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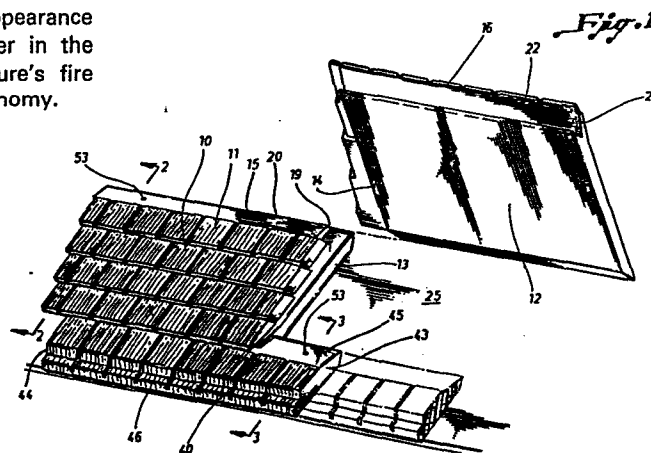
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54 **Roofing and siding members.**

67 An integrally fabricated roofing or siding panel of polyurethane foam, and a roofing or siding system of such panels. The panels have longitudinally alternating overlapping and backset simulated shingle patterns, along with matingly cooperative transverse mounting arrangements so that an aggregation of such panels presents the appearance of an ordinary roof. Fly ash is used as a filler in the polyurethane foam mix to improve the structure's fire retardancy, its dimensional stability, and its economy.



ROOFING AND SIDING MEMBERS

This invention relates to roofing and siding  
5 members.

DESCRIPTION OF PRIOR ART

Roofing and siding materials of various types  
are of widespread familiarity. Asphalt composition  
10 shingles find common usage, largely because they are  
relatively inexpensive. Wood shingles and shakes, and, in  
many communities, clay tiles, are very popular owing to  
their aesthetic appeal. However, the labour required to  
install each of these varieties is often as or more  
15 expensive than the material costs because each single,  
shake, or tile must be individually applied to the roof.  
Similarly, wood sidings and the like require individual  
application of each course to the side of the building.

Although wood shingles and shakes are quite  
20 attractive, they present so great a fire hazard that  
authorities in many communities now limit or prohibit  
their usage. Furthermore, in times of increasing concern  
with regard to energy conservation, traditional roofing  
and siding materials offer little insulative quality to  
25 the structures in which they are used.

Exemplary of the development of roofing and  
siding structures over a number of years are the  
following inventions:

U.S. Patent No. 337,310, which issued on March  
30 2, 1886, to J W Crabbe, discloses siding and roofing with  
two rabbets cut into each end. Each pair of rabbets is  
cut on opposite sides of the board when it is used for  
roofing, whereas each pair of rabbets is cut on the same  
side of the board when it is used for vertical siding.

35 The weatherboarding of U.S. Patent No.

1,492,190, which issued to W. E. Aycock on April 29, 1924, is tapered and has two rabbets in its upper or thicker area so that the weatherboard above rests in the upper of those rabbets.

5           In the composition shingle construction taught in U.S. Patent No. 1,800,403, which issued to H E Pfaff, et al on April 14, 1931 each shingle is equipped on its lower edge with a flange which overlaps the upper area of the shingle immediately below.

10           U.S. Patent No. 2,078,039, which issued to P Stoner on April 20, 1937, discloses siding with a single rabbet on its thinner upper edge and a plurality of rabbets on the thicker lower edge. This patent also discloses mating grooves and protrusions in the bevelled  
15 faces to facilitate sealing.

          U.S. Patent No. 2,452,054, which issued on October 26, 1948, to Grinnel Jones, et al, discloses a fire-retardant composition, designed to be applied as a reactive surface coating to combustible and  
20 non-combustible materials.

          While the structures discussed above have their own attributes, each is found wanting in terms of expense of labour required for installation, and lack of fire retardancy and insulative properties.

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#### SUMMARY OF THE INVENTION

          It is to those desirable attributes of ease of installation, fire retardancy, and insulative quality  
30 that at least preferred embodiments of the present invention is directed.

