

MILLINGTON & GEORGE.

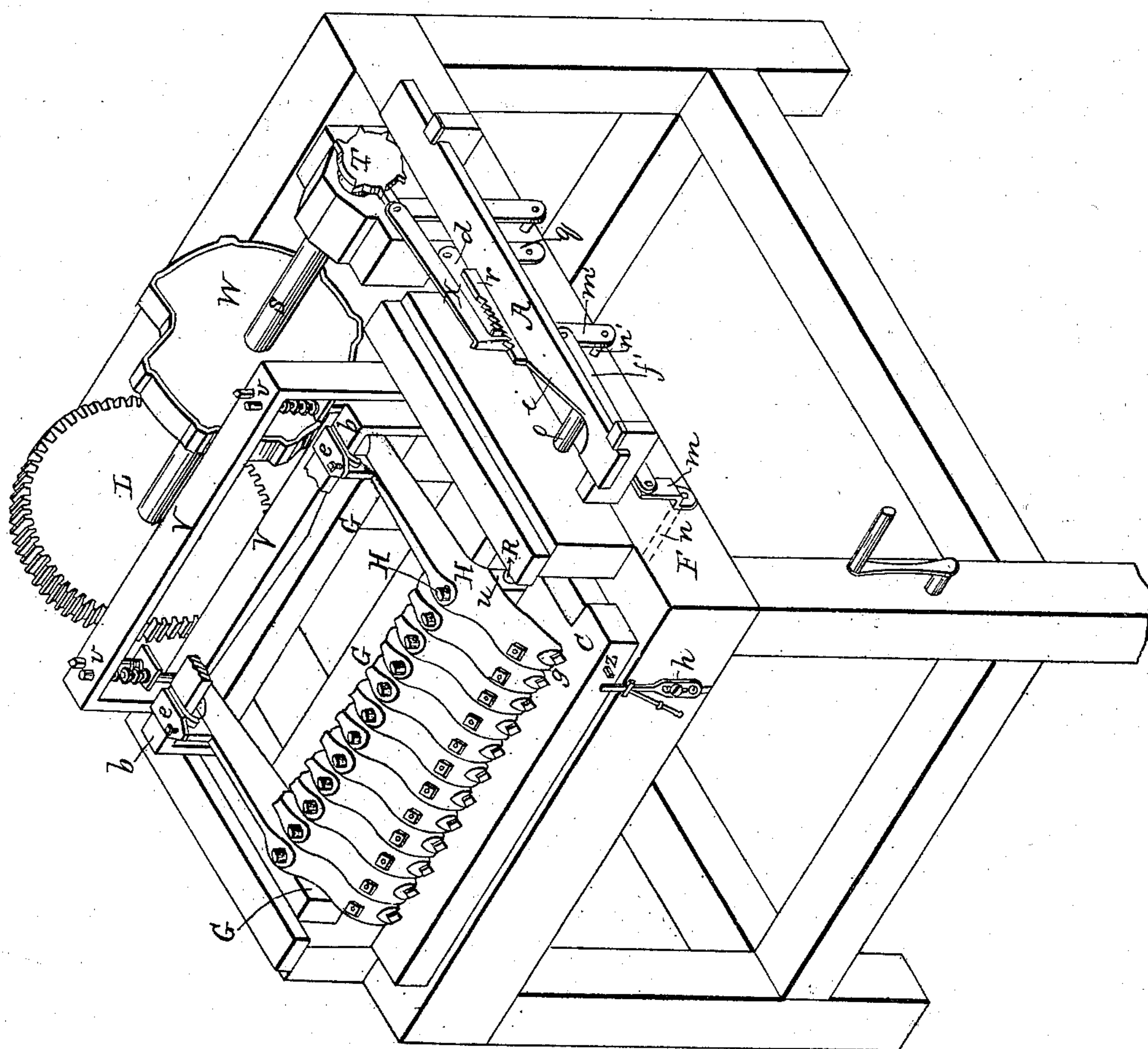
2 Sheets—Sheet 1.

Dividing Engine.

No. 11,489.

Patented Aug. 8, 1854.

Fig. 1.



MILLINGTON & GEORGE.

2 Sheets—Sheet 2.

Dividing Engine.

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Fig. 3.

