

July 10, 1934.

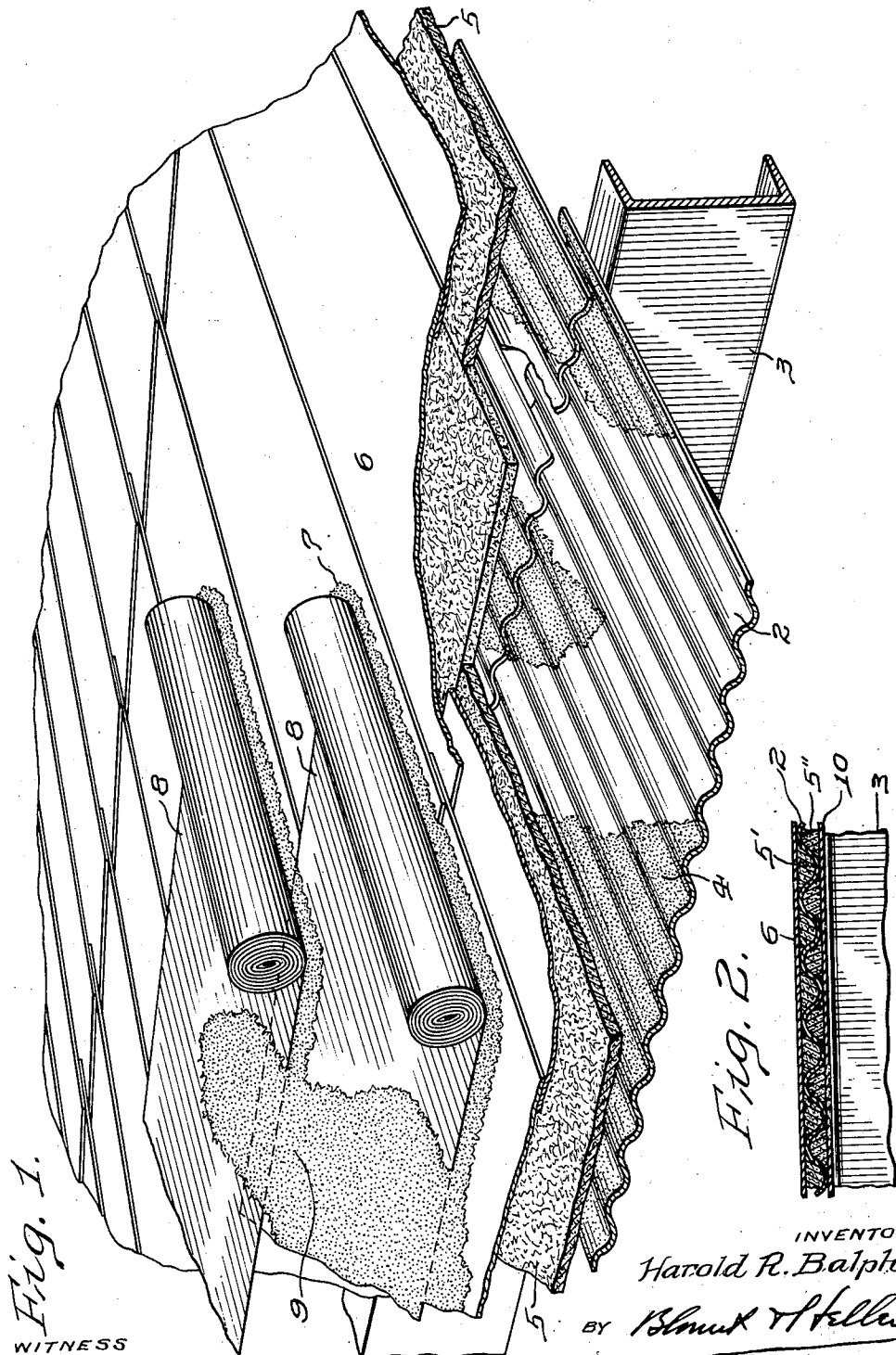
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1,965,972

ROOFING AND SIDING CONSTRUCTION

Filed June 17, 1931

2 Sheets-Sheet 1



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ROOFING AND SIDING CONSTRUCTION

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2 Sheets-Sheet 2

Fig. 3.

