

**March 19, 1968**

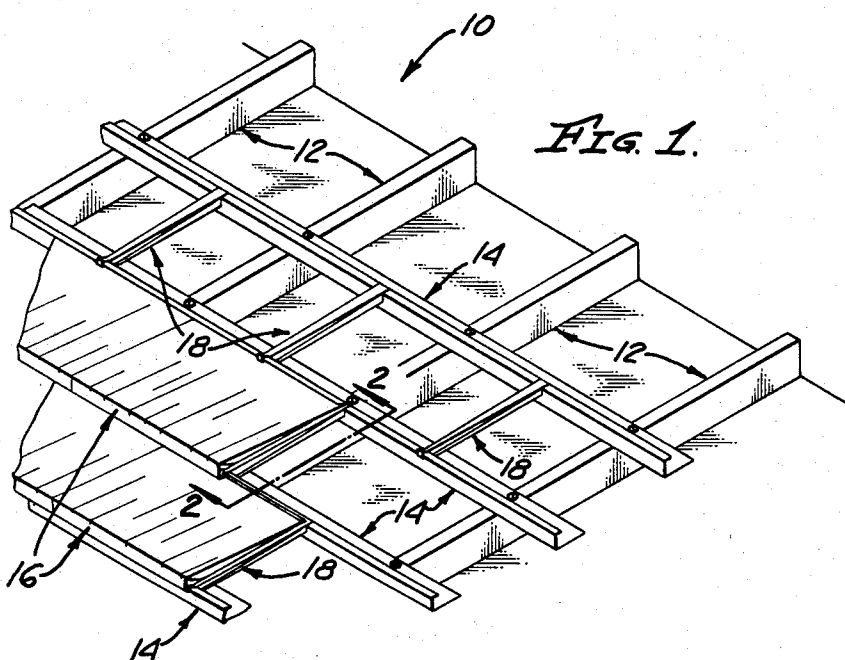
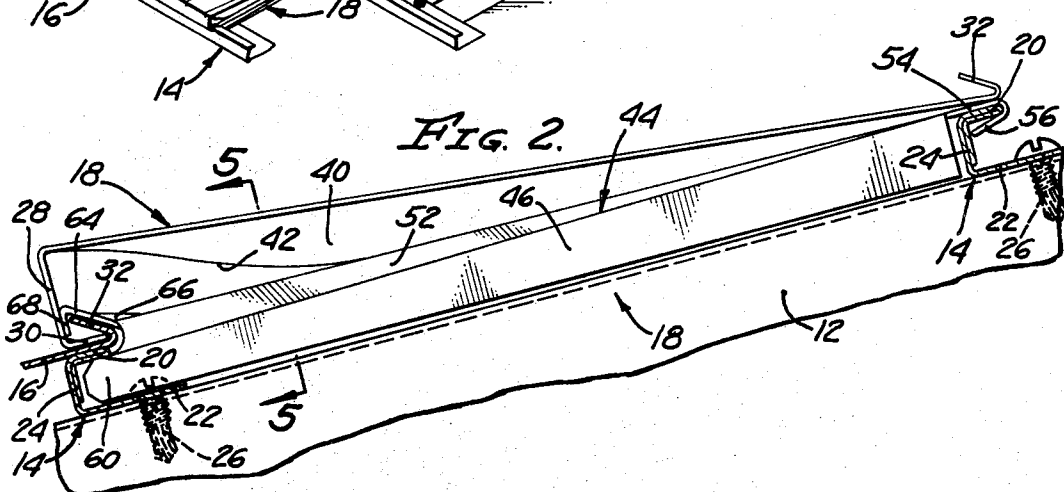
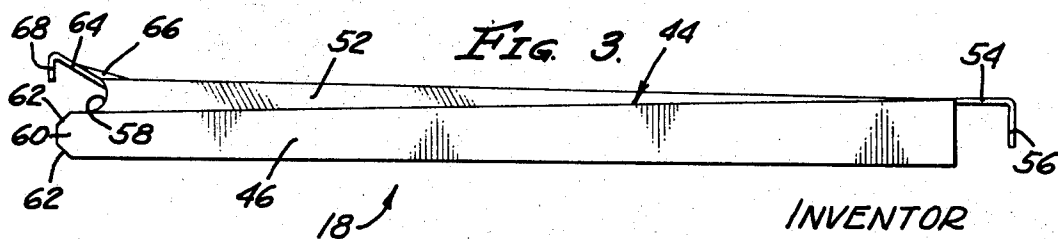
**J. A. BERRIDGE**

