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(54) **DORMER CALCULATOR**

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(52) **U.S. Cl.** **703/1; 52/745.06; 52/79.1**

(57) **ABSTRACT**

The present invention is a method for laying out a dormer that projects outward from a main roof and has a gable end and a dormer roof originating at a dormer point and terminating at an outer edge of the dormer roof near the gabled end. The dormer includes roof sheathing supported by dormer trusses. The dormer trusses include a gable truss and a plurality of valley trusses. The method of the present invention includes receiving a plurality of dormer inputs from a user. A plurality of layouts for the roof sheathing on the dormer roof are generated as a function of the dormer inputs. One or more layouts are then recommended to a user to reduce a quantity of roof sheathing waste.

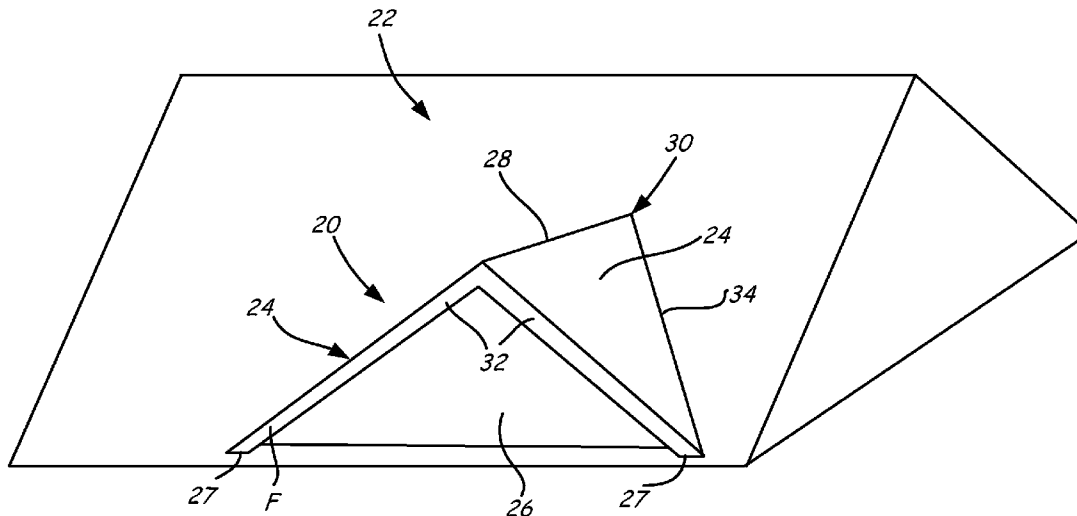
(21) Appl. No.: **12/902,313**

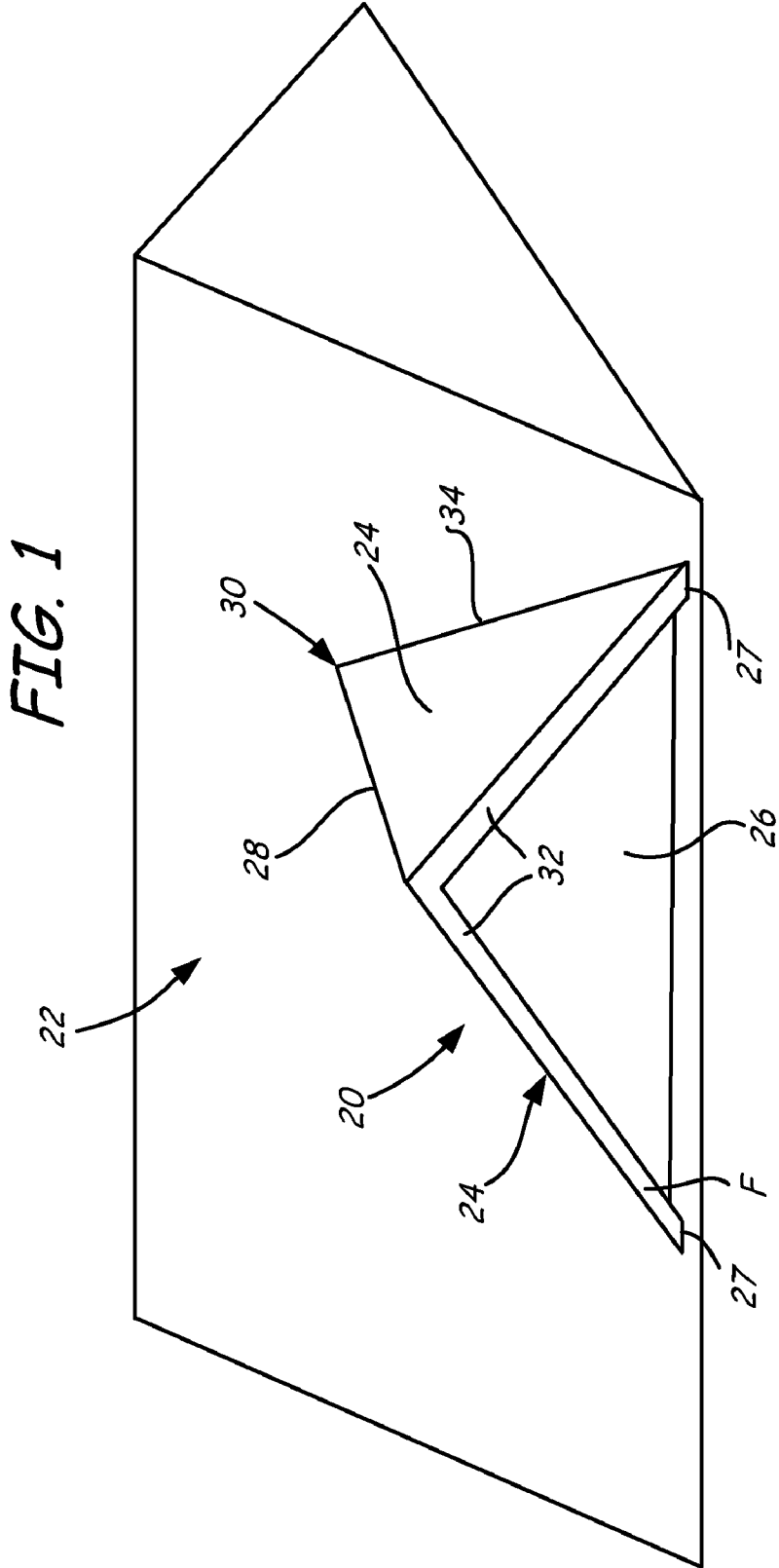
(22) Filed: **Oct. 12, 2010**

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/043,802, filed on Jan. 26, 2005, now Pat. No. 7,813,902.

(60) Provisional application No. 60/592,597, filed on Jul. 30, 2004.





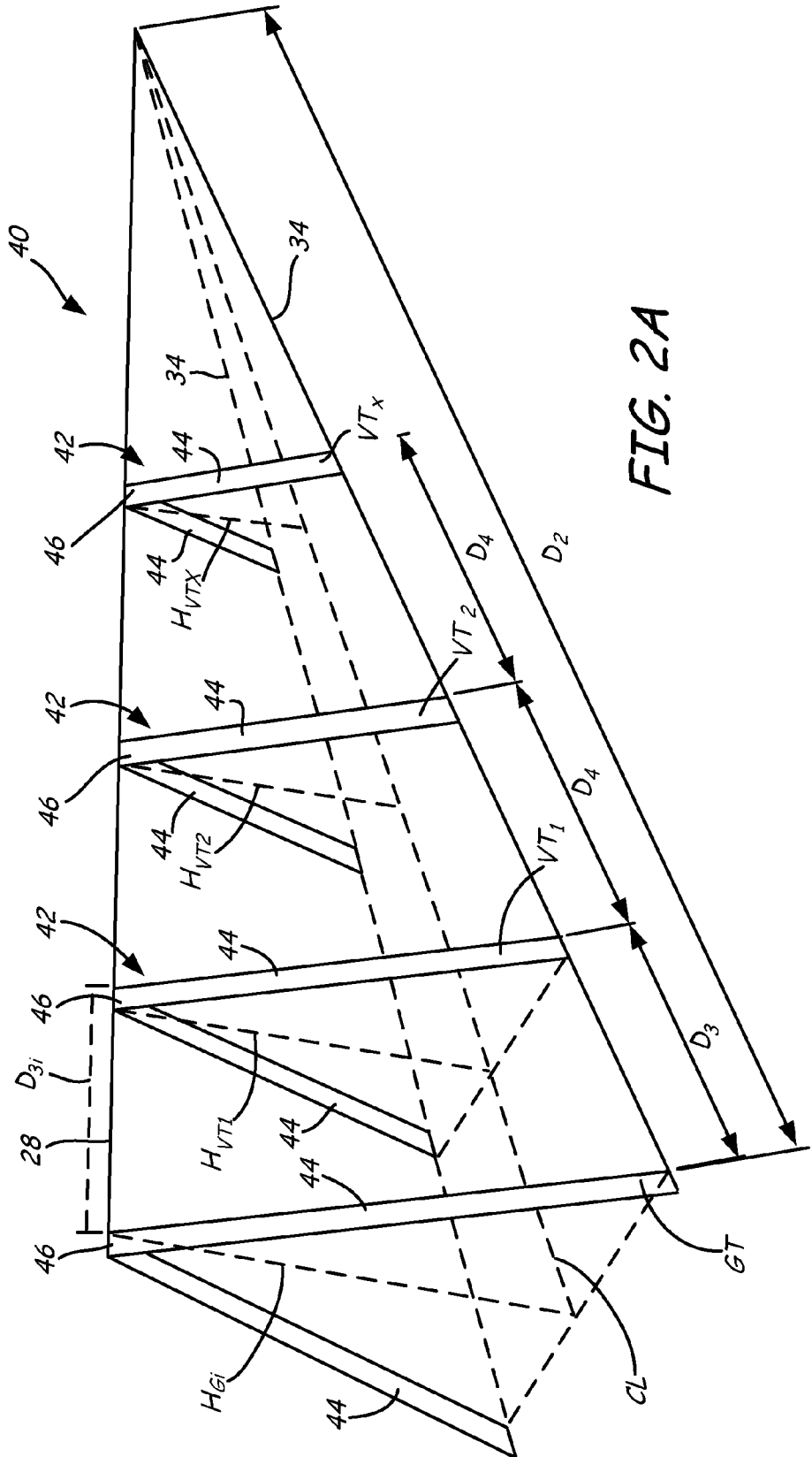


FIG. 2A

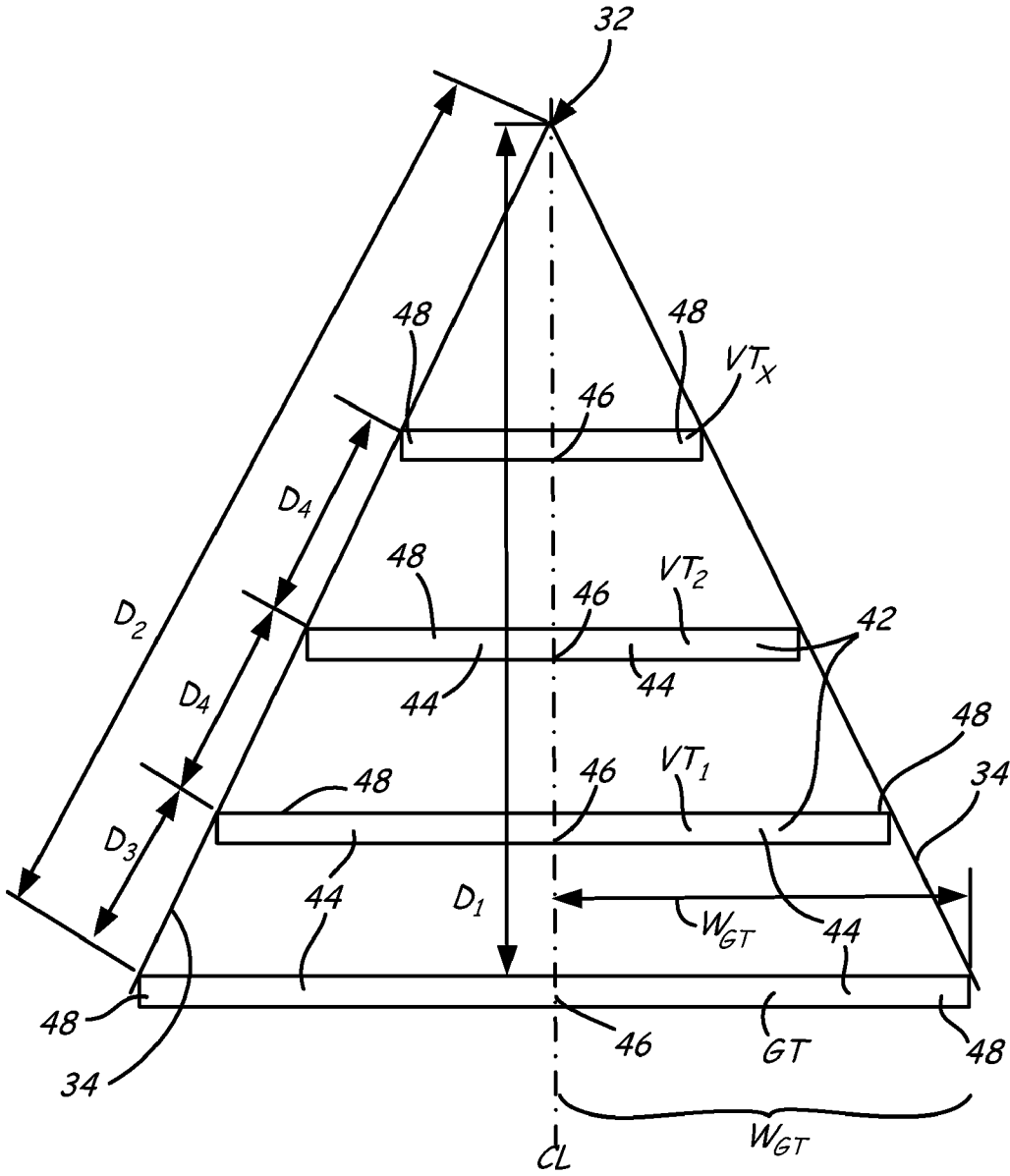
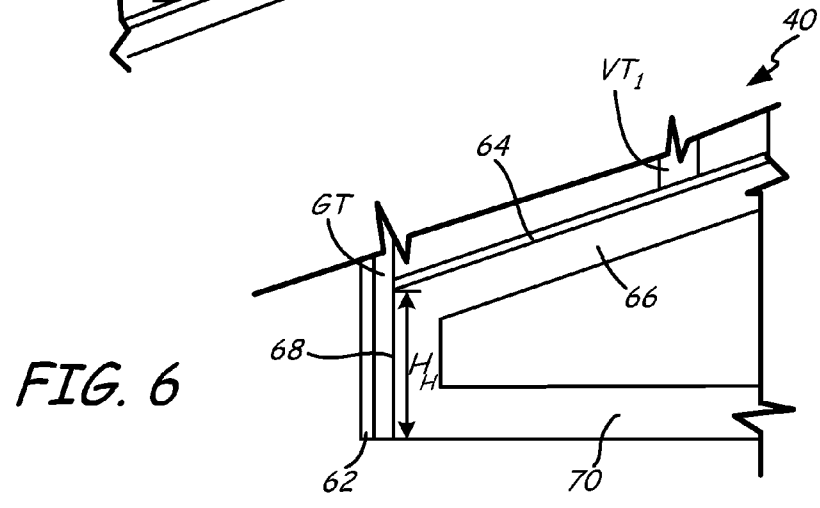
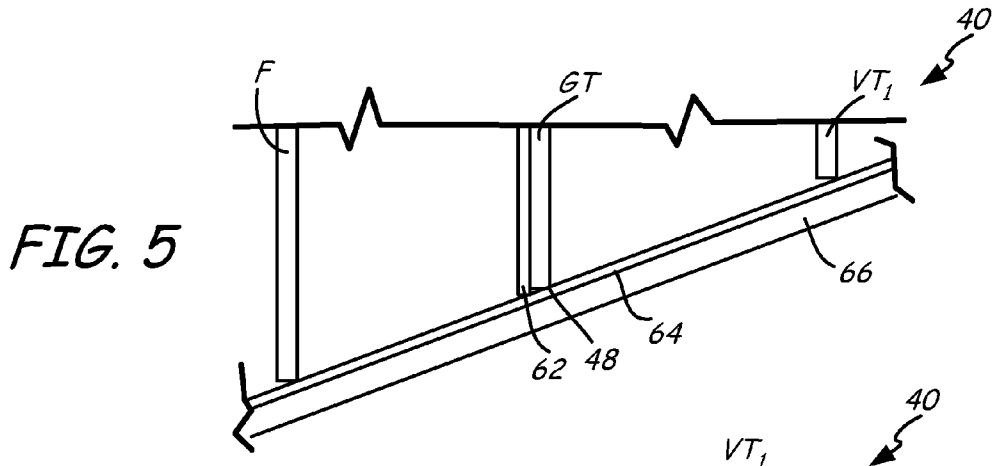
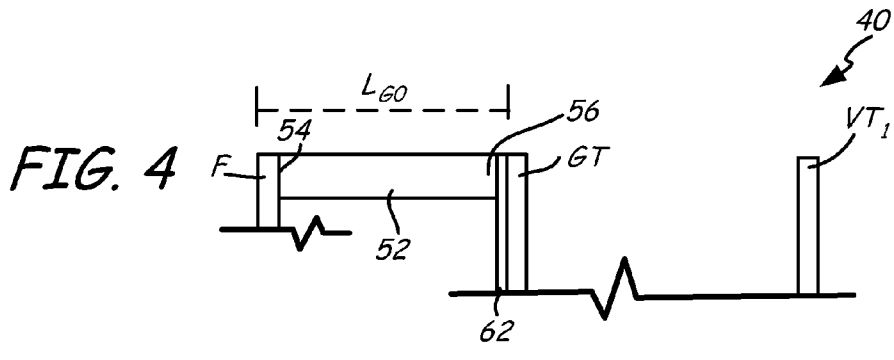
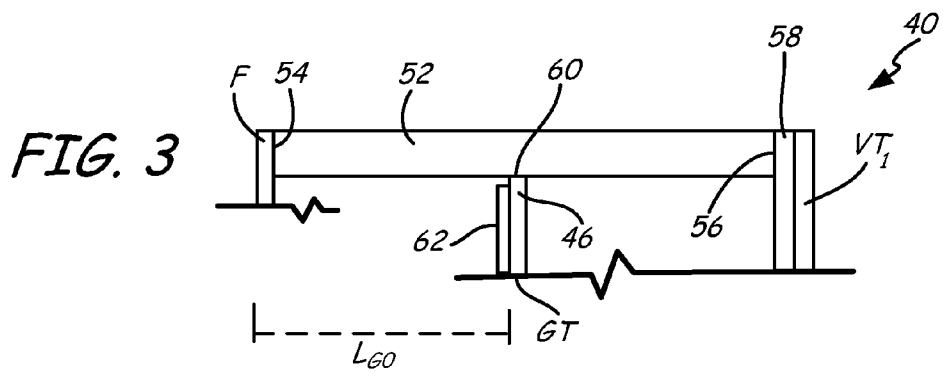


