

(No Model.)

2 Sheets—Sheet 1.

W. H. BAST.
SQUARE FOR RAFTER AND STAIR WORK.

No. 458,441.

Patented Aug. 25, 1891.

Fig. 1.

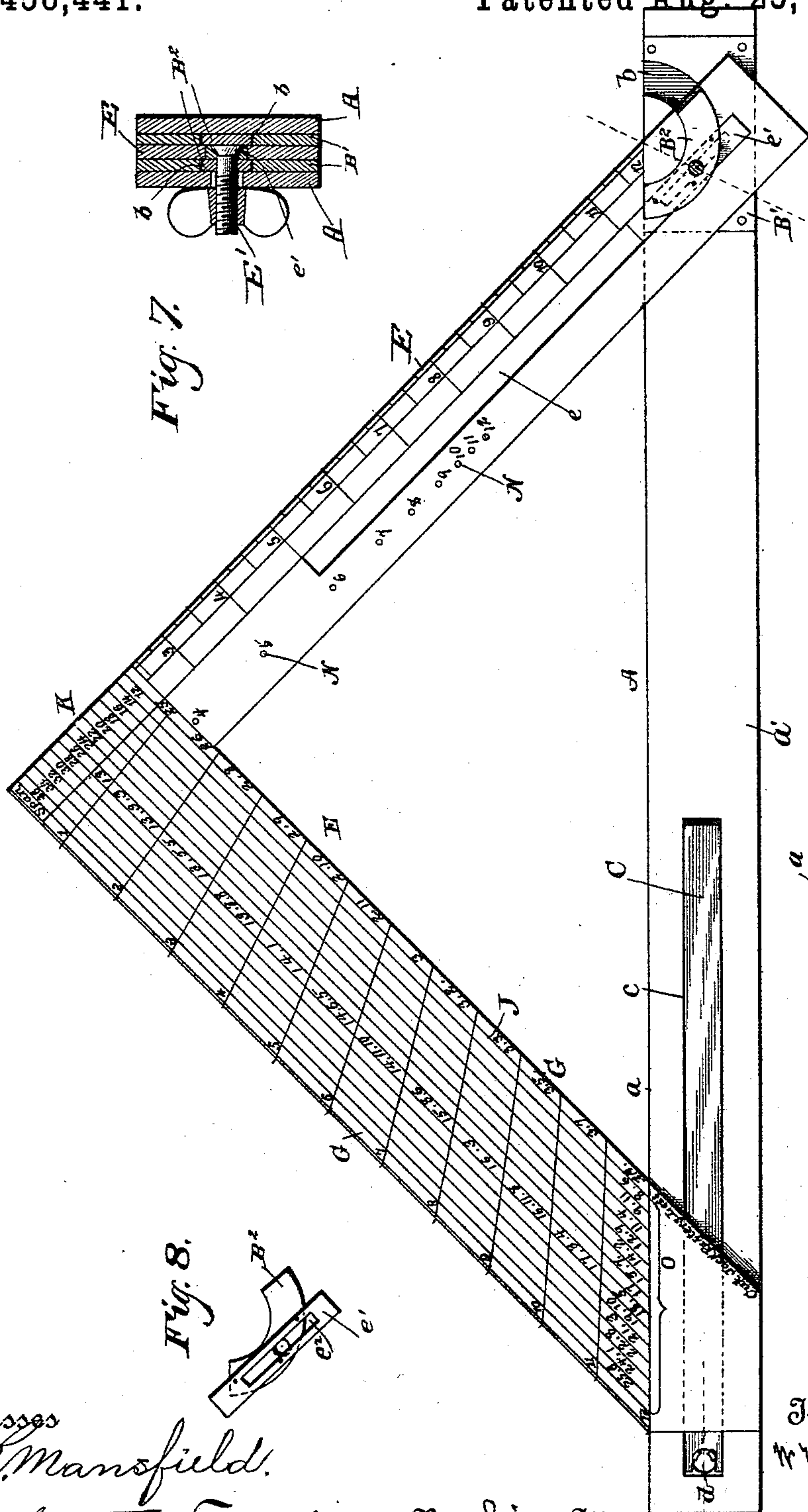


Fig. 7.

