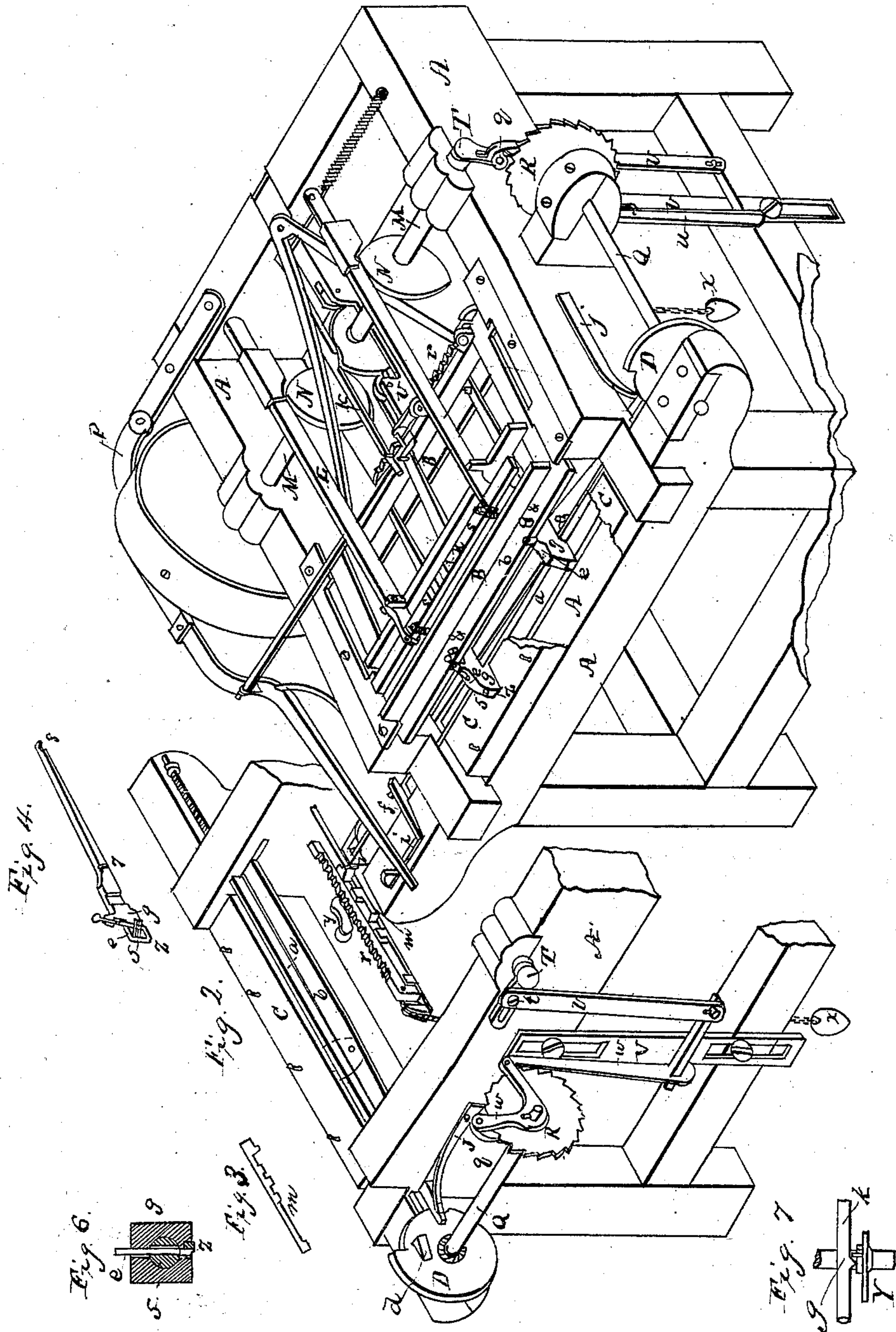


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Graduator.

No. 16,857.