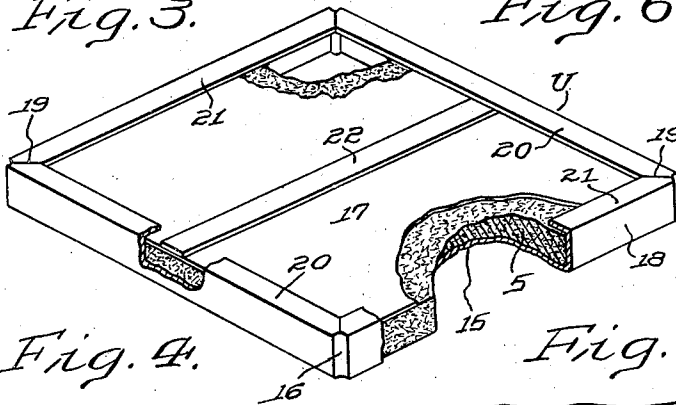


Fig. 6.

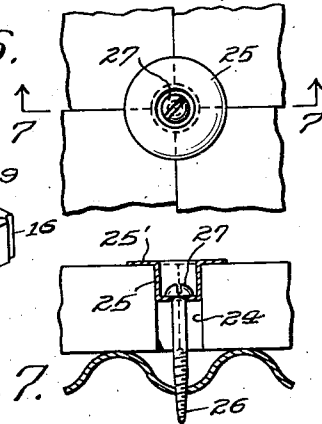


Fig. 4.

Fig. 7.

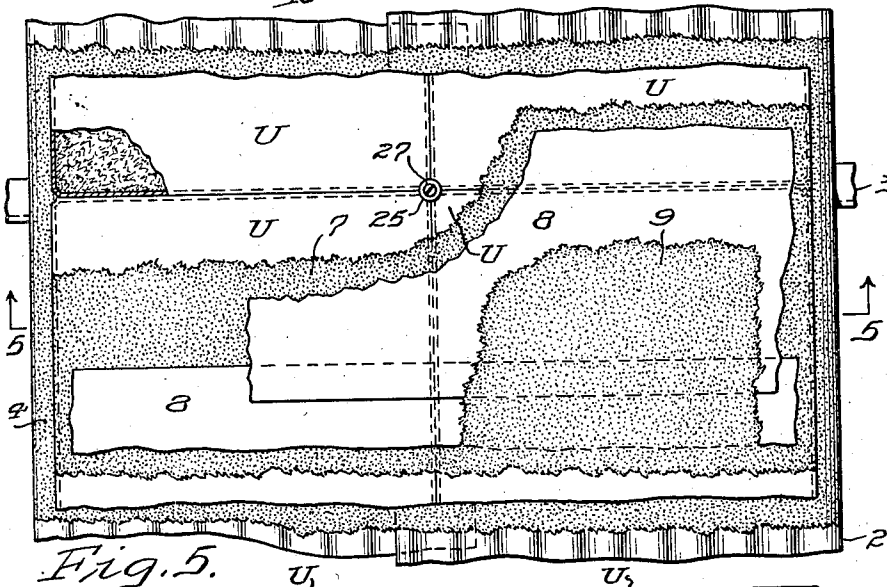


Fig. 5.