FIG. 2B



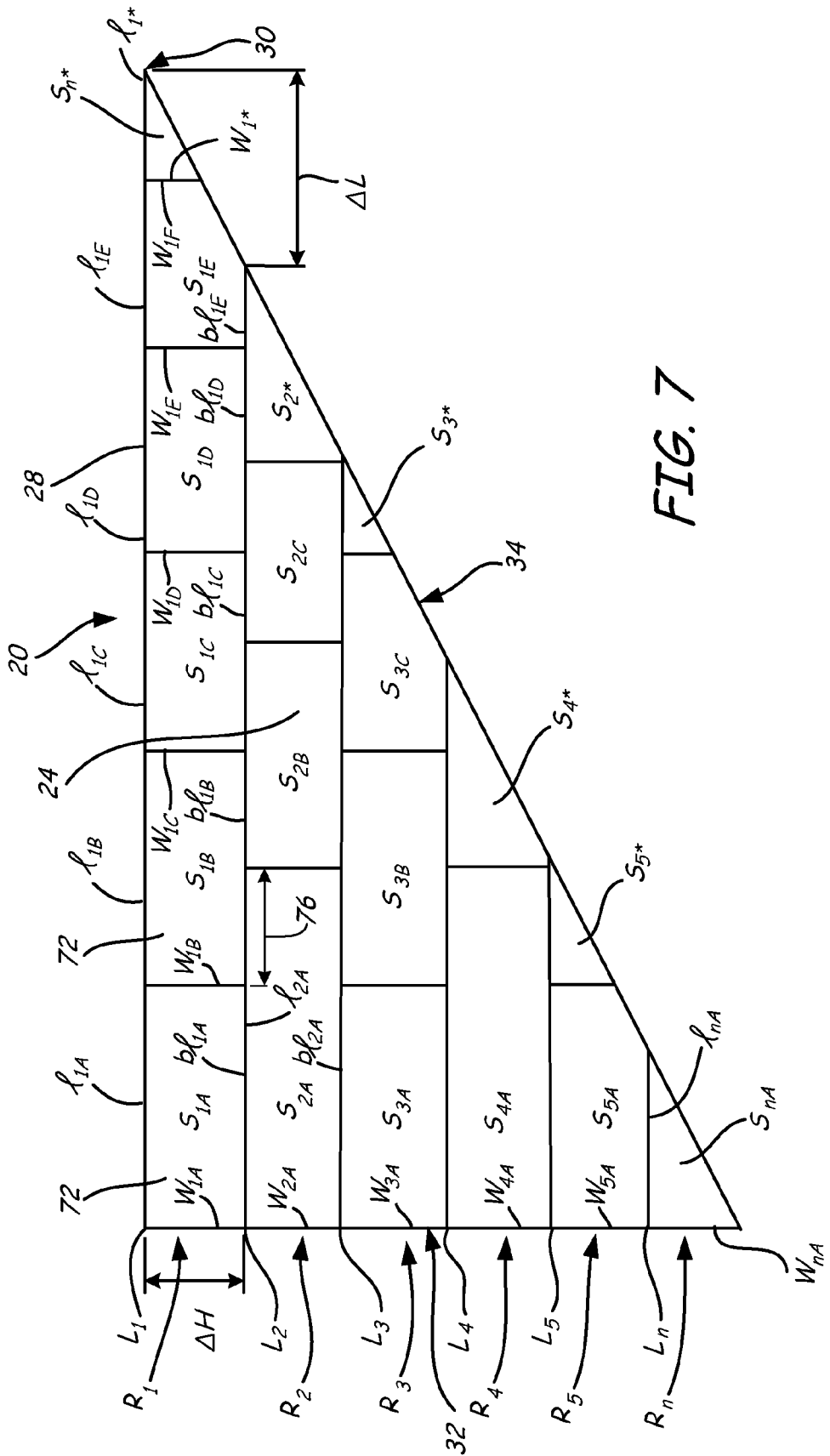


FIG. 7

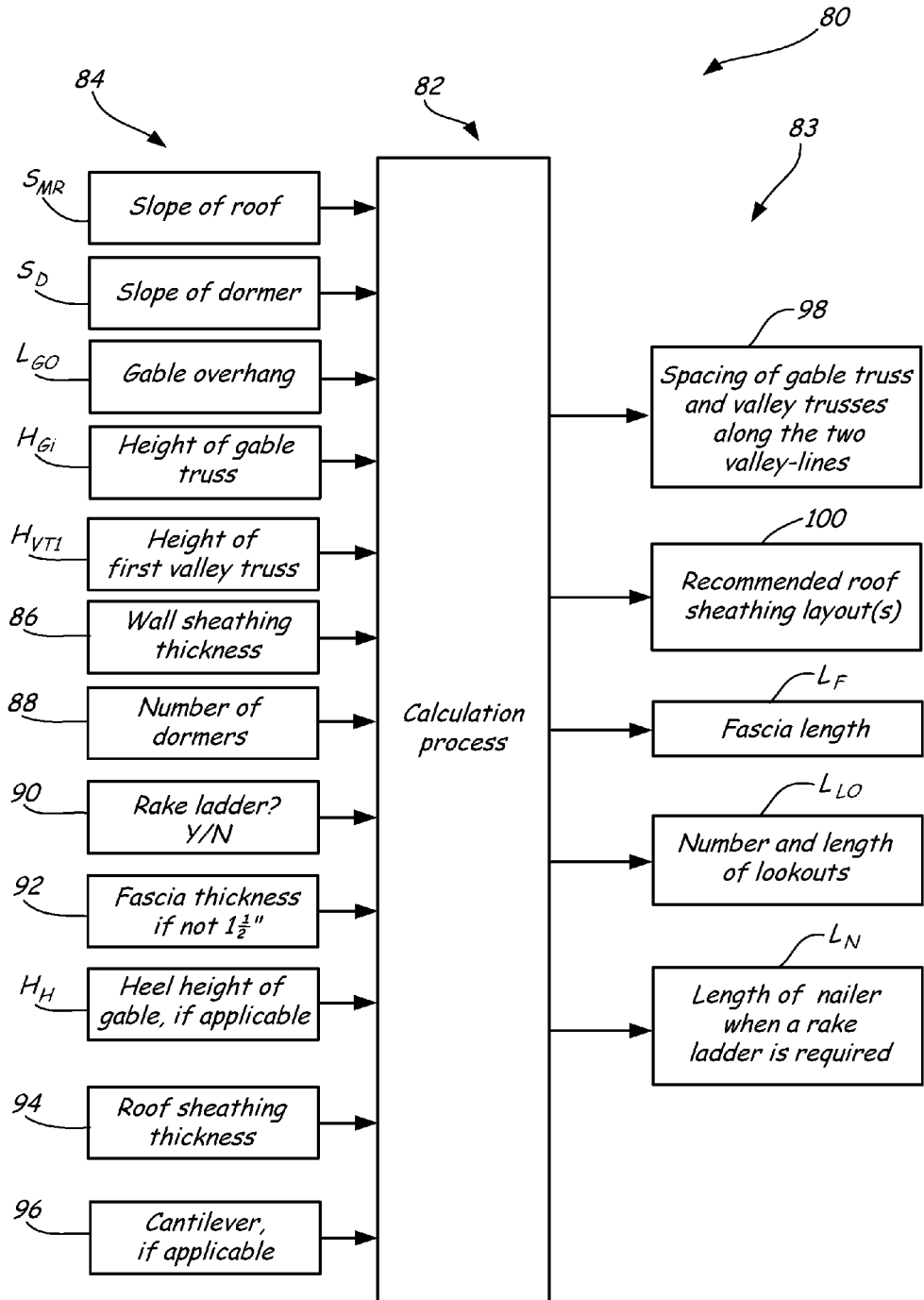


FIG. 8

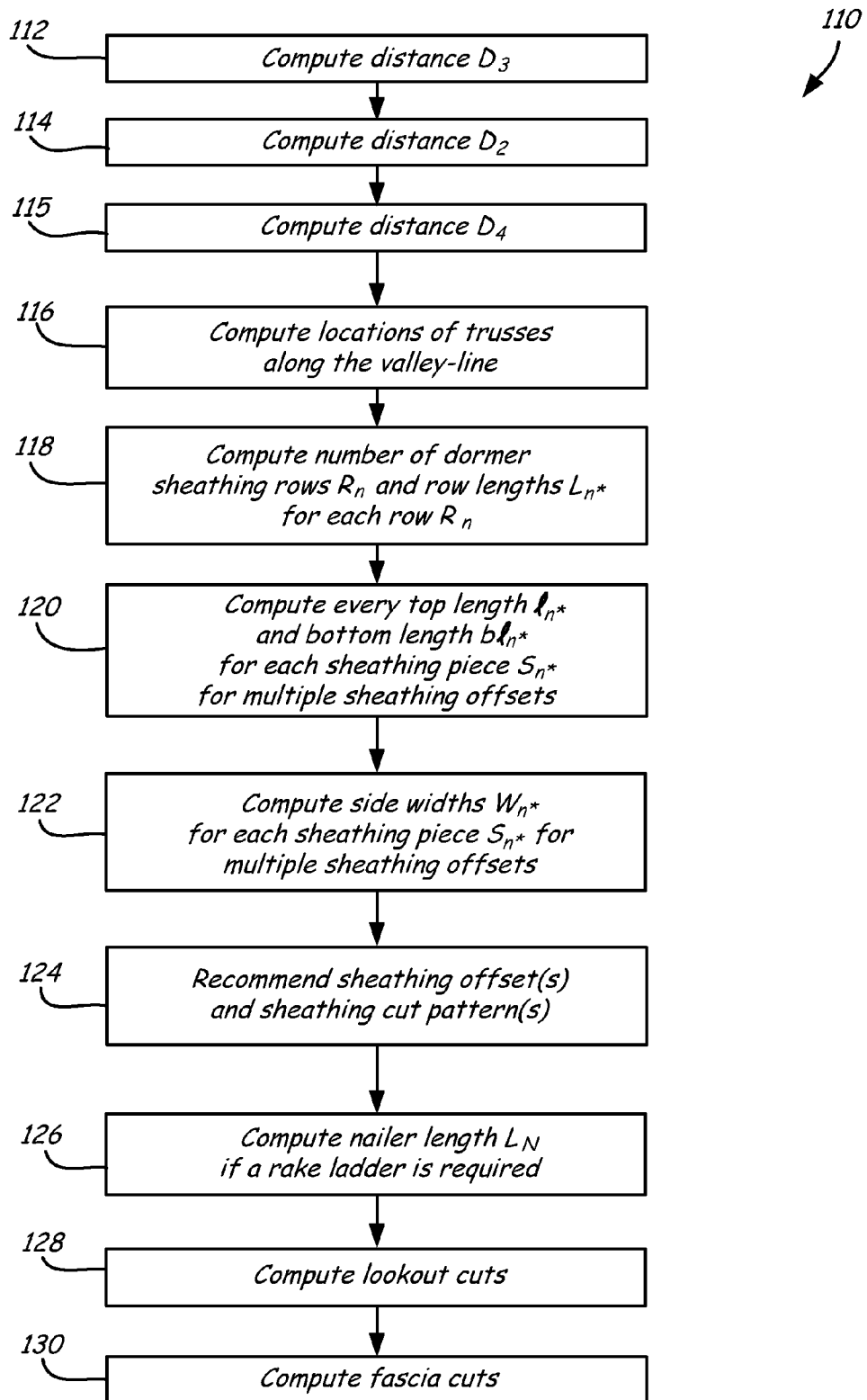


FIG. 9

FIG. 10A

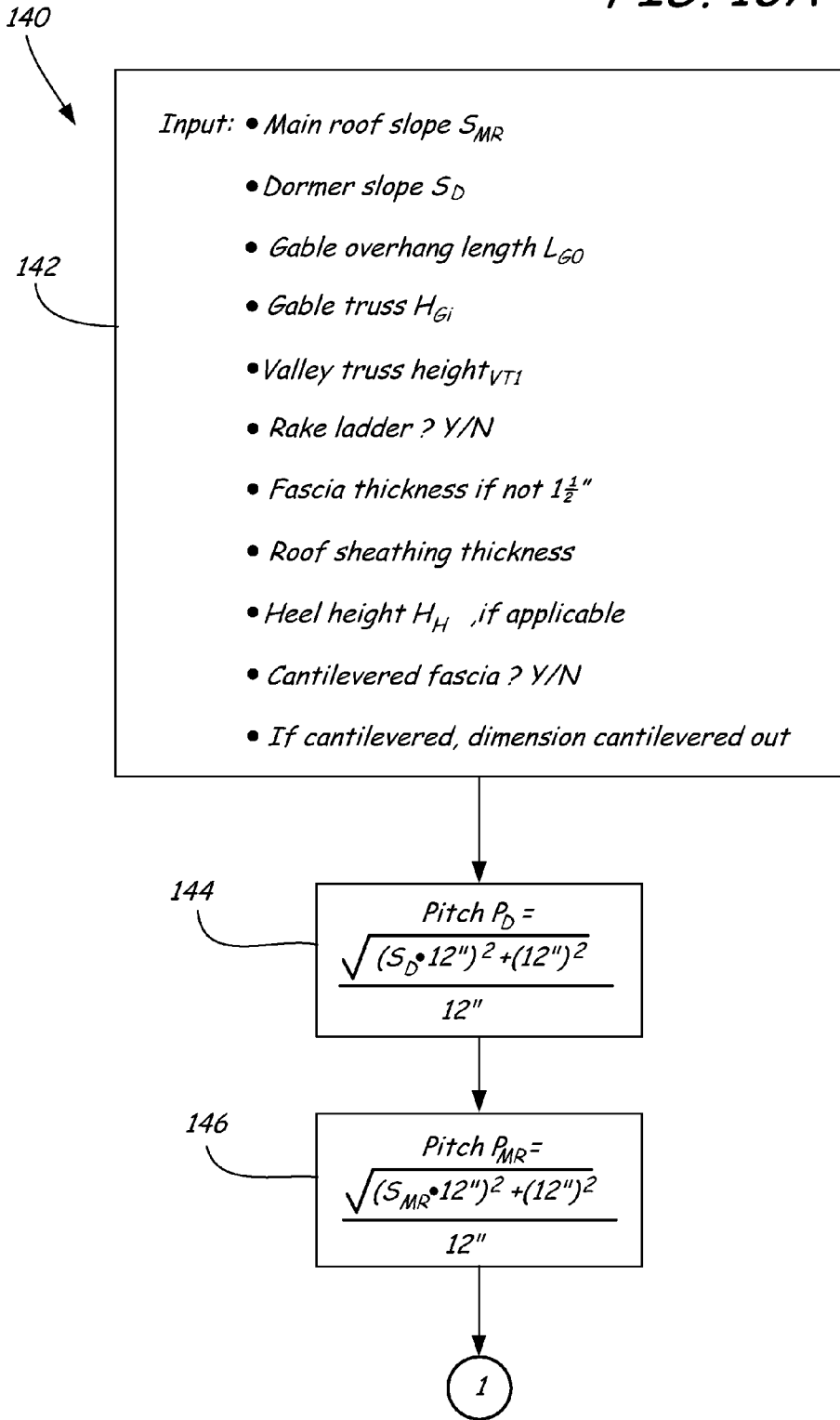


FIG. 10B

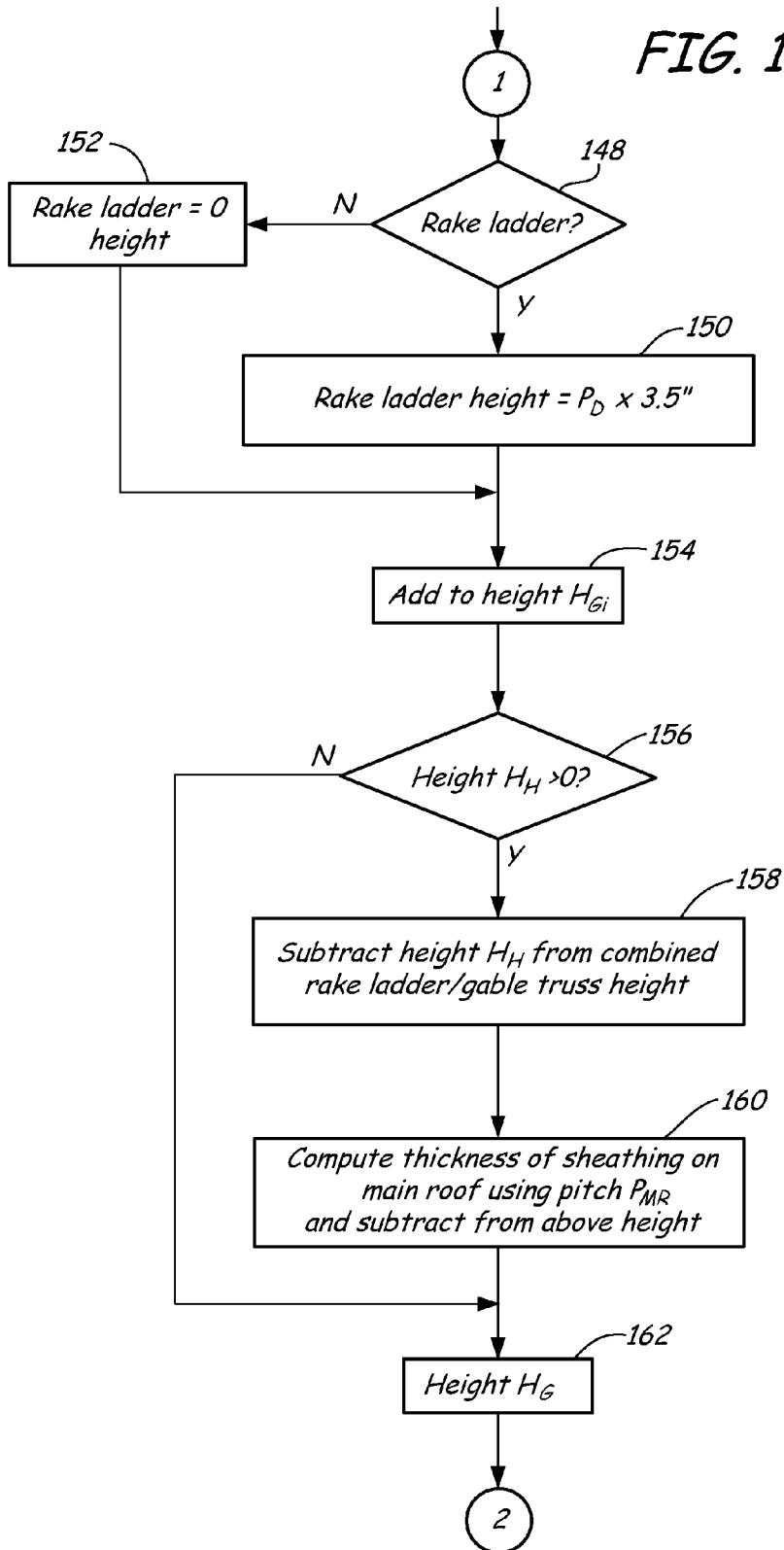


FIG. 10C

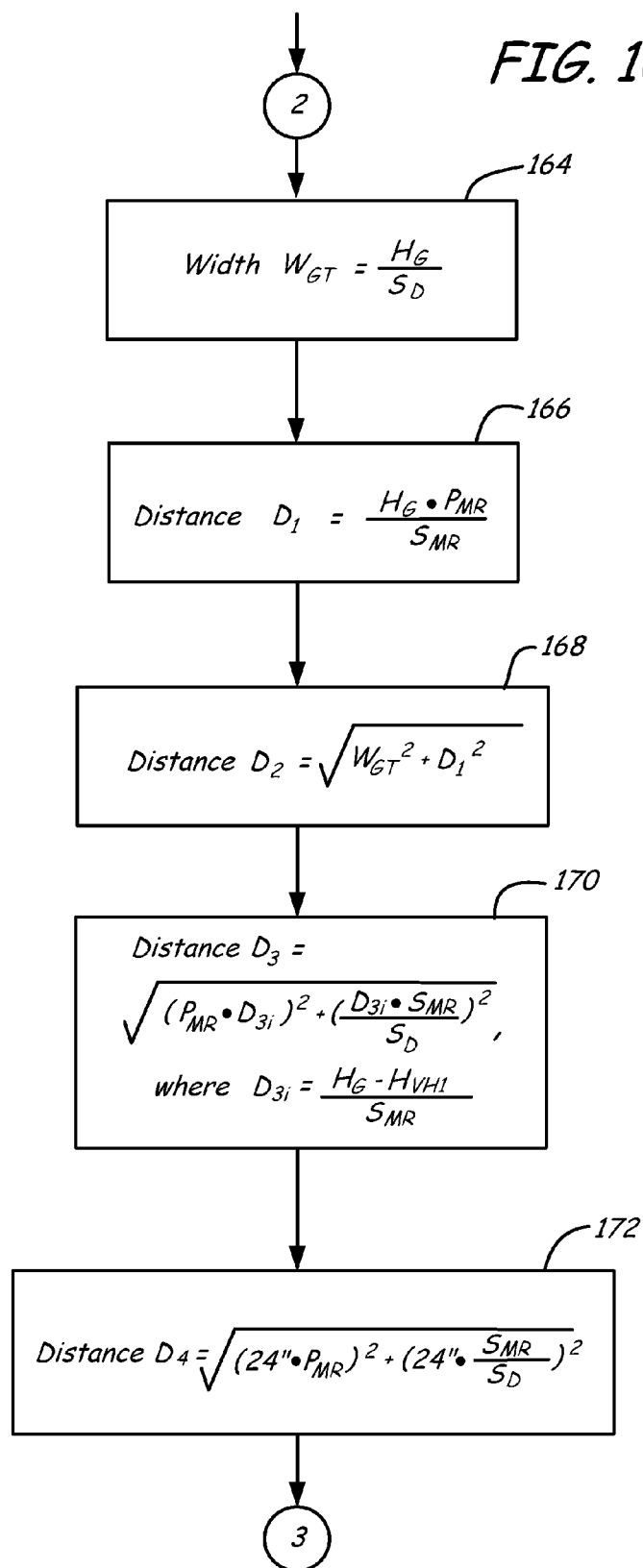


FIG. 10D

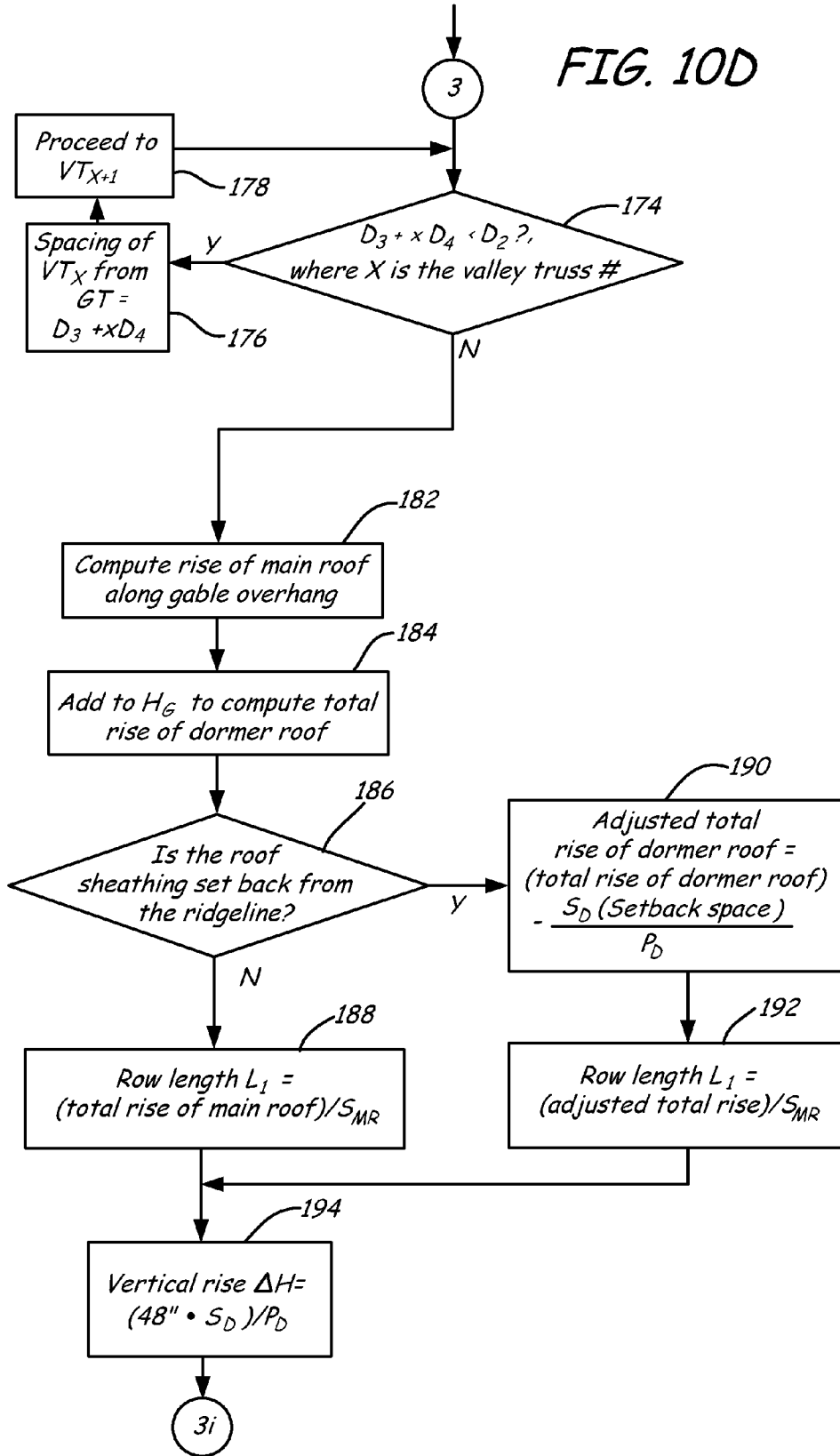