Patented March 17, 1857.



UNITED STATES PATENT OFFICE.

HEMAN WHIPPLE, OF SHAFTSBURY, VERMONT.

MACHINE FOR GRADUATING CARPENTERS' SQUARES.

Specification of Letters Patent No. 16,857, dated March 17, 1857.

To all whom it may concern:

Be it known that I, HEMAN WHIPPLE, of Shaftsbury, in the county of Bennington and State of Vermont, have invented a new and Improved Method of Graduating Carpenters' Squares, Rules, &c.; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and to the letters marked thereon.

The nature of my invention consists in providing (for the common two foot square) twenty-four gravers set in stocks each about twenty inches long, which are confined to the bottom of a carriage, fitted to move back and forth far enough to make the longest crosswise mark on the square, the carriage being pressed forward by the action of a cam, in the rear, which is brought to bear on the teeth of a movable scale, having the length of the marks for the different divisions arranged on it—and the gravers being set one inch apart from center to center, the depth of the marks are regulated by gage rubbers near the points, the graver stocks, being pressed down by spiral springs, acted upon, by levers attached to the top of the carriage aforesaid. The square being confined on the face of an anvil fitted to slide longitudinally, one inch, on the front rail of the frame, and is moved forward by a scroll cam connected to a ratchet wheel, so divided as to mark with precision the least, as well as the largest fraction of the inch and is brought back to its starting point by the rebound of a spring released at the opposite end from the scroll cam.

To enable others skilled in the art to make and use my said invention, I will proceed to give a more particular description of its construction, and operation; and shall have occasion to refer to the annexed drawing, and the letters of reference marked thereon (viz:) Figure 1, an isometrical drawing of the machine, as seen from the right hand corner in front; Fig. 2, a sectional outline sketch as seen from the right hand corner in the rear; Fig. 3, a scale or index, by which the length of the fractional marks are determined; Fig. 4, a vertical section of the graver stock, and attachments; Fig. 5 mortise bolt to secure the gravers.

A, the frame—a strong rectangular frame to which the machinery is attached.

B, the carriage, extending from the front to the center rail with braces extending

back to the guide, at the rear of the frame—to the bottom of which are suspended the graver stocks, and, together, with which, it is moved back and forth on the frame A, (by the little cam Y) far enough to make the longest cross mark on the square.

C, the anvil—on the face of which the square is confined for graduating. It is fitted to slide longitudinally one inch, being moved by the pressure of the scroll cam D, against the end of the rod *a*, attached to its back side.

D, the scroll cam—fitted to move the anvil and square one inch at each revolution, while the gravers are marking the several fractions with lines of proper length—by pressure against the end of the rod *a*, attached to the back side of the anvil C.

a, the rod attached to the back side of the anvil C, and extending through both sides, of the frame A, the left end being encircled with a spiral spring pressing the other end against the periphery of the scroll cam D, which at one revolution presses it back one inch, while the divisions of the inch are graved on the square.

b, the balance lever, swings laterally on a pivot projected from the rear of the front rail of the frame A. It lies on the back side of the rod *a*, directly under the front edge of the carriage B, extending through slots in both sides of the frame, in which it swings—on the right hand side. The end of the lever is pressed by the spring *j*, against the side of the scroll cam D, on which is the wedge cam *d*, by which the other end of the lever is brought toward the front rail of the frame; and by pressing the wedge *f*, under the latch *p*, raises it from the catch *i*, which liberates the main shaft M, from the clutch pulley O, and stops the machinery.

d, the wedge cam, on the back side of the scroll cam D, by which the balance lever *b*, is made to act on and liberate the latch *p*, from the catch *i*.

f, the wedge, attached to the left hand end of the balance lever *b*, to raise the latch *p*, from the catch *i*.

i, the catch by which the latch *p*, is held to act on the clutch pulley O.

j, the spring attached to the side of the frame holding the lever *b*, to the scroll cam D.

