

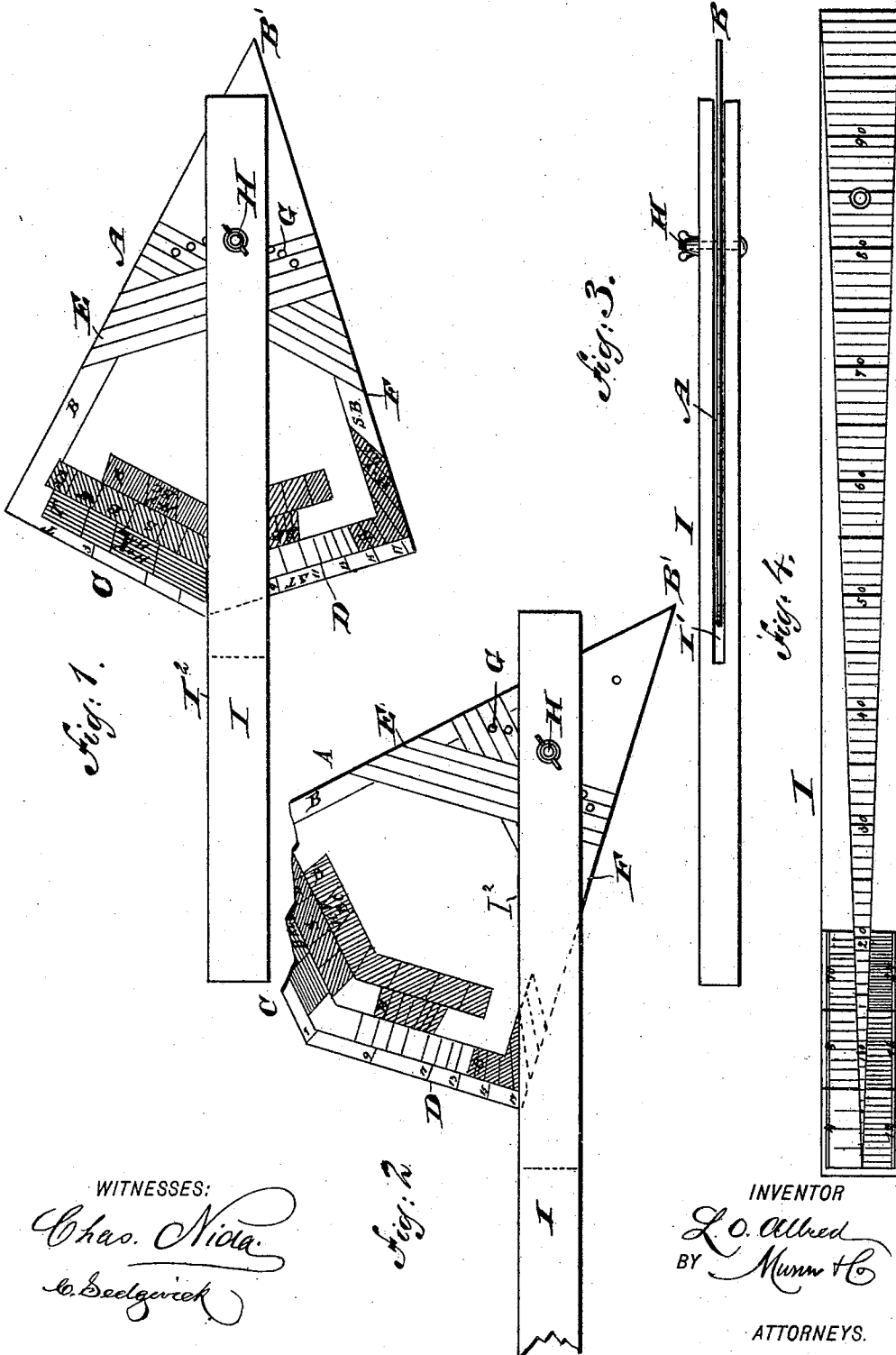
(No Model.)

3 Sheets—Sheet 1.

L. O. ALLRED.  
MEASURING AND DRAWING TOOL.

No. 496,714.

Patented May 2, 1893.



WITNESSES:

Chas. Nicola  
C. Sedgwick

INVENTOR

L. O. Allred  
BY Munn & Co

ATTORNEYS.



