Aug. 8, 1933. F. F. GRAVELL ET AL 1,921,356

STAIR BUILDING TOOL

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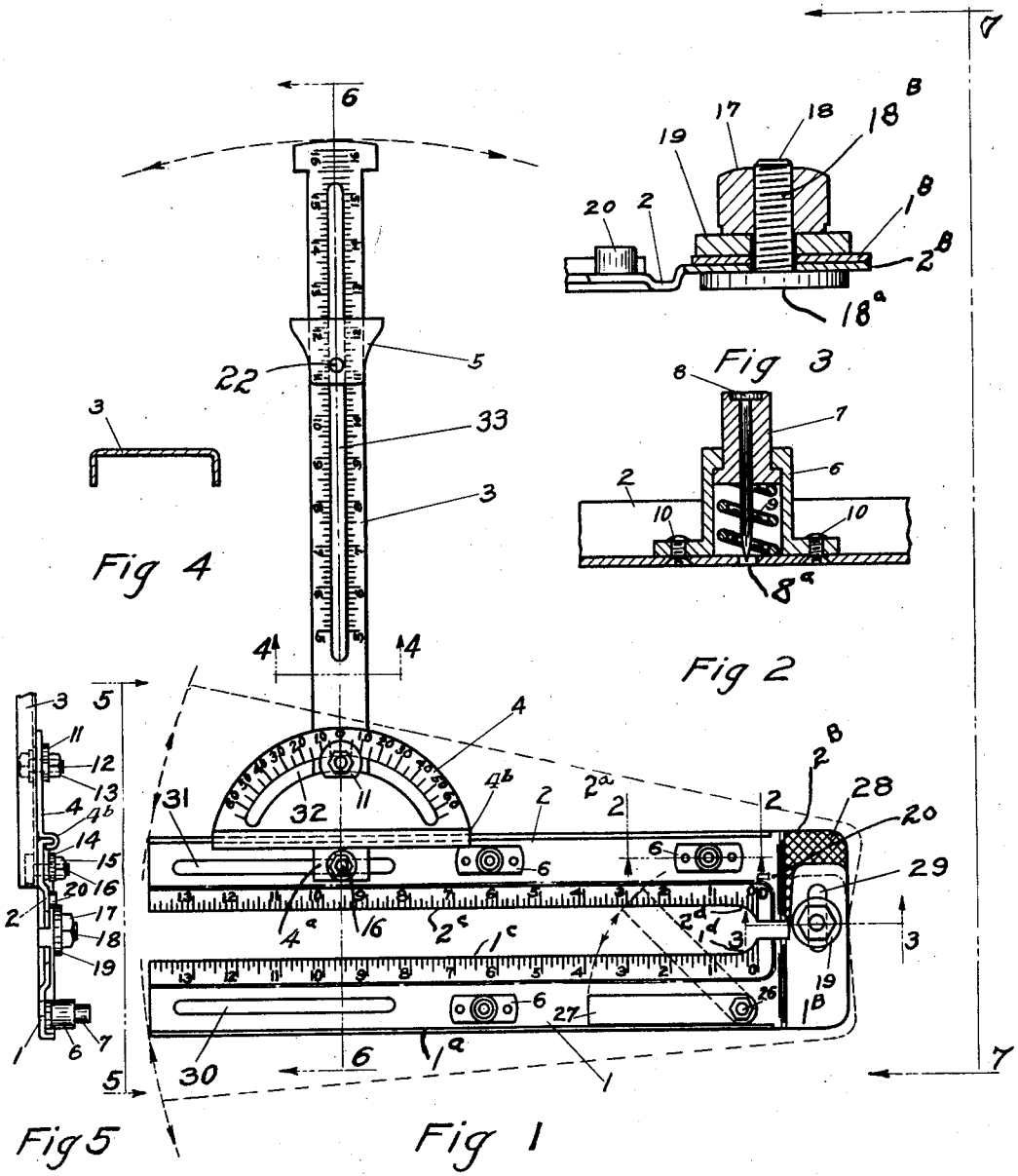