g, the graver stocks, equal in number to the inches, or units, to be divided on the

square (two of which are represented) the fore-ends being placed under the front rail of the carriage B, side by side, one inch apart from center to center, and extending
 5 from the anvil C, to the back rail of the carriage B, to which they are attached by adjustable screws and pins and are connected near the front ends by rods S, (inclosed by spiral springs) to the adjusting rail *h*, and
 10 are retained in position by the studs, and *e*, the gravers, passing through a mortise near the front end of the graver stocks (one of which is located) and secured by the mortise bolt 5, and set screw above, as seen in section (Fig. 4) at an angle of near 45°.

5, the mortise bolt, fitted into the front end of the graver stocks, at right angles, with the graver and having a mortise, one side of which corresponds with the mortise
 20 in the graver stock, through which the graver *e*, passes, and a portion of the other side being cut away to allow a side pressure on the graver by turning the bolt, which at the same time is brought forward to its
 25 seat by the action of the nut on the outer end. This is more clearly represented in full size in Fig. 6; and it will be apparent that the simple operation of screwing up the mortise bolt 5, both draws the graver *e*, forward to its seat, as well as confining it to the
 30 exact place sidewise.

z, the gage rubber, composed of steel or other hard metal secured to the lower edge and front end of the graver stocks by a dovetail or otherwise, extending back by the side
 35 and to the rear of the graver, its greatest convexity being near the graver point.

6, (Fig. 4) mortise through which the studs &c. pass to retain the graver stocks in
 40 position.

7, (Fig. 4) hole, through which the rods S, pass to connect the graver stock to the rail *h*.

8, (Fig. 4) mortise through and by which
 45 the adjusting screws and pins confine the stocks to the back rail of the carriage B.

h, the adjusting rail, extending across the top near the front of the carriage B, being supported, and moved up and down by the
 50 levers L, L, to give a general pressure to the graver stocks, and to raise them from the square, by the agency of the springs and rods *s*.

s, the rods, connecting the rail *h*, to the
 55 stocks *g*, having a small head on the lower end, and screw and nut at the upper end, encircled by spiral springs between the rail and stocks, of sufficient strength to produce the desired pressure on each individual
 60 graver while cutting the marks on the square.

L, the long levers, two levers connected to and turning at the fulcrum rail F, and extending from the adjusting rail *h*, back to
 65 the cams N, on which they rest at the rear

end, which levers, by the action of the cams N, press the gravers while cutting the marks on the square, and raise them to let the square slide longitudinally.

F, the fulcrum rail, attached to the carriage B, in the rear of the adjusting rail *h*, on the top of which the long levers L, are hung and turn. 70

M, the main shaft, lies across the frame A, at right angles about one third the distance
 75 from the rear end, to which are attached, and revolves with it, the friction clutch pulley O, the two lever cams N, the little cam Y, and the adjustable crank T.

N, the lever cams, attached to and revolving
 80 with the main shaft M, under the rear ends of the long levers L when the full sides of the cams are up. The rear ends of the levers are raised. The gage rubbers are pressed onto the square while the marks are being
 85 cut by the gravers, but when the blank sides are up the gravers and stocks are raised, and the square is moved longitudinally by the scroll cam D.

O, the friction clutch pulley, fitted and
 90 acting as a driver to the main shaft M, on the outer side of the frame A, by the pressure of the latch P, against the pivot at the outer end of the shaft M, the shaft and machinery is put in motion; but when the
 95 latch is liberated from the catch *i*, the pulley O, still revolves, but the motion of the machinery is arrested.

P, the latch, attached by a joint to the rear end of the frame A, and passing around
 100 on the outside of the pulley O, which, controlled by a pivot-pin, passing from the latch to the center of the clutch, the front end is brought across the front rail on the
 105 outside of the frame A, where it is confined by the catch *i*, to give motion to the machinery; but when liberated from the catch by the action of the balance lever *b*, the machinery is stopped.

