

June 21, 1932.

W. H. FINKELDEY

1,864,055

ROOFING MATERIAL

Filed April 5, 1930

2 Sheets-Sheet 1

Fig. 1.



Fig. 2.

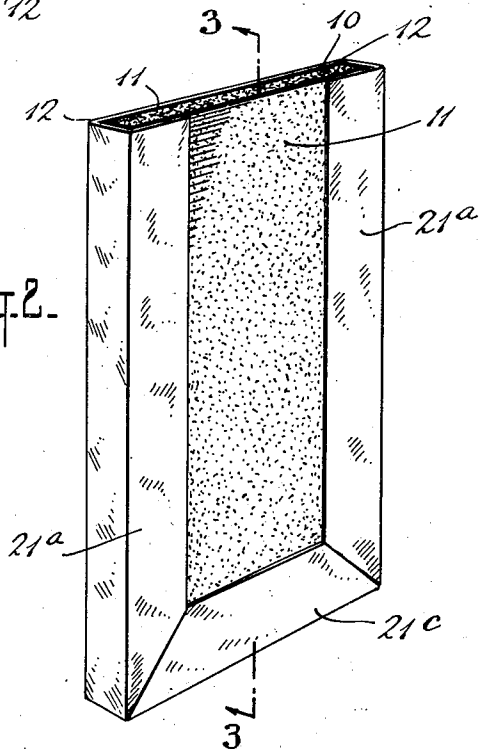
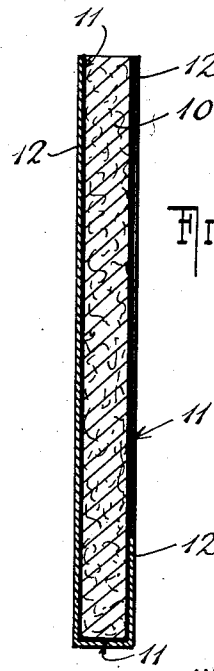


Fig. 3.



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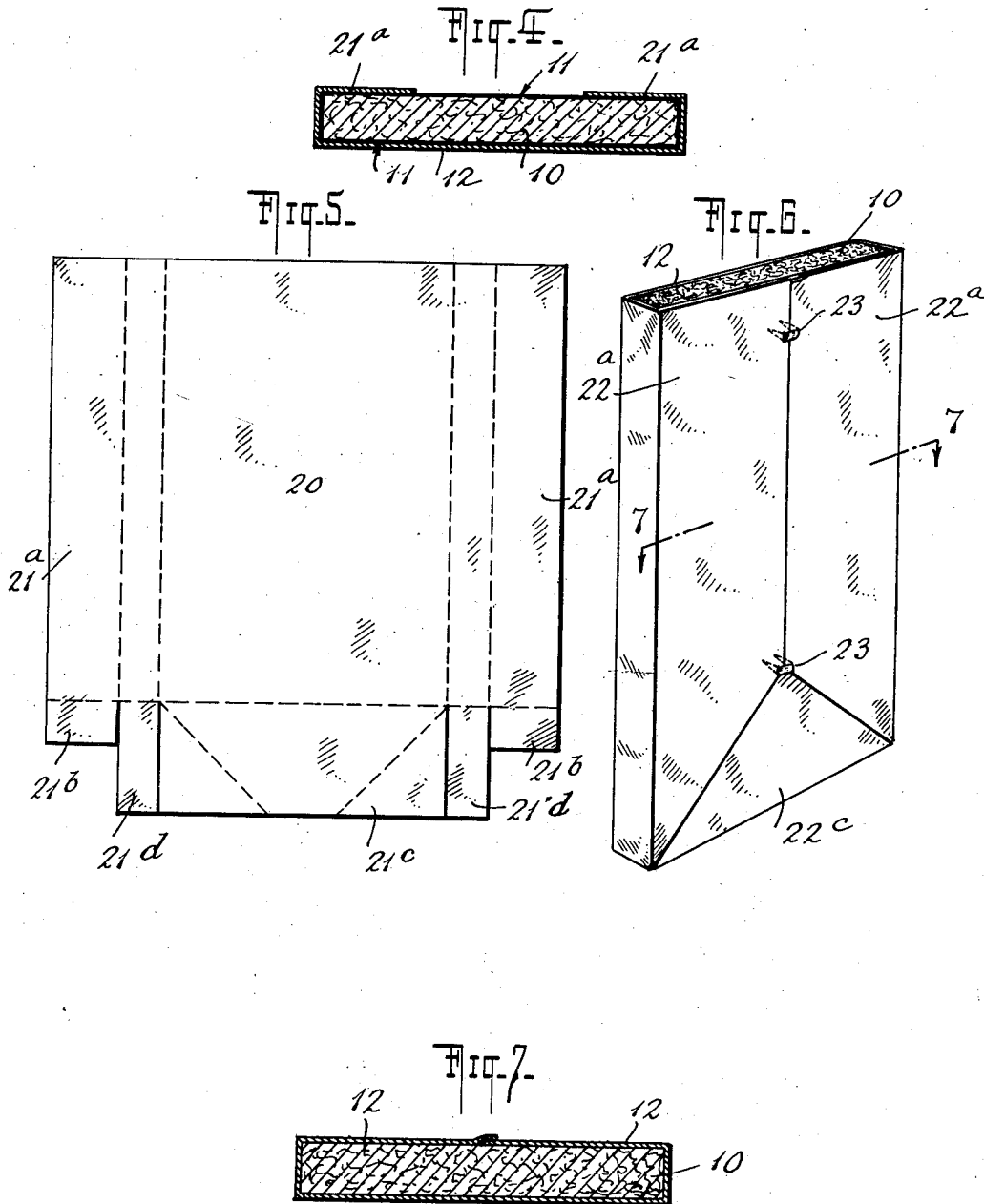
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2 Sheets-Sheet 2