          In one embodiment, a panel is provided with a simulated shingle or siding pattern on its upper surface. This pattern has the appearance and the dimensions of a  
35 plurality of courses of shingles or siding of whichever

common variety is being imitated. The pattern overhangs one edge of the panel, and is backset on the opposite edge so that when two panels are placed side by side, a continuous array of shingles or siding is presented. Panels are connected to each other above and below by means of matingly receptive surfaces at the upper and lower edges. Similarly constructed starter panels and ridge row members are used to complete the entire roofing or siding assembly. The members of this system are made of polyurethane foam, with the surface of each member having applied to it, for purposes of fire retardancy, paint containing a silicon-coated phosphate. To further enhance the fire retardancy, the cost, and the shrinkage characteristics of the panels, a filler of fly ash is used in the foam mix.

It is, therefore, an object of at least preferred embodiments of the present invention to provide a roofing or siding member entailing a plurality of courses of a simulated roofing or siding pattern.

Another object of at least preferred embodiments of the present invention is to provide a roofing or siding system requiring less labour to install than traditional roofing or siding systems.

Yet another object of at least preferred embodiments of the present invention is the provision of a fire retardant roofing or siding member.

A further object of at least preferred embodiments of the present invention is the provision of a roofing or siding member having enhanced insulative characteristics.

A still further object of at least preferred embodiments of the present invention is to provide a polyurethane foam roofing or siding member which is economical and commercially feasible to produce.

For a better understanding of the invention reference will now be made, by way of example, to the accompanying drawings, in which:-

5           Figure 1 is a perspective view of two longitudinally adjacent roofing or siding shingle panels of the present invention, with one such panel being rotated and spaced longitudinally apart from the first panel and with said panels being shown in placement  
10 relative to starter panels therebelow;

Figure 2 is a cross-sectional view of a panel taken along lines 2-2 of Figure 1;

Figure 3 is a cross-sectional view of a starter panel taken along lines 3-3 of Figure 1;

15           Figure 4 is a cross-sectional view of a roofing or siding shingle arrangement of the present invention illustrating the interconnecting relationship of the various members thereof; and

20           Figure 5 is a cross-sectional view, taken along lines 5-5 of Figure 4, of the area near the apex of a roofing system of the present invention, illustrating the structure and interconnecting relationship of the ridge row members.

25           Referring to the drawings, the reference numeral 10 designates a roofing panel of the present invention. Although a roofing structure is particularly illustrated in Figures 1-5, and although the description herein refers particularly to the embodiments of the present invention as incorporated into a roofing system, it is  
30 nevertheless apparent that the invention is equally adaptable to siding panels and to a siding system.

35           Roofing panel 10 is preferably constructed of polyurethane foam and may be manufactured from any of a number of foam mixes, all of which are well known in the industry, such as that marketed under the trademark

COROFOAM. Also, and as will be discussed in greater detail below, panel 10 may be constructed of foam having certain new and beneficial properties.

5 Roofing panel 10 is provided generally with upper and lower surfaces 11 and 12, first and second transverse edges 13 and 14, and top and bottom longitudinal edges 15 and 16. Upper surface 10 has thereon a simulated shingle pattern, preferably having the appearance and dimensions of a plurality of courses  
10 of shingles. It may, of course, be constructed in the fashion of any desired roofing or siding pattern, including, but not limited to, simulated courses of clay tile roofing and lapboard siding. The particular simulation illustrated in Figure 1 is that of wood  
15 shingles.

The simulated shingle pattern on upper surface 11 preferably encompasses the major portion of that surface. In the area of the second transverse edge 14, however, the shingle pattern longitudinally overhangs  
20 that edge. On the other hand, in the area of the first transverse edge 13, the shingle pattern is longitudinally backset a substantially equal distance.

On the upper surface 11 and in the area of the top longitudinal edge 15 is situated an upper mounting  
25 arrangement, generally depicted in Figure 1 by the reference numeral 19. Upper mounting arrangement 19 includes thereon a relatively substantial upper mounting shelf 20, as shown, between the simulated shingle pattern and the top longitudinal edge 15.

30 On the lower surface 12 and in the area of the bottom longitudinal edge 16 is situated a corresponding lower mounting arrangement 21. Lower mounting arrangement 21 includes thereon a lower mounting shelf 22 so that when the lower mounting shelf 22 of one such panel is  
35 placed above the upper mounting shelf 20 of the panel

transversely adjacent thereto, the shelves 20 and 22 are matingly receptive to each other.