FIG. 10E

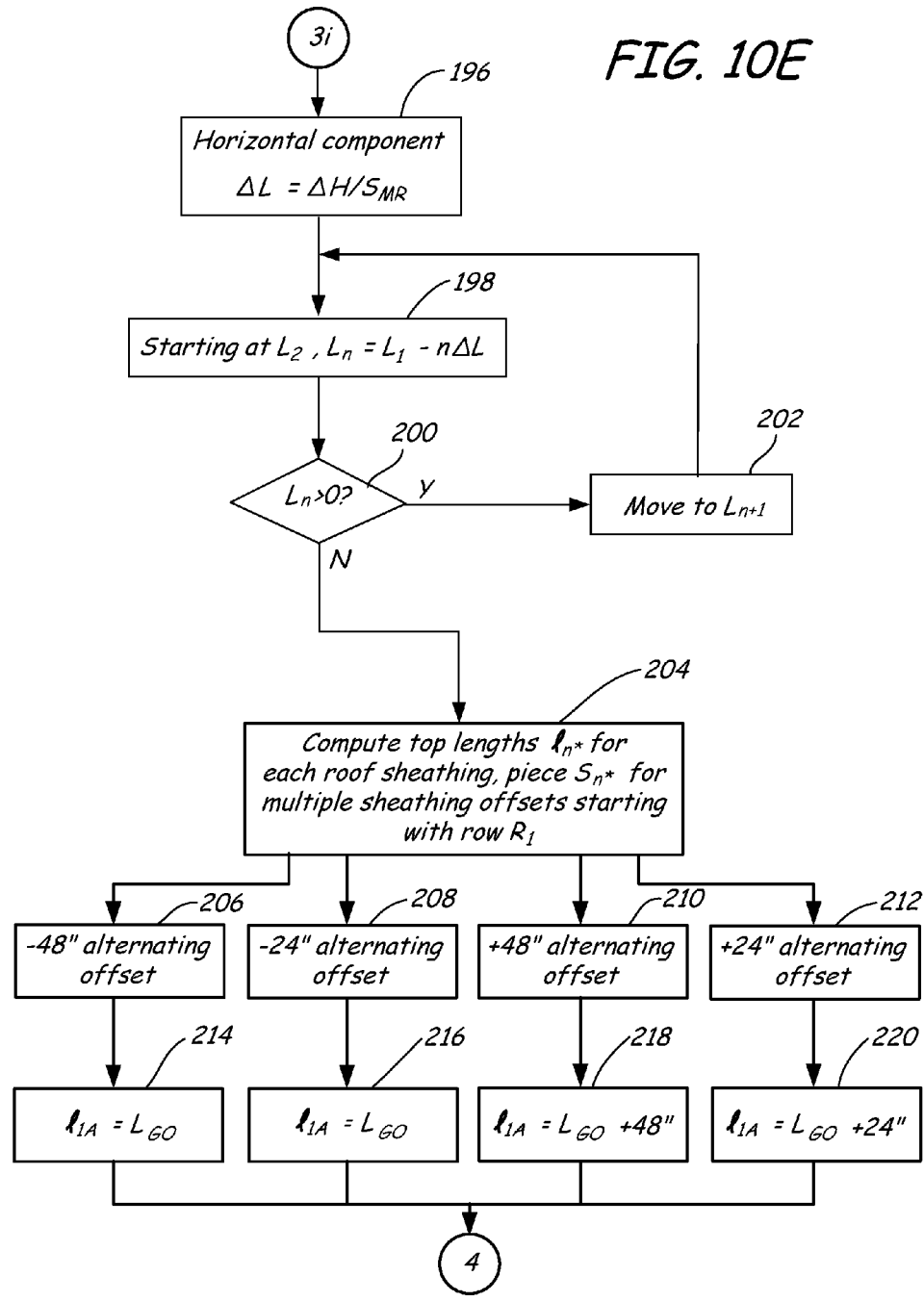


FIG. 10F

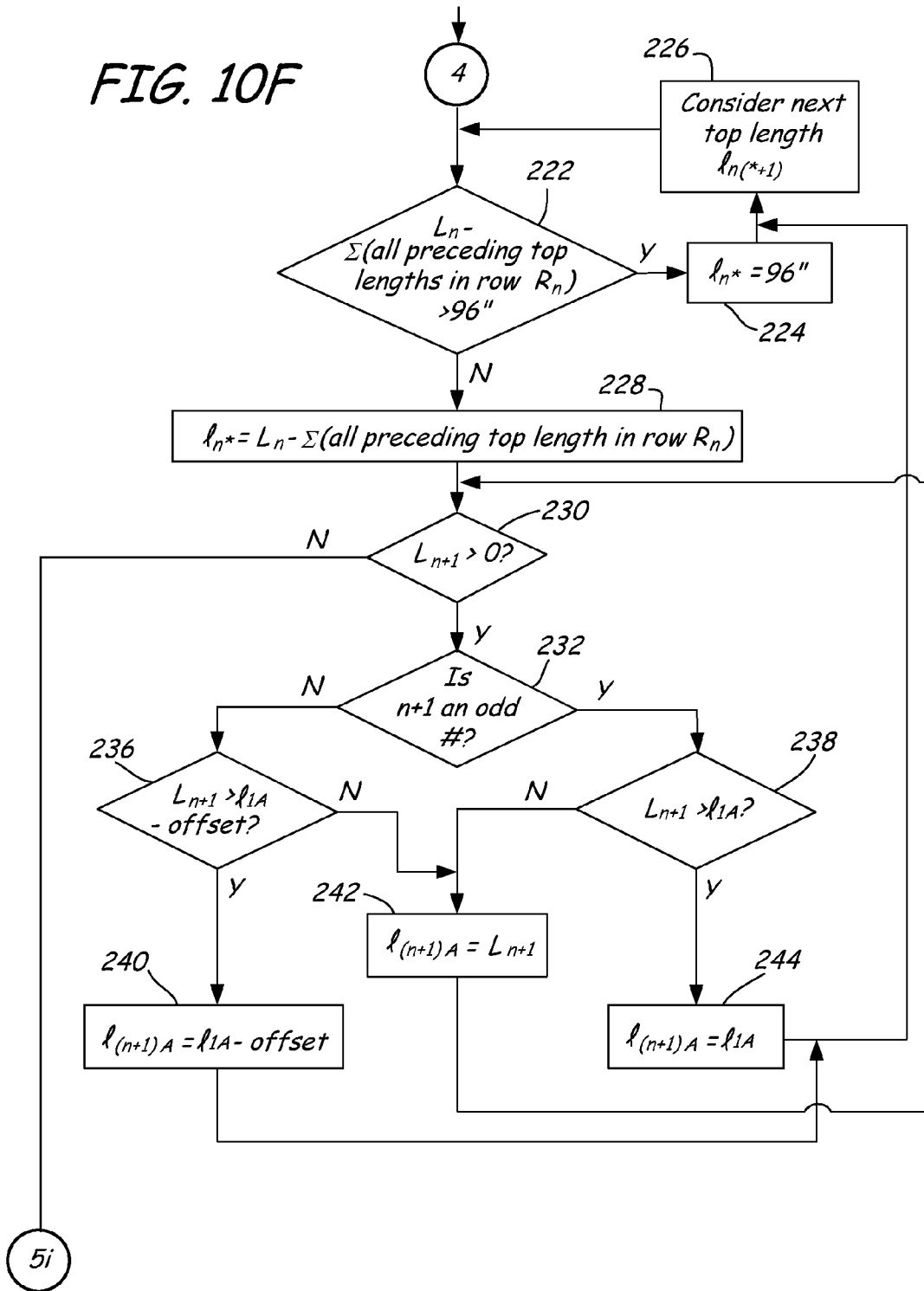


FIG. 10G

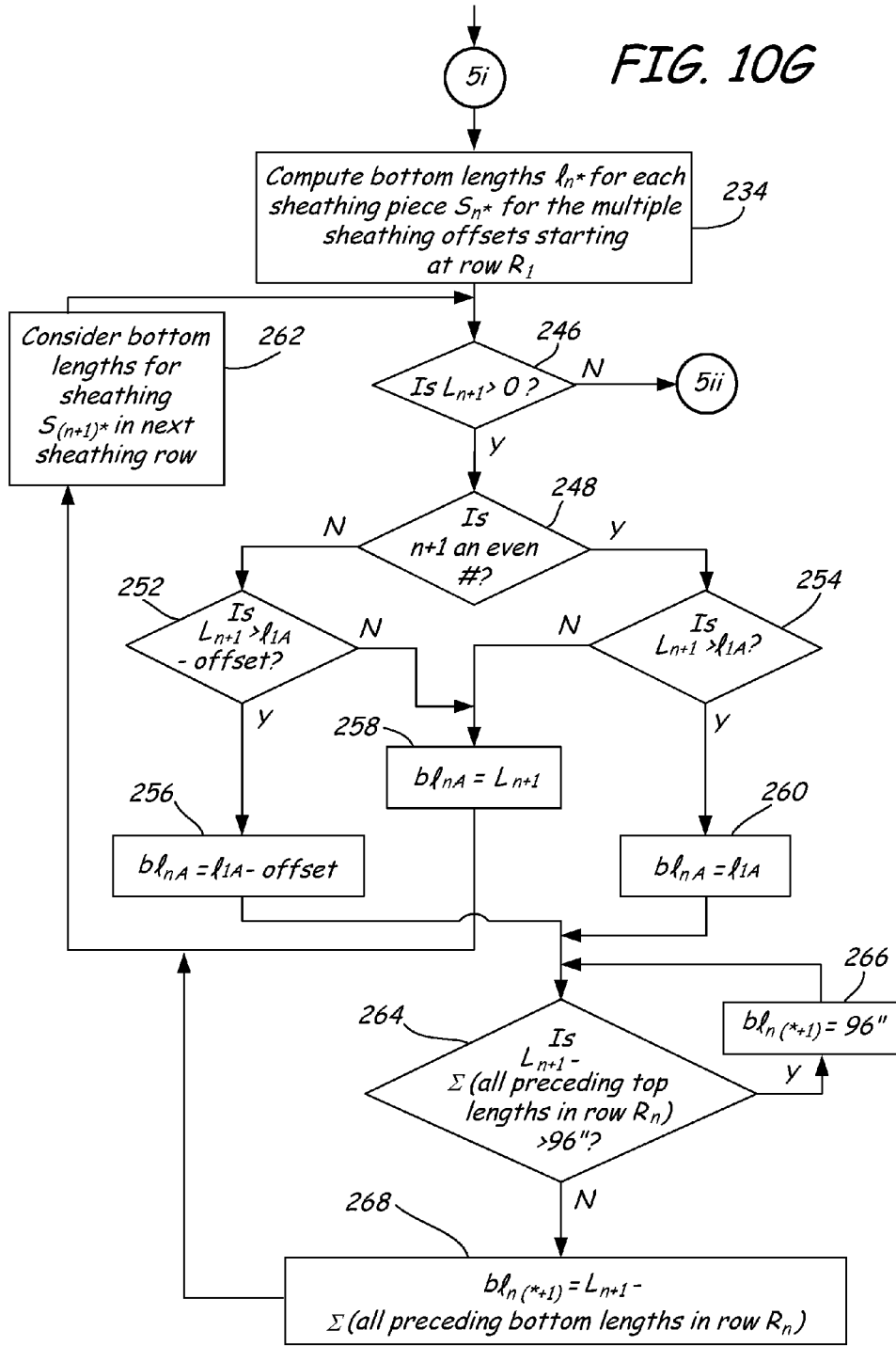


FIG. 10H

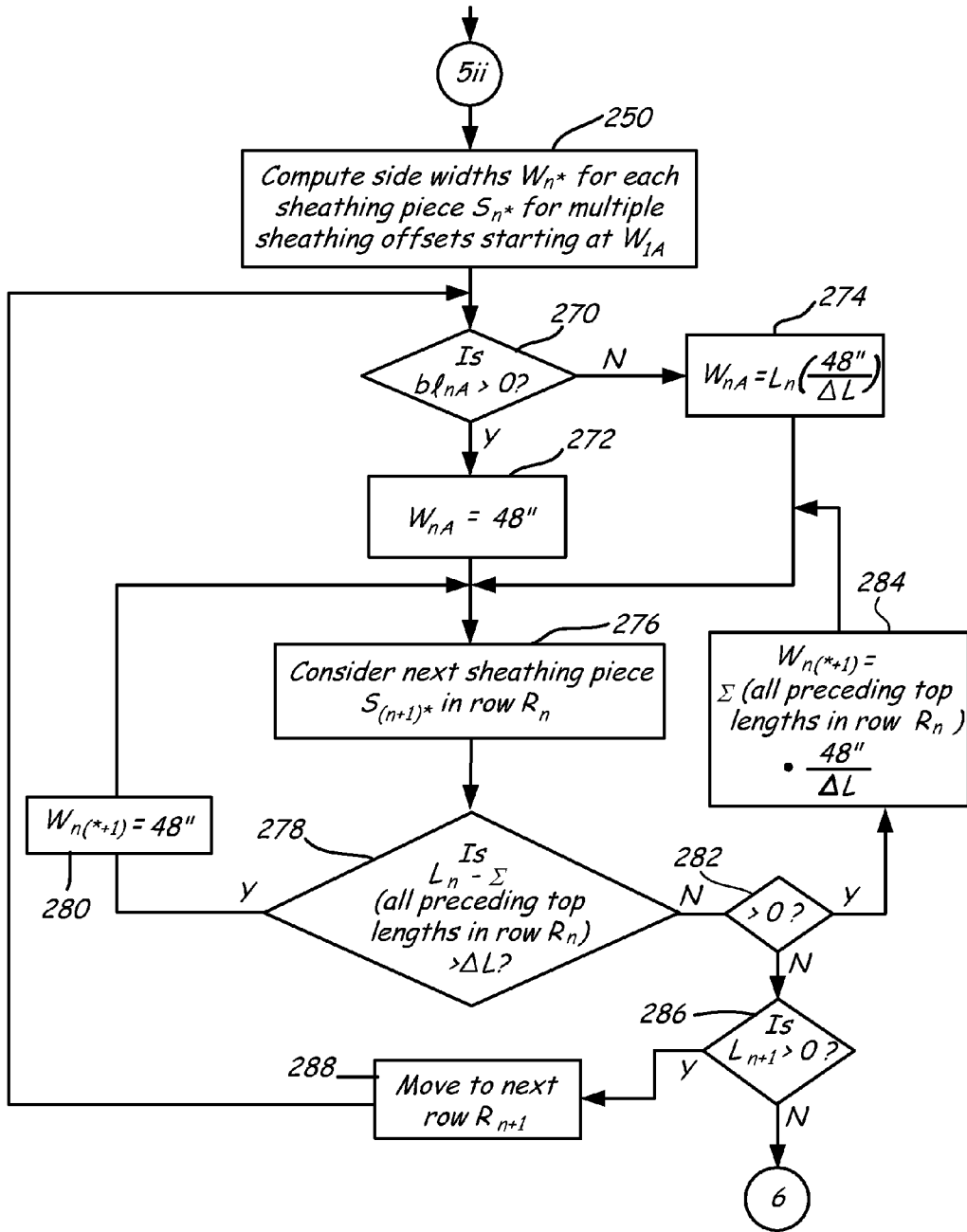


FIG. 10I

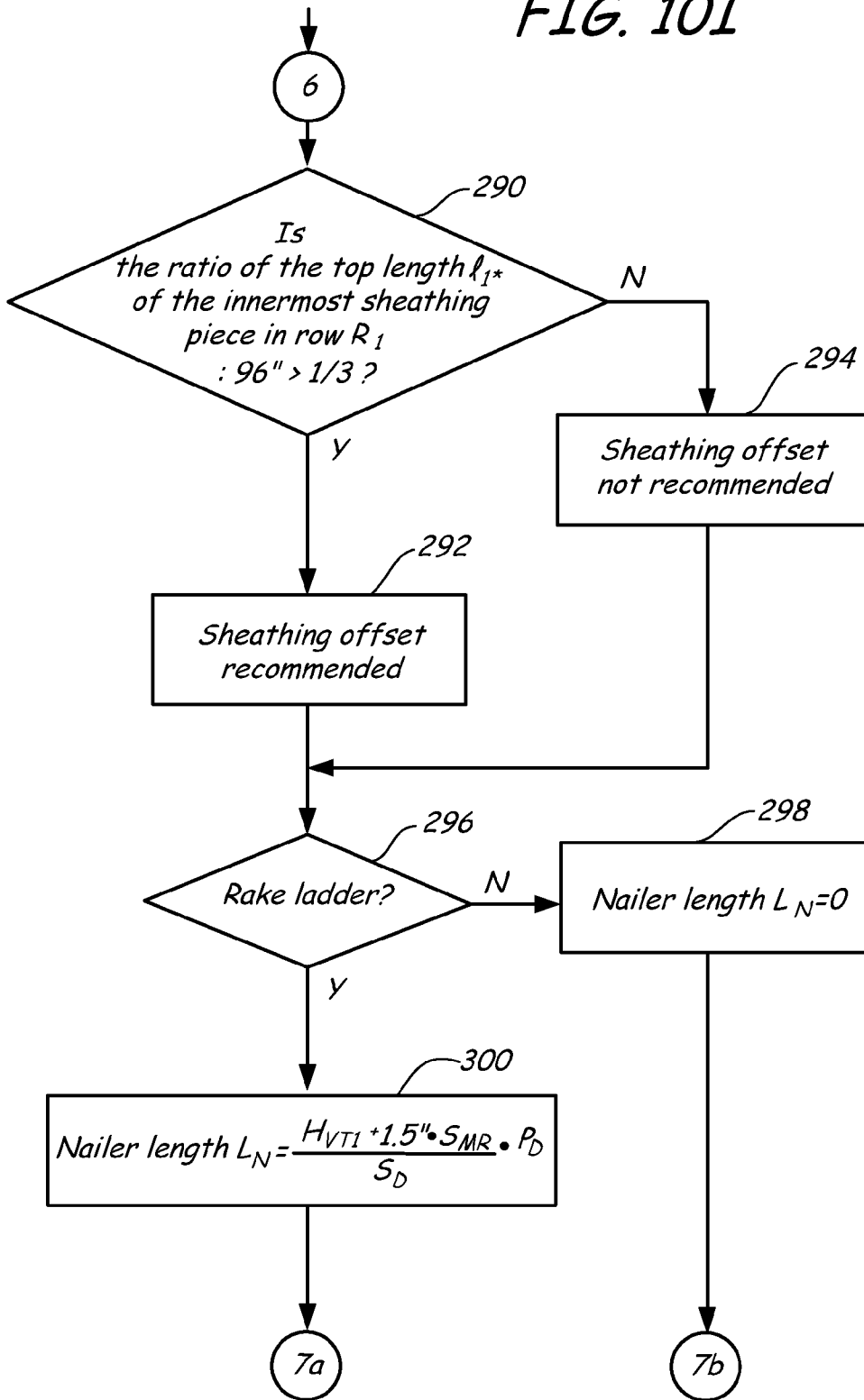


FIG. 10J

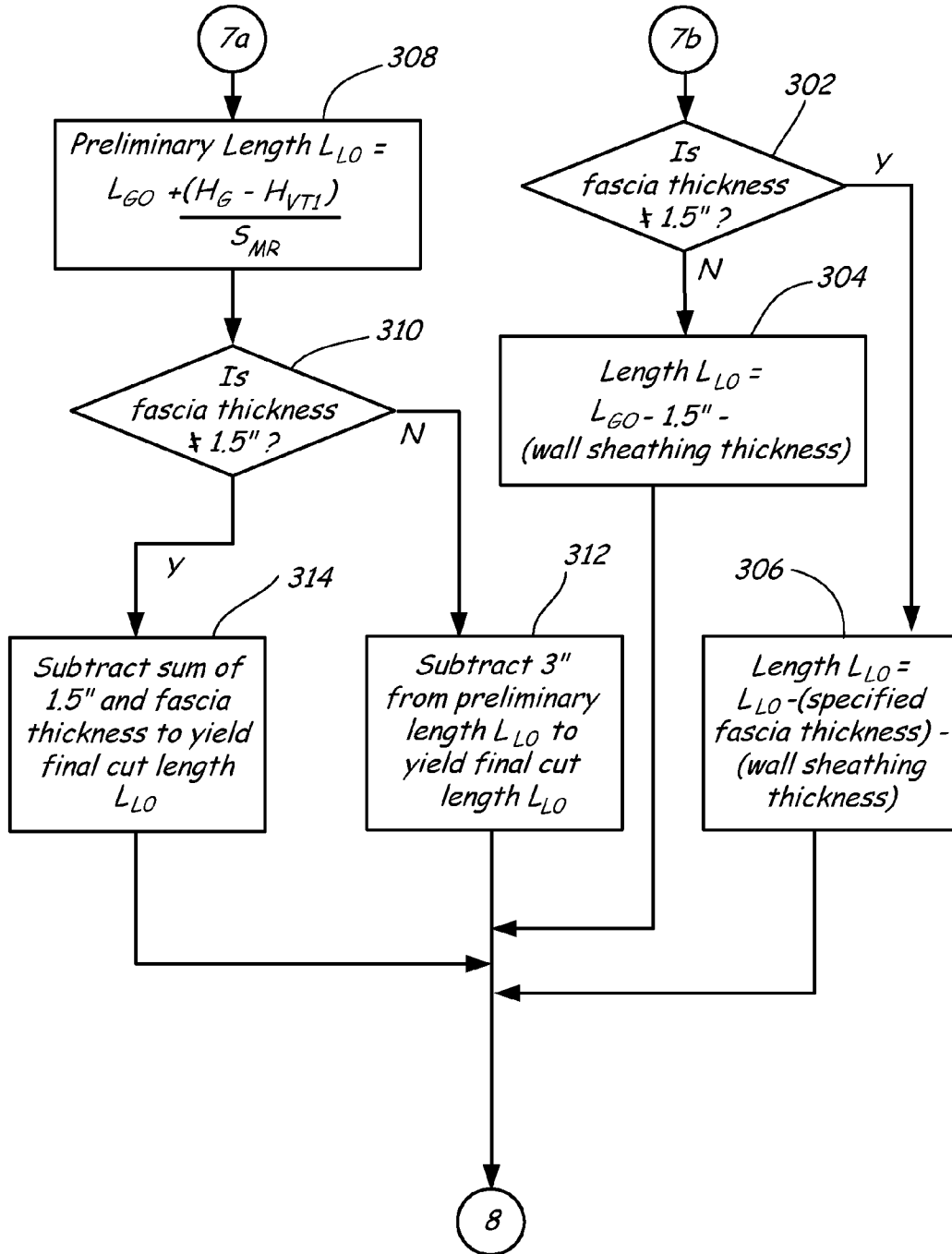
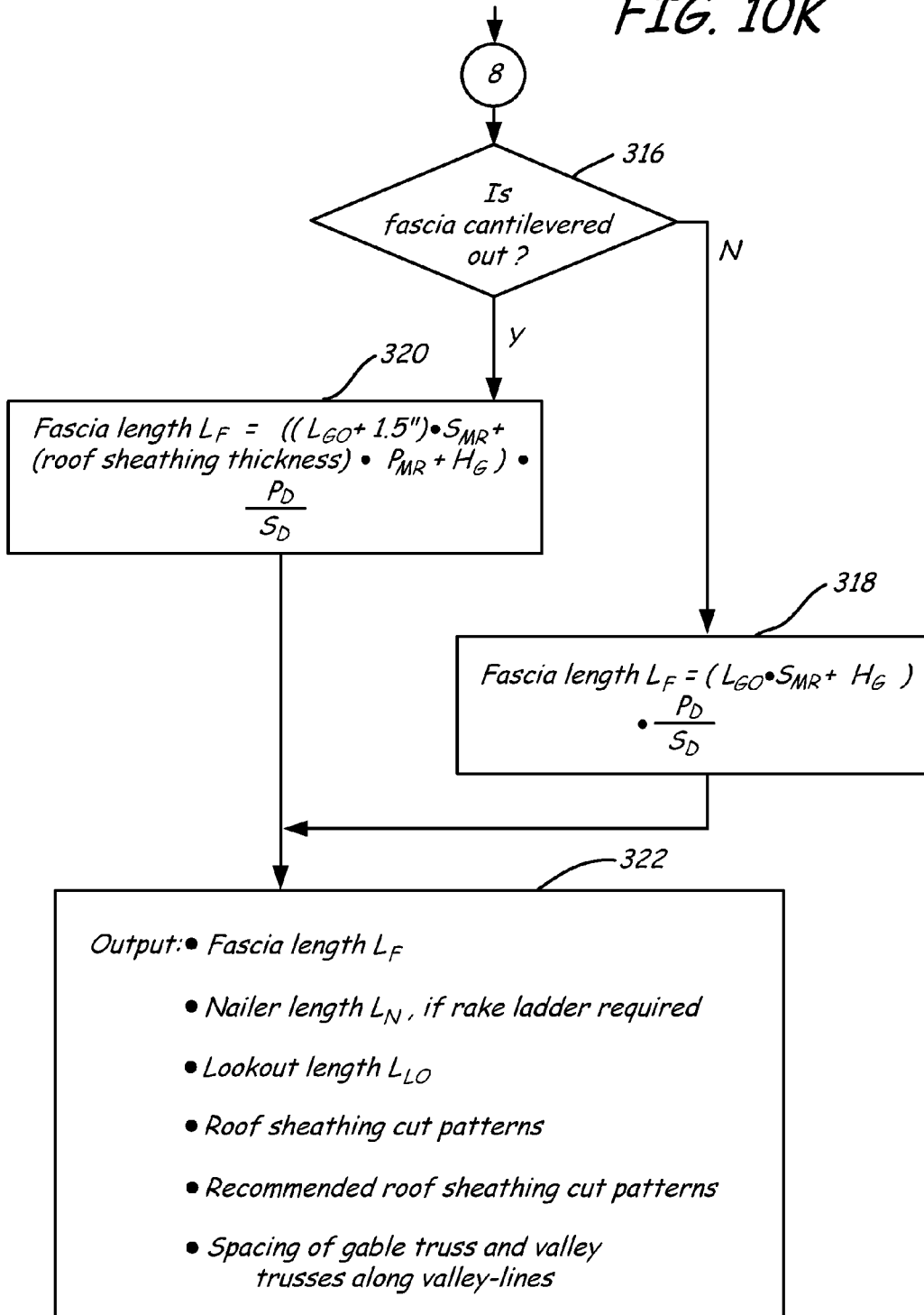


