J. LYMAN.

DRAFTING SCALE.

No. 187,290. Patented Feb. 13, 1877

Fig. 1.

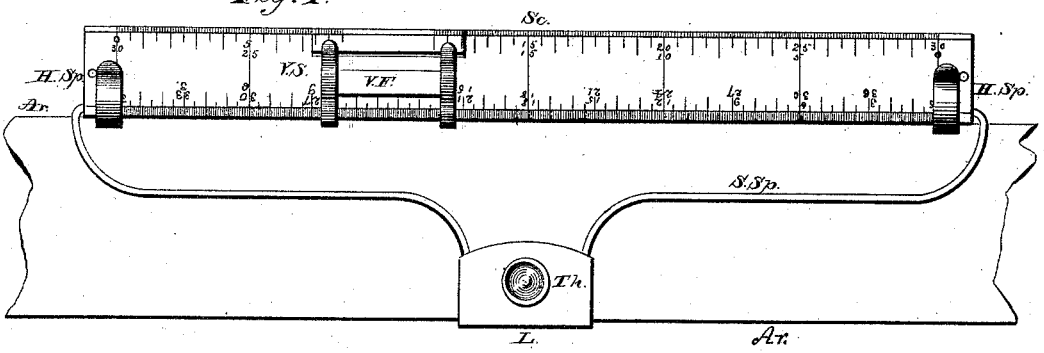


Fig. 2.

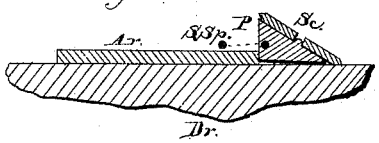


Fig. 3.

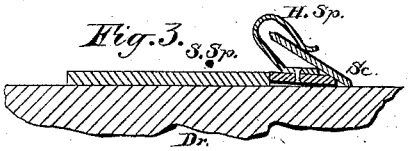


Fig. 4.

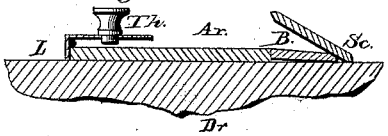


Fig. 5.

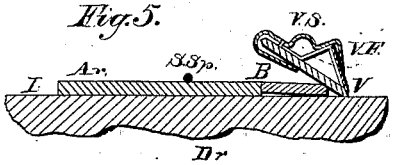


Fig. 6.

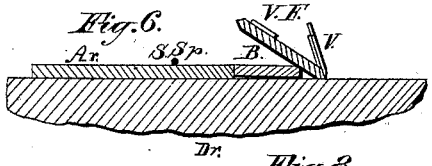


Fig. 7.

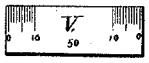


Fig. 8.

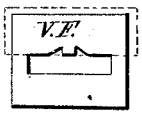
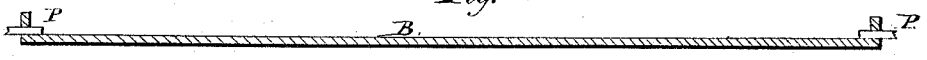


Fig. 10.

Fig. 9.



Witnesses:

Albert. J. Lyman
Fritz. Von Faldern.

Inventor:

Josiah Lyman.

UNITED STATES PATENT OFFICE.

JOSIAH LYMAN, OF LENOX, MASSACHUSETTS.

IMPROVEMENT IN DRAFTING-SCALES.

Specification forming part of Letters Patent No. **187,290**, dated February 13, 1877; application filed March 30, 1876.