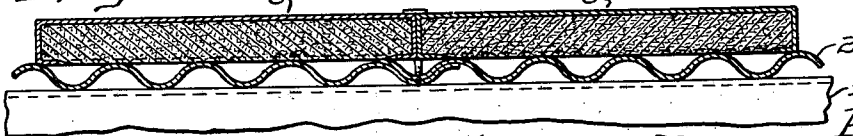
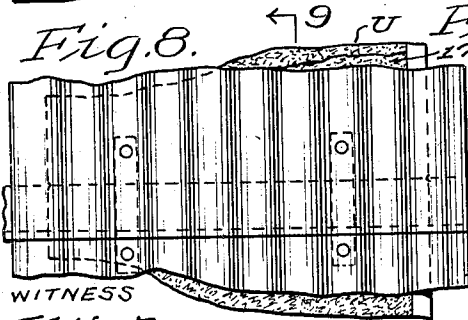
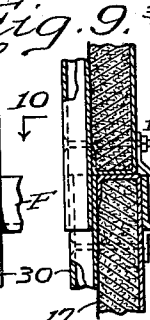
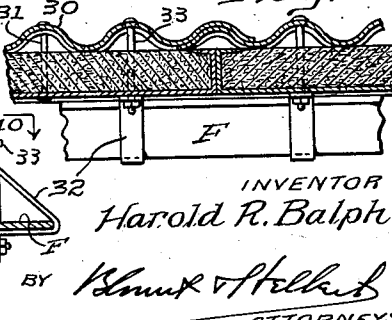


Fig. 8.



WITNESS
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Fig. 9.



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ROOFING AND SIDING CONSTRUCTION

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3 Claims. (Cl. 108—6)

Roofs of the class to which the present invention relates are generally constructed by first securing formed iron or steel sheets on the purlins of the building to form a deck, the sheets being lapped at their edges so as to present an unbroken surface. This surface is then covered or "mopped", as it is termed in trade parlance, with a coating of a bituminous material, such as asphalt, tar or the like (which I shall herein designate by the inclusive term "asphalt"), on which coating is then disposed a layer of insulating material conveniently applied in sheets of suitable size. The upper surface of the insulation is then mopped with asphalt and a layer of felt rolled or otherwise laid on, the edges of the felt strips being suitably lapped; the upper surface of the felt is then mopped and another layer of felt applied until five or six alternating layers of felt and asphalt are ultimately built up and the desired thickness attained, after which the uppermost layer of felt is mopped with a final coating of asphalt to provide the weathering surface, all the asphalt coatings being generally applied hot. A roof of this type is expensive to construct, requiring, as it does, a large amount of labor, felt and asphalt and is open to the disadvantage that if the felt and asphalt layers above the insulation are at any time punctured by a sharp or heavy object falling or resting on the roof, an opening is formed through which water can seep down into the insulation, and as it cannot penetrate therebelow because of the subjacent steel deck, it tends to spread laterally in the insulation, causing rapid deterioration and rotting. Particularly is this true when the more effective heat insulating materials now on the market are employed, as they are readily pervious to water and quickly disintegrate in the presence thereof, so that in a relatively short time after the protective layers of felt and asphalt are punctured, a large area of the roof becomes more or less unserviceable.

In constructing the usual type of insulated steel building sidings, it has been customary to first fasten steel siding sheets to the framework of the building, to then apply thereto a layer of insulation, conveniently in the form of sheets of suitable size and thickness, and to finally apply corrugated or flat steel siding sheets to the outer surface of the insulation, lapping these sheets vertically and laterally to afford weatherproof joints. This type of construction is expensive as it ordinarily necessitates the erection of a scaffolding at least twice to enable the various layers embodied in the complete siding to be conveniently applied; it is difficult to repair if locally dam-

aged or punctured and, as in the case of roofing of the character just described, extreme care must be used to prevent the insulating material from becoming wet during the process of erection, as if it does so, rot and deterioration rapidly occur after the job is completed when those types of insulation which are readily pervious to water are employed and which, as above stated, are the most effective from an insulating standpoint, while if the harder and less pervious sorts of insulation are used, any wetting thereof during erection while less likely to bring about subsequent decay, nevertheless tends to cause the sheets to buckle and warp, thus enhancing the difficulty of properly applying the outer layer of sheets and producing a satisfactory job as a whole.

The present invention is therefore directed to the improvement of roofing and siding constructions with a view to reducing the cost thereof and producing an improved installation not open to the objections to which I have briefly referred and embodying advantages not heretofore present in roofs and sidings of the general class to which the invention relates.