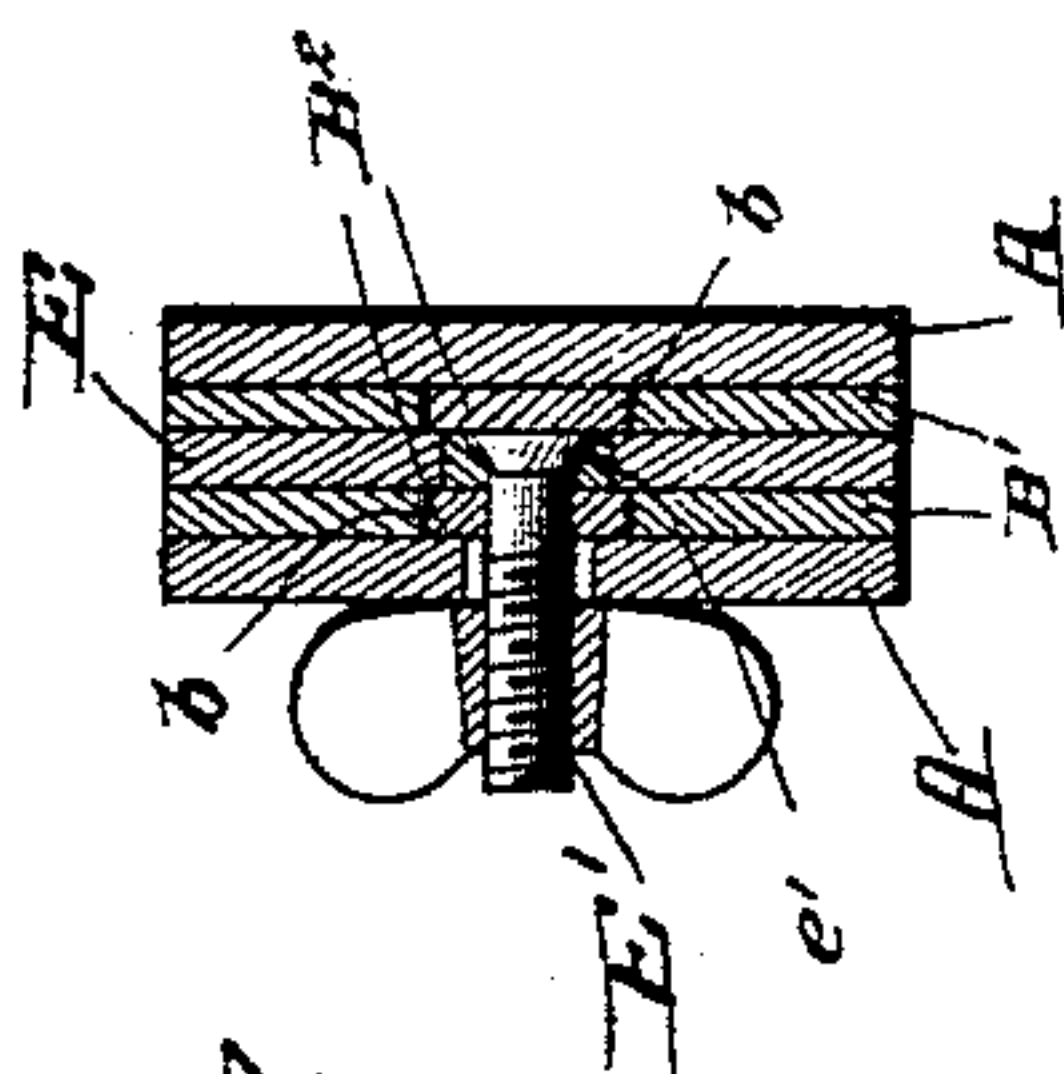


Fig. 8.