In developing the system described herein, it was an objective to provide an appropriate first, or starter, panel. This is accomplished by the starter panel denoted generally by reference numeral 40 in Figures 1, 3 and 4. Like roofing panel 10, starter panel 40 has upper and lower surfaces 41 and 42, first and second transverse edges 43 and 44, and top and bottom longitudinal edges 45 and 46. Also, a simulated shingle pattern encompasses the major portion of upper surface 41. An upper mounting arrangement 49, including an upper mounting shelf 50, is also constructed in the same fashion as the upper mounting arrangement 19 and upper mounting shelf 20 on roofing panel 10.

However, in order to provide the appearance of an ordinary roof, the structure of starter panel 40 in the area of its bottom longitudinal edge 16 is altered so that the lower course of starter panel 40 appears to be mounted atop a starter strip. This is accomplished by forming, in the vicinity of bottom longitudinal edge 46, starter indentation 54 in the manner illustrated in Figures 1 and 3.

To install a system composed of starter panels 40 and roofing panels 10, one begins by attaching to the roof decking 25 or rafters, in the vicinity of its lower edge, a series of longitudinally adjacent starter panels 40 so that the first transverse edge 43 of each abuts the second transverse edge 44 of the starter panel adjacent thereto, so as to form a complete starter course on the surface being roofed. Attachment to the decking 25 can be accomplished by nails, staples, or other ordinary fastener means 53, through the upper mounting shelf 50, as indicated in Figure 4.

The next step in the installation procedure

involves the application of consecutive courses of transversely adjacent roofing panels 10. The first course of such panels 10 are attached to the starter panels 40 by bringing the lower mounting shelf 22 of panel 10 into  
5 mated relationship with the upper mounting shelf of the starter panel 40 immediately transversely adjacent. This assembly is connected to the decking 25 by nails, staples, or other fastener means 53 driven through the upper mounting arrangement 19 of panel 10. In this manner the  
10 starter panel 40 and the roofing panel 10 thereabove form a roofing structure having the appearance and dimension of a plurality of courses of shingles. In fact, by installation of a course of starter panels 40, followed by a course of roofing panels 10, one can apply the  
15 equivalent of several courses of conventional roofing in significantly less time, thereby saving considerably on the cost of labour.

Application of additional courses of roofing panels 10, as needed, is made in like manner, with each  
20 such course being transversely adjacent the previous one therebelow, towards the apex of the roof surface, all as illustrated in Figure 4. It is most often the case that the top longitudinal edge 15 of the uppermost course will not approximate the apex of the roof. In such instances,  
25 however, as shown in Figure 4, the uppermost panels 10 may be severed as needed without detriment to the system.

A ridge row may be constructed of polyurethane foam members to cover the apex of the roof, with said ridge row being constructed so that any particular member  
30 thereof straddles the apex and covers the uppermost portion of the panels 10 on both sides of the apex. However, because of varying slopes found on the roofs to which the system may be applied, we have found it advantageous to construct ridge row members 30 in the  
35 manner described below and illustrated in Figures 4



and 5.

Ridge row members 30 each have upper and lower surfaces 31 and 32, first and second transverse edges 33 and 34, and top and bottom longitudinal edges 35 and 36. 5 Top longitudinal edges 35 are formed at the appropriate angle from the upper and lower surfaces 31 and 32, which angle varies according to the roof slope, so as to form a substantially mated juncture above the roof apex, as illustrated in Figure 4. In a fashion similar to roofing 10 panel 10, ridge row member 30 has, in the vicinity of its first transverse edge 33, right-hand mounting arrangement 68, including right-hand mounting shelf 69, as shown. Correspondingly, ridge row member 30 is provided, in the vicinity of its second transverse edge 34, with left-hand 15 mounting arrangement 70, including left-hand mounting shelf 71, also as shown in Figure 5.

With this structure, an array of ridge row members 30 may be attached longitudinally adjacent to one another above the uppermost roofing panels 10 in the area 20 of, and on either side of, the roof apex. The area defined by the top longitudinal edges 35 of such an arrangement of ridge row members may cover a ridge cap 72, connected by ordinary fastener means 54, to the panels 10 on either side of the roof apex, as shown. And, 25 of course, each ridge row member 30 is connected to the panel 10 therebelow by ordinary fastener means 54 through left-hand mounting shelf 71, as shown in Figure 5.

