





(Model.)

3 Sheets—Sheet 3.

C. H. MERRILL.

SCALE FOR LAYING OUT CUTTER HEAD BITS.

No. 246,625.

Patented Sept. 6, 1881.

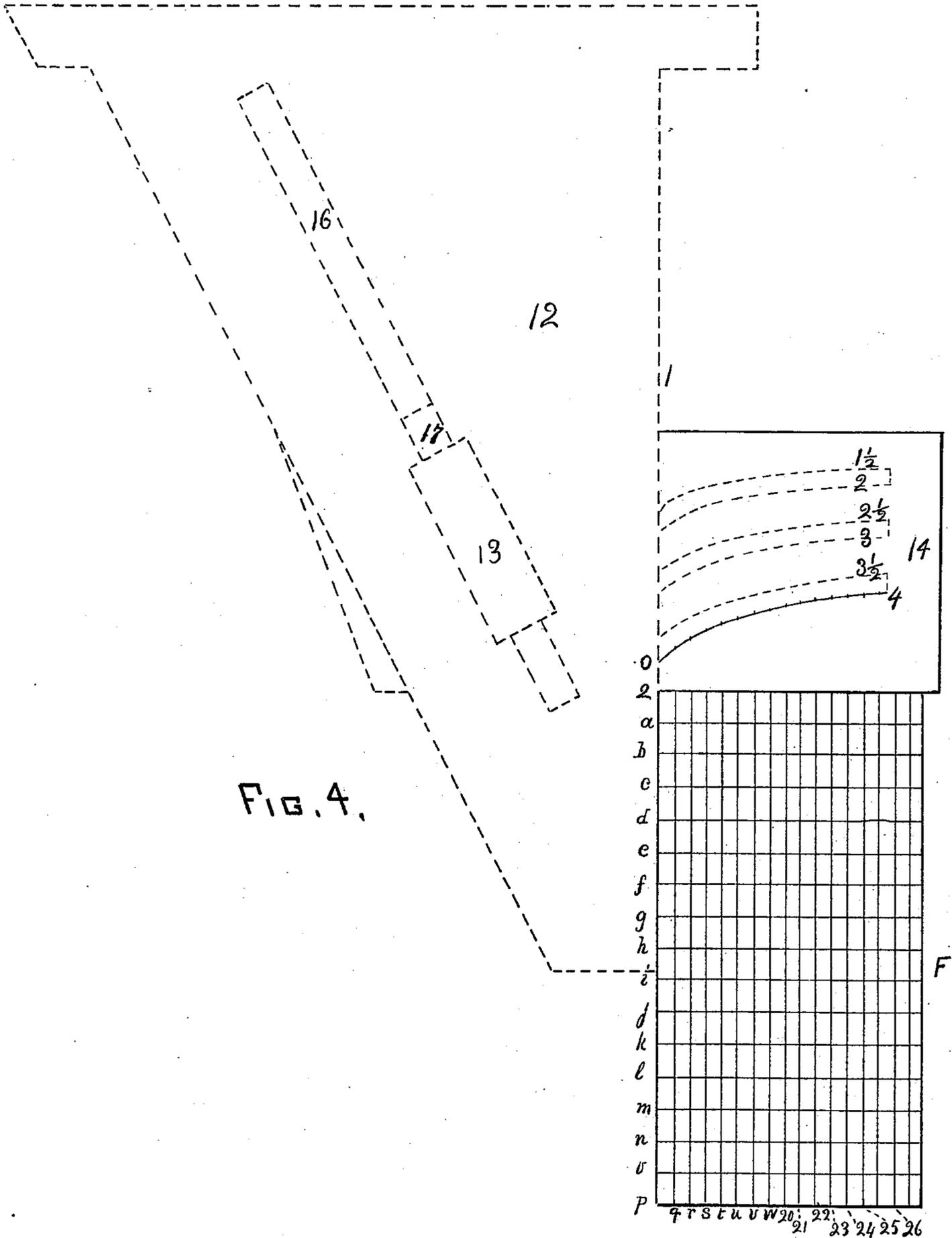


FIG. 4.

WITNESSES.

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# UNITED STATES PATENT OFFICE.

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## SCALE FOR LAYING OUT CUTTER-HEAD BITS.

SPECIFICATION forming part of Letters Patent No. 246,625, dated September 6, 1881.

Application filed January 17, 1881. (Model.)