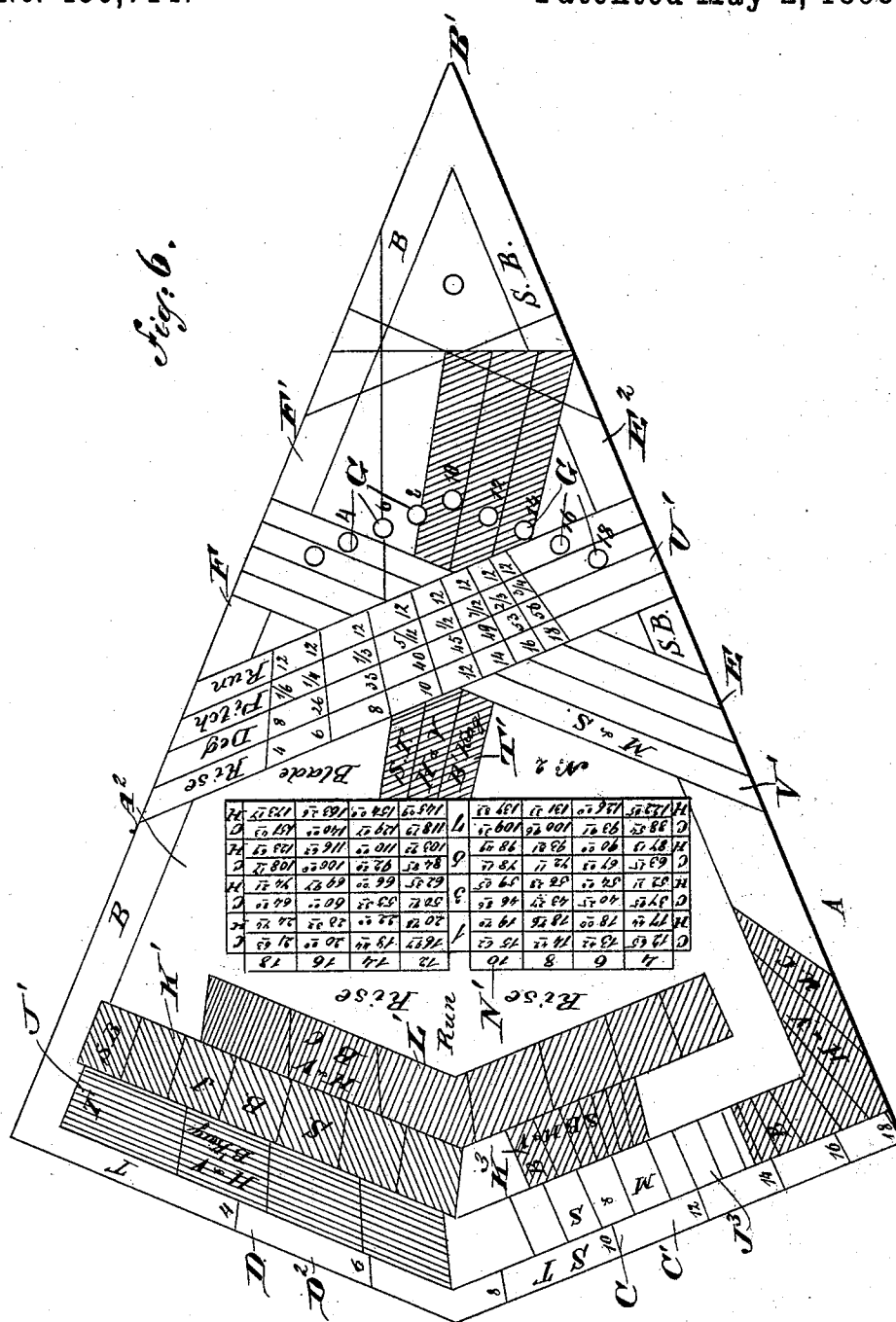
(No Model.)

3 Sheets—Sheet 3.

L. O. ALLRED.  
MEASURING AND DRAWING TOOL.

No. 496,714.

Patented May 2, 1893.



WITNESSES:

*Chas. N. Allen*  
*C. Sedgwick*

INVENTOR

*L. O. Allred*  
BY *Munn & Co*  
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# UNITED STATES PATENT OFFICE.