Fig 1

Fig 3

Fig 2

Fig 4

Fig 5

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Fig. 6

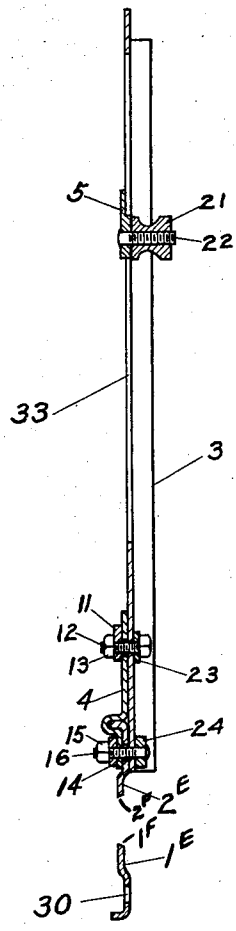


Fig. 8

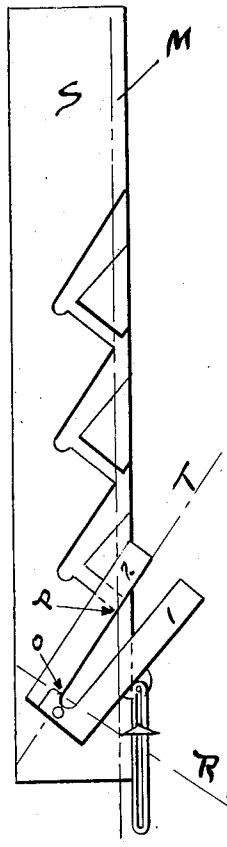


Fig. 7

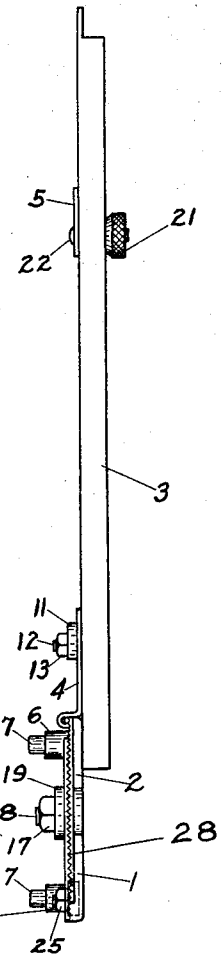
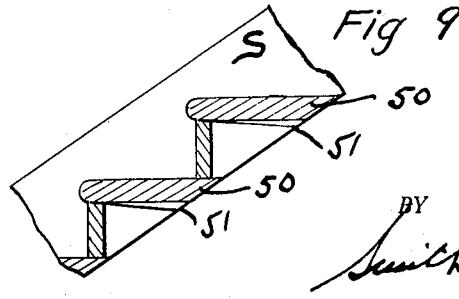


Fig 9



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UNITED STATES PATENT OFFICE

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STAIR BUILDING TOOL

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Application October 26, 1929. Serial No. 402,671

18 Claims. (Cl. 33—102)

This invention is a wood-working tool designed more particularly for use by carpenters, cabinet makers and the like for performing various operations including rabbeting, dadoing and the like. The invention has particular utility in the building of stairs.

One object of the invention is to provide a tool of the character indicated which will be simple in construction and which will enable a relatively unskilled worker to perform the more difficult operations in wood-working such as rabbeting, dadoing and the like, with all the skill and proficiency of a skilled workman.

Another object of the invention is to provide a tool of the character indicated which may be temporarily secured to the work in hand and used as a templet or guide for directing the saw, dado cutter, or similar wood-cutting tool of the workman.

Another object of the invention is to provide a tool of the character indicated which may be adjusted to the various angles and dimensions of the work at hand and which, due to its adjustability, is capable of use in a multiplicity of instances arising in the wood-working art.

These and other objects of the invention will become apparent from the following specification read in connection with the accompanying drawings wherein we have illustrated a preferred embodiment of our invention.

In the drawings:

Figure 1 is a plan view of the invention.

Fig. 2 is a fragmental sectional view taken on the line 2—2 of Fig. 1 and showing the construction of the securing pins.

Fig. 3 is a fragmental sectional view taken on the line 3—3 of Fig. 1 and showing the pivot by which the two straight edges are secured.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a fragmental side elevation of the invention as viewed from the line 5—5 of Fig. 1.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 1.

Fig. 7 is a side elevation of the invention as viewed from the line 7—7 of Fig. 1.

Fig. 8 is a diagrammatic view showing the manner in which the tool is used for cutting the rabbets in the stringer of a stair case.

Fig. 9 is a fragmental sectional view showing a portion of a stringer with the stair treads and risers fitted therein.