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ROOFING MATERIAL

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This invention relates to an improvement in roofing materials, and particularly to a composite metal-covered shingle or other roofing form which provides many advantages over the roofing materials now on the market.

One of the objects of my invention is to provide a composite metal-covered shingle or other roofing form which will provide the corrosion-resistant advantages of a metal roof and the lightweight, economy and insulating properties of cheaper roofing materials.

Another object of the invention is to provide a composite shingle or other roofing form having a lightweight non-rigid supporting portion covered with a metal coating of a thickness approximating the thickness of a sheet of paper and of sufficient flexibility to be wrapped around the supporting layer and conform to its shape and irregularities of surface.

Another object of the invention is to provide a roofing form having the corrosion resistance to industrial atmospheres which is possessed by such metals as lead, copper, zinc, aluminum or high chromium alloy steels in which the metal used is of a minimum thickness and in a condition known as "dead soft" anneal and is wrapped upon a cushioning and insulating support which is of such a nature as to cushion and absorb blows or walking upon the roof and permit the metal to yield to the same without being ruptured.

Other objects and advantages of my invention will appear from the following description:

It has long been recognized, particularly in industrial communities where the atmosphere contains a high percentage of corrosive gases, that the use of non-corrosive metallic roofing is highly desirable. Metallic roofings, such as copper, zinc, tin plate, etc., as heretofore provided, have, however, many disadvantages due to their weight, discoloration, cost of manufacture, difficulty of applying the same and due to the fact that they have very low insulating properties in themselves and often do not afford the desired degree of corrosion resistance. Lead, which

has a high corrosion resistance and is largely used for chemical equipment, is not ordinarily used for roofing because of its low tensile strength and tendency to flow on sloping surfaces, which makes it necessary to apply it in relatively thick, heavy sheets, which are both expensive and difficult to apply, requiring special skill and training on the part of the roofer.

I have found, however, that when used over a relatively firm, yet cushioning, supporting base, such as fiber board, produced from wood fiber, bagasse or similar materials, or soft wooden shingles, it is possible to use very thin lead or other metallic sheets to provide a corrosion-resistant and waterproof roofing material which is of lightweight, low cost and easy to handle. The lead, copper, zinc, aluminum or other metal, is preferably applied to the base material as a metal foil or sheet approximately three one-thousandths of an inch thick in a "dead soft" annealed state, so that it can be readily wrapped and folded around the insulating base in much the same manner that wrapping paper is applied to a package, thereby facilitating manufacture of the composite shingle or other roofing form.