The novel roofing or siding system described above represents, in and of itself, a significant 30 improvement over the prior art. In order to be even more useful in building construction, however, it is desirable that panels of this fashion be economical to produce and possessing a satisfactory degree of fire retardancy. Those objectives have also been accomplished by 35 incorporating fly ash as a filler in the polyurethane

foam mix. In particular, high sodium fly ash (i.e. a composition meeting the standard of ATSM C-618, Vol. 14, Class C Mineral Ad Mixture), has been found suitable for each of those purposes and may be mixed in proportions as high as 70% fly ash and 30% polyol-isocyanate. Although low sodium fly ash has been previously used in asphalt and cement products, it is believed that my discovery of this utility of high sodium fly ash in low density foam products is especially noteworthy in view of the fact that its inclusion has allowed the product of my invention to pass the UL 790 fire tests, i.e. Underwriters, Inc. Tests for Fire Resistance of Roof Covering Materials. And, naturally, because of its considerably lesser cost than foam system components, fly ash is economically beneficial as well. Further, I have found the inclusion of fly ash as a filler to provide superior dimensional stability to the produced foam, with little shrinkage of the foam occurring.

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CLAIMS

1. A roofing or siding shingle panel adapted for  
5 disposition on a roof or on a building wall, said panel  
(10) comprising:

a base portion having an upper surface (11), a  
lower surface (12), a first transverse edge (13), a  
second transverse edge (14), a top longitudinal edge  
10 (15) and a bottom longitudinal edge (16) thereon;  
and the major portion of the upper surface (11)  
having a simulated shingle or siding pattern  
thereon;

an upper mounting arrangement (19) disposed  
15 along the top longitudinal edge (15) of the base  
adjacent the upper surface (11) thereof, said upper  
mounting arrangement (19) including a relatively  
substantial upper mounting shelf (20), said upper  
mounting shelf (20) being situated on the upper  
20 surface (11) between the simulated shingle or siding  
pattern and the top longitudinal edge (15) of the  
base;

a lower mounting arrangement (21) disposed along  
the bottom longitudinal edge (16) of the base  
25 adjacent the lower surface (12) thereof, said lower  
mounting arrangement having a lower mounting shelf  
(22) for substantially mated reception with the  
upper mounting shelf (20) of the next transversely  
adjacent panel disposed therebelow;

a portion of the simulated shingle or siding  
30 pattern being longitudinally backset a first  
predetermined distance from the first transverse  
edge (13) of the base to expose a portion thereof  
and longitudinally overhanging the second transverse  
35 edge (14) of the base by a second predetermined

distance substantially equal to the first distance such that when the panel is disposed on the structure the overhang overlies substantially entirely the exposed portion of the base of the panel longitudinally adjacent the second transverse edge (14) thereof while the exposed portion of the base of the panel is substantially overlaid by the overhang from the panel next longitudinally adjacent the first transverse edge (13) thereof to thereby camouflage the longitudinal abutment between panels.

2. A roofing or siding shingle starter panel adapted for disposition on a roof or on a building wall, said starter panel (40) comprising:

a base portion having an upper surface (41), a lower surface (42), a first transverse edge (43), a second transverse edge (44), a top longitudinal edge (45), and a bottom longitudinal edge (46) thereon; and the upper surface (41) having a simulated shingle or siding pattern thereon; and

an upper mounting arrangement (49) disposed along the top longitudinal edge (45) of the base adjacent the upper surface (41) thereof, said upper mounting arrangement (49) including a relatively substantial upper mounting shelf (50), said upper mounting shelf (50) being situated on the upper surface (41) between the simulated shingle or siding pattern and the top longitudinal edge (45) of the base, and said upper mounting shelf (50) being constructed for substantially mated reception with the lower mounting arrangement of the next transversely adjacent panel disposed thereabove.