LEMUEL O. ALLRED, OF PALESTINE, TEXAS.

## MEASURING AND DRAWING TOOL.

SPECIFICATION forming part of Letters Patent No. 496,714, dated May 2, 1893.

Application filed September 3, 1892. Serial No. 444,960. (No model.)

*To all whom it may concern:*

Be it known that I, LEMUEL O. ALLRED, of Palestine, in the county of Anderson and State of Texas, have invented a new and Improved

Measuring and Drawing Tool, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved measuring and drawing tool, which is simple and durable in construction, readily adjusted, easily applied, and arranged for conveniently finding bevels, pitches, degrees and lengths in framing roofs, and also for other purposes.

The invention consists of a plate in the shape of an eighth of an octagon having four sides, and a straight edge pivoted on the said plate and indicating thereon.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters and numerals of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement. Fig. 2 is a like view of the same with the straight edge in a different position. Fig. 3 is a side elevation of the same. Fig. 4 is an enlarged plan view of the straight edge; and Figs. 5 and 6 are enlarged plan views of the faces of the plate.

The improved measuring and drawing tool is provided with a plate A, made in the shape of one-eighth of a regular octagon having four sides E, F, C, D, the two sides E, F, of which are of equal length intersecting at the acute angle of the plate, and the two shorter sides C, D, also of equal length intersecting at the obtuse angle of the plate, and the long and short sides forming a right angle or square at their intersections on either side of the plate.

In the plate A, near the point B', is arranged a series of apertures G adapted to be engaged by a pivot bolt H, also engaging a straight edge I formed with a slot I' for the passage of the plate A. The upper edge I<sup>2</sup> of the straight edge indicates on the various graduations and scales on the faces A' and A<sup>2</sup> of the plate A, as hereinafter more fully

described. The edges of the sides C, D and the sides E, F, have marginal lines forming margins called "blade," "sub-blade," "tongue," and "sub-tongue" and are marked B, S B, T, S T, respectively.

As shown in Fig. 5 the margin C<sup>2</sup> of the side C is marked T, indicating "tongue," with lines indicated by uneven numerals. The margin D' on the side D is marked S T, indicating "sub-tongue" and is divided by lines marked with uneven numerals. The lines on the margins C<sup>2</sup> and D' are radial from the correspondingly marked apertures G on this face A' of the plate A. The margin E' on the side E is marked B and indicates "blade," the margin F<sup>2</sup> on the side F is marked S B and indicates "sub-blade." A similar arrangement will be observed on the other face A<sup>2</sup> of the plate A, as shown in Fig. 6, in which the margin C' on the side C is marked S T, indicating "sub-tongue" and having lines marked with even numerals, the said lines being drawn from the centers of the correspondingly marked apertures G on this face of the plate A. The margin D<sup>2</sup> on the side D is marked T, indicating "tongue," and is likewise divided by lines marked with even numerals and leading from the correspondingly marked apertures G. The margin E<sup>2</sup> on the side E is marked S B, indicating "sub-blade;" and the margin F' on the side F is marked B, indicating "blade." The lines in the margins C', C<sup>2</sup>, D', D<sup>2</sup> indicate pitches, the center of which is in the center of the correspondingly numbered aperture G. Thus, the apertures G marked 3, 5, 7, 9, 11, 13, 15 and 17 on the face A' of the plate A, and the same apertures marked 4, 6, 8, 10, 12, 14, 16 and 18 on the other face A<sup>2</sup> of the plate A, are centers for sixteen regular pitches; that is, each number or center represents a roof, brace, &c., as rising this number of inches to the foot run; as, for instance, nine inch rise, thirty-seven degrees, three-eighths pitch, twelve inch run.

Next to the margin C<sup>2</sup> on the face A' of the plate A is arranged a division J marked "H & V Bkng.," meaning "hip and valley backing." A similar division J' is arranged next the margin D<sup>2</sup> on the other face A<sup>2</sup> of the plate, and a division J<sup>2</sup> is arranged alongside the margin D' and is marked "M & S," meaning

"miters and squares." A similar division J<sup>3</sup> is next the margin C', also marked "M & S," and having a like meaning.