Lead and other metals of this thickness do not have sufficient strength in themselves to withstand the ordinary strains to which a roofing material is subjected in applying the same or to permit walking over the roof or withstand the blows of hailstones or other objects falling upon the roof. When, however, metal of this thickness is applied over a supporting or cushioning layer which is firm, rigid and inflexible yet relatively yieldable to indentation, such as provided by insulate, celotex, and similar fiber boards, the metal, if in a condition of "dead soft" anneal, can flow or dent without rupture to permit the force of the blow or pressure to be absorbed by the relatively yieldable cushioning or backing layer and can therefore withstand the force of blow or walking along the roof which it could not stand if applied in such thin sheets over a hard and relatively firm support.

Another advantage of applying the metal

covering in a thin "dead soft" sheet is that it can be made to conform by pressure to any irregularities in the surface of the backing or supporting material, so as to provide shadows or other irregularities in the roofing surface and reduce glare and other objections which come from the metallic lustre of a smooth metallic roof. The cushioning backing or supporting member is preferably of lightweight and high insulating properties so as to reduce the transfer of heat through the roof and being soft is easily nailed or otherwise secured to the roof supporting structure in much the same manner as ordinary wooden shingles.

In the manufacture of my improved shingle or other roofing form, I prefer to apply an adhesive material, preferably of an asphaltic or bituminous nature, to the fiber board or other support before the metal foil is wrapped around the support to hold the support and the metal covering firmly together. The metal foil forms a protecting envelope around the adhesive, preventing exposure of the adhesive to light and weather conditions, so that the adhesive does not dry out and harden and is maintained in a plastic condition, and in the event of a rupture in the surface of the metal coating, can flow into the hole and seal and water-proof the same.

While various non-corrosive metals in thin sheet or foil condition may be used for covering my supporting form, and in condition of "dead soft" anneal may be wrapped around the support by production methods, such as the use of a commercial package wrapping machine, my invention is of particular value in that it permits the use of lead, which is one of the most non-corrosive metals as a commercial roofing material, where otherwise the use of lead would be impractical because of its low tensile strength and the difficulty of handling and applying it in sheets of sufficient thickness to withstand the strains to which a roof is subjected. The wrapping of lead or other metals in a thin foil around a lightweight cushioning or plastic supporting and insulating material, such as fiber board or soft wood, provides a shingle or roofing form which is as easily handled and applied to the roof as an ordinary wood shingle or roofing tile, and at the same time provides all the advantages of a metal roof.

Referring now to the drawings which are used in an illustrative sense to indicate certain preferred forms of embodiment of my invention:

Figure 1 is a plan view of a part of a roof showing the arrangement of the shingles on the roof and the method of attaching them by nailing to the roof structure beneath.

Figure 2 is a rear perspective view of one form of shingle embodying my invention.

Figure 3 is a vertical section on the line 3—3 through the shingle of Figure 2.

Figure 4 is a horizontal section through the shingle shown in Figure 2 taken approximately at its mid-point.

Figure 5 is a plan view of one form of pattern blank of metal as cut out before wrapping around the supporting shingle. The dotted lines indicate lines along which the metal will be bent in folding or wrapping the same about the shingle base.

Figure 6 is a rear perspective view of a modified form of the shingle in which the back is entirely enclosed by the metal sheath and

Figure 7 is a horizontal sectional view upon the line 7—7 of Figure 6.