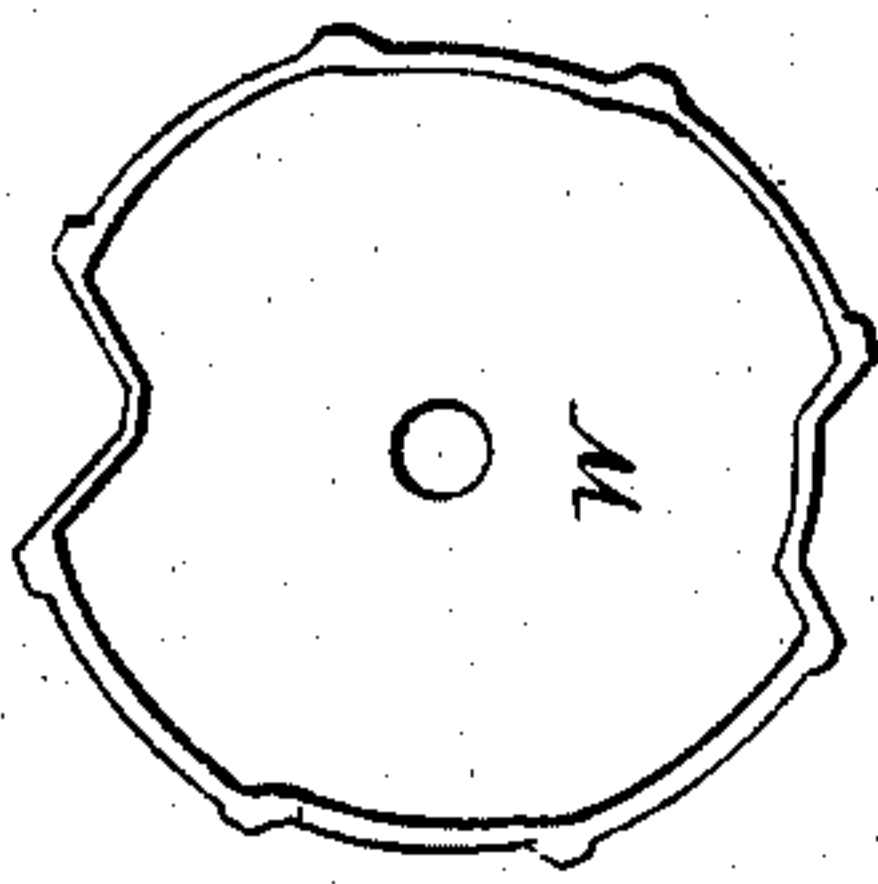


Fig. 5.



Fig. 2.

