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(54) **Title:** METHOD AND APPARATUS FOR INSTALLING ROOFING SHINGLES

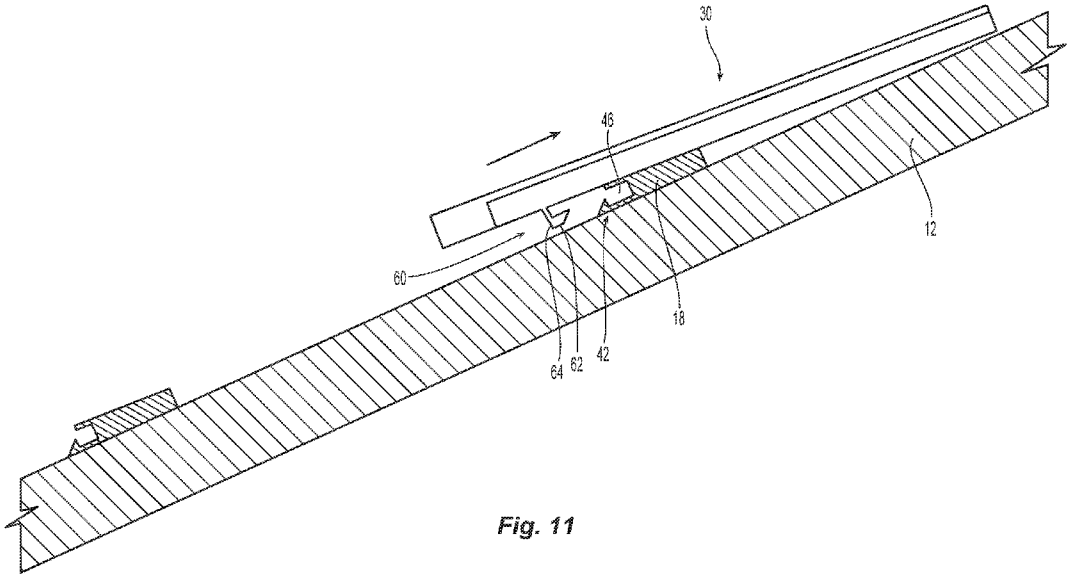

Fig. 11

(57) **Abstract:** A method and apparatus for installing roofing shingles on a roof deck in a top-to-bottom manner is disclosed. Engineered battens are positioned and installed on the roof deck in a bottom-to-top manner. Each batten has a female mating area which allows complementary shingles to be securely attached to the battens by sliding a corresponding mating portion of a shingle into the mating area of the batten resulting in a snap-fit engagement which secures the shingles onto the roof deck without nails. The method and apparatus have several unique advantages, such as allowing shingles to expand and contract ("breathe") without buckling and/or tearing when the ambient temperature fluctuates. In addition, since the manner of installation is from top-to-bottorn, this allows roofers to use the rows of nailed battens as safety scaffolding improving roofers' traction and ultimately enhancing their safety while performing this inherently dangerous job.

WO 2021/055362 A1

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METHOD AND APPARATUS FOR INSTALLING ROOFING SHINGLES

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to pending U.S Provisional Application No. 62/900,690, filed September 16, 2019; which is expressly incorporated herein by reference.

FIELD OF THE DISCLOSURE

The present disclosure relates to residential roofing shingles and a top-down, or top-to-bottom, method for installing them.

DESCRIPTION OF RELATED ART AND SUMMARY OF THE DISCLOSURE

A few top-down residential roofing shingles and installation methods have been designed before, albeit without much commercial success. Consequently, the practice of top-down roofing is not well known. Typically, the approach used for shingle installation is bottom-up, or bottom-to-top; that is, where a roofer nails a first row of shingles across the bottom edge, or "eave", of a roof plane, then proceeds to nail a second row of shingles just above the first row – making sure to overlap the previous row slightly in order to permit the natural flow of rainwater off the roof. Thereafter, a roofer nails a new row of shingles just above the previous one – and so on, from the bottom eave to the top edge, or "ridge", of that roof plane. Since almost all styles of roofing shingles (asphalt, wood shake, metal. clay, and slate, for example) are designed

to accommodate this method, the bottom-up manner is widely accepted as the standard method of shingle installation.

By contrast, top-to-bottom roofing refers to a method whereby a roofer installs shingles from the ridge to the eave; that is, starting installation of shingles at the top of a roof and moving down, row by row down to the eave, until the roof plane is fully covered with shingles. In spite of the fact that other top-to-bottom roofing shingles and associated installation methods have been attempted, they have not been broadly accepted in the industry. In contrast to them, the present disclosure dramatically simplifies both the design of the products used, as well as the ease of their installation. In this unique way, roofers and homeowners alike may enjoy many advantages inherent in a top-to-bottom shingle system, as will be described below.

The present disclosure combines the use of shingles and battens to complete a typical residential roof. Simple wooden battens are commonly used in the installation of many heavyweight shingle applications – for clay and concrete tiles, especially. Common battens are typically made of solid wood in a simple rectangular shape (usually 1″ x 2″), and are often 48″ to 96″ long. These battens are typically nailed into a roof deck prior to the addition of the very heavy clay or concrete tiles both 1) to help position the shingles evenly, parallel to the eave-line of the roof, as well as 2) to help prevent these heavy shingles from sliding off the typical slope of a traditional residential roof.

By contrast, the engineered battens contemplated by the present disclosure - which may be solid or hollow - are designed 1) to help position the complementary lightweight, engineered shingles evenly, parallel to the eave-line of the roof, 2) to provide a snap-fit secure engagement mechanism for attaching the aforementioned complementary shingles to the roof deck, and also 3) to initially provide more secure

footing for a roofer – much like scaffolding on the roof deck – that will permit the roofer to do his inherently dangerous job with a much enhanced degree of safety.

"Snap-fit" as used herein refers to the standard assembly method used to attach flexible parts, usually plastic, by pushing the parts' interlocking components together. In general, a snap-fit comprises a protruding, male part of one component, e.g., a hook, stud or bead, which is deflected briefly during the joining operation and catches in a complementary female depression in the mating component, often producing a snapping sound. After the joining operation, the snap-fit features return to a stress-free condition, while holding the two complementary pieces in place.

The battens of the present disclosure not only provide a roofer with the ability to establish regular, parallel, vertical spacing guides for his impending installation, they do so in a way that greatly reduces his risk of slipping and/or falling off the roof. In the initial preparation of any roof plane contemplated by the present disclosure, a roofer would nail battens horizontally across the roof starting at the bottom edge, then space additional battens at regular vertical intervals above the edge until the roof plane is fully equipped with parallel rows of battens – ready to receive the shingles that will be correctly aligned with, and securely attached to, said battens.

The engineered plastic shingles of the present disclosure are uniquely designed to be easily and securely snap-fitted onto the battens without the use of nails.

The pre-aligned, parallel battens assist the roofer in assuring the quality of the installation, since the shingles attached to the battens 1) will assuredly be parallel to the eave of the roof plane, 2) will assuredly be horizontally aligned with all the other shingles in their row, and 3) will be securely attached to the roof deck via the battens that are fastened to the roof deck with nails.

The batten nails affix the battens to the roof deck, and the battens interlock with the shingles; therefore, the batten nails hold the individual shingles securely to the roof deck, though indirectly – without having to nail the shingles individually into the roof. Furthermore, in a top-to-bottom installation, battens possess an additional advantage: they act effectively as foothold scaffolding on the sloped roof deck. As such, they provide a new and more reliable form of traction on the roof deck – greatly enhancing the roofers' security, and perhaps more importantly, his/her sense of security. As a result, the present disclosure provides the following advantages over prior art versions of top-to-bottom roofing:

1) Simplifies installation of roofing shingles;

2) Improves ease of correctly positioning shingles on the roof;

3) Reduces number of nails used to secure shingles and battens to the roof;

4) Reduces time to correctly apply new shingles to the roof;

5) Eliminates the possibility of vertically-adjacent shingles buckling;

6) Improves ease in replacing a damaged shingle during the life of the roof and

7) Reduces a roofer's risk of slipping and/or falling off a roof by:

a. Eliminating the need for roofers to balance themselves on a sloped roof while standing on top of any other potentially slippery shingles below; and

b. Providing the much needed additional security of battens as footholds – especially on steeper slopes – as the roofer installs the shingles above his stance.

These battens function as a form of built-in scaffolding to the surface of any roof slope, providing extra security against slips and/or falls off the roof. Using this strategy

of top-to-bottom roofing, a scaffold-like batten would be available on all sloping planes of the roof deck, enhancing roofers' safety while installing shingles from top to bottom (until the roofer completes the installation of shingles on the bottom row from his ladder or other ground-based scaffolding).

The present disclosure provides a system in which shingles may be installed in a top-to-bottom manner, after specially designed battens have first been positioned and nailed in place. In this system, each shingle is attached to the roof deck by simply and easily sliding it into the open or female portion of a batten, eliminating the need to nail down any individual shingle. Then, by interlocking each shingle with the one just previously installed, and by simultaneously sliding the forward edge of said shingle underneath the rearward edge of previously installed shingles in the row just above it, the present shingle-batten disclosure provides a roofing system whereby a roofer can completely shingle all the surfaces of a typical roof without nailing a single shingle.

In the end, after the roof installation with the present invention is complete, all attached shingles are free to breathe – i.e., to expand or contract naturally in any direction when the ambient temperature fluctuates – without any risk of buckling or warping since they are attached securely to the roof (through battens), but not nailed. While they are indirectly held down against the roof deck by the force of the batten nails, these shingles are not constrained from growing slightly forward and backward, or slightly leftward and rightward, as the natural forces of expansion and contraction dictate with ambient temperature fluctuations. Finally, in the unlikely event that any individual shingle of a roof becomes damaged over time (by a fallen tree limb in a sporadic windstorm, for example), that individual shingle can be removed and easily replaced with a new one.

BRIEF DESCRIPTION OF THE DRAWINGS

The present disclosure will be best understood with reference to the accompanying drawings, in which:

FIGS. 1-2 are schematic representations of a building showing the general installation of battens in a bottom-up, or bottom-to-top, manner, as indicated by the arrows, of the shingle system of the present disclosure;

FIGS. 3-4 are schematic representations of a building showing the general installation of shingles in a top-down, or top-to-bottom manner, as indicated by the arrows, of the shingle system of the present disclosure;

FIG. 5 is an enlarged perspective view of a portion of the roof of FIGS. 1-4 showing battens prior to installation of any shingles;

FIG. 6 is a cross-sectional view of FIG. 5 taken along line 6-6 of FIG. 5;

FIG. 7 is a view similar to FIG. 5 showing an installed shingle;

FIG. 8 is a top view of a single shingle;

FIG. 9 is a bottom view of a single shingle;

FIG. 10 is a cross-sectional view taken along line 10-10 of FIG. 8;

FIGS. 11-14 are similar to FIG. 6 showing installation of the shingle of FIG. 7;

FIGS. 15-16 are similar to FIG. 7 showing installation of a second shingle;

FIG. 17 is a cross-sectional view taken along line 17-17 of FIG. 16 showing the horizontal interlock between two adjacent shingles;

FIG. 18 is similar to FIG. 16 showing installation of a third shingle;

FIGS. 19-21 are similar to FIGS. 11-14 showing installation of a shingle in a second row, below the one previously installed above;

FIG. 22 is similar to FIG. 18 showing a top view of the shingle of FIGS. 19-21 completely installed;

FIG. 23 is similar to FIG. 22 showing installation of an additional shingle;

FIGS. 24-27 are similar to FIGS. 11-14 that illustrate a second example;

FIG. 28 is similar to FIG. 7, illustrating the second example with an installed shingle;

FIGS. 29-31 are similar to FIGS. 19-21 but with the second example; and

FIG. 32 is similar to FIG. 22, but with the second example, and with several shingles removed for ease of explanation.

DETAILED DESCRIPTION

The present disclosure comprises a plurality of shingles and battens that operate together to provide a shingle system for a roof. Specifically, the present disclosure comprises a top-to-bottom, interlocking shingle-and-batten system for roof installation. Two examples of this system are disclosed.

Referring to FIGS. 1 and 2, reference numeral 10 generally indicates a building structure which has a plurality of battens installed on roof deck 12. Building structure 10 is not limited to a specific size or type of construction. Roof deck 12 extends from roof ridge 22 to roof eave 20 and is not limited to a particular positive slope. That is, roof deck 12 may extend from roof ridge 22 to roof eave 20 at pitches of varying positive

slopes or steepness. Initially, battens are installed in a bottom-to-top manner on roof deck 12, beginning adjacent to roof eave 20, and continuing in regular intervals in a generally upward direction towards the roof ridge 22. Lowermost batten 14 is installed, followed by batten 16, followed by batten 18, and so forth, at regular vertical intervals, -- in 12" intervals, for example -- between battens. Roofers assure that battens are installed parallel to one another in this manner until the uppermost batten is placed at a distance less than or equal to one interval prior to reaching roof ridge 22. The material of the battens is not limited and may include any material, such as plastic, metal, wood, or the like.

Referring to FIGS. 3 and 4, once all battens are installed on roof deck 12, an individual field shingle is installed by laying it over the uppermost batten and then sliding it across that batten generally upwardly toward the roof ridge 22, until it fits snugly into the batten, as will be described in greater detail below. Field shingles, which are those typically installed across the planes of a roof deck, will be generally referred to as "shingles". Trim shingles (not shown) may be used to cover eaves, ridges, hips, gables and other non-planar parts of the roof as is customary and would be understood by a person of ordinary skill in the art.

Shingles are preferably installed left-to-right, across the entirety of the batten in the uppermost row of shingles 24, which is adjacent to roof ridge 22. Shingles in row 24 are followed by shingles installed in a second row 26, followed by a third row 28, and so on, until reaching lowermost batten 14 This top-to-bottom method of shingle installation is preferable over typical bottom-to-top shingle installation methods because it increases roofer safety and ease of work, improving both the quality of the work and the productivity of the roofer in the process. This method also ensures a high degree of aesthetic quality since parallel battens are installed prior to the installation of

any shingles. Once parallelism is established by installing the battens, consistent vertical spacing between adjacent rows of shingles and consistent horizontal alignment of adjacent (and interlocked) shingles in the same row is assured. This system greatly reduces much of the time associated with a roofer's repeated evaluation of each individual shingle's positioning for parallelism between rows and alignment within any one row. The material of the shingles is not limited and may include any material suitable for roofing, such as plastic, metal, wood, clay, cement, asphalt, composite, concrete, silicon panels or the like.

Referring again to FIG. 4, lower shingle row 26 and upper shingle row 24 demonstrate the spatial relationship between shingles installed in vertically adjacent rows on roof deck 12.

FIG. 5 shows a portion of a first example of two installed battens 16 and 18 on roof deck 12 prior to installation of shingles. Battens 16 and 18 have a generally elongated rectangular shape. In this first example, the battens 16 and 18 are shown as solid, but they may be hollow as in the second example to be described below. The battens may be secured to roof deck 12 with standard fasteners 34 used in the roofing industry, whether that is galvanized roofing nails, copper roofing nails, standard roofing screws, or the like, as is well known by a roofer of ordinary skill. These fasteners may be selected to match the expected longevity of the roofing material and/or to comply with local building codes. For ease in explanation, the various types of fasteners will collectively be referred to in the specification and claims as "nails", and the process of securing fasteners to the roof will be referred to in the specification and claims as "nailing".

FIG. 6 is a cross-sectional side view of FIG. 5. In this example, each batten may have a forward surface 36, a rear surface 37, a top surface 38, a bottom surface 40, and a

female mating area generally indicated by reference numeral 42. In a second example, described below, the battens are hollow and thus may not have a bottom surface. Mating area 42 may for example comprise an upwardly pointed batten hook 44, a batten flange 45 extending rearwardly from rear surface 37, and a batten opening 46 located between batten hook 44 and batten flange 45. Batten hook 44 extends rearwardly from rear surface 37, with batten hook 44 located opposite flange 45.

FIG. 7 is similar to FIG. 5 and illustrates a shingle 30 installed on batten 18. Rows of shingles may be installed beginning at the left lateral edge of roof deck 12.

FIG. 8 shows an enlarged top view of shingle 30. Each shingle has a generally rectangular shape and includes a top surface 51, a front edge 50, a rear edge 54, a right side edge 52 and a left side edge 53. Each shingle also may have a gutter 55 attached to right side edge 52. Gutter 55 has a raised outer edge 56, an open lower edge 57, and a gutter dam 58. The structure of gutter 55 allows water to run off of the roof without falling in the gaps between horizontally adjacent shingles. The size of each shingle is not limited and may, for instance, vary in length, width, profile height and/or profile shape (flat versus curved shape, for example).

FIG. 9 shows an enlarged bottom view of shingle 30. The bottom surface 31 of each shingle may include vertical, horizontal or diagonal reinforcing ribs 59 which are spaced throughout the bottom surface of the shingle. The arrangement of reinforcing ribs 59 is not limited to being evenly spaced and the space between adjacent ribs may vary. A mating edge 61 is located on the bottom surface and is perpendicular to left edge 53. A mating prong 60 projecting from the bottom surface of the shingle is designed to engage with the snap fit design of batten 16, as will be described.

FIG. 10 is a cross-sectional view of FIG. 8 showing gutter 55, reinforcing ribs 59, mating prong 60 and mating edge 61 of shingle 30.

FIGS. 11-14 are sequential and show shingle 30 being installed on roof deck 12. The method of installation may be described as follows.

Referring to FIG. 11, mating prong 60 may include a shingle hook 62 and a rear surface 64. Shingle 30 may be installed by inserting its mating prong 60 into mating area 42 of batten 18. Installation of shingle 30 may be completed by sliding the shingle generally upwardly across the batten toward the roof ridge 22, as will be described in greater detail below.

FIG. 12 shows shingle 30 extending in a generally upward direction until batten hook 44 and shingle hook 62 come into contact.

Referring to FIG. 13, once batten hook 44 and shingle hook 62 come into contact, batten hook 44 lifts shingle hook 62, which results in batten flange 45 flexing and rising as shingle hook 62 enters batten opening 46.

Referring to FIG. 14, which is sequential to FIG. 13, once shingle hook 62 is located within batten opening 46, batten flange 45 has lowered, and rear surface 64 rests against batten hook 44 in a snap-fit engagement. The shingle's mating prong 60 is thus interlocked and secured within batten opening 46 of mating area 42. The foregoing details of mating prong 60 and batten mating area 42 are exemplary, and many other configurations and structures may be employed to achieve the same result, a second example of which will be described below.

