L. E. BAILEY.

CARPENTER'S SQUARE.

APPLICATION FILED JUNE 9, 1908.

937,202. **Patented Oct. 19, 1909.**

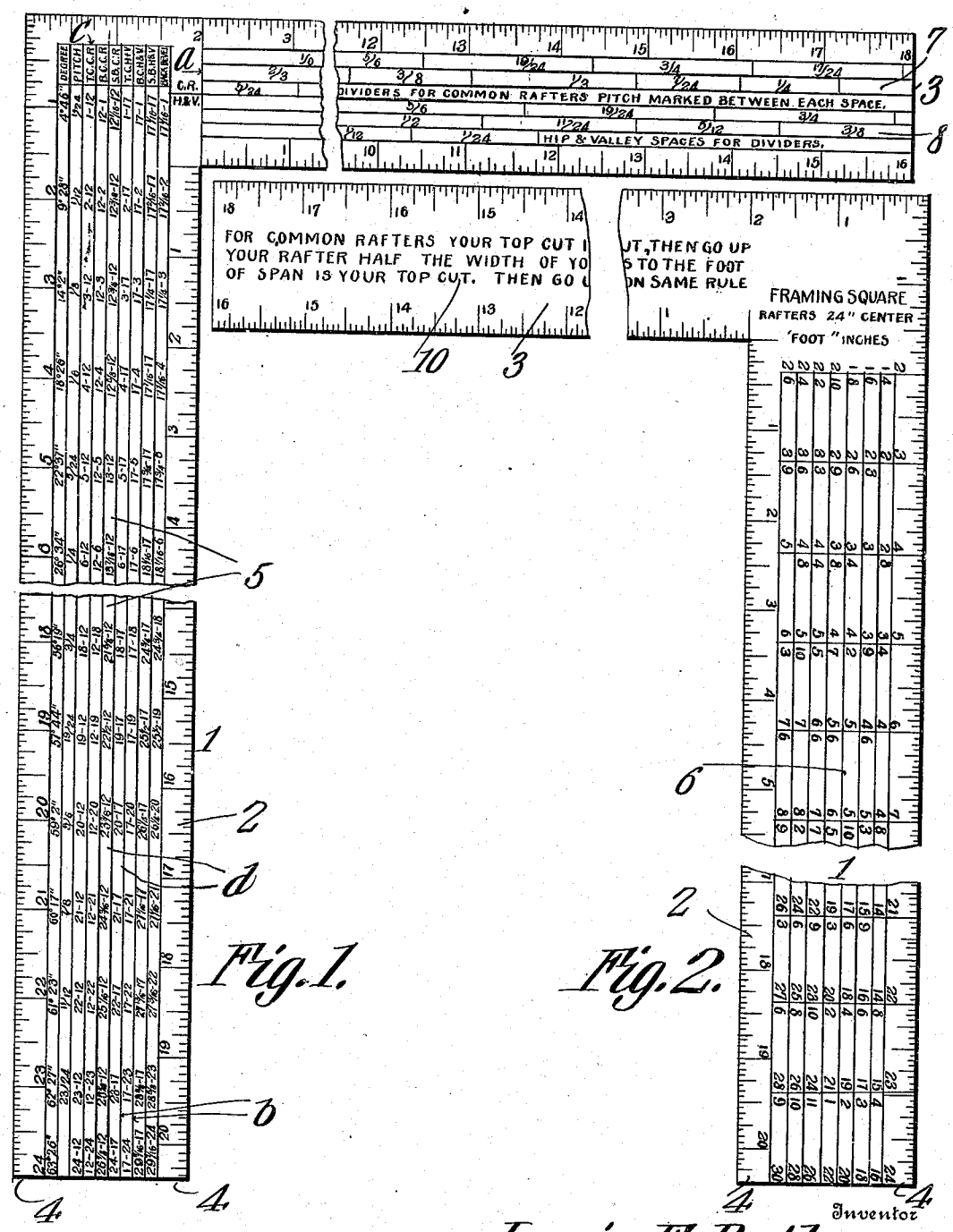

Fig. 1.

Fig. 2.

Witnesses

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CARPENTER'S SQUARE.

937,202. Specification of Letters Patent. Patented Oct. 19, 1909.

Application filed June 9, 1908. Serial No. 437,604.

To all whom it may concern:

Be it known that I, LOUIS EUGENE BAILEY, a citizen of the United States, residing at Haskell, in the county of Haskell and State of Texas, have invented a new and useful Carpenter's Square, of which the following is a specification.

This invention relates to a tool for the use of carpenters and joiners and known as a framing square, a carpenter's square, a steel square etc.; and has for its main object to provide a square of the type mentioned with a newly devised table to be stamped on one face or side of the blade of the square by means of which table the square may be applied to rafters and other timbers and boards, and the angles and lengths required on which they are to be cut quickly and easily ascertained. On the same face of the tongue of the square are two scales which are used when the spans or widths of buildings are given in feet and fractions thereof, these scales to be used for measuring only the fractions of feet, or in other words, inches. The opposite face of the square contains the usual board measure scale on the blade, and directions on the tongue for using the table of rafter cuts.

