Oct. 19, 1965 F. J. BACHMANN ETAL 3,212,192

MEASURING INSTRUMENT

Filed May 6, 1963

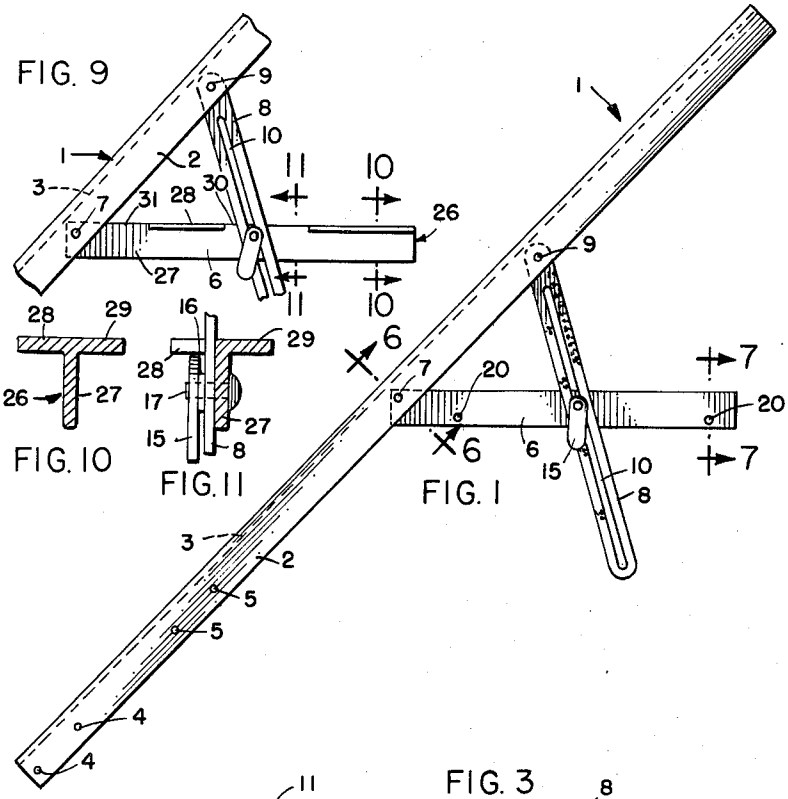

FIG. 1

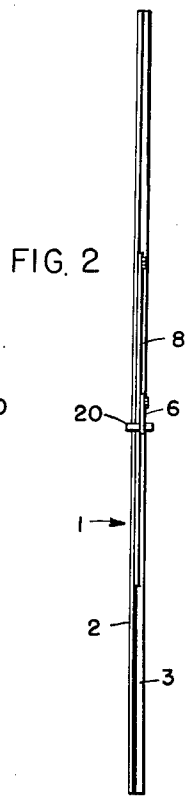

FIG. 2

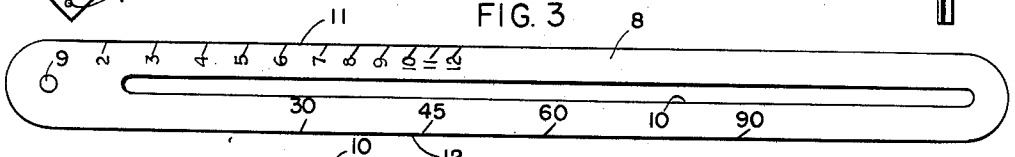

FIG. 3

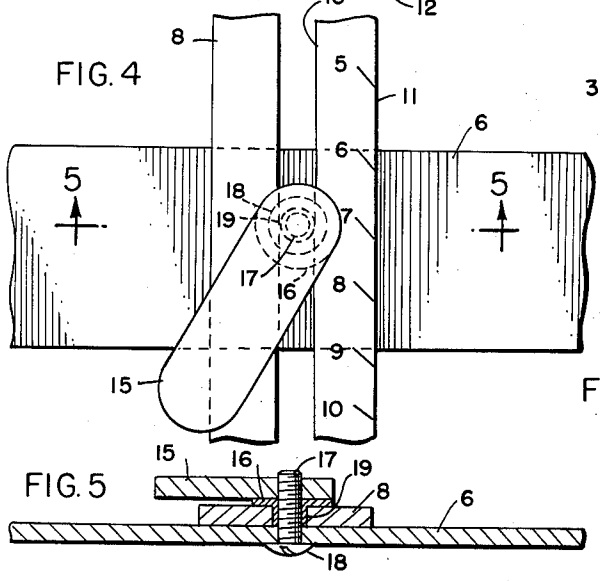

FIG. 4

FIG. 5

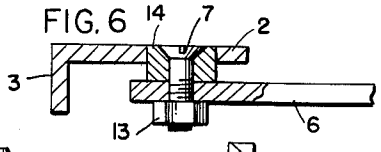

FIG. 6

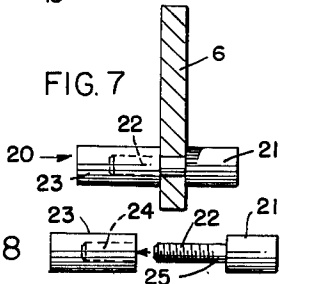

FIG. 7

FIG. 8

FIG. 9

FIG. 10

FIG. 11

INVENTOR:
FRANK J. BACHMANN
W. THOMAS ATKINSON
BY Maryall, Johnston, Cook & Root
ATT'YS

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MEASURING INSTRUMENT

Frank J. Bachmann, 1819 W. Thomas Atkinson, Inverness Countryside, Palatine, Ill.

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This invention, in general, relates to improvements in measuring instruments useful in the building trades and, more particularly, has reference to improvements in protractor-saw guide combinations.

One of the problems, of which I have become acutely aware, in residential construction is that of obtaining a good fit between the edge of boards, siding, aluminum siding, etc., in the gabled area of a house, garage, etc., and the underside of the gabled roof. The siding fitted into the gabled area must be cut at each end thereof at an acute angle to the longitudinal axis of the siding, which angle corresponds with the pitch or slope of the underside of the roof itself or structural members or trim attached thereto.

The tools of the invention are constructed so as to provide accurate measurements or settings for marking or cutting lines on structural siding, roof rafters, or other angularly cut like members. One of its structural features relates to the provision of guide means on the tool by which it can be properly positioned without change of setting of the tool upon flopping over of the tool to mark saw lines or serve as a saw guide for cuts made with the rear face of a piece of siding or other structural member facing upwardly.

The tools of the invention are designed to provide an accurate and quick guide for cutting or marking materials. The tool comprises an L-shaped (in cross-section) member, called a straight edge, which may have several pairs of pivot holes in which are mounted pivot means for a base leg and adjustable arm pivotally mounted on the blade. The adjustable arm may have graduated markings along one edge indicating degree settings and on the other edge roof pitch settings. When these marks are lined up with an edge of the base leg, they read directly either degree or roof pitches. The base leg has appropriately positioned holes to receive a pivot screw and a locking lever screw. It further has gauge or guide means projecting sidewardly therefrom.

The tools also have a specially designed locking lever which permits locking of the blade, base leg, and adjustable arm in various positions. The gauge or guide means projecting from opposite sides of the base leg allows the use of the tool in fully reversible positions and are so positioned and designed as to make this tool particularly suited for use as a measuring, marking and cutting guide for siding. The gauge or guide means may be at least two spaced pins mounted on the base leg or may be elongated, straight legs projecting from the sides of the base leg. The length of the pins and width of the elongated legs are selected in the light of problems confronted when using the tool as a guide in cutting siding, e.g., aluminum siding. The gauge or guide means near the straight edge should be shallow enough so that they do not interfere with the motor of a power saw when a power saw is guided by the instruments of the invention. A locking lever bushing is employed so as to control the side clearance in the adjustable arm slot, thereby providing a minimum side movement, affording greater accuracy when using the graduated markings. The pivot screws mounted through the blade are of the flat head type and are threaded into the base leg and adjustable arm and locked in position with nuts so that the countersink contact may be adjusted at any time to compensate for wear, thereby eliminating looseness and maintaining a high degree of accuracy in the tool.

Specific, preferred embodiments of the invention are shown in the drawings wherein:

FIG. 1 is a top plan view of a combination protractor-saw guide;

FIG. 2 is an end elevation thereof;

FIG. 3 is an enlarged top plan view of the adjustable arm;

FIG. 4 is a fragmentary, enlarged top plan view of the structure for releasably locking the adjustable arm and base leg;

FIG. 5 is a section taken on section **5—5** of FIG. 4;

FIGS. 6 and 7 are sections taken on sections **6—6** and **7—7**, respectively, of FIG. 1;

FIG. 8 is an exploded view in side elevation of a guide pin used in the illustrated embodiment; and

FIG. 9 is a fragmentary view in side elevation of another embodiment while FIGS. 10 and 11 are sectional views taken on sections **10—10** and **11—11**, respectively, of FIG. 9.

Referring to the drawing, the instrument or tool illustrated therein comprises a long straight edge **1** which is L-shaped in cross section. The straight edge **1** has a leg **2** and a leg **3** at right angles to the first-mentioned leg, i.e., a right angle bar. The leg **2** has located thereon a plurality of pivot holes **4**, **5**, the holes of hole pairs **4**, **5** being spaced equidistant from each other at any desired point along the length of the leg **2**. The pivot holes **4**, **5**, i.e., any pair thereof, may be used to pivotally mount a base leg **6** by means of a screw **7** and an adjustable arm by means of a screw **9**, respectively, on the blade.