The snap-fit engagement as described above allows the shingle to be captured securely and held on the roof by the batten without requiring any additional nailing of the individual shingle by a roofer. This method of interlocking shingles to battens should substantially reduce the time, effort, waste, re-work and number of nails required to install a roof, enhancing the productivity of the roofer compared to

traditional methods. In addition, shingles that are interlocked to battens without nailing the shingles is advantageous to a quality roof installation. Interlocking shingles with battens allows shingles to naturally expand and contract in changing ambient temperature conditions. By contrast, in the prior art, where a shingle is fixed in place by nails on its uppermost/leftmost side, and is fixed in place on its lowermost/rightmost side by another nailed down shingle, that shingle will not be permitted to "breathe," or to naturally expand and contract as its inherent thermal coefficient of expansion requires. A shingle that is constrained against expansion and/or contraction will be subject to a greater risk of buckling and/or tearing during freeze-thaw cycles, depending on the material with which it is made and the temperature variations it endures throughout its lifecycle on a house.

FIG. 15 shows the installation of a second shingle 66. Gutter 55 of shingle 30 interlocks with mating edge 61 (see FIG. 9) of adjacent shingle 66 and slides upwardly until reaching gutter dam 58 of shingle 30. At this point, the mating prong 60 of shingle 66 and batten mating area 42 of shingle 66 interlock (see FIGS. 11-14), thereby creating both a vertical and horizontal interlock.

FIG. 16 is similar to FIG. 7, and shows second shingle 66 fully installed to the right of shingle 30.

FIG. 17 is a partial sectional view of FIG. 16 showing the horizontal interlock between gutter 55 of shingle 30 and mating edge 61 of shingle 66.

FIG. 18 is similar to FIG. 16 and shows the installation of a third shingle 68 in a first row of shingles installed on batten 18 of roof 12. After second shingle 66 is installed next to first shingle 30, it is followed by third shingle 68, and continues rightwardly in a horizontal direction, side-by-side, until a complete row of shingles is attached. Installation of shingles is not limited to installation from the left side of roof deck 12 to

the right side of roof deck 12, although it is preferred in this configuration where shingle gutter 55 is on the right-hand side. However, where gutter 55 is located on the left side of the shingle, installation may, alternatively, be achieved in a right-to-left manner.

FIGS. 19-21 are similar to FIGS. 11-14 where lower shingle 32 is installed below upper shingle 30 using the same method as shown in FIGS. 11-14.

Referring to FIG. 19, it illustrates shingle 32 being installed on a lower batten 16. Shingle 32 has the same corresponding portions as shingle 30, i.e., a shingle mating prong 73, a top surface 71, a bottom surface 77, a front edge 70, a rear edge 74, a left side edge 76 (shown in FIG. 22), a right side edge 72, a gutter 75, and a ribbed surface on its underside. Likewise, batten 16 is similar to batten 18. Therefore, batten 16 has the same corresponding portions as batten 18, including a mating area 82 having a flange 85.

FIG. 19 shows the mating prong 73 of lower shingle 32 being inserted into the mating area, generally indicated by reference numeral 82, of batten 16 in a generally upward direction so that front edge 70 of lower shingle 32 is directly below rear edge 54 of upper shingle 30. As a result, top surface 71 of lower shingle 32 is inserted into an opening 79 between upper shingle 30 and roof deck 12.

FIG. 20 is similar to FIG. 13 in showing lower shingle 32 in the process of engaging with batten 16.

FIG. 21 is similar to FIG. 14 in illustrating mating prong 73 of lower shingle 32 snap-fit and fully interlocked within mating area 82 of batten 16. FIG. 21 also helps explain the how shingle 32 of the present disclosure is allowed to "breathe" (expand and contract) after installation. That is, shingle 32 is constrained in only one place: at the location of the snap-fit, i.e., where the shingle mating prong 73 is fully interlocked

with the batten mating area 82. Thus, shingle 32 will be able to expand from the snap-fit area to front edge 70, or from the snap-fit area to rear edge 74.

FIG. 22 is sequential to FIG. 18, where lower shingle 32 is installed on batten 16 in a second row below and laterally between shingle 30 and shingle 66.

FIG. 23 is sequential to FIG. 22 where a second lower shingle 90 is installed adjacent to shingle 32 on batten 16. Additional shingles are installed in a lateral direction, side-by-side, until the row is complete. This manner of shingle installation continues until roof 12 is completely covered by shingles.

FIGS. 24-27 are views similar to FIGS. 11-14 showing a second example of a batten and shingle configuration and structure which achieves substantially the same result as the first example.

Specifically, FIGS. 24-27 illustrate shingle 30′ being installed on roof deck 12′. In this example, shingle 30′ is substantially similar to shingle 30, including similar corresponding portions. Batten 18′ includes a mating area generally indicated by reference numeral 42′. Batten 18′ may be hollow instead of solid as shown in the first example. Mating area 42′ may comprise a batten opening 46′ located between batten flange 45′ and the top of roof deck 12′. In this example, batten hook 44′ is downwardly pointed and is formed at the end of flange 45′. Mating prong 60′ may include a shingle hook 62′ and a rear surface 64′. The method of installation of a shingle may be described as follows.

Referring to FIG. 24 shingle 30′ may be installed by moving it upwardly in the direction of the arrow such that mating prong 60′ is moved into mating area 42′ between batten 18′ and the top of roof 12′.

FIG. 25 is sequential to FIG. 24 and shows shingle 30′ extending further upwardly until batten hook 44′ and shingle hook 62′ come into contact.

Referring to FIG. 26, once batten hook 44′ and shingle hook 62′ come into contact, batten flange 45′ flexes and rises and shingle hook 62′ flexes and lowers.

Referring to FIG. 27, which is sequential to FIG. 26, once shingle hook 62′ has fully entered batten opening 46′, batten flange 45′ lowers and shingle hook 62′ rises in a snap-fit engagement. The shingle's mating prong 60′ is thus interlocked and secured within batten opening 46′ of mating area 42′.

FIG. 28 illustrates shingle 30′ installed on batten 18′ on roof deck 12′.

FIGS. 29-31 are similar to FIGS. 19-21 where lower shingle 32′ is installed below upper shingle 30′ using the same method as shown generally in FIGS. 19-21, but with the second example.

Referring more particularly to FIG. 29, shingle 32′ is being installed on a lower batten 16′ than shingle 30′. Shingle 32′ has the same corresponding portions as shingle 30′, i.e., a mating prong 73′, a top surface 71′, a lower surface 77′, a front edge 70′, a rear edge 74′, a right side edge 72′, and a gutter 75′. Likewise, batten 16′ has the same corresponding portions as batten 18′, including a mating area 82′ having a flange 85′ terminating in a batten hook 84′.

FIG. 29 shows the mating prong 73′ of lower shingle 32′ being inserted into the mating area, generally indicated by reference numeral 82′, of batten 16′. Lower shingle 32′ is moved in a generally upward direction so that front edge 70′ of lower shingle 32′ is positioned below rear edge 54′ of upper shingle 30′. In other words, top surface 71′ of lower shingle 32′ will be inserted into the opening 79′ between upper shingle 30′ and roof deck 12′.

FIG. 30 is similar to FIG. 26 in showing lower shingle 32′ in the process of mating with batten 16′.

FIG. 31 is similar to FIG. 27 wherein mating prong 73′ of lower shingle 32′ is fully interlocked with mating area 82′ of batten 16′. As with the first example, shingle 32′ is constrained in only one place: at the location of the snap-fit junction where the single mating prong 73′ is fully interlocked with the batten mating area 82′, thereby allowing shingle 32′ to "breathe", i.e., expand and contract, after installation.

FIG. 32 shows lower shingle 32′ installed on batten 16′ in a second row below shingle 30′. For the sake of simplicity and ease in explanation, shingles which would be installed laterally adjacent to shingle 30′ have been omitted from this view. It is understood that, as in the first example, additional shingles are installed in a lateral direction, side-by-side, until a row is complete before moving on to the next row. This manner of shingle installation continues until roof 12′ is covered by shingles.

It may be appreciated that by virtue of the foregoing, a straightforward and efficient method and apparatus are provided for installing shingles on a roof. A plurality of rows of battens is first installed from bottom-to-top, each batten having an interlocking portion formed integrally therewith. Then a plurality of shingles is installed from top-to-bottom, one by one, starting at the top row of the roof deck nearest the ridge. Each shingle has an interlocking portion formed integrally therewith which mates with the interlocking portion of a batten in a simple upward movement.

Thus, a snap-fit engagement shingle-batten system for a roof is provided where shingles may be installed in a top-to-bottom manner that holds a shingle in place by locking it into a shingle mating portion of a batten, eliminating the need for nailing shingles onto the roof. It provides a much safer, easier, and more productive installation

experience for roofers, while it simultaneously enhances the alignment quality and resulting aesthetic quality of the finished roof.

WHAT IS CLAIMED IS:

1. Apparatus for installing shingles on a roof in a top-to-bottom manner, comprising:

an elongated batten attached to said roof;

said batten having a shingle mating area, said shingle mating area having a batten hook and a flange, said batten hook and said flange forming a batten opening; and

a shingle having a shingle hook for positioning within said batten opening, said shingle hook interlocking with said batten hook for securing said shingle to said batten in a snap-fit without nails.

2. The apparatus according to claim 1, wherein said batten is secured to said roof using a plurality of nails.

3. The apparatus according to claim 1, wherein said batten includes a top surface and a rear surface, said batten hook extending from said rear surface of said batten.

4. The apparatus according to claim 3, wherein said flange extends from the top of said rear surface of said batten.

5. The apparatus according to claim 4, wherein said batten hook is located opposite said flange.

6. The apparatus according to claim 4, wherein said batten hook is formed at one end of said flange.

7. The apparatus according to claim 1, wherein said shingle includes a top surface and a bottom surface, and said shingle hook extends downwardly from said bottom surface of said shingle.

8. The apparatus according to claim 1, wherein said batten hook includes a batten hook angled surface, and said shingle hook includes a shingle hook angled surface, whereby said angled surfaces are adapted to contact each other during installation of said shingle onto said batten.

9. The apparatus according to claim 7, wherein said flange flexes upwardly when said shingle hook is inserted into said batten opening.

10. A method of installing a plurality of battens and shingles onto a roof having an top edge and a bottom edge, comprising the steps of:

(a) securing a plurality of battens to the roof so that the battens are substantially parallel to said bottom edge of said roof, each of said battens having a female shingle mating area, each of said shingles having a shingle hook on the bottom surface thereof;

(b) placing one of said shingles on top of one of said battens;

(c) moving said one shingle upwardly towards said top edge of said roof until said shingle hook engages said female shingle mating area in a snap-fit manner.

11. The method of claim 10, further comprising the step of inserting a front edge of said one shingle under a rear edge of another of said shingles in the row above it as said one shingle is moved upwardly.

12. The method of claim 10, further comprising the step of installing said shingles from the top edge of said roof to the bottom edge thereof.

13. The method of claim 10, wherein the step of moving said shingle upwardly comprises the steps of flexing a flange of said female shingle mating area as said shingle hook is inserted into said female shingle mating area whereby said flange is lowered as said shingle is further inserted into said female shingle mating area.

14. A system for attaching shingles to a roof top-to-bottom in such a manner to allow each shingle to breathe after installation, comprising:

a plurality of battens fastened to said roof in such a manner so as to be substantially parallel to each other;

each of said battens having a top surface, a front surface, a rear surface, and a shingle mating area on said rear surface;

said battens being secured to said roof by nails extending through said top surface to said roof;

each of said battens having a batten hook in said shingle mating area;

a plurality of shingles attached to said battens;

each of said shingles having a top surface, a bottom surface, and a shingle hook on said bottom surface;

said batten hook interlocking with said shingle hook in a snap-fit engagement to secure said shingles to said battens without nails.

15. The system as set forth in claim 14, wherein said shingles are secured to said battens only at said snap-fit engagement to permit each of said shingles to breathe after installation.

16. The system as set forth in claim 14, wherein said shingles each include a front edge and a rear edge, the front edge of one of said shingles being inserted under the rear edge of an adjacent shingle during installation thereof.

17. The system as set forth in claim 14, wherein said shingle mating area includes a flange having a free end.

18. The system as set forth in claim 17, wherein said flange is raised as said shingle hook is inserted into said shingle mating area.

19. The system as set forth in claim 18, wherein said batten hook extends upwardly and is opposite said flange.

20. The system as set forth in claim 18, wherein said batten hook extends downwardly from said free end of said flange.

21. A batten used for installing a shingle on a roof, said shingle having a mating prong on the bottom surface thereof, said roof having a lower edge and an upper edge, comprising:

an elongated batten horizontally positioned on said roof between said lower edge and said upper edge of said roof;

said batten having a forward surface closer to said upper edge of said roof than said lower edge, and a rear surface closer to said lower edge of said roof than said upper edge; and

said rear surface of said batten having a female mating area integrally formed therewith, whereby said female mating area of said batten is adapted to receive said mating prong of said shingle and interlock therewith in a snap-fit.

22. The batten as set forth in claim 18, wherein said female mating area includes a batten hook.

23. The batten as set forth in claim 22, wherein said batten hook extends rearwardly from said rear surface of said batten.

24. The batten as set forth in claim 23, wherein said batten hook is positioned at the lower portion of said rear surface.

25. The batten as set forth in claim 22, wherein said batten hook is positioned at the upper portion of said rear surface.

26. The batten as set forth in claim 22, wherein said female mating area of said batten includes a flexible flange extending rearwardly from said rear surface thereof.

27. The batten according to claim 26, wherein said flange is located opposite said batten hook.

28. The batten according to claim 26, wherein said batten hook is positioned at the end of said flange.

29. A shingle adapted to be installed on a batten connected to a roof, wherein said batten includes a front surface, a rear surface, and a mating area on said rear surface, comprising:

a shingle having a top surface, a front edge, a rear edge, and a bottom surface;

said bottom surface having a mating prong;

said mating prong adapted to mate with the female mating area of said batten whereby said shingle may be interlocked with said batten in a snap-fit and secured to said roof without using nails.

30. The shingle as set forth in claim 29, wherein said mating prong includes a shingle hook extending downwardly from said bottom surface of said shingle.

31. The shingle as set forth in claim 30, wherein said female mating area includes a batten hook for interlocking with said shingle hook.

32. The shingle as set forth in claim 31, wherein said shingle hook is adapted to flex upon entering said female mating area.

AMENDED CLAIMS
received by the International Bureau on 04 Feb 2021(04.02.2021)

[Claim 1] Apparatus for installing shingles on a roof having a ridge and an eave in a top-to-bottom manner, comprising:
a plurality of elongated battens attached to said roof substantially parallel to said ridge and said eave, each of said battens having a batten top surface and a batten bottom surface, said batten bottom surface attached to said roof;
each of said battens having an integrally formed batten hook and an integrally formed flange, said batten hook and said flange forming a batten opening, said batten hook and said flange extending from said batten towards said roof eave; and
a plurality of shingles, each of said shingles having a shingle top surface and a shingle bottom surface, an integrally formed shingle hook located on said shingle bottom surface for positioning within said batten opening, said shingle hook extending from said shingle towards said roof ridge and interlocking with said batten hook for securing said shingle to said batten in a snap-fit;
whereby said shingles may be attached to said battens in a top-to-bottom manner from said ridge to said eave on said roof without using nails.

[Claim 2] The apparatus according to claim 1, wherein said batten is secured to said roof using a plurality of nails.

[Claim 3] The apparatus according to claim 1, wherein said batten includes a rear surface, said batten hook extending from said rear surface of said batten.

[Claim 4] The apparatus according to claim 3, wherein said flange extends from the top of said rear surface of said batten towards said roof eave.

[Claim 5] The apparatus according to claim 4, wherein said batten hook is located opposite said flange.

[Claim 6] The apparatus according to claim 4, wherein said batten hook is formed at one end of said flange.

[Claim 7] The apparatus according to claim 1, wherein said shingle hook extends downwardly from said shingle bottom surface.

[Claim 8] The apparatus according to claim 1, wherein said batten hook includes a batten hook angled surface, and said shingle hook includes a shingle hook angled surface, whereby said angled surfaces are adapted to contact each other during installation of said shingle onto said batten.

[Claim 9] The apparatus according to claim 7, wherein said flange flexes upwardly when said shingle hook is inserted into said batten opening.

[Claim 10] A method of installing a plurality of battens and shingles onto a roof having a ridge and an eave, comprising the steps of:
(a) securing a plurality of battens to the roof so that the battens are substantially parallel to said eave of said roof, each of said battens having a shingle mating area integrally formed therewith, each of said shingles having a shingle hook integrally formed therewith on the bottom surface thereof and extending towards said ridge of said roof;
(b) placing one of said shingles on top of one of said battens;
(c) moving said one shingle upwardly towards said ridge of said roof until said shingle hook engages said shingle mating area in a snap-fit manner and
(d) securing said shingles to said battens from the ridge of said roof to the eave of said roof without nails.

[Claim 11] The method of claim 10, further comprising the step of inserting a front edge of said one shingle under a rear edge of another of said shingles in the row above it as said one shingle is moved upwardly.

[Claim 13] The method of claim 10, wherein the step of moving said shingle upwardly comprises the steps of flexing a flange of said shingle mating area as said shingle hook is inserted into said shingle mating area whereby said flange is lowered as said shingle is further inserted into said shingle mating area.

[Claim 14] A system for attaching shingles to a roof having a ridge and an eave in a top-to-bottom manner, comprising:
a plurality of battens fastened to said roof in such a manner so as to be substantially parallel to each other;
each of said battens having a top surface, a front surface, a rear surface, and a shingle mating area on said rear surface;
said battens being secured to said roof by nails extending through said top surface into said roof;
each of said battens having a batten hook and a batten flange in said shingle mating area that extend towards said eave of said roof;
a plurality of shingles placed on top of said battens;
each of said shingles having a top surface, a bottom surface, and a shingle hook
on said bottom surface that extends towards said ridge of said roof;
said batten hook interlocking with said shingle hook in a snap-fit en-

gagement to
secure without using nails said shingles to said battens from said ridge of said roof to said eave of said roof.

[Claim 15] The system as set forth in claim 14, wherein said shingles are secured to said
battens only at said snap-fit engagement to permit each of said shingles to
breathe after installation.

[Claim 16] The system as set forth in claim 14, wherein said shingles each include a front edge and a rear edge, the front edge of one of said shingles being inserted under
the rear edge of a vertically adjacent shingle during installation thereof.

[Claim 17] The system as set forth in claim 14, wherein said shingle mating area includes an integrally formed flange having a free end.

[Claim 18] The system as set forth in claim 17, wherein said flange is raised as said shingle hook is inserted into said shingle mating area.

[Claim 19] The system as set forth in claim 18, wherein said batten hook is opposite said flange.

[Claim 21] A batten used for installing a shingle on a roof,
wherein said shingle has an integrally formed mating prong on the bottom surface thereof, said roof having an eave and a ridge, said mating prong extending towards said ridge of said roof
wherein said batten is horizontally positioned on said roof between said eave and said ridge of said roof;
said batten having a forward surface closer to said ridge of said roof than said eave, and a female mating area closer to said eave of said roof than said ridge, and
said female mating area integrally formed therewith, whereby said female mating area of said batten is adapted to receive said mating prong of said shingle and interlock therewith in a snap-fit.

[Claim 22] The batten as set forth in claim 18, wherein said female mating area includes an integrally formed batten hook.

[Claim 23] The batten as set forth in claim 22, wherein said batten hook extends towards said eave of said roof.

[Claim 24] The batten as set forth in claim 23, wherein said batten hook is positioned at the lower portion of said female mating area.

[Claim 25] The batten as set forth in claim 22, wherein said batten hook is positioned at the upper portion of said female mating area.

[Claim 26] The batten as set forth in claim 22, wherein said female mating area of said batten includes an integrally formed flexible flange.

[Claim 27] The batten according to claim 26, wherein said flange is located opposite said batten hook.

[Claim 28] The batten according to claim 26, wherein said batten hook is positioned at the end of said flange.

[Claim 29] A shingle adapted to be installed on a batten connected to a roof having a ridge and an eave,
wherein said batten includes a front surface, and an integrally formed female mating area extending towards said eave
wherein said shingle includes a top surface, a front edge, a rear edge, and a bottom surface;
said bottom surface having an integrally formed mating prong;
said mating prong adapted to mate with said female mating area of said batten
whereby said shingle may be interlocked with said batten in a snap-fit and secured to said roof without using nails.

[Claim 30] The shingle as set forth in claim 29, wherein said mating prong includes an integrally formed shingle hook extending downwardly from said bottom surface of said shingle.

[Claim 31] The shingle as set forth in claim 30, wherein said female mating area includes an integrally formed batten hook extending towards said eave of said roof for interlocking with said shingle hook.

[Claim 32] The shingle as set forth in claim 31, wherein said shingle hook is adapted to flex upon entering said female mating area.

[Claim 33] The shingle as set forth in claim 29, wherein said mating prong extends towards said ridge of said roof.

[Claim 34] Apparatus for installing shingles on a roof having a ridge and an eave in a top-to-bottom manner, comprising:
a plurality of elongated battens attached to said roof substantially parallel to said ridge and said eave, each of said battens having a batten top surface and a batten bottom surface, said batten bottom surface attached to said roof;
each of said battens having an integrally formed batten hook and an integrally formed flange, said batten hook and said flange forming a batten opening, said batten hook and said flange extending from said

batten towards said roof eave; and
a plurality of shingles, each of said shingles having a shingle top surface and a shingle bottom surface, a shingle prong located on said shingle bottom surface for positioning within said batten opening, said shingle prong interlocking with said batten hook for securing said shingle to said batten in a snap-fit;
whereby said shingles may be attached to said battens in a top-to-bottom manner on said roof without using nails.

[Claim 35] The apparatus according to claim 34, wherein said shingle prong is integrally formed with said shingle.

[Claim 36] The apparatus according to claim 35, wherein said shingle prong extends from said shingle bottom surface towards said roof ridge.

[Claim 37] The apparatus according to claim 34, wherein said batten hook extends towards said roof eave from said batten bottom surface, and said batten flange extends towards said roof eave from said batten top surface.

[Claim 38] The apparatus according to claim 34, wherein said batten hook and said batten flange both extend from said batten top surface towards said roof eave.

[Claim 39] The apparatus according to claim 34, wherein said batten hook and said batten flange extend towards said roof eave.

[Claim 40] Apparatus for installing shingles on a roof having a ridge and an eave in a top-to-bottom manner, comprising:
a plurality of elongated battens attached to said roof substantially parallel to said ridge and said eave, each of said battens having a batten top surface and a batten bottom surface, said batten bottom surface attached to said roof;
each of said battens having a batten hook and a batten flange, said batten hook and said batten flange forming a batten opening; and
a plurality of shingles, each of said shingles having a shingle top surface and a shingle bottom surface, an integrally formed shingle prong located on said shingle bottom surface for positioning within said batten opening, said shingle prong extending from said shingle towards said roof ridge and interlocking with said batten hook for securing said shingle to said batten in a snap-fit;
whereby said shingles may be attached to said battens in a top-to-bottom manner on said roof without using nails.

[Claim 41] The apparatus according to claim 39, wherein said batten hook and said batten flange are integrally formed with said batten.

[Claim 42] The apparatus according to claim 40, wherein said batten hook and said batten flange both extend towards said roof eave.

[Claim 43] The apparatus according to claim 40, wherein said batten hook extends towards said roof eave from said batten bottom surface, and said batten flange extends towards said roof eave from said batten top surface.

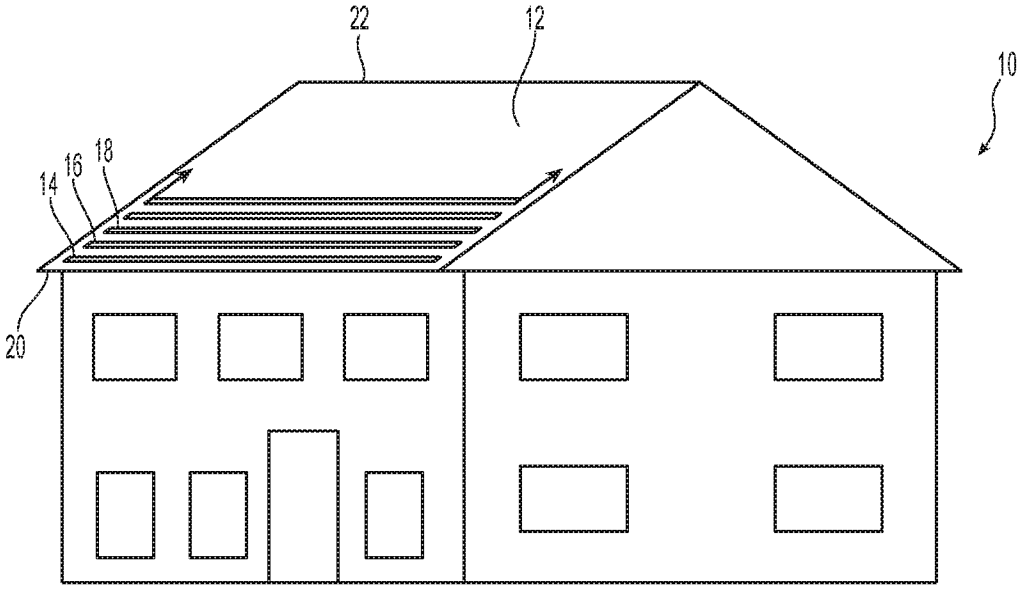


Fig. 1

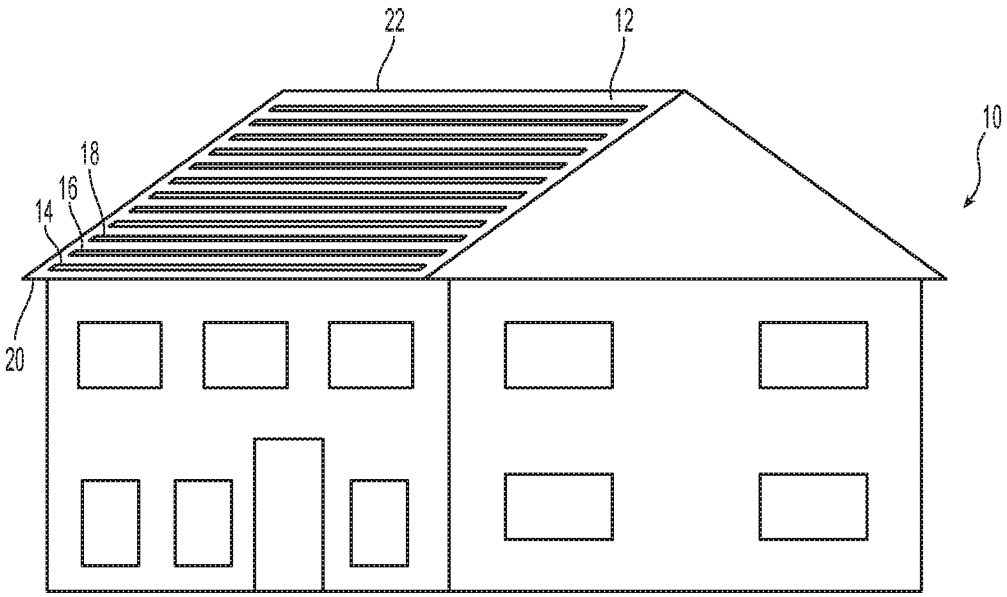


Fig. 2

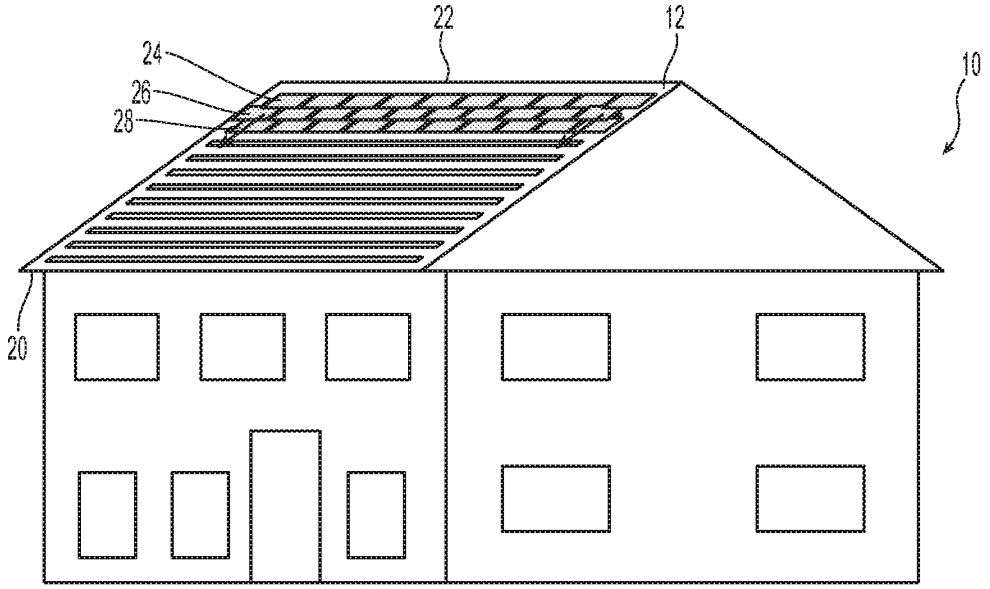


Fig. 3

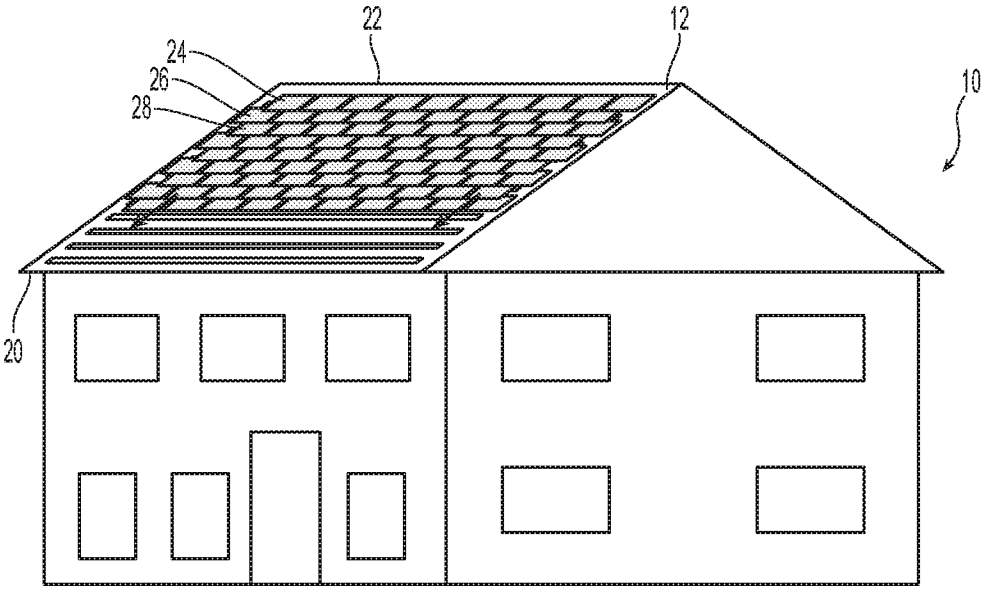


Fig. 4

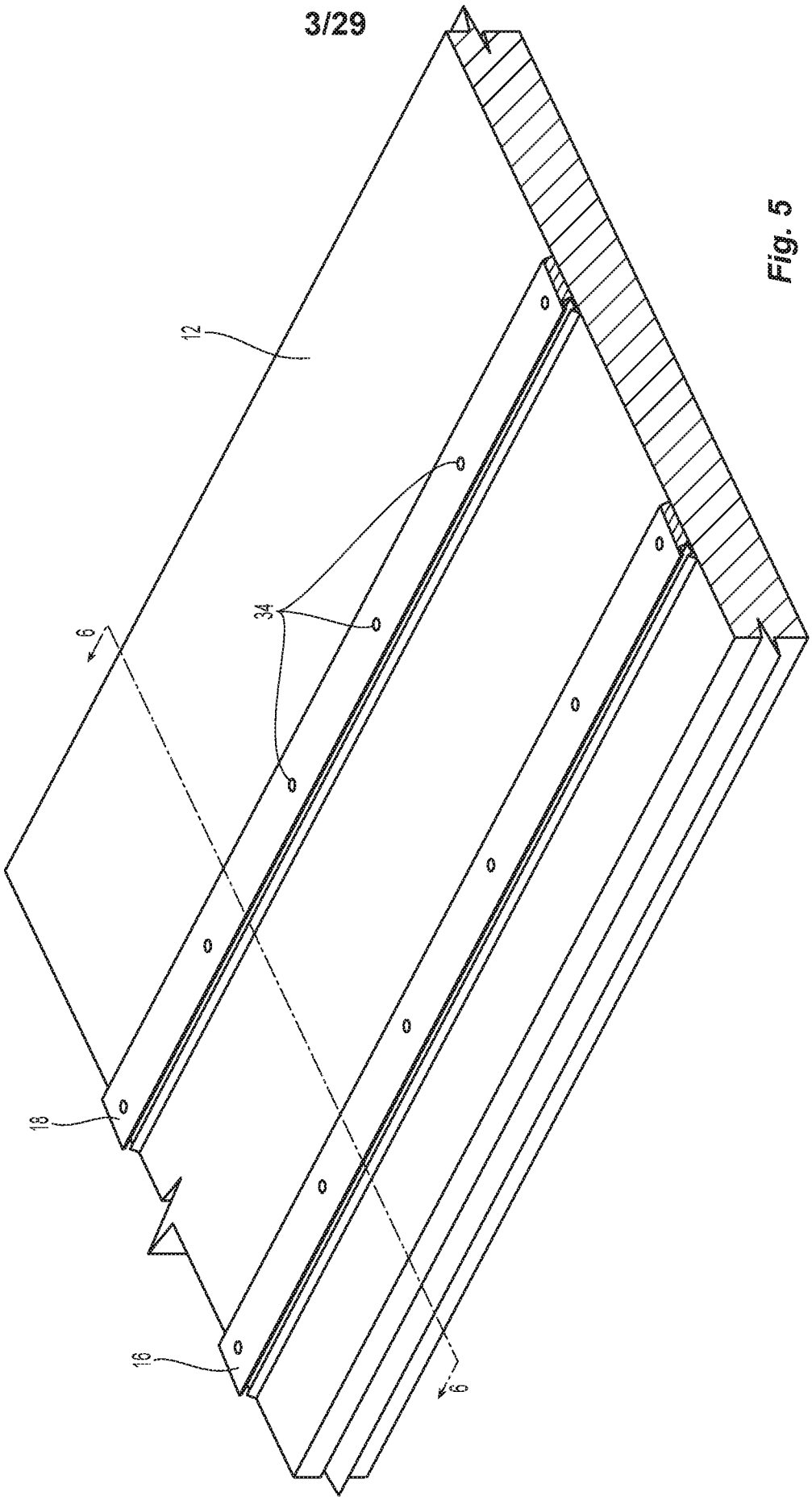


Fig. 5

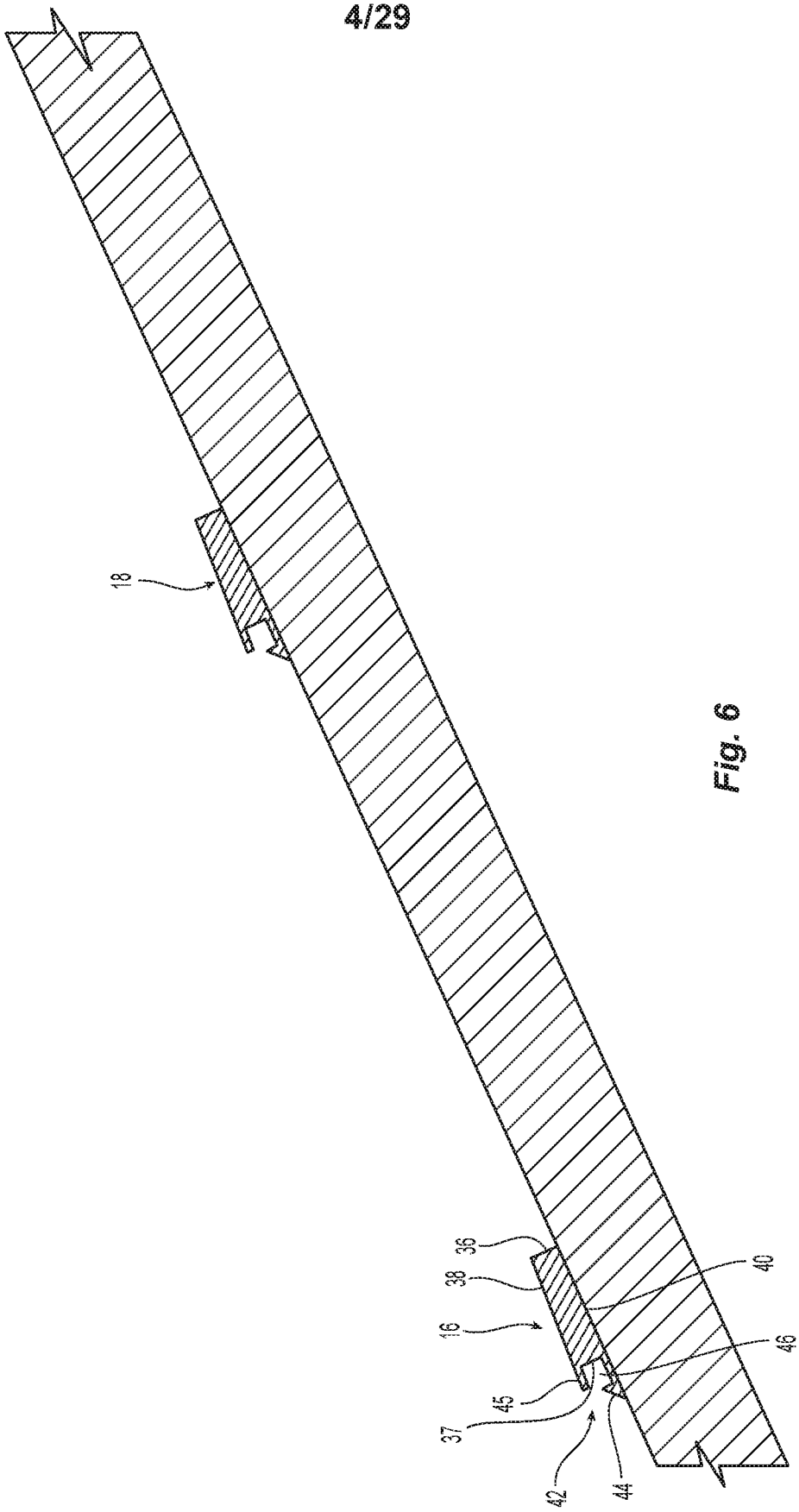


Fig. 6

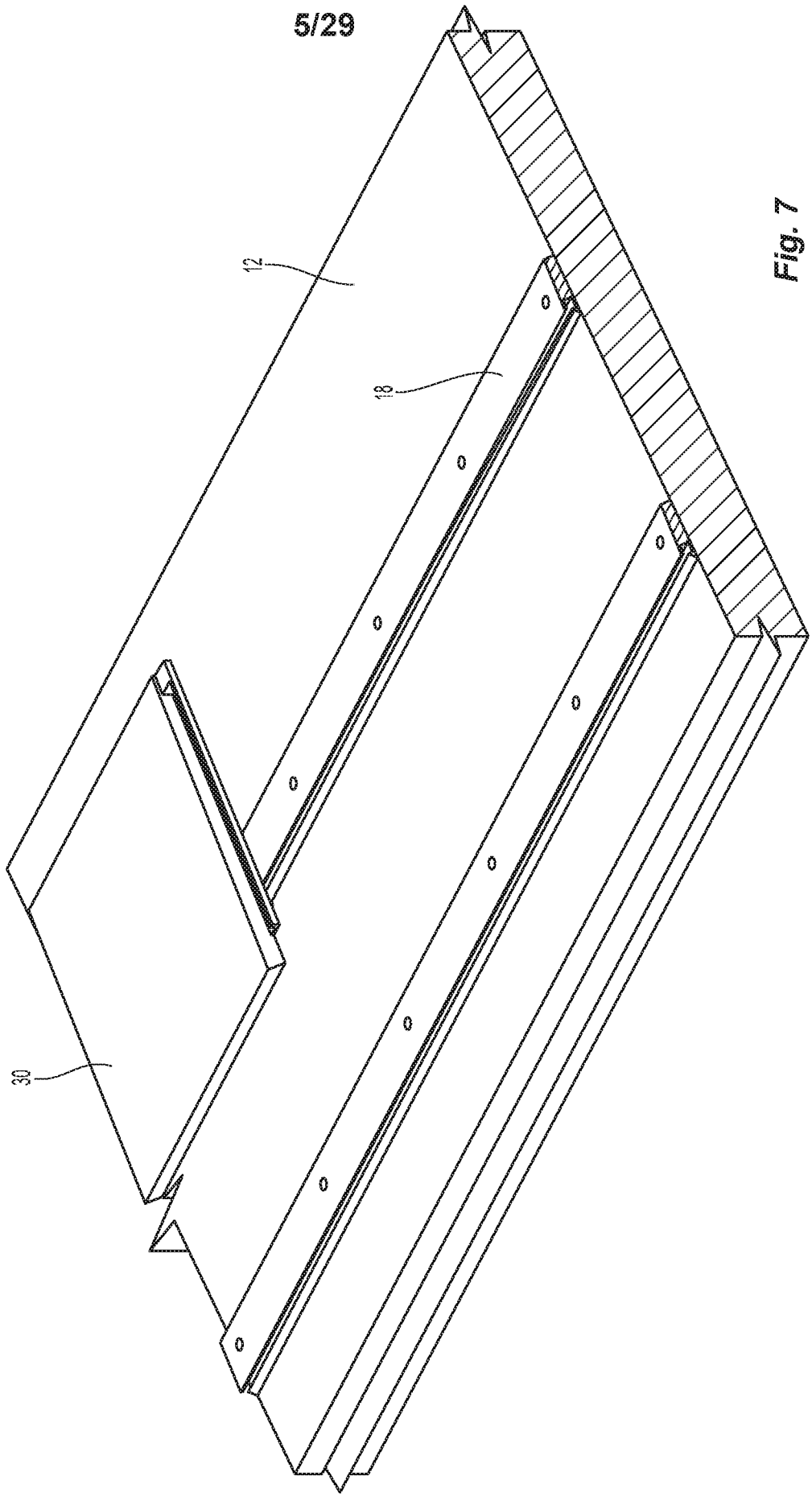


Fig. 7

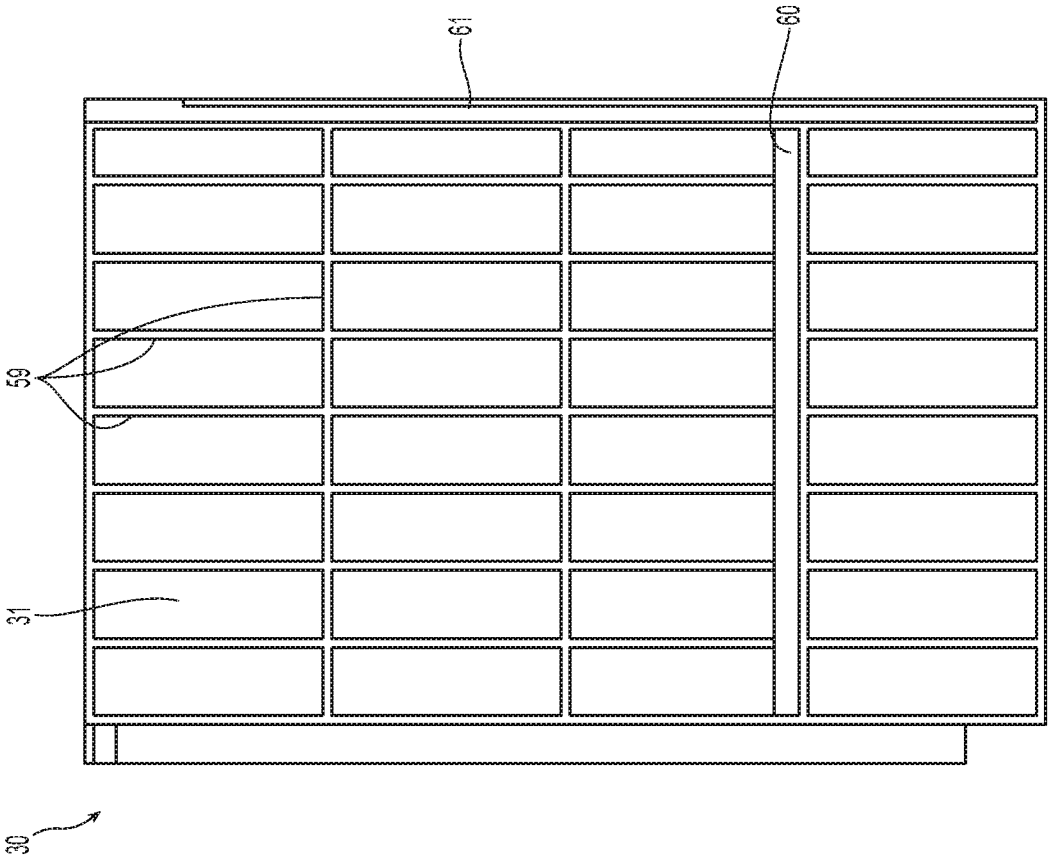


Fig. 9

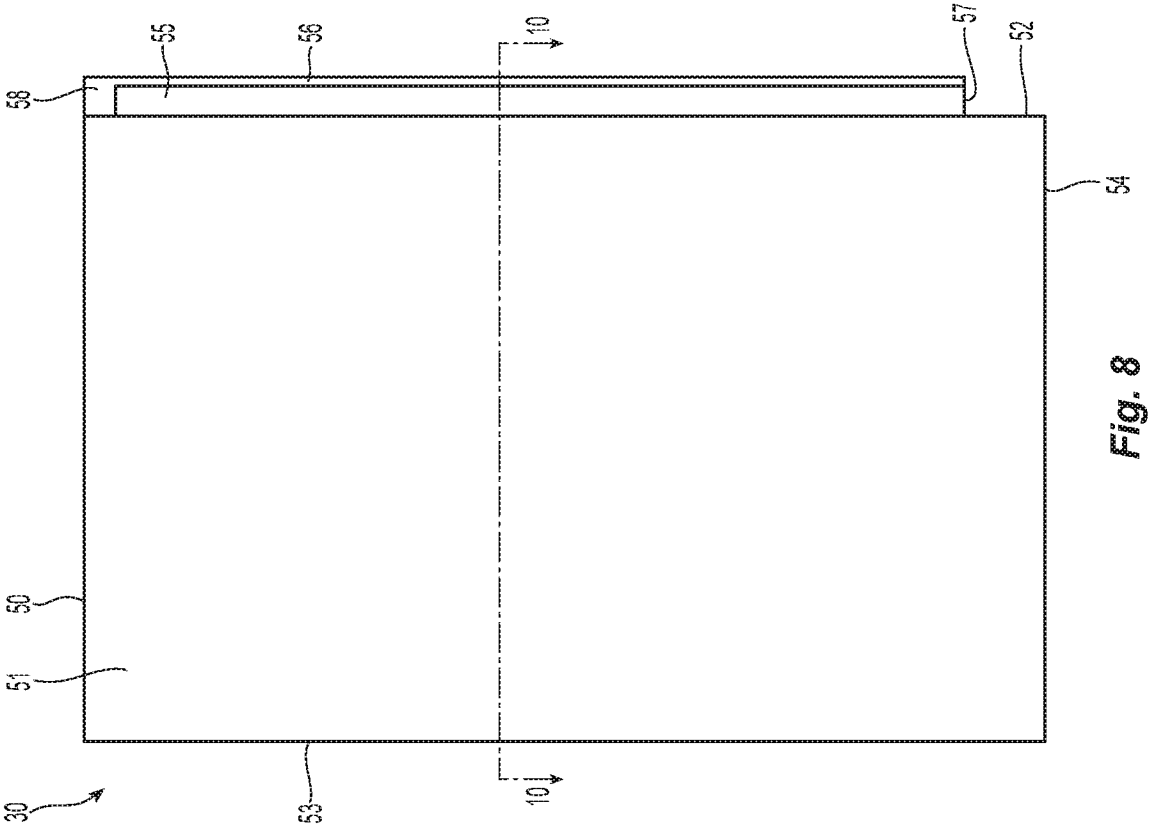