FIG. 10K



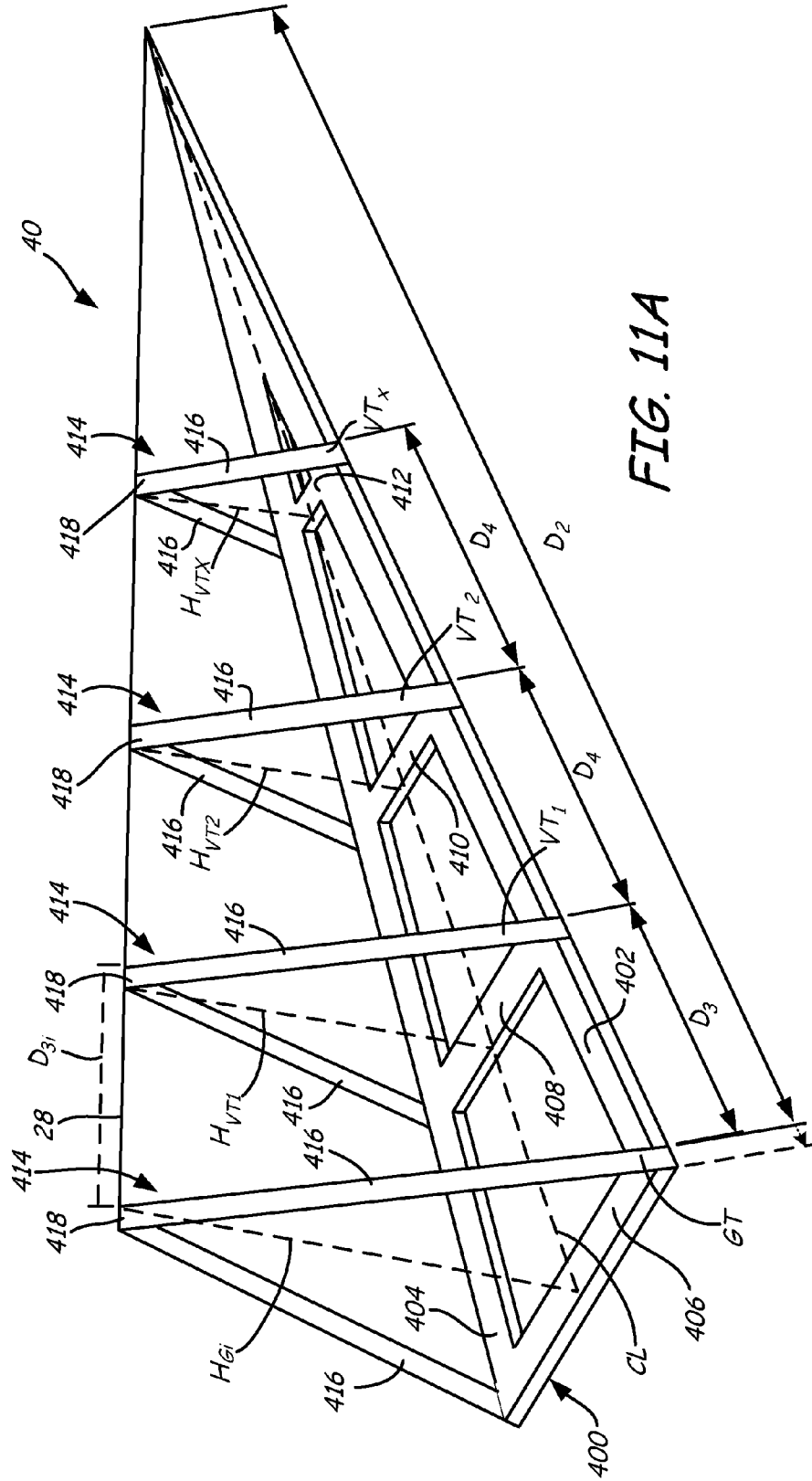


FIG. 11A

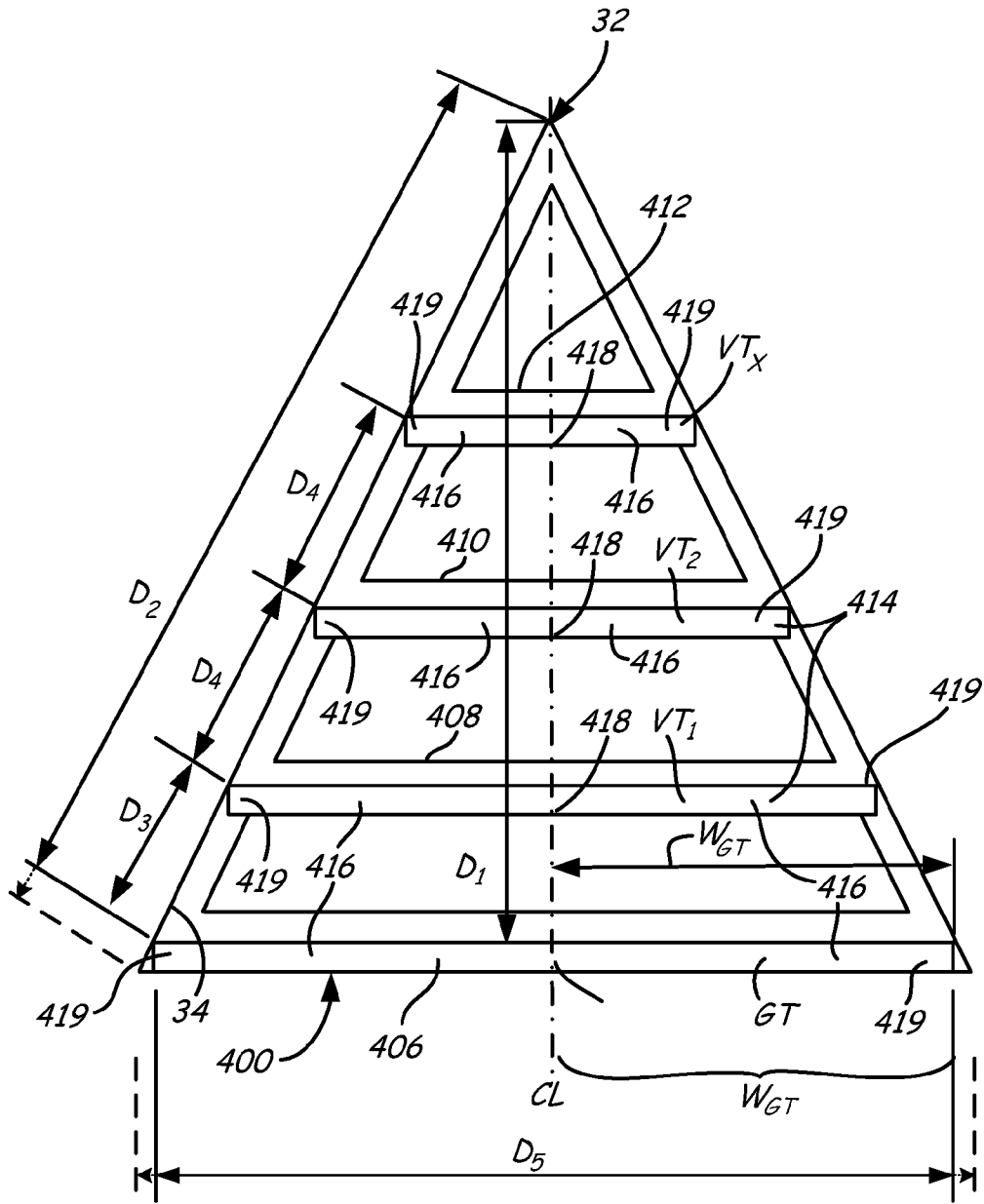


FIG. 11B

FIG. 12

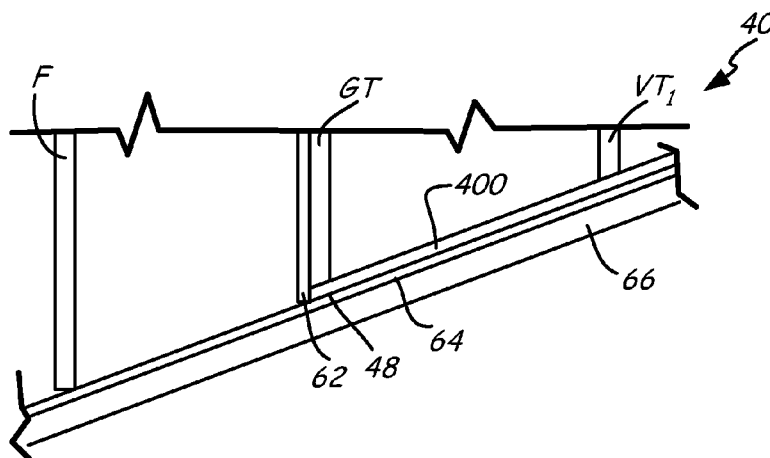
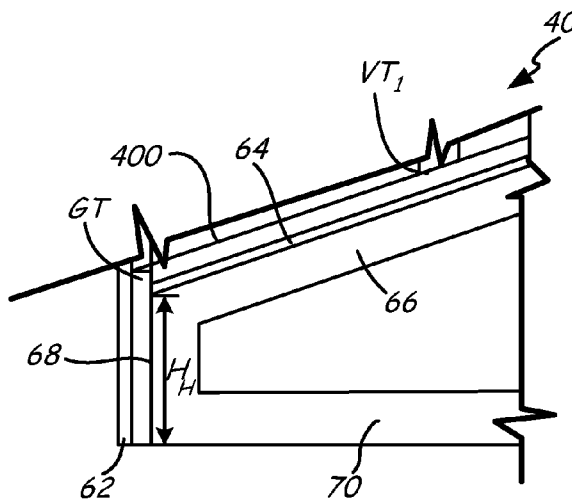