**3,373,534**

ATTACHMENT CLIP FOR METAL SHINGLES

Filed Feb. 1, 1966

2 Sheets-Sheet 1



March 19, 1968

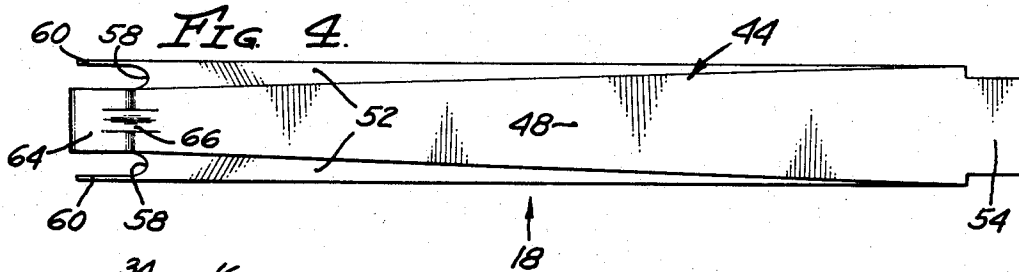
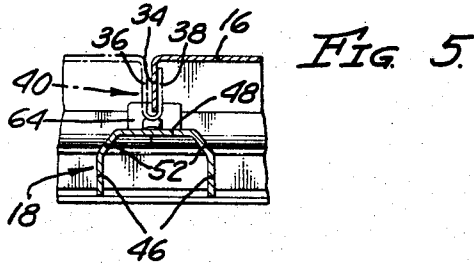
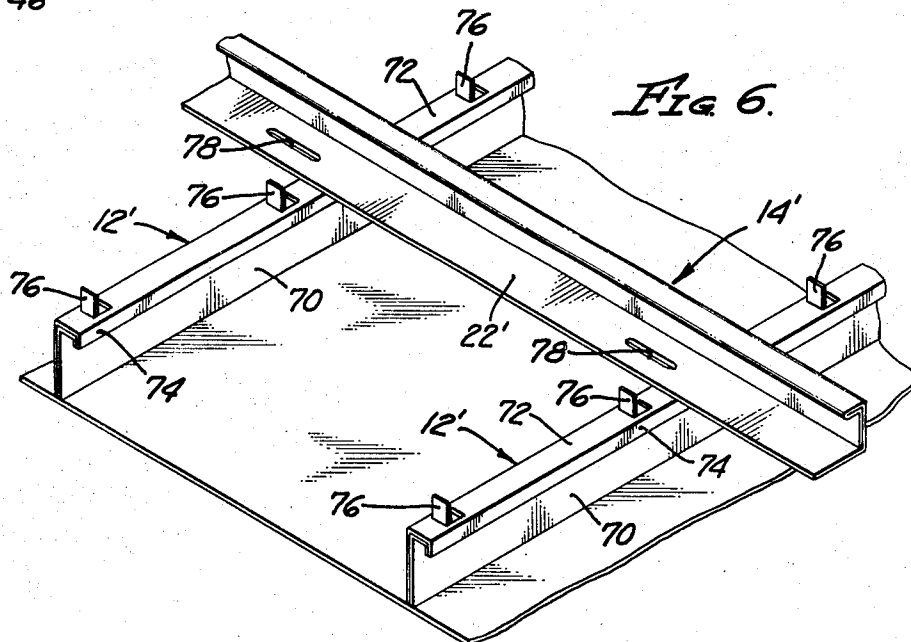
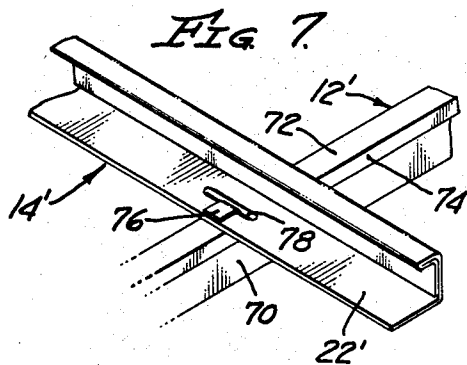
J. A. BERRIDGE