Fig. 8

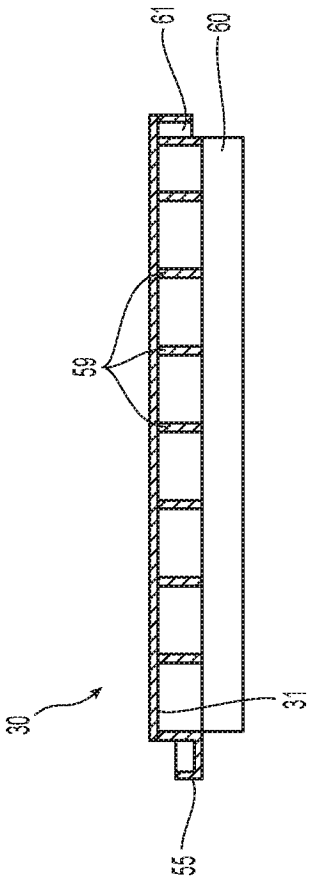


Fig. 10

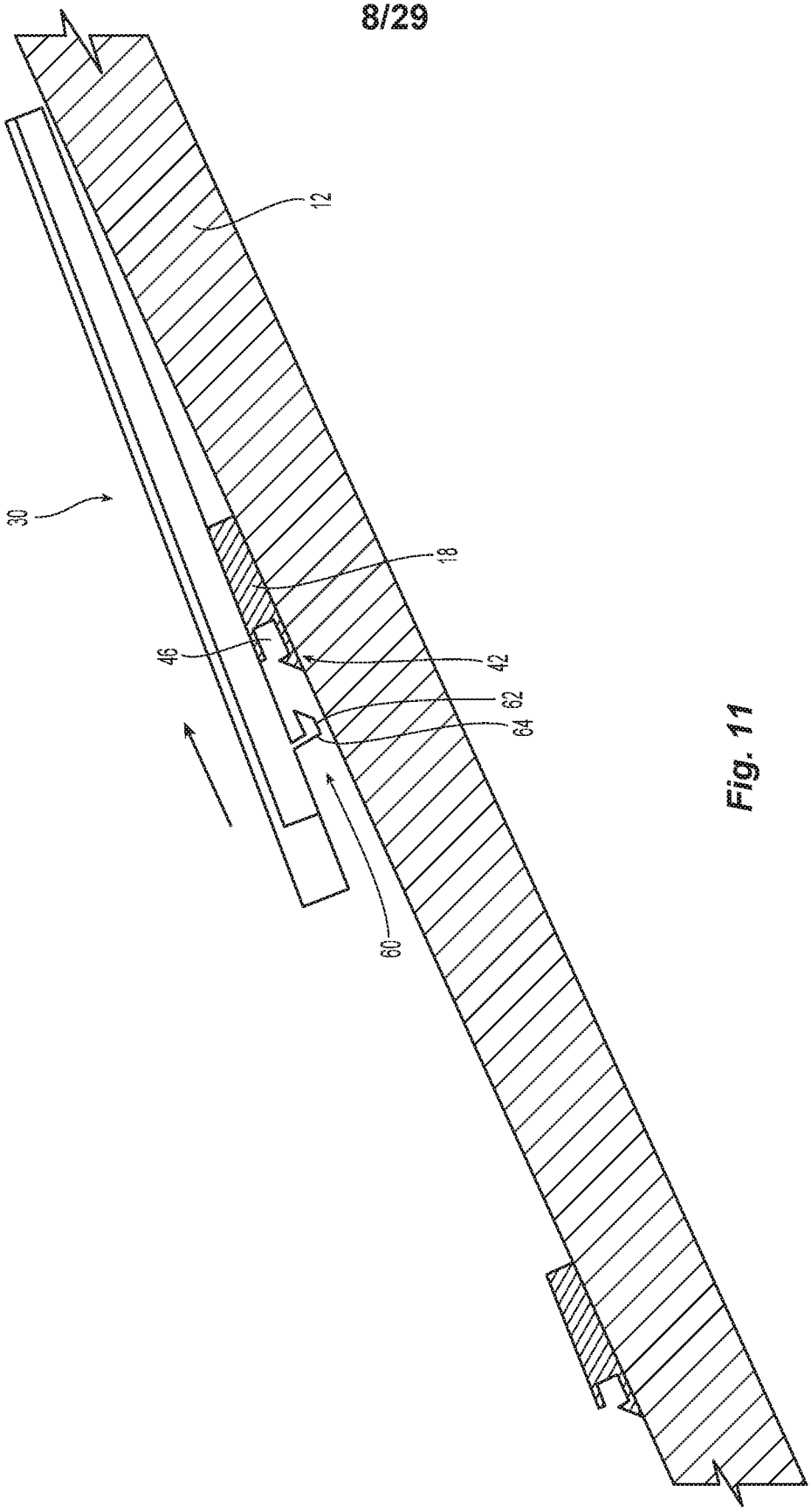


Fig. 11

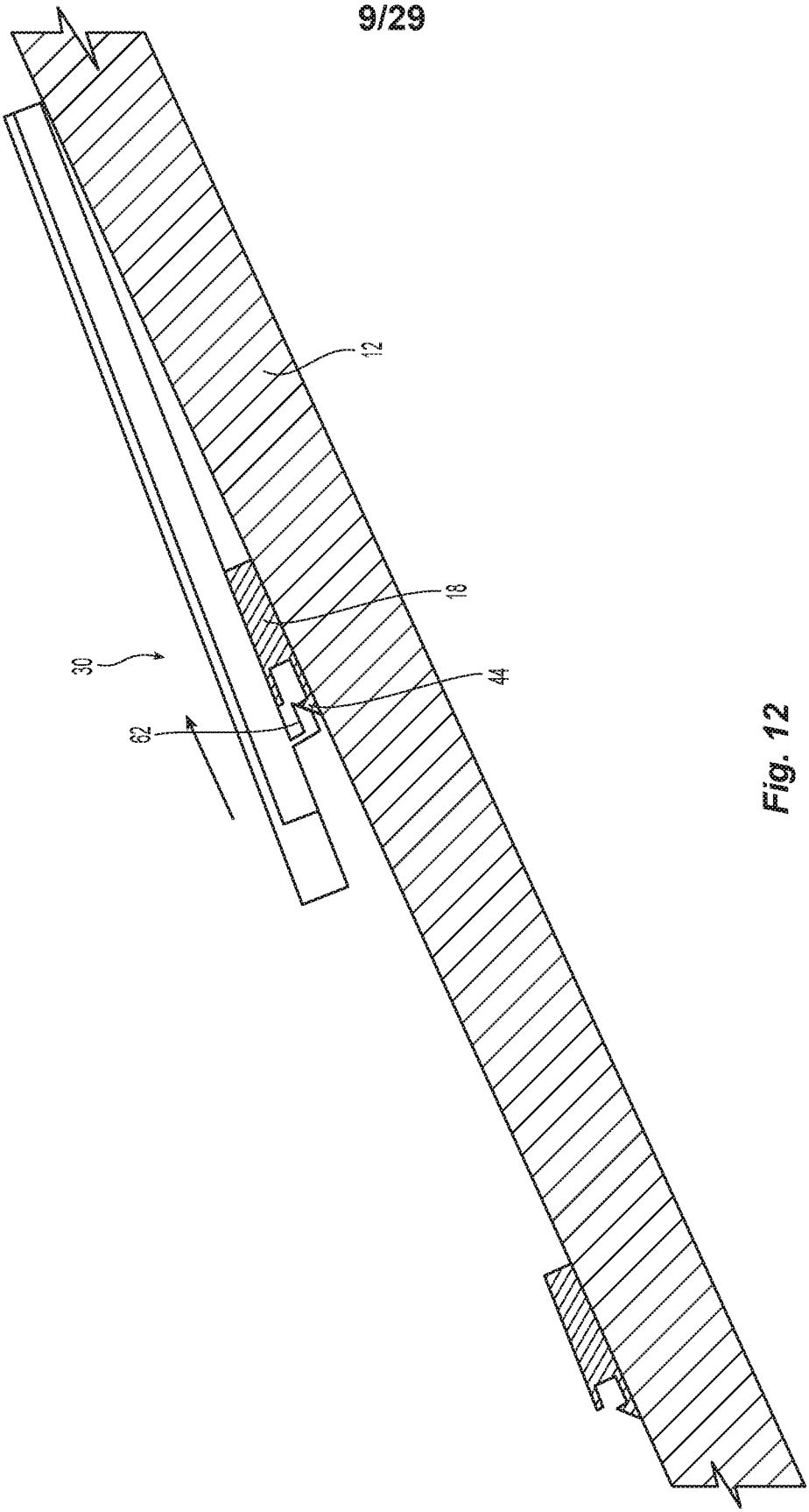


Fig. 12

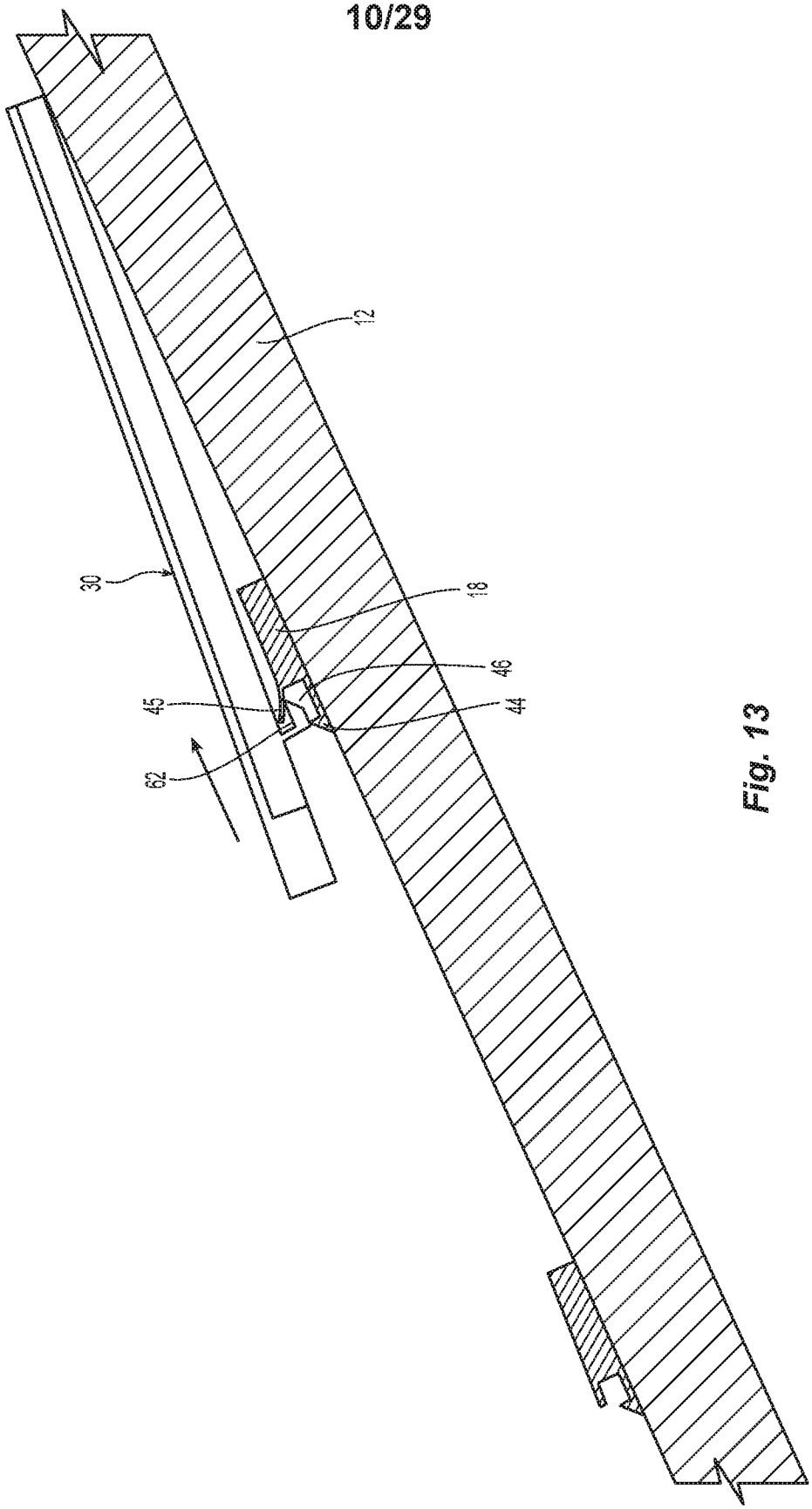


Fig. 13

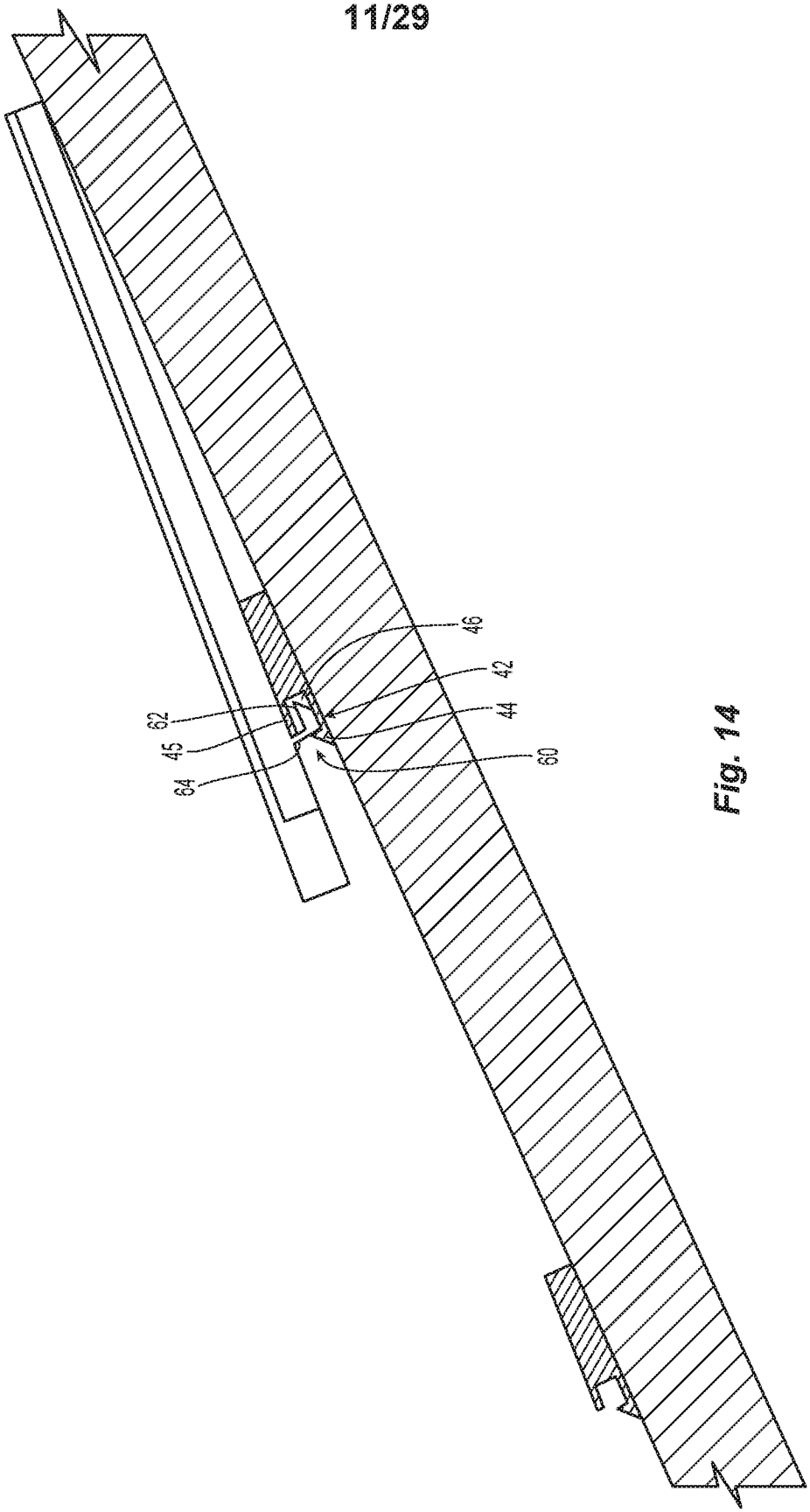


Fig. 14

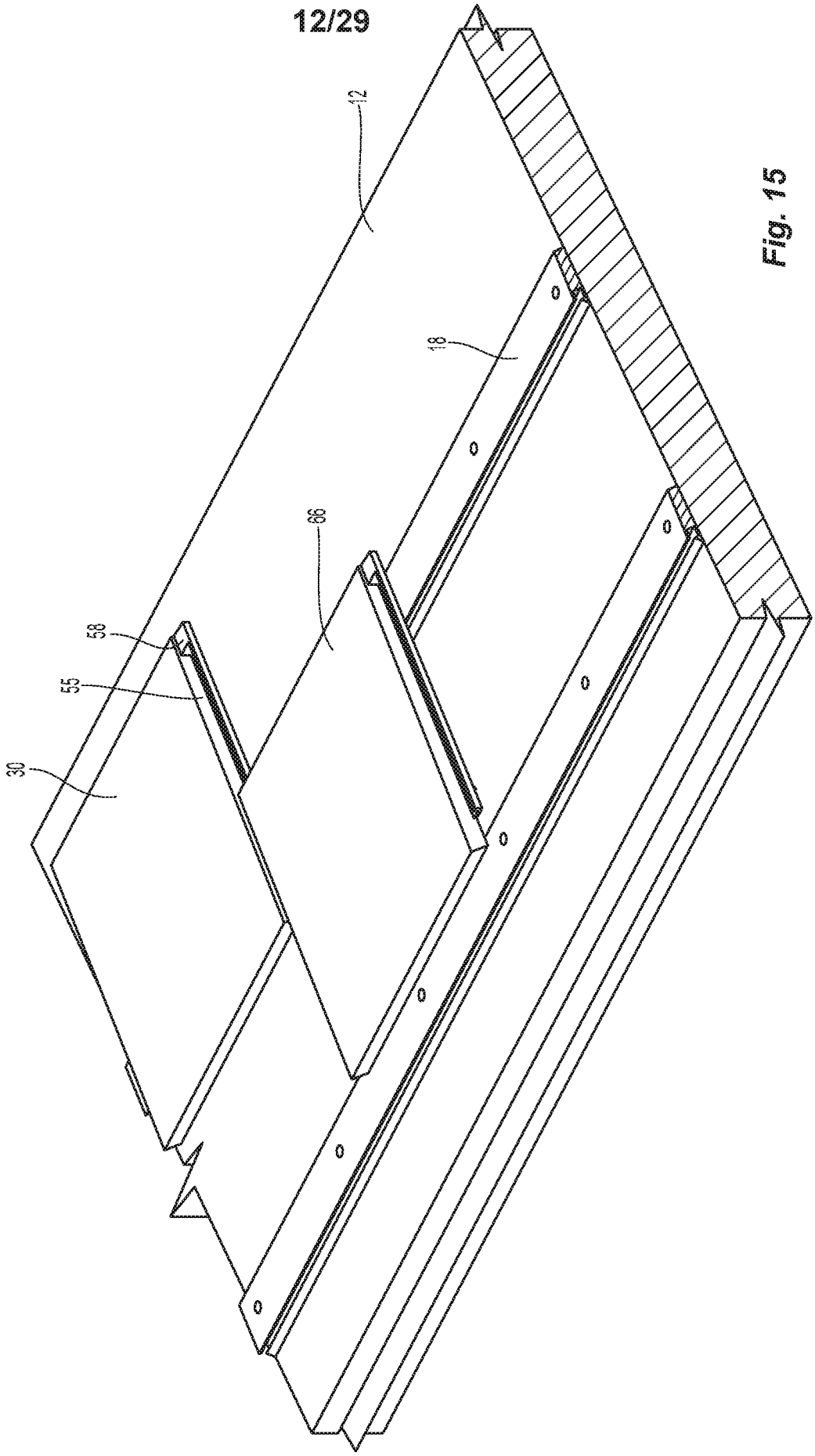
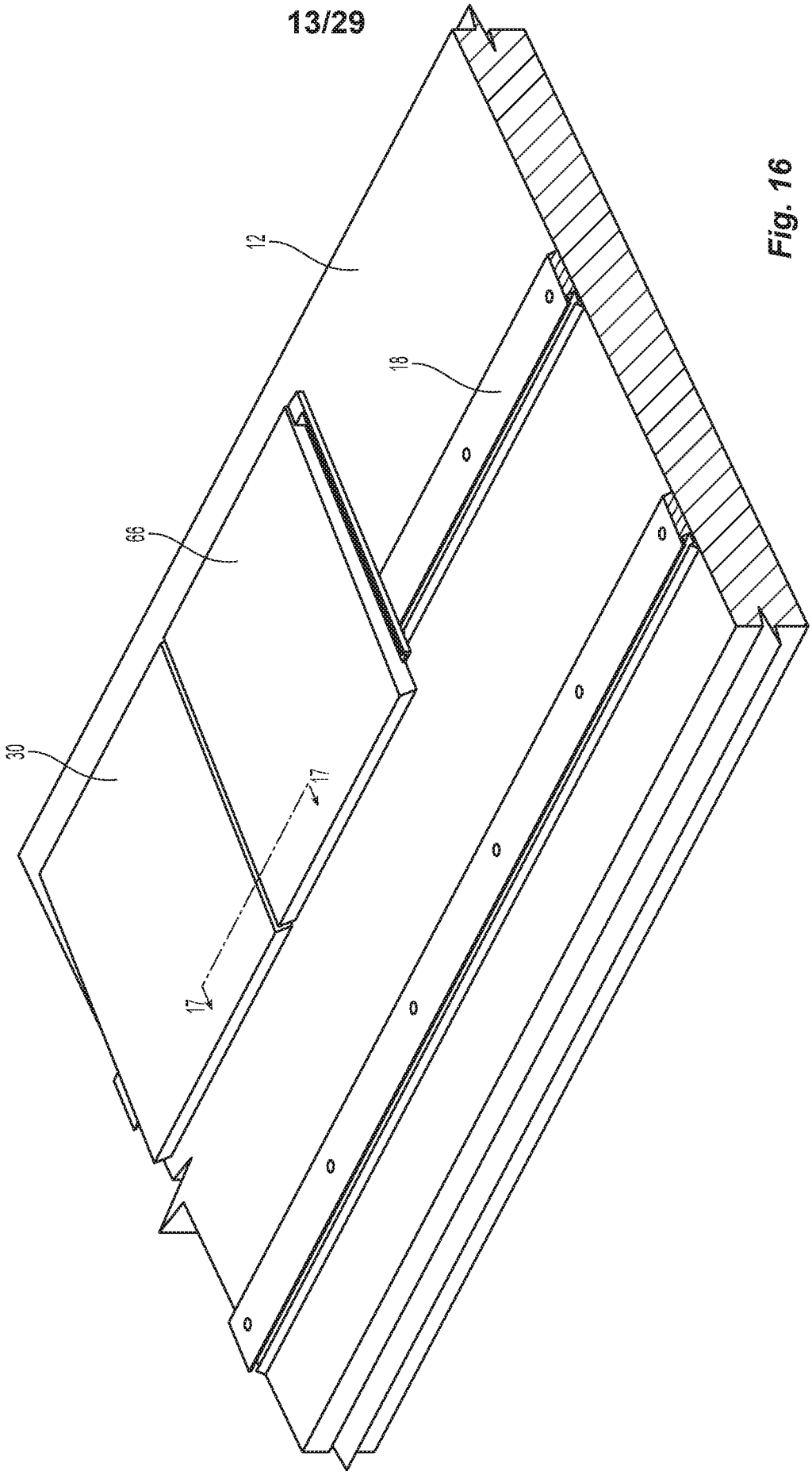


Fig. 15



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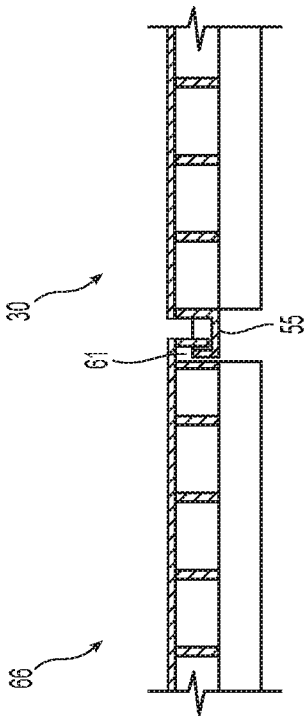