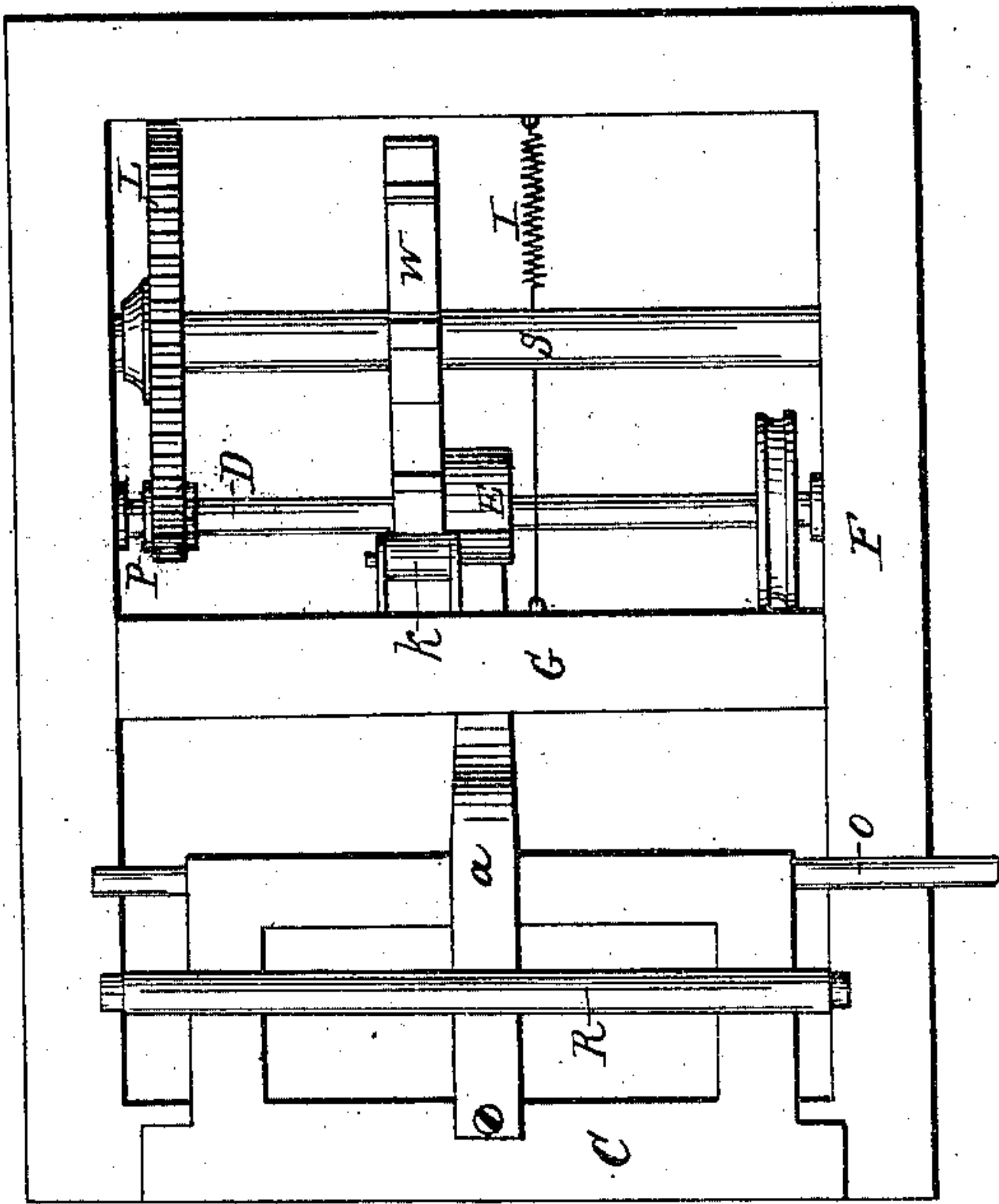
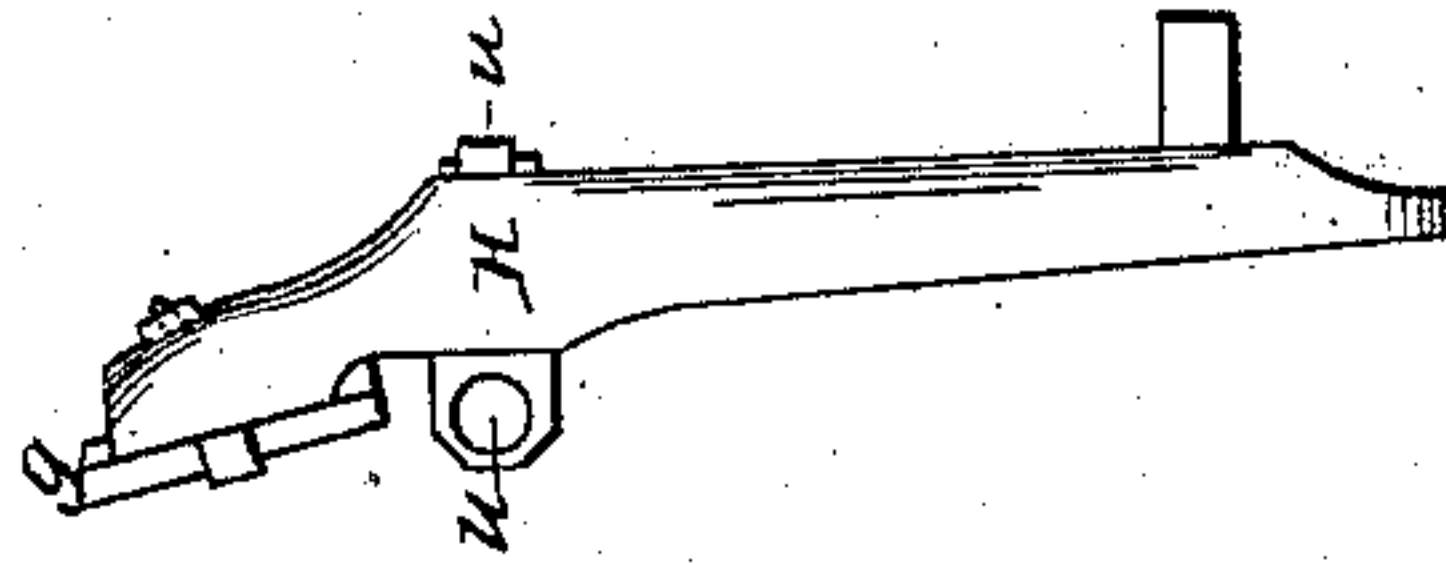


Fig. 4.





# UNITED STATES PATENT OFFICE.

N. MILLINGTON AND D. J. GEORGE, OF SHAFTSBURY, VERMONT.

## MACHINE FOR GRADUATING CARPENTERS' SQUARES.

Specification forming part of Letters Patent No. 11,489, dated August 8, 1854; Reissued August 22, 1871, No. 4,523.