More particularly, the invention in its broader aspect includes the provision of a roof of improved type in which the insulating material is fully protected from rot or disintegration induced by the penetration of water through the superjacent felt and asphalt; which in its preferred embodiment requires but a single layer of felt instead of a plurality of layers with consequent saving in the amount of these materials necessary for the construction of a roof of given area; which can be laid more rapidly under usual conditions than the ordinary type of roof; which may be laid in such manner as to reduce the chance of the insulating material becoming wet while the laying operation is in progress, and which, in addition to the several advantages to which reference has just been made, is as fully satisfactory for the performance of its intended function as the roofs of analogous types which have hitherto been in general use.

The invention additionally comprehends the provision of a novel building or construction unit adapted for use in roofing and siding constructions through the medium of which a roof embodying the aforesaid advantages, as well as others hereinafter more particularly pointed out, can be constructed rapidly and at a low cost, or a complete insulated siding having distinct advantages over the sidings hitherto employed may be readily applied without the necessity of erecting the scaffolding more than once with conse-

quent material saving in erection costs, both the roofs and sidings embodying the said units being capable of local repair in case of necessity without disturbing any extended portion surrounding or in the vicinity of the damaged area.

Other objects, advantages and novel features of construction, methods of erection and arrangement of various parts are hereinafter more particularly pointed out or will be apparent from the following description of certain roofing and siding constructions embodying the principles of the invention and of the novel building unit to which I have referred, in connection with which reference may be had to the accompanying drawings.

To enable those skilled in the art to readily comprehend and practise the invention, it will be convenient to first refer to a roof constructed in accordance therewith without the use of the aforesaid units; to then describe the said units, and to finally refer to the manner of employing them in the constructions of roofs and sidings.

Therefore, in the said drawings, I have shown in perspective in Fig. 1 a portion of such a roof with certain parts broken away to better show internal construction, this view being also designed to facilitate a ready understanding of the preferred method of laying the roof, while Fig. 2 is a fragmentary vertical section showing a somewhat modified construction thereof. Fig. 3 is a perspective view, with certain parts broken away to better show internal construction, of one of my novel building units. Fig. 4 is a fragmentary plan view with certain parts broken away to better show internal construction of a portion of a roof embodying a plurality of said units, and Fig. 5 is a partial vertical section thereof on line 5—5 in Fig. 4. Fig. 6 is a fragmentary top plan view on a larger scale, and Fig. 7 a section thereof on line 7—7 showing the preferred manner of fastening the units at their adjacent corners when assembled in a roof of the character of that shown in Fig. 4. Fig. 8 is a fragmentary side elevation of a building siding constructed by use of the said units; Fig. 9 is a vertical section on the line 9—9 thereof, and Fig. 10 a horizontal section on the plane of line 10—10 in Fig. 9. Throughout the drawings, like characters of reference are used to designate corresponding parts.

More particularly, the roof illustrated in Fig. 1 comprises a deck 2 supported on and suitably secured, as by any convenient form of fastening means (not shown) to the purlins 3 or other supporting framework embodied in the building of which the roof forms a component part. This deck is shown as formed of a plurality of corrugated steel or iron sheets laid with their edges in overlapping relation so as to constitute a continuous uninterrupted surface, but, if desired, flat sheets laid in a similar manner may be used instead of corrugated ones, or the deck may be formed of wood, concrete or other suitable material. After the deck is laid it is mopped with a coating 4 of asphalt, and preferably before the latter has set, sheets of insulating material 5 are laid upon the deck with their edges in butting engagement with each other. After the application of the insulation, flat sheets 6 of steel or other suitable metal are laid upon it with their edges overlapping in both directions as shown so as to provide a continuous surface, the sheets 6 being thus effective to fully and adequately cover the subjacent layer of insulation. The upper surface of the sheets 6 is then mopped with asphalt 7

and strips of felt 8 rolled or otherwise laid thereon before the asphalt has set so that it will act as a binder between the felt and the subjacent metallic sheets and firmly unite the felt thereto, the felt strips, as clearly shown in Fig. 1, being suitably lapped at their edges so as to form a continuous uninterrupted surface above the metallic sheets 6. A final coating 9 of asphalt or other material suitable to form a weathering surface for the roof is then mopped onto the felt, thus completing the construction of the roof.