3,373,534

ATTACHMENT CLIP FOR METAL SHINGLES

Filed Feb. 1, 1966

2 Sheets-Sheet 2



INVENTOR  
JACK A. BERRIDGE  
BY *Herbert E. Kidden*  
AGENT

1

3,373,534

## ATTACHMENT CLIP FOR METAL SHINGLES

Jack A. Berridge, Riverside, Calif., assignor to American Metal Climax, Inc., New York, N.Y., a corporation of New York

Filed Feb. 1, 1966, Ser. No. 524,318

6 Claims. (Cl. 52—90)

The present invention relates generally to roofing structures, and more particularly to means for attaching sheet metal shingles to the supporting roof structure. The primary object of the invention is to provide a new and improved method of assembling sheet metal shingles to the roof structure, using no tools other than pliers and a hammer, or a screwdriver.

The invention is primarily for use with sheet metal shingles of the type usually made up in elongated panels (typically about 4 feet in length), which are bent and otherwise formed to simulate several rough-surfaced, thick-butt shakes arranged side-by-side. These panels are laid with their lengthwise dimension extending horizontal along the sloping roof, and are conventionally mounted on wood sheathing, to which they are secured at intervals along their length by attachment clips. The attachment clips are usually hooked over the upper edge of the panel and are nailed down to the sheathing. The upper edge of the panel is then overlaid by the next panel above, which covers and conceals the attachment clips.

One disadvantage of this arrangement is that once the shingles have been installed, there is no way of inspecting the job to make sure that the required number of attachment clips were used. Since the nailing of the attachment clips is the most time-consuming part of the installation job, a careless workman can speed up the job considerably by skimping on the number of attachment clips used. However, this results in a sub-standard installation, which is apt to fail under loads considerably less than that which the shingles were designed to withstand.

Another important object of the invention, therefore, is to provide a shingle attachment clip which is an integral part of the roof structure holding the shingles down to the purlins, and which cannot be left out by a workman in the interest of speeding up assembly.

A further object of the invention is to provide a new and improved clip for attaching sheet metal shingles to underlying purlins, wherein said clips serve also to strengthen and reinforce the shingles, particularly at the point where adjoining shingles come together, so as to enable the shingles to support a normal live load such as a person walking on the roof. To this end, the attachment clip of the present invention is made so that it spans the space between the adjacent purlins and interlocks at both ends with said purlins and with the upper and lower edges of the associated shingle, so as to secure said shingles to the purlins and provide bearing support for the ends of the shingles.

Another object of the invention is to provide a new and improved method of installing metal shingles, that is much faster and easier than nailing the old attachment clips to the sheathing.

Yet another object of the invention, in one of its aspects, is to provide a metal roof structure which may be assembled without using screws, rivets, or other fastening devices. Instead, the rafters are provided at intervals along their length with upstanding, pre-punched tabs which are inserted through slots in the base of the purlin and then bent over to secure the purlin to the rafter. The said tabs are spaced apart the exact amount of shingle exposure, and after the purlins are in place the shingles and clips can be installed with nothing more than a pair

2

of pliers to bend a tab on the upper end of the clip, so that it hooks under the top flange of the purlin.

These and other objects and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiment thereof, reference being had to the accompanying drawings, wherein:

FIGURE 1 is a fragmentary perspective view of a roof constructed in accordance with the principles of the invention, showing the metal shingles in varying stages of installation;

FIGURE 2 is an enlarged fragmentary sectional view, taken at 2—2 in FIGURE 1, showing one end of a shingle in elevation;

FIGURE 3 is a side elevation of one of the single attachment clips;

FIGURE 4 is a top plan view of the same;

FIGURE 5 is a fragmentary sectional view, taken at 5—5 in FIGURE 2;

FIGURE 6 is a fragmentary perspective view of another embodiment of the invention, showing a method of securing the purlins to the rafters by means of tabs bent upwardly from the top side of the rafters; and

FIGURE 7 is another fragmentary perspective view, showing one of the tabs on the rafter inserted up through a slot in the lower flange of the purlin and bent over to secure the same thereto.