FIG. 13



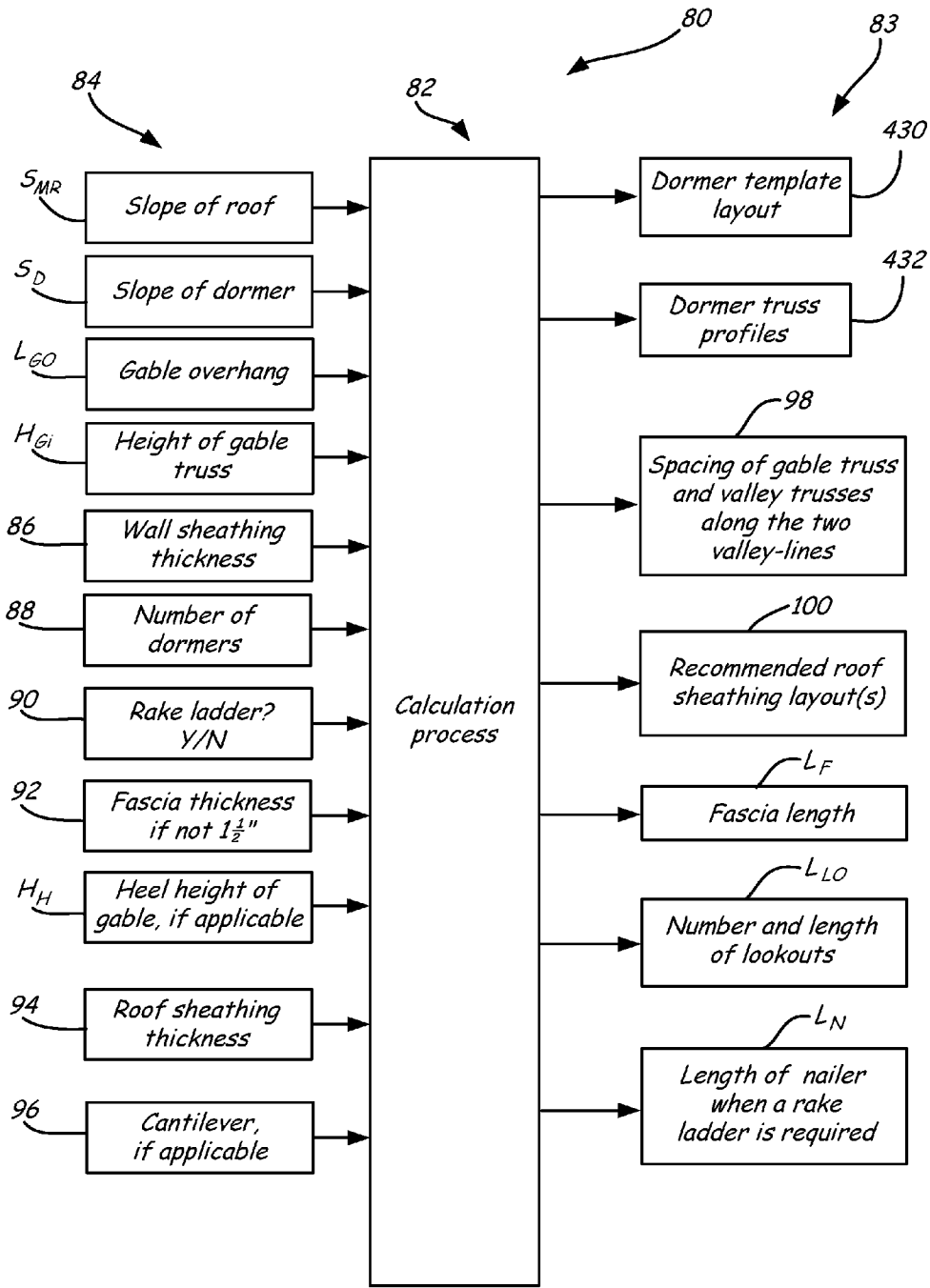


FIG. 14

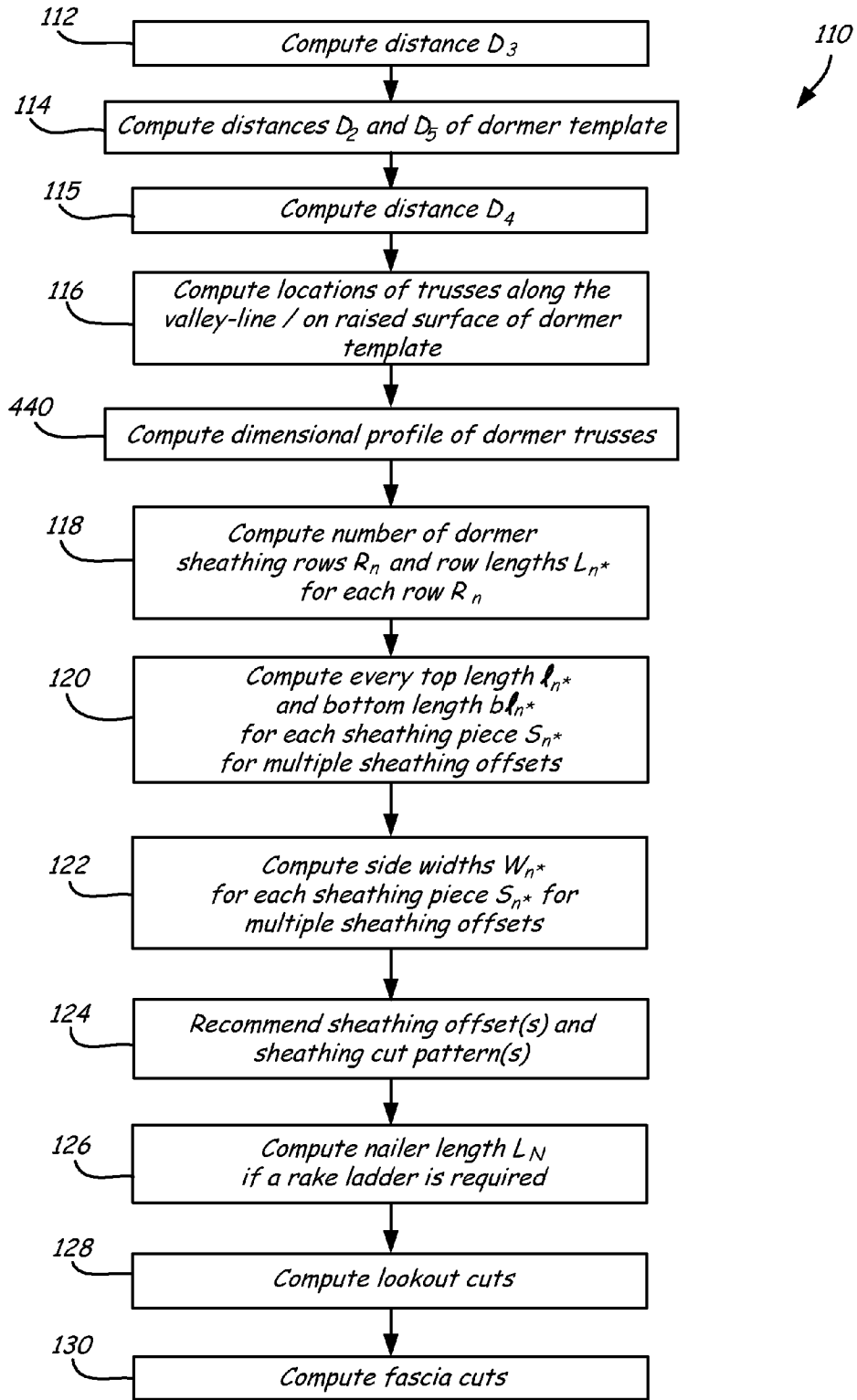


FIG. 15

FIG. 16A

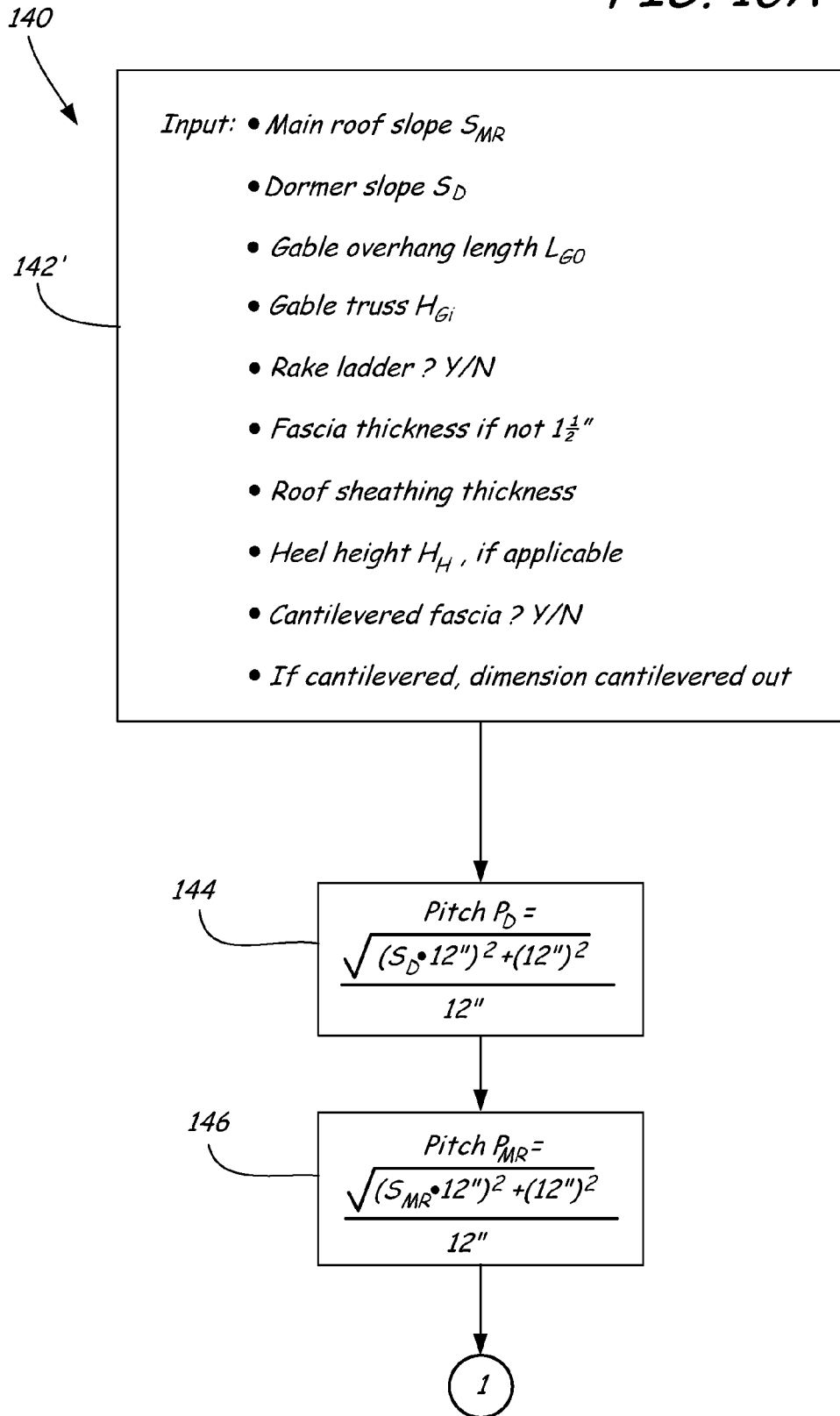


FIG. 16B

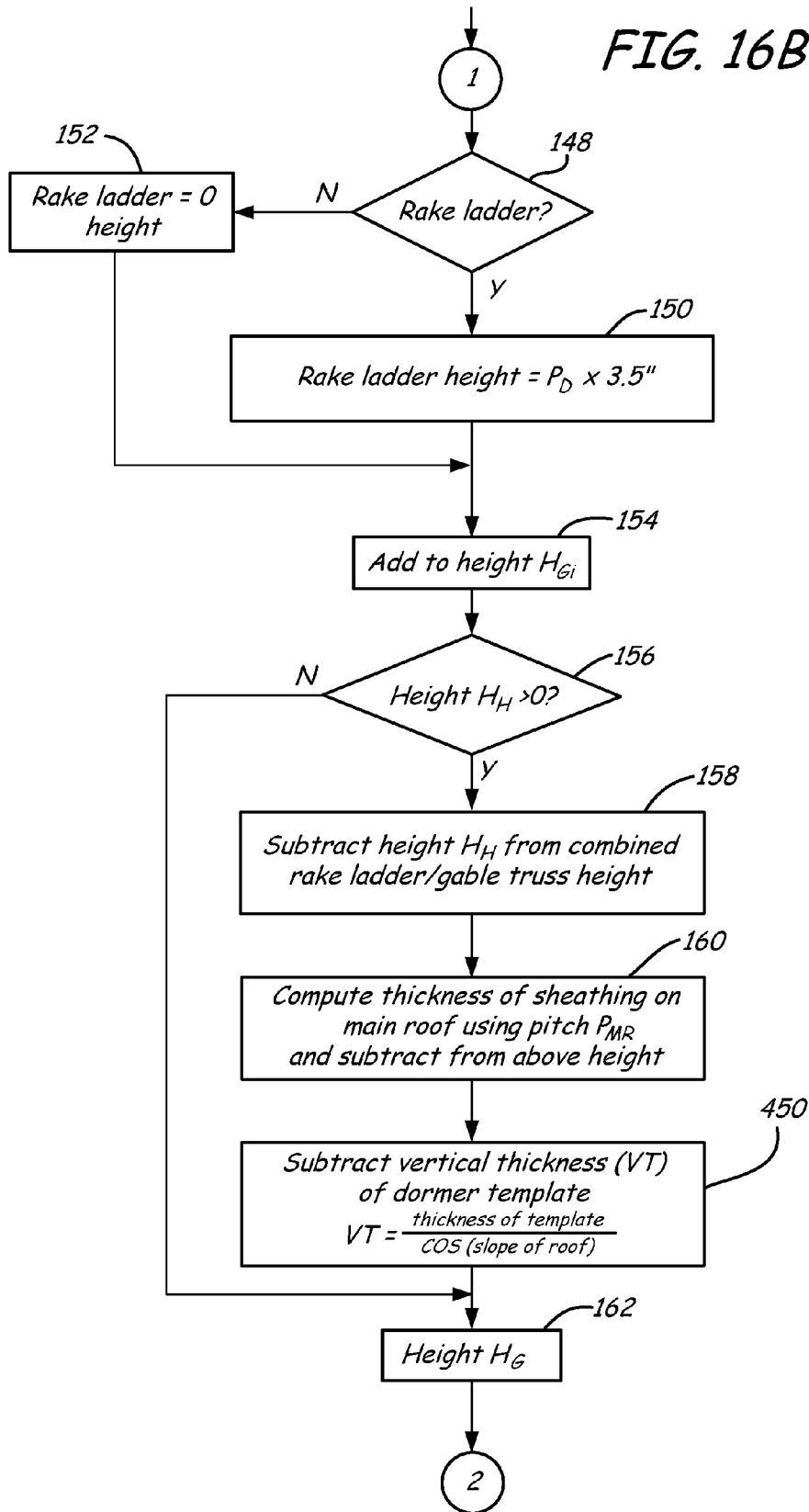


FIG. 16C

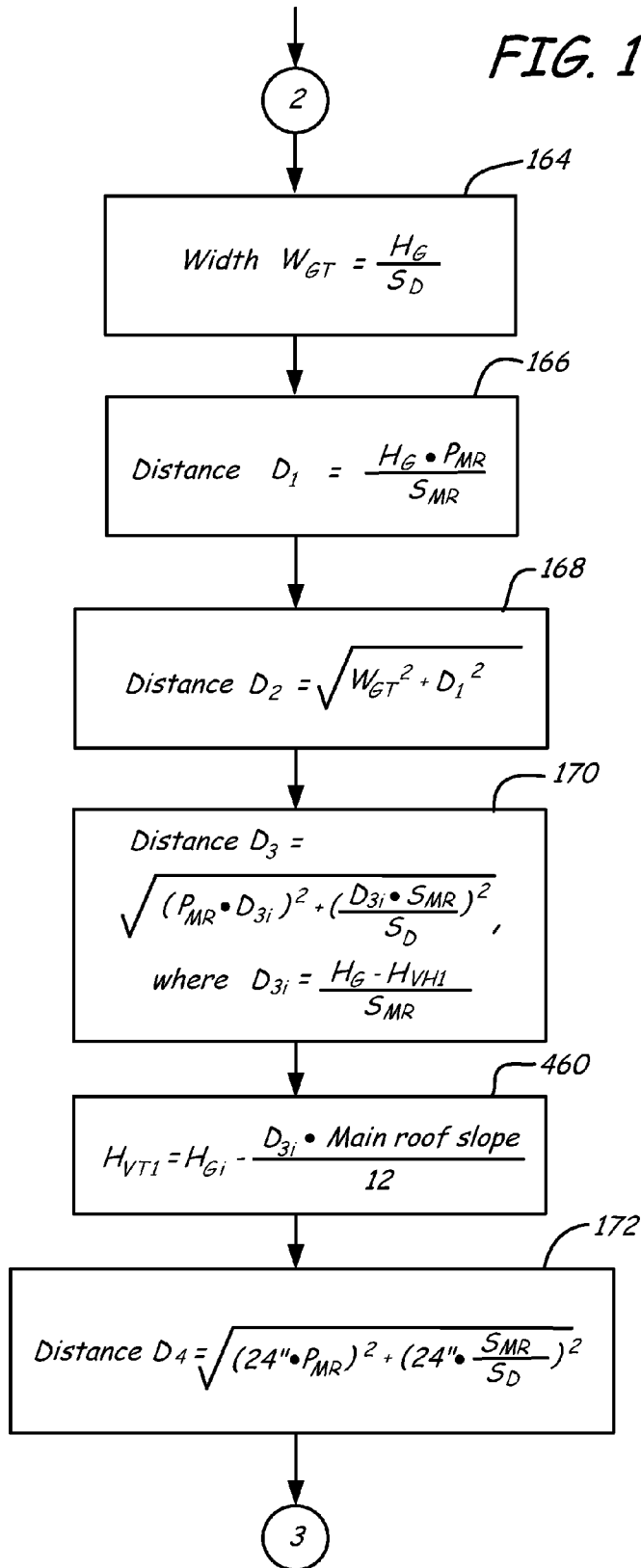


FIG. 16D

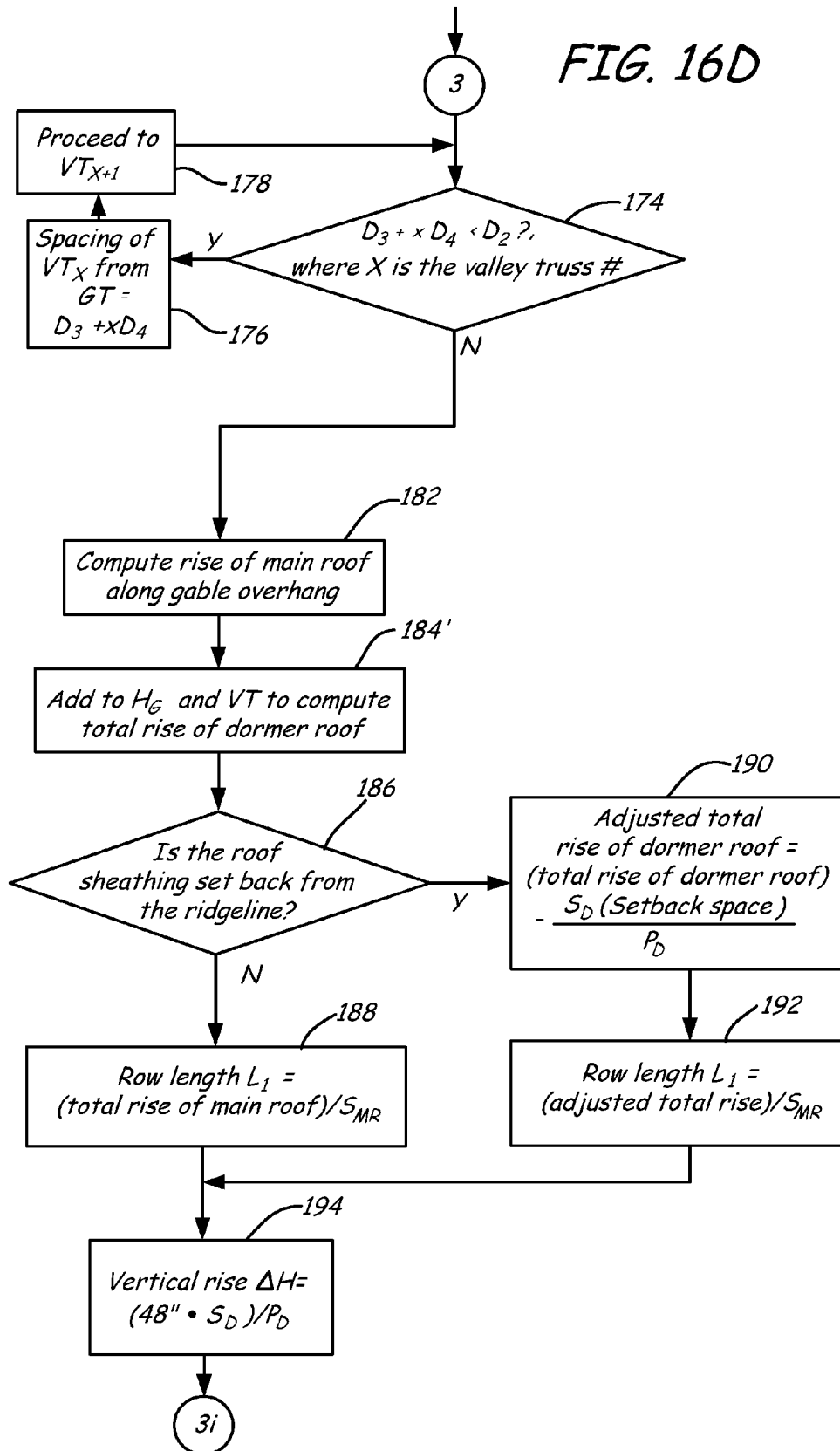


FIG. 16E

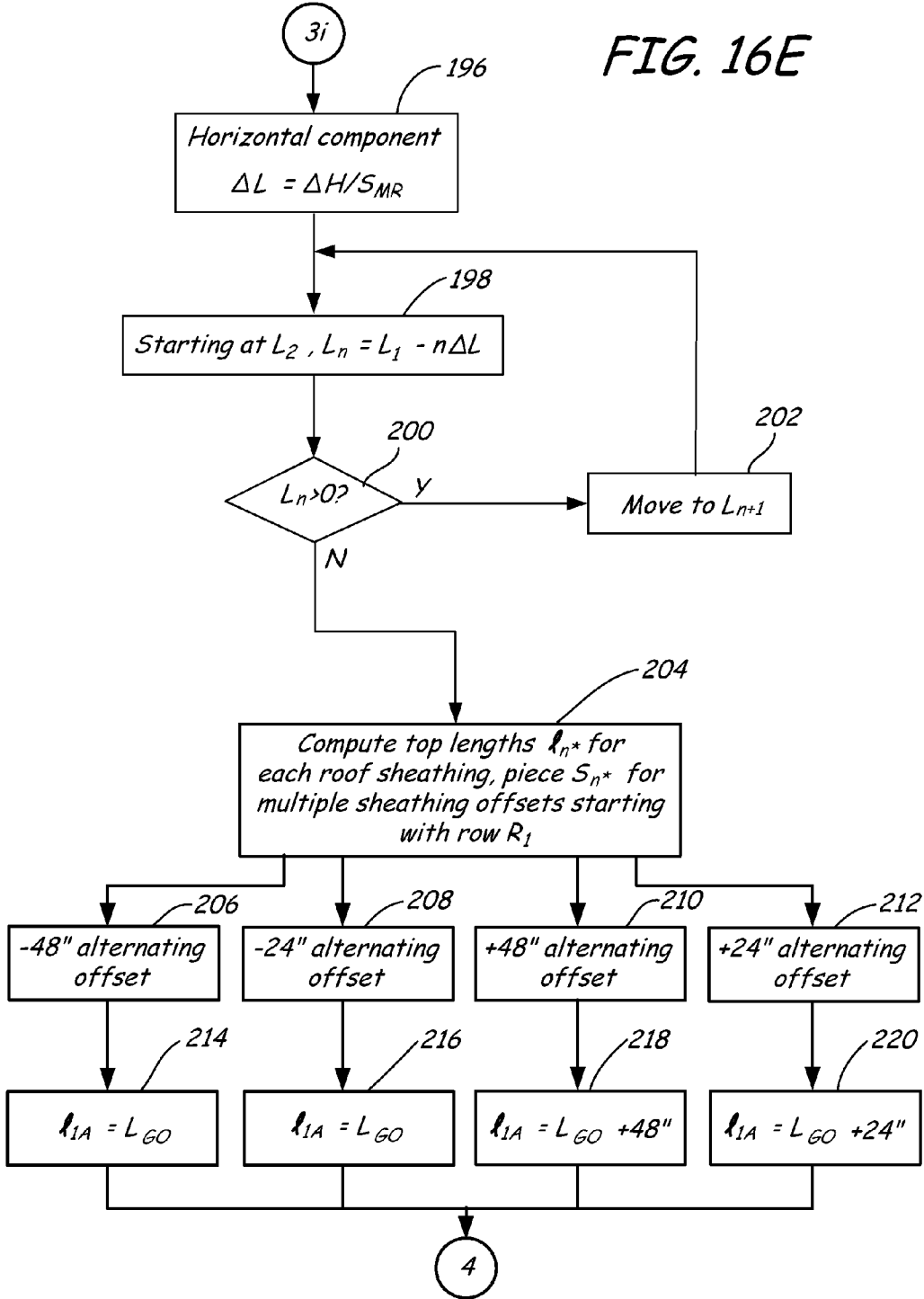
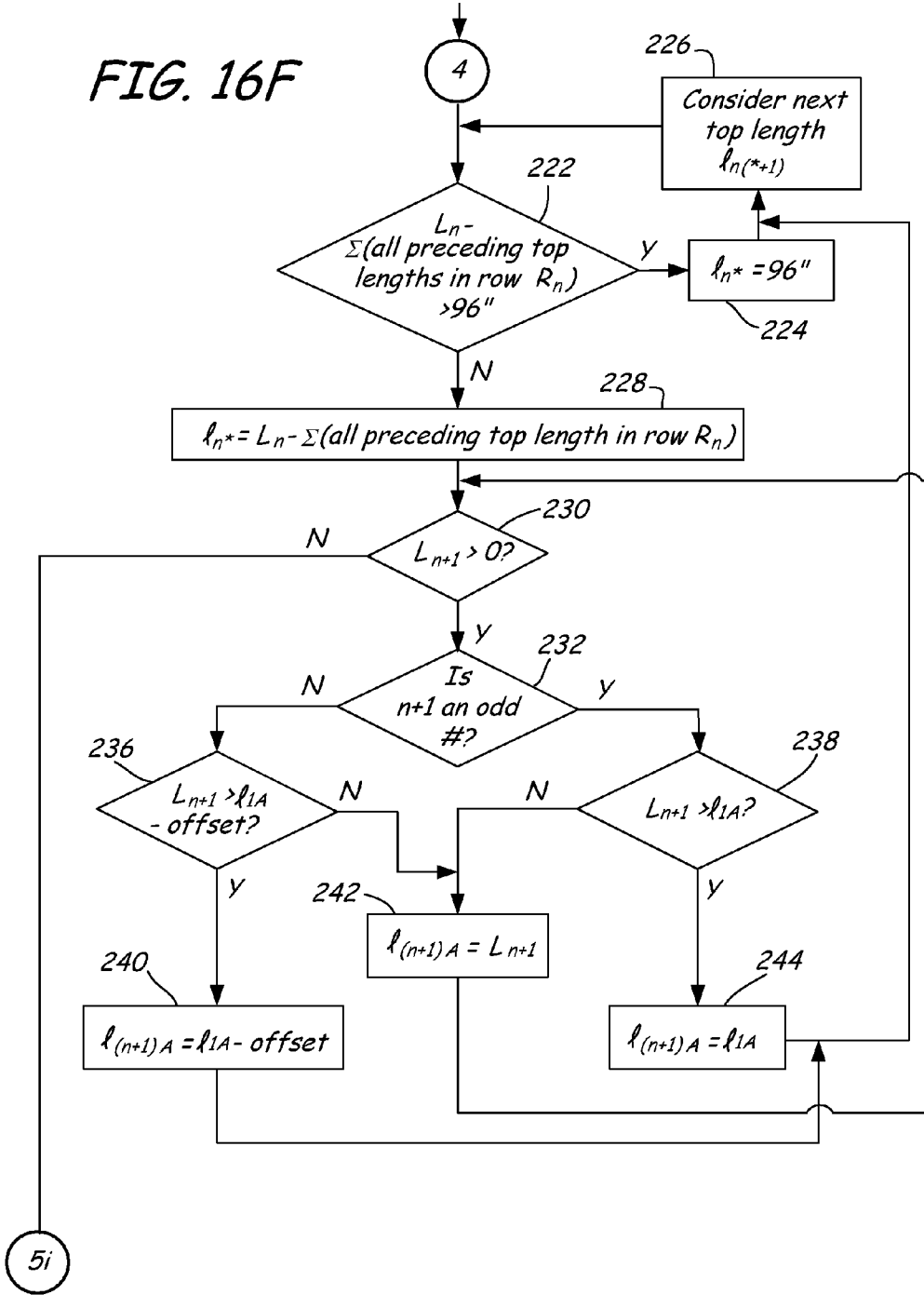