Of course, if desired, a plurality of layers of felt with asphalt interposed between them may be laid upon the metallic sheets 6, but under usual conditions it is found that a single layer of felt is fully sufficient to form a satisfactory roof construction, since because of the presence of the subjacent metallic sheets it is unnecessary, as in the ordinary roof construction, to build up a relatively thick body of felt above the insulation in order to suitably protect it. Moreover, while it is usually convenient to apply the insulating material in separate sheets, it may, if preferred, be applied as a continuous layer or coating, but irrespective of the particular method of application employed, it will be apparent that in my improved roof the insulating material is interposed between two metallic layers and thus thoroughly protected above and below, while the superjacent layer of metal forms a firm and solid backing for the felt and prevents any water from reaching the insulation in case the felt becomes punctured or otherwise damaged. In consequence, in accordance with my invention, I am enabled to provide a roof in which the insulation is fully protected from causes leading to rot or deterioration; which is generally cheaper to construct than the usual roof of generally similar type since the steel sheets and single layer of felt can be laid more quickly under most conditions and with less labor than the plurality of felt layers with asphalt interposed between which have heretofore been required; in which the saving in felt and asphalt effected where, as preferred, but a single layer of felt is employed, in most cases more than offsets the cost of the metallic sheets 6, and which due to the protection afforded the insulation, tends to remain in serviceable condition much longer than roofs of the usual construction and requires fewer repairs.

Furthermore, while the roof is being laid, it is relatively easy to protect the insulating sheets from becoming wet with the attendant disadvantages to which I have referred, since they need only be laid as fast as they can be readily covered with the sheets 6, whereas in the usual construction it is frequently necessary to lay a considerable area of the insulation before it can be satisfactorily mopped and the first layer of felt applied.

In Fig. 2 I have indicated a slightly modified construction in which the insulation 5', 5" instead of being in sheets, is molded or otherwise formed in strips which can be respectively laid in the convolutions of the corrugated material forming the deck 2. Under such circumstances, where the insulation is applied above and below the deck, as shown, it will generally be necessary to support the subjacent insulation 5' on a flat sub-deck 10 laid between the main deck and the purlins 3, but where the insulation is merely applied to the upper side of the deck 2, the sub-deck 10 may, of course, be omitted. In either case, the metallic sheets 6 disposed above the insulation

will normally rest on the top of the convolutions of the corrugated deck 2 and also to some extent on the strips of insulation disposed therebetween where the latter fully fill the convolutions.

5 It will be apparent that the insulation can be omitted entirely where an uninsulated roof is preferred and the flat sheets 6 laid directly upon a corrugated deck 2, thus affording a suitable foundation for the application of the asphalt 7 and felt 8.

10 Reference may now be had to Fig. 3, in which I have shown one of the building or construction units heretofore mentioned and which may desirably be employed in the construction of a roof presenting all of the advantages of the roof shown in the preceding figures as well as certain additional ones, among which are reduction in the time required for laying and ease of local repair in case of damage.