R, the ratchet wheel, is attached to the
 110 rear end of the shaft Q, and revolves with, and controls the motion of the scroll cam D, its teeth being equal in number of the smallest fractions into which the inch will be divided; and a number which will divide
 115 equally, for the largest fractions. It is moved by the action of the pawl *q*, attached to the angular lever *w*.

T, the crank, at the end of the main shaft M, the sweep having a slot or groove the
 120 whole length, and by confining the connecting bar U, by the crank screw *t*, in the slot at a greater or less distance from the center of the shaft M, the inch may be divided into greater or less fractions as may be desired. 125

U, the connecting bar, attached at the upper end by the crank screw to the crank T, and at the lower end to the slide V.

V, the slide, having slots at the upper and lower ends, is attached by screws to the 130

upper and lower rails of the frame, and receives a reciprocating motion from the crank T.

u, the rod, connecting the slide V, to the angular lever *w*.

w, the angular lever, the angle being attached to, and turning on the end of the shaft Q. At the back side of the ratchet wheel R, the horizontal arm is connected to the rod *u*, giving a reciprocating motion to the vertical arm and the pawl *g*.

g, the pawl, is connected to the angular lever *w* and moves the ratchet wheel R, and scroll cam D, forward to give the desired friction of the inch at each movement, which is adjusted by the distance which the crank screw *t*, is placed from the center of the main shaft M.

t, the crank screw, connects the connecting bar U, to the sweep of the crank T, and is movable in the slot, and the farther it is moved from the center of the shaft, the larger will be the fractions, into which the unit will be divided.

Q, the shaft of the ratchet wheel R, and the scroll cam D, to which they are both made fast.

r, the straight ratchet, placed on the back side of the carriage B, is moved longitudinally by the pawl lever *k*, and carries with it the movable scale or index *m*, for giving the proper length to the several divisions of the inch.

m, the movable scale, or index (Fig. 3) is placed, under and moved by, the straight ratchet *r*. It is a single one, of a set, all having their teeth differently arranged, as to length, so as to accommodate all the different classes or grades of squares; so arranged as to bring the proper tooth directly in front of the point projecting from the front of the truck *v*, at each revolution of the little cam Y.

v, the truck, is placed on a rail in the center of the frame directly under the little cam Y, and at right angles with the main shaft M, moving back and forth on rollers, its depth at the ends being rather more than half the diameter of the little cam Y.

v, a space equal to the diameter of the cam being cut, in the middle nearly to the base, having a groove in the center to admit the cam, and deep grooves at the ends, in which, friction rollers on each side, are placed; against which the cam bears, in its back and forward motion, at the front of the truck a point projects, which is brought to bear against the ends of the teeth of the index *m*, forcing the carriage forward, which, being done, the rear end of the truck returns against the guide on the center of the back rail of the frame, to which, the carriage braces are attached and moves back, with the carriage to its resting place.

Y, the little cam, on the center of the

main shaft M, producing, at each revolution, a reciprocating motion to the truck *v*.

y, the detent, is attached to a knob near the center of the back rail of the carriage B, to hold the straight ratchet *r*, and index *m*, when moved laterally by the lever *k*.

k, the pawl lever, attached by a pin or joint to the guide, near the point of the braces at the rear of the frame, passing across and above the main shaft M, having a projection or cam *g* acted upon by a pin or cog, in the side of the cam Y, see plan Fig. 7, to give it a lateral movement, and extending forward over the cam rod *n*, alongside of a pin in the rear rail of the carriage B, against which it is pressed by a spiral spring connecting it to the frame, in the rear of the cam Y. The lower side being brought to an edge, takes hold of the teeth of the ratchet *r*, and being pressed off by the cog in the side of the cam Y, the ratchet *r*, is moved one division of the index *m*, and secured to its position by the detent *y*.

n, the cam rod is attached to the latch P, in front of the clutch pulley O, and passes along the fore side of the hind rail of the carriage B, under the lever *k*, and a pin in the detent *y*, and having a cam or semi-circle on the underside at the ends, so that when the rod is drawn back by the outward movement of the latch P, the cam is pressed against the cross rail of the carriage the lever *k*, and the detent *y*, are both raised from the teeth of the ratchet, which is drawn back to the starting point by the weight *x*.

x, the weight by which the ratchet and index are drawn back.