3. A roofing or siding ridge row member adapted for disposition on a roof or on a building wall, said ridge row member (30) comprising:

a base portion having an upper surface (31), a

lower surface (32), a first transverse edge (33), a second transverse edge (34), a top longitudinal edge (35), and a bottom longitudinal edge (36) thereon, and the major portion of the upper surface (31) having a simulated shingle or siding pattern thereon;

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a left-hand mounting arrangement (70) disposed along the second transverse edge (34) of the base adjacent the upper surface (31) thereof, said left-hand mounting arrangement (70) including a left-hand mounting shelf (71), said left-hand mounting shelf (71) being situated on the upper surface (31) between the simulated shingle or siding pattern and the second transverse edge (34) of the base;

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a right-hand mounting arrangement (68) disposed along the first transverse edge (33) of the base adjacent the lower surface (32) thereof, said right-hand mounting arrangement (68) having a right-hand mounting shelf (69) for substantially mated reception with the left-hand mounting shelf of the next longitudinally adjacent ridge row member disposed thereat.

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4. A roofing or siding shingle arrangement for covering the roof or wall of a structure comprising:

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a first plurality of roofing or siding shingle starter panels (40) each disposed longitudinally adjacent the other along the longitudinal dimension of the structure to define a starter row of shingle panels;

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a second plurality of roofing or siding shingle panels (10) each disposed longitudinally adjacent the other along the longitudinal dimension of the structure to define a second row of shingle panels transversely adjacent the starter row, the lower

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mounting shelf (22) of each panel in the second row being substantially matingly received with the upper mounting shelf (50) of the starter panel in the first row adjacent therebelow;

5 a plurality of roofing or siding ridge row members (30) each disposed longitudinally adjacent the other along the longitudinal dimension of the structure in the vicinity of its apex to define a ridge row of such members transversely adjacent the  
10 or a second row, the lower surfaces (42) of said ridge row members (30) being attached to the upper surfaces (11) of the panels (10) of the second row therebelow, the left-hand mounting shelf (71) of each ridge row member (30) being substantially  
15 matingly received with the right-hand mounting shelf (69) of the ridge row member adjacent thereto;

each starter panel (40) of the first row comprising:

a base portion having an upper surface (41), a lower surface (42), a first transverse edge (43), a  
20 second transverse edge (44), a top longitudinal edge (45) and a bottom longitudinal edge (46) thereon; and the upper surface having a simulated shingle or siding pattern thereon; and

an upper mounting arrangement (49) disposed  
25 along the top longitudinal edge (45) of the base adjacent the upper surface (11) thereof, said upper mounting arrangement (19) including a relatively substantial upper mounting shelf (20), said upper mounting shelf (20) being situated on the upper  
30 surface (41) between the simulated shingle or siding pattern and the top longitudinal edge (45) of the base, and said upper mounting shelf (50) being constructed for substantially mated reception with the lower mounting arrangement (21) of the next  
35 transversely adjacent panel disposed thereabove;

each shingle panel of the second row comprising:

5 a base portion having an upper surface (11) and a lower surface (12), a first transverse edge (13), a second transverse edge (14), a top longitudinal edge (15) and a bottom longitudinal edge (16) thereon; and the major portion of the upper surface (11) having a simulated shingle or siding pattern thereon;

10 an upper mounting arrangement (19) disposed along the top longitudinal edge (15) of the base adjacent the upper surface (11) thereof, said upper mounting arrangement (19) including a relatively substantial upper mounting shelf (20), said upper mounting shelf (20) being situated on the upper surface (11) between the simulated shingle pattern and the top longitudinal edge (15) of the base;

15 a lower mounting arrangement (21) disposed along the bottom longitudinal edge (16) of the base adjacent the lower surface (12) thereof, said lower mounting arrangement having a lower mounting shelf (22) for substantially mated reception with the upper mounting shelf (20) of the next transversely adjacent panel disposed therebelow;

20 a portion of the simulated shingle or siding pattern being longitudinally backset a first predetermined distance from the first transverse edge (13) of the base to expose a portion thereof and longitudinally overhanging the second transverse edge (14) of the base by a second predetermined distance substantially equal to the first distance such that when the panel is disposed on the structure the overhang overlies substantially entirely the exposed portion of the base of the panel longitudinally adjacent the second transverse edge (14) thereof while the exposed portion of the

