

Feb. 17, 1942.

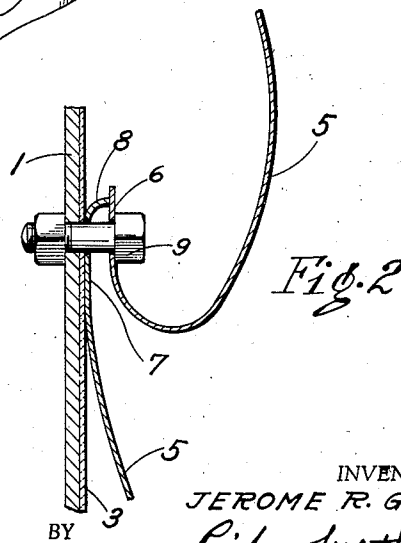
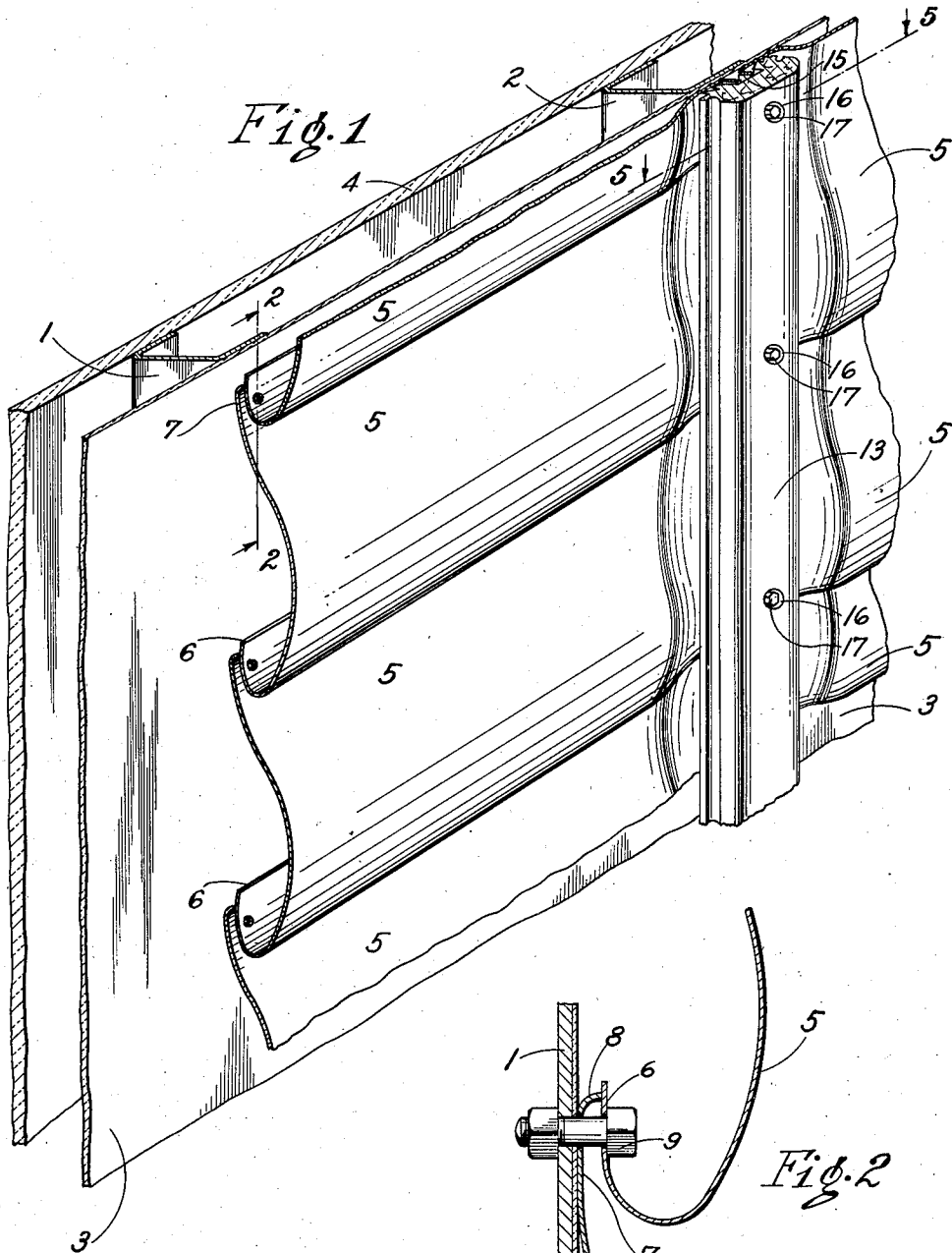
J. R. GEORGE