Attention is first directed to FIGURES 1 to 5, inclusive, of the drawings, wherein a section of roof constructed in accordance with the present invention is designated in its entirety by the reference numeral 10. The roof 10 comprises a plurality of parallel, inclined rafters 12, preferably of roll-formed sheet metal, although they could be of wood, and mounted horizontally on these rafters are purlins 14. Sheet metal shingles 16 are mounted on the purlins 14, and are connected thereto by attachment clips 18.

The purlins 14 are preferably roll-formed of sheet aluminum alloy, or other metal, to the channel-shaped configuration shown in FIGURE 2. Each of the purlins has parallel upper and lower flanges 20 and 22, which are connected together along one edge by a vertical web 24. The purlins are placed with their lower flanges 22 bearing on the top surfaces of the rafters 12, and with the web 24 on the downward side of the purlin, so that the flanges 20, 22 face upwardly. The lower flange 22 is then attached to the rafters, using nails if the rafters 12 are of wood, or self-tapping or sheet-metal screws in the case of metal rafters. Since the rafters 12 illustrated herein are of roll-formed sheet metal, the purlins are secured thereto by sheet-metal screws 26, which are started through aligned, undersized holes that are pre-punched or drilled in the lower flange 22 of the purlin and in the rafter 12.

Each of the metal shingles 16 is press-formed from sheet aluminum alloy, or other metal, to simulate a short row of several shingles, or shakes. The panels are typically about 4 feet long, and are laid with their lengthwise dimension extending horizontally along the sloping roof, as shown in FIGURE 1. The several shingle panels are assembled end-to-end, and interlock with one another along their ends and along their top and bottom edges, to form close-fitting joints. The bottom edge of the panel is bent downwardly at 28 to form a simulated butt end, and then rearwardly to form a narrow flange 30, which is approximately parallel to the top side of the shingle. At its upper edge, the shingle is bent over at an acute angle to form an upwardly and forwardly inclined lip 32, which forms an angle of about 30 degrees to the top side of the shingle.

At one end of each of the shingle panels, the top side of the shingle is bent downwardly at 90 degrees, to form

a flange 34. The other end of the shingle is bent downwardly at 36, and then upwardly at 38 to define a narrow channel 40. The shingle panels are assembled so that the flange 34 of one panel projects down into the channel 40 of the next adjacent panel, as best shown in FIGURE 5. The narrow channel 40 increases in depth from the top edge of the panel to the bottom edge thereof, and is formed at its lower end with an upwardly curved scoop 42 which terminates substantially at the bend line, whereby water running down the channel is carried by said scoop out to the bend line and cascades down onto the next lower shingle without flowing into the joints connecting the bottom edge of the panel with the top edge of the panel below. The flange 34 is correspondingly shaped at its lower edge to conform to the bottom of the curved scoop, and the ends of adjoining shingles are thus interlocked with one another.

Each of the attachment clips 18 is preferably formed of sheet aluminum alloy, and comprises an elongated body 44 having the configuration of an inverted channel. The body 44 has parallel straight side walls 46 and a bottom wall 48. The bottom wall 48 is essentially flat, and is joined to the side walls 46 by long, inclined, tapering portions 52. At one end of the body 44, the channel bottom 48 extends beyond the edge of the side walls 46, to form a tab 54. The outer end portion of tab 54 is bent downwardly at 56. Initially, the portion 56 is bent down at approximately 90 degrees to the tab 54, but at the time of installation, the portion 56 is bent under the upper flange 20 of the purlin 14, as best shown in FIGURE 2.

At the other end of the attachment clip 18 there are two gaps 58 which separate the channel bottom from side walls 46. The ends of side walls 46 that are thus separated from the channel bottom form projections 60, which are adapted to extend into the space between the upper and lower flanges 20 and 22 of the lower purlin, and to bear against the underside of the upper flange 20, as shown in FIGURE 2. That portion of the channel bottom 48 lying between the gaps 58 forms an extension 64, which is bent upwardly at an angle of about 30 degrees and is strengthened by means of a stiffening ridge 66. The extremity of the extension 64 is bent downwardly to form a tab 68, which hooks over the lip 32 on the next lower shingle, as shown in FIGURE 2.

In assembling the purlins 14 and the shingles 18 on a roof, the purlins are installed on the rafters by use of a spacing gauge, so that they are spaced apart exactly the amount of shingle exposure. The purlins are then screwed or nailed to the rafters, and the shingