Dec. 16, 1930. J. NICKELS 1,785,044

UNIVERSAL RAFTER FRAMING MACHINE

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FIG. 3

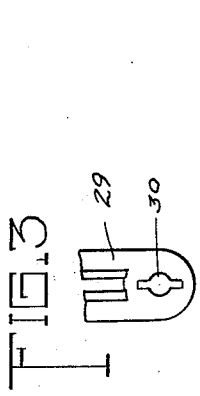
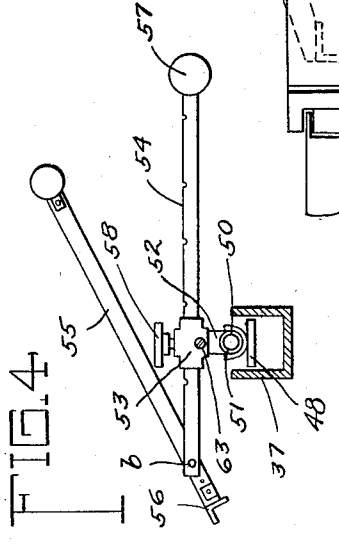


FIG. 1

FIG. 4



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Dec. 16, 1930. J. NICKELS 1,785,044

UNIVERSAL RAFTER FRAMING MACHINE

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FIG. 2

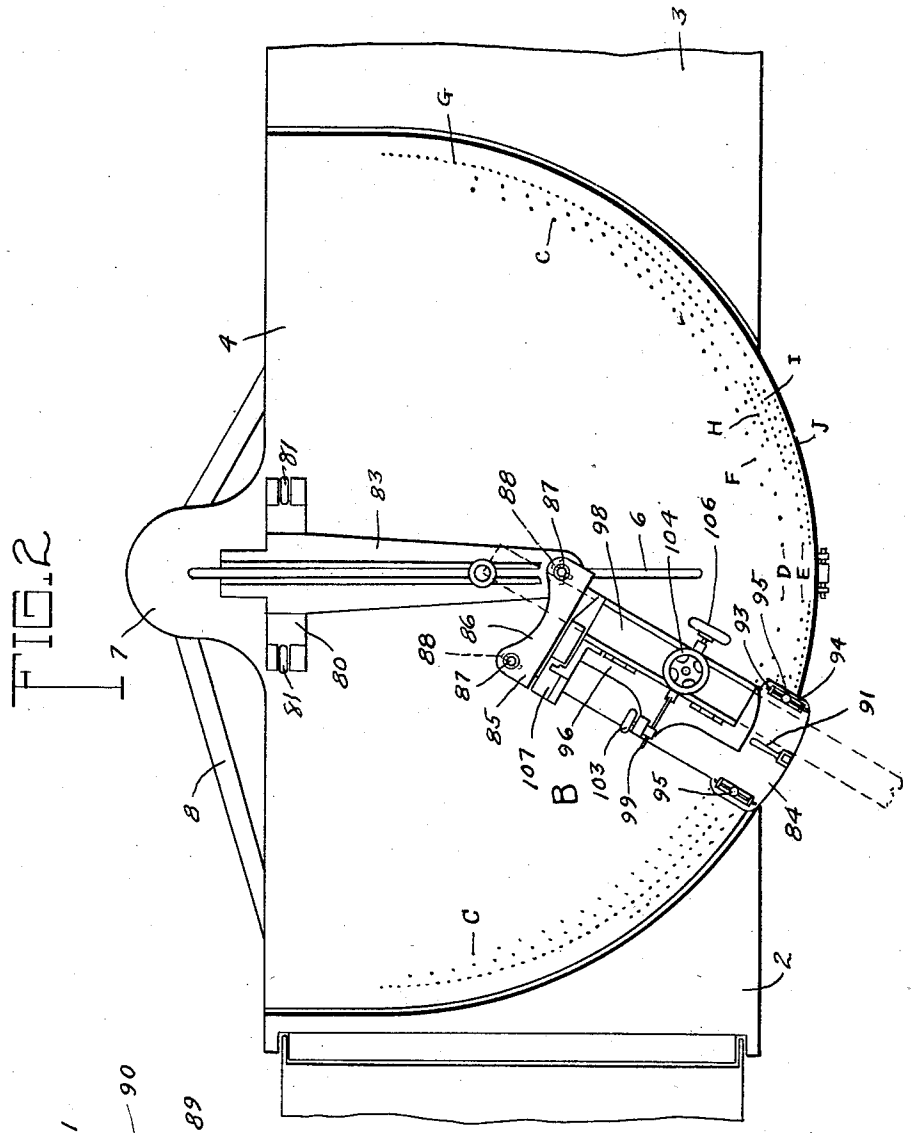
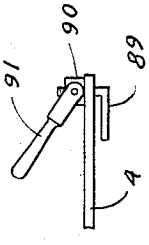


FIG. 5



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UNIVERSAL RAFTER FRAMING MACHINE

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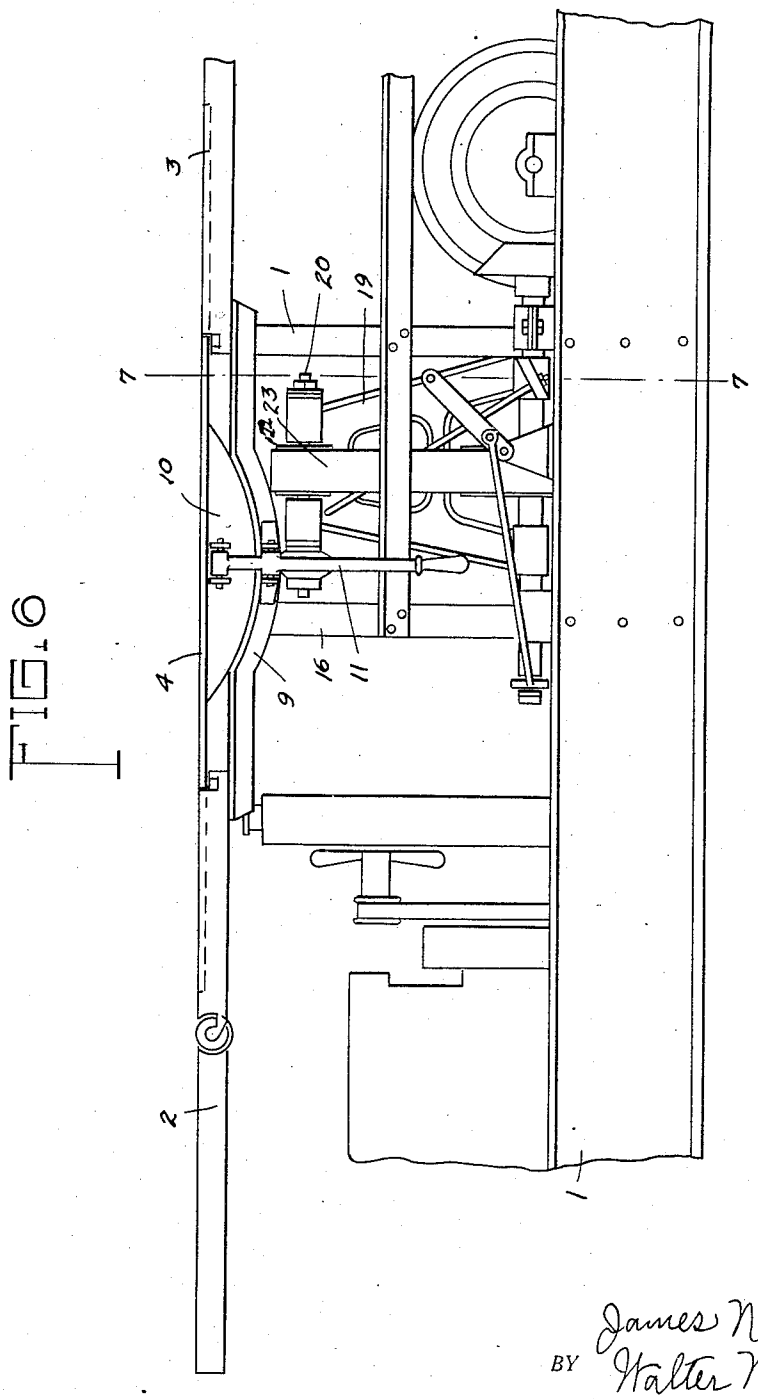


FIG. 6

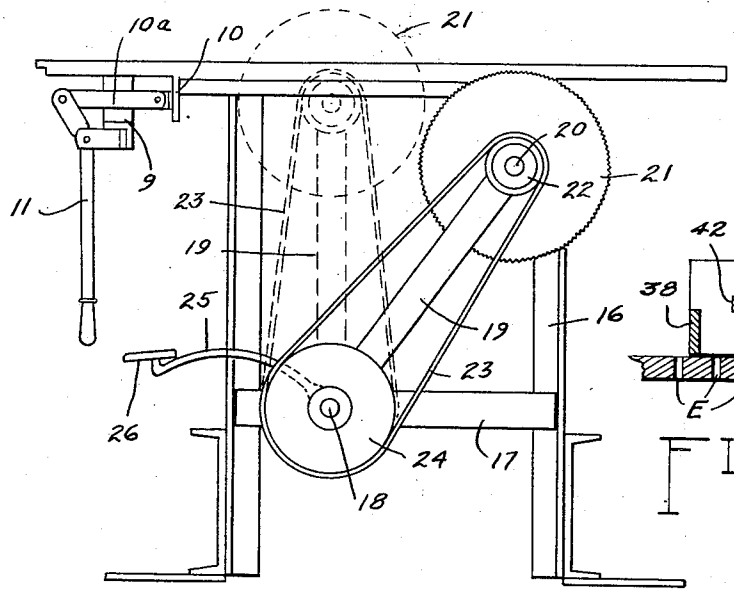
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Dec. 16, 1930. J. NICKELS 1,785,044