Referring more particularly to the accompanying drawings wherein like reference numerals designate like parts throughout, it will be noted that the invention comprises two straight-edge elements numbered 1 and 2, respectively, and an adjustable angle gauge numbered 3. The two straight edge elements 1 and 2 are generally L-shaped and are secured together with the foot portions 1^B and 2^B, respectively, in overlying superposed relation. The members 1 and 2 are connected together for relative adjustment by a sliding pivot comprising a bolt 18 suitably anchored on the member 2 and extending through a slot 29 formed in the foot portion 1^B of the member 1. The bolt 18 is threaded as at 18^B and is provided at the opposite extremity with an enlarged head 18^a. In order to accommodate the head 18^a between the member 2 and the surface supporting the tool, the foot portions 1^B and 2^B are preferably upset at 2, as shown in Fig. 3. The bolt 18 is further provided with a knurled nut 17 by which the members 1 and 2 may be secured in an adjusted position, and the inner contacting surfaces of the foot portions 1^B and 2^B of the members 1 and 2, respectively, are roughened or serrated as shown at 28 in order to obtain a more rigid securement of the members 1 and 2 when the nut 17 is tightened. A washer 19 is interposed between the nut 17 and the upper surface of the foot portion 1^B to prevent disturbing the members during tightening of the nut.

The angle gauge 3 is designed for adjustable attachment to either the straight-edge 1 or the straight-edge 2. As shown in Fig. 1, the gauge 3 is secured to the straight-edge 2 by a bolt member 16. For the purposes of adjustability the straight-edge 2 is provided with an elongated slot 31 and the lower extremity of the gauge 3 is apertured, the bolt member 16 passing through the end of the gauge and the slot in the straight-edge 2. An angle plate 4 is arranged to overlie the gauge 3 and the straight-edge member 2, and in order to insure a substantial and rigid joint between these members, the plate 4 carries an extension 4^a, which is apertured, the bolt 16 passing through said aperture in the plate, and the gauge, straight-edge, and plate being adjustably secured by a nut 15 threaded onto bolt 16, a washer 14 being interposed between the nut 15 and the surface of the extension 4^a.

The gauge member 3 is preferably channel-shaped in cross section as shown in Fig. 4 for imparting rigidity thereto and said member is provided with a central elongated slot 33 in which is slidingly mounted an auxiliary gauge or marker 5 arranged to be secured in an adjusted position

thereon by means of a clamping nut and bolt, numbered 21 and 22 respectively.

The plate 4 is arranged to slide longitudinally upon the straight-edge member to which it is secured and to guide the plate in its movement, the straight-edge member is provided with an upturned edge or flange 2^a. The flange is received within a groove 4^b formed in the plate 4 and extending transversely across the same. The groove is shown as being formed by beading or crimping the material or stock from which the plate is made, but obviously the same result may be obtained in other ways. As thus described the plate 4 and gauge 3 have sliding engagement with the straight-edge 2, while the gauge also has pivotal movement with respect to both the plate and gauge. The plate 4 is preferably fashioned in the form of an angle gauge and to this end a circular arc concentric with the pivot bolt 16 is provided as at 32. As shown this arc is in the form of an arcuate slot, one edge of which is graduated in angular degrees. A clamping bolt 12, carried by the gauge 3, is arranged to move in the slot 32, said bolt being threaded and provided with a nut 13 whereby the gauge may be secured to the plate in an adjusted angular position. A washer 11 is provided on the bolt 12 between the nut and plate, in order to facilitate this operation. This construction not only provides means for measuring or for indicating the angle formed between the straight-edge member and the gauge 3 but insures a far more substantial and rigid tool, due to the fact that the plate 4 functions as a tie plate or gusset between the gauge and straight-edge.

For the purpose of securing the tool in place upon a piece of work, the straight-edge elements 1 and 2 are provided with a plurality of spring retracted pins 8, which, as shown in Fig. 3, are provided with head members 7, said pins and heads being mounted within cylindrical cup-shaped members 6 which are secured to the members 1 and 2 by suitable screws or rivets 10. The pins are retained in a retracted position by means of coiled springs 9 positioned within the cup-shaped members 6 and arranged to bear upon the heads 7 for the purpose of maintaining the points of the pins retracted beyond the outer surface of the straight-edges 1 and 2. The straight-edges, of course, are perforated or apertured as at 8^a to permit the passage of the pins therethrough. In operation, when the tool has been adjusted to the proper position, the heads of the pins are struck a light blow with a hammer which forces the pin into the work piece to secure the tool in place. The friction between the pins and the work piece is normally greater than the force of the spring 9 tending to withdraw the pins 20 so that the pins maintain the tool in position until manually released. It is to be noted that the means provided for securing the tool to the work does not interfere in any way with making the adjustments of the plate 4, gauge 3 or gauge 5.

As shown in Fig. 1, the straight-edge members 1 and 2 are provided with straight-edges 1^c and 2^c respectively which are arranged in opposition, facing each other and together defining an open ended slot, the lateral dimensions of which may be varied by the sliding pivot connection of the members 1 and 2. Near the pivot end of the members 1 and 2 the respective straight-edges 1^c and 2^c are provided with arcuate wing portions 1^d and 2^d which together form a curved or rounded inner end for the slot defined by the members 1 and 2. This construction enables the cutting of rabbets or dadoes designed to receive round nose stair treads.

It will be noted from an inspection of Fig. 5 that the arcuate wing portions $1d$, $2d$ are arranged in abutting relation with respect to each other so that when the straight-edge members are adjusted toward each other, said portions $1d$, $2d$ function as abutting shoulders to define the limit of approach of said straight-edge members with respect to each other.

An auxiliary means is provided to enable one to cut square nose rabbets or dadoes, said means comprising a bar 27 pivotally mounted at 26 to the straight-edge 1 and arranged to normally occupy a position as shown in full lines in Fig. 1, but movable at will to a position overlying the arcuate wing portions 1^d and 2^d and abutting a limiting stop 29. In this position the contour of the end wall of the slot formed by the straight-edges 1 and 2 is straight so that when the tool is used as hereinafter described a square nose dado may be cut.

The tool as thus described may be made of any suitable material such as steel, brass, or the like and in order to enhance the utility of the tool as a whole, the straight-edges 1^c and 2^c, and the edges of the slot 33 in the gauge 5 are preferably graduated in suitable units of length.

As the tool forming the subject matter of this invention is designed more particularly for use in building stairs, the manner in which the tool may be used for this purpose will now be described. Referring to Fig. 8, S represents a stringer from which it is desired to cut one cheek of a pair of stairs. The first operation in this connection is to scribe upon the stringer S the so-called margin line M and to lay off on the stringer with the line M as a base the so-called riser and tread lines indicated by the reference characters R and T respectively. The lines R and T are drawn without the use of the tool being described and represent the rise and tread of a single step. The distance along the line R from the margin line M to the point of intersection between the lines R and T represents the rise of a given step while the length of the line T between the margin line M and the point of intersection between the lines R and T represents the width or depth of a given tread. The lines R and T having been drawn as indicated the tool is laid upon the stringer S in the manner indicated with the straight-edge 2 coinciding with the line T. Inasmuch as the rounded edge of a tread is in excess of its given dimension of width, the straight-edge element 2 is initially positioned on the line T drawn on the stringer S so that the portion of the straight-edge between the points O and P defines the depth or width of the tread. The pivot bolt 8 is then loosened and the straight-edge 1 is adjusted with respect to the straight-edge 2 in the following manner. In building stairs it is customary for the builder to obtain ready cut treads of a desired thickness from a mill and these treads are furnished to order together with certain wedge elements which are fitted beneath the stair treads to insure a tight fit of the treads within the cheeks of the stair case. The manner in which the treads and wedges are arranged in the finished stair case is shown in Fig. 9 wherein the treads are indicated by the reference character 50 and the wedge elements are indicated by the reference numeral 51. In adjusting the straight-edge 1 with respect to the straight-edge 2 a stair tread and a wedge element are fitted

endwise against the stringer and into the space between the straight-edges 1 and 2 with the exposed or tread surface of the tread next to and coinciding with the edge of the straight-edge element 2. The straight-edge element 1 is then adjusted until it coincides and is in snug engagement with the wedge element on the bottom side thereof, the element 1 for the purposes of this adjustment being moved angularly and bodily about the pivot bolt 18. When the element 1 has been properly adjusted in the manner described the pivot bolt 18 is tightened by the knurled nut 17. During the adjustment just outlined the rounded edge of the stair tread fits within the rounded end of the slot formed by the arcuate portions 1^d and 2^d of two straight-edge elements 1 and 2. The straight-edge elements 1 and 2 having been thus adjusted are secured in position upon the stringer by driving the pins 8 into the wood as outlined hereinbefore. The gauge element 3 is now adjusted into a position in engagement with the side edge of the stringer S and secured in such position by tightening the bolts 12 and 16. The slide 5 is then moved to coincide with the point of intersection between the lines R and M and is secured in this position.