Next the division J on the face A' of the plate A is a division K, marked "S B J," meaning "side bevel jack." A similar division K' is arranged alongside the division J'; and a division K<sup>2</sup> is arranged alongside the division J<sup>2</sup> and is marked "S B H & V," meaning "side bevel hip and valley;" and a similar division K<sup>3</sup> is arranged alongside the division J<sup>3</sup> and is likewise marked "S B H & V," having the same meaning.

Next to the divisions K, K<sup>2</sup> on the face A' is arranged the division L, and a similar division L' is arranged on the other face A<sup>2</sup> of the plate A, both divisions L and L' being marked "H & V B C," meaning "hip and valley bottom cut."

On the faces A' and A<sup>2</sup> are also arranged the tables N and N' for figuring lengths, and next to the tables are arranged the divisions T and T' respectively, marked "S T H & V Bkng," meaning "sub tongue, hip and valley backing." Other divisions U, U' are also formed on the faces A' and A<sup>2</sup> of the plate, the said divisions indicating rise, degree, pitch and run, as shown. Divisions V and V' on the faces are marked "M & S," meaning "miters and squares."

As shown in Figs. 5 and 6, the divisions J, J', K, K', K<sup>2</sup>, K<sup>3</sup>, L, L', and T, T' are section lines, the lines running parallel to corresponding edges of the plate A, so as to indicate on each edge of the plate. The angle measured is to be taken in connection with the upper face of the straight edge I. Thus, for instance, as shown in Fig. 1, the pivot H passes through the aperture G, marked 9, and by swinging the straight edge over the plate we finally bring the upper edge of the straight edge in line with an indicating line in the division J, which gives us the bevel between the side C and the top edge of the straight edge for the pitch 9, for hips and valleys, as marked in the said division.

As shown in Fig. 2, the straight edge has been swung on the plate A until its upper edge is in line with a line in the margin F<sup>2</sup>, near the side D, the angle being between the side E and the top edge I<sup>2</sup> of the straight edge I, as the cross sectional lines of this division are parallel with the said side E. One face of the straight edge I is ruled into inches, quarters, eighths, tenths, twelfths, sixteenths, twenty-fourths and hundredths, for convenience for laying off work, scaling drawings, and making calculations. The division of the inch into hundredths in the original manner shown by the scale is designed to facilitate, simplify, and render practicable, convenient and correct the use of the hundredths of inches in the tables of lengths, N and N', which are reckoned in inches and hundredths, the same as the brace measure of the steel square.

The tool can be advantageously used, in ad-

dition to what it is especially designed for, on any kind of roof, spire or brace or any kind of framing and shop-work where the ordinary bevel or try-square is used, but this tool is prepared more particularly, so far as tabulated lengths are concerned, for such number of pitches in gradations of one inch as may be included in degrees fourteen to fifty-six inclusive, or any kind of roof or brace rising three inches to the foot run, or one-eighth pitch to eighteen inches to the foot run, or three-fourths pitch.

Every pivotal point G on either face of the plate is a center from which the tool can be set and used for laying off correctly a square, square miter, octagon, octagon miter, degrees, &c.

The numbers on the tongues and sub-tongues, as well as those in the rise columns, have the same meaning as the corresponding figures at pivotal points or centers; the figures on the tongues and sub-tongues, having a greater radial scope than those in the column of rises, are the guides proper, and the tool is to be set exactly to such sub or cross line as will come nearest to, and under the proper rise figure when it is necessary to know or lay off the pitch or inclination desired.

When the tool is set for a certain pitch of roof or rafter, the blade invariably shows the bottom or lower end cut of the timber, and the tongue the upper end cut.

Roof bevels and cuts of any kind, and sufficiently correct for all purposes, provided the inclination or pitch of roof is anywhere within the limit of fourteen and fifty six degrees, can be marked off from the tool by selecting the set pitch coming nearest to the roof wanted. The sixteen regular or set pitches are represented as being correct for all lengths as well as bevels, pitches and degrees, but the tables of length will not be, other than for estimating or like purposes, so nearly exact as to justify their use outside of the set or standard pitches given, for the laying off of the net framing lengths.

Almost without exception roofs are designed by architects to rise a given number of inches to every foot of run of the rafters, or, designed to be a certain pitch as one-eighth, one-sixth, one-third, one-half, &c. This, of course, makes clear the requirements of the device in this respect, and adds to the convenience in framing and other work.