The adjustable arm **8** is a flat, elongated arm having a longitudinal slot **10** therein. The opposite, longitudinal edges **11**, **12** of the arm **8** have provided therealong, respectively, markings corresponding to the pitch number for roofs and degree indications or markings which can be used to set the tool of the invention at indicated roof pitches or at varying degrees of inclinations between the base leg **6** and the straight edge **1**. The degree markings or indications may be provided at any degree inclination, the markings at 30°, 45°, 60° and 90° in FIG. 3 being for the purpose of illustrating such markings. Additional markings may be provided if desired. The marking lines are slanted so that they lie parallel with the upper edge of base leg **6** in each respective angular setting of the tool.

The detail of the pivot screw mounting of the base leg **6** on the straight edge **1** is shown in FIG. 6. The pivot screw **7** extends through the leg **2** of the straight edge **1** and also is threadedly mounted in the base leg **6**. It is tightly secured on the base leg **6** by means of a nut **13** threaded thereon. The screw **7** preferably is a flat head screw having a tapered head. The tapered head may be mounted in a pivot bushing **14** having a countersunk axial hole providing tapered surface against which the head of the screw **7** is rotatably seated. The bushing **14** provides a clearance between the base leg **6** and the leg **2** of the straight edge **1** into which the adjustable arm **8** will fit when the instrument is collapsed for storage or shipping.

The straight edge **1** and the base leg **6** can be pivoted to any desired degree of angular inclination within the limits of travel of the arm **8**, the longitudinal slot **10** of which is slidably mounted with relation to the slide pin or element mounted on the base leg **6**. The straight edge **1**, base leg **6**, and arm **8** may be locked in any adjusted position by the use of a locking arm **15** which is threadedly mounted on the end of the screw **17**. The screw **17** is threadedly mounted in the base leg **6** with its head **18** lying flat against base leg **6**. A flanged bushing **16** is fitted snugly on the shank of screw **17**. The bushing **16** is slidably mounted in the slot **10** of the adjustable

arm **8** with its cylindrical segment **19** in close clearance with reference to the side walls of the slot **10**. The purpose of the bushing is to provide a substantially wobble-free fit between the bushing and the slot.

When the arm **15** is threaded onto the screw **17**, it draws together in frictional, locking relationship, the base leg **6** and the adjustable arm **8** to lock these members in fixed relationship. When the arm **15** is threaded off the screw **17**, the frictional contact between the base leg **6** and arm **8** is sufficiently loose so that the members can slide with relation to each other to set the base leg **6** and the straight edge **1** in a different angular relationship.

One of the features of the invention which enables the tool of FIGS. 1–8 to be used to mark either the front face or the back face of a piece of siding or the like is the provision on the base leg **6** of at least two pins **20** which are carefully positioned on the base leg **6** at equal distances from the bottom or top edge of the base leg **6**. These pins **20** extend from both faces or sides of the base leg **6** and may be used as gauge or guide pins against which is positioned one of the edges of the siding or the like. The gauge or guide pins **20** may comprise, for example, a cylindrical pin segment **21** having an axial threaded shank **22**. The shank **22** may be a full thread shank which is threadedly fitted in a carefully positioned tapped hole provided in the base leg **6**. Alternatively, the portion **25** of shank **22** next to the pin segment **21** may be unthreaded, as shown in FIGS. 7 and 8. The portion **25** is snugly fitted in an untapped hole in the base leg **6**. A cap pin portion, i.e., a cylindrical pin portion **23** having a centrally tapped hole **24**, is threadedly mounted over the portion of the threaded shank **22** extending through the base leg **26**. This structure provides pin segments **21, 23** extending from both faces or sides of the base leg **6**. Thus, when the tool is used in the marking of siding on the front face thereof, e.g., with the tool positioned in the orientation shown in FIGURE 1, the pin portions **21** serve as the gauge or guide pins which are seated against the edges of the siding or the like. Pins **20** may also be solid pins driven through holes in the base leg so as to project from both sides thereof.

When the back face or rear face of the siding is to be marked or sawed, the carpenter's tool of the invention is flopped 180° from the position shown in FIGURE 1, in which case the portions **23** of the pin **20** serve as the gauge or guide pins which are positioned against the edge of the siding to be marked or sawed.

