F. W. ROYAL.

CARPENTER'S SQUARE.

APPLICATION FILED APR. 22, 1910.

975,079.

Patented Nov. 8, 1910.

2 SHEETS—SHEET 1.

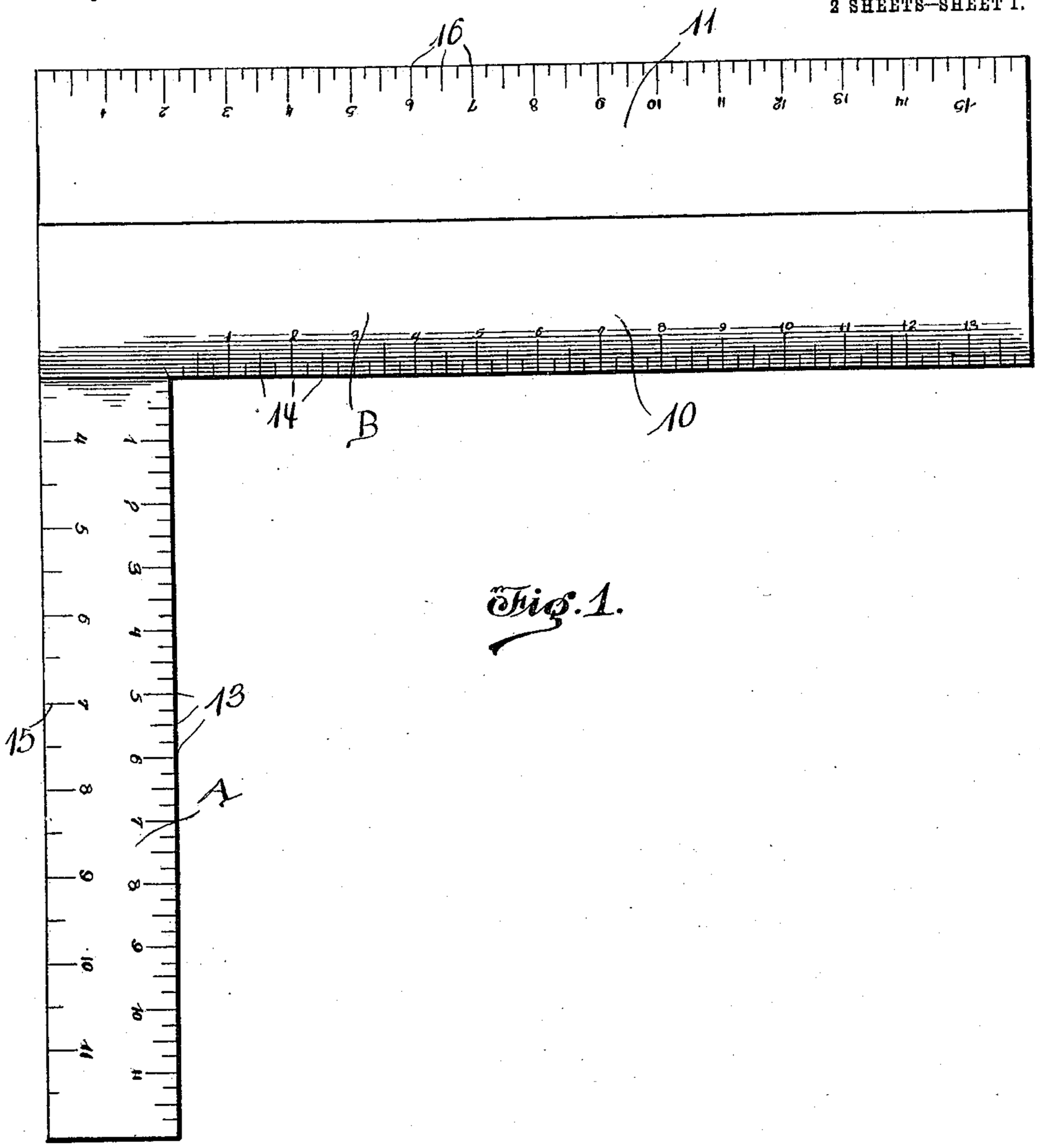

Fig. 1.