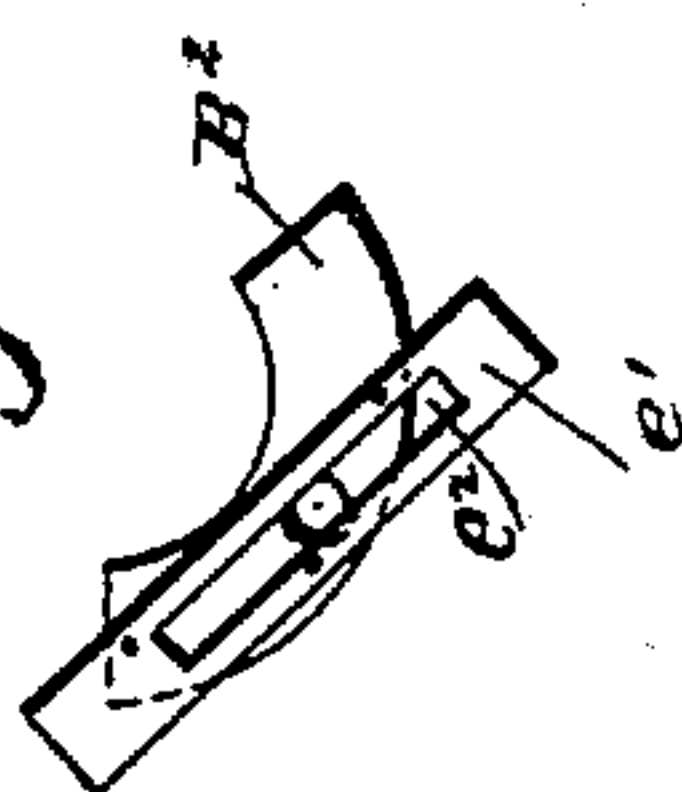
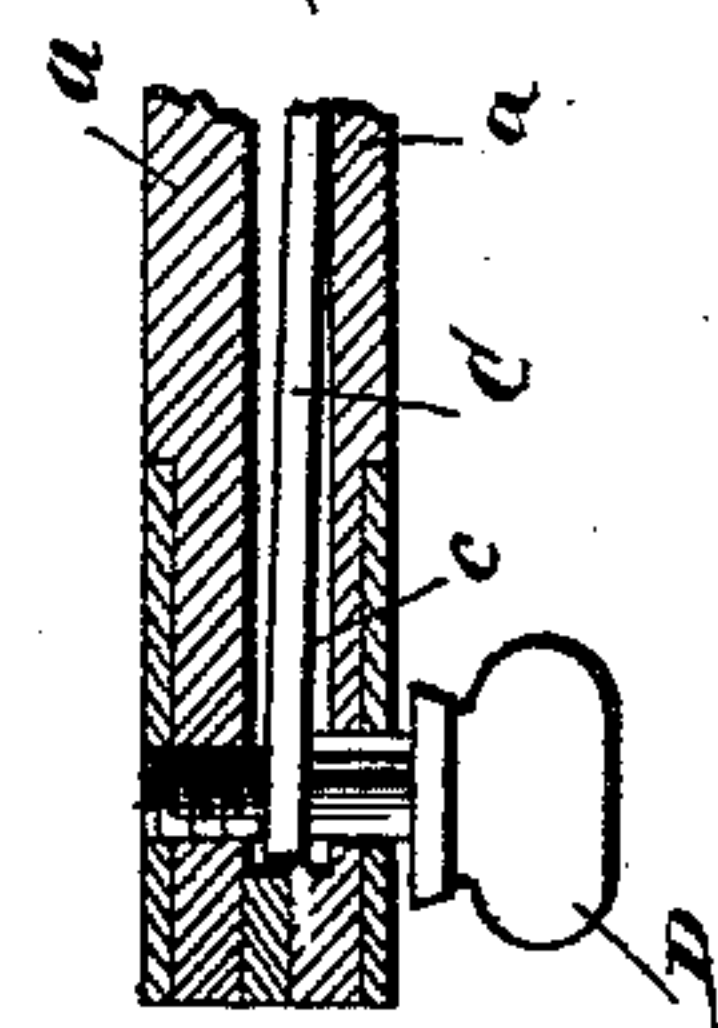


Fig. 9.



Witnesses

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Fig. 3.