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base of the panel is substantially overlaid by the overhang from the panel next longitudinally adjacent the first transverse edge (13) thereof to thereby camouflage the longitudinal abutment between panels.  
5 each ridge row member comprising:

a base portion having an upper surface (31), a lower surface (32), a first transverse edge (33), a second transverse edge (34), a top longitudinal edge (35) and a bottom longitudinal edge (36) thereon;  
10 and the major portion of the upper surface (31) having a simulated shingle or siding pattern thereon;

a left-hand mounting arrangement (70) disposed along the second transverse edge (34) of the base adjacent the upper surface (31) thereof, said  
15 left-hand mounting arrangement (70) including a left-hand mounting shelf (71), said left-hand mounting shelf (71) being situated on the upper surface (31) between the simulated shingle pattern and the second transverse edge (34) of the base;

a right-hand mounting arrangement (68) disposed along the first transverse edge (33) of the base adjacent the lower surface (32) thereof, said  
20 right-hand mounting arrangement (68) having a right-hand mounting shelf (69) for substantially mated reception with the left-hand mounting shelf for the next longitudinally adjacent ridge row member disposed thereat.

5. A roofing member as claimed in Claim 1, 2 or 3,  
30 when integrally fabricated of polyurethane foam.

6. A roofing member as claimed in Claim 5, comprising approximately 70% or less, by weight, fly ash.

7. An improved polyurethane foam wherein fly ash, in an amount not exceeding approximately 70%, by weight,  
35 comprises a portion of the constituent ingredients.



8. The invention of Claim 6 or 7, wherein said fly ash is high sodium fly ash, as determined by the standards of ASTM method C-618, Vol 14, Class C Mineral Ad Mixture.