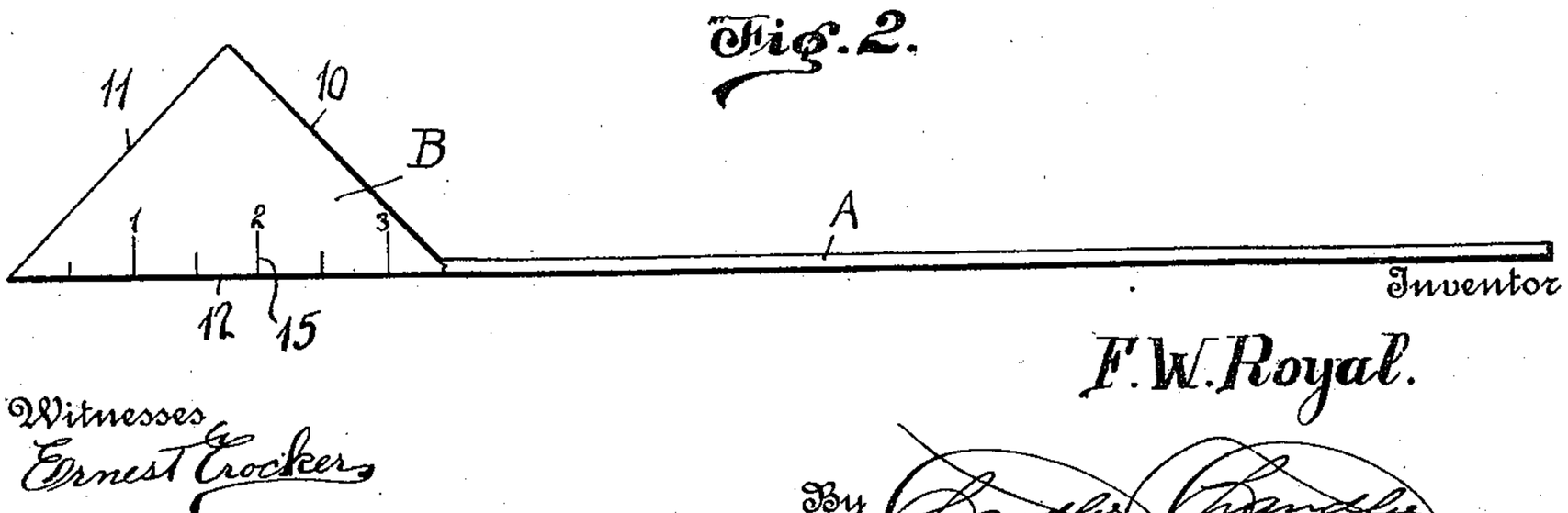

Fig. 2.

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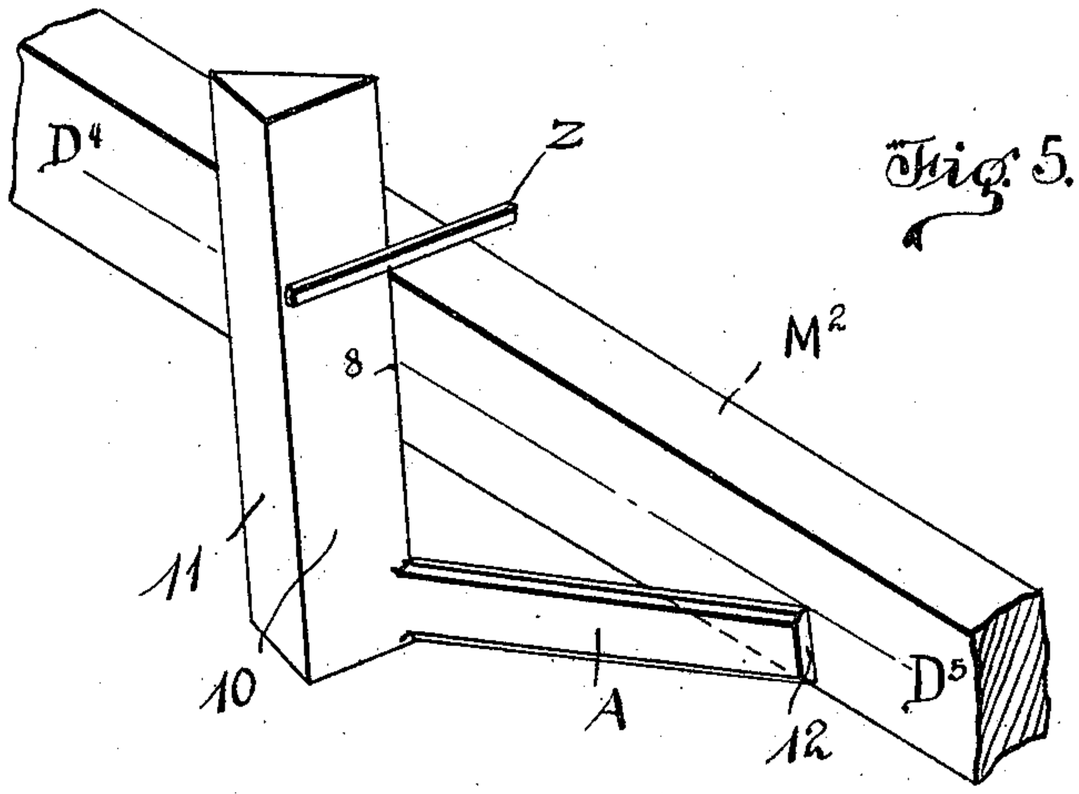