The invention will be more clearly understood from the following detailed description and the accompanying drawing forming a part of this specification, in which;

Figure 1 is a view of one face of the square with a portion removed from the blade and from the tongue, and Fig. 2 a similar view of the opposite face.

Like reference characters are used for the same parts in both figures.

The square 1 is made as usual of sheet steel with a blade 2, twenty-four inches long and two inches wide, and a tongue 3, eighteen inches long and one and five eighths inches wide the blade and tongue forming a true right angle. The inner and outer edges of the square on both faces are provided with the usual graduations 4 into inches and fractions thereof, but if desired metrical graduations may be substituted for the inch graduations more commonly employed. On one face of the blade 2 of the square is placed a table 5, to be described later, situated between the two edge graduations and extending from end to end of the blade. The opposite face of the blade has thereon the usual board measure 6, so well known to those skilled in the art that description thereof is deemed unnecessary. That face of the tongue 3 continuous with the face of the blade 2 bearing the table 5, carries two scales 7 and 8 between the edge graduations 4. These two scales 7 and 8 extend from a line *a*, running across the tongue continuous with the inner edge of the blade 2. A brief explanation 10 on the use of the table 5 is impressed in the opposite face of the tongue between the edge graduations 4.

Referring now to the table 5, it will be seen to comprise ten parallel longitudinal lines *b* extending from the extreme end of the blade 2 to a transverse line *c* near the outer graduation 4 on tongue. Between these lines *b* are included nine spaces *d* each space containing figures immediately under the inch divisions of the outer graduation 4, which figures when viewed collectively will be seen to form a column of figures under each of said inch divisions. In each space *d*, preferably at the end of the table 5 near the outer edge of the tongue 3, is placed a word or abbreviation indicative of the use to which the figures in the same longitudinal space are to be put. Beginning with the outermost space the words and abbreviations which follow in order are "Degree", the angle of the rafters in circular measure: "Pitch", the common name for the angle or inclination of rafters: T. C. C. R. (top cut common rafter) and B. C. C. R. (bottom cut common rafter), refer to the number of inches to be measured off on the outer graduations 4 of the blade and tongue respectively to obtain the correct angles for cutting the top and bottom ends of common rafters: "S. B. C. R." (side bevel common rafter) indicates the inches to be set off on the edges of the square to get the bevel or side angle of a rafter where it meets a hip or valley rafter: "T. C. H. & V." (top cut hip and valley) and "B. C. H. & V" (bottom cut hip and valley) give the inches to be counted off on the edges of the square to obtain the correct top and bottom cuts for hip and valley rafters: "S. B. H. & V." (side bevel hip and valley) gives the correct measurements to be used when a hip or valley rafter requires a side bevel to fit against the side of the ridge plate or a common rafter, and "Back bevel" are the measurements for the ends of hip and valley rafters and ridge plates when they are beveled from both sides toward the center line of the rafter or plate to form either an exterior or an inte-

rior angle on the end of the timber. Looking more attentively at the table 5, there will be found in the space *d* headed "Pitch", a fraction below each inch mark on the outer edge of the square. These fractions, beginning with 1/24 under the 1 inch division line and ending with 1.0. (24/24) at the end of the blade, each indicates the ratio which the perpendicular side of a right triangle having a height equal to the number of inches in the graduation immediately above the fraction, bears to the base of said triangle having a constant length of twenty-four inches, or in other words the ratio of the height of a roof to the span or width of a building to be covered thereby, and when the fractions are reduced to twenty-fourths of an inch, the numerators represent the rise in inches of a roof for each twelve inches or running foot of the span of the building. For instance, 1/4 pitch equals 6/24 pitch, the angle of the roof therefore will be a rise of six inches to each foot measured in a horizontal plane. The next space below "Pitch" headed "T. C. C. R." and all the others have two numbers below each pitch number. The numbers in the space "T. C. C. R." indicate the lengths to be measured on the outer edges of the blade and tongue of the square. Thus, if the pitch is 1/4 it will be seen that the numbers in the T. C. C. R. space below 1/4 pitch are 6–12, the square therefore must be measured from the angle six-inches on the tongue and twelve inches on the blade and these division lines placed exactly at one edge of the rafter lying flat, or on a straight line thereon running from end to end. A line drawn at an angle across the rafter guided by the outside of the blade will give the exact direction of cut for the top of the rafter. Running the eye from one end to the other of the space (T. C. C. R.) it will be observed that the first of each two numerals is the same as that of the inch mark just above it, and that the second numeral in each case is twelve. The pitch triangle is, therefore, for each pitch, twelve inches for base, the first of the two numbers give the rise per foot run and the hypotenuse or line connecting these two numbers in the scales on the square the angle or pitch of the roof.