UNIVERSAL RAFTER FRAMING MACHINE

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FIG. 7



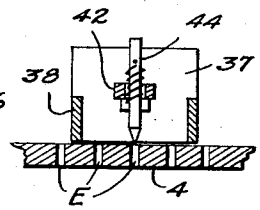


FIG. 14

FIG. 9

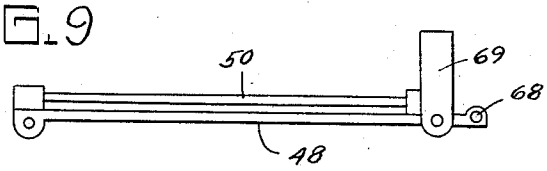


FIG. 8

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UNIVERSAL RAFTER FRAMING MACHINE

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FIG.10

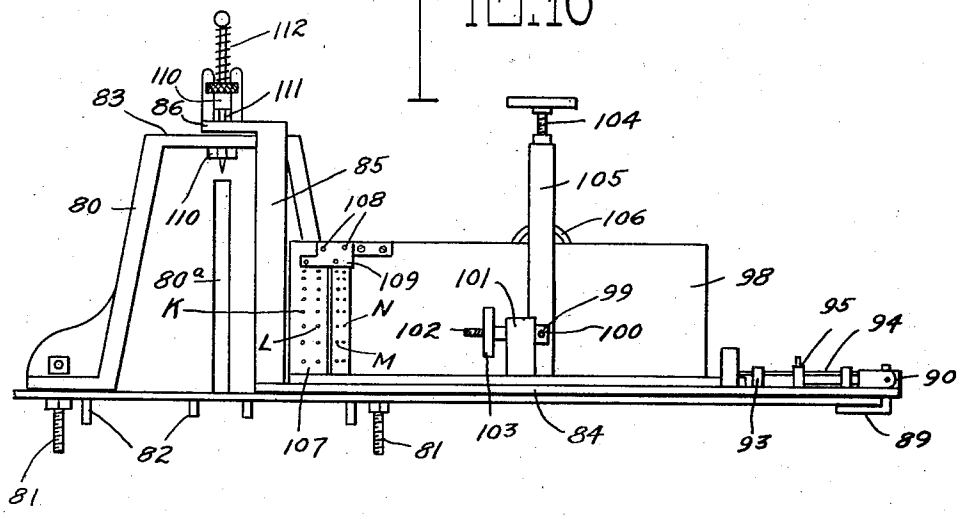


FIG.11

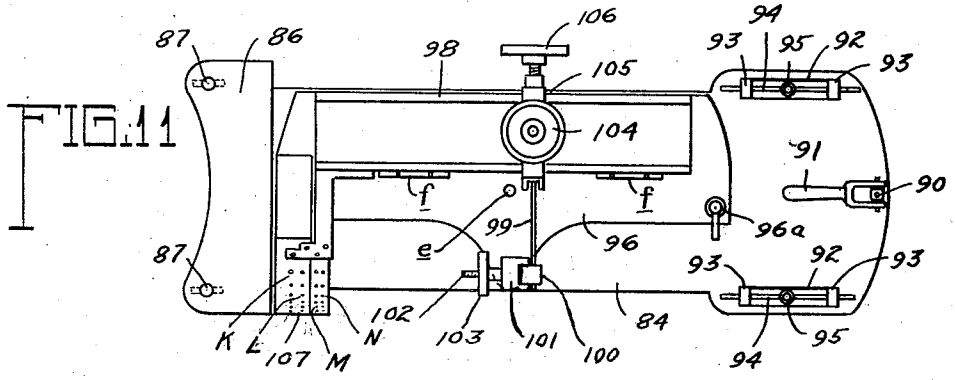


FIG.12

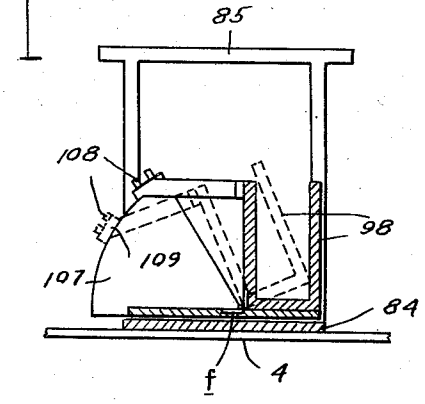
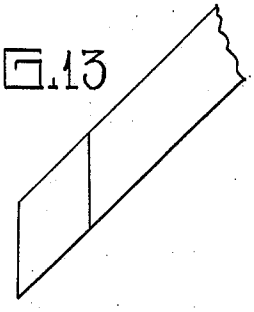


FIG.13



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UNITED STATES PATENT OFFICE

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UNIVERSAL RAFTER-FRAMING MACHINE

Application filed January 21, 1927. Serial No. 162,483.

My invention has reference to a universal rafter framing machine, and has for its purpose to provide a simple and efficient means for making all regular and irregular side and end cuts, such as common rafter foot cuts, hip and valley rafter foot cuts, hip and valley rafter side cuts, jack rafter side cuts, octagon hip rafter and octagon jack rafter cuts, and others. The machine is designed as a part of a portable machine, in which are incorporated other mechanisms, but the drawings in the present case are limited to that part of the machine which is used in shaping the ends of the rafters, the same as the same would appear if held in a stationary position.

The machine comprises a frame-work and main table or bench, on which is supported a work-table or dial, the front of which is of a semi-circular form, having a slot on a central radial line through which a swingingly mounted circular saw operates. The arcuate edges of the dial are provided with series of perforations forming scales with suitable markings to indicate the proper positioning of one or other of a pair of gages to be used therewith, and by means of which the pieces of timber are presented to the saw in proper position for being cut. Said gages are capable of being used interchangeably, one thereof being used for making one class of cuts, and the other for those of another class, as will be hereinafter more fully pointed out. Saws of different diameters are also made use of therewith.

The construction and arrangement of the machine is such that an unskilled person can quickly determine the proper position of a framing piece with reference to the saw, and clamp the same in such position. While using the hands for steadying the piece he can then operate the saw by means of foot actuated mechanism specially provided therefor. The work table is also slidably mounted and provided with means for moving the same with reference to the saw, so that in the case of some rafter pieces which are not entirely severed by the action of the saw the work can be completed by the movement of the work-table toward the rear.