*To all whom it may concern:*

Be it known that we, NORMAN MILLINGTON and DENNIS J. GEORGE, 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 we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and the letters and figures marked thereon.

The nature of our invention consists in providing (if for the common carpenters' square, two feet long) twenty four gravers, about four inches long, firmly set in metallic handles, about twenty inches long, and attached to a rod, about one fourth the distance from the front end of the handles, the rear ends being adjusted by screws and springs. These handles are placed side by side one inch apart from center to center and are attached to a carriage about one foot wide and two feet long, which slides laterally (sufficient to make the longest cross mark) on ways and is pressed forward, to cut the marks, by a wheel, in the rear, having on its periphery a succession of eight cams (to divide the inch into eighths), the highest point of each rising to the same plane, but differing in depth to give the desired length of mark to each of the several divisions of the inch. The square to be graduated is confined to the front rail of a carriage directly under the points of the gravers, which is moved at right angles from the motion of the gravers by an inclined plane and the motions of the two carriages so arranged, that as often as the square is pressed forward one eighth by the inclined plane each of the gravers cuts at the proper place the desired cross mark, for the inch—half, quarters and eighths—and as there are twenty four gravers, each graduating one inch, the whole square is completed whilst the square moves longitudinally but a single inch. But to enable others skilled in the art to make and use our said invention, we will proceed to give a more particular description of its construction and operation—

The accompanying drawings, which make a part of this specification and to which reference is made, are as follows, viz: No. 1, an isometrical delineation of the machine; No. 2, a section of the machine with the gravers and their carriage removed; No. 3, the surface of the cam wheel, with eight cams, to

divide the inch into eighths; No. 4, a graver and handle enlarged, showing also the universal joint; No. 5, a single elliptical cam on the driver shaft.

The same letter wherever found refers to the same article.

F, the cast iron frame, or bed piece, to which all the parts are attached C, the carriage on which the square is confined for graduating; G, the graver carriage, to which the gravers are attached, slides laterally on ways, being drawn back by the spring I, into the spaces between the cams to begin each mark at the proper distance from the edge, for each division of the inch, and is pressed forward by the cams (which all rise to the same plane) so as to bring the points of the gravers across to the front edge of the square; I, the spiral spring connected to the rear edge of the graver carriage G, and back side of the bed piece F, to draw back the points of the gravers *g*, from the edge of the square; R, the rod on the front side of the graver carriage G, to which the graver handles H, are attached by the universal joint *u*; V, the balance frame, balancing at its center on the rear rail of the graver carriage G, so that the gravers will cut the same depth on the thin as on the thick end of the tape square; *v*, the screws and springs standing perpendicularly in the balance frame V, to adjust the pressure of the rear end of the graver handles; *e*, the guides attached to the cross bar *b*, in front of the balance frame V, having slots at the front end to receive the spurs on the top of handles H, and screws by which the gravers are raised or depressed; *b*, the cross bar in front of the balance frame (cut out in the drawing); H, the graver handles (see No. 4) turning on the rod R, and adjustable at the rear end by the guides *e*, and spiral springs and screws *v*; *g*, the gravers—small square rods about 4 inches long, placed cornerwise under, and projecting a little beyond, the front of the handles, to which they are firmly attached by loop bolts, the rear end being raised to an angle of 24° from the bed piece; *u*, the universal joint (see No. 4) connecting the graver handles H, to the rod R; W, the cam wheel on the cam shaft S, on the periphery of which is a series of cams (see No. 3) all rising to the same plane, but of different depths, to make the marks of the proper length to each division of the inch,