Fig. 5.

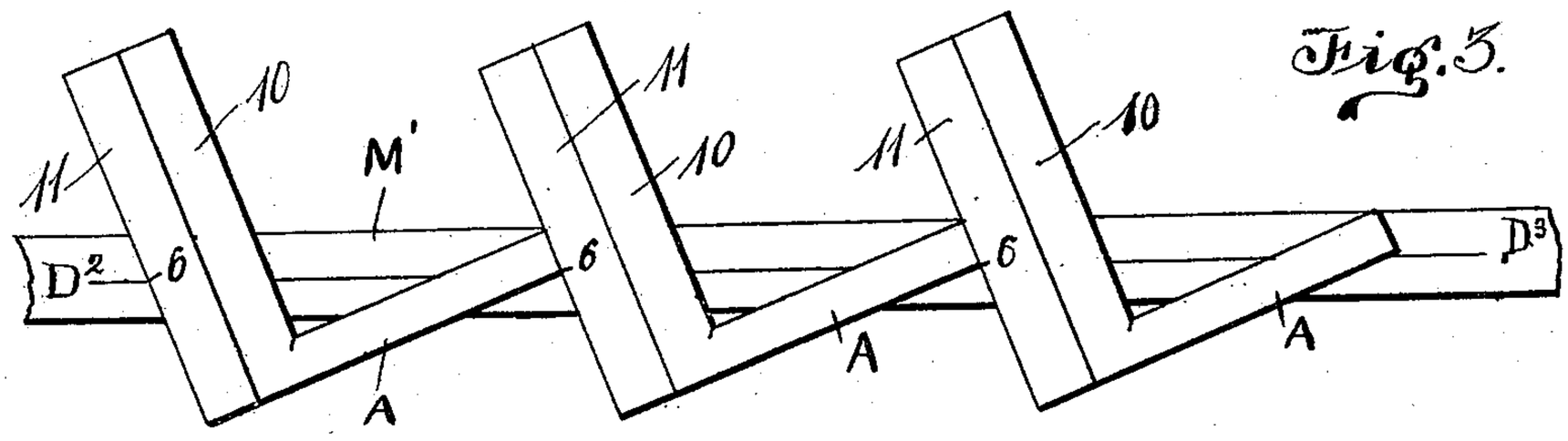

Fig. 3.