The purpose and character of the invention will be more fully understood from the following specification, taken in connection with the accompanying drawings, in which;—

Fig. 1 is a plan view of the invention, with the gage A mounted for operation thereon.

Fig. 2 is a similar view, with the gage B shown in operative position.

Fig. 3 is a detail of the end of the arm 29.

Fig. 4 is a detail of the rafter clamping devices of the gage A.

Fig. 5 is a detail of the outer end of the gage B.

Fig. 6 shows the machine in front elevation.

Fig. 7 is a cross-section on the line 7—7 of Fig. 6.

Fig. 8 is a side elevation of the gage A, with the rafter support thereof held in an inclined position.

Fig. 9 is a detached view of the rafter support.

Fig. 10 is a side elevation of the gage B and parts associated therewith.

Fig. 11 is a plan view thereof.

Fig. 12 is an end view of said gage B, partly in cross-section.

Fig. 13 shows the end of a framing piece with a combination end and side cut thereon.

Fig. 14 is a cross-section through the extension 38 and bar 42.

The reference number 1 indicates a frame, upon which is supported a pair of table sections 2 and 3, the ends of which are spaced apart from each other, and mounted thereon above such space is a work table or dial 4, provided on its lower face with guides 5, (shown in broken lines), which are slidable on the edges of the sections 2 and 3. The dial is preferably formed of metal, and is supported so that the upper face thereof will be flush with the faces of the sections 2 and 3. Centrally of the dial 4 is a saw-slot 6, which is projected rearwardly into an extension 7 of the dial. At their rear edges the sections 2 and 3 are united by a brace 8, and at their front edges by a brace 9, curved downwardly as shown in Fig. 6. The ends of the brace 8 are also connected with the upper ends

of the rear posts of the frame 1, upon which the sections 2 and 3 rest.

Fixed to the lower face of the dial 4 is a cross-plate 10, connected by a link 10^a with the upper end of a hand-lever 11, fulcrumed to the brace 9, and extending downwardly therefrom. By moving the handle of said lever forwardly the dial 4 is moved rearwardly a few inches, sufficiently to complete the cutting of a board that is supported on the dial. A pair of contractile coiled springs 12 are connected forwardly to the brace 9 and rearwardly to clips 13 on the lower face of the dial, by means of which said dial is held normally in its forward position, and returned thereto after having been moved rearwardly.