20 This unit, generally designated as U, comprises a sheet of insulating material 5 of suitable size and thickness and a metal sheathing 15 arranged to wholly cover one face and the marginal edges of the sheet and a narrow perimetral area on its opposite face. This sheathing, desirably of sheet iron or steel, is preferably initially formed as a relatively shallow tray by deep drawing a flat sheet, as in this way seams at the intersecting corners of the vertical flanges and through which water might seep into the insulation in the assembled unit are entirely avoided, the corners of the tray being inwardly flattened or symmetrically curved or rounded as at 16 for a purpose to be hereinafter described. The sheet of insulation which is of such size as to snugly fit within the box or tray thus formed, is then disposed therein and, preferably, a layer of waterproof paper 17 placed on its upper exposed surface, after which the vertical flanges 18 are bent inwardly, after being suitably cut or fashioned at the corners so as to properly come together in diagonal seams 19, so as to overlie the marginal edges of the sheet 5 as at 20 and 21 and thus hold it securely in position. One or more strips of sheet metal 22 may be extended transversely across the paper 17, or across the upper face of the insulation if the paper be omitted, to assist in maintaining the parts in position, the ends of these strips being entered beneath the overlying side flanges 20. However, instead of forming the requisite shallow tray by drawing a flat sheet, it may be constructed in any other way if preferred as, for example, by suitably bending up the edges of a flat sheet of metal, properly forming the inwardly rounded corners, and then welding or soldering the vertical flanges together adjacent thereto preparatory to placing the insulating material in position, while under certain conditions in which a very cheap construction will suffice, the welding or soldering can be omitted and the ends of the vertical flanges simply butted at the corners, but this is not so desirable since it affords a possible opportunity for water to penetrate the insulation. Preferably, also, the seams 19 may be welded or soldered after the insulation is in place while the ends of the transverse strips may be secured to the side flanges 20 in any suitable way instead of being merely tucked thereunder.

70 It will thus be apparent that after assembly in the unit, the dimensions of which are determined by the purpose for which it is intended to be used, the sheet of insulation is entirely covered on one face, on all of its edges and for a narrow perimetral area on the opposite face by the metallic sheathing 15, while the remainder of the last

mentioned face is at least temporarily protected by the waterproof paper 17 preferably disposed thereover. A plurality of these units may be readily assembled as now to be described to form either a roof embodying the principles of that shown in Fig. 1 or a siding of improved construction.

80 When utilizing the units in roof construction (see Figs. 4 and 5), the deck 2 is first laid on the purlins 3 and secured thereto as already described. It is then mopped with asphalt 4 and before the latter has had time to set, the units are laid thereon with their sheathed surfaces uppermost, the waterproof paper having been previously removed so that the face of the insulation thus exposed will bed into the plastic coating of asphalt. The units are laid with their edges abutted in both directions with the result that whenever four units are brought together their inwardly rounded adjacent corners will form a small cylindrical opening 24 of suitable size to receive a cupped metal washer 25 having a flange 25' of sufficient diameter to overlie the end of the opening, the cupped-shape portion of the washer affording a seat for the head of a screw or bolt 26 extending downwardly into the subjacent deck and thus serving to secure the units rigidly thereto as best shown in Figs. 6 and 7. After the units are secured in place, they are mopped with asphalt 7, a layer 8 of felt applied, the edges of the strips being suitably lapped so as to provide an unbroken surface, and the final weathering coat 9 of asphalt or the like mopped thereover, thus completing the roof, the entire composite structure of which is clearly shown in Fig. 4, while in Fig. 5 the layer of felt and adjacent coatings of asphalt are omitted for the sake of clearness.

Under ordinary conditions, the employment of the units as just described materially facilitates the laying of the roof and reduces the labor and time required therefor. Moreover, as the asphalt 7 penetrates the joints at the abutting edges of the units and covers the heads of the screws 27, a substantially homogeneous and continuous base is presented for the application of the superjacent layer of felt, while if for any reason the latter should subsequently be punctured or otherwise damaged, the insulation therebeneath is fully protected, as any water which may leak through is prevented from reaching the insulation by the layer of metallic sheathing disposed thereover.

