A. MALSIN.

FLEXIBLE RULER.

APPLICATION FILED JUNE 25, 1915.

1,233,382.

Patented July 17, 1917.

2 SHEETS—SHEET 1.

Fig. 1

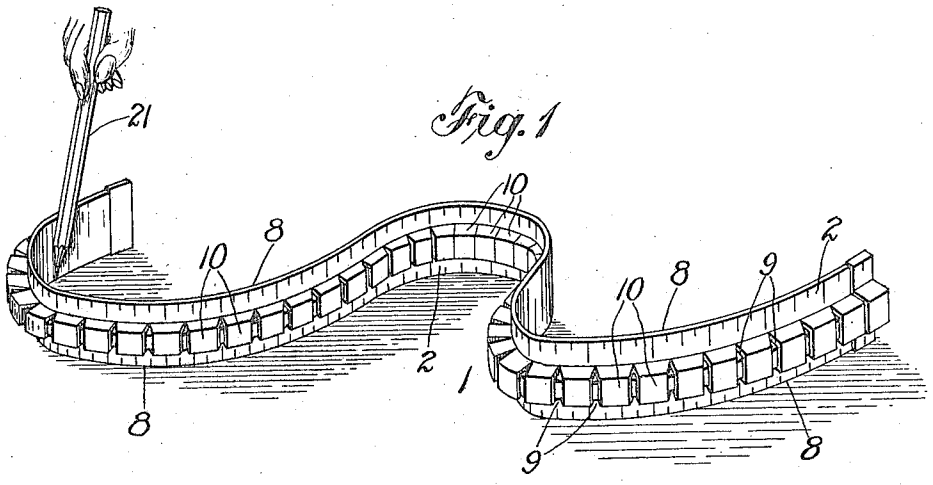


Fig. 7

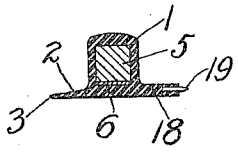


Fig. 8

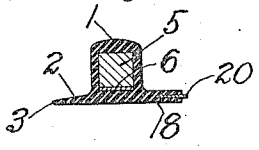


Fig. 9

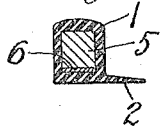


Fig. 11

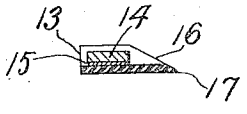


Fig. 10

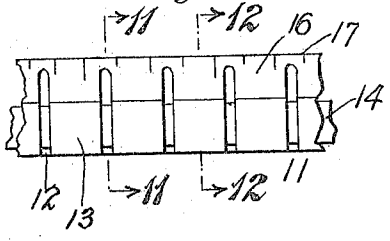
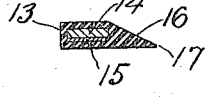


Fig. 12



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2 SHEETS—SHEET 2.

Fig. 2

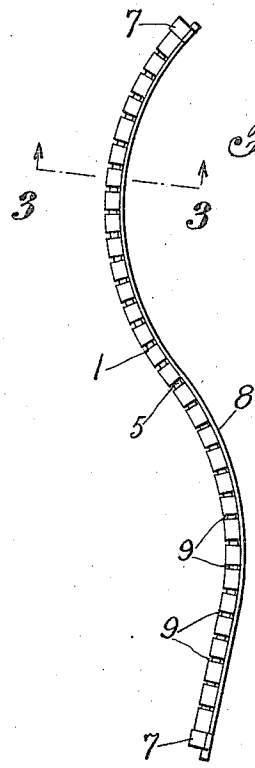


Fig. 3

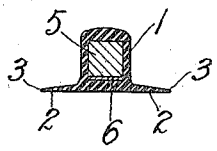


Fig. 4

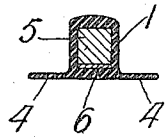


Fig. 5

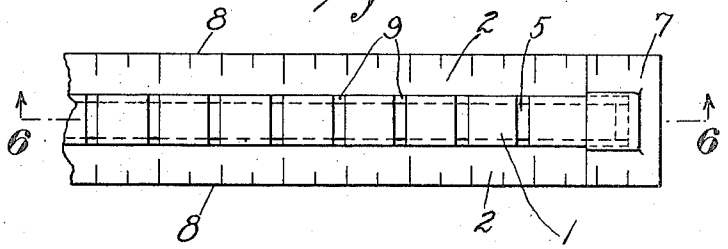
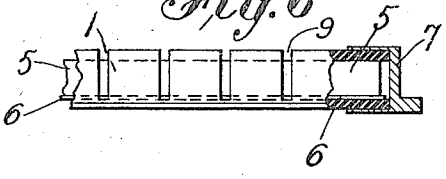


Fig. 6



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UNITED STATES PATENT OFFICE.