Beneath the dial 4 is an auxiliary frame 16, having a pair of cross-pieces 17 in which is rotatably mounted a shaft 18, on which is swingingly supported a frame 19, in the upper end of which is journalled a shaft 20. Fixed on one end of the shaft 20 is a circular saw 21, in line with the slot 6, so as to move upwardly therein upon the frame 19 being properly rocked. Secured to the other end of the shaft 20 is a pulley 22, connected by a belt 23 with a pulley 24 on the shaft 18, to which power may be applied in any suitable manner for the purpose of rotating the same. Projected outwardly from the frame 19 is a lever 25, provided at its outer end with a pedal 26, by means of which the saw frame and saw can be moved forwardly, a portion of the upper part of the saw passing thru the slot 6 and cutting the material positioned thereon. Upon removing the foot from the pedal the saw drops rearwardly and downwardly out of the way.

In Fig. 1 of the drawings is shown the dial 4 and the gage A in its relation thereto when being used therewith. This gage is held swingingly in position on the dial by means of a bracket 28, provided with an arm 29, in the end of which is a key-hole slot 30, for engagement by one of a pair of bolts 31 and 32 in a plate 33 projected from the head 34 of the gage. The ends of said bolts are shaped similarly to the slot 30 and are passed thru the same when the gage is positioned immediately over the saw-slot. A movement of the gage to either side of the slot operates to lock the same from release, and the same can be readily detached by turning the gage back to its original position. The gage A is designed more specially for making common cuts on the ends of rafters, for cutting hip and valley, octagon hip rafters, and the like.

The bracket 28 is secured to the dial 4 by means of a pair of bolts 35, and the proper positioning of said bracket is further assured by dowel pins 36, projecting downwardly from the bracket and entering openings in the dial.

Besides the parts of the gage above mentioned, it embodies a channel-plate box 37, with which is connected the head 34. At the other end of the box is a plate 38 forming an extension thereof, and the arc of movement of the end of which is concentric with that of the edge of the dial 4. The sides of the box 37 form parallel straight-edges and are in line with the bolts 31 and 32, and when either of said bolts is connected with the arm 29 it serves as a pivot upon which the gage can swing in a horizontal plane. The plate 38 projects beyond the edge of the dial 4 and is capable of being attached thereto by means of a clamp-bolt 39, the end of which is beneath the dial. The upper end of the bolt 39 is threaded to receive a hand-nut 39^a, between which and the plate 38 is a sleeve 40. Upon operating the hand-nut in the proper direction the hooked end of the bolt is drawn tightly against the lower face of the dial, holding the box 37 from movement.

The plate 38 is of rectangular formation, and supported by the end plates thereof, on a level with the top of the plate, is a bar 42, on the sides of which are spaces 43, said bar containing a series of spring-controlled push-pins 44, the lower ends of which are adapted for selective engagement with perforations arranged in arcuate series C, D, E, and F in the dial 4. Said pins are four in number, one for each of said series, and each of said series is properly identified on the face of the dial, in a manner not shown on the drawings on account of the reduced size thereof. For example, the series D has the notation "Com. rafter foot cut", and the push-pin for that series has a letter C or other marking on its end, to correspond therewith. The particular manner in which the gage is set will be more fully described hereinafter. The various perforations are also identified by numbers or other insignia, so that the several insignia, form scales which may be read by the operator, to determine the proper positioning of the gage. These readings can be made thru the openings 43 in the outer end of the gage. Additional push-pins 46 are provided at the sides of said openings, for use in setting the gage for making polygon cuts and others.

In making common cuts on the ends of rafters the piece of timber is held against the side of the box 37 of the gage, as shown at 47 in Fig. 1. The gage is also provided with a plate 48, having a pivotal connection with the head 34 of the gage by means of a thumb-screw 49 passing thru the parallel side-plates of said head, and thru an opening in the inner end of the plate 48. Supported above said plate is a rod 50 upon which is slidably and rockingly mounted a sleeve 51, from which projects upwardly a stem 52, see Fig. 4, on which is rotatably supported a guide 53. Slidable in said guide is a bar 54, to one end

of which is pivoted a hand-lever 55, as at *b*. Pivoted to one end of said hand-lever is an angle-plate shoe 56, which adapts itself to the corner of the framing-piece that is being cut, and holds the same rigidly against the gage. While held in this position the saw 21 is swung upwardly by means of the foot-lever 25, cutting a piece of wood from the end of the board 47. The bar 54 can be held in adjusted position by means of a hand-screw 58 in the upper part of the guide 53, and engageable with notches in the upper edge of the bar 54. These notches can be regularly spaced to form a gauge with differences in inches or fractions thereof, corresponding with the width of a piece of timber held against the box 37, and the bar 54 set accordingly.