To all whom it may concern:

Be it known that I, JOSIAH LYMAN, of Lenox, in the county of Berkshire and State of Massachusetts, have invented a new and improved Drafting-Scale, of which the following is a specification:

My invention consists, first, in a new and improved form of sliding scale, applicable to all classes of drafting, in which both of the graduated edges are double-beveled to a definite angle, viz., of thirty degrees to the plane of the flat surface, and of sixty degrees to each other; the subdivisions being all made on the beveled part of the plate, thus allowing of four separate scales on each plate; secondly, in a frame or mounting for this plate, (connected with a sliding spring,) which gives an inclination to its flat surface of about thirty degrees, or a little more, to the plane of the drafting-board on which it rests—one of the beveled edges thus nearly coinciding with the paper, while the other is inclined to it at an angle of sixty degrees, or of thirty degrees to the perpendicular thereto; thirdly, in the peculiarity of the verniers, and their combination with their frame and spring, as described in detail.

To enable others skilled in the art to comprehend and use my invention, I will describe in detail its construction and applications.

Figure 1 shows in plan the scale-plate with its fixtures all complete, as in use; including the holding-springs, main sliding spring, with its attachment to the frame and to the arm of the trigonometer, or protractor, or T-square, and the vernier, with its sliding frame and double springs.

Fig. 2 is a transverse section of the instrument, through one of the beveled posts of the frame. It shows the form, thickness, width, and inclination of the scale-plate, with the socket or orifice for the rounded tooth of the post fitted to it, as indicated. It also exhibits at two points the sliding spring, viz, at its attachment to the post and in the curve, with the trigonometer arm and a portion of the drafting-board on which the whole rests.

Fig. 3 is a transverse section through the center of one of the holding-springs, showing how the latter is attached to the base of the frame, and the manner of its holding in its normal position the scale-plate.

Fig. 4 is a transverse section through the center of the thumb-nut, thumb-plate, and lip, showing the manner in which the frame-base is held in contact with the trigonometer-arm.

Fig. 5 is a transverse section through one of the vernier-springs, showing its form through its entire length, with the exact shape of that part of the vernier-frame upon which it rests and to which it is riveted.

Fig. 6 is a transverse section through the center of the vernier-frame and vernier, showing the tooth of the former fitted into a corresponding socket or groove in the latter, to prevent it from slipping forward.

Fig. 7 is a view in plan of the vernier; and

Fig. 8 is a view in plan of the vernier-frame before being bent into its proper form, as shown in Figs. 5 and 6, the dotted lines showing the outline of the vernier in its relative position. It also shows the construction of the lip before being bent up and fitted to the vernier-socket.

Fig. 9 is a longitudinal section (through the ends of the sliding spring) of the scale-frame, including its base B and posts P P.

Fig. 10 is a longitudinal section of the thumb-nut, thumb-plate, and sliding spring.

The several parts of this instrument may be described as follows: The scale-plate, usually made of German silver, is ordinarily either six and a half or twelve and a half inches long, three-quarters of an inch wide, and about one-fourteenth of an inch thick. The two edges, as illustrated in Figs. 2, 3, 4, 5, and 6, are double beveled. The graduated marks are cut clean with a wedge-shaped tool, like that of the engraver—narrow, but so deep that when placed in its normal position on its frame, the needle-point will readily, with invariable certainty and while held plumb, follow any one of them entirely down to the paper, thus forming a circular dot instead of an elliptic one, as is unavoidable when inclined.

The frame consists of a plate of German silver, half an inch wide and one-fourteenth of an inch thick, with posts attached at or near the ends

at right angles, as shown in Fig. 9. The tops of the posts are beveled to an angle of 30° with the base B, as shown in section P, Fig. 2. The length of the frame is identical with that of the scale plate. On the beveled part of these posts is left a projecting tooth, made cylindrical at the base and spherical at the top, being thus fitted to corresponding orifices in the scale-plate, as clearly shown in Figs. 1, 2. Through the posts, very near the rear edge and even with the upper surface of the base, are drilled orifices for receiving the two ends of the sliding spring S Sp, Figs. 1, 2, and 9.