ALBERT MALSIN, OF NEW YORK, N. Y.

FLEXIBLE RULER.

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Application filed June 25, 1915. Serial No. 36,182.

To all whom it may concern:

Be it known that I, ALBERT MALSIN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Flexible Rulers, of which the following is a specification, reference being had therein to the accompanying drawing.

My present invention relates to a flexible rule or measuring device of the class adapted to be bent into any desired form or curvature and retained in this position until the flexing is changed by rebending. The object of the invention is to provide an adjustable or flexible rule having graduations or scale marks and so constructed as to enable the taking of accurate measurements and of drawing lines of any desired curvature. The invention also comprises numerous details and peculiarities in the construction, arrangement and combination of the various parts, substantially as will be hereinafter more fully described and claimed.

In the accompanying drawing illustrating my invention:

Figure 1 is a perspective view of my improved flexible rule;

Fig. 2 is a side view of my improved rule shown in a position where it is bent into a compound curve;

Fig. 3 is a cross-section on the line 3, 3 of Fig. 2;

Fig. 4 is a similar cross-section of a modification of the lateral flanges;

Fig. 5 is a plan view of a portion of my improved rule;

Fig. 6 is a partial side view, a part of which at the end of the rule is shown in section on the line 6, 6 of Fig. 5;

Fig. 7 is a cross-section showing the use of pencils for marking on a chart or other surface the lines of the curves or bendings of the rule;

Fig. 8 is a similar cross-section showing the rule provided with an inked ribbon or other marking device;

Fig. 9 is a similar cross-section of a rule provided with a single lateral flange;

Fig. 10 is a partial plan view of a modified form of the invention;

Fig. 11 is a cross-section of the same on the line 11—11 of Fig. 10;

Fig. 12 is another cross-section on the line 12—12 of Fig. 10.

Similar characters of reference designate corresponding parts throughout the different figures of the drawing.

My improved rule comprises a sectional tubular or hollow strip of rubber, having any desired degree of hardness and capable of being bent without breaking. Instead of rubber obviously any other material, as for example, celluloid, or other substance having proper qualities may be used, provided it is flexible throughout and is capable of bending without breaking. The form of the tubular or hollow strip 1 may vary within considerable limits, being thicker or thinner, narrower or wider, etc., and it is provided on one or both sides with lateral longitudinal flanges 2, 2, which preferably reduce gradually in thickness from the member 1 to the outer edge 3, where said flanges are very thin, although, if desired, the flanges may be uniform in thickness from the member 1 to the outer edge, as shown at 4 in the modified form in Fig. 4. The rule, therefore, essentially consists of the hollow flexible body or strip 1, having one or more lateral flanges molded together as a single integral unit.

The hollow rubber strip 1 is provided at regular intervals with indentations, slots, or cut-out portions 9 which may have any desired form, as, for instance, the V-shape, shown in Fig. 1, or the parallel-sided shape, shown in Figs. 2, 5 and 6, these cuts 9 preferably extending from the outer surface of the hollow strip 1 inwardly as far as the flanges 2, and thus providing between them a series of segmental hollow members 10, which serve as guides or retaining sleeves for the strips of lead and spring metal to be herein described. The cutting out of the material at 9 and thus enabling the construction of a series of elastic hollow sections instead of one continuous tubular strip, is found to possess many advantages, principal among which is that of permitting the rule to be more easily bent and retained in its bent position, even when the curvature of the bend is abrupt and sharp, for in this bending the segments 10, if the bend is convex, will separate farther from each other, whereas if the bend is concave, the segments 10 will bind more closely against each other, as indicated in Fig. 1.

