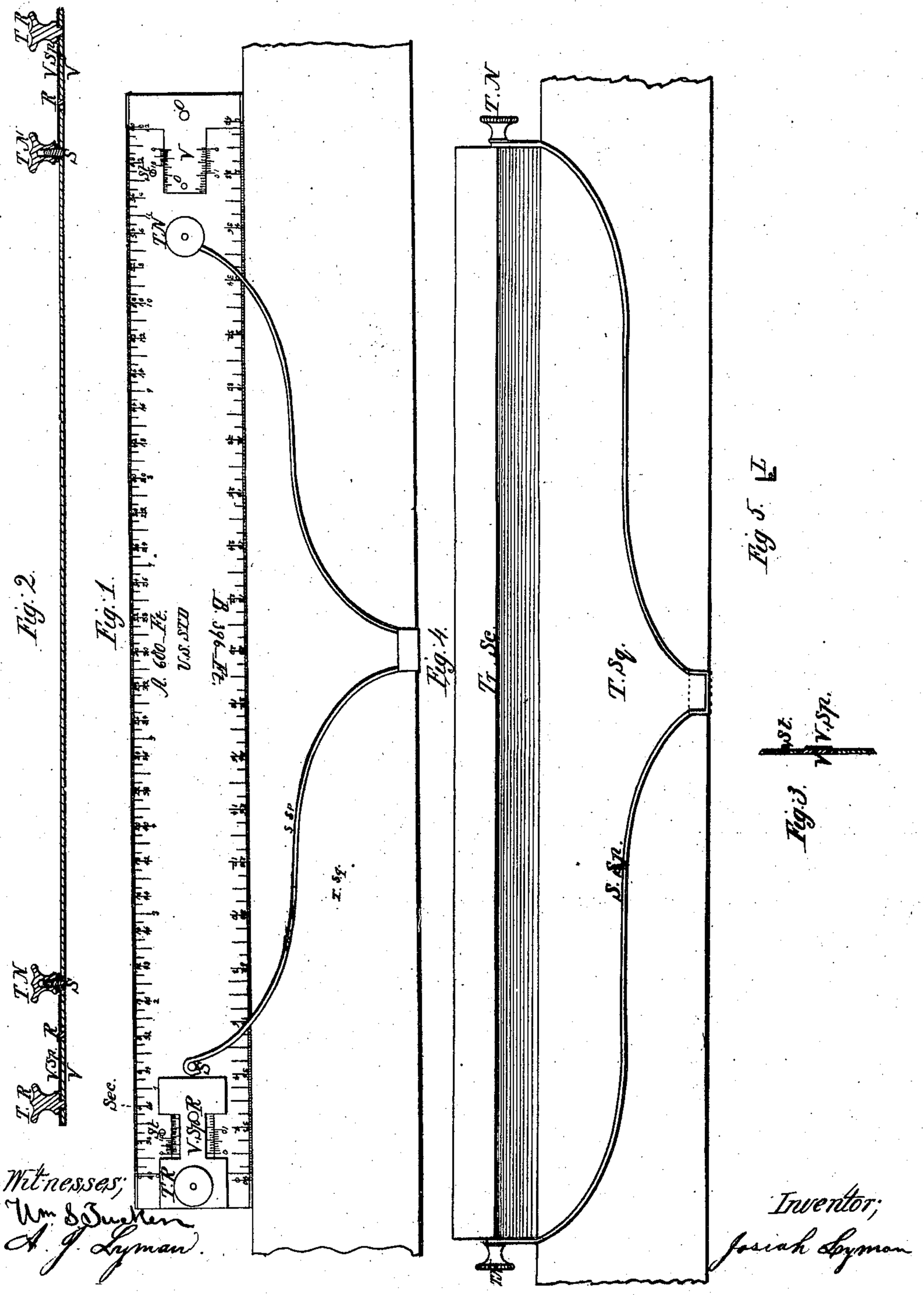
No. 46,256. PATENTED FEB. 7, 1865.

J. LYMAN.

DRAFTING SCALE.



UNITED STATES PATENT OFFICE.

JOSIAH LYMAN, OF LENOX, MASSACHUSETTS.

IMPROVEMENT IN DRAFTING-SCALES.

Specification forming part of Letters Patent No. **46,256,** dated February 7, 1865.

To all whom it may concern:

Be it known that I, JOSIAH LYMAN, of Lenox, in the county of Berkshire, in the State of Massachusetts, have invented a new and Improved Drafting-Scale, valuable for all purposes of rectilinear drafting; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification, in which—

Figure 1 is a plan view of the scale with its slide-spring and attachment thereby to the arm of the trigonometer or T-square T S*q*. Fig. 2 is a longitudinal section of the instrument through its center. Fig. 3 is a transverse section through the vernier-piece, vernier-spring, and stop-screw S*t*. Fig. 4 is a plan view of the slide-spring when applied to a triangular scale, T*r* S*c*. Fig. 5 is a transverse section of the lip-piece L, with the wire spring.

To enab'e others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The invention consists of three parts—viz., the scale proper with its two beveled edges, the verniers with their springs, and the slide-spring.