The sliding spring S Sp is made of German silver wire one-twentieth of an inch in diameter, bent into the shape shown, soldered to the little German-silver plate Th, into which is screwed the thumb-nut Th, Figs. 1, 4, and 10. The rear border of the plate is bent down so as to form a lip, L, Fig. 4; and the side borders are bent in a similar manner, but extend no lower than the bottom of the spring, as seen in Fig. 10. This spring, by its lip, holds the scale-frame firmly in contact with the trigonometer or T-arm, yet at the same time admits of a smooth, steady, sliding motion, with friction increased or diminished at pleasure by bending; thus securing constant parallelism between the lower or working edge of the scale and the adjacent edge of the trigonometer or T-arm. The same spring is applicable to either the foot or six-inch scale, but in the former case sockets for the ends of the spring are fastened to the frame at requisite distances from its center.

The holding-springs, H Sp, H Sp, Figs. 1 and 3, riveted to the frame-base, Fig. 3, while they allow the scale-plate to be freely and easily slid either into or out of its normal position, at the same time hold it firmly in contact with the posts at the required angle. These are also made of German silver.

The vernier consists of a German-silver plate, a little more than an inch in length, about three-quarters of an inch wide, and one-fiftieth of an inch thick, Figs. 5, 6, and 7. The graduations are double. The two zero-marks being exactly one inch apart, the readings of the two are always identical, and are therefore checks on each other, so as to give the mean reading with twice the certainty of one. This twofold reading also enables the operator to read the scale with equal ease from left to right or right to left. And this is a very essential facility; for, in ordinary reading, the zero-line of the vernier constitutes one of the termini of any given or required distance, and one of the zero or unit lines of the scale the other; and in dotting any given distance, the needle-point is applied to the latter, but never to the former.

On the under side of the vernier, about the twentieth of an inch from its upper edge, a longitudinal groove is cut, half or two-thirds through the plate (seen in section in Fig. 6) into which the corresponding tooth of the vernier frame is fitted, so as, while admitting of lateral motion for sliding into or out of position the vernier, to secure it against forward motion.

The vernier-frame, as shown in Fig. 8, has the precise form given it by the die before being bent. In Fig. 5 may be seen in section the form, after being bent, of those portions which lie directly under the vernier-springs; and in Fig. 6 the form through its central section is exhibited.

The peculiar shape of the vernier-springs is shown in width in Fig. 1, V S V S, and in section in Fig. 5, V S. They are attached, as there shown, to the vernier-frame by means of rivets or small screws and thumb nuts. The action of these springs is threefold, viz: first, to hold with one end the vernier snugly to its frame; secondly, with the other end to hold the frame in contact with the scale-plate, giving sufficient friction to allow of smooth, uniform, lateral motion; and thirdly, by pressing the lower edge of the vernier firmly against the beveled face of the scale-plate to hold the frame from slipping backward while being slid laterally in its normal motion.

The foregoing specification and illustrations clearly show that the scale-plate may be instantly slipped out from its position and inverted; or, with its ends or sides reversed, replaced so as to bring any one of the four scales into working position; and also that either a decimal or duodecimal vernier suited thereto may be in the same moment slipped into position for use.

Thus constituted, it is believed that for convenience, accuracy, or expedition this scale, for all classes of rectilinear drafting, stands unrivaled.

I claim—

1. The flat scale-plate, constructed as set forth; in which scale-plate each of the two longitudinal edges is double beveled to a definite angle, viz, of about sixty degrees, and in which the four faces produced by such beveling have each the same inclination of about thirty degrees to their adjacent and corresponding flat surfaces.

2. A frame or mounting for this scale-plate, as shown, consisting of base, posts, (beveled to the same angle as the bevels of the plate,) and sliding spring; the posts holding the plate in uniform inclination to the paper, and the spring holding the whole in firm contact with the trigonometer or T-arm.

3. The combination, as described, of double verniers (suited to the several scales) with their frame and tri-acting spring.

JOSIAH LYMAN.

Witnesses:
F. W. BALDWIN,
ALBERT J. LYMAN.