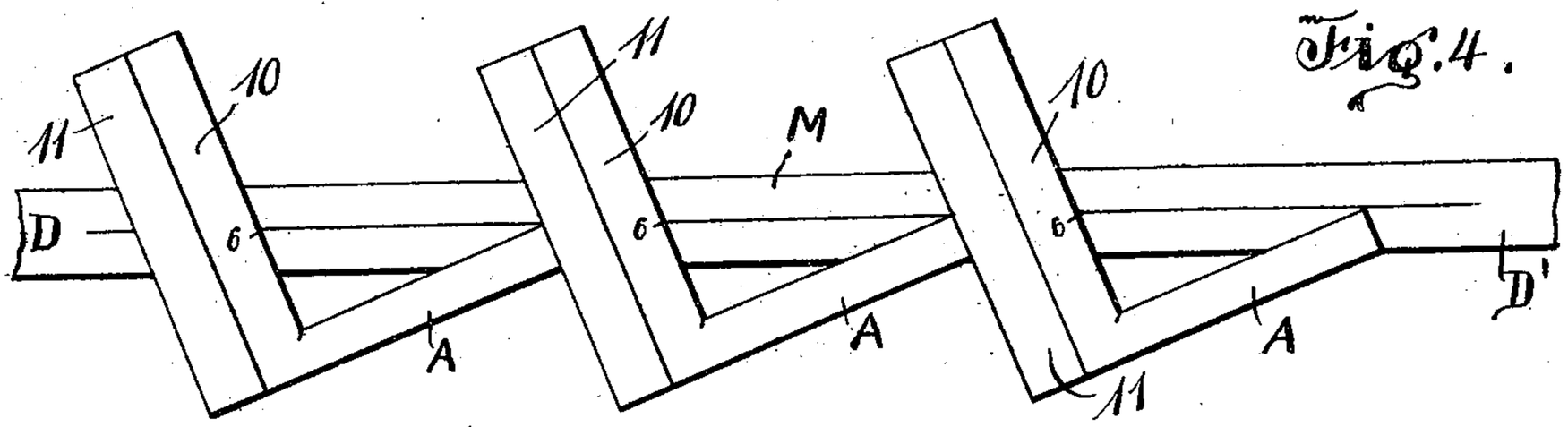

Fig. 4.

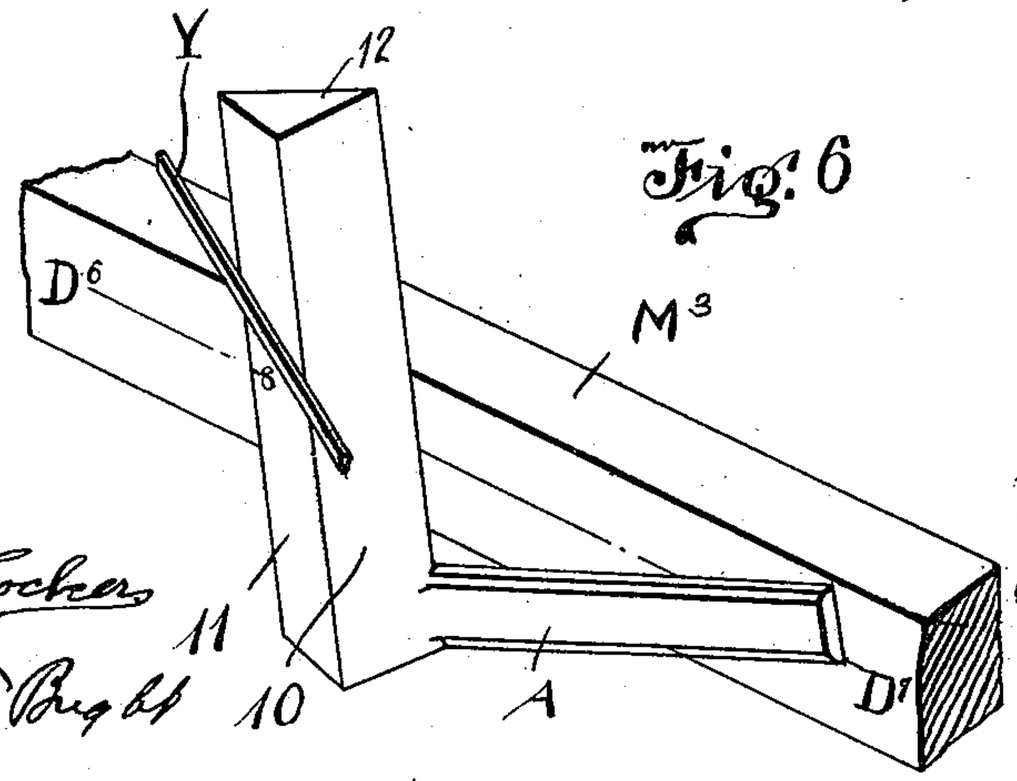

Fig. 6

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UNITED STATES PATENT OFFICE.

FORESTER W. ROYAL, OF BALLSTON, OREGON.

CARPENTER'S SQUARE.

975,079. Specification of Letters Patent. **Patented Nov. 8, 1910.**

Application filed April 22, 1910. Serial No. 556,941.