By way of illustration, the rafter is properly positioned with relation to the saw in the following manner:—Assuming that the rafter is to have an 8 inch rise, the clamp-bolt 39 is first loosened, permitting the gage to move freely on its pivot. The push-pin 44 that is marked for a common rafter cut is then brought into register with the marking "8" in the series of holes designated for the common rafters (such marking not being referred to in the drawings). The clamp-bolt is again tightened and the timber clamped against the side of the gage-box, ready for cutting. The bar 54 is also provided with a scale on its face, with markings to indicate the proper location of said bar for holding rafters of different widths. The end of said bar is also provided with a weight 57, for tipping the opposite end of said bar and the lever 55 upwardly out of the way of the timber when it is being placed in position or removed.

In the same manner if a roof board is to be cut for a hip roof with a given amount of rise, the pin 44 marked to indicate roof boards is moved on the corresponding scale to the desired number, and the gage set in that position. A protractor scale is also marked on the face of the dial at G, with markings to indicate the degrees of a circle. The 45 degree marking on this scale will coincide with the 12 inch rise marking on the common scale.

Slidable vertically in the bolt 31 is a needle-pin 60 (see Fig. 8), provided with a knob 61 on its upper end, and held normally in elevated position by a coiled spring 62 thereon. When the end of the timber has been marked for cutting the pin 60 is forced downwardly until its point is near such timber, such point being in line with the saw. If the mark on the timber is not in proper position the timber is adjusted in position until it is thus located. The cut of the saw will then be made along the line of the marking.

It will be noted that when the gage A is positioned on the right half of the dial a left side cut is made, and for making a cut on the opposite side the gage is transferred to the other side of the saw slot. To do this the pivot point is changed to the bolt 32, and the piece to be cut is held against the opposite side of the box 37. To assist in this the position of the bar 54 is reversed, such bar being held in its adjusted positions by means of a set-screw 63, in the part 53. The series of openings for engagement by the push-pins are duplicated on the side of the dial to which the gage is transferred.

For making combination cuts on the end of a rafter it is necessary to not only hold the rafter at an angle with the saw, but in an inclined position with reference thereto. To accomplish this a pair of plates 65 are pivoted on the inner faces of the side-plates of the box 37, said plates being provided with series of holes to receive a thumb-screw 67, which also passes thru an opening 68 in the outer end of the plate 48. The end of the plate can thereby be held in elevated position, with said plate sloping toward the saw slot. Projected upwardly from the outer end of the plate 48 are a pair of vertical arms 69, the outer faces of which are in the same plane with the outer faces of the box 37, and the rounded lower ends of which fit into recesses 70 in the upper edges of the side-plates when the plate 48 is in fully lowered position. In the lower end of each of the arms 69 is an opening to receive a thumb-screw 71, having a large head 72, preferably of hexagonal form, and a body portion which serves as a rest for a framing piece that is being presented to the saw with the head 72 against the outer face of the framing piece and holding the same. A similar thumb-screw 73 is adapted for insertion in one of a series of holes 74 in the head 34 of the box, said thumb-screw also providing a support for the framing piece with the head of the screw against the timber.

The holes 66 are given a spacing corresponding with the desired amount of elevation to be given to the outer end of the framing piece, and with proper markings therefor, so that it can be determined at a glance at what height the piece should be held. The same is true of the holes 74, the holes in one row alternating with those in the other row, and determining the amount of elevation of the inner end of the timber. When the plate 48 is at its lowest point with the thumb-screw 71 in place, a piece of timber would be supported thereon with a one inch rise, and each additional adjustment of said plate upwardly would add another inch rise thereto. The same is the case with the adjustment of the thumb-screw 73.

By way of illustration of the use of the parts just described, if it is desired to cut what is known as a cripple dormer rafter, which rests directly on the roof boards, if the roof has a 12 inch rise and the dormer a 6 inch rise, the gage A is set with the push-pin for the common rafter at the hole 12 in the com-

mon rafter series. The thumb-screw 67 is then inserted in the opening in one of the plates 65 which is sixth from the bottom, and which would be numbered 6, then thru the opening 68 and into the opening six in the other plate 65. This establishes the position of the plate 48. The rests 71 and 73 are then placed in position, and the piece to be cut supported thereon, with the lower corner just above the saw slot 6. The timber is then clamped in place by the lever 55, which follows the movement of the plate 48, and, the gage having been again clamped to the dial, the piece is ready for cutting. The end of a piece of timber which has received both an end cut and side cut in the one operation is shown in Fig. 13. The lever support being slidable on the rod 50 makes it possible to position said support most conveniently for holding the piece that is being cut.