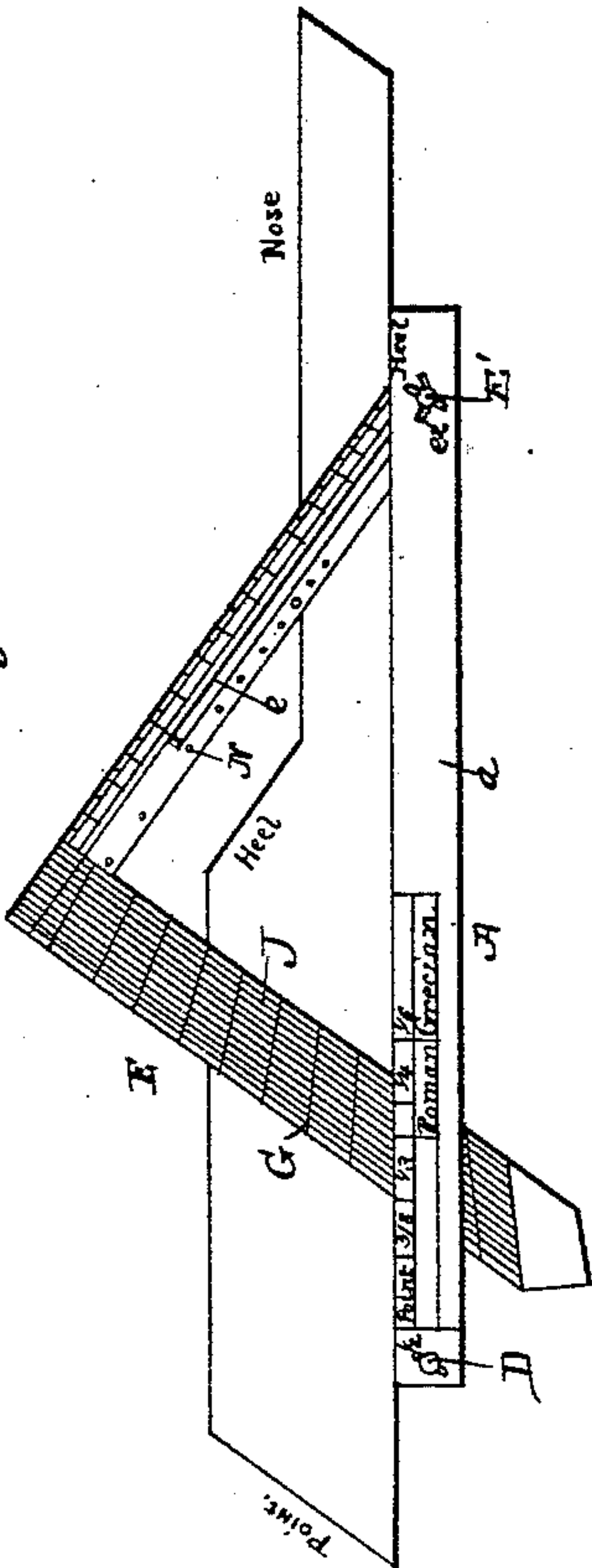


Fig. 2.

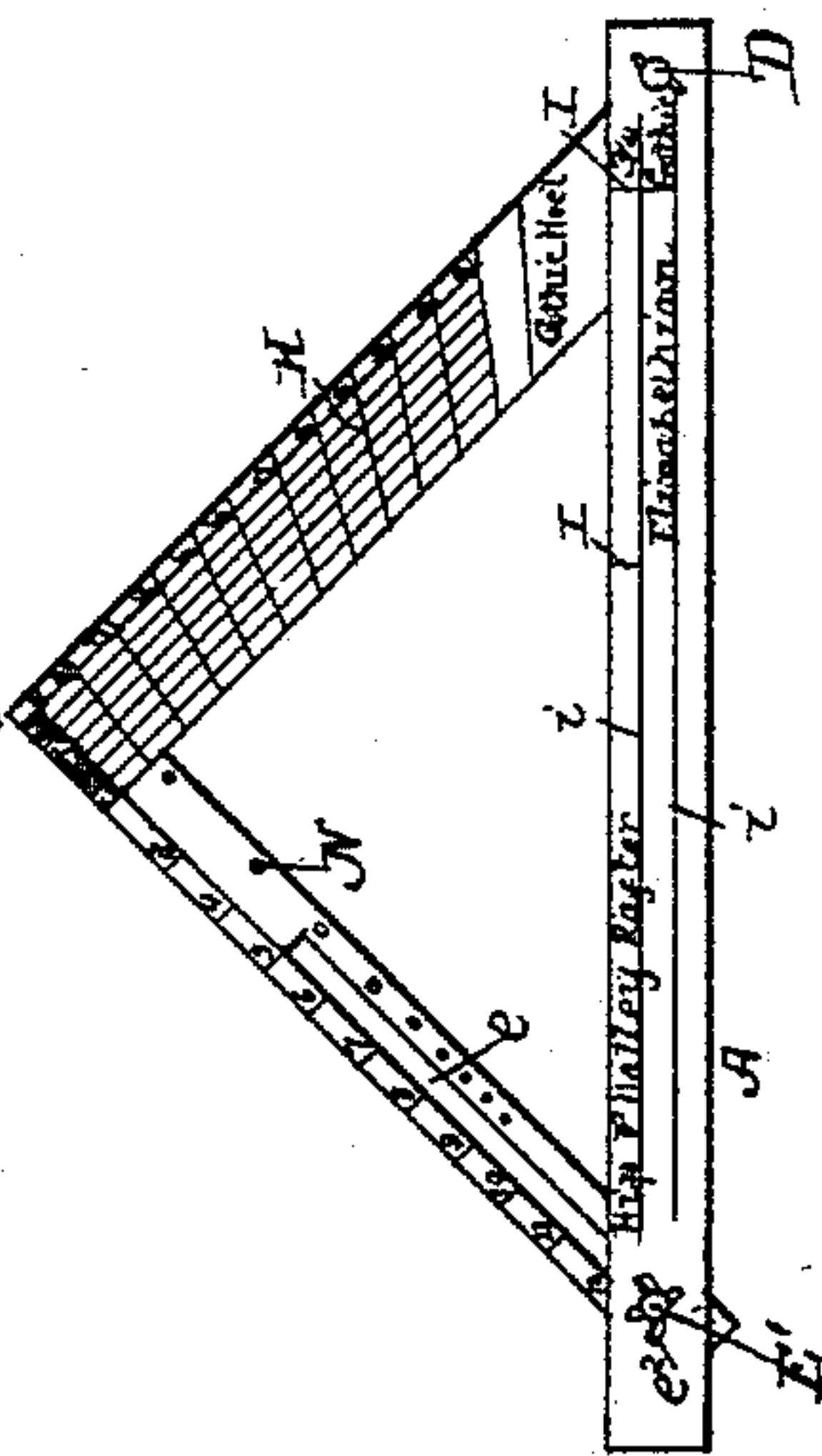


Fig. 5.