To all whom it may concern:

Be it known that I, CALEB H. MERRILL, of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Scales for Laying Out Molding-Irons, of which the following is a specification, reference being had to the accompanying drawings, illustrating the device, in which—

Figure 1, Sheet 1, is a plan or top view of my improvement; Fig. 2, a section taken on line *x*, Fig. 1. Fig. 3, Sheet 2, and Fig. 4, Sheet 3, are geometrical diagrams, showing how the margins of the curved slots in the sliding bar of the scale are found.

The object of the present invention is to provide convenient means for laying out the forms of the cutting-edges of the knives used on different-sized cutter-heads, to cut any given form of molding.

The particular form of cutter-heads to which my invention relates is what is called the "square head," which is provided with four knives placed at right angles to each other.

The nature of my invention consists in a main plate of thin metal, provided with a diagonal slot to guide the movement of a sliding bar, which is moved diagonally up and down to lay out a molding-iron. The sliding bar is provided with curved slots, by using the margins of which I determine the projections of the bits or knives from the face-lines of the molding; and, further, in gage-lines on the main plate, to compensate for the extra length of knives, to allow for the various projections of the bolts which hold the knives to the heads, that they (the bolts) may not come in contact with the molding during the cutting thereof.

12 is a thin metal plate, in which is formed a slot, 16, in this case of sixty degrees. A short intermediate plate, 17, is placed in this slot, and on the face of plate 12 is placed a cap-plate, 13, and on the back side of the plate 12 is placed a sliding bar, 14, which is rigidly secured to plates 17 and 13 by rivets or screws, so that it will remain at right angles to the edge 1 of plate 12 in any movement it may have. A straight-edge, 15, is attached to the large end of the plate 12, to run on the edge of a drafting-board; or a straight-edge may be attached to the drafting-board for the large end of plate 12 to bear against, and the straight-edge 15 omitted.

Figs. 3 and 4 illustrate the method of finding one of the curves in plate 14—as, for instance, the curved line 4.

A represents a four-inch cutter-head, and B the highest point where the knives finish the molding.

A line, C, is made through opposite corners of the head and extended down indefinitely, and below line B is divided into any number of parts, in this case each part being one-fourth of an inch. A circle, D, incloses the square of the cutter-head, and a circle, E, is inclosed in the square of the head. The tangent lines H, I, J, K, &c., are drawn from the smaller circle, E, to points  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1, &c., on line C. Then a piece of card-board or like material, F, is placed below the bar 14; Fig. 4, and on it are marked lines *a*, *b*, *c*, *d*, &c., one-fourth of an inch apart, to correspond to the distances between the points  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , &c., on line C, Fig. 3, and vertically the same card is divided by lines *q*, *r*, *s*, &c., one-eighth of one inch apart, or one-half of the width of the divisions *a*, *b*, *c*, &c. The slot 16 in plate 12 is supposed to be a sixty-degree angle, so that by raising the bar 14 a fourth of an inch it will be drawn on plate 12 an eighth of an inch. From this ratio the scale on the card-board is made. To get the points from intersections of lines to find the curve 4 on bar 14, an arbitrary point, O, is taken on said bar one-fourth inch up from line 2 and on line 1 on plate 12, to retain strength of metal; then place one foot of the dividers on point  $\frac{1}{4}$ , Fig. 3, and the other on the point where line H crosses circle D; then carry the dividers to Fig. 4 and place one foot where line *q* crosses line 2, and with the other foot make a mark on plate 14 vertically over line *q*; then on Fig. 3 place one foot of the dividers on point  $\frac{1}{2}$  and the other foot on the point where line I crosses circle D; then carry the dividers to Fig. 4 and place one foot on the point where the lines *r* *a* cross each other and the other foot vertically above line *r*, and make a mark on plate 14; then, again, on Fig. 3 place one foot of the dividers on point  $\frac{3}{4}$  and the other where line J crosses circle D; carry, as before, the dividers to Fig. 4 and place one foot where line *s* bisects line *b*, and with the other directly above line *s* make a mark on plate 14; continue to take *seriatim* all the distances from 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $1\frac{3}{4}$ , and 2 on line C to the points

where the lines K L M N O cross the circle D, and transfer the distances as heretofore stated, taking care to place the lower foot of the dividers on the next succeeding lines, *c, d, e, &c.*, and on the next succeeding lines to the right, *t, u, v, &c.*, from those already given on the board F, till all the points to form curve 4 on plate 14 are made; then draw a curved line through the points, and the line 4 is complete. If the point O be taken higher or lower on bar 14, due allowance must be made.

The bar 14 may be operated by a guide or slot other than the one on an angle of sixty degrees—as, for instance, on an angle of forty-five degrees—in which case the lines on the card-board F should be made so as to form superficial squares of one-fourth of an inch each.