With the tool in this position any form of suitable cutting tool either manually operated or power operated may be worked within the slot formed between the straight-edge elements 1 and 2 using said edges as a tool rest or guide and the stringer S thus rabbeted or dadoed to the proper depth. Where a round nosed tread is being used the rounded end of the dado is preferably made by the use of a suitable gouge. In order to facilitate the use of power driven cutters, saws and the like in the manner just indicated, the straight-edges 1^c and 2^c of the straight-edge elements 1 and 2 are preferably upset above the plane of the tool as clearly shown at 1^E and 2^E in Fig. 6. Furthermore, these edges are preferably beveled away from the upper surface thereof as indicated at 1^F and 2^F in order to define a knife edge for the slot. In this manner the edges of the slot are raised above the plane of the work in order to provide a clearance for the cutting tool. This arrangement not only enables the dado or rabbet to be cut with extreme accuracy but also prevents dulling the edge of the tool by contact with the edge of the slot. A very effective way of cutting the rabbets for stair treads is by the use of a hand operated saw with a depth gauge attachment of conventional design.

After the tread rabbet has been cut in the manner indicated the tool is moved along the stringer until the slide element 5 of the gauge 3 coincides with the point of intersection between the line T and the margin line M and the tool is secured in this position with the gauge element 3 in snug contact with the edge of the stringer. The tool having been thus positioned is in the proper place to cut the rabbet for the succeeding stair tread and the treads are successively cut in the manner indicated. Obviously the tool may be successively used for successive treads without readjustment and this enables a very rapid and accurate laying out and cutting of the stair treads with a considerable saving of time and by relatively unskilled workmen.

In cutting the cheek for the opposite side of the stair case the gauge element 3 with its associated angle plate 4 is removed from the straight-edge element 2 and secured to the straight-edge element 1 in a similar manner. For enabling this interchange of the gauge member 3 and plate 4, the straight-edge element 1 is provided with an elongated slot 30 and an upstanding edge flange 1^a similar in all respects to the slot 31 and to flange 2^a of the straight-edge element 2.

When it is desired to cut a stair stringer for treads having a square nose in place of a round nose, the adjustable bar 27 may be swung from the position shown in Fig. 1 to a position in which it lies transverse to the slot formed between the elements 1 and 2 and abutting against the stop element 20. In this position the curved end wall of the slot is obstructed by said bar and the straight edge of the bar provides the slot with a straight end wall. For cutting treads of this type the end of the dado may be cut by a chisel in an obvious manner.

Having thus described our invention it is apparent that we have devised a tool which may be used not only as a templet or pattern for laying out stair cases and rabbets of all kinds but the tool is capable also of being secured to the work to serve as a guide element for guiding the cutting tool of the workman whether the tool be a manually operated one or a power operated tool. Also, due to the raised and beveled edges on the straight-edge elements, all possibility of dulling the tool due to injurious contact of the tool with the straight-edge elements is precluded. It is also to be noted that by providing the straight-edge elements 1 and 2 with a slotted pivot, these members may be moved bodily with respect to each other as well as angularly whereby they may be adjusted to accommodate any given tread with its associated wedge. This is of extreme importance when it is understood that no uniform practice prevails with respect to the size or given taper of a wedge that is used with stair treads and that ordinarily these tapers have to be calculated by the workmen for each individual job.

It is further to be noted that by constructing the gauge member 3 of channel-shaped stock this member is rendered substantially rigid and this feature together with the manner in which it is secured to the straight-edge, namely by the adjustable angle plate 4 having the inverted U-shaped runner or groove engaging over the upturned edge of the straight-edge element renders an extremely rigid and substantial construction. The channel in the back of the gauge 5 also serves as a convenient housing for the heads 23 and 24 of the clamping bolts 12 and 16 respectively.

It is further to be noted that the surface of the tool which is placed in contact with the work during the use of the tool is free from obstructions which would normally tend to interfere with the efficient use of the tool.