In my preferred form of flat tile or single-like construction, the rectangular shaped shingle base 10, composed of a good heat insulating material, as for example a molded wood fiber board, such as insulite or celotex, and coated preferably with a layer of adhesive 11, is partially wrapped in a thin lead or other metallic foil 12, which operation can be performed economically in one of the commercial package wrapping machines. The base material 10 should possess good insulating properties and should also be plastic or yielding to the extent that, if the thin metal covering over said base be struck a blow, the base will yield or flow thus absorbing the energy of the blow and allowing the metal covering to dent without rupture which would not be the case were the base constructed of hard unyielding material. It is this important feature of the base material which permits the successful use of such thin metal coverings or foils of lead, zinc and aluminum which have no great structural strength in the thickness used by me. The base 10 may be of any desired thickness or shape for easy handling by the roofer and to secure the proper heat insulation and give the shingle the butt thickness or other characteristics desired from an architectural view point. Other fiber or natural wood boards having proper heat insulating and cushioning or blow absorbing characteristics may be used as the base material. The material used should possess sufficient strength and stiffness to function as a firm supporting structure for the thin metallic covering.

The entire surface of this base material with the exception of one end is coated with the adhesive 11, preferably of an asphaltic or bituminous nature in the form of water emulsions or dissolved in mineral solvents, such as gasoline or solvent naphtha, by either dipping, spraying or painting the fiber board base. The water emulsion has been found most satisfactory both because of its greater adhesive properties in cementing the metal to its support and because it adheres to the surface of the board and does not penetrate as the mineral solvents do; however, other suitable adhesive materials may be used, par-

particularly adhesives having water-proofing properties although this is not essential. The edge surface at one end of the shingle is left uncoated with the adhesive in order to permit the ready escape of water vapor or volatile solvents absorbed by the porous fiber board base and which might otherwise be sealed in the interior of the base material by the metallic covering and the water-proof nature of the adhesive and might cause blistering or reduce the heat insulating value of the base.

After the adhesive applied either to the base or the metallic covering has partially dried and its surface is still "tacky", the metallic sheathing or covering 12 consisting preferably of a single sheet is wrapped or folded around the base material as indicated in Figures 2 and 3 and then brought into firm contact with the adhesive by applying pressure to the several surfaces which will firmly secure the sheet metal to the base board. It is usually found that the adhesion between metal and the base board is greater than the cohesion between the constituents of the base board material.

In my preferred form of construction, Figure 2, the metal does not extend entirely across the back of the shingle as this is not necessary in most cases to give the desired protection against the weather and an economy in the quantity of metal used is thereby effected although I may cover the entire back if desired. A suitable pattern of the thin sheet metal covering is shown in Figure 5 although it will be understood that in quantity production ordinary rectangular sheets, which may be cut from rolls of lead foil may be used. In applying this cover to the base material, the flat surface 20 is first placed over one face of the base 10. The flaps 21a are then folded around the long edges of the base and partially over the underneath or back surface as shown in Figure 2. The end tabs 21b are then folded under the bottom edge and pressed into position. The end flap 21c is wrapped over the end bending the metal at the points indicated by the dotted lines so that the flaps 21d are folded in and are in contact with the bottom edge of the shingle. In its final position the flap 21e partially covers the underside as shown in Figure 2. All surfaces of the thin metal sheath are brought into intimate contact with the adhesive by applying pressure at appropriate steps during the wrapping operation.

In my preferred form of shingle construction I use, as the thin metallic covering, rolled sheet or strip lead approximately three one-thousandths (3/1000) of an inch thick although I may use greater or less thickness of lead or other metals if in a condition of "dead soft" anneal without departing from the spirit of my invention. Lead of this thickness can be readily folded and bent so that it is adaptable to use in automatic

wrapping machines for applying it to the base material. It is readily understood that sheet or strip lead of this thickness could not be used by itself as a roofing material if it were applied in the usual manner by fastening the same to the roof structure with nails or clips or similar devices since it obviously would not possess sufficient structural strength to withstand the handling during application without tearing or puncturing and is too thin for ordinary commercial soldering.

While I prefer to cover the shingle or other roofing form with thin rolled strip or sheet lead approximately three one-thousandths (3/1000) of an inch thick, I do not wish to be limited to the use of this metal alone as it is obvious that other thin rolled metals or foils, such as zinc, aluminum, copper, etc., of similar thickness could be used. In place of flat, smooth roofing elements, curved forms simulating curved tile or flat elements having embossed, raised or roughened surfaces could also be manufactured according to my method by pre-forming the base material and embodying suitable methods of folding the metallic covering so as to snugly fit the surface of the roofing elements and attaching the same by the use of a proper adhesive as previously described. The different styles of curved roofing tiles now being manufactured in ceramic materials, such as clay or terracotta, can be duplicated in roofing forms constructed according to my invention.