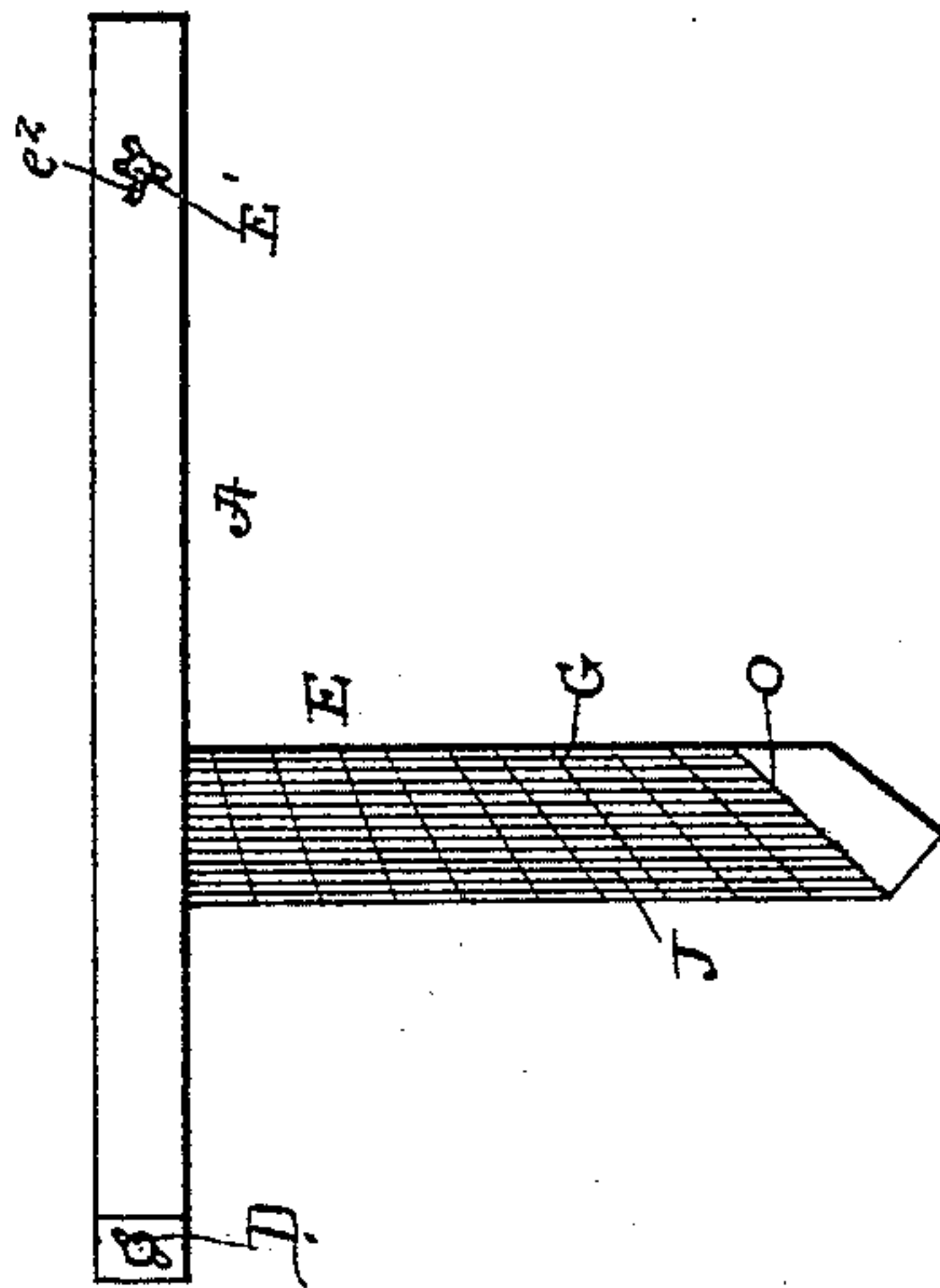


Fig. 4.