Operation: The machinery being arranged as before specified, and the square secured to the anvil C, the index *m*, and the crank T, arranged (say) to graduate inches, into eighths. The lever P, being pressed into the catch *i*, the cam rod *n*, leaves the pawl lever *k*, and detent *y*, and securing the clutch to the pulley O, gives motion to the shaft M, and at the first half revolution, the pawl lever *k*, adjusts the index *m*, by the action of the cog, on the side of the little cam Y, the levers L, are raised by the cams N, and presses the gage rubbers down on the square (the edge of which is just forward of the point of the gravers) the truck *v*, is forced forward by the cam Y, against the index *m*, moving the carriage and gravers *e*, to make the inch mark, and the crank T, draws back the pawl *g*, one eighth of the circumference of the ratchet R. And at the last half revolution, the gravers are raised from the square, the pawl *g*, moves the ratchet R, the scroll cam D and the anvil C, forward one eighth of an inch. The truck *v*, and carriage B, are carried back. Thus at each revolution the square is marked and moved

forward one eighth of an inch but at the eighth revolution, the wedge cam *d*, moves the balance lever *b*, which presses the wedge *f*, under and raises the latch *P*, from the catch *i*. A spring presses the latch outward, carrying with it the cam rod *n*, which raises the pawl lever *k*, and the detent *y*, from the ratchet *r*, allowing it, and the index *m*, to move back by the weight *x*, the shaft being released from the clutch pulley *O*, rests.

The advantages thus derived are facility, uniformity, certainty, and perfection of the work, having the edge of the square smooth and free from all fractures, to which, in the usual method they are constantly liable.

I do not claim regulating the extent of motion given to the graver stocks in drawing by means of cams, as these have been used; it being understood that I do not claim a mortise bolt to secure a bar or tool, as this has before been used, but I am not aware of any mortise bolt having before been constructed with the mortise for the tool eccentric or one side of the mortise partially removed, so that the flat side of the graver is pressed to the side of the mortise in the graver stock by the turning of said mortise bolt, and brings the same correctly to its position irrespective of the thickness of the graver itself; but

What I claim as my invention and desire to secure by Letters Patent, is—

1. The scale index *m*, mounted upon the carriage *B*, and regulating the extent of motion given to said carriage from the truck *v*, and pusher point, whereby the length of the

division mark is determined and the cut made from the edge of the square substantially as specified.

2. I claim the arrangement of the rack *r*, lever *k*, and its actuating cam or pin, pawl *y*, rod *n*, and weight *h*, or its equivalent, for moving and adjusting the index *m*, to be acted on by the pusher *v*, substantially as specified.

3. I claim arranging the graver stocks *g*, within the carriage *B*, substantially in the manner and for the purposes specified, when said graver stocks are governed by the levers *L*, adjusting rail *h*, and springs and rods *s*, or equivalents for pressing down the gravers in cutting and thus lifting the same up off the square while returning as specified.

4. I claim the arrangement of the scroll cam *D*, anvil or bed *C*, rod *d*, lever *b*, latch *i*, incline wedge *f*, and clutch or friction lever *p*, for moving said bed *C*, and its square endwise the required integral part between each stroke of the gravers and then stopping the machine when the divisions are completed substantially as specified.

5. I claim the manner of securing the gravers *e*, in place, and bringing them to the exact position in the stocks *g*, by means of the mortise bolt *g*, constructed and operating substantially as and for the purposes specified.

HEMAN WHIPPLE.

Witnesses:

ALEXANDER POTTER,
E. H. KNIGHT.