In conclusion it is to be understood that while we have chosen to describe and illustrate a preferred embodiment of our invention, such description and illustrations are but for the purpose of example and not to define the limits of our invention which are to be determined from the scope of the appended claims.

Having thus described our invention, what we claim is:

1. A tool of the character described comprising a straight-edge member, an angle gauge, means pivotally and slidably connecting the gauge and straight-edge member, an angle plate overlying the gauge and straight-edge member, said angle plate being apertured coincidentally with the pivot point of the gauge, said gauge pivot passing through the aperture of the angle plate and means associated with said pivot for securing the

gauge in an adjusted position longitudinally of the straight-edge member, the angle plate having an arcuate edge concentric to the gauge pivot and at a substantial distance therefrom, and means remote from said gauge pivot associated with the gauge and plate for securing said members in adjusted angular positions of the gauge.

2. A tool of the character described comprising a straight-edge member, a gauge pivotally and slidably mounted thereon, an angle plate overlying the gauge and provided with an upstanding open bead at one edge thereof defining a groove opening onto the underside of the plate, an upstanding edge on the straight-edge member and engaged in the groove, said groove and upstanding edge being dimensioned to dispose the plate and straight-edge member in substantially coplanar relation, and means connecting the plate, gauge and straight-edge member together for relative adjustment the gauge being provided with a longitudinal side flange extending below the plane of the straight-edge member and angle plate.

3. A tool of the character described comprising a pair of straight-edge members, each of said members being provided with a straight-edge portion, said straight-edge members being normally disposed with the straight-edge portions thereof in opposed spaced relation, means for relatively adjusting said members laterally to conform to a desired stair tread rabbet, said means including means to secure said members in angularly adjusted position, a single angle gauge for defining the tread rise when operatively associated with one of said straight-edge members, and means for adjustably mounting said gauge on either of said straight-edge members whereby the tool may be used for scribing the stair tread rabbets on either of the risers of a stair case.

4. A tool of the character described comprising a pair of straight-edge members connected for relative adjustment by a slidable pivot, each of said straight-edge members being provided with an upstanding flange, an angle plate provided with means for operative association with the flange of either straight-edge member, an angle gauge arranged for operative association with the plate and either straight-edge, and means for securing the parts in operative position on either straight-edge member.

5. A tool of the character described comprising a pair of straight-edge members connected for relative adjustment by a slidable pivot, an angle gauge pivotally and slidingly mountable on either straight-edge member, an angle plate slidingly mountable on either straight-edge member, means for securing said gauge, plate, and straight-edge members in adjusted positions, and an auxiliary gauge adjustably mounted on the first mentioned gauge and movable to positions a greater or lesser distance from the pivotal center of said first mentioned gauge.

6. A tool of the character described comprising a pair of straight-edge members connected for relative adjustment by a slidable pivot, an angle gauge movably mounted upon a straight-edge member and adjustable toward and away from the pivot point of the straight-edge members and also angularly adjustable about its point of connection with the straight-edge member, an auxiliary gauge mounted on the first mentioned gauge and movable to and from the point of connection of the first mentioned gauge and the straight edge member, means for securing the several parts in adjusted positions and means for interchangeably associating the gauge with either straight-edge member.

7. A tool of the character described comprising a pair of straight-edge members pivotally connected for relative adjustment, the straight-edges of said members being arranged in opposed relation and upset above the general plane of the tool, said straight-edge members adjacent the pivotal connection being provided with arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members.

8. A tool of the character described comprising a pair of straight-edge members pivotally connected for relative adjustment, the straight-edges of said members being arranged in opposed relation and upset above the general plane of the tool, said straight-edge members adjacent the pivotal connection being provided with arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members, one of said straight-edge members being slotted adjacent the pivotal connection whereby to permit lateral separation of said members.

9. A tool of the character described comprising a pair of straight-edge members pivotally connected for relative adjustment, the straight-edges of said members being arranged in opposed relation and upset above the general plane of the tool, said straight-edge members adjacent the pivotal connection being provided with arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members, and a bar movable at will to a position to overlie said arcuate wing portions whereby to define a straight end wall for the slot formed between the straight-edge members.

10. A tool of the character described comprising a pair of straight-edge members pivotally connected for relative adjustment, the straight-edges of said members being arranged in opposed relation facing one another and upset above the general plane of the tool, said straight-edge members adjacent the pivotal connection being provided with arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members, a bar pivotally mounted on one straight-edge member and normally occupying a position entirely within the confines thereof, said bar being movable at will to a position overlying the arcuate wing portions of both straight-edge members, and a stop member defining said position of the bar whereby to form a straight end wall for the slot between the two straight-edge members.