In FIGS. 9–11, there is shown another embodiment for the base leg wherein elongated legs projecting from opposite sides of the base leg are the functional equivalents of the gauge pins heretofore described. The base leg **26** of FIGS. 9–11 comprises an elongated bar **27** and two elongated legs **28, 29** extending outwardly from opposite sides of the bar **27**. The base leg in transverse cross-section may be T-shaped as shown in FIGS. 9–11, inverted T-shaped, in the shape of a cross, or the like. The legs **28, 29** provide on opposite sides of the base leg guide or gauge surfaces to be laid against the edge of siding, a board, etc., when the instrument is used for measuring a roof pitch angle, for marking a saw cut line or as a saw guide. The leg **29** is used as the gauge or guide means for orienting the instrument properly on the material to be cut or marked or against installed siding in measuring roof pitch when the instrument is laid thereon in the position shown in FIG. 9. When the instrument is flopped over, the leg **28** serves as the gauge or guide means.

The leg **28** is cut away at sections designated **30** and **31** in FIG. 9 so that the bar **27** may lie flat against the leg **2** of the straight edge **1** and the adjustable arm **8**. The cut-away sections **30, 31** are of sufficient length so that the leg **28** does not interfere, over the degree of angular adjustability desired for the instrument, with angular movement of the base leg **26** relative to straight edge **1**, with the angular-sliding movement of the adjustable arm **8** relative to base leg **26**, and with pivotal movement of locking lever **15**.

As the tools are shown in the drawing, they are set up for marking or acting as a saw guide for siding or the like. They are set to the angle required by lining up the gauge or guide means with a horizontal or vertical member on the building or placing said means against siding or the like, swinging the straight edge around to conform to the roof pitch or surface that is to be fitted, then locking the tool in this position by tightening the locking lever. The tool may be held against the material to be cut on either the front or reverse side of said material. The material to be cut may then be marked by drawing a line along the straight edge and freehand cutting with a saw, or the tool may be set in this position and a power saw may be guided along the edge of the straight edge, making a direct cut without marking.

The construction of the tools allows cutting from the reverse side of the material, due to the unique design. This reverse side cutting has been found necessary particularly when cutting aluminum siding. When using a power saw it has been found practical to cut from the reverse side of the material so as not to rip out the face edge. When using a conventional type protractor it becomes necessary to read the setting in degrees and then to subtract this setting from 90 degrees, reset the protractor and then mark on the reverse side; or with certain small protractors, none of which permits the use of the tool as a saw guide, to make a short mark, and extend the mark through the use of a separate straight edged member. Needless to say, this type of marking is far less accurate and consumes considerably more time.

By using the pair of pivot holes which will give the straight edge the longest extension above the base leg, the tool can be used to work in tight corners and also as a large adjustable square for cutting wide sheets of paneling, etc. The use of the tool in this manner permits taking quick, accurate measurements of the pitch of a floor or ceiling when fitting paneling to a wall or around windows. The use of the roof pitch graduations on the tool provides a fast and accurate means of marking rafters for roof construction.

It is thought that the invention and its numerous attendant advantages will be fully understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the form herein disclosed being a preferred embodiment for the purpose of illustrating the invention.

The invention is hereby claimed as follows:

A protractor-saw guide comprising a saw-guide member which is an elongated, angle bar composed of two elongated legs at right angles to each other, an elongated base member including an elongated base bar, one of said elongated legs having a series of longitudinally spaced apertures therethrough, means removably and pivotally mounting said one end of said elongated base bar in a selected one of said apertures with said base bar lying parallel with said one of said legs, said one of said legs having a second series of apertures therethrough with respective apertures of said second series spaced at predetermined distances from respective apertures of said first-mentioned series, a flat, elongated arm with an elongated slot therein, means removably and pivotally mounting one end of said arm in a selected one of said second series of apertures with said arm lying parallel with said one of said legs, the slotted portion of said elongated arm crossing said elongated bar of said base member, thereby providing a triangulated orientation between said saw-guide member, said base member and said arm, a cylindrical bushing with an axial aperture extending through said bushing, the cylindrical, outer wall of said bushing being positioned in close clearance in said elongated slot for guiding the sliding and pivoting movement of said arm

relative to said base member when said saw-guide member is pivoted relative to said base member, a fastener member having a threaded shank extending through said elongated bar of said base member and said axial aperture of said bushing, said threaded shank being snugly fitted in said axial aperture, the threaded, outer end of said shank projecting beyond an axial end of said bushing, a flange on said axial end of said bushing, a locking member having a threaded hole threaded on said outer end of said shank and adapted to be threaded tightly against said flange for releasably locking said saw-guide member, said arm, and said base member in various relative angulations of said saw-guide and base members, and a pair of pin members mounted on said base member at longitudinally spaced positions thereon, each pin member having axially aligned pin portions projecting from opposite sides of said base member, whereby respective pin portions on either side of base member are adapted to serve as abuttable projections for orienting said protractor-saw guide against an edge of a board to be marked or sawed.

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ISSAC LISANN, *Primary Examiner.*