When the common cuts only are being made the plate 48 is held securely in its lowest position in the top of the box 37 by means of a hand-screw 76 in said plate, the threaded end of which enters a similarly treaded opening in a boss 77 in the lower part of the box. The head 34 is also provided with series of openings in the opposite plates thereof, in which the screws 73 can be held for half inch rises on dormer rafters. The plates 65 can also be provided with rows of alternating openings for making half or quarter inch rises.

It will be understood that the adjustments of the plate 48 can be made on either side of the gage, and the timbers similarly supported on either side thereof, depending upon which side of the dial the gage is positioned.

The gage B is designed for use in cutting jack rafters and other timbers where it is desired to tip the piece with relation to the saw, instead of inclining it as in the former case. This gage is shorter than the gage A, and has a longer support, the pivotal point thereof being ten inches farther from the rear edge of the dial 4 than that of the gage A, in a machine of standard build. The support comprises a bracket 80, secured to the dial 4 at the rear end of the slot 6 by means of bolts 81, and similarly held in position by dowels as on the other bracket 28. Extending forwardly is an arm 83 for attachment of the gage. Said gage B comprises a base 84, at one end of which is an arch 85, at the upper part of which is a plate 86, provided with a pair of pivots 87, to enter an opening 88 in the end of the arm 83. The pivots and opening are of a form corresponding with that of the bolts 31 and 32 and opening in the arm 29, and are similarly operated.

In the outer end of the base 84 are a pair of openings 92, at the ends of which are bearings 93 in which are slidably held small rods 94, each of which carries a push-pin 95, similar to the push-pins 44. Series of holes are also provided for the pins 95, as indicated at H, I, and J, said series being interposed between the first-named series of perforations, and having arcs concentric therewith.

It will be evident that the radius of movement of the outer end of the gage B is shorter than that of the gage A, and that it would not be possible to accommodate a stationary pin in the end of the gage B to a series of openings on an arc similar to that of the series of openings used for the gage A. The discrepancy is overcome, however, by the radial adjustment of the pins 95, enabling them to be engaged with any of the openings in the last-named series. These series are also duplicated on the opposite sides of the saw slot, and are properly indicated on the face of the dial. On account of the more restricted movement of the gage B, as compared with that of the gage A, the field occupied by said last-named series of holes is quite limited. In Fig. 2 the gage B is shown arranged for right side cuts, it being understood that it can also be transferred to the right hand side of the machine for making left side cuts by changing the pivotal connection to the other one of the pivots 87. In either arrangement the push-pin 95 in line with the pivot is the one that is made use of in positioning the gage.

Supported on the base 84 is a plate 96, with a pivotal connection with said base as at *e*, and held from movement by a pin 96ª, locking the end of the plate to the base. Carried by the plate 96 is a rafter holder 98, hinged to said plate as at *f*, so as to be capable of being tipped inwardly, as shown in broken lines in Fig. 12. Said holder is held in such adjusted position by means of a rod 99, having a pivotal connection with the inner plate of the holder 98, and connected with a keeper 100 which is vertically slidable in a channel in a post 101 supported on the plate 96. The keeper is locked in adjusted positions by a threaded stem 102 and thumb-nut 103 thereon.

A two-by-four or other piece of framing lumber is placed in the holder 98 with its end projecting thru the arch 85, in position to be cut by the saw; which for use with the gage B must be of greater diameter than that used with the gage A, the last-named saw being preferably a twelve inch one, and the one used with the gage B a twenty inch one. The piece of timber is held securely in place by a hand-screw 104 in a frame 105 above the holder 98, and by a similar hand-screw 106 in the outer plate of said holder. The side-bars of the frame 105 are rigidly connected with the side-plates of the holder 98, on the outer faces thereof.

The degree of angle of the piece of timber toward the saw is determined as in the former case, by loosening the bolt 89, engaging the

pin 95 with the proper hole in the dial and again tightening the bolt. The degree of inclination of the holder 98 is determined by means of a quadrant 107 supported on the base 84, and provided with series of openings K, L, M, and N, which are engageable by push-pins 108 on a follower 109 attached to the holder 98. Said series are to be used in setting said holder for a hip and valley side cut, jack rafter side cut octagon hip rafter side cut, and octagon jack rafter side cut. In using the gage, after it has been set for the desired angle as above stated, the keeper 100 is released and the holder 98 tipped until the push-pin 108 of the desired series on the quadrant 107 is in engagement with the proper opening for the cut that is to be made, whereupon the keeper is again secured in place, maintaining the holder 98 tipped at the proper angle. The roofing piece is then placed in the holder and secured in place, and the saw operated as before described.