In roof-work we will now, as illustrating the ready adaptability of the bevel, suppose that the plans call for a hip and valley roof, rising nine inches to the foot or three-eighths pitch, and that the building to be roofed is thirty-eight feet wide from face to face of heel-plates, measured parallel to the run of the rafter. The bevel plate or blade of the tool is perforated on an octagon angle with as many holes (counting both sides) as there are set pitches, and these holes are centers on which to pivot the plate for such pitch or de-

gree of roof as may be required. Having pivoted the bevel plate to handle from center 9, the rise to the foot sought, the tool is ready for use in directly laying off on the work such cuts, bevels, miters, backings and lengths as may be necessary in this pitch of roof.

Example: Required the bevels and length of a hip rafter for a building thirty-eight feet wide with a roof rising nine inches to the foot, or three-eighths pitch. Having already pivoted the bevel for this degree of roof we obtain the bottom or lower end cut of the hip rafter by finding the only line in division marked H & V B C, that will come up to, and parallel with the upper edge of handle when the same is swung around to it. The lines in this division being all marked with the initial letter "B" and the division line shaded parallel to the blade indicates that from the blade must be marked off, directly on the timber or pattern, if need be, the bottom cut of all hip and valley rafters. In the same manner we find the upper end cut, but from a different division, also the side bevels of hips and valleys, jacks or cripples in the same way from divisions S. B H & V and S B, T, &c. To back or bevel the hip or valley rafter, find, with a turn of the handle or blade as before, a line in one of the two divisions marked backing, and the initials above the objective line and line-shading will show from which edge of the tool the required backing is to be obtained. To find the length of a hip rafter, for a roof as above set forth proceed as follows: One-half of thirty-eight feet equals nineteen feet, the run of a common rafter for this span of roof. The tables do not give, without addition, the length of rafter sought, hence, take from the table such number of runs as will amount in the aggregate, to nineteen feet,—in this case we take one 5, and two 7s, from the column of runs, and the lengths from the division under 9, in section "H," equally as many times and opposite the run figures.

*Example.*

| Runs.         | Inches. | Hundredths. |                                                             |
|---------------|---------|-------------|-------------------------------------------------------------|
| 5 feet        | 96      | .04         |                                                             |
| 7 feet        | 134     | .46         | Hip and valley lengths from                                 |
| 7 feet        | 134     | .46         | Sections "H," Division 9.                                   |
| Total 19 feet | 364     | .96         | 30 feet, 4-96/100 inches, the length of hip rafters sought. |

In like manner obtain the lengths of valley, common and jack rafters, collar beams, braces, &c. To obtain the lengths of common, as well as jack rafters, proceed as above with the exception that the lengths must be taken from sections "C," and these lengths must be opposite the runs used.

*The tables of length.*—On the enlarged figures 5 and 6, the tables show the rise, run and lengths. The large numerals 1, 3, 5 and 7 under the word "run" are feet, as 1 foot, 3 feet, 5 feet and 7 feet, and are intended as a basis from which the operator of the tool can pick out such run of rafter or brace as he may require. The operator may have to add,

multiply or divide these run numerals in order to obtain the run sought, as in the case of the thirty-eight foot roof illustrated in this specification. In this case one 5 and two 7s made the nineteen feet, the run sought. The numerals 3, 5, 7, 9, 11, 13, 15 and 17 on table of Fig. 5, and the 4, 6, 8, 10, 12, 14, 16 and 18 on the table of Fig. 6, simply represent the rise of the rafter or brace to the foot run, as, eight-inch rise one-third pitch, &c. The body of the tables gives the lengths, which are to be added, divided or multiplied precisely like the run figures. On both right and left of the

tables the letters 

|   |   |
|---|---|
| C | H |
| H | C |

 mean "C" for "common," and "H" for "hip."