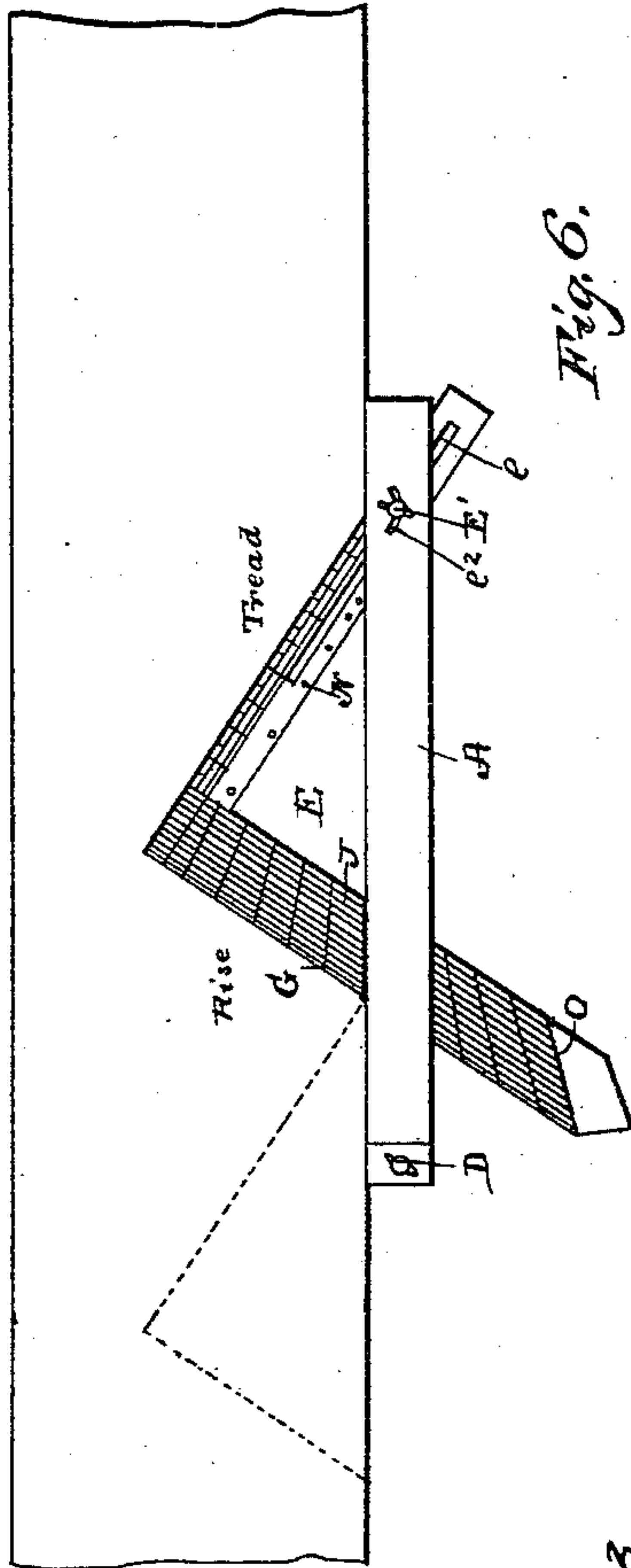


Fig. 6.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.00	1.41	1.73	2.00	2.24	2.45	2.63	2.78	2.91	3.02	3.12	3.21
2	1.41	1.73	2.00	2.24	2.45	2.63	2.78	2.91	3.02	3.12	3.21	3.29
3	1.73	2.00	2.24	2.45	2.63	2.78	2.91	3.02	3.12	3.21	3.29	3.36
4	2.00	2.24	2.45	2.63	2.78	2.91	3.02	3.12	3.21	3.29	3.36	3.42
5	2.24	2.45	2.63	2.78	2.91	3.02	3.12	3.21	3.29	3.36	3.42	3.47
6	2.45	2.63	2.78	2.91	3.02	3.12	3.21	3.29	3.36	3.42	3.47	3.51
7	2.63	2.78	2.91	3.02	3.12	3.21	3.29	3.36	3.42	3.47	3.51	3.54
8	2.78	2.91	3.02	3.12	3.21	3.29	3.36	3.42	3.47	3.51	3.54	3.56
9	2.91	3.02	3.12	3.21	3.29	3.36	3.42	3.47	3.51	3.54	3.56	3.58
10	3.02	3.12	3.21	3.29	3.36	3.42	3.47	3.51	3.54	3.56	3.58	3.59
11	3.12	3.21	3.29	3.36	3.42	3.47	3.51	3.54	3.56	3.58	3.59	3.60
12	3.21	3.29	3.36	3.42	3.47	3.51	3.54	3.56	3.58	3.59	3.60	3.61

Witnesses

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Inventor

W. H. Bast.

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UNITED STATES PATENT OFFICE.

WILLIAM H. BAST, OF OLINDA, CALIFORNIA.

SQUARE FOR RAFTER AND STAIR WORK.

SPECIFICATION forming part of Letters Patent No. 458,441, dated August 25, 1891.