it being situated in rear of the graver carriage G, to press forward the carriage and gravers to the front edge of the square; S, the cam shaft, by which the large gear L, cam wheel W, and tappet wheel are turned; L, the large gear on the cam shaft making one revolution to 8 of the driver shaft D; E, the elliptical cam on the driver shaft (see No. 5) to raise and sustain the square, on the front of the carriage, by the agency of the arm *a*, while the marks are being cut; P, a small pinion on the driver shaft D, so graduated as to make eight revolutions while the cam shaft S, makes but one; *a*, an arm attached to the carriage C, and passing under the elliptical cam E, to raise the square to the points of the gravers to receive the marks; T, the tappet wheel on the end of the cam shaft S, on the periphery of which are as many tappets or projections, save one, as you design to divide the inch into equal parts, which tappets acting on the rear end of the pawl X, move forward the ratchet *r* and inclined plane *i*; X, the pawl hung in the rear, near the tappet wheel, by which it is moved forward, the front end resting on the detent *d*, and ratchet *v*; *d*, the detent, hung to the arm *g*, under the pawl X, and resting in the ratchet *v*, one tooth in rear of the pawl, to detain the ratchet when the pawl is lifted and while the gravers are cutting; A, the slide, moving longitudinally on the outside of the bed piece F, on the inner edge of which the inclined plane *i*, and the ratchet *v*, are attached; it is moved forward by the pawl X, and brought back to its starting point by a spring; *v*, the ratchet, attached to the inner edge of the slide A; *i*, the inclined plane on the inner edge of the slide A, is pressed against the end of the rock shaft O, and moves the carriage C, and square longitudinally to measure the successive division of the inch; O, the long rock shaft, supporting the back side of the carriage C, and on which the carriage rocks laterally to raise the square up to the points of the gravers on slides longitudinally pressed by the inclined plane *i*, at every successive division of the inch; *n*, the short rock shaft projecting from under the side of the bed piece F, and having two arms, one on the out and the other on the inside rail of the bed piece F, standing nearly at right angles, by the agency of which the pawl X and detent *d*, are raised from the ratchet, and the slide is drawn back by a spring; *m'*, an arm on the outside of the short rock shaft *n'*, the top being cut to an angle of some 45° to slide under a lifting pin in the back side of the detent and raise both the detent and pawl from the ratchet and hold them till the inclined plane *i*, is brought back to its starting point; *h*, an adjustable upright slide, moving up and down on the front

of the bed piece F, and extending up to the center of the carriage C, and is raised by the long inside arm of short rock shaft *n*, and depressed by the pressure of the pin *z*, in the edge of the carriage C; *z*, a pin in the front edge of the carriage C, to lodge on the top and press down the upright slide *h*; *k*, a friction roller on the rear rail of the graver carriage G, to reduce the friction of the cam wheel W; D, the driver shaft; *f'*, rod connecting arms *m* and *m'* of rock shafts *n* and *n'*.

Note.—Each different style of finishing squares will require a cam wheel with different depths of cams, and these may be placed side by side on the cam shaft and moved and keyed to act on the friction roller at pleasure.

Operation:—The several parts of the machine being arranged as above described and the square being confined on the front side of the carriage C, by clamps, or otherwise and the driver shaft D, being put in motion. The cam E, by the agency of the arm *a*, presses up the square against the points of the gravers till the springs at the rear of the graver handles bear with sufficient force to mark the square. The deepest cam on the cam wheel W, (which gives the inch mark,) bears against the rear of the carriage C, moving all the gravers and making all the inch marks on the edge at once. The lowest plane of the cam E, being at the bottom side, the front of the carriage C falls from the points of the gravers. The tappet cam now presses against the rear end of the pawl which, resting in the ratchet *r*, drives forward the inclined plane *i* against the end of the rock shaft O, and moves the square longitudinally one eighth of an inch. The next cam on the wheel designed to make the eighth mark (the shortest on the square) is produced by the same operation as the inch mark, above described, as are also all the divisions to the inch. When the seventh mark is made, and the pin *z*, having pressed forward the upright slide *h*, then the carriage rises to move the last mark, and slide passes under the pin *z*, which presses down the slide, and being connected with the arm *m'*, raises the pawl X and detent *d*, from the ratchet *r*, and allows both the inclined plane *i* and carriage C, to slide back to their starting points, when the square is removed and another confined to the carriage C. The work is done with accuracy and in one sixth time required to do it by hand gravers.

What we claim as our invention and desire to secure by Letters Patent, is—

1. The arrangement in a single frame substantially as set forth, of as many gravers as there are units to be divided, so as by the action of the cam wheel W or its equivalent, simultaneously to trace, of the proper length, each set of division and fractional lines.



2. The balance frame V, with its appendages, to equalize the pressure of the spiral springs on the graver handles *g*, so as to give the same depth of mark, on the thin as  
5 on the thick end of the taper square.

3. The inclined plane *i*, with its appendages for moving the square longitudinally and dividing the inch into any desirable number of equal parts.

10 4. The carriage C, arranged to press the squares up against the points of the gravers

by a cam, or otherwise, all the several parts, or their equivalents to be arranged and combined as above specified, or in any other manner substantially the same, which shall 15 produce the intended effect.

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DENNIS J. GEORGE.

Witnesses:

JOHN HASTINGS,  
CHARLES E. HOUGHTON.

[FIRST PRINTED 1913.]