To all whom it may concern:

Be it known that I, FORESTER W. ROYAL, a citizen of the United States, residing at Ballston, in the county of Polk, State of Oregon, have invented certain new and useful Improvements in Carpenters' Squares; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to carpenters' squares.

The object of the invention resides in the construction of a square designed for use in quickly and accurately obtaining the lengths and cuts of hip, valley, common and jack rafters without committing to memory a vast array of figures or resorting to the usual mathematical steps to reach the results desired.

With these objects in view the invention consists in the details of construction to be hereinafter referred to and particularly pointed out in the claims.

In describing the invention in detail reference will be had to the accompanying drawings wherein like characters of reference denote corresponding parts in the several views, and in which:

Figure 1 is a plan view of a square constructed in accordance with the invention; Fig. 2, a side view of the square showing an edge of the blade and the end of the tongue which constitutes a continuation of said edge; Fig. 3, a view showing the method of applying the square in determining the length of a hip or valley rafter; Fig. 4, a view showing the method of applying the square in determining the length of a common or a jack rafter; Fig. 5, a view showing the method of utilizing the square in determining the roof plane angle of a jack rafter and the vertical angle of both a common and a jack rafter; and, Fig. 6, a view showing the method of utilizing the square in determining the vertical and roof plane angles of either a hip or valley rafter.

Referring to the drawings, the square is shown as comprising a tongue B and a blade A disposed in the usual relation. The tongue B is constructed with its cross section having the shape of an isosceles right triangle forming corresponding side faces 10 and 11, and a base 12. The blade A is attached to the tongue B so as to be in the same plane with the base of said tongue. The length of the blade A is represented as twelve inches and has its inner side scaled in inches as at 13. Likewise the lower edge of the face of the tongue B is scaled in inches and fractions of an inch as at 14, said scale beginning at the point of intersection of the lower edge of the side 10 with the inner edge of the blade A and increasing toward the outer end of the tongue B, it being understood that said tongue may be any desired length, being shown in this instance as fourteen inches. The base 12 of the tongue B has a width of 4.97 inches, thus making the combined length of the outer side of the blade A and the width of the tongue B 16.97 inches. This combined length of the blade A and the width of the tongue B is divided into twelve equal parts as at 15 (Figs. 1 and 2), each of said divisions thus bearing the same relation to one inch as 16.97 bears to 1 foot. The lower edge of the side 11 of the tongue B is also scaled in inches and fractions thereof as at 16, said scale extending from end to end of the tongue and increasing from the inner to the outer end.

In measuring rafters it is customary to take 12 inches or one foot as the basis, therefore in determining the length of a rafter the square is usually applied as many times to the material as the horizontal distance from the lower end of the rafter to a point located in a perpendicular dropped from the point where the elevated end of the rafter rests. For example:—a common rafter on a building four feet wide, with a rise of six inches per foot would be 26.83 inches long, or twice the distance covered by a straight line drawn from six inches on the lower edge of the side 10 of the tongue B to the outer end of the inner side of the blade A.

In Fig. 4 of the drawing is illustrated the method of determining the length of a common or jack rafter to be cut from material M, for use in a building six feet wide, with a roof having a rise of six inches for every foot of level distance covered by the rafter to be supplied. D—D′ indicates the working line of the material M and upon a selected point in this line the outer end of the inner side of the blade A of the square is placed, said point constituting the lower