2,273,485

WALL CONSTRUCTION

Filed May 19, 1939

3 Sheets-Sheet 1

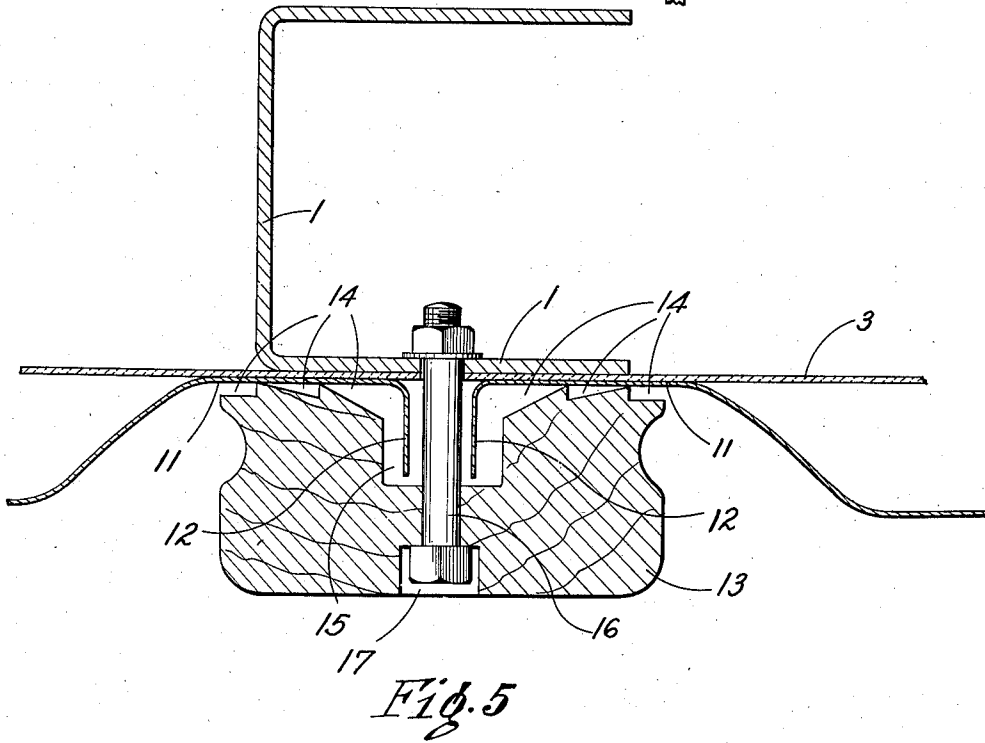
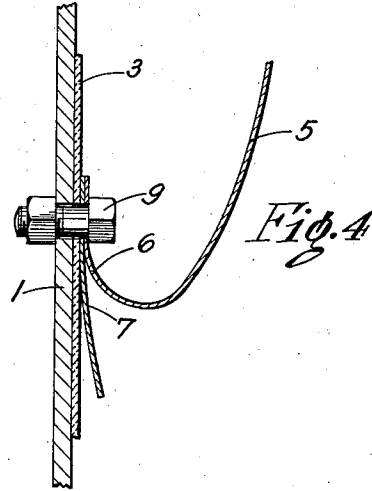
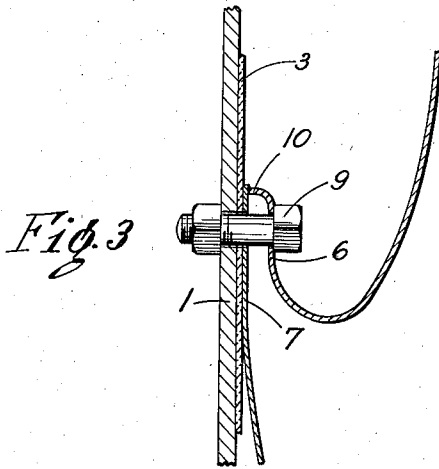


