,390. Patented Jan. 24, 1893.



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UNITED STATES PATENT OFFICE.

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FLEXIBLE RULER.

SPECIFICATION forming part of Letters Patent No. 490,390, dated January 24, 1893.

Application filed August 6, 1892. Serial No. 442,301. (No model.) Patented in France July 17, 1890, No. 207,030; in Germany February 17, 1891, No. 58,654; in England June 8, 1891, No. 9,697, and in Austria-Hungary February 25, 1892.

To all whom it may concern:

Be it known that I, GEORG WILHELM KRAFT, of Dresden, in the Kingdom of Saxony, in the German Empire, have invented certain new and useful Improvements in Flexible Rulers, of which the following is a specification, and which has been in part patented in France by brevet No. 207,030, dated July 17, 1890; in Germany by Patent No. 58,654, dated February 17, 1891; in Great Britain by Patent No. 9,697, dated June 8, 1891, and in Austria-Hungary by Privilegium, Tom. 42, Fol. 511, Tom. 26, Fol. 417, dated February 25, 1892.

In drawing lines with an ordinary ruler as hitherto in use there is a difficulty in drawing the lines straight if the object ruled does not present a level surface as is the case for example in large business ledgers and other large account books on the curved surfaces of the sheets of which the ruler cannot be pressed down evenly. The production of a flexible ruler has met with these difficulties, viz: that when constructed of hard material the ruler had, in order to be really flexible, to be made too thin whereby the drawing edge of the ruler comes too near to the paper causing blotting on the paper; and when made of a soft and flexible material, such for example as india-rubber, the soft edge of such material does not offer resistance enough against the pen.

The object of the present invention is to construct a ruler which combines the following qualities and advantages (first) having a hard or resisting drawing edge, (second) being high enough to prevent the necessary distance between the paper and the drawing edge and (third) being so flexible that it easily yields to adapt itself to curved surfaces with the slightest pressure. The ruler constructed according to this invention possesses all these desirable qualities and advantages.

Figure 1 is a side view of one example of a ruler embodying my invention. Fig. 2 is a side view of another example of my invention. Fig. 3 is a top view corresponding with Fig. 2. Fig. 4 is a partial longitudinal section in the line $x\,x$ of Fig. 3. Fig. 5 is a perspective view showing the ruler in use on an account book.

Similar letters of reference designate corresponding parts in all the figures.

The ruler shown in Fig. 1 simply consists of two elastic plates of suitable length and width, one of the plates a being of steel of convenient minimum thickness, the other plate b being of a soft material such as soft india rubber, the two plates being secured together by rivets or any other suitable means, the plate of soft material being of less width than the steel plate to which it is attached for allowing at least one edge of the steel plate to protrude or project to form a permanent edge for ruling, but the said plate of soft material being of such thickness that a proper distance is established between the paper to be ruled and the ruling edge of the steel plate, which latter of course in using the ruler, lies uppermost.

In the example shown in Figs. 2, 3 and 5, the ruler consists of two elastic plates $a\,a'$ of suitable length and width, both plates being made of steel of convenient minimum thickness suitable for the purpose. These two elastic plates are connected together in such manner that they lie with their flat sides parallel with each other and if desired at such a distance apart from each other as to constitute the thickness of an ordinary ruler, the connection being such that the parallelism is always kept up while the two elastic plates may be shifted independently of each other in the lengthwise direction. I preserve the full elasticity of each plate and thereby of the ruler composed of such plates. I prefer to make the said plates $a\,a'$ of steel but reserve to myself the right of using any material which in very thin plates combines the necessary flexibility, hardness and resistance. The lower plate a is provided with studs or projections d at its upper surface, said studs ending in a round head and having an annular recess f below the head. The upper plate a' is provided with long slots c, each slot having at one end a widened opening for the head of the studs d to enter, whereas the slots are of smaller dimensions in the remainder of their length to allow the annularly recessed portions f of the studs to enter into them. In

the middle or near the middle of the lower plate *a* and on its upper surface a nut *i* is affixed, the upper plate *a'* at the corresponding place being provided with a hole for the screw *g*, with a milled head to enter the nut and to combine the two plates *a* and *a'* rigidly at or near their middle part while leaving them free to move independently of each other when in use to accommodate the ruler to curved surfaces which are to be ruled. I prefer to make the lower plate *a* of less width as indicated in dotted lines in Fig. 3, so as to prevent the said plate from being touched by the ink of the pen, thus imitating the hollow recess usual in wooden rulers.