Fig. 2

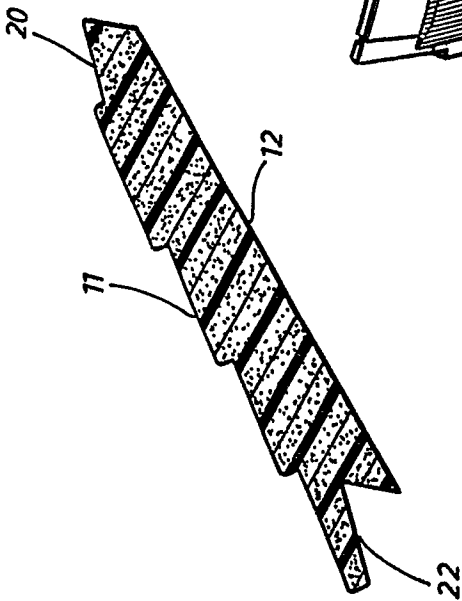


Fig. 1

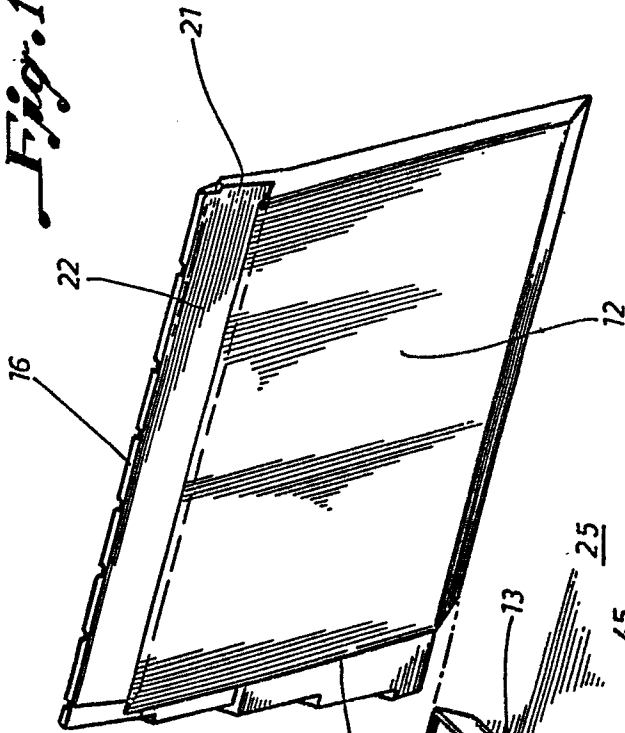
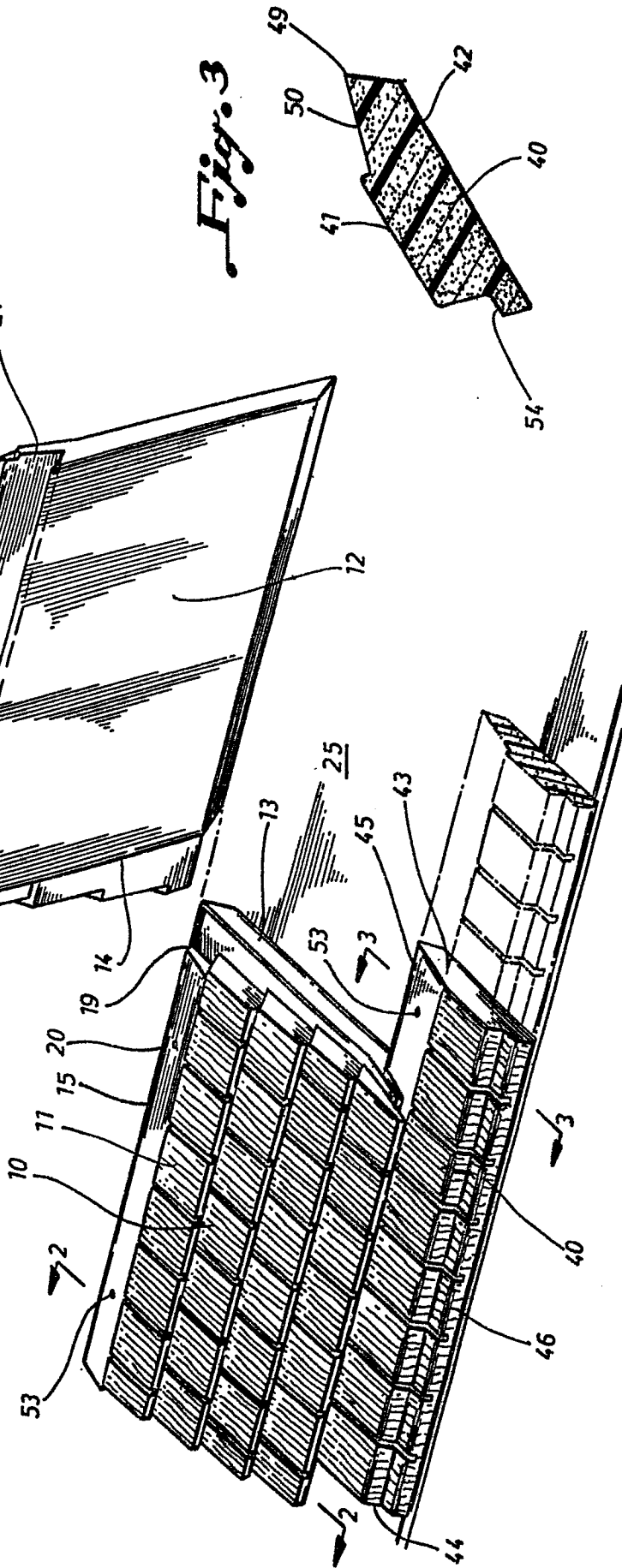