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3 Sheets-Sheet 2



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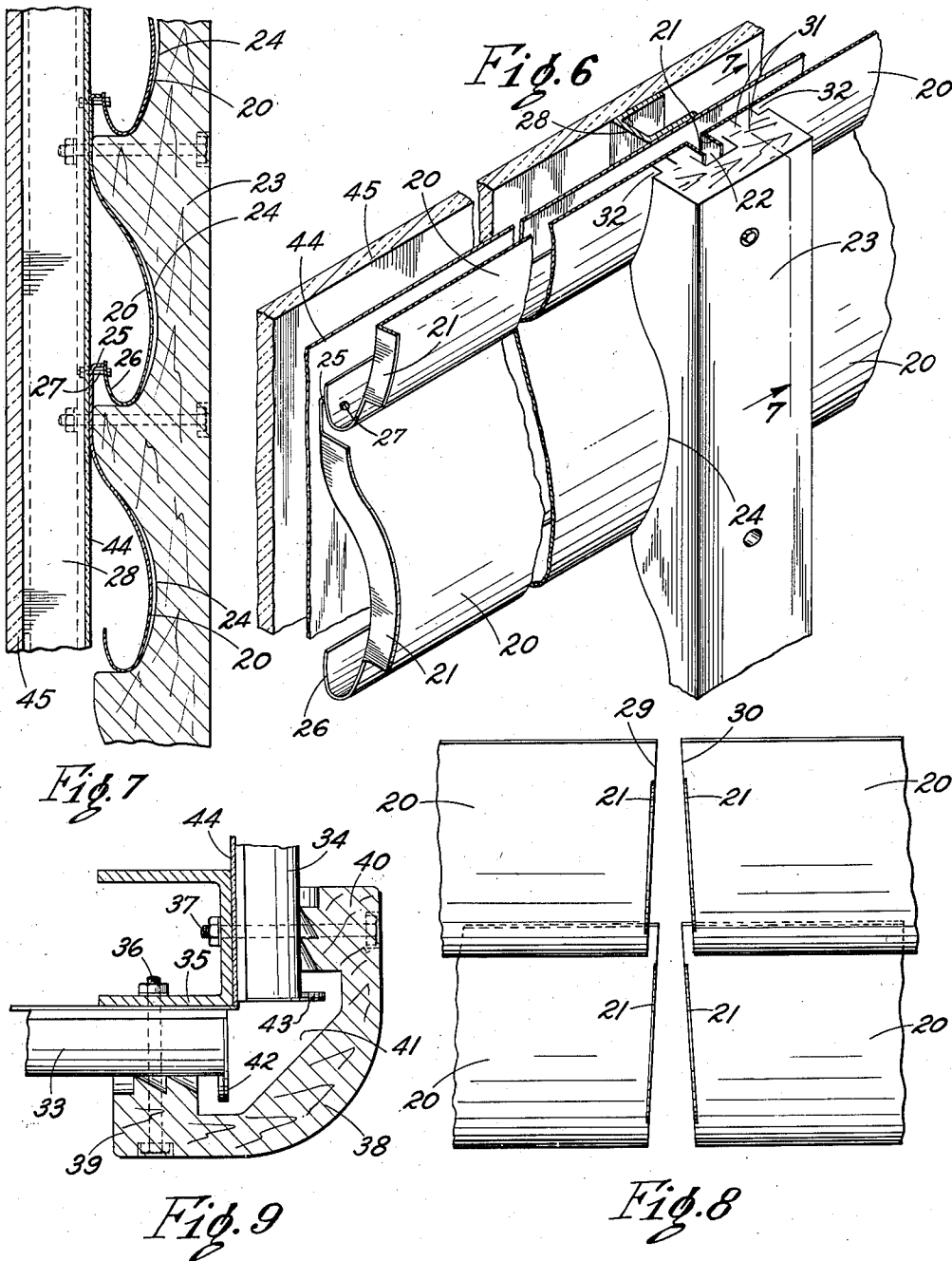
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WALL CONSTRUCTION

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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WALL CONSTRUCTION

Jerome R. George, Marion, Mass.

Application May 19, 1939, Serial No. 274,620

7 Claims. (Cl. 189—86)

This invention relates to building construction and more particular to an improved form of wall structure and metal siding therefor.

In present day building construction many attempts are being made to eliminate the use of wood, thus doing away with the fire hazard and making a structure which will be free from the destructive attacks of termites, etc. A number of problems have been encountered, however, in the utilization of steel in building constructions and one of the most important of these is the matter of the relatively high coefficient of expansion of steel. Steel buildings must be built to cover a temperature range of approximately 160° F., that is, from about 30° below zero to about 130° above zero, and therefore the expansion problem becomes a serious one as a steel section 12 feet long, anchored at its center, will expand approximately $\frac{1}{8}$ " at each end under such extreme conditions.