In the form of embodiment of the invention shown in Figures 6 and 7, the thin metal sheath or foil covering is cut large enough to cover the entire top and underneath surface of the shingle and is secured by first folding into position flaps 22a and then 22c as previously described, the flaps being made secure to the base by fastening with small tacks or wire staples 23 or by soldering or lock seaming depending upon the character of the metallic covering used. In this type of construction, no adhesive need be used over the surface of the fiber board base but after applying the thin and ductile sheet metal covering the latter would be pressed into close contact with the rough irregular surface of the fiber board base by subjecting the assembled and covered shingle to pressure. The thin ductile metallic covering would deform without rupturing sufficiently to permit forcing the metal more or less into the small interstices of the fiber or base which may be specially roughened in manufacture for this purpose, thus securing a type of metallic adhesion to the same. The pattern used for the covering metal in Figures 7 and 8 could be rectangular, permitting the foil to be fed into the wrapping machine from a roll and cut off in proper lengths without necessitating special cutting for each individual shingle pattern.

When the shingles of this type are secured to the roof, they are laid in the usual overlapping relation with the lower portion of each shingle exposed to the weather as indicated in Figure 1 so that the shingles on top cover the joints of the shingle below and prevent water from seeping through between them. Depending upon the size of the shingle, various amounts of each shingle may be left exposed to the weather but in any case the final roof surface will be entirely metal covered. The shingles are easily attached to the roof by nailing in the usual manner as indicated at 24 and the nail holes in each row of shingles are covered by overlapping shingles of the next course of shingles above it. It is not necessary to lay such shingles on a special roofing support other than that normally used for wood shingles, nor is it necessary to previously punch or drill the shingles before applying.

It is obvious that a structure of this type with the various elements overlapping will give a roof covering of high heat insulating properties due to the multiple thickness of the insulating fiber board. Furthermore, this type of roof covering is extremely light as compared to slate, ceramic tile or other forms of metallic roof covering having equivalent heat insulating and corrosion resisting properties.

While I have described certain specific embodiments of my invention in considerable detail in order that the invention may be fully understood, it will be obvious that my invention is not confined to the details described, and that various modifications and changes can be made therein without departing from the spirit of my invention or the scope of the appended claims.

What I claim as my invention is:

1. A roofing element of the character described comprising a base member formed of fiber board of rigid, inflexible, heat insulating character but compressible and relatively yieldable to indentation and a weather proof protective covering of "dead soft" ductile corrosion resisting metal foil whereby blows on the covering sheet are absorbed by said base, permitting the covering sheet to flow and dent through a substantial distance without rupture.

2. A roofing element as defined in claim 1, the thickness of the metal foil of which approximates 3/1000 of an inch.

3. A roofing element of the character described consisting of a base member of relatively rigid inflexible but compressible supporting material formed of cellulose fiber practically free from binder, a thin rolled metal covering too weak to make a satisfactory roof without support and too thin for commercial soldering partially enclosing and supported by said base member and a water-

proof and adhesive bonding material between said body part and said cover.

4. A roofing element, as defined in claim 3, the adhesive bonding material of which is retained in a condition to flow into and seal ruptures in the metal covering.

5. As an article of manufacture a roofing form comprising a supporting base material substantially inflexible and firm yet possessing sufficient cushioning or yielding properties to enable it to deform under locally applied loads, such as a blow, and a "dead soft" ductile metal covering wrapped there around and conforming thereto.

6. A roofing element of the character described consisting of a rigid, inflexible, rough surfaced base member of a cellulosic fiber board and a lead covering of a foil like thickness secured thereto and conforming to the roughness of the surface thereof, substantially as described.

In testimony whereof I have affixed my signature to this specification.

WM. H. FINKELDEY.