FIG. 16F



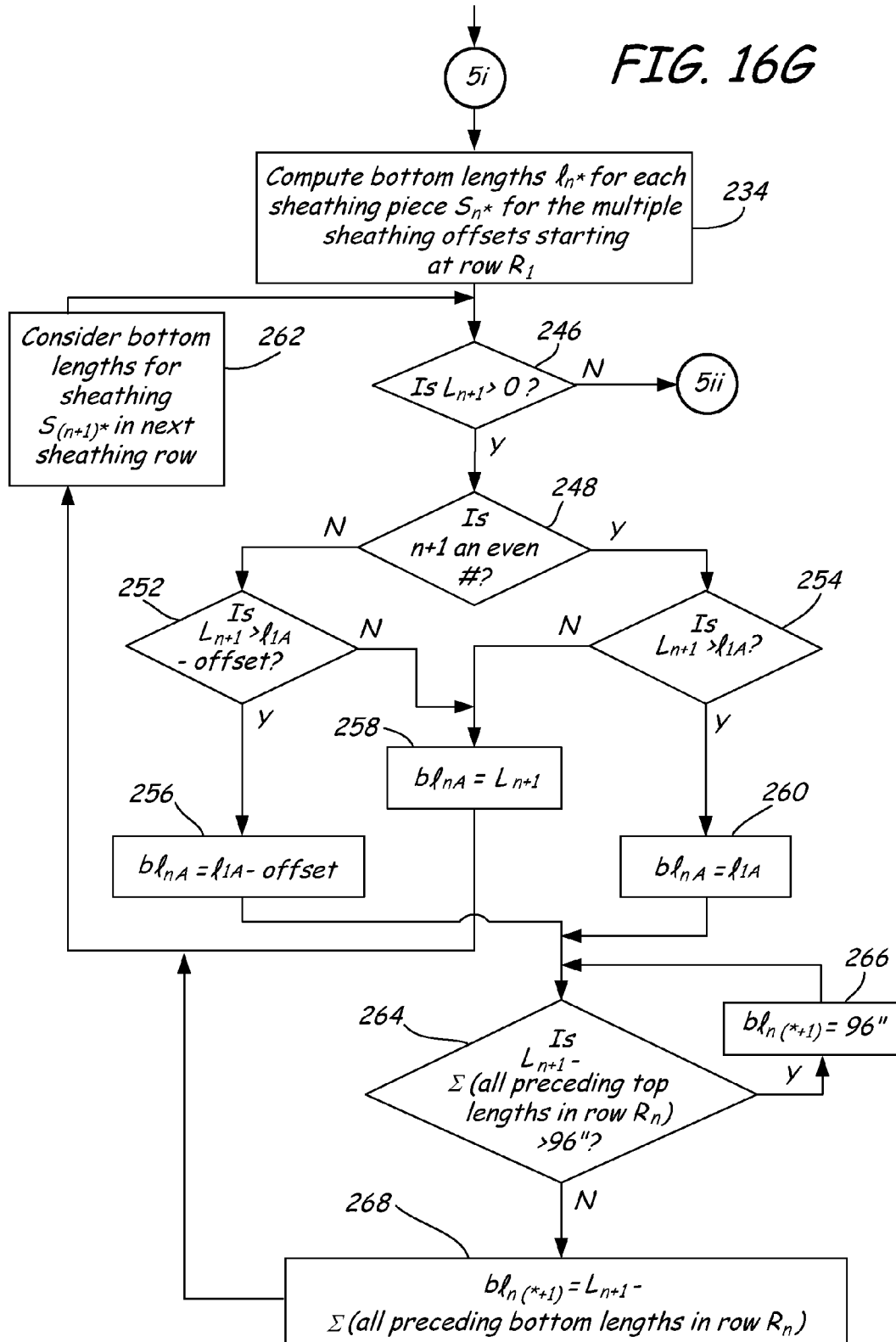


FIG. 16H

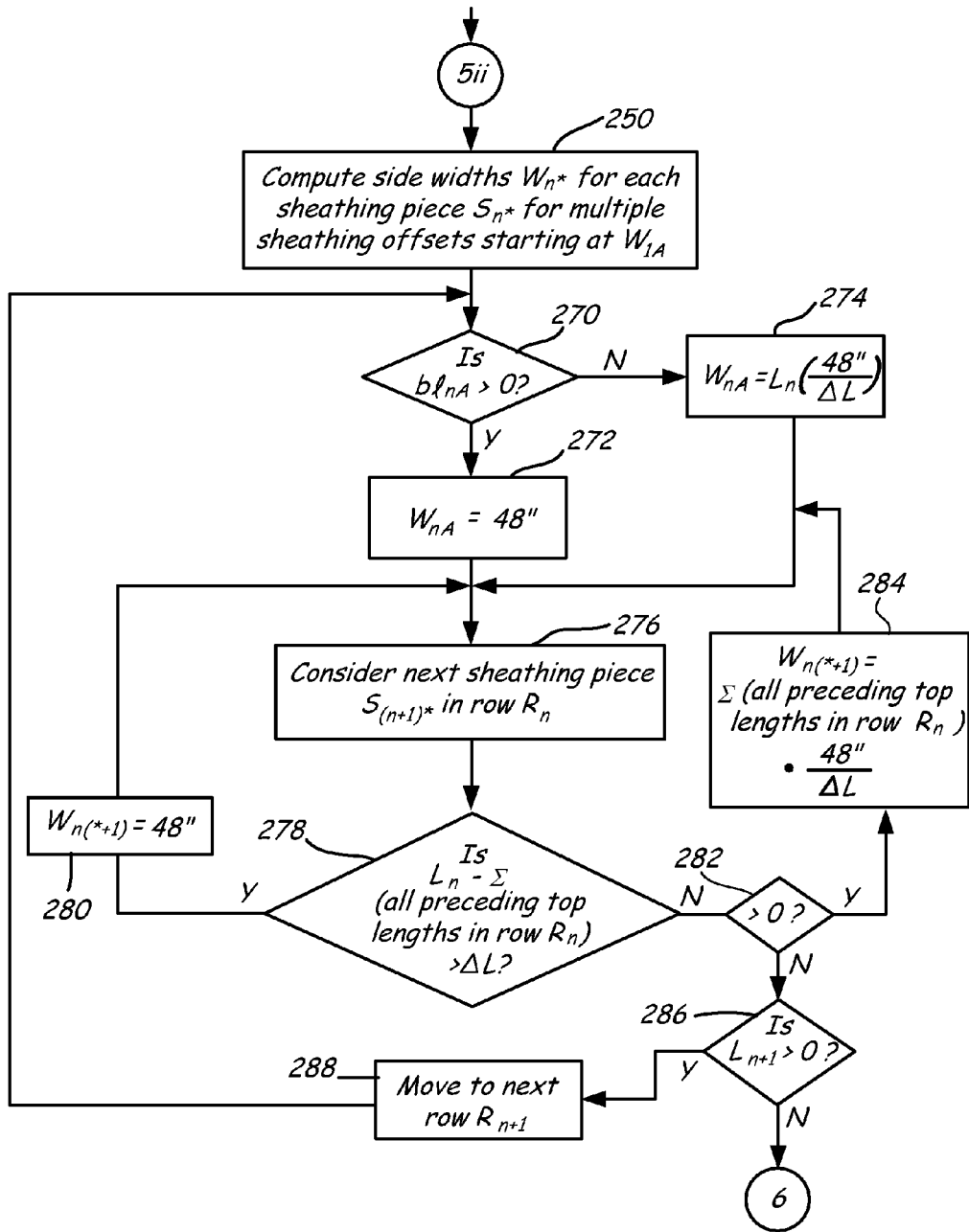


FIG. 16I

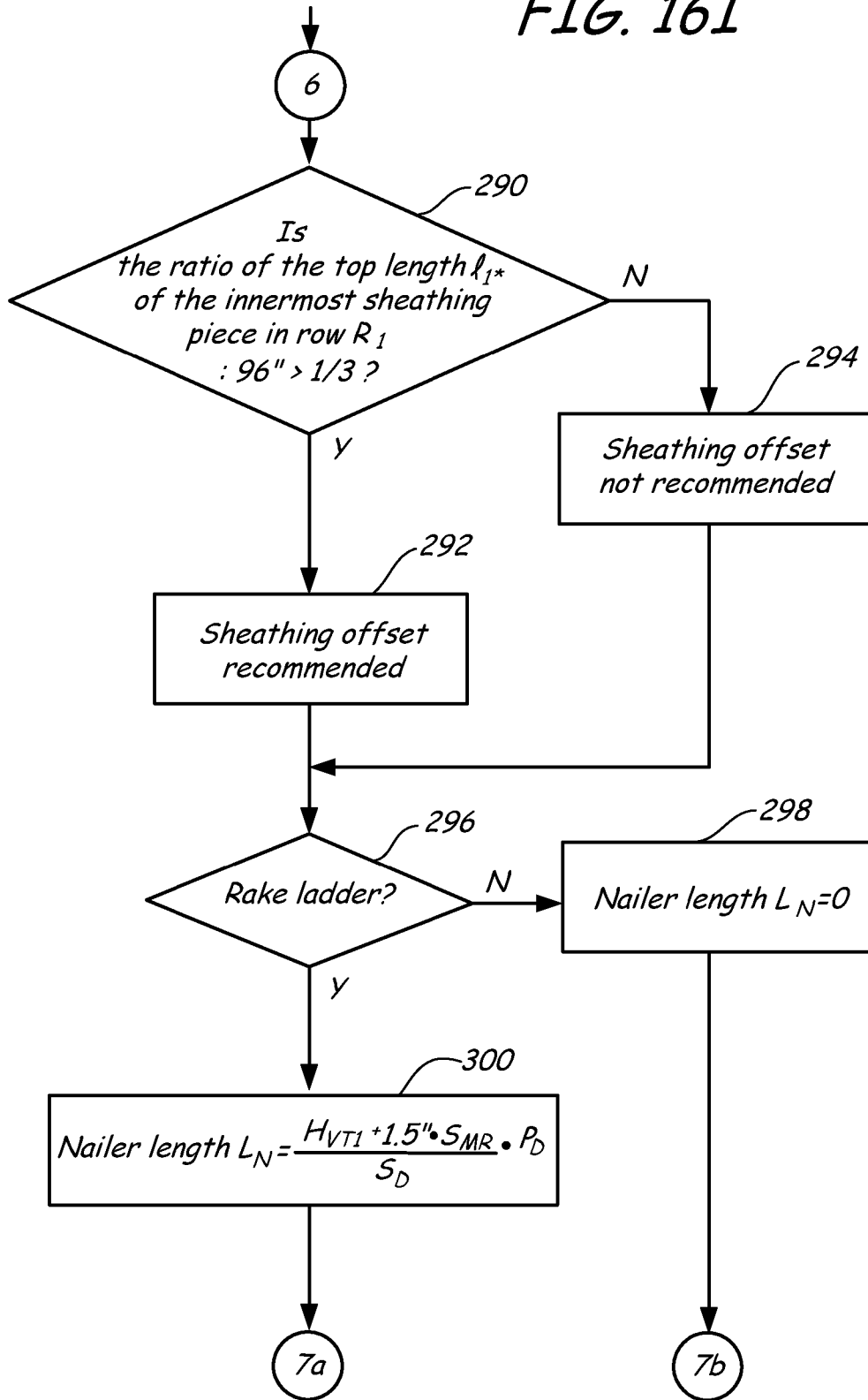


FIG. 16J

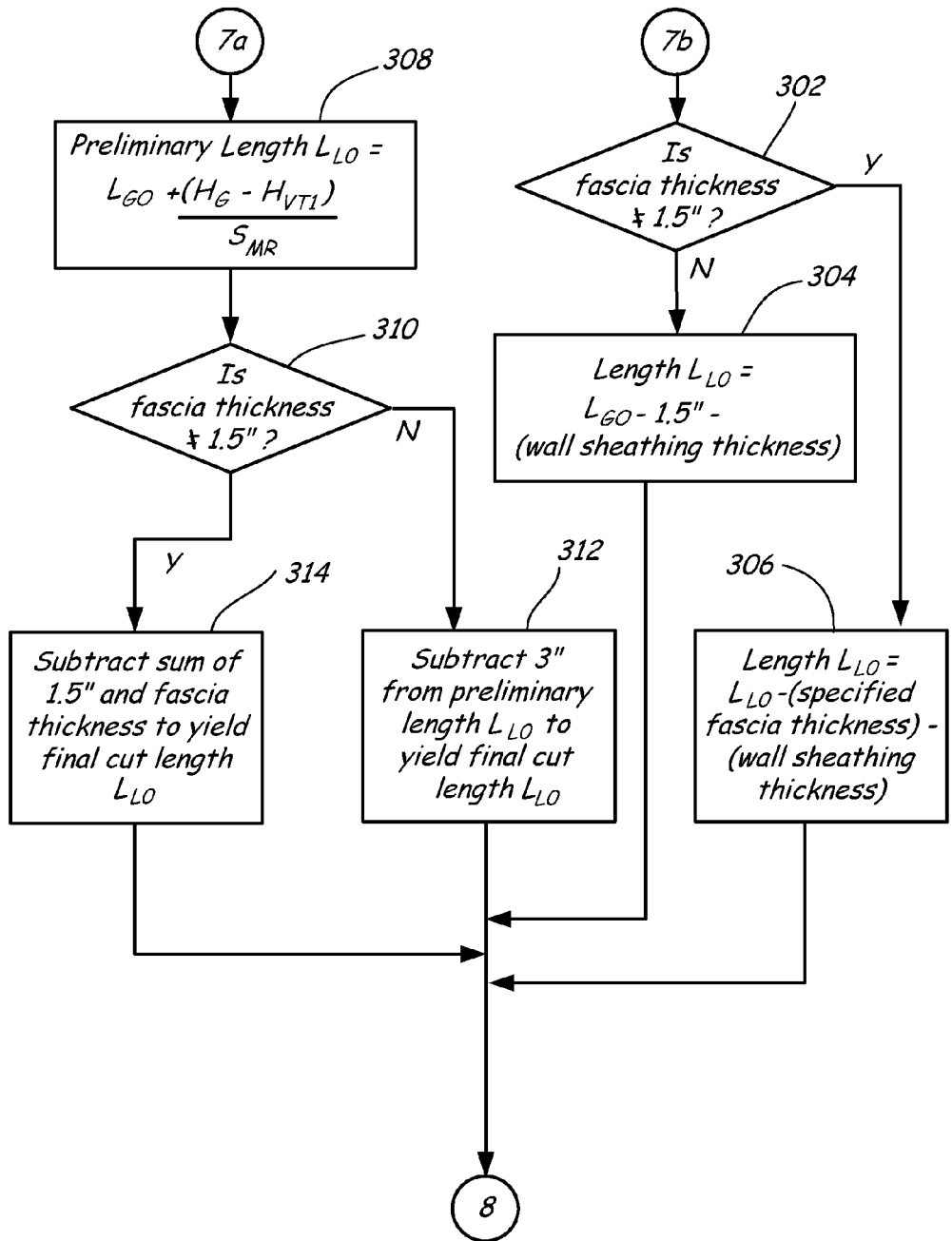
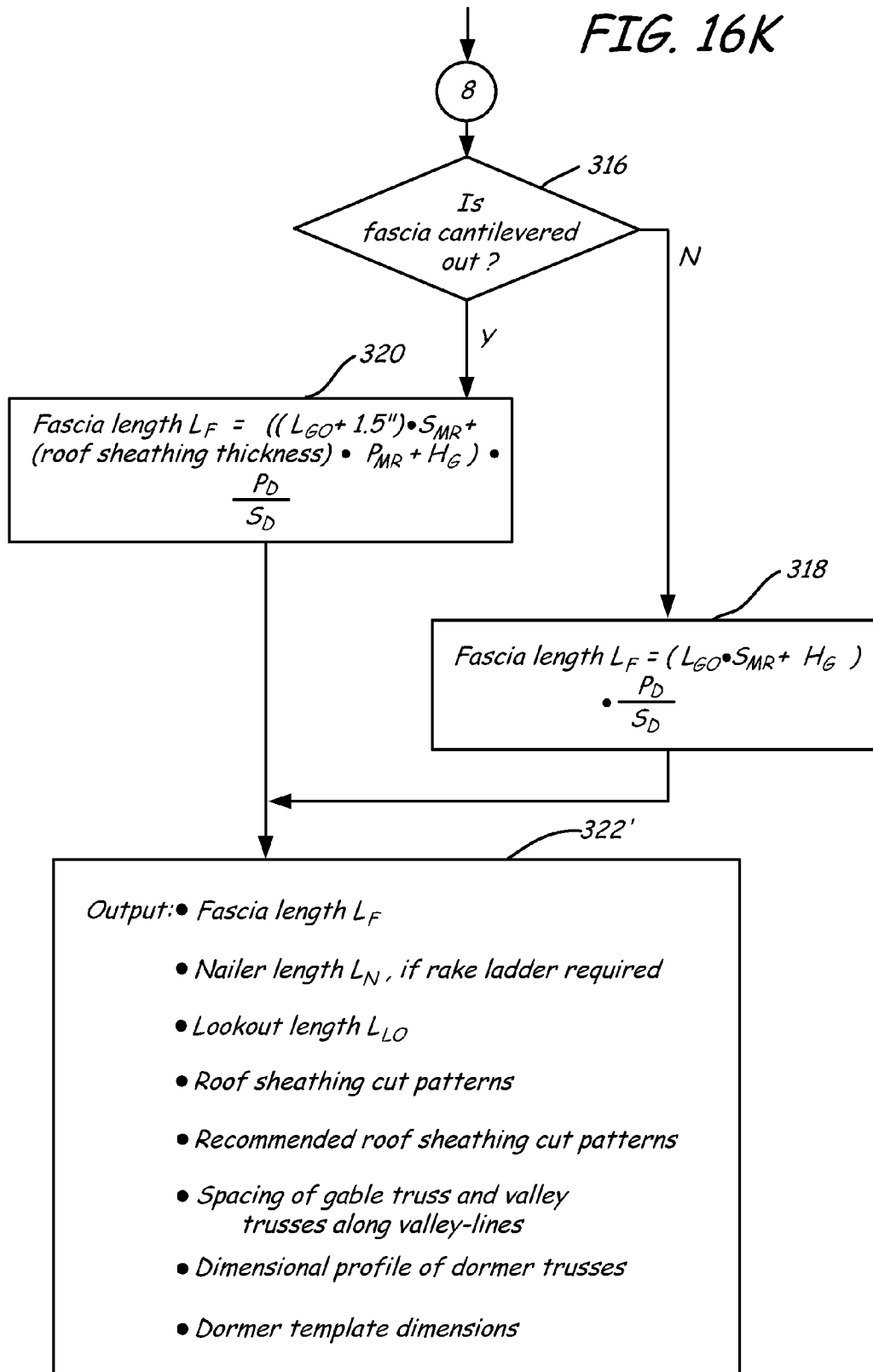


FIG. 16K



DORMER CALCULATOR

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application is a continuation-in-part of U.S. application Ser. No. 11/043,802 filed Jan. 26, 2005 for “DORMER CALCULATOR” by Dean Onchuck, which in turn claims the benefit of Provisional Application No. 60/592,597 filed on Jul. 7, 2004 by Dean Onchuck and entitled “DORMER CALCULATOR.”

INCORPORATION BY REFERENCE

[0002] The aforementioned U.S. application Ser. No. 11/043,802 and Provisional Application No. 60/592,597 are hereby incorporated by reference in their entirety.

BACKGROUND OF THE INVENTION

[0003] The present invention relates generally to the field of dormer construction. In particular, the present invention relates to a method for laying out the materials for constructing a dormer.

[0004] A dormer is a roofed structure projecting outward from the sloping plane of a main roof. A dormer may be included in a roof to increase headroom, improve ventilation, provide a vertical surface suitable for installing windows or other openings, or to add to the aesthetic appeal of a building.

[0005] The framework of a dormer typically consists of a series of spaced trusses which support roof sheathing. These dormer trusses, commonly referred to as valley trusses, are available from suppliers in a pre-manufactured form. The trusses are typically uniformly spaced pursuant to industry standards such as, for example, twenty-four inches on center. The spacing of the outermost dormer truss, commonly referred to as a gable truss, and the first valley truss may deviate from the uniform spacing of the other trusses depending upon the particular dormer installation. The suppliers of pre-manufactured trusses typically do not provide the installer with the appropriate spacing for the gable truss and the first valley truss.

[0006] Even when using pre-manufactured trusses, laying out dormers is a time-consuming endeavor that requires a significant amount of expertise. Frequently, a dormer installer spends significant amounts of time on the roof measuring and making roof sheathing placement and cutting decisions. Traditional practices for laying out dormer roof sheathing can involve guesswork that may result in wasted material, lengthy exposure times on the roof, and a hazard of material waste dropped from the roof. As such, there exists a need for an improved method for laying out dormer truss locations and dormer roof sheathing.

BRIEF SUMMARY OF THE INVENTION

[0007] The present invention is a method for laying out a dormer that projects outward from a main roof. The dormer has a gabled end and a dormer roof originating at a dormer point and terminating at an outer edge of the dormer roof near the gabled end. The dormer includes roof sheathing supported by dormer trusses. The dormer trusses include a gable truss and a plurality of valley trusses.

[0008] In one embodiment, the method of the present invention includes receiving a plurality of dormer inputs from a user. A plurality of layouts for the roof sheathing on the

dormer roof are generated as a function of the dormer inputs. At least on roof sheathing layout is then recommended to a user.

[0009] In another embodiment, the method of the present invention includes receiving a plurality of dormer inputs from a user. The dormer inputs are processed to generate a gable truss spacing for spacing the gable truss from a first valley truss and a uniform valley truss spacing for spacing neighboring valley trusses from each other. The location of the dormer trusses are then determined using the gable truss spacing and the uniform valley truss spacing. The location of each dormer truss is then displayed to a user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a perspective view of an embodiment of a dormer projecting outward from a main roof.

[0011] FIG. 2A is a simplified perspective view of dormer framing for use in constructing the dormer of FIG. 1.

[0012] FIG. 2B shows a top view of the dormer framing of FIG. 2A.

[0013] FIG. 3 is a partial side view of an embodiment of the dormer framing of FIG. 2A with a rake ladder detail for attaching a fascia to the dormer framing.

[0014] FIG. 4 shows a partial side view of an embodiment of the dormer framing of FIG. 2A with a conventional lookout attaching a fascia to the dormer framing.

[0015] FIG. 5 shows a partial side view of a conventional technique for attaching a fascia and a gable truss of the dormer framing of FIG. 2A to the main roof.

[0016] FIG. 6 shows a partial side view of an embodiment of the dormer framing of FIG. 2A, wherein the dormer framing has a gable truss with a heel height.

[0017] FIG. 7 shows a side view of the dormer of FIG. 1 with a coordinate system for defining the size and location of each piece of roof sheathing to be installed on the dormer roof.

[0018] FIG. 8 is a block diagram representation of a method of the present invention for producing a plurality of dormer outputs as a function of a plurality of dormer inputs.

[0019] FIG. 9 is a flow diagram illustrating a calculation process for use in the method of FIG. 8.

[0020] FIG. 10 is a flow diagram illustrating an embodiment of the calculation process of FIG. 9.

[0021] While the above-identified drawing figures set forth several embodiments of the invention, other embodiments are also contemplated, as noted in the discussion. In all cases, this disclosure presents the invention by way of representation and not limitation. It should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that fall within the scope and spirit of the principles of the invention. The figures may not be drawn to scale. Like reference numbers have been used throughout the figures to denote like parts.

DETAILED DESCRIPTION

[0022] FIG. 1 is a perspective view of dormer 20 projecting outward from main roof 22. Main roof 22 encloses a primary roofed-in area and dormer 20 encloses a secondary roofed-in area. Dormer 20 includes dormer roof 24, fascia F, gabled end 26, and ridgeline 28 formed in dormer roof 24. Ridgeline 28 originates at dormer point 30, extends along dormer roof 24, and terminates at edge 32 of dormer roof 24 near fascia F. Fascia F has two bottom ends 27, which in dormer 20 of FIG.

1 attach to main roof 22. A pair of valley-lines 34, only one of which is visible in FIG. 1, are located at the intersection of main roof 22 and dormer roof 24. Valley-lines 34 extend outward from dormer point 30 and terminate at edge 32.

[0023] As shown in FIG. 1, both main roof 22 and dormer roof 24 are sloped. Main roof 22 has a main roof slope S_{MR} representing an amount of vertical rise of main roof 22 per an amount of horizontal run of main roof 22. Similarly, dormer roof 24 has a dormer slope S_D representing an amount of vertical rise of dormer roof 24 per an amount of horizontal run of dormer roof 24.

[0024] FIGS. 2A and 2B are simplified views of dormer framing 40 for supporting dormer roof 24 and gabled end 28 of dormer 20, with FIG. 2A showing a simplified perspective view of dormer framing 40 and FIG. 2B showing a simplified top view of dormer framing 40. Dormer framing 40 includes gable truss GT and valley trusses 42, which are each centered on centerline CL located along main roof 22 equidistant to valley-lines 34. Gable truss GT and valley trusses 42 each include a pair of rafters 44 joined at truss peak 46 and having ends 48 for attachment to main roof 22. Depending upon the size and structural requirements for a particular dormer 20, the number of valley trusses 42 may vary from a single valley truss 42 to any number, x , of valley trusses VT_1 through VT_x . Gable truss GT has truss height H_{GT} and a truss width W_{GT} . Each valley truss 42 has a different truss height H_{VT_x} . Gable truss GT is the outermost truss relative to dormer point 30, height H_{GT} is larger than any height H_{VT_x} . As shown in FIG. 2, the closer a particular valley truss VT_x is located to gable truss GT, the greater its height H_{VT_x} and, conversely, the further a particular valley truss VT_x is located from gable truss GT, the less its height H_{VT_x} .

[0025] Gable truss GT is spaced from dormer point 30 along centerline CL by distance D_1 and from dormer point 30 along valley-line 34 by distance D_2 . In addition, gable truss GT is spaced from valley truss VT_1 along ridgeline 28 by distance D_3 , and from valley truss VT_1 along valley-line 34 by distance D_3 . Valley trusses 42 are spaced from each other along valley-line 34 by distance D_4 . As shown in FIG. 2, distances D_2 , D_3 , and D_4 are each measured from an inside edge (relative to dormer point 30) of each respective truss. Depending upon the particular configuration of dormer 20, distance D_3 and D_4 may be the same, distance D_3 may be less than distance D_4 , or distance D_3 may be greater than distance D_4 . In some embodiments, distance D_4 is fixed in accordance to construction conventions, such as, for example, twenty-four inches on center for standard wood framing techniques. Distance D_4 may vary from one dormer to another, depending upon the materials and construction conventions used to construct each dormer.

[0026] Multiple framing variations are employed in the dormer construction industry for attaching fascia F to dormer framing 40. FIGS. 3 and 4 are partial side views of two different embodiments for attaching fascia F to dormer framing 40 of dormer 20, with FIG. 3 showing dormer framing 40 with a rake ladder detail and FIG. 4 showing dormer framing 40 without a rake ladder detail. As shown in FIG. 3, fascia F attaches to lookout 52 at outer end 54 of lookout 52. Fascia F is made of two pieces and each piece has a fascia length L_F (not shown in FIGS. 3 and 4). Inner end 56 of lookout 52 attaches to nailer 58 and middle portion 60 of lookout 52 attaches to truss peak 46 of gable truss GT. Nailers 58 attach to valley truss VT_1 and extend along each rafter 44 of valley truss VT_1 to secure lookout 52 relative to valley truss VT_1 .