Probably one of the chief reasons why wood has been so extensively used in construction work is the fact that wood does not change its dimensions due to changes in temperature. Furthermore, while wood does expand and contract due to changes in the moisture content, even this influence does not affect wood in the direction of the grain. Thus, the only changes in the size of a piece of wood will occur transversely to the direction of the grain and such changes, being in one direction, can easily be taken care of. With materials such as steel, however, which change their dimensions in all three directions due to changes in temperature, an entirely different problem is encountered. In previously proposed steel building structures with which I am familiar panels or sheets have been employed. Means may be provided to permit expansion in two directions but expansion in the third direction has resulted in buckling of the sheets, giving them an undesirably wavy appearance.

Among the objects of my invention are the provision of steel siding units and walls which will simulate the appearance of the commonly employed wood clapboard construction, which may be economically produced and installed, which will be weather-proof and weather resisting and which will not be affected in efficiency or appearance by the normal expansion and contraction of the steel members in any direction; the provision of a building wall structure which can be erected with a minimum of effort and by unskilled labor; the provision of a building wall structure composed of metal siding members with which certain wood members may be employed,

the grain of the wood extending in such a direction that the assembly of metal siding members will not be affected by normal variations in the dimensions of the wood members.

The above and other objects of my invention will appear from the following description of several embodiments thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a fragmentary perspective view of a portion of a wall structure embodying my improvements.

Figure 2 is an enlarged fragmentary vertical cross-sectional view taken substantially on line 2—2 of Figure 1.

Figure 3 is a view generally similar to Figure 2 but illustrating a modified edge formation of the siding strip units.

Figure 4 is a view generally similar to Figures 2 and 3 but illustrating a third modification of the engaging edges of the siding strips.

Figure 5 is a horizontal cross-sectional view taken on line 5—5 of Figure 1 and illustrating the expansion joint and sealing arrangement for the ends of adjacent siding strips.

Figure 6 is a fragmentary cross-sectional perspective view of a modified form of my wall structure in which the metal siding members are not flattened at their ends as shown in Figure 1.

Figure 7 is a vertical cross-sectional view taken substantially on line 7—7 of Figure 6.

Figure 8 is a fragmentary side elevation of the siding structure shown in Figure 6 with the wood molding strip removed.

Figure 9 is a horizontal cross-sectional view illustrating a corner construction for my siding strips.

Referring now to Figure 1, my preferred wall construction comprises a plurality of vertical, spaced metal studding members 1 and 2, an outside layer of building paper 3 or the like, an inner covering of insulating wall board 4 or other suitable material, and a plurality of steel siding strips, generally indicated by the reference character 5. In the embodiment shown in Figures 1 and 2 each of the siding strips 5 comprises a sheet metal member of curvilinear section having its bottom edge 6 bent inwardly to extend substantially vertically upwardly in spaced relation to the main curved wall of the strip and having its upper edge 7 formed with a generally horizontal, outwardly projecting flange 8. The siding strips 5 are arranged in overlapping relation in the usual clapboard fashion, with the bottom portion of each strip overlying and protecting from exposure the top portion of the next

below strip, and are secured together and to the studding members 1 by bolts 9 which extend through suitable holes in the lower edge 6 and the upper edge 7 of adjacent siding strips. The "exposed" portion of each strip is that which is seen when the strip is viewed from a point substantially level with the strips under consideration.

When two pieces of sheet metal are clamped together with an appreciable area of contact therebetween water may tend to work up into the joint due to capillary attraction. This might, in some instances, cause leakage between the bottom edge of one siding strip and the top edge of the next below strip and permit water to collect in the siding. I have overcome this danger completely by providing the outwardly extending flange 8 which runs the entire length of the top edge of each siding strip and which abuts the vertically extending bottom edge 6 of the siding strip next above with a narrow, substantially line contacting surface. This is clearly seen in Figure 2 and by this arrangement, due to the extremely small contact surface between adjacent siding strips, the danger of leakage due to capillary attraction and resulting corrosion is eliminated.

In Figure 3 I have illustrated a modified joint construction for preventing the capillary accumulation of water in the curved bottom portions of the sliding members. This joint is similar in mode of operation to that shown in Figure 2 but differs therefrom in that the horizontal flange 10 is formed on the upwardly extending inner bottom edge portion 6 of the siding strip and the upper edge portion 7 of the strip is flattened out. The bolt 9 in Figure 3 will clamp the flange 10 tightly against the upper edge 7 of the next below siding strip thus forming a weather tight joint in the same manner as is formed by the members 6 and 8 in Figure 2.

In Figure 4 I have illustrated an arrangement in which the horizontal flange on the top or bottom edge of each siding strip is eliminated and the bolt 9 simply clamps the flat lower edge of one siding strip and the flat upper edge of the adjacent strip tightly together and to the studding members 1.

I prefer to make my siding strips 5 in units approximately 12 feet long, although they may, of course, be made longer or shorter as desired. In order to provide a slightly, weatherproof and simply installed end joint between abutting siding strips of the same course the construction shown in Figures 1 and 5 may be employed. Each siding strip unit 5 is flattened for a short distance in from each end, as shown at 11, and the extremity is bent preferably at approximately 90°, to form outwardly extending flanges 12.

The clamping and covering member 13 may be of wood or other suitable material and has its inner surface grooved as shown at 14 to break air currents in which water might be entrained and to permit good sealing contact with the flat end portions 11 of the siding strips. A longitudinally extending groove 15 is also formed in the member 13 and extends inwardly from the inner surface thereof. Bolts 16, preferably having their heads disposed counter-sunk in holes 17 in the outer face of the cover strip 13, extend through the studding 1 and serve to clamp the material strips 13 firmly against the flattened portions of the abutting siding members. As is clearly seen in Figure 5, space is provided between the side walls of the groove 15 and the flanges 12 and between the bolt 16 and the flanges

12. Thus, longitudinal expansion of the siding strips is permitted without buckling or distortion of the wall structure.

As the siding strips 5 are bolted to the intermediate studding members, as seen in Figure 1, the holes in the top and bottom edges of the siding members through which the bolts 9 extend are preferably made slightly larger than the diameter of the bolts in order to permit expansion and contraction as the temperature changes.

In the form of my invention shown in Figures 6, 7 and 8 the metal siding units 20 are not flattened at their ends but are provided with end flanges 21 which project, preferably substantially at right angles to the direction of extent of the siding, into a groove 22 in the vertical molding strips 23 which seal the joints between the ends of adjacent siding strips. The molding 23 is cut out as indicated at 24 in a series of grooves or scallops which overlie the convexly curved siding members 20. As is clearly seen in Figure 7 the groove 24 does not normally tightly fit the convex contour of the siding members 20 but is spaced therefrom. As the metal of the siding members is relatively thin, expansion in the direction of the thickness of the material is so slight as to be completely ineffective. Expansion in the direction of the length of the siding members is taken care of by spacing the ends of adjacent members and the end flanges 21 thereof apart in the grooves 22 in the same manner as described above in regard to Figure 1. Expansion of the metal in the third direction, i. e., vertically, merely causes the convex portions 20 of the siding members to move or breathe in or out toward or away from the cut out portion 24 of the molding strip 23. When the members 20 reach their maximum temperature they may just fit the groove 24 of the molding 23 while when they are considerably cooler they may contract into somewhat the position shown in Figure 7. The anchorage of the siding strip edges to the studding is not effected by this breathing in and out of the convexly curved siding strips and thus contraction and expansion of the siding members will not noticeably change their appearance nor will it cause any buckling or waviness to take place.

The top edge of each siding strip is provided with a flange 25 which is engaged by the upwardly extending portion 26 of the bottom of the next above siding strip. Bolts 27 extend through the two siding strips and through the supporting channel 28 in a manner similar to that shown in Figure 2. The ends of the strips 20 are preferably cut on a slight bevel as seen at 29 and 30 in Figure 8. The opposite ends of each strip are beveled in opposite directions and thus the top edges of adjacent flanges 21 are closer together than the bottom edges of these flanges. This prevents any interference between the top edges of the flanges 21 of one row of siding members 20 and the bottom edges of the flanges 21 of the next above row of siding members 20. Of course, the flanges 21 are completely enclosed by the slot 22 in the molding 23. Saw tooth ridges 31 are also preferably formed on the inner curved or scalloped surfaces of the molding 23 to break up air currents and cause entrained moisture to be deposited before it gets into the interior of the panel structure.

The edge portions 32 of the molding 23 are cut away as indicated so that rubbing of the siding

units 20 against the wood molding 23, due to lengthwise expansion and contraction of the metal, will not make a visible mark on the surface of the siding. Any marking which occurs will be hidden by the overhanging portion of the molding 23. This same feature is shown in Figures 1 and 5.