By reason of the increased diameter of the saw used with the gage B it projects for a greater distance above the dial 4, and the standard of the bracket 80 is necessarily provided with a vertical slot 80ª to accommodate the same.

By way of illustrating the operation of the machine with the gage B, if it is desired to cut a jack rafter with a 12 inch rise, the gage is set on the dial with the push-pin 95 at No. 12 on the jack-rafter series of holes. The holder 98 is then tipped over until the pin 108 for the jack-rafter series of holes on the quadrant 107 is in engagement with the No. 12 hole therein, and the holder secured in that position. A rafter piece is then secured in place in the holder, and will be in proper position for the cut to be made.

A finder is also provided with the gage B for use with the marking on a piece of timber, consisting of a sleeve 110 mounted on the arm 83, in which is movably held a needle-pin 111, held normally in raised position by a spring 112. On account of the fact that the framing piece projects past the pivotal point of the gage, as shown in Fig. 2, it is necessary to position the pin 111 several inches in rear of the pivot, at the point where the end of the timber crosses the saw-slot.

By the use of the machine hereinbefore described it is possible to make all of the known cuts on rafters, and various combinations thereof. Having the dial 4 adaptable to the two styles of gages eliminates the necessity of having two separate dials and appurtenant mechanism.

The preferred method of using the machine is to make all of one kind of cuts first, and all of those to be cut by one of the gages, before changing to the other gage. Where a number of rafters are to be provided with the same kind of cut, all of the cuts at one end of said rafters will be made first, before reversing the position of the gage, and the machine then set for making the cuts on the other ends. By this means a considerable amount of time is saved. In some cases of common rafters the cuts at both ends can be made by merely reversing the position of the timber in its supporting holder.

When the gage B is transferred from one side of the slot 6 to the other the position of the rafter holder 98 is reversed, by turning the plate 96 on its pivot, and the plate is again held in locked position by the pin 96ª, entering another opening in the base 84, not indicated in the drawings. The holder is then capable of being tipped toward the saw slot, as before.

What I claim, and desire to secure by Letters Patent, is:

1. In a device of the class described, a saw-table dial provided with a central saw slot provided with series of openings forming arcuate scales, a bracket fixed to said dial, a gage having parallel side faces and pivot means in line with each of said faces adapted for interchangeable pivotal connection with said bracket at a point above said slot, pins carried by said gage adapted for engagement with said openings, and means for holding said gage in adjusting positions, to fix the position of a piece of rafter material held against that side of said gage which is in line with the pivotal point.

2. In a device of the class described, a saw-table dial provided with a central saw slot, and provided with one or more series of openings forming arcuate scales, a gage adapted for a pivotal mounting at either side of said slot, and having parallel side faces for the alternative support of a piece of rafter timber in position for being cut, spring-actuated pins for selective engagement with said perforations, to establish the position of said gage with reference to said saw slot, and a clamping mechanism carried by said gage, capable of adjustment in position to hold a piece of rafter timber to one side or the other of said gage.

3. A device of the class described, comprising a frame and circular saw swingly mounted therein, a slidably mounted dial above said saw, provided with a slot for the passage of said saw, and having series of pin engaging devices forming gage establishing scales on its face, a gage pivoted on said dial so as to swing horizontally thereon, and provided with pins adapted for engagement with said engaging devices, means for moving said dial rearwardly to increase the length of cut of said saw, and means for returning said dial to its forward position.

4. In a device of the class described, a frame and saw swingingly mounted therein, a work dial above said saw provided with a saw slot, and having series of lumber cutting markings arranged thereon in protractor

style, a gage pivoted at a point above said saw slot, and provided with gage devices for use with said markings, means for holding said gage in adjusted positions, means for holding a piece of rafter lumber in place against said gage, and means for positioning the marked end of said lumber with reference to the saw.

5. In a device of the class described, in combination with a frame and saw swingingly mounted therein, a work dial supported above said saw and provided with a saw opening, and protractor scales the radii of which center at a point above said saw, a bracket fixed to said dial at the rear end of said saw opening, and provided with a forwardly projecting arm, and a gage having a pivotal connection with said arm, and provided with gage devices for use with said scales, the pivotal connections between said arm and gage preventing the disconnection of the gage from the arm in any position of said gage except when it is in line with said saw opening.

In testimony whereof I affix my signature.

JAMES NICKELS.