Nailer 58 is formed from two pieces, with each piece having a nailer length L_N (not shown in FIG. 3). Wall sheathing 62 is attached to gable truss GT to form gable end 28.

[0027] As mentioned above, FIG. 4 shows dormer framing 40 without a rake ladder detail. Similar to the embodiment of FIG. 3 (that includes a rake ladder detail), fascia F attaches to outer end 54 of lookout 52. However, in the embodiment of FIG. 4, lookout 52 is shorter and attaches at inner end 56 to wall sheathing 62 secured to gable truss GT.

[0028] As shown in FIGS. 3 and 4, each embodiment of dormer framing 40 has a gable overhang length L_{GO} that is equal to the distance between gable truss GT and an outside face of fascia F. Thus, length L_{GO} indicates the distance the outside face of fascia F is spaced out from gable truss GT.

[0029] Multiple framing variations are also employed in the dormer construction industry for attaching fascia F at its two bottom ends 27 (FIG. 1) to support structures such as, for example, dormer framing 40 or main roof 22. In some embodiments, bottom ends 27 of fascia F may be secured directly to main roof 22 or a component of main roof 22, while in other embodiments bottom ends 27 may be secured to a support cantilevered out from the building fascia of main roof 22.

[0030] FIGS. 5 and 6 are partial side views of two framing variations for dormer framing 40 used in the dormer construction industry for securing gable truss GT relative to main roof 22. As shown in FIG. 5, ends 48 of gable truss GT are secured to main roof sheathing 64 of main roof 22, which is attached to main roof support 66 of main roof 22. In other embodiments of dormer framing 40, ends 48 of gable truss GT may be secured directly to main roof supports 66. In FIG. 6, side portion 68 of gable truss GT is secured to building support 70 of main roof 22. As shown in FIG. 6, gable truss GT has heel height H_H which equals the length of the portion of height H_{GT} that extends below main roof sheathing 64.

[0031] FIG. 7 shows a side view of roof 24 of dormer 20, with a plurality of cut and installed roof sheathing pieces 72 supported by gable truss GT (not shown in FIG. 7) and valley trusses 34. Each roof sheathing piece S_{n^*} has top length l_{n^*} , bottom length bl_{n^*} , first width W_{n^*} , and second width $W_{n^{*(+1)}}$ that is identical to the first width $W_{n^{*(+1)}}$ of an adjacent roof sheathing piece $S_{n^{*(+1)}}$. In an exemplary embodiment, roof sheathing pieces 72, prior to any cutting, comprise rectangular sheets of plywood measuring about ninety-six inches long by about forty-eight inches wide. In other embodiments, roof sheathing pieces 72, prior to any cutting, may be any type of roof sheathing material known in the art with any starting dimension known in the art.

[0032] Each roof sheathing piece S_{n^*} is located in any number of horizontal rows R_1 through R_n , with row R_1 located along ridgeline 28 and the last row R_n located along valley-line 34 at its most distant end with respect to dormer point 30. Each row R_1 through R_n has a different respective row length L_1 through L_n . Starting with row R_1 , each successive row differs in length by distance ΔL and is separated from the previous row by vertical rise ΔH corresponding to the vertical rise of an uncut roof sheathing piece positioned on dormer roof 24. Thus, for example, row R_1 has length L_1 and row R_2 has length L_2 , with length L_2 being equal to $L_1 - \Delta L$. Each particular horizontal row R_1 through R_n may include any number of roof sheathing pieces $S_{n,4}$ through $S_{n,*}$, with $*$ representing the number of roof sheathing pieces (including roof sheathing piece $S_{n,*}$) separating roof sheathing piece $S_{n,*}$ from edge 32 using an alphabetical scale.

[0033] As shown in FIG. 7, in the dormer construction industry, it is common to horizontally offset the roof sheathing pieces S_{n^*} in a given row R_n from roof sheathing pieces $S_{(n+/-1)^*}$ in a neighboring row $R_{(n+/-1)}$ by offset distance **76**. This offset pattern typically alternates every other row so that, for example, the particular roof sheathing pieces in even numbered rows are aligned horizontally with respect to each other, while the particular roof sheathing pieces in odd numbered rows are aligned horizontally with respect to each other. Examples of offset distance **76** include +24 inches, +48 inches, -24 inches, -48 inches, or any other offset distance **76** known in the art. As used herein, a positive offset distance **76** occurs when top length l_{1A} is longer than top length l_{2A} and a negative offset distance **76** occurs when top length l_{1A} is shorter than top length l_{2A} .

[0034] Before installing roof sheathing **72** on roof **24**, dormer installers must first construct dormer framing **40** (shown in FIGS. 2-6) to support roof sheathing **72**. Constructing dormer framing **40** requires locating gable truss GT and valley trusses **42** along the pair of valley-lines **34**. Even when installing pre-manufactured dormer trusses, the location of gable truss GT relative to valley truss VT_1 must be determined, which can be a time consuming and potentially hazardous process. In addition, the dormer installers may also need to determine cut details for lookout **52**, nailer **58**, and fascia F. After dormer framing **40** has been constructed on main roof **22**, the dormer installers must then install roof sheathing **72** on dormer framing **40**. When using conventional methods, this typically involves custom cutting each roof sheathing piece S_{n^*} while on main roof **22**. These conventional methods can result in significant material waste, prolonged exposure time on the roof, and a hazardous conditions resulting from material waste dropped from main roof **22**. The dormer calculator of the present invention provides an efficient method for laying out dormer framing **40** and roof sheathing **72** while on the ground, thereby saving time, reducing material waste, and reducing the hazards associated with conventional methods.

[0035] FIG. 8 is a block diagram illustrating of an exemplary embodiment of dormer calculator **80** of the present invention. Dormer calculator **80** uses calculation process **82** to generate dormer outputs **83** as a function of one or more dormer inputs **84**. Examples of dormer inputs **84** include main roof slope S_{MR} , dormer slope S_D , gable overhang length L_{GO} , gable truss height H_{GT} , valley truss height H_{VT1} , wall sheathing thickness input **86**, input **88** representing the total number of dormers to be constructed, input **90** representing whether a rake ladder detail will be included in dormer **20**, input **92** representing the fascia thickness, heel height H_H , input **94** representing the roof sheathing thickness of main roof **22**, input **96** indicating whether a cantilevered fascia is to be included in dormer **20**, and/or any other dormer input known in the art. Any number and combination of dormer inputs **84** may be inputted into calculation process **82** to yield one or more dormer outputs **83**. For example, in one embodiment of dormer calculator **80**, slope S_{MR} , slope S_D , length L_{GO} , height H_{GT} , and height H_{VT1} are mandatory inputs, while the remaining inputs **84** shown in FIG. 8 are optional inputs.

[0036] Examples of dormer outputs **83** include output **98** indicating locations of gable truss GT and one or more valley rafter **42** along valley-lines **34**, output **100** indicating a recommended roof sheathing offset distance(s) **76** and roof sheathing cut dimensions, fascia length L_F , a number of lookouts **52** and length L_{LO} for lookouts **52**, nailer length L_N when

a rake ladder detail is required, and/or any other dormer output known in the art. Depending upon the particular embodiment of dormer calculator **80**, dormer outputs **83** may be generated by calculation process **82** in any number or combination. For example, in one embodiment of dormer calculator **80**, a single dormer output **81** is produced by calculation process **82** as a function of one or more dormer inputs **84**, while, in the embodiment of FIG. 8, a plurality of dormer outputs **83** are generated as a function of a plurality of dormer inputs **84**.

[0037] Dormer calculator **80** may be used with any measurement system (such as, for example, metric or imperial) and any sizes of roof sheathing pieces and framing materials known in the art. In some embodiments, the uncut dimensions of the roof sheathing pieces and/or the framing materials are inputted into dormer calculator **80** by a user. In one embodiment, one or more dormer truss spacing preferences (such as, for example, the spacing along ridgeline **28** between inside faces of adjacent valley trusses) are inputted into dormer calculator **80** by a user.

[0038] The following is a summary of the abbreviations used in FIGS. 9 and 10:

[0039] b_{1n^*} Bottom length for a piece of dormer roof sheathing S_{n^*} .

[0040] CL Centerline running along the main roof between the pair of valley-lines and equidistant to each valley-line.

[0041] D_1 Distance gable truss GT is spaced from the dormer point along CL.

[0042] D_2 Distance gable truss GT is spaced from the dormer point along the valley-lines.

[0043] D_{3i} Distance gable truss GT is spaced from valley truss VT_1 along the ridgeline.

[0044] D_3 Distance gable truss GT is spaced from valley truss VT_1 along the valley-lines.

[0045] D_4 Uniform distance the valley trusses are spaced from each other along the valley-lines.

[0046] GT Gable truss.

[0047] ΔH Vertical rise of an uncut roof sheathing piece S_{n^*} positioned on the dormer roof.

[0048] H_{GT} Height of gable truss GT.

[0049] H_G Full inside height of gable truss GT, as measured from the dormer roof directly above gable truss GT.

[0050] H_{VTx} Height of valley truss VT_x .

[0051] H_H Heel height for gable truss GT.

[0052] l_{n^*} Top length of roof sheathing piece S_{n^*} .

[0053] L_{GO} Length of the gable overhang.

[0054] L_{LO} Length of the lookout.

[0055] L_n Length of horizontal roof sheathing row R_n .

[0056] L_N Length of a nailer for attaching a lookout to VT_1 .

[0057] P_D Pitch of the dormer roof.

[0058] P_{MR} Pitch of the main roof.

[0059] R_n Horizontal row of roof sheathing on a dormer roof.

[0060] S_{n^*} Piece of roof sheathing in row R_n at horizontal location *.

[0061] VT_x Number x valley truss.

[0062] W_{GT} Width of gable truss GT measured from centerline CL.

[0063] W_{n^*} Outside width of a piece of roof sheathing S_{n^*} .

[0064] FIG. 9 is a flow diagram illustrating a calculation process **110**, which is an embodiment of calculation process **82** of FIG. 8. In steps **112** through **116**, process **100** generates information related to the positioning of gable truss GT and valley rafters **42** in dormer **20**. At steps **112**, **114**, and **115**,

process 110 computes distances D_3 , D_2 , and D_4 , respectively (see FIGS. 2A and 2B). Using distances D_2 , D_3 , and D_4 , process 112 computes the locations of gable truss GT and valley rafters 42 along valley-line 34 at step 116.

[0065] As shown in steps 118 through 124 of FIG. 9, process 110 generates information related to the positioning of roof sheathing 72 on dormer roof 24. At step 118 of FIG. 9, process 110 computes row length L_n (FIG. 7) for each roof sheathing row R_n . Using the information generated in step 118 process 110 then computes top length l_{n*} and bottom length bl_{n*} (FIG. 7) at step 120 for every roof sheathing piece S_{n*} for multiple roof sheathing offsets 76. At step 122, process 110 then generates width W_{n*} (FIG. 7) for each roof sheathing piece S_{n*} . At step 124, process 110 then recommends one or more sheathing offsets 76 from the multiple sheathing offsets 76 of step 120.

[0066] In steps 126 through 130 of FIG. 9, process 110 generates information related to the attachment of fascia F to gable truss GT. If a rake ladder detail is required as shown in FIG. 3, process 110 generates nailer length L_N at step 126. At step 128, process 110 generates length L_{LO} and a number of lookouts 52 to be cut (see FIGS. 3 and 4). At step 130, process 110 generates length L_F .

[0067] Thus, when a user inputs the relevant dormer inputs 84 of FIG. 8 into calculation process 110 of FIG. 9, calculation process 110 computes, and outputs to the user, the dormer framing layout information needed to construct dormer framing 40 of FIGS. 2 through 6 on main roof 22. Using dormer inputs 84 and the dormer framing layout information, calculation process 110 also computes, and outputs to the user, one or more recommended roof sheathing layouts.

[0068] FIG. 10 is a flow diagram illustrating calculation process 140, which is a detailed embodiment of calculation process 110 of FIG. 9, for generating dormer outputs 83 as a function of dormer inputs 84. As shown in FIG. 10, a plurality of dormer inputs 84 are inputted into process 140 at step 142. Process 140 then executes a plurality of steps 144 through steps 320 and outputs a plurality of dormer outputs 83 to a user at step 322.

[0069] Steps 144 through 178 of FIG. 10 are detailed descriptions of the processes involved in performing steps 112 through 116 of FIG. 9 and yield the locations of gable truss GT and valley trusses 42 along valley-lines 34 (FIGS. 2A and 2B). Steps 182 through 202 of FIG. 10 are detailed descriptions of the processes involved in performing step 118 of FIG. 9 and yield row length L_n for each row R_n (FIG. 7). Steps 204 through 268 of FIG. 10 correspond to step 120 of FIG. 9 and yield top length l_{n*} and bottom length bl_{n*} for each roof sheathing piece S_{n*} (FIG. 7). Steps 270 through 288 of FIG. 10 are detailed descriptions of the processes involved in performing step 122 of FIG. 9 and yield width W_{n*} (FIG. 7) for each roof sheathing piece S_{n*} . Steps 290 through 294 of FIG. 10 are detailed descriptions of the processes involved in performing step 124 of FIG. 9 and yield one or more recommended sheathing offsets 76 (FIG. 7). Steps 296 through 300 of FIG. 10 are detailed descriptions of the processes involved in performing step 126 and yield nailer length L_N . Steps 302 through 314 of FIG. 10 are detailed descriptions of the processes involved in performing step 128 of FIG. 9 and yield length L_{LO} (see FIGS. 3 and 4). Steps 316 through 320 of FIG. 10 are detailed descriptions of the processes involved in performing step 130 of FIG. 9 and yield length L_F .

[0070] As discussed above, steps 144 through 178 of process 140 yield the locations of gable truss GT and valley

trusses 42 along valley-lines 34. In step 144, the pitch P_D of dormer roof 24 is computed using the formula $P_D = ((S_D \cdot 12'')^2 + (12'')^2)^{1/2} / 12''$. Thus, in this embodiment, P_D represents the ratio of a length along dormer roof 24 (i.e., a hypotenuse length) to a horizontal component of that length. Step 146 calculates the main roof pitch, P_{MR} , using the above equation for step 144 with slope S_{MR} substituted in place of slope S_D . Steps 144 and 146 are optional and are included to simplify downstream calculations. As determined by decision step 148, if a rake ladder detail is required, a rake ladder height is determined in step 150 by multiplying pitch P_D by 3.5 inches. The 3.5 inch multiplier term in step 150 represents the vertical width of lookout 52 (see FIGS. 3 and 4) assuming lookout 52 is cut from two-by-four stock material. In other embodiments, this multiplier is supplied by the user and inputted into process 140 at step 142. In still other embodiments, a different multiplier than 3.5 inches is supplied by process 140 pursuant to the dimensions of lookout 52. If a rake ladder detail is not required, a rake ladder height is set at zero pursuant to step 152. As indicated by step 154, the rake ladder height resulting from step 150 or step 152 is then summed with height H_{gi} (shown in FIG. 2A).

[0071] Decision step 156 determines whether gable truss GT has a heel height H_H greater than zero, as shown in FIG. 6. If gable truss GT does not have a heel height (i.e., $H_H \leq 0$), the combined rake ladder/gable truss GT height determined in step 154 is the full inside height of the gable, H_G , as indicated by step 162. However, if gable truss GT has a non-zero heel height H_H , heel height H_H is subtracted from the combined rake ladder/gable truss GT height by step 158 to yield an adjusted gable height. At step 160, the vertical thickness of the roof sheathing on main roof 22 is then determined by multiplying the inputted roof sheathing thickness by pitch P_{MR} and summing the product with the adjusted gable height of step 158 to yield height H_G , as indicated in step 162.

[0072] At step 164, W_{GT} of FIG. 2B is computed by dividing height H_G by slope S_D . Distance D_1 of FIGS. 2A and 2B is computed at step 166 using the equation distance $D_1 = H_G P_{MR} / S_{MR}$. Distance D_2 of FIGS. 2A and 2B is then computed at step 168 using the equation distance $D_2 = (W_{GT}^2 + D_1^2)^{1/2}$. Distance D_3 of FIGS. 2A and 2B is computed by first calculating distance D_{3i} in step 170 using the equation distance $D_{3i} = (H_G - H_{VH1}) / S_{MR}$. Distance D_3 is then computed in step 170 using the equation distance $D_3 = ((P_{MR} D_{3i})^2 + (D_{3i} S_{MR} / S_D)^2)^{1/2}$. At step 172, distance D_4 of FIGS. 2A and 2B is computed using the equation distance $D_4 = ((24'' \cdot P_{MR})^2 + (24'' \cdot S_{MR} / S_D)^2)^{1/2}$, where 24 inches is the spacing along ridge line 28 between inside faces of adjacent valley trusses VT_x and VT_{x+1} . In the embodiment of FIG. 10, valley trusses 42 are spaced pursuant to the industry standard of twenty-four inches on center along ridge line 28. In other embodiments, valley trusses 42 may be spaced pursuant to any spacing used in the art. In step 176, the spacing of each particular valley truss VT_x from gable truss GT is determined by summing D_3 and the product $x D_4$, where x is the valley truss number. As indicated by steps 178 and 174, this process is continued for each successive valley truss, VT_{x+1} , as long as the sum of $D_3 + x D_4$ is less than D_2 . Once the sum of $D_3 + x D_4$ is less than or equal to D_2 the above iterative process ceases as indicated by decision step 174.

[0073] As discussed above, steps 182 through 202 yield row length L_n for each row R_n of FIG. 7. Starting at step 182, the vertical rise of main roof 22 along the gable overhang is computed. This vertical rise is then summed with height H_G to

yield the total vertical rise of dormer roof **24** from outer edge **32** of dormer roof **24** to dormer point **30**. In steps **186** through **192**, row length L_1 is calculated. If row R_1 is set back from ridgeline **28** so that a space (not shown in FIG. 7) along dormer roof **24** separates row R_1 from ridgeline **28**, the vertical component of the setback space is subtracted from the total vertical rise of dormer roof **24** computed in step **186**. The vertical component of the setback space is computed in step **190** by multiplying the setback space by slope S_D and then dividing the product by pitch P_D . As indicated in steps **188** and **192**, depending on whether dormer **20** has a setback space, row length L_1 is computed by dividing the total vertical rise of dormer roof **24** (minus any vertical setback) by slope S_{MR} .

[0074] The vertical rise ΔH (shown in FIG. 7) of a full piece of roof sheathing located on dormer roof **24** is computed in step **194** using the calculation $\Delta H = (48")S_D/P_D$, where 48 inches represents the uncut width of rectangular roof sheathing having a length of 96 inches. In other embodiments, this uncut width in step **194** is greater than or less than 48 inches, depending upon the size of the roof sheathing material employed. In step **196**, the distance ΔL of FIG. 7 is computed by dividing vertical rise ΔH by slope S_{MR} . Then, as indicated by step **198**, row length L_n for each dormer sheathing row R_n is computed using the calculation $L_n = L_1 - n\Delta L$, where n is the sheathing row number of row R_n . As indicated by decision step **200**, this calculation is repeated for each successive row, R_{n+1} , until row length L_n is no longer greater than zero, at which point process **140** moves on to step **204**.

[0075] As previously mentioned, steps **204** through **268** yield top length l_{n*} and bottom length bl_{n*} for each roof sheathing piece S_{n*} of FIG. 7. As shown in the embodiment of FIG. 10 in steps **204** through **220**, starting with row R_1 , top length l_{1A} is computed for a -48 inch offset, a -24 inch offset, a +48 inch offset, and a +24 inch offset. In other embodiments of process **140**, top length l_{1A} may be computed for any sheathing offset **76** of FIG. 7 known in the art in any combination, with steps **214** through **220** being modified accordingly. Top length l_{1e} and bottom length bl_{1e} are then calculated for each roof sheathing piece S_{1*} in row R_1 . Moving inward from roof sheathing piece S_{1A} relative to edge **32** of FIG. 7, as indicated by steps **222** and **226**, if the difference between row length L_1 and the sum of all top lengths proceeding roof sheathing piece S_{1*} is greater than 96 inches, top length l_{n*} is set to equal 96 inches by step **224**. Process **140** then considers top length $l_{n^{(*+1)}}$ for the next roof sheathing piece $S_{n^{(*+1)}}$ and repeats decision step **222** for each successive roof sheathing piece $S_{1^{(*+1)}}$ until the difference between row length L_1 and the sum of all preceding top lengths l_{1*} in row R_1 is no longer greater than 96 inches. Once this occurs, top length l_{1*} for that particular roof sheathing piece S_{n*} is computed by step **228** as the difference between row length L_n and the sum of all preceding top lengths l_{1*} in row R_1 .

[0076] As indicated by decision step **230**, process **140** then moves to the next row R_{n+1} and determines whether row length L_{n+1} is greater than zero. If row length L_{n+1} is not greater than zero, process **140** moves to step **234** and begins computing every bottom length bl_{n*} . However, if row length L_{n+1} is greater than zero, decision step **232** determines whether the row number, $n+1$, for row R_{n+1} is an odd number. If $n+1$ is an odd number, decision step **238** determines whether row length L_{n+1} is greater than top length l_{1A} . If row length L_{n+1} is not greater than top length l_{1A} , then top length $l_{(n+1)A}$ is set to equal row length L_{n+1} by step **242**, and process

140 returns to step **230** and moves to the next roof sheathing row. If, however, row length L_{n+1} is greater than top length l_{1A} , then top length $l_{(n+1)A}$ is set to equal top length l_{1A} as indicated in step **234**, and process **240** returns to step **226** to consider the next top length l_{n*} in the same roof sheathing row. Returning to decision step **232**, if $n+1$ is not an odd number, decision step **236** determines whether row length L_{n+1} is greater than the difference in length between top length l_{1A} and offset **76** (i.e., l_{1A} -offset). If row length L_{n+1} is greater than l_{1A} -offset, top length $l_{(n+1)A}$ is set to equal l_{1A} -offset by step **240** and process **140** returns to step **226** to consider the next top length l_{n*} in the same roof sheathing row. If, however, row length L_{n+1} is not greater than l_{1A} -offset, then top length $l_{(n+1)A}$ is set to equal row length L_{n+1} by step **242**, and process **140** returns to decision step **230** to consider the next roof sheathing row R_{n+1} . The above process repeats itself until decision step **230** identifies a row length L_n that is not greater than zero, at which point process **140** moves to step **234**.