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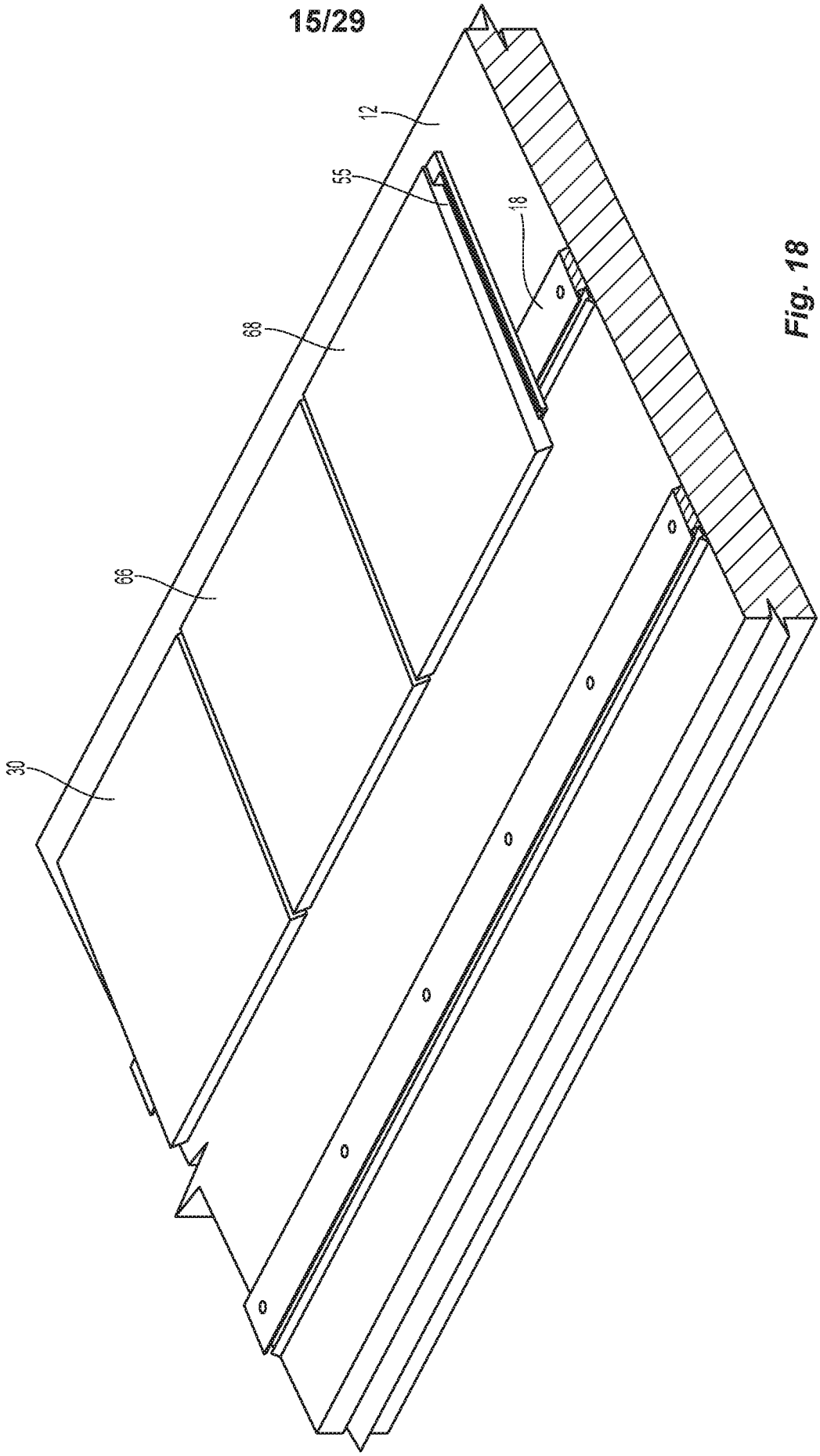


Fig. 18

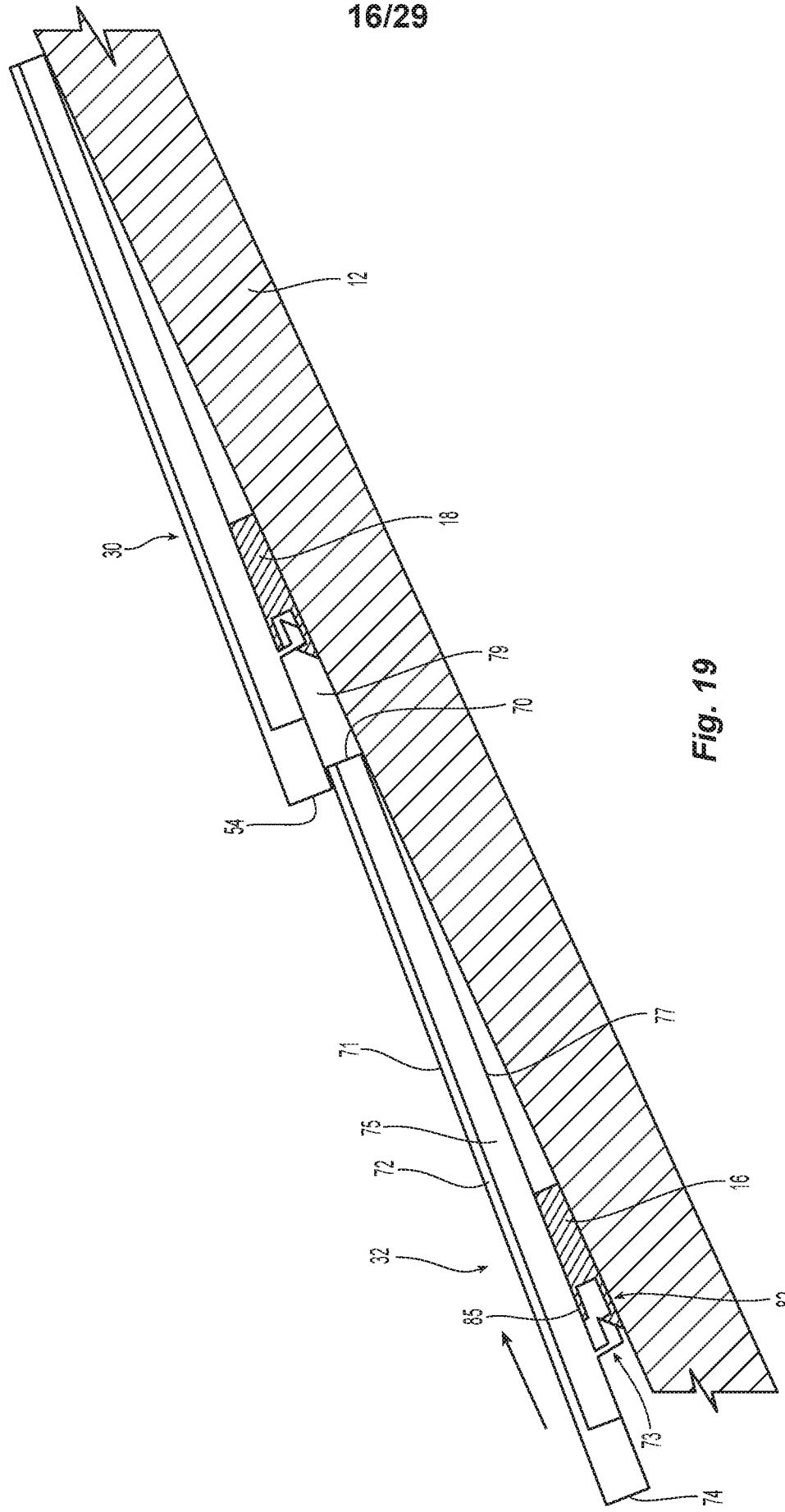


Fig. 19

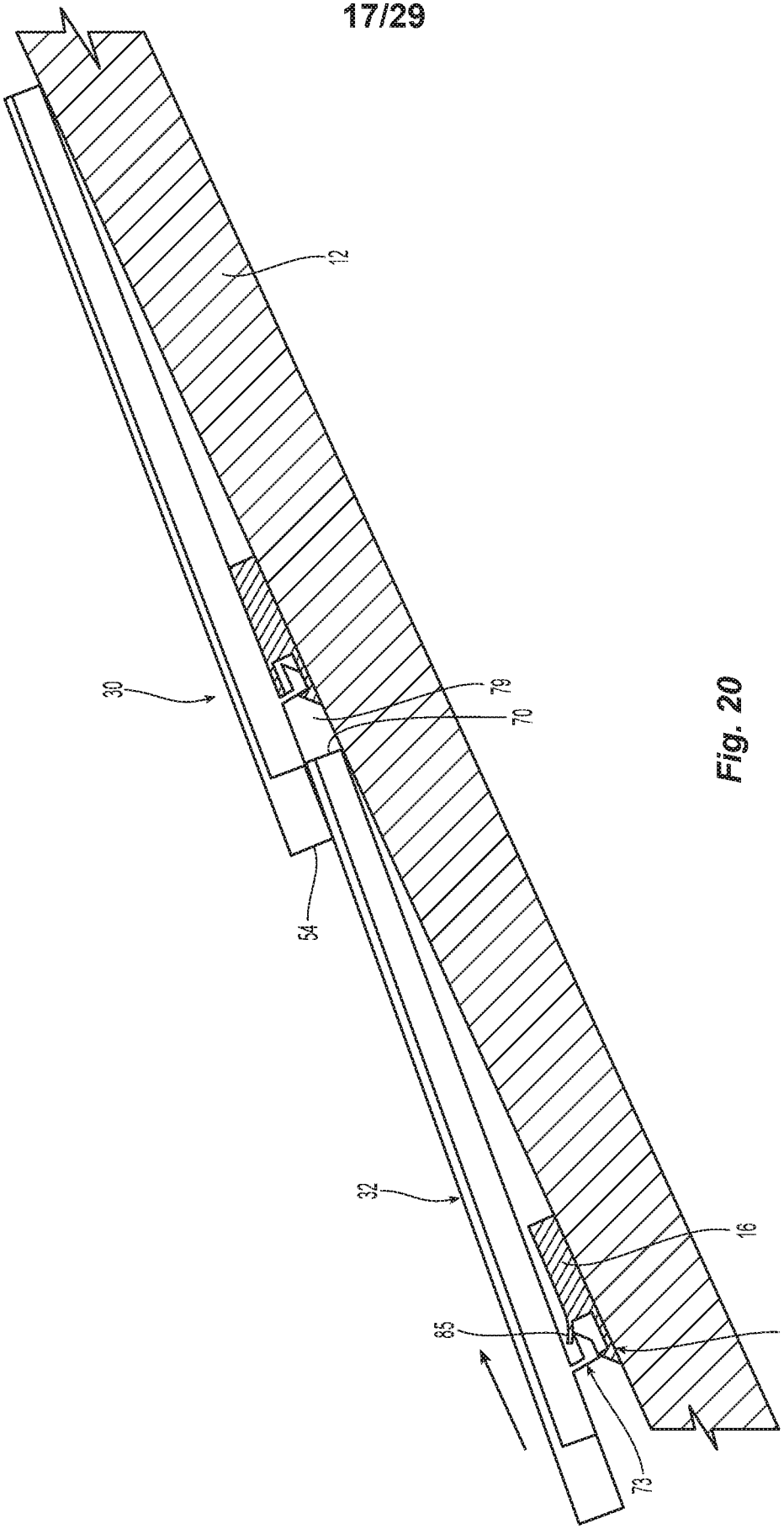


Fig. 20

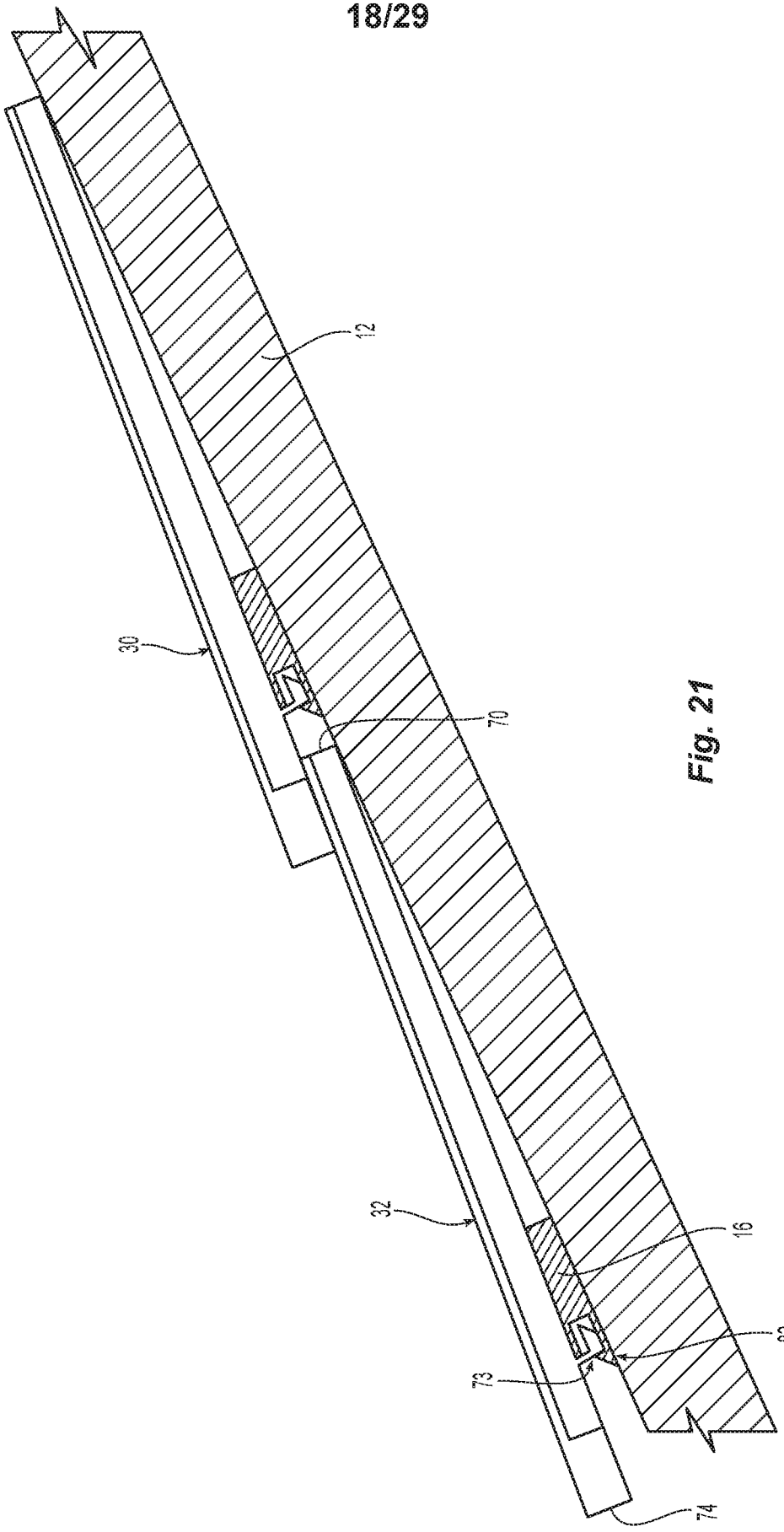


Fig. 21

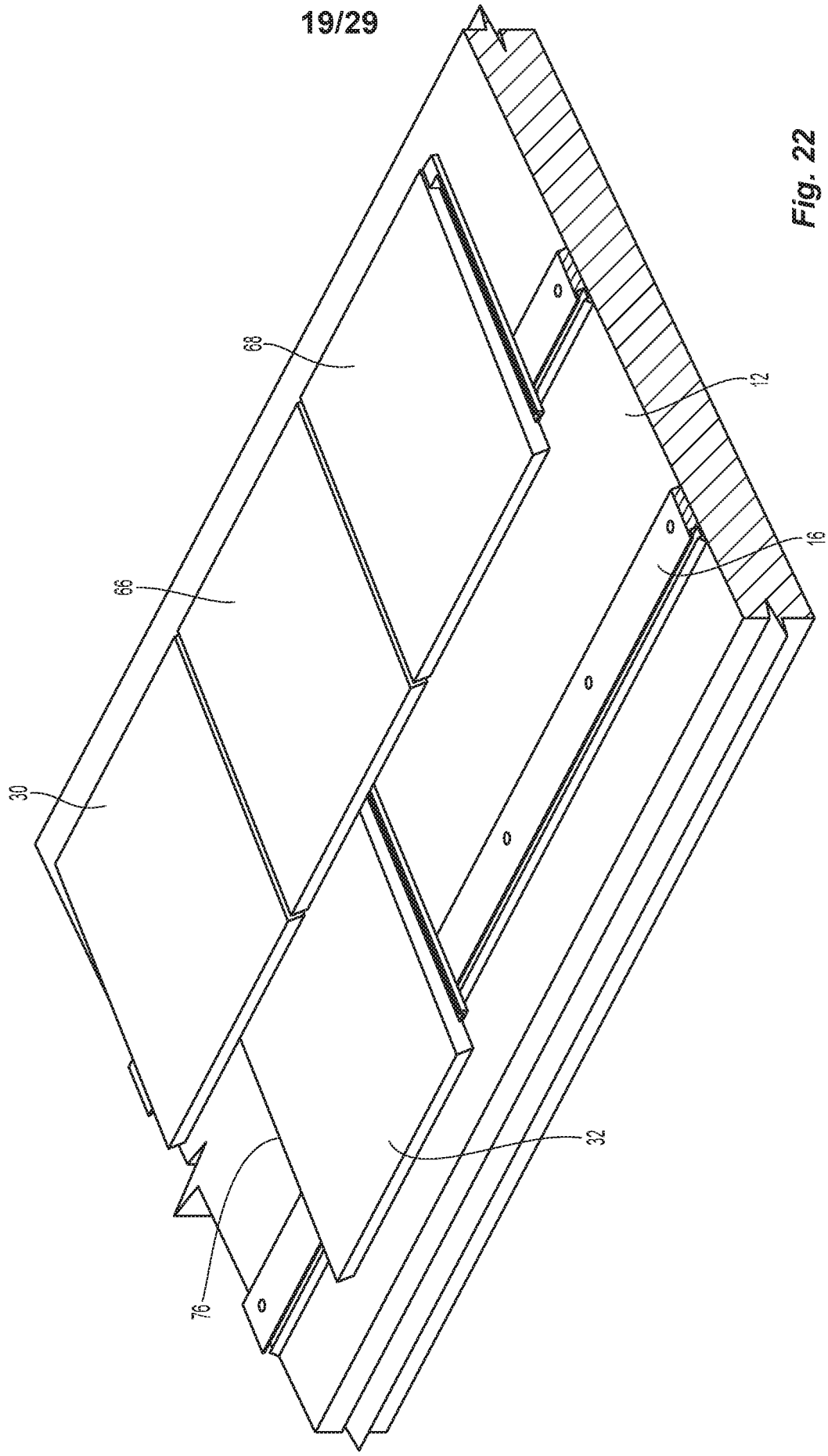
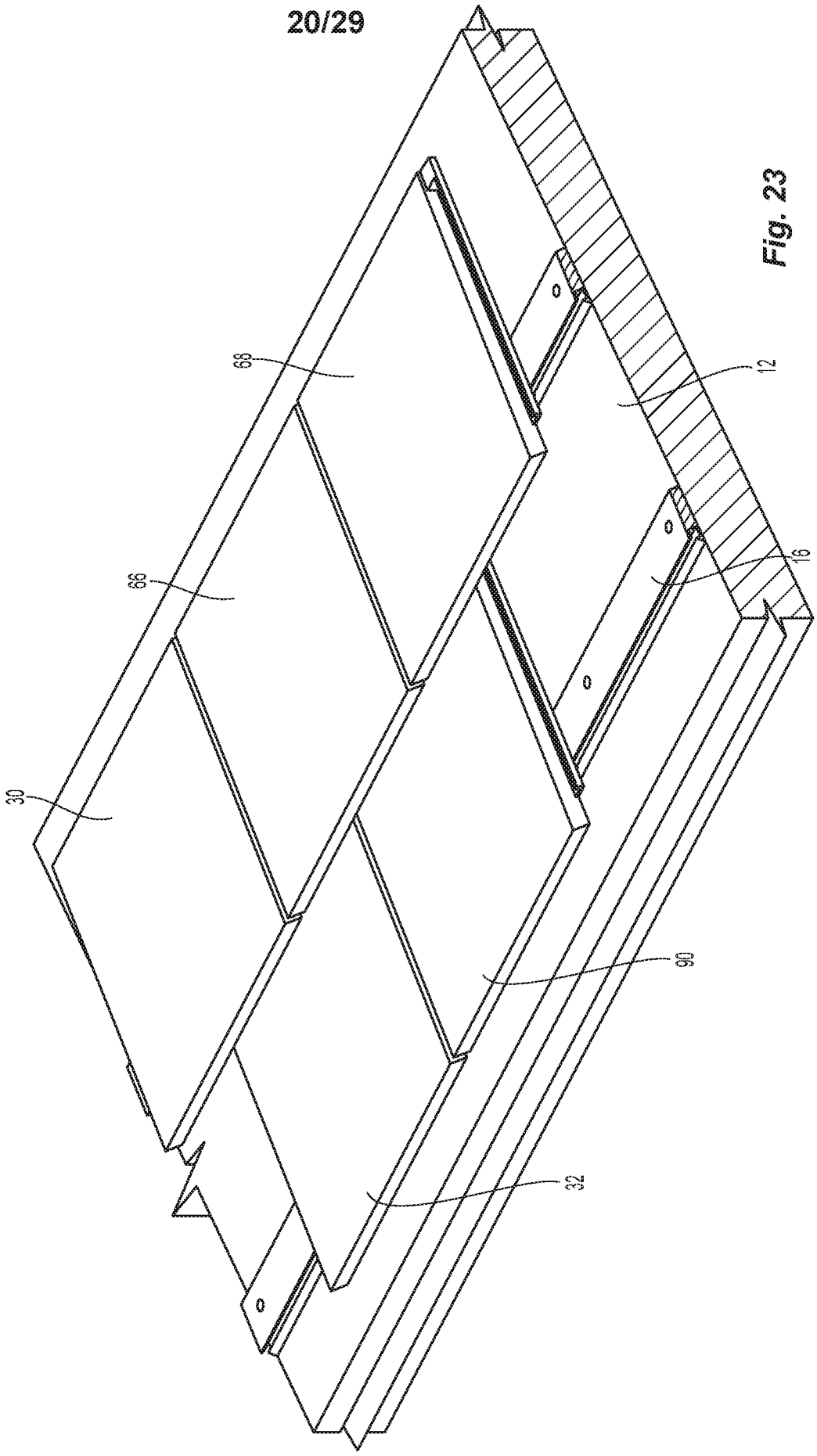