11. A tool of the character described comprising a pair of straight-edge members, means pivotally connecting said members for relative adjustment, the pivotal connection between said members being laterally offset with respect to the straight-edge portions thereof whereby said straight-edges are arranged in opposed spaced relation, said straight-edge members adjacent the pivotal connection being provided with complemental arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members.

12. A tool of the character described comprising a pair of straight-edge members, means pivotally connecting said members for relative adjustment, the pivotal connection between said members being laterally offset with respect to the

straight-edge portions thereof whereby said straight-edges are arranged in opposed spaced relation, said straight-edge members adjacent the pivotal connection being provided with complemental arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members, one of said straight-edge members being slotted adjacent the pivotal connection whereby to permit lateral separation of said members.

13. A tool of the character described comprising a pair of straight-edge members, means pivotally connecting said members for relative adjustment, the pivotal connection between said members being laterally offset with respect to the straight-edge portions thereof whereby said straight-edges are arranged in opposed spaced relation, said straight-edge members adjacent the pivotal connection being provided with complemental arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members, and a bar mounted on one of the straight-edge members and movable at will to a position to overlie said arcuate wing portions whereby to define a straight end wall for the slot formed between the straight-edge members.

14. A tool of the character described comprising a pair of straight-edge members, means pivotally connecting said members for relative adjustment, the pivotal connection between said members being laterally offset with respect to the straight-edge portions thereof whereby said straight edges are arranged in opposed spaced relation, said straight-edge members adjacent the pivotal connection being provided with complemental arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members, and a bar mounted on one of the straight-edge members and movable at will to a position to overlie said arcuate wing portions whereby to define a straight end wall for the slot formed between the straight-edge members, one of said straight-edge members being slotted adjacent the pivotal connection whereby to permit lateral separation of said members.

15. A tool of the character described comprising a pair of straight-edge members, means pivotally connecting said members for relative adjustment, the pivotal connection between said members being laterally offset with respect to the straight-edge portions thereof whereby said straight-edges are arranged in opposed spaced relation and upset above the general plane of the tool, said straight-edge members adjacent the pivotal connection being provided with complemental arcuate wing portions forming a substantially semi-circular extremity for the slot defined by the straight-edge members, a bar pivotally mounted on one straight-edge member and normally occupying a position entirely within the confines thereof, said bar being movable at will to a position overlying the arcuate wing portions of both straight-edge members, and a stop member defining said position of the bar whereby to form a straight end wall for the slot between the two straight-edge members, one of said straight-edge members being slotted adjacent the pivotal connection whereby to permit lateral separation of said members.

16. A tool of the character described comprising a pair of straight-edge members, a laterally extending foot portion carried by each of said members, each of said foot portions being apertured, said straight-edge members being arranged with the straight-edge portions thereof lying in opposed relation with the foot portions in superposed relation and the apertures thereof alined, a pivot member extending through the alined apertures, and means associated with said pivot member for permitting angular adjustment of the straight-edge members, said straight-edge members being provided with opposed stop shoulders positioned with respect to said pivot member to define the limit of approach of said straight-edge members with respect to each other.

17. A tool of the character described comprising a pair of straight-edge members, a laterally extending foot portion carried by each of said members, each of said foot portions being apertured, said straight-edge members being arranged with the straight-edge portions thereof lying in opposed relation with the foot portions in superposed relation and the apertures thereof alined, a pivot member extending through the alined apertures, means associated with said pivot member for permitting angular adjustment of the straight-edge members, and opposed stop shoulders carried by the straight-edge members adjacent the pivot members and offset inwardly with respect to the straight-edge portions of said straight-edge members whereby to maintain said straight-edge portions of the straight-edge members spaced throughout the length thereof.

18. A tool of the character described comprising a pair of straight-edge members, each of said members being provided with a pivot receiving aperture offset laterally with respect to the straight-edge portion of said straight-edge members, and a pivot pin passing through said apertures, at least one of said pivot receiving apertures being elongated whereby the straight-edge members may be laterally adjusted relative to each other to conform to a given stair tread rabbet, the space between said opposed straight-edge members being free and unobstructed from end to end.

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