end of the rafter. The tongue portion of the square is then moved until the six inch scale on the lower edge of the side 10 of the tongue B also rests upon the line D—D′. The distance between the outer end of the inner side of the blade A and the six inch scale on the lower edge of the side 10 of the tongue B is then set out upon the line D—D′ and measured successively thereon three times, the combined distances laid out on the line D—D′ being the length of the common or the jack rafter desired. The application of the square just described may be also utilized in determining the cut or rather the line of cut at the top of a common rafter for it will be perfectly obvious that a line traced along the lower edge of the side 10 across the material M will give the proper angle of cut for disposing the upper end of said common rafter against the ridge board. However, as a jack rafter is disposed at its upper end against a hip or valley rafter the roof plane angle of said jack rafter or in other words, the angle at which it meets a hip or valley rafter must be determined in a different manner from that just described with respect to the common rafter and will be presently referred to. In computing the length of hip and valley rafters under the conditions just recited the method of utilizing the square differs from that employed in the case of common and jack rafters and is illustrated in Fig. 3, wherein M′ represents the material from which the hip or valley rafter is to be cut and D^2—D^3 the working line thereof. The outer end of the outer side of the blade A is placed upon a selected point in said line, said point constituting the lower end of the rafter and the tongue B moved until the six-inch scale on the lower edge of the side 11 coincides with the line D^2—D^3. The distance from the outer end of the outer side of the blade A to the six-inch scale on the side 11 of the tongue B is then laid off successively three times on the line D^2—D^3, the combined length of these distances being the length of the desired hip or valley rafter. It may be here mentioned that the length of hip and valley rafters of any predetermined rise for each diagonal foot of level distance covered from the angle or corner of a building is the length of the hypotenuse of a right triangle formed by the height of such predetermined rise and the hypotenuse of a right angle triangle whose altitude and base are each twelve inches in length, hence the combined length of the outer side of the blade A and the base of the end of the tongue B is made 16.97 inches, the base of the tongue B being 4.97 inches. By embodying these dimensions in the square in the relation described and scaling the combined outer side of the blade A and the base of the tongue B into the same number of equal parts as the inner side of the blade A, the value of the square in drafting common, jack, hip and valley rafters is maintained.

In order to ascertain the vertical and roof plane angle of the jack rafter having a rise of eight inches per foot and a known length the square is applied as shown in Fig. 5. In this figure the square rests against the face of the material M^2 which will constitute the side of the rafter with the outer end of the inner side of the blade A coinciding with the working line D^4—D^5 of said material and the eight inch scale of the side 10 also coinciding with the line D^4—D^5. A straight edge Z or other suitable instrument is then placed so as to lie continuously upon the side 10 of the tongue and the face of the material M^2 which will constitute the top of the rafter. When the square and straight edge are in this position the line traversed by the lower edge of the side 10 of the tongue B and the straight edge are successively marked upon adjacent faces of the material and this marking will indicate respectively the cuts to be taken to give the desired vertical and roof plane angles. The reason for the correctness of the vertical cut just referred to will be obvious while the correctness of the cut to be taken to give the roof plane angle resides in the fact that the elevated end of the jack rafter meets the hip rafter at an angle of 45 degrees and as the side 10 of the tongue B is disposed at an angle of 45 degrees to an imaginary level of the jack rafter being drafted the line traversed by the straight edge Z must be mathematically correct for the roof plane angle of the jack rafter.

To ascertain the roof plane angle of a hip or valley rafter having a rise of eight inches per foot and a known length the square is applied as shown in Fig. 6. In this figure the square is placed against the material M^3 with the outer end of the outer side of the blade A coinciding with the working line D^6—D^7 and the eight inch scale of the side 11 of the tongue also coinciding with the line D^6—D^7. A straight edge Y is then placed so as to lie continuously upon the side 11 of the tongue and the face of the material M^3 which will constitute the top of the rafter. The material is then suitably marked as described in connection with a jack rafter and this marking will indicate the correct cut to be taken to give the desired roof plane angle of the hip or valley rafter. The accuracy of the result thus reached is dependent upon the fact that a hip or valley rafter comes in contact with other members of the roof at what would be if carried to an imaginary level, an angle of 45 degrees to said level and as the side 11 of the tongue is disposed at an angle of 45 degrees to the imaginary level above referred to the cuts indicated by the lower edge of the side 11

and the straight edge Y must of necessity be such as to give the desired roof plane angle.

What is claimed is:

1. A carpenter's square having the inner edge of its blade scaled into equal divisions and the outer and inner edge of its tongue scaled into divisions equal to the divisions of the inner edge of the blade; and having the combined width of the tongue and the length of the blade equal to the square root of twice the square of the length of the inner edge of the blade, said tongue and blade being scaled throughout their combined width and length into the same number of equal divisions as the inner edge of the blade.

2. A square having the inner edge of its blade scaled into equal divisions and its tongue constructed of a prism having the cross section of an isosceles triangle, the edges of said tongue being scaled into divisions equal to the divisions of the inner edge of the blade; and having the combined width of the tongue and the length of the blade equal to the square root of twice the square of the length of the inner edge of the blade, said tongue and blade being scaled throughout their combined width and length into the same number of equal divisions as the inner edge of the blade.

In testimony whereof, I affix my signature, in presence of two witnesses.

FORESTER W. ROYAL.

Witnesses:
WALLACE YATES,
EARL W. ANDERSON.