Fig. 22



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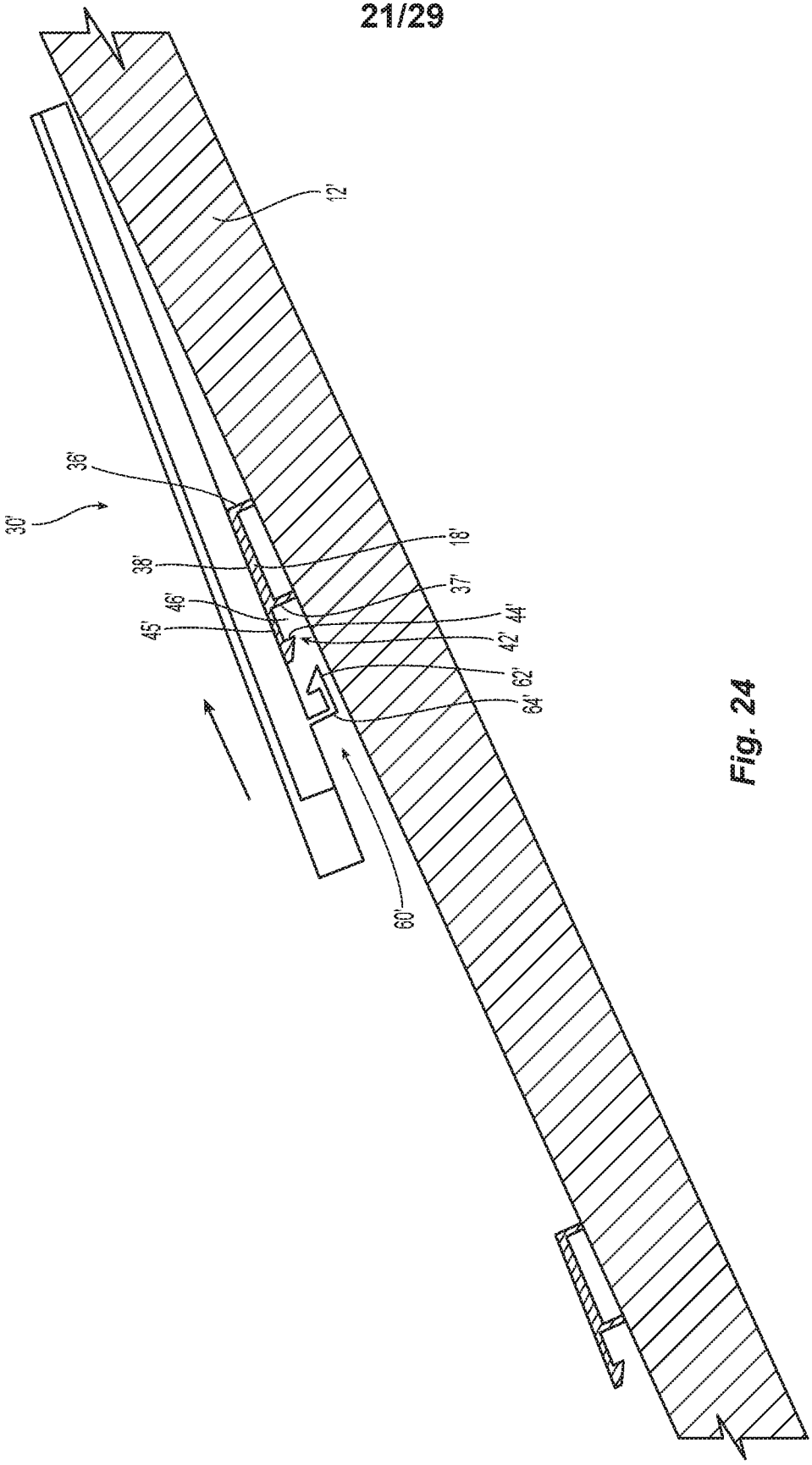