This segmental tubular or hollow strip 1 contains a strip of rigid or partially rigid material 5, such as lead, soft copper, or some other metallic substance, which can be bent

without breaking and will retain any position into which it may be bent, and which can be bent easily and quickly into one position or another. Also, within the hollow rubber members 10 are one or more straight springs 6 consisting of flexible metal or material, which has a tendency to resume a straight position after each bending. The resiliency of the strip or strips of spring metal is overcome by the partially rigid character of the bendable metallic rod, so that the spring metal does not have the function of restoring the ruler to a straight form after each bending, but what the spring strip does is to have the function of tending to counteract and overcome small irregularities that may exist in the bendable metallic piece, and thus enable the outer rubber surface of the ruler to afford a continuous and perfect curve for the use therewith of drawing tools. In this way sharp corners or bends are prevented. The thin flexible strip is preferably located between the bendable strip 5, which lies within the hollow segmental portions of the body of the rule, and the continuous base of the said body that unites the said segmental portions. Both the partially rigid metallic strip 5 and the spring metal strip 6 are made somewhat shorter in length than the hollow member 1 which contains them, so that during the bending process, since the inner parts slide more or less longitudinally, they will thus have room for action in adjusting themselves. The ends of the ruler are provided with suitable metallic or other cap pieces 7, made in any convenient manner and secured to the ruler in such a way as to properly close the ends of the hollow part 1, thus concealing the pieces 5 and 6, giving an ornamental appearance to the ruler, and enabling the ends thereof to be more conveniently handled.

The ruler may obviously have flanges 2 or 4 on one or both edges. In Fig. 1, as also in Fig. 5, I have represented two flanges, one on each side, whereas in Fig. 9, I show the device provided with only one flange. It will operate equally well either way. In Fig. 1 the position of the ruler when in use for drawing curved lines, is clearly shown, and with the ruler I have indicated a pencil 21 in the position that it occupies when the hand is holding the same and is drawing the pencil along the vertical edge of one of the flanges 2 for the purpose of making a curved line on the surface on which the rule is placed. It will be noted that the flange, when allowed to rest on any surface on which a line is to be drawn, presents a firm strong shoulder or wall, against which the pencil point will run without any danger of inaccuracy or slipping, and if the hand firmly holds the pencil and draws the point along the edge of the flange of the ruler, a fine will be marked corresponding precisely to the curvature of the ruler.

In Figs. 10, 11 and 12, I have delineated a form of the ruler which, closely approximating in shape that of the common and well-known flat wooden ruler, possesses the characteristics of my present invention. In this case the hollow flexible body 11 is flat and elongated, and is cleft at intervals at 12 so as to form the intervening segments 13, the latter having a flat cavity therein to receive a wide bendable lead or other strip 14 and a flat spring piece 15. Along one side is a beveled face 16 which carries at its edge 17 the usual scale or measurement markings or graduations, said beveled edge corresponding to the scale-provided beveled flange of the form of the invention illustrated in Fig. 3. In this form, however, all the essential parts of the invention are present, as there is a hollow sectional strip containing a spring member and a partially rigid bendable member, while the measuring is accomplished by the comparatively thin edge, the bending of which is not susceptible to error in the same manner that the bending of the thicker hollow strip would be.

The lateral longitudinal flanges, are provided, one or both, with suitable graduations or scale marks at 8 in order to enable measurements to be taken. These graduations may be in accordance with any desired system of notation, and may be in inches and fraction of inches, the markings of the metric system, or otherwise as may be preferred. A great advantage exists in having the graduations applied to flanges which are comparatively thin instead of to the thicker and heavier part 1 of the rule. If the part 1 were so marked instead of the comparatively thin flanges, it would be found in bending that the bendable material, as rubber, of which such a ruler is necessarily made, would, in the process of flexing, cause inaccuracy in the measurements, as the distances between the graduation marks would be apt to lessen or increase in consequence of the stretching or compacting of the rubber. This is avoided by using the thin edge of the flange, which in any bending that occurs stretches or changes its condition only very slightly, and not enough to be reflected in any inaccuracies in the distances between the graduation marks.

In the use of a ruler of the kind I am now describing it is common to apply the same to an object for the purpose of ascertaining its exact contour together with the proportions of such contour, and then to apply the ruler to a chart or model, so as to depict thereon the same contour with an exact record of the proportions taken by the scale or graduations on the rule. Commonly the markings on the chart or model from the ruler will be performed by the use of a

pencil, as shown in Fig. 1, but, if desired, one of the flanges or other part of the ruler, as, for instance, the flange 18 in Fig. 7, may be provided with a series of pins, pencils, crayon points, or the like at 19, by means of which markings on the chart will be more readily effected than if it were necessary to employ a separate pencil; for by simply laying the ruler upon the surface the points 19 will transfer suitable color markings or perforations whereby the curvature of the ruler will be reproduced; or in lieu of these pointed markers 19, I may utilize a ribbon 20, which has been suitably inked and secured within a slot in the flange 18, as indicated in Fig. 8; so that in this way the ruler may be applied quickly to an object and shaped to conform to a bend in said object, and then the line of such bend may be quickly traced on the chart by laying the ruler thereon, and this process may be repeated quickly and indefinitely as often as may be required to make up the chart in accordance with any predetermined method of measurement.