If the "example" had required the length of a "common" rafter instead of the length of a "hip" rafter, the figures opposite 5 and 7 and in section "C" would have been required instead of the lengths in section "H." The shaded divisions are all marked with the initial letter or letters of the edge of the plate from which the work is to be marked off when the tool is set. The first division from the tongue on both faces of the plate is marked "T" on the tool, that being the initial letter of "tongue" shows that when the tool is adjusted the work must be marked off from the tongue only. This division is for the backing of "hip" and "valley" rafters. It is one of two divisions for the procuring of this particular bevel. All of the other divisions are complete in themselves, and not divided into two parts. The "mallet handle" division for the backing of "hips" and "valleys" being initialed "S, T," indicates that from the "sub-tongue" must the required backing be obtained.

There being no two lines or marks in the above mentioned divisions that are both parallel and on a line with one another, makes it impossible for the tool to be adjusted wrong when the slightest care is taken in setting. The object of the straight edge or handle is to find a line in one or the other of these divisions that will come up to and at the same time be parallel with its upper edge. It is the same with all other divisions. The cross lines in any of the divisions are intended for guides by which the upper edge of the handle or straight edge is to be set, there being only one line in each division that will come up to and parallel with the upper edge of straight edge when the said straight edge is confined to any particular aperture. The single aperture or pivotal point nearest the point "B" on either face of plate are centers by which the tool may be extended to its full limit for squaring and mitering and also for octagon faces and miters when the straight edge is properly adjusted to the lines drawn at right angles to the blade and sub-blade adjacent to the said aperture.

A square or squared miter may be obtained from the single aperture near point

"B" by swinging the straight edge around to division "M & S" adjacent to sub tongue and finding the only cross line in the said division that will come up to and parallel with the upper side of straight edge. This also applies to all other apertures with the only difference that any of the latter are centers from which to obtain squares and miters from three "M & S" divisions instead of one.

All divisions, excepting those marked "M & S" (miters and squares) are line-shaded parallel to either one or the other blades or tongues, and they indicate the edge of the plate or blade from which to obtain the angle sought.

From the tables it will be seen that the runs for both "hip" and "common" rafters are reckoned the same. This is done in order to simplify the work of taking lengths, condensing the tables, &c., and is brought about by calculating the run of "hip" or "valley" rafters at right angles to face of wall, instead of a square miter line.

To ascertain the meaning and utilize correctly the hundredths of inches, so often essential to correct measurements, take from the triangular scale of hundredths, with a sharp pair of dividers, the span or length of bar corresponding to such number of hundredths as may be required. The practical measurement thus obtained may be transferred directly to the work and added to the feet and inches already marked off, or, the same may be registered or marked off on drawings in such practicable subdivisions of the inch as may be found nearest correct by examining the ordinary scales with the dividers thus set.

The bevel should be held in the left hand with the face side of handle toward the operator while adjusting, and the plate and screw operated by the right hand.

When the tool is set or being adjusted that face of the plate containing the work sought should always face in the same direction as the face of the handle, and the objective lines or guides must invariably be found with the upper or top edge of the handle. The thumb screw is on the face, and the scales on the back of the handle.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A measuring and drawing tool provided with a plate having four sides; the two longer sides intersecting at an acute angle and the two shorter ones intersecting the longer sides at right angles and each other at an obtuse angle, substantially as described.

2. A measuring and drawing tool, comprising a plate having two long sides and two short sides, the long sides intersecting at an acute angle and the short sides intersecting the long sides at right angles and each other at an obtuse angle, and a straight edge to which the plate is pivoted, substantially as described.

3. In a measuring and drawing tool, the combination with a plate made in the shape of an eighth of an octagon and having a series of pivotal apertures, of a straight edge adapted to indicate on both faces of the said plate, and a pivot connecting the said straight edge with the said plate at one of the said apertures, substantially as shown and described.

4. A measuring and drawing tool comprising a plate in the shape of an eighth of an octagon and having a series of pivotal apertures, the faces of the said plate being provided with graduated margins and graduated devices relative to the said pivotal apertures, a straight edge having a slot for the passage of the said plate, and a pivot for connecting the said straight edge with the said plate at one of the said pivotal apertures, substantially as shown and described.

5. A measuring and drawing tool comprising a plate in the shape of an eighth of an octagon, and having a series of pivotal apertures, the faces of the said plate being provided with graduated margins and graduated devices relative to the said pivotal apertures, the said faces of the plate being also provided with tables of lengths, substantially as shown and described.

LEMUEL O. ALLRED.

Witnesses:

B. R. WALKER,  
W. F. WALKER.