Fig. 24

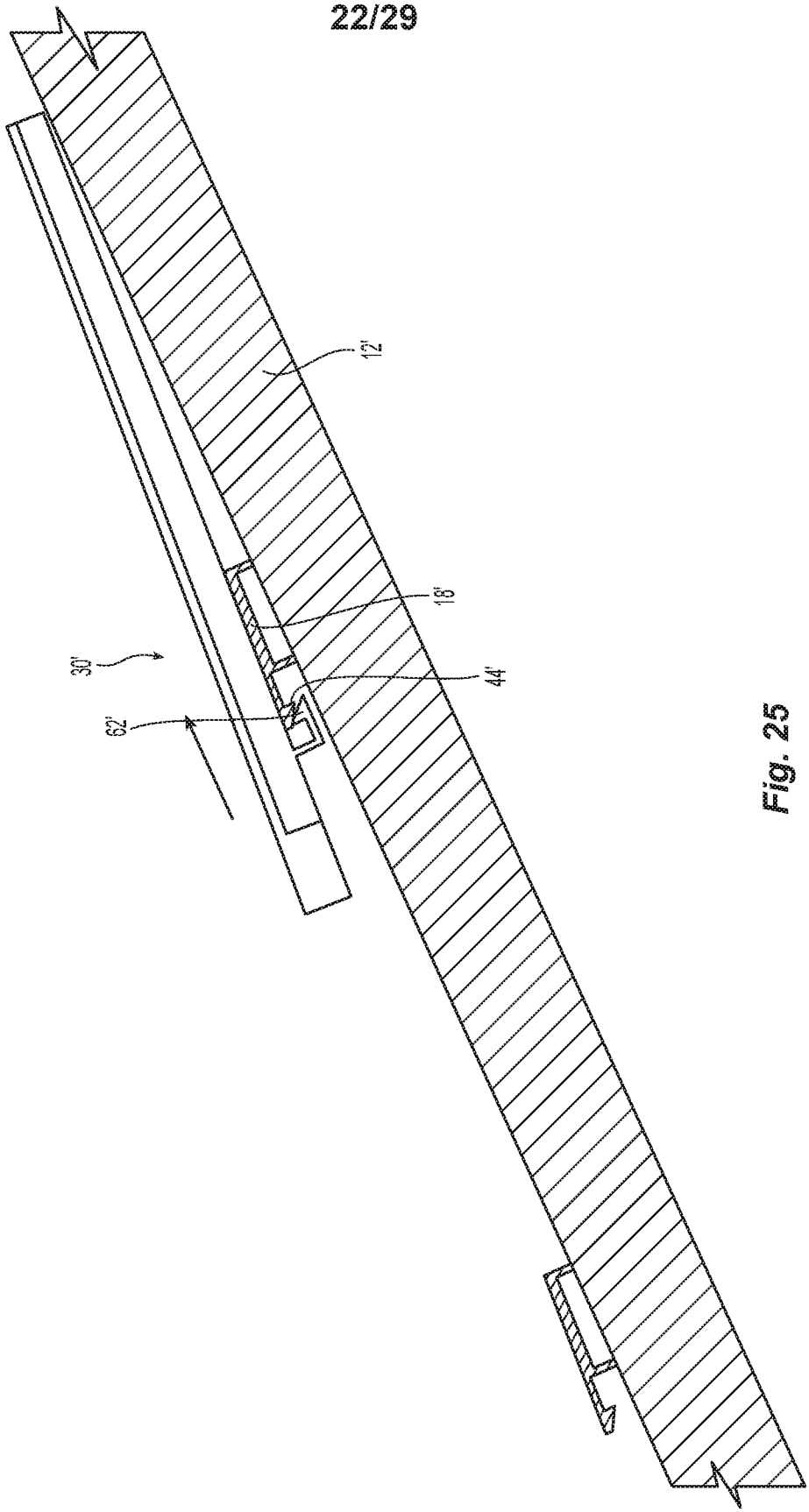

Fig. 25

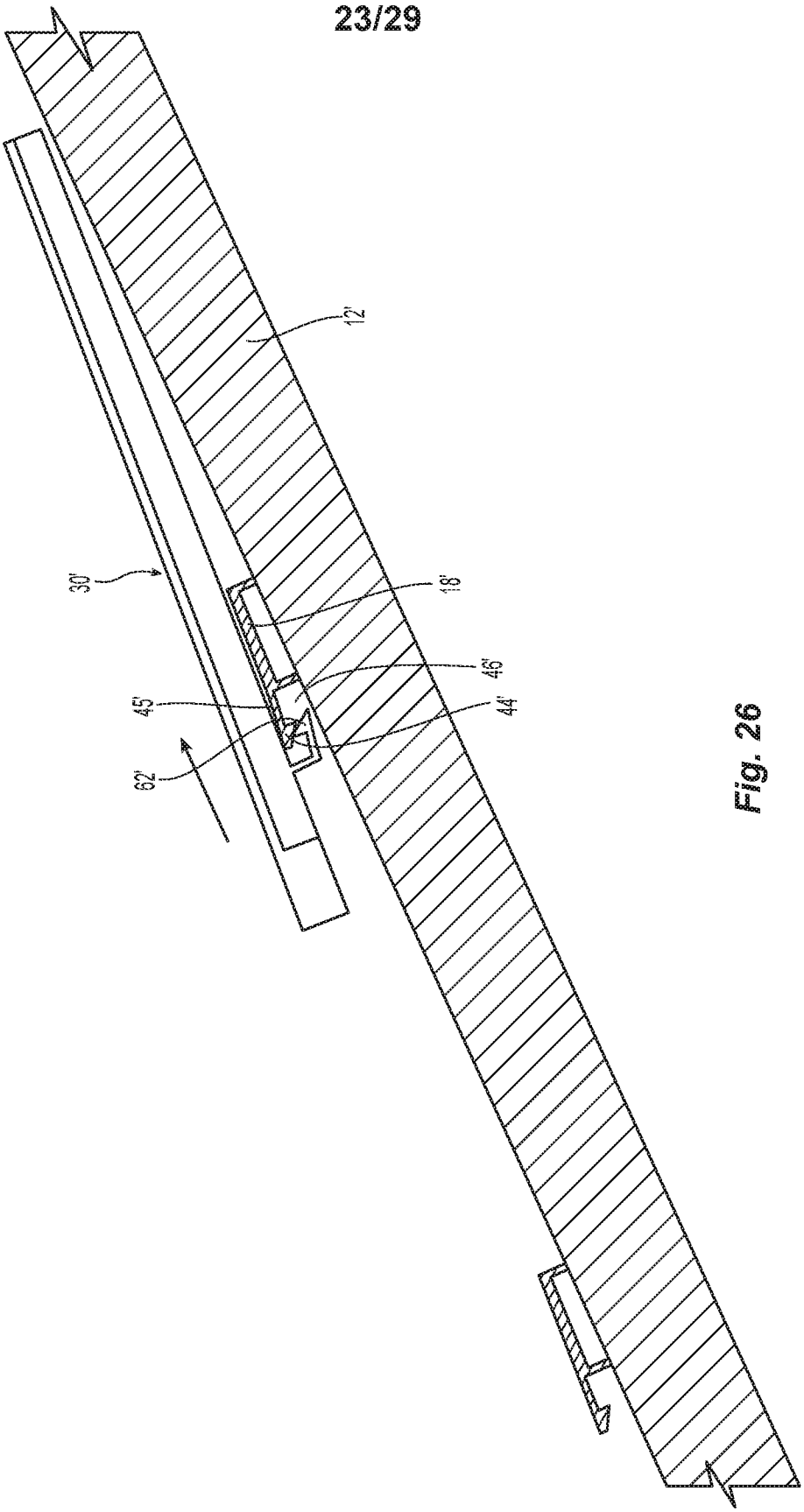

Fig. 26

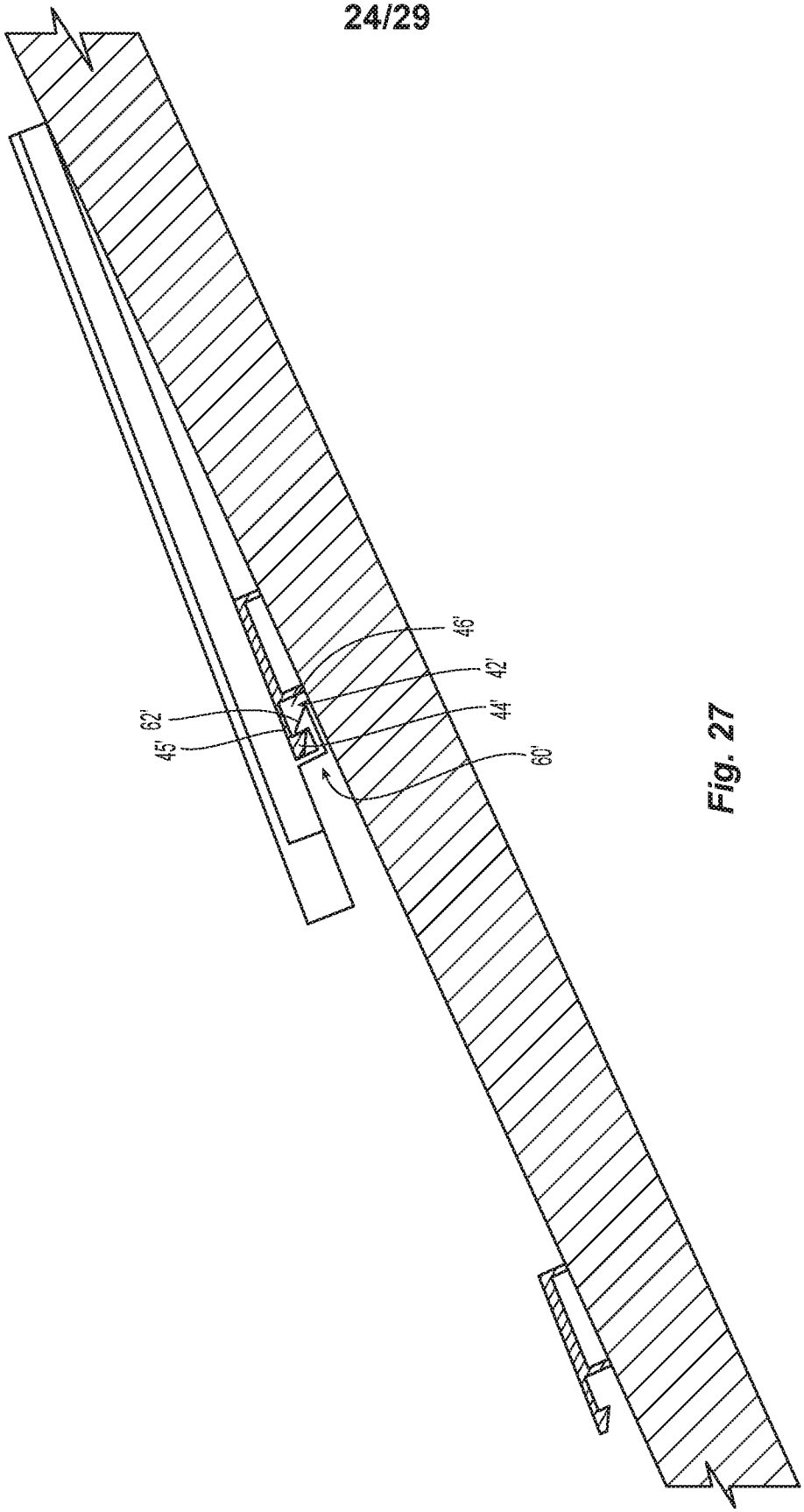

Fig. 27

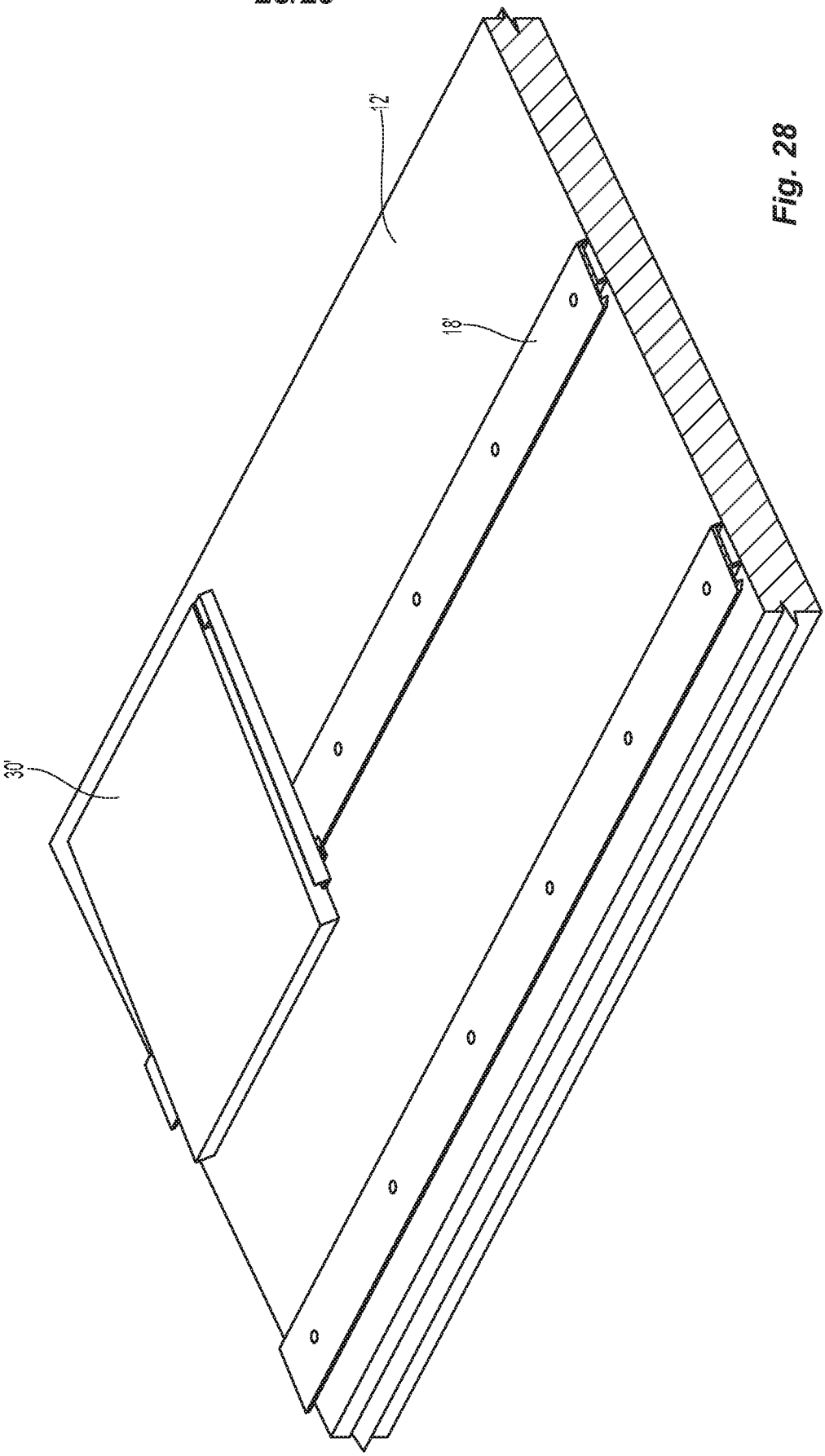

Fig. 28

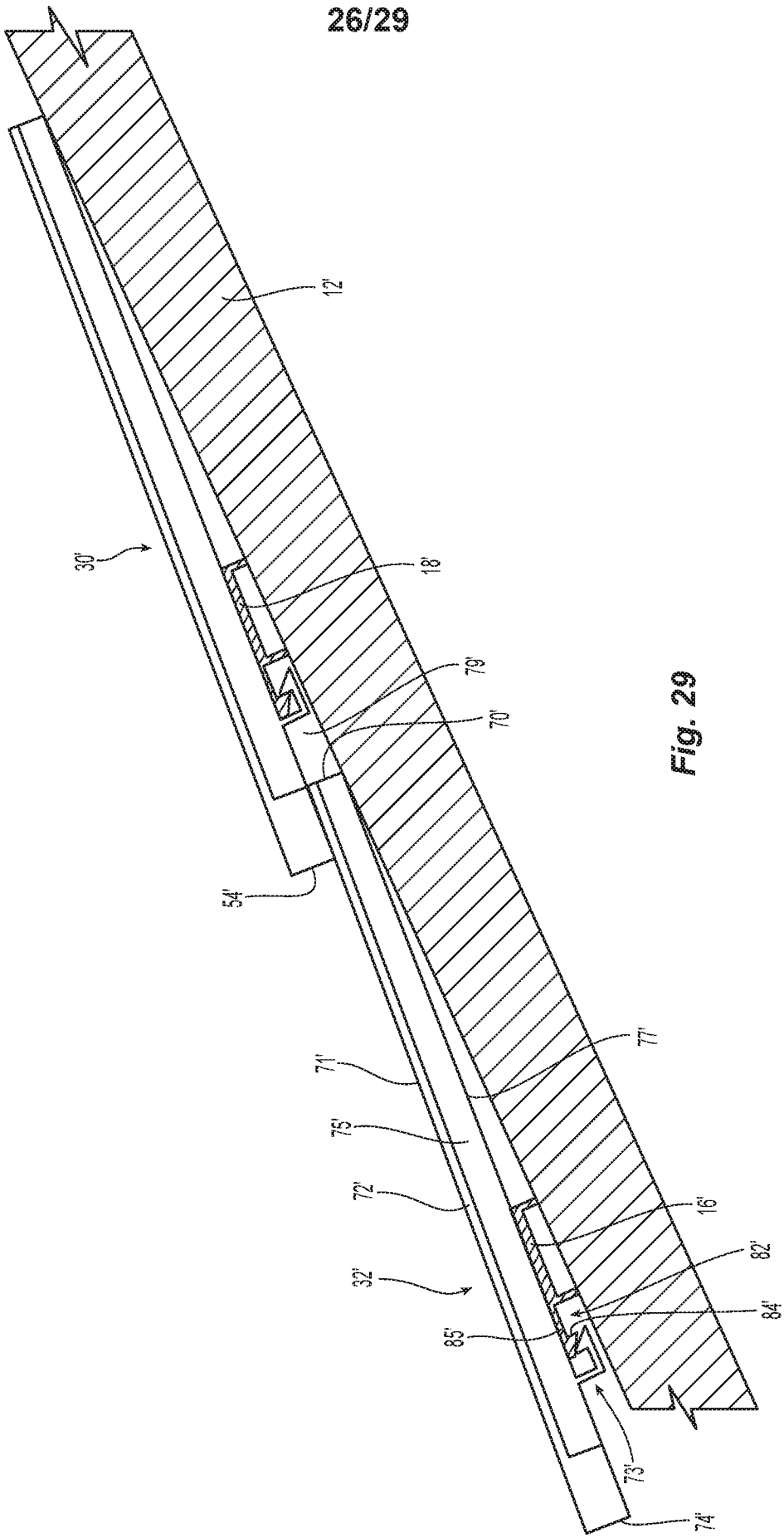

Fig. 29

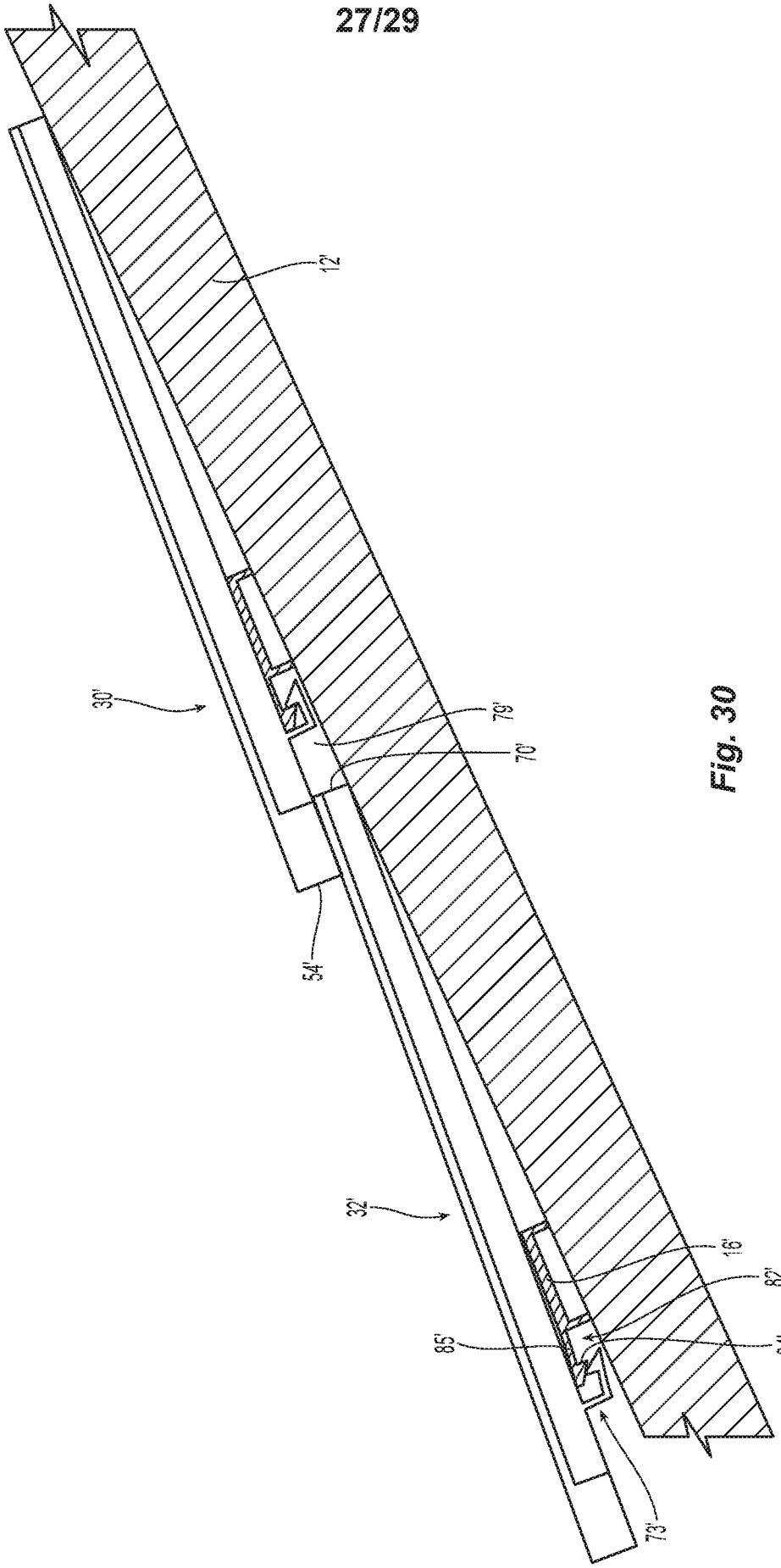

Fig. 30

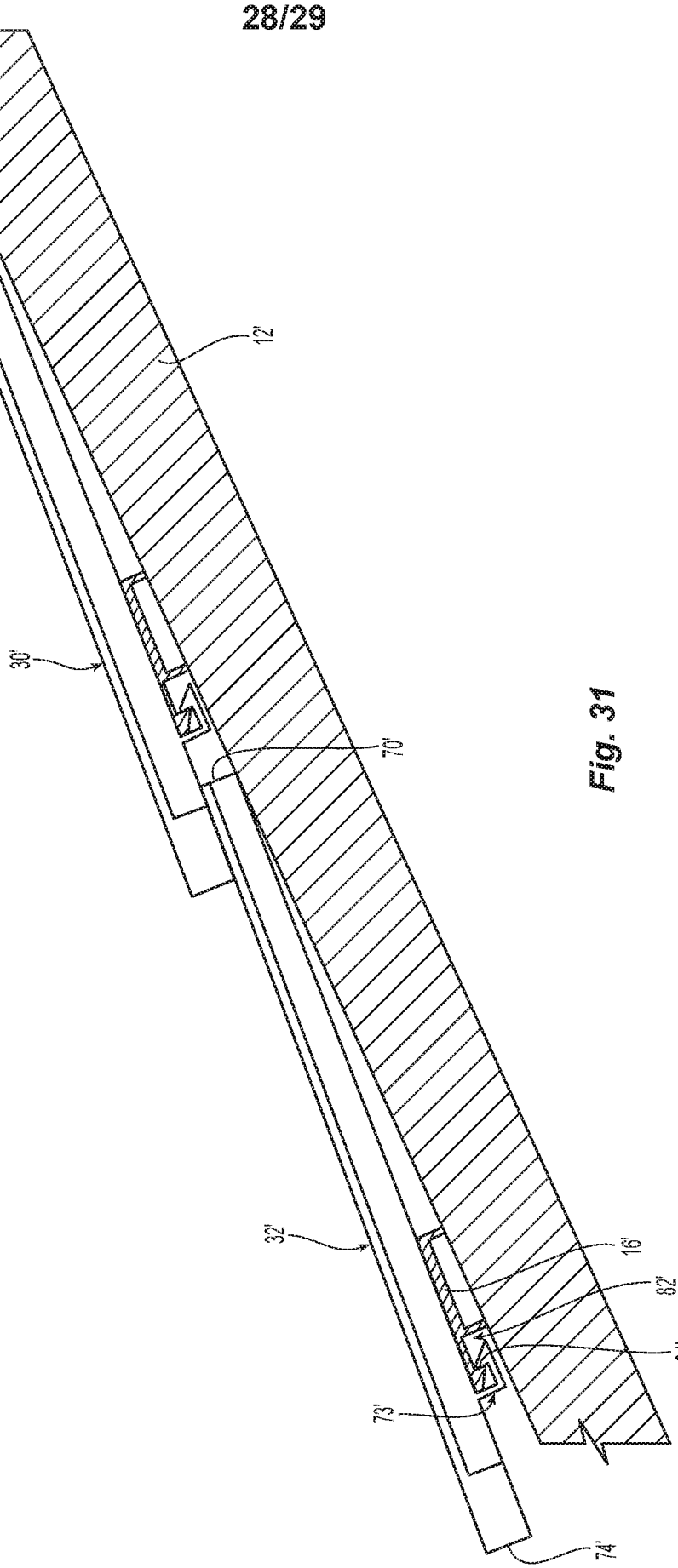

Fig. 31

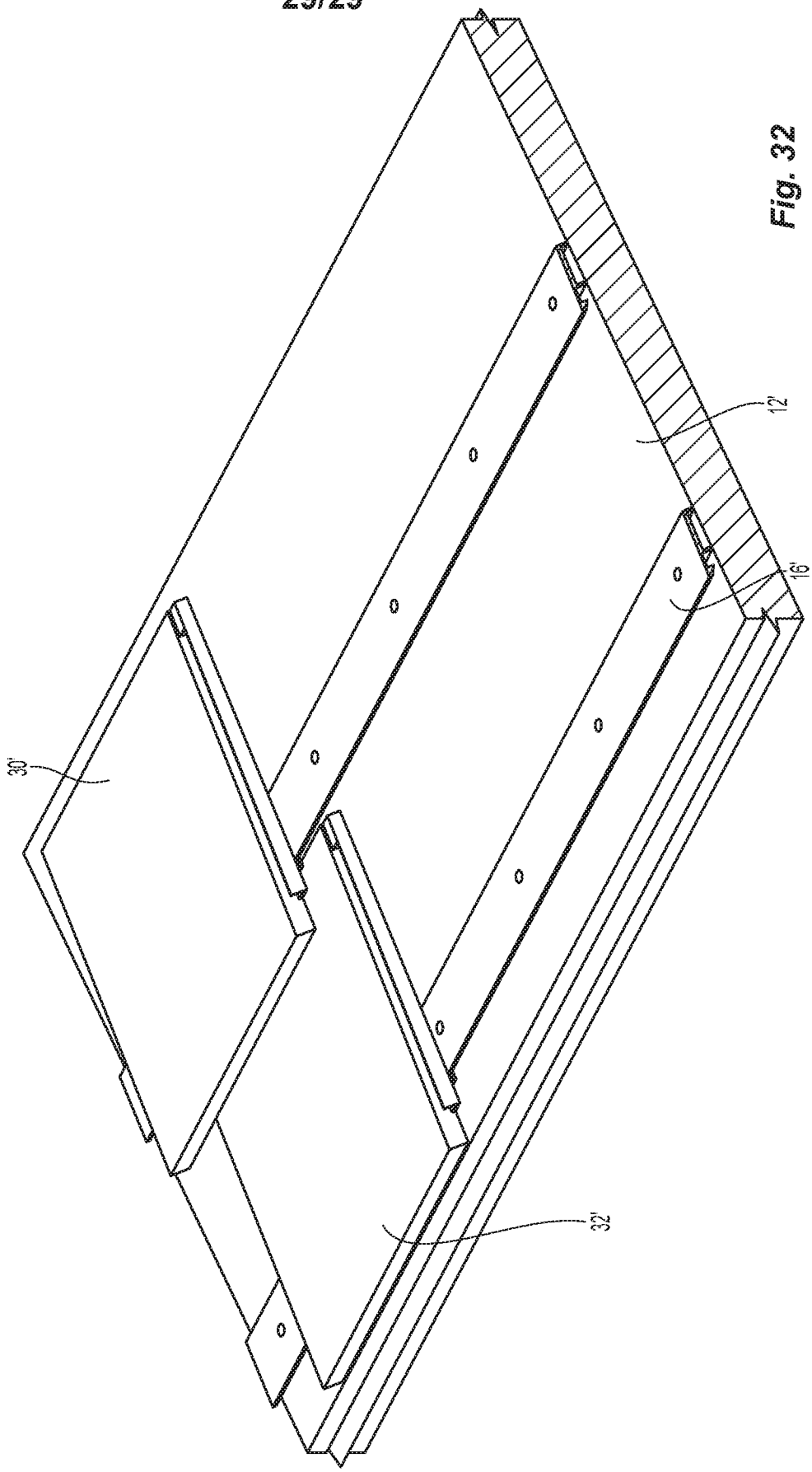

Fig. 32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2020/050894

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - E04D 3/363; E04D 1/00; E04D 1/20; E04D 1/26; E04D 1/34; E04D 3/36 (2020.01)

CPC - E04D 3/363; E04D 1/00; E04D 1/20; E04D 1/265; E04D 1/34; E04D 3/36; E04F 13/0803; E04F 13/083 (2020.08)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

see Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

see Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

see Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8,006,456 B1 (GREEN et al) 30 August 2011 (30.08.2011) entire document	1, 3-5, 7, 9-13, 21-24, 26, 27
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Y		2, 14-19, 21, 22, 25, 26, 28
X	US 7,168,215 B1 (BEDNARCZYK) 30 January 2007 (30.01.2007) entire document. See page 10 of the ISA/237.	1, 3, 4, 6, 8, 14, 17, 18, 20, 29-32
---		---
Y		21, 22, 25, 26, 28
Y	US 4,958,471 A (WADDINGTON) 25 September 1990 (25.09.1990) entire document	2, 14-19
A	US 2016/0123014 A1 (QUALITY EDGE, INC.) 05 May 2016 (05.05.2016) entire document	1-32
A	US 2014/0250815 A1 (QUALITY EDGE, INC.) 11 September 2014 (11.09.2014) entire document	1-32

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

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"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 November 2020	08 DEC 2020
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