Application filed February 28, 1891. Serial No. 383,272. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BAST, of Olinda, in the county of Shasta and State of California, have invented certain new and useful Improvements in Trigonometrical Squares; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a top view of my improved trigonometrical square for use in cutting rafters, trusses, and stair-beams, one part of the stock being removed. Fig. 2 is a view of the reverse side thereof. Fig. 3 is a view illustrating the instrument as used for marking rafters. Fig. 4 is a similar view thereof as used for a stair-pattern. Fig. 5 shows it adjusted for a common try or T square. Figs. 6, 7, 8, and 9 are details.

This invention is an improved instrument or square for carpenters and architects; and its object is to provide a tabulated square by which an experienced or inexperienced workman can ascertain at once the length of rafters necessary in constructing a roof over a certain span or width of building and at any pitch desired, and can also quickly set the instrument so as to be able to mark the correct angles by which the heel and point of rafter must be cut. The instrument is also useful for measuring and marking truss-rods, stair-patterns, &c., and can be readily adjusted as a try or T square, or can be separated and used as an L-square or ordinary angle, all of which will be clearly understood from the following description and claims.

Referring to the drawings by letter, A designates the stock of the instrument having a narrow longitudinal slot a' , for the play of the angle, as shown.

B' B' designate metal plates secured to the inner faces of the top and bottom pieces a of the stock, near one end thereof, and in these plates are semicircular grooves b b . (The grooves might be made in the pieces a .)

C designates a metal plate or spring concealed in a recess c in the inner face of one piece a at the opposite end of the stock, and the outer end of this spring is upturned and projects through an opening d in the end of

the stock, through which opening passes a thumb-screw D, which when screwed down forces the spring toward the opposite piece a . 55

E designates a right-angled or L square having limbs of equal length, one narrow, the other wide. In the narrow limb is a longitudinal slot e , in which is fitted a slotted plate e' , and on opposite sides of the plate are 60 semicircular or quadrant-shaped plates $B^2 B^2$, which engage grooves b , as indicated, and thus accurately hinge or pivot the angle to the stock in such manner that the wider end of the angle rests in and plays through the 65 slot a' in the stock and beneath the spring C, which is employed to lock the angle when shifted, being clamped by screw D.

E' is a thumb-screw attached to plate B^2 and playing through the slot in plate e' and 70 having an enlarged head, so that when it is tightened the plate e' is spread and binds in slot e , thus locking the quadrants thereto. When thumb-screw E' is loosened, the square can be shifted so as to project the narrow 75 limb through the stock, plate e' slipping in slot e . When the square is drawn out until plate e' is at the outer end of slot e and locked to the square, the square will be properly pivoted on the stock, as indicated in Fig. 1. The 80 semicircular rib and groove causes the square to turn on an exact pivotal or central point with less liability to displacement by wear, and also enables the square to be quickly disengaged from the stock, as by turning the 85 square entirely backward until the narrow limb is parallel with the stock the rib will be drawn out of the groove. When thus separated the square can be used like an ordinary L-square. The wide limb of the square has 90 a series of scores G G, starting from points equidistant along its outer edge, but all converge to or radiate from the central point or pivot of the square on the stock, and on the opposite face of the square are a series of 95 similar scores H H, but made on different angles to scores G. They are numbered from 1 to 12, beginning at the corner of the square and extending toward the end of the wide limb. 100

Scores G and H indicate regular and hip pitch. The side of the square bearing scores G is the top side, and on the top face of the stock are marked the words "Roman" and

"Grecian," (the architectural terms of corresponding pitch,) and longitudinal lines *h h*, indicating the pitch and so marked, and between lines *h* are a series of transverse divisions *H*, (marked $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, &c.,) to indicate fractions of pitches. The end of the stock adjoining spring *C* is marked "Point" and the opposite end "Heel," to assist in the marking of the rafters.

Turning the instrument over, the opposite face of the stock is marked with longitudinal lines *i i* and by transverse lines *II*, which are marked $\frac{1}{4}$, &c.; also words "Hip" and "Valley" rafter at the left-hand end of the stock, holding the L-square from you, and the words "Elizabethian" and "Gothic," architectural terms of corresponding pitches.

The wide limb of the square is divided into a table by means of a parallel series of longitudinal lines *J J*, which intersect the scores *G* and *H*. At the corner of the square is a division or column *K*, in which are marked in succession the widths of roofs or span of roofs—say from twelve to thirty-six feet. Then in the spaces between the scores *G* and *H* are figures indicating the length of rafter necessary to be cut for each rafter, and for the pitch indicated by the scores—for instance, for a span of twenty-six feet and the pitch to be that indicated by score *G*, No. 4, the length of rafter indicated is 13.88 feet; for the pitch indicated by score *G*, No. 12, the length of rafter is shown eighteen feet five inches, and for any intermediate pitches the length of rafter is given at once.