Fig. 3



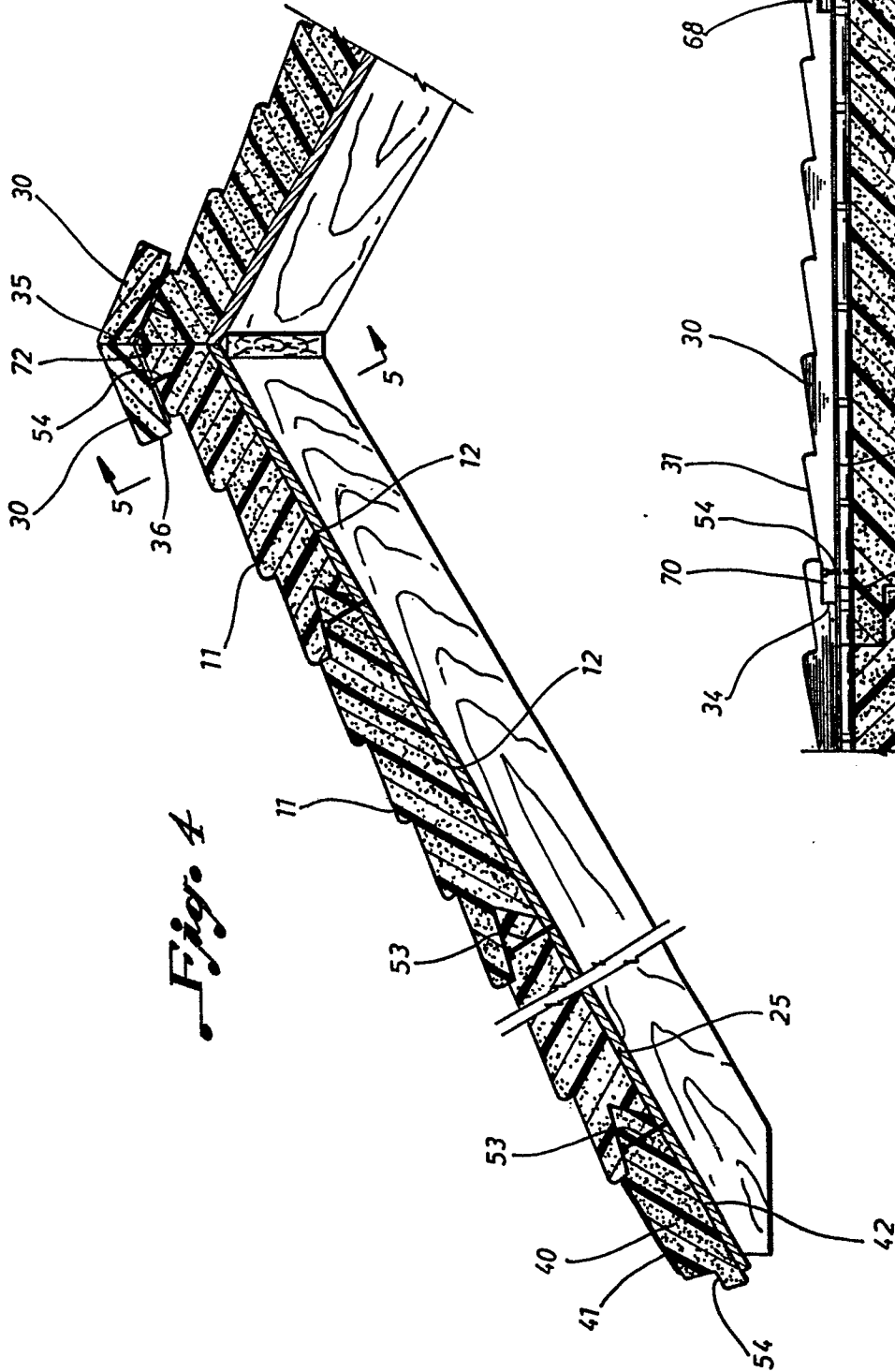


Fig. 4

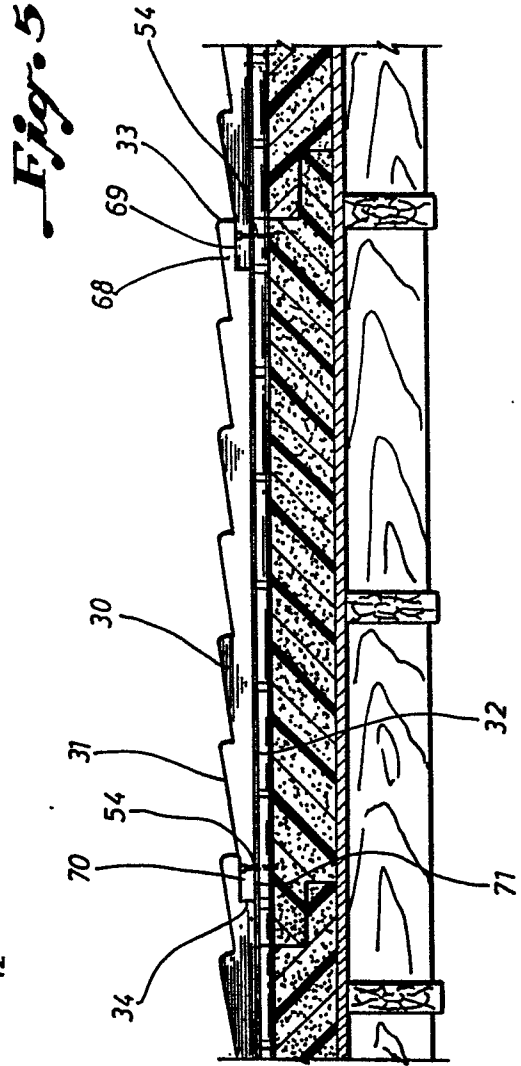


Fig. 5