As hitherto mentioned, my novel building units may also desirably be employed in the erection of sidings, as by their use it is possible to install a complete insulated siding by constructing the scaffolding only once with consequent material reduction in time and labor costs. When the units are to be employed for this purpose, as best shown in Figs. 8, 9 and 10, a sheet 30 of corrugated steel or iron, although a flat sheet may be used, is preferably first secured against the unsheathed face of each unit, the waterproof paper 17 being preferably left in position and not removed as when the unit is used for roofing, as its presence is unobjectionable, and in fact to some extent enhances the weatherproof and insulating qualities of the siding. The sheet is of sufficient size to extend beyond the lateral and bottom edges of the unit when secured thereto with its upper edge flush with the upper edge thereof, and the parts are held together by bolts or rivets 31 located inwardly from the edges of the unit at a sufficient distance to enable adjacent units

to be conveniently butted together when the siding is being erected. The marginal portions of the metal sheet 30 extending beyond the unit as just described, are of such size as to permit standard or any desired lapping of the sheets laterally and vertically, so that when the siding is being applied with the sheathed faces of the units adjacent the framework of the building and the corrugated sheets remote therefrom, it is possible to bring the lateral edges of adjacent units into butting engagement and to lap the lateral edges of the corrugated sheets over each other as best shown in Fig. 10, as well as to butt the horizontal edges of adjacent units and lap the bottom edge of each sheet over the top edge of the sheet therebelow as best shown in Fig. 9, thus providing the usual weatherproof lapped joints between the corrugated sheets and a substantially continuous and smooth metallic surface adjacent the framework of the building. Any suitable means may be utilized for holding the units with their attached sheets in position such, for example, as straps 32 running over horizontal frame members F and bolted at their extremities to adjacent units and sheets by bolts 33 or the like.

While it will generally be found most advantageous to attach the siding sheets to the units prior to erection as just explained, under certain conditions it may be preferred to secure the units to the framework and then apply the siding sheets 30, suitably fastening them through the units to the framework and properly lapping their adjacent edges.

A siding of this character affords maximum insulating properties, it having been determined that by the use of one-half inch insulating material it is possible to obtain approximately the same insulating value as is afforded by a nine inch brick wall with, of course, a corresponding increase in insulating value as the thickness of the insulation is increased. Moreover, a siding of this character can be readily taken down and reassembled at another point when required which is frequently a matter of distinct advantage, while repair in case of damage is greatly facilitated since one or more defective units can be readily removed and replaced with new ones without disturbing the remainder of the siding. This feature is also a matter of similar advantage in the case of a roof embodying the units, as if any portion thereof becomes damaged it can be readily repaired by removing merely the defective units after cutting away or raising the superjacent felt, leaving the remainder of the roof undisturbed. As the insulation is fully protected from the weather by the waterproof paper and

sheathing, there is substantially no danger of its becoming wet if the former is left in place as is the preferred practice when using the units in the construction of sidings, while if they are employed for roofing purposes the paper need not be removed until just before the units are placed in position, so that it is possible to carry on the construction of roofs and sidings under weather conditions which would preclude or greatly hinder operations or result in undesirable wetting of the insulation were the methods hitherto in use employed.

It is, of course, to be distinctly understood that the various embodiments of the invention herein shown and described are to be considered as illustrative only and not by way of restriction or limitation, as changes and modifications in details of construction, arrangement of parts and the like may be made if desired without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. In building construction, a roof comprising a metallic deck, an asphaltic coating on the deck, a layer of water pervious insulating material above the deck sealed to said coating, metallic sheathing covering and forming a non-readily-perforable protective layer above the insulating material, an asphaltic coating on said sheathing, a layer of fibrous material disposed above the sheathing and coating, and a weathering coat of asphaltic material above the fibrous material.

2. In building construction, a roof comprising a corrugated metal deck, a coating of asphaltic material thereon, a layer of water pervious insulation sealed to said asphaltic coating, a flat sheet metal sheathing above the said insulation, an asphaltic coating covering said sheathing, a layer of felt disposed thereon and an asphaltic weathering coat superposed on the felt.

3. In building construction, a roof comprising a continuous supporting deck, a plurality of individual units disposed thereon with their edges in abutting engagement, each unit comprising a sheet of water pervious insulating material lying adjacent and sealed to the deck and a sheet metal sheathing extending over the upper face and edges of said sheet, means for securing said units to the deck, a coating of asphaltic material on said sheathing, a layer of felt on said coating, and a weathering coat of asphaltic material on the felt.

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