For three-and-one-half-inch or other sized cutter-heads herein mentioned a separate drawing should be made from such head on the same plan as shown at Fig. 3, and from such figure so made the same operation is repeated as herein given to get curved line 4, and a curved line will be indicated to lay out the proper form of bits for the cutter-head chosen, in lieu of the four-inch cutter-head shown at Fig. 3.

To put my improvement in use, the scale is to be put on an ordinary drafting-board with the straight-edge 15 from the operator, so that it can be moved from right or left squarely on the board.

The straight-edge 15, projecting below the main plate 12, forms a guide, which holds the plate parallel with the edge of the drafting-board.

Operation: A pattern (dotted lines 6) of the desired form of molding to be made is laid under the scale, with the highest point of the molding on line 10. This line 10 is drawn parallel with the straight-edge 15, and may vary in its position up or down according to the different projections of the bolts fastening the knives to the cutter-heads. These bolts sometimes project beyond the corners of the cutter-heads—that is, the distance from the center of the shaft to the outer ends of the bolts is greater than the distance from the center of the shaft to the corners of the cutter-heads; and the knives must be long enough to prevent these bolts, as well as the corners of the cutter-heads, from coming in contact with the molding. If the bolt projects one-eighth of an inch beyond the corner of the cutter-head, line 10 should be drawn across the upper and inner end of gage-line  $\frac{1}{8}$ , Fig. 1, and for different projections the line 10 should touch respectively the different gage-lines marked  $\frac{2}{8}$ ,  $\frac{3}{8}$ , and  $\frac{4}{8}$ . In this instance, as shown at Fig. 1, it crosses the gage-line  $\frac{4}{8}$ , thereby providing for a four-eighth or half-inch projection of bolts and a corresponding projection of the bits or molding-irons. When the pattern has been placed under the device as above stated, adjust the plate 12 so that its edge 1 will touch the extreme right-hand point 18 of the dotted line 6. Then slide the plate 14 up or down, so

as to bring its lower edge, 2, at the same point 18 of dotted line 6. A sharp-pointed instrument should now be placed in the corner formed by the edge 1 of the plate 12, and any marginal line of the slots in bar 14, as the size of the cutter-head used may require. In this instance the instrument is placed in the corner formed by the edge-line 1 of plate 12 and lower line, 4, of the lower slot, showing that a four-inch cutter-head is used. If the cutter-head should be three and one-half inches, the instrument or marker should be moved up to line  $3\frac{1}{2}$ ; and for the different-sized heads of three, two and a half, two, and one and a half inches the marker should be used respectively in the corners formed by the edge 1 of plate 12 and these different-curved margins of the slots. Having placed the instrument in the corner formed as above stated, puncture the paper so as to make a visible mark, which will be the extreme right-hand edge of the knife (dotted lines 7) which is to cut the form of molding shown by dotted lines 6. The marker being removed, move the plate 12 to the left and the plate 14 down, so as to bring the next dot of line 6 in the angle formed by edges 1 and 2, and again puncture the paper, as before, in the corner formed by lines 4 and 1. This operation is continued, each dot of molding-line 6 being brought to the angle formed by lines 1 and 2. For each dot, puncture the paper in the angle formed by lines 1 and 4 till the left-hand point of line 6 at the base-line 9 is reached. The punctures forming dotted line 7 will then be the exact form of the edge of the knife to cut out the required form of molding 6.

I claim as new and desire to secure by Letters Patent—

1. In a scale for laying out molding-irons for cutter-heads, the plate 12, provided with a diagonal guide, 16, in combination with the sliding bar 14, provided with one or more slots having curved margins 4,  $3\frac{1}{2}$ , 3,  $2\frac{1}{2}$ , 2, or  $1\frac{1}{2}$ , by means of which the bar 14 is drawn under plate 12 as it is elevated, so as to shorten the projections of the slots from the edge 1 of plate 12, as and for the purpose specified.

2. The within-described method of laying out molding-irons for cutter-heads, consisting of attaining the points for the edge of the molding-iron from the face of the molding by adjusting the bar 14 on the plate 12, as specified.

3. The method of finding the curved guide-lines 4,  $3\frac{1}{2}$ , 3,  $2\frac{1}{2}$ , 2, and  $1\frac{1}{2}$ , as shown in diagrams, Figs. 3 and 4.

4. The allowance-scale  $\frac{1}{8}$ ,  $\frac{2}{8}$ ,  $\frac{3}{8}$ , and  $\frac{4}{8}$ , to fix the working position of the scale to suit the projections of the irons required to clear the sweep of the bolts with which they are fastened, as set forth.

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Witnesses:

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