The narrow limb of the square is marked off into regular scale measurements or divisions, and in the said limb are formed a series of perforations *N N*, through which the rafters can be longitudinally scored to indicate how much of the rafter shall be cut out to form the brackets for eave-cornices, &c. Each hole is shown its relation to lines on the wide arm by figures.

At the inner edge of the wide limb of the square is a division *O*, marked "cut jack-rafters less," and in each space between the scores is given the length in inches that must be taken off the rafters to every foot-space between rafters, as indicated by the numbers above in making the jack-rafters.

On the lower face of the angle or side scored by marks *H* is a line extending radially from the point of connection of square and stock, and marked "Gothic heel." This means the heel for Gothic pitch, which is three-fourths pitch. By using the quadrant connection between the square and stock the perfect pivoting of the square is insured. By having this perfect pivot center a correct hypotenuse is given between the limbs of the square along the edge of the stock, which indicates the length of rafter-foot, which is equidistant to twelve inches base-line, and also gives the correct length of cornice-bracket, as indicated in Fig. 1.

On the opposite side of the instrument, as indicated in Fig. 2, it gives the bevel-pitch, length of hip, and valley rafter for all the corresponding pitches in Fig. 1. By my instrument the workman can ascertain at once, without drafting for any given width of building, however complicated by wings, &c., of different widths, the pitch, bevel, and length of rafter, width and length of cornice-bracket, and the exact length and bevel and ends, and length of cornice-bracket of the hip and valley rafters, also the length of jack-rafters. When used as a stair-pattern, as in Fig. 4, the small arm gives the tread, the wide arm the rise.

If the workman is to frame a roof having a pitch—say of one foot in three, or one-third—he adjusts the angle to the score *G*, No. 8. Then he looks in the "span" column of figures until he finds the number corresponding to the span of the roof, then, following down the longitudinal line on which such number is placed to score No. 8, he finds numbers which indicate the length of regular rafter, and if he wishes to cut jack-rafters he finds what numbers are marked at score *G*, No. 8, in the "cut jack-rafters less" column, finding it to be at the inner edge of the wide limb, and subtracts so much per foot for the successive jack-rafters. Turning the square over and looking at the figures adjoining the stock in the division numbered 12 in span column, he finds the length of corresponding hip and valley rafters for a one-half-pitch roof, and if he wants the length of rafters for one-third pitch for any width of base given in the span column he can ascertain it at once, and by shifting the square to various pitches, as required, he can at once determine in the foregoing manner the length of rafters and their respective bevels.

Having described my invention, what I claim as new, and desire to secure by Letters Patent thereon, is—

1. An instrument for the purpose specified, consisting of a stock and a square pivoted by one limb to one end of the stock and having on its other limb a series of scores made on lines radiating from the pivot of the square, a series of parallel lines intersecting the scores, a series of figures in the divisions made by said scores, and lines for indicating the length of rafters for given spans at various pitches, substantially as described.

2. A square for the purpose specified, having one limb adapted to be pivotally connected to one end of a stock and having perforations *N*, and the other limb having radial scores and parallel division-lines intersecting the scores and numbered and figured, substantially as and for the purpose specified.

3. The combination of the stock having a slot and a semicircular channel with a square having a quadrant on one limb engaging said slot, for the purpose substantially as set forth.

4. The combination of the stock having a

slot and a spring concealed in a recess at one side of the slot and a thumb-screw for operating said spring with a square pivoted by one end to the stock and having its free limb passing through the slot therein and adapted to be bound by said spring, substantially as set forth.

5 5. The combination of the stock having a longitudinal slot, a spring and actuating thumb-screw in one end, and a semicircular recess at the other end with a square having a quadrant-plate on one limb engaging the said recess, substantially as described.

10 6. The square for the purpose described, having a narrow limb provided with perforations N and a wide limb divided by radiating scores and longitudinal parallel lines and a tabular series of figures thereon in the divisions between the scores and lines, substantially as and for the purpose described.

20 7. The combination of the stock and the square having a longitudinal slot in one arm with the plate in said slot and the quadrants attached to said plate and engaging curved

recesses in the stock, substantially as specified.

8. The combination of the slotted stock and the square having a longitudinal slot in one arm with a plate fitted in said slot, the quadrants connected thereto and engaging semicircular recesses or grooves in the stock, and the thumb-screw for binding said plate in the slot, substantially as described.

9. The combination of the stock and the square having a longitudinal slot in one arm with the plate in said slot, the quadrants attached to said plate and engaging curved recesses in the stock, and the binding-springs engaging the other arm of the square, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM H. BAST.

Witnesses:

J. H. SUMNER,
M. A. WALTON.