It is essential that the body of the rule should be flexible throughout so that any portion thereof may be bent into a regular curve to conform to an object the contour of which is to be copied and that the base of the body, that is, the part that is applied to the said object, shall be extended along one side at least to form a thin edge or flexible flange that will follow the shape given to the body of the rule when applied to the object being measured or to be copied.

It will be understood that many changes may be made in the precise combination and arrangement of the various parts without exceeding the scope of the invention. There may be more than one inner metallic strip which is capable of being bent and retained in its bent position, and there may be more than one resilient coöperating strip for assisting the partially rigid piece or pieces to bend neatly and symmetrically without breaking; and further the shape and form of the main member 1 of the rule which constitutes a housing element for the partially rigid strip and the spring may vary within wide limits.

The use of a rule of this kind will be obvious and its function will be easily understood from the foregoing description. It obviously may be bent at any angle, either the multiple curve, shown in Fig. 1, or a single curve, and a curve either long and gradual, or short and abrupt, and any position into which it may be bent will be maintained until it is bent again, this being made possible by the use of the bendable strip of lead or similar material which holds its position, and communicates its shape to the inclosing rubber envelop, and by the coöperating spring metal piece which avoids sharp angles and contributes to the more successful operation of the device.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A flexible rule having a relatively broad base adapted to be applied to an object the shape of which is to be taken by the rule, one edge at least of the base being formed into a thin flange, and hollow segments secured to the outer side of the said base, such segments being flexible, and bendable, shape-retaining means located within the said hollow segments.

2. A flexible rule having a relatively broad flexible base adapted to be applied to an object the shape of which is to be taken by the rule, one edge at least of the base being formed into a thin flange, and hollow, separated segments on the outer side of the said base and integral therewith, and a bendable, shape-retaining strip located in the said hollow segments.

3. A rule consisting of a body flexible throughout whereby it may be bent into regular curves, said body being formed of hollow segments spaced apart and a base uniting the said segments, the base being adapted to be applied to an object the contour of which is to be copied, and extending laterally beyond the said hollow segments to constitute a thin flexible flange, bendable means located within the said hollow segmental body adapted to retain the rule in the shape into which it may be bent, and a thin spring metal strip also located in the said body of the rule and between the bendable means and the base of the flexible body.

4. A rule consisting of a body flexible throughout whereby it may be bent into regular curves and formed with a base adapted to be applied directly to an object the contour of which is to be copied, and said base extending laterally from the body proper to form a thin flexible flange or edge, on which are formed measuring graduations, and a bendable strip located within the body of the rule and adapted to retain the latter in the shape into which it is bent when applied to the object.

5. A rule consisting of a body flexible throughout whereby it may be bent into regular curves and provided with a base adapted to be applied directly to an object the contour of which is to be copied, the base being extended laterally as a thin flexible flange or edge and beveled upon its upper face from the body proper toward the edge, and a bendable strip located within the body of the rule adapted to retain the latter in the shape into which it is bent when applied to the object.

6. A ruler consisting of a flexible body, marking means partly embedded in one of the longitudinal edges of said body, and bendable means within said body serving to retain the position of the latter after each bending.

7. A ruler consisting of a flexible body having longitudinal flanges, one formed with a comparatively fine edge carrying a series of measuring graduations, marking means in the opposite flange, and bendable means within said body serving to retain the position of the latter after each bending.

8. A ruler consisting of a flexible body cleft into a series of sections and having longitudinal flanges, one of said flanges having a comparatively thin edge carrying a series of graduations, marking means partly embedded in the opposite flange, and bendable means extending through the said sections and serving to retain the position of the latter after each bending.

9. In a rule, the combination with a flexible hollow member providing a series of segments and having a lateral flange, a marker embedded in said flange, and means within the flexible member adapted to be bent at various angles and retain its position after each bending.

10. In a rule, the combination of a yielding sectional member providing a series of hollow sections and having a thin lateral flange formed with measuring marks, a bendable strip within the hollow segments which retains its position after being bent, and means partly embedded in the flange whereby a marking operation is performed.

In testimony whereof I affix my signature.

ALBERT MALSIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."