[0077] As indicated in steps **234** through **268**, the process of computing every bottom length bl_{n*} of FIG. 7 is similar to the above process for calculating every top length l_{n*} . Starting with row R_1 , decision step **246** determines whether the row length L_{n+1} of the next sheathing row (which for row R_1 is row length L_2), is greater than zero. If row length L_{n+1} is not greater than zero, process **140** moves to step **250** and begins to compute the side widths W_{n*} of FIG. 7. If, however, row length L_{n+1} is greater than zero, decision step **248** determines whether $n+1$ is an even number. If $n+1$ is an even number, decision step **254** determines whether row length L_{n+1} is greater than top length l_{1A} . If row length L_{n+1} is greater than top length l_{1A} , then bottom length bl_{nA} is set to equal top length l_{1A} as indicated by step **260**. If however, row length L_{n+1} is not greater than top length l_{1A} , then bottom length bl_{nA} is set to equal row length L_{n+1} as indicated by step **258**, and process **140** moves to step **262** to consider bottom length $bl_{(n+1)*}$ for the next sheathing row R_{n+1} . Returning to decision step **248**, if $n+1$ is not an even number, decision step **252** determines whether row length L_{n+1} is greater than l_{1A} -offset. If row length L_{n+1} is greater than l_{1A} -offset, then bottom length bl_{nA} is set to equal l_{1A} -offset, and process **140** moves to decision step **264** to consider the next bottom length $bl_{n^{(*+1)}}$ in row R_n . If however, L_{n+1} is not greater than l_{1A} -offset, then, as indicated in step **258**, bottom length bl_{nA} is set to equal row length L_{n+1} , and process **140** moves to step **262**.

[0078] Decision step **264** determines whether the difference between row length L_{n+1} and the sum of all preceding bottom lengths in row R_n is greater than 96 inches. If this difference is greater than 96 inches, then, as indicated in step **266**, bottom length $bl_{n^{(*+1)}}$ is set to equal 96 inches, and decision step **264** considers the bottom length for the next piece of roof sheathing in row R_n . If however the difference between row length L_{n+1} and the sum of all preceding bottom lengths in row R_n is not greater than 96 inches, then step **268** sets bottom length $bl_{n^{(*+1)}}$ to be equal to this difference, at which point process **140** returns to step **262** and considers the bottom lengths in the next sheathing row. The above process for computing bottom lengths bl_{n*} of FIG. 7 continues until decision box **246** reaches a row length L_{n+1} that is not greater than zero, at which point process **140** moves on to step **250**.

[0079] As indicated above, steps **250** and steps **270** through **288** compute widths W_{n*} of FIG. 7 starting with width W_{1A} as indicated in step **250**. Decision step **270** determines whether

bottom length $bl_{n,a}$ is greater than zero. If bottom length $bl_{n,a}$ is greater than zero, width $W_{n,a}$ is set to equal 48 inches by step 272. In this embodiment, 48 inches corresponds to the width of an uncut roof sheathing piece $S_{n,*}$. In other embodiments, $W_{n,a}$ may be set by the user or process 140 to any roof sheathing piece width known in the art. From step 272, process 140 moves to step 276 and considers the next roof sheathing piece $S_{n(*+1)}$ in row R_n . If however, top length $bl_{n,a}$ is not greater than zero, width $W_{n,a}$ is computed by step 174 to equal row length L_n multiplied by 48 inches and divided by distance ΔL of FIG. 7, where 48 inches is the width of an uncut roof sheathing piece $S_{n,*}$. Process 140 then moves from step 274 to step 276 and considers the next roof sheathing piece $S_{n(*+1)}$ in row R_n . Decision step 278 determines whether the difference between row length L_n and the sum of all preceding top lengths in row R_n is greater than distance ΔL . If the difference computed in step 278 is greater than distance ΔL , width $W_{n(*+1)}$ is set to equal to 48 inches by step 280, and process 140 returns to step 276 and considers the next sheathing piece $S_{n(*+1)}$ in row R_n . If, however, the difference between row length L_n and preceding top lengths in row R_n is not greater than distance ΔL , decision step 282 determines whether this difference is greater than zero. If the difference is greater than zero, step 284 sets width $W_{n(*+1)}$ to equal the sum of all preceding top lengths in row R_n multiplied by the ratio of 48 inches to distance ΔL , and process 140 moves decision step 276. However, if decision step 282 determines the difference between row length L_n and the sum of all preceding top lengths in row R_n to be less than or equal to zero, decision step 286 then determines whether row length L_n is greater than zero. If row length L_n is greater than zero, then width $W_{n(*+1)}$ for the next row R_{n+1} are calculated as indicated by step 288. This process continues moving from row to row down dormer roof 24 until decision step 286 reaches a row length L_n that is not greater than zero. At this point, process 140 moves to step 290.

[0080] In decision step 290, the ratio of top length $l_{1,*}$ of the innermost (relative to edge 32) piece of roof sheathing $S_{1,*}$ in row R_1 to the length of an uncut piece of sheathing is determined and compared to the fraction $\frac{1}{3}$. In the embodiment of FIG. 10, as indicated in step 290, the length of uncut roof sheathing piece $S_{n,*}$ is set to equal 96 inches. In other embodiments, the length of the uncut roof sheathing may be any sheathing length known in the art. Decision step 290 determines this ratio for each roof sheathing offset 76 of steps 206 through 212. If the ratio for a particular roof sheathing offset 76 is not greater than $\frac{1}{3}$, then that roof sheathing offset is not recommended as indicated in step 294. In other embodiments, the value that the ratio must exceed to be recommended by step 292 may vary depending upon the acceptable level of roof sheathing waste.

[0081] Decision step 296 determines whether a rake ladder detail as shown in FIG. 3 is to be included based on information inputted by input step 142. If a rake ladder detail is not required, nailer length L_N is assigned a value of zero by step 298. If, however, a rake ladder detail is to be incorporated, nailer length L_N is determined by step 300 using the calculation $(H_{VT1} + S_{MR} \cdot 1.5")P_D/S_D$, where 1.5 inches represents the width of nailer 58. In the embodiment of FIG. 10, a two-by-four is used as the starting material for nailer 58. In other embodiments, 1.5 inches may be replaced by the appropriate width of any nailer material known in the art. If a rake ladder detail is to be incorporated length L_{LO} (shown in FIGS. 3 and 4) is computed in step 308 using the formula $L_{LO} = L_{GO} + (H_G -$

$H_{VT1})/S_{MR}$. If a rake ladder detail is not to be incorporated, step 302 determines whether the fascia thickness is equal to 1.5 inches based on the relevant input in step 142. If the fascia thickness is not 1.5 inches, step 304 computes length L_{LO} to be $L_{GO} - (1.5" + \text{wall sheathing thickness})$, where the wall sheathing thickness is the thickness of wall sheathing 62 of FIG. 4. If however, the thickness of fascia F is not equal to 1.5 inches, step 306 then carries out the same calculation as in step 304 using the thickness of fascia F inputted in step 142. If a rake ladder detail is to be incorporated in dormer 20, step 310 determines whether the thickness of fascia F is equal to 1.5 inches. If the thickness is not equal to 1.5 inches then the final cut length L_{LO} is given in step 314 by subtracting the thickness of fascia F from input step 142 from the value obtained in step 308. If the thickness of fascia F is equal to 1.5 inches, then step 312 subtracts three inches from the preliminary length L_{LO} determined by step 308 to yield the final cut length L_{LO} , where three inches represents the sum of the fascia thickness and the thickness of nailer 58.

[0082] If fascia F is to be cantilevered out, fascia length L_F is computed in step 320 using the calculation $L_F = (S_{MR}(L_{GO} + 1.5") + P_{MR}(\text{roof sheathing thickness})) \cdot P_D/S_D$. For a non-cantilevered fascia F, step 318 computes fascia length L_F using the formula $(L_{GO}S_{MR} + H_G) \cdot P_D/S_D$. Then, in a final step, step 322 outputs to a user fascia length L_F , nailer length L_N (if applicable), length L_{LO} , a roof sheathing cut pattern, one or more recommended roof sheathing cut patterns, and the spacing of gable truss GT and valley trusses 42 along valley-line 34.

[0083] The dormer calculator described above with respect to exemplary embodiments of the present invention provides a systematic method for laying out the framing and the roof sheathing for a dormer projecting outward from a main roof. The locations of the dormer trusses with respect to the main roof are determined using a plurality of dormer inputs received from a user to generate a gable truss spacing and a uniform valley truss spacing. The gable truss spacing and the uniform valley truss spacing are used to determine the location of each dormer truss along the pair of valley-lines where the dormer meets the main roof. Based on these dormer truss locations, a plurality of roof sheathing layouts are determined, with each roof sheathing layout including a quantity of roof sheathing pieces to be installed on the dormer roof and cut dimensions for each piece of roof sheathing. The dormer calculator then recommends at least one of the roof sheathing layouts to a user. As such, a dormer installer using the present invention can make all of the dormer roof sheathing cuts and placement decisions while on the ground, thereby saving time, reducing roof exposure time, and eliminating the need for removing roof sheathing waste from the roof.

[0084] Another embodiment of the present invention relates to a method for producing a dormer template or underlay. The dormer template is attachable onto a main roof to aid in formation of the dormer structure. Utilizing a method similar to the dormer layout method described above, the dormer template is formed with dimensions that locate the dormer trusses in correct positions. In an exemplary embodiment, the dormer template is materially formed dimensionally (that is, formed of inexpensive building materials such as paper/fabric or plywood, for example, that is not designed to be load-bearing), with sufficient structural integrity to bear the reaction forces applied by the dormer trusses that are attached to it. The load of the dormer trusses is supported by the main roof support. In a particular embodiment, the dormer

template has a thickness of about 1.5 inches. Alternatively, the dormer template may be formed of a structural material that becomes a part of the structural design of the dormer. Also, in some embodiments, the main roof sheathing under the dormer roof may be eliminated by virtue of the dormer template being constructed to replace the functions of the main roof sheathing in that location.

[0085] FIGS. 11A and 11B are simplified diagrams showing dormer template 400 for forming dormer framing 40 according to an embodiment of the present invention, with FIG. 11A showing a simplified perspective view and FIG. 11B showing a simplified top view. Dormer template 400 includes side pieces 402 and 404 and cross pieces 406, 408, 410 and 412. Side pieces 402 and 404 converge at center line CL to form two sides of a triangle, with cross piece 406 forming the base of the triangle. Cross pieces 406, 408, 410 and 412 mark the location on which dormer trusses 414 are to be attached. Specifically, rafters 416 forming gable truss GT are located on side pieces 402 and 404 of dormer template 400 at opposite ends of cross piece 406, and rafters 416 forming valley trusses VT1, VT2 and VT3 are located on side pieces 402 and 404 of dormer template 400 at opposite ends of cross pieces 408, 410 and 412, respectively. Rafters 416 of gable truss GT and valley trusses VT1, VT2 and VT3 are joined at truss peak 418, and are configured and spaced in generally the same manner as shown and described above with respect to FIGS. 2A and 2B.

[0086] Dimensions D_2 and D_5 of dormer template 400 are shown in solid lines for a configuration in which a non-zero heel height exists. If there is no heel (that is, if the heel height is zero), dimensions D_2 and D_5 of dormer template 400 extend as shown in dashed lines in FIGS. 11A and 11B.

[0087] With the provision of dormer template 400, the entire dormer framing 40 may be a premanufactured product that can be assembled at a factory or in the field. Notably, the layout of the dormer that has traditionally been a task for a worker at the construction site, is predetermined by the dormer template, so that the worker at the construction site need only assemble dormer framing 40 on dormer template 400 and/or attach dormer framing 40 to the main roof.

[0088] As described above with respect to FIGS. 3 and 4, multiple framing variations are employed in the dormer construction industry for attaching fascia F to dormer framing 40. FIG. 3 shows dormer framing 40 with a rake ladder detail, and FIG. 4 shows dormer framing 40 without a rake ladder detail. In each of these embodiments, dormer template 400 may, in an exemplary configuration, be constructed so that distance between fascia F and first valley truss VT_1 is calculated to be equal to the spacing between the other valley truss rafters.

[0089] FIGS. 12 and 13 are partial side views of framing variations for dormer framing 40. FIGS. 12 and 13 are substantially identical to FIGS. 5 and 6 discussed above, except that FIGS. 12 and 13 incorporate dormer template 400, positioned on main roof sheathing 64.

[0090] FIG. 14 is a block diagram illustrating an embodiment of dormer calculator 80 that incorporates the creation of dormer template 400. The diagram shown in FIG. 14 is substantially identical to FIG. 8 discussed above, except that one dormer input 84 to calculation process 82 is removed and two additional dormer outputs 83 are generated by calculation process 82. Specifically, input H_{VT1} (the height of the first valley truss) is no longer an option to be provided to calculation process 82, and calculation process 82 generates dormer template layout 430 and dormer truss profiles 432 as addi-

tional outputs. An exemplary process for generating these outputs is described in detail below.

[0091] FIG. 15 is a flow diagram illustrating calculation process 110 that incorporates the creation of dormer template 400, which is an embodiment of calculation process 82 of FIG. 14. The diagram shown in FIG. 15 is substantially identical to FIG. 9 discussed above, except that steps 114 and 116 are modified to account for the creation of dormer template 400, and new step 440 is added after step 116 for computation of the dimensional profile of dormer trusses 414. Specifically, step 114 is modified to indicate that distances D_2 and D_5 are both computed for dormer template 400 (see FIG. 11A). Step 116 is modified to indicate that the locations of trusses are computed along the valley line and/or on the raised surface of dormer template 400. Step 440 is added after step 116, and involves computing the dimensional profile of dormer trusses 414. The remaining steps are the same as described above with respect to FIG. 9.

[0092] The calculation process involving the creation of dormer template 400 receives as an input the roof height above the plane of the main roof at its heel (H_{Gi}), and then utilizes the main roof slope (S_{MR}) and the dormer slope (S_D) to determine the inner point of the dormer roof where it meets the main roof, which is known as the dormer point. From the dormer point, two lines are formed along the intersections of the dormer roof and the main roof to configure the outline of the dormer on the main roof. Dormer template 400 is formed with dimensional material (e.g., 1.5 inches in thickness in one embodiment) comprising side pieces 402 and 404 around the perimeter of the dormer outline, and the heights of dormer trusses 414 (i.e., rafters 416 forming valley trusses VT_1 , VT_2 and VT_3) are calculated to establish a location for each to fit into the dormer and form the dormer's ridge line. The locations of dormer trusses 414 are marked on dormer template 400. In the embodiment shown in FIGS. 11A and 11B, these locations are marked by cross pieces 408, 410 and 412.

[0093] FIG. 16 (including FIGS. 16A-16K) is a flow diagram illustrating calculation process 140, which is a detailed embodiment of calculation process 110 of FIG. 15, for generating dormer outputs 83 as a function of dormer inputs 84 and incorporating the creation of dormer template 400. The diagram shown in FIGS. 16A-16K is substantially identical to FIGS. 10A-10K discussed above, except as discussed in detail below.

[0094] In FIG. 16A, step 142' shows the inputs to the calculation process. Step 142' differs from step 142 shown in FIG. 10A in that valley truss height H_{VT1} is no longer included in the input list. This is because the calculation process for creation of dormer template 400 produces valley truss height H_{VT1} based on other variables, and is not a fixed input to the process. However, in an exemplary embodiment, a slider bar is created in a user interface to the calculation process (typically a computer running an application that includes the calculation process), with the slider being movable to the right or left to see the effects of changing valley truss heights and roof sheathing layouts. This feature allows the calculation process to be used either to work with prefabricated valley trusses, or to be used to show other possible dimensions of valley trusses which will optimize roof sheathing layouts.

[0095] In FIG. 16B, step 450 is added after step 160 to subtract the vertical thickness (VT) of dormer template 400 from the overall height calculation, since dormer template 400 will be located so as to underlay the dormer trusses. VT is

determined by dividing the thickness of the template by the cosine of the angle of the slope of the main roof.

[0096] In FIG. 16C, step 460 is added after step 170 to calculate the height of valley truss VT1. As discussed above with respect to FIG. 16A, this height is not a fixed input to the calculation process in the embodiment involving creation of a dormer template 400 (although, as discussed above, a slider bar may be added to show calculations of various valley truss heights and roof sheathing layouts to allow the user to see the effects of changes in those parameters on one another).

[0097] In FIG. 16D, step 184' is modified to add back in the vertical thickness (VT) of dormer template 400 when calculating the total rise of the dormer roof (since this number was subtracted from the earlier calculation of height H_G , but does add to the total rise of the dormer roof).

[0098] In FIG. 16K, step 322' shows the outputs of the calculation process. In step 322', the dimensional profile of the dormer trusses and the dormer template dimensions are added (compared to step 322 shown in FIG. 10K), to indicate that these outputs are generated by the process that involves creation of dormer template 400.

[0099] As a result of the process shown in FIGS. 16A-16K, the dimensions of dormer template 400 and dormer trusses 414 are generated, and dormer template 400 is subsequently constructed accordingly. Dormer template 400 provides visual indicators of the locations of dormer trusses 414, which may also be premanufactured so that the entire dormer can be assembled either in a factory or in the field with no layout required by the assembler at the construction site.

[0100] Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

1. A method of forming a dormer template to underlay dormer trusses that support a dormer projecting outward from a main roof, the dormer trusses comprising a gable truss and a plurality of valley trusses, the method comprising:

- receiving a plurality of dormer inputs from a user;
- processing the dormer inputs to generate a dimensional profile for the dormer template, including first and second side piece dimensions and a plurality of valley truss locations relative to the gable truss, and to generate a dimensional profile of the valley trusses for placement on the dormer template at the valley truss locations; and
- constructing the dormer template according to the generated dimensional profile.

2. The method of claim 1, wherein receiving a plurality of dormer inputs from a user comprises receiving dormer inputs including at least one of a main roof slope, a dormer slope, a gable overhang length, a gable truss height, a wall sheathing thickness, an input representing the total number of dormers to be constructed, an input representing whether a rake ladder detail will be included in the dormer, an input representing the fascia thickness, a heel height, an input representing the roof sheathing thickness of the main roof, and an input indicating whether a cantilevered fascia is to be included in dormer.

3. The method of claim 1, wherein processing the dormer inputs to generate the dimensional profile for the dormer template further includes generating locations and dimensions of cross pieces connecting the first and second pieces together at the valley truss locations.

4. A method for recommending a roof sheathing layout for a dormer projecting outward from a main roof, the dormer

having a roof constructed from roof sheathing supported by dormer trusses, the method comprising:

- receiving a plurality of dormer inputs from a user, the dormer inputs including at least one of a main roof slope, a dormer slope, a gable overhang length, a gable truss height, a valley truss height, a wall sheathing thickness, an input representing the total number of dormers to be constructed, an input representing whether a rake ladder detail will be included in the dormer, an input representing the fascia thickness, a heel height, an input representing the roof sheathing thickness of the main roof, and an input indicating whether a cantilevered fascia is to be included in dormer;

generating a plurality of layouts for the roof sheathing on the dormer roof as a function of the dormer inputs; and recommending at least one roof sheathing layout to a user.

5. The method of claim 4, wherein each roof sheathing layout includes a location for each piece of roof sheathing on the dormer roof.

6. The method of claim 4, wherein each roof sheathing layout indicates a cut dimension for each piece of roof sheathing.

7. The method of claim 4, further comprising:

generating a location of each dormer truss along the main roof as a function of the dormer inputs.

8. The method of claim 4, wherein the dormer inputs comprise:

- the dormer slope;
- the main roof slope;
- the gable truss height; and
- the first valley truss height.

9. The method of claim 8, wherein the plurality of dormer inputs further comprise the gable overhang distance.

10. The method of claim 8, wherein a plurality of roof sheathing row lengths are generated using the dormer slope, the main roof slope, and the gable truss height, the plurality of roof sheathing layouts generated as a function of the roof sheathing row lengths.

11. The method of claim 10, wherein each roof sheathing layout includes cut dimensions for each piece of roof sheathing, the cut dimensions including a top length, a bottom length, and a side width.

12. The method of claim 4, wherein the at least one roof sheathing layout is recommended as a function of a ratio of a top length of an innermost piece of roof sheathing to a length of an uncut piece of roof sheathing, the innermost piece of roof sheathing located in a roof sheathing row nearest to a dormer ridgeline.

13. A method for determining locations of dormer trusses with respect to a main roof, the dormer trusses supporting a dormer projecting outward from the main roof along a pair of valley lines originating from a dormer point, the dormer trusses comprising a gable truss and a plurality of valley trusses, the method comprising:

- receiving a plurality of dormer inputs from a user, the dormer inputs including at least one of a main roof slope, a dormer slope, a gable overhang length, a gable truss height, a valley truss height, a wall sheathing thickness, an input representing the total number of dormers to be constructed, an input representing whether a rake ladder detail will be included in the dormer, an input representing the fascia thickness, a heel height, an input repre-

senting the roof sheathing thickness of the main roof, and an input indicating whether a cantilevered fascia is to be included in dormer;

processing the dormer inputs to generate a gable truss spacing for spacing the gable truss from a first valley truss and a uniform valley truss spacing for spacing neighboring valley trusses from each other;

determining the locations of the dormer trusses using the gable truss spacing and the uniform valley truss spacing; and

displaying the location of each dormer truss to a user.

14. The method of claim **13**, wherein the location of each dormer truss comprises a location along the pair of valley lines.

15. The method of claim **13**, wherein the dormer inputs comprise:

- the gable truss height;
- the valley truss height;
- the main roof slope; and
- the dormer roof slope.

16. The method of claim **15**, wherein the gable truss spacing is the spacing between the gable truss and the first valley truss along the pair of valley lines and is determined as a function of the gable truss height, the valley truss height, the main roof slope, and the dormer roof slope.

17. The method of claim **15**, wherein the uniform valley truss spacing is determined along the pair of valley lines as a function of the main roof slope, the dormer roof slope, and a known uniform spacing distance for spacing neighboring valley trusses from each other along a ridgeline of the dormer.

18. The method of claim **15**, wherein determining the location of each dormer truss comprises:

- generating a gable truss location along the pair of valley lines relative to the dormer point as a function of the

- dormer roof slope, the main roof slope, and the valley truss height, the gable truss location separated from the dormer point along the pair of valley lines by a dormer point spacing;
- generating a first valley truss location along the pair of valley lines as a function of the gable truss spacing and the gable truss location; and
- generating at least one next valley truss location as a function of the uniform valley truss spacing and the first valley truss location, the next valley truss location located along the pair of valley lines closer to the dormer point relative to a preceding valley truss location; and
- continuing to generate the next valley truss location until the next valley truss location is separated from the dormer point along the pair of valley lines by a distance equal to the uniform valley truss spacing.

19. A premanufactured dormer kit for a dormer configured to project outward from a main roof, the kit comprising:

- a plurality of dormer trusses having heights that establish a ridge line of the dormer; and
- a dormer template specifying locations of each of the plurality of dormer trusses, the locations and heights of the dormer trusses being based on a height of a roof of the dormer above the plane of the main roof at its heel (H_{Gi}), a slope of the main roof (S_{MR}), and the dormer slope (S_D).

20. The premanufactured dormer kit of claim **19**, wherein the dormer template comprises side pieces around a perimeter of an outline of the dormer, and cross pieces marking the locations of each of the plurality of dormer trusses.

21. The premanufactured dormer kit of claim **19**, wherein the dormer template is formed of dimensional material that is not designed to be load-bearing.

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