The scale may be used either with or without the other parts, or with either of them separately, as occasion may require. It may be made of German silver, of steel, of brass, of aluminum, or of any similar metal. When made plain—that is, without verniers—the most convenient dimensions are about one-twentieth inch thick, one and three-eighths inch wide, and twelve and one-half inches long, allowing one foot (or the number of even units nearest to this) for the graduated part, as shown in Fig. 1. Its essential peculiarity consists in having the two longitudinal edges beveled to such an angle and with the subdivisions so graduated upon them that each of the marks will guide with certainty the point of the needle or prick (while held in an upright position, being traced by it quite down to the paper) in making a dot at the end of any required distance. The best to effect this object, I have found by experiment that an angle for the beveled edges of about thirty degrees with a perpendicular is required, and that the graduating-tool shall be so shaped as smoothly to cut out a deep, narrow chip entirely across in marking the edges. This angle of bevel is seen in the transverse section, Fig. 3. The same angle exists in the common equilateral triangular scale; but when made of wood the division-marks cannot be used to guide the needle-point, since they would thus in a short time be torn and destroyed. Ivory and box-wood scales with inclined borders are common, but not so inclined or so graduated on the edges as to guide at all the needle-point in making a dot. Nor are the subdivisions on a separate level, as in the scale herein described. The great utility of this arrangement of the subdivisions is evident from the fact that the marks are universal guides for both entire spaces and for fractional portions of a space. For when the scale is plain, in laying down any given distance, either the space next to the zero-mark or the one at the other end of the required distance, being subdivided by the eye into ten equal parts—that is, into hundredths of the unit—the scale is slid on the paper till the required portion of a space is embraced between the given dot and the terminal mark, while the needle is carried to the mark designating the required unit and tenth, and in it a second dot is made. On the other hand, in measuring the distance between any two points, either the zero-mark or the other terminal mark is first brought to coincide with one of them, while the units, tenths, and hundredths are instantly read on the scale at this or the other point.

When the scale is made with verniers its entire length, with these included, is about twelve and three-fourths inches, the dimensions in other respects being the same as when made plain.

V, Fig. 1, shows the form and arrangement of the vernier-pieces. V *sp*, at the left end of the figure, is the vernier-spring, partially covering the vernier-piece at that end, but for the sake of distinctness left off at the other. O *o* are orifices for the rivets. The vernier-pieces are fitted into slots in the ends of the scale, held from being elevated above its upper surface by the edges being beveled, as shown in Fig. 3, and from being depressed below its lower surface by the springs, (as V *sp* at the left end.) They are riveted to the vernier-pieces by the rivets R R, Figs. 1, 2, and the thumb-rivets T R T R. The thickness of the springs, which are made of brass or German silver, is seen in Figs. 2 and 3, and

s about one fortieth inch. Spring force is given to them by having the central portions swelled or raised a little before riveting. The vernier-pieces are held from being drawn out too far by the stop-screws S*t* S*t*.

In graduating the vernier-scales the zero-mark is in all cases made on the vernier-piece, as in scale A, Fig. 1; but when the units of the two scales A and B terminate at different points, as in Fig. 1, in which the subdivisions of the two scales embrace the exact ratio of links to feet, then the graduation of the longer scale extends far enough beyond the zero-mark of the other scale to complete the requisite number of units, and at the same time render the two ends of the scale identical in the relative position of corresponding marks.

With the plain scale a distance may be laid down or measured reliably to the five-hundredth or six-hundredth of an inch. With the verniers attached the degree of accuracy is about four times as great, while the simplicity of the construction renders its cost comparatively small. But for most uses the convenience and value of this scale is greatly enhanced by the slide-spring S S*p*, Fig. 1. This is instantly attached to or removed from the scale by means of the thumb-nuts T N, Figs. 1 and 2, and their corresponding screws, S S, made of iron or steel, and permanently fastened to the scale or the nuts. For the sake of distinctness the nut in Fig. 1, at the left end of the spring, is represented as removed, but that at the right end attached.

In Fig. 4 the same method of attachment is employed as in the flat scale; but since it is triangular the spring is applied to the ends of the scale. This spring is usually made of brass wire, hardened by drawing. The lip L (seen in plan in Fig. 1, in section in Fig. 5, and represented by a dotted outline in Fig. 4) is also made of brass, and is soldered to the wire. By means of the spring and its lip the scale is brought into contact with and becomes a sliding scale for the trigonometer or the arm of any T-square. To give it the requisite spring force, the wire is so bent that the lip, when not drawn over the side of the arm, shall stand about one-eighth of an inch therefrom. Thus when it is drawn over, the scale is not only held steadily in contact with the arm, but is slid by its thumb-nuts with great smoothness and ease, yet with sufficient friction to prevent any accidental slipping. This slide-spring is analogous to that patented with the micrometer-scale before referred to; but the method of attachment is entirely different, as well as the construction of the lip. It is also much more convenient—first, because, being tightly fastened to the scale, no weight is required to keep the lip in its place; secondly, because it is not exposed to slip off from the scale; and, thirdly, because the lip moving with more certainty and uniformity with the scale, the latter is not liable to change its position after the hand leaves the nut, as is the case with the old spring referred to.

Since this new scale, for nearly every purpose to which either is applicable, is much more convenient than the old scale-plate of the trigonometer, or even the micrometer-scale referred to, and its cost hardly half as much, while in practical accuracy it is superior to either, its introduction will greatly enhance the value of the former instrument, as well as involve an indefinite number of applications used separately by itself in every department of rectilinear drafting.

I claim as my invention—

1. Such an arrangement, application, and graduation of the beveled edge of the scale herein set forth as renders it a universal reliable guide to the needle-point in making a dot on the paper at the end of any required or given distance.

2. The arrangement and application of the slide-spring, as set forth, to the scale herein described, by which it is brought into contact with and becomes a part of the protracting trigonometer or of a T-square.

JOSIAH LYMAN.

Witnesses:

WM. S. TUCKER,

A. J. LYMAN.