The common rafters as is well known rise from each side of the wall and meet in the center of the building at the ridge. Therefore, in calculating the length of a rafter, one-half the span or width of the building is used. For example, a building twenty feet wide one-half thereof is of course ten feet and this multiplied by the height per foot which in a one-fourth pitch is six inches, gives the height of the roof at the top of the ridge-pole above the plane of the wall plates sixty inches or five feet. Now, having drawn the line for the top cut on a rafter for a building twenty feet wide if the square be moved along the rafter a distance equal to ten times the length of the line of the hypotenuse extending between the twelve and the six inches marks on the square and a line be drawn across the rafter against the tongue, the result will give the correct length of the rafter and the angle for the bottom cut thereof. The numbers in the space "S. B. C. R." give the numbers for marking the side bevel of cripple or jack rafters or those that, extend from the wall plate to the hip rafter and from the ridge plate to the valley rafter. As these rafters are parallel to the common rafters the same base, twelve inches is used, but the other number given is the length of the hypotenuse of the pitch triangle. The square is applied to the top of the rafter in this case and the inches indicated measured off on the square as heretofore described, then placed on top of the rafter and the mark always drawn on the side of the square on which the larger of the two numbers was measured and never on the side measuring twelve inches. The lengths of these rafters are obtained by a rule well known to carpenters and framers. To get the top and bottom cuts of hip and valley rafters, the number seventeen is used as the base of the pitch triangle for reasons well known to those skilled in the art and the operation is the same as for similar cuts on common rafters. Side bevel hip and valley rafters (S. B. H. & V.) are bevel cuts on the sides of the upper ends of these rafters where they meet the side of a ridge plate or common rafter and the numbers indicated are used for obtaining this angle in the same manner as described for getting the side bevel of cripple or jack rafters. Back bevel numbers are used for back beveling the ends of hip and valley rafters, that is to say, cutting the hip rafters to a point to form an exterior angle at the end and making an angular notch in the valley rafters, thereby producing an interior angle at the ends of these rafters. To find the lengths of back beveled hip rafters, they should be cut first and then begin the measurement where the angle meets the side of the rafter, but in the case of valley rafters, the measurement begins at the end so it is immaterial whether the length of the rafter is made before or after the cut.

When the width or span of a building is given in feet and inches, various means have been devised for calculating the additional length to be given the rafters to include the inches of the span. To avoid the necessity of calculating these fractional divisions of a foot, correctly calculated scales 7 and 8 respectively for common rafters and for hip and valley rafters will be found on the face of the tongue 3 on the same side of the square as the table 5. The scales 7 and 8 con-

sist of longitudinally extended parallel lines and cross lines between each two parallel lines arranged to form between said parallel lines spaces differing in length, said spaces having values according to a common fractional part of a foot run and varying pitches. Each of these varying spaces is provided with an index mark to denote the pitch which gives that particular length of space. To use these scales let it be assumed that the span of a building is eighteen feet six inches with a pitch of 1/4. The half span is first measured on the rafter as usual. Then, with the dividers, measure the length of the space in the common rafter scale 7 containing the fraction 1/4. Turning now to the rafter which has been measured for the half span or nine feet, add to the length thereof three steps of the dividers or one-half the number of inches in the span. By this simple means the correct length of a rafter can be quickly obtained whatever the length of the span in feet and fractions thereof. The scale 8 is used in a similar manner for hip and valley rafters.

From the above, it will be readily seen that the use of a carpenter's square is greatly simplified by means of the table 5 and the two scales 7 and 8. All probable pitches are given in the table with their circular measurements and immediately below each pitch is placed the measurements in inches to be marked off from the graduations on the outer edges of the scales for making all angular cuts in the construction of roofs; and when the span or width of buildings is given in feet and inches, the scales 7 and 8 on the tongue give the additional length to be added to the common rafters and hip and valley rafters to compensate for the inches in the span.

By means of this scale, all the timbers necessary for a roof may be measured, marked and cut out with great exactness before beginning the construction of the roof.

What is claimed is:—

1. A square containing a table calculated for whole numbers, and another table calculated for fractions, the last-mentioned table consisting of a series of parallel lines, and cross-lines therebetween arranged to form between said parallel lines spaces of different lengths, each of said spaces having a value corresponding to the fractional part of a foot, and index marks on said spaces denoting the value thereof.

2. A square having a blade containing a table calculated for whole numbers, and a table on the tongue of the square calculated for fractions, the last mentioned table consisting of a series of longitudinally extending parallel lines, and cross-lines therebetween arranged to form between said parallel lines spaces of different lengths, each of said spaces having a value corresponding to the fractional part of a foot, and index marks on said spaces denoting the value thereof.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

LOUIS EUGENE BAILEY.

Witnesses:
A. E. Myles,
E. S. Whitelaw.