In using the ruler the protruding edge of the upper plate *a'* serves as the permanent drawing edge for the pen to rest against, whereas the lower plate *a* rests on the paper to be ruled and preserves or protects the paper from being soiled or blotted by the ink, which in the act of drawing adheres to the edge of the upper plate and dries up between the two plates. The space or room between the two plates may, if desired, be filled up with a soft substance such as paper which, in long strips of the width of the lower plate or of less width, is provided with elongated holes to pass over the studs *d*, such strips preserving the parallelism between the two plates but being capable of shifting longitudinally independently of each other. If an absorbent material is used to fill up the space between the plates, such material will take up the ink adhering to the drawing edge of the upper plate.

Such an elastic and flexible ruler may be composed of more than two plates, connected together and being capable of shifting independently in lengthwise direction, the elasticity and flexibility however of such ruler being inferior to those composed of two plates only.

If the ruler is laid for use on a surface of a certain curvature, the ruler will by the slightest pressure on the top plate accommodate itself to the surface by bending so that it rests on all parts of the surface in the line to be drawn, thus insuring a straight line without necessitating the rocking of the ruler as is the case if the latter is stiff and rigid in all its parts. With my improved ruler the plates *a* and *a'* will always, even if bent, remain parallel, whereas the plates are capable of shifting independently of each other, to yield while the ruler is bent.

I may connect the two plates *a* and *a'* in any suitable manner such as by means of hinged parts arranged between the two plates *a* and *a'* allowing these two plates to shift independently of each other in lengthwise direction, but maintaining all the while their parallelism. But I have found the recessed studs in combination with the elongated slots to be preferable, said construction affording the possibility of easily detaching the two plates by simply unscrewing the middle screw *g* and shifting the upper plate so as to allow the stud heads to escape through the holes provided for them.

I do not limit myself to the exact construction of the ruler as explained above; I reserve to myself the right to vary the parts according to will, always maintaining in an elastic or flexible ruler the parallelism of the upper and lower thin plates and their capability of lengthwise shifting independently from each other, thereby constituting a ruler capable of yielding to the curved surface of the object to be ruled and yet being of the sufficient height or thickness and resistance and offering a stiff and rigid edge for the pen to rest against in the act of ruling.

I may mention that instead of the studs with recesses under their head, rivets may be used which with their stems are fixed to the one plate while the rivet heads pass through the holes of the other plate and the stems of the rivets slide in the elongated slots of this latter plate.

What I claim as my invention is:

1. A flexible ruler capable of adapting itself to different forms of surfaces to be ruled composed of two elastic plates combined together, the one being a metal plate, the other being a plate of soft and elastic material, one edge of the metal plate forming the ruling edge while the other plate keeps the distance between the ruling edge and the paper to be ruled, substantially as herein set forth.

2. A flexible ruler composed of two or more superposed elastic plates of metal or other material, of which one has a permanent ruling edge, and a connection substantially as herein described between the said plates which permits the said plates to shift independently of each other in lengthwise direction when the ruler is in use to enable the ruler to adapt itself to curved surfaces, as herein set forth.

3. A flexible ruler composed of two or more flexible plates *a* and *a'* provided with studs or rivets *d* and with elongated slots *c* for the studs or rivets to enter into and to slide freely within, and a fastening between said plates which secures them firmly together at one point in their length while permitting them to slide freely the one relatively to the other throughout the rest of their length, substantially as herein described.

4. In a flexible ruler, the combination of two elastic plates separated from each other but connected together to shift lengthwise independently of each other and one of which has a permanent ruling edge, and an interposed filling of flexible and soft material, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

GEORG WILHELM KRAFT.

Witnesses:
FRANZ RIESKE,
CURZ SCHAUFUSS.