In Figure 9 a corner construction is shown in which the siding strips 33 on one wall and the siding strips 34 on the adjoining wall are secured to a channel 35 by bolts 36 and 37. These bolts also extend through the right angle molding member 38. This is similar in its general provisions to the molding 23 except that the leg portions 39 and 40 extend at right angles and engage the siding strips 33 and 34 respectively. An enlarged groove or channel 41 is formed in the molding to accommodate the end flanges 42 and 43 of the siding strips. The building paper, which is preferably placed immediately behind the siding strips, is shown at 44 in Figures 5, 7 and 9, and in Figures 6 and 7 insulating material or wall board is indicated at 45.

The siding strips shown in Figures 6, 7, 8 and 9 can expand and contract freely in any direction without binding or buckling and without subjecting the fastenings to harmful stresses. The vertical wood molding strips which cover and protect the ends of adjacent strips are made with the grain extending vertically and therefore they do not expand or contract in this direction and will not tend to shift or distort the position of the steel siding members.

Although I have described in considerable detail the illustrated embodiments of my invention it will be understood by those skilled in the art that variations and modifications may be made in the cross-sectional contour of the siding strips and in the other elements of my invention without departing from the spirit thereof, and I do not, therefore, wish to be limited to the specific forms of my invention herein shown and described, but claim as my invention all embodiments thereof coming within the scope of the appended claims

I claim:

1. A metal siding strip of the type described comprising an elongated sheet metal member having at its bottom edge a portion bent to extend substantially vertically upwardly and having at its top edge a flange extending substantially horizontally outwardly and adapted to have edge engagement with a side surface of another siding strip, said siding strip being of substantially uniform curvilinear cross-section intermediate its ends and having its ends flattened to lie in the same plane, said flattened ends being provided with flanges extending outwardly therefrom, said cross sectional form of said strip having a concave upper portion and a convex lower portion smoothly merged into said concave portion.

2. In a wall structure of the type described, a plurality of sheet metal siding strips arranged in overlapping relation, said siding strips having a cross-sectional contour whereby each strip intermediate its top and bottom edges projects outwardly from the plane of the wall to which

it is attached in a smooth unbroken partially convex and partially concave curved line, said strips having their ends flattened to lie substantially in the plane of the wall to which they are attached, each end of each siding strip member having an outwardly extending flange, grooved covering strips extending vertically at the end joints between siding strips, said covering strips being made of wood with the grain thereof extending vertically, and means for securing said covering strips in place with their inner surfaces engaging the flattened ends of abutting siding strips and the said outwardly extending flanges disposed in said groove.

3. A siding strip of the type described comprising an elongated sheet metal member of curvilinear transverse cross-section, the top and bottom edges of said strip being adapted to be secured to a wall structure with the convex side of the strip on the outside, and the ends of said strip being formed with outwardly projecting flanges, said flanges on the opposite ends converging from top to bottom of the strip

4. An elongated, rectangular, thin metal siding strip having outwardly projecting end flanges and flattened portions adjacent thereto, the portion of the strip between said flattened end portions having substantially the same curvilinear cross-section from end to end and comprising a concave part extending downwardly from adjacent to the top edge, a convex part therebelow, and a lower edge part bent back underneath said convex part.

5. An elongated, rectangular, thin metal siding strip having outwardly projecting end flanges and flattened portions adjacent thereto, the portion of the strip between said flattened end portions having substantially the same curvilinear cross-section from end to end and comprising an outwardly extending top edge flange, a concave part extending downwardly from the top flanged edge, a convex part therebelow, and a lower edge part bent back underneath said convex part.

6. An elongated, rectangular, thin metal siding strip having outwardly projecting end flanges and flattened portions adjacent thereto, the portion of the strip between said flattened end portions having substantially the same curvilinear cross-section from end to end and comprising a concave part extending downwardly from adjacent to the top edge, a convex part therebelow, a lower edge part bent back underneath said convex part, and a rearwardly bent flange at the bottom edge.

7. An elongated, rectangular, thin metal siding strip having outwardly projecting end flanges and flattened portions adjacent thereto, the portion of the strip between said flattened end portions having substantially the same curvilinear cross-section from end to end and comprising a concave upper part, a convex part therebelow, and a lower edge part bent back underneath said convex part, one side edge being substantially flat and the other side edge having a flange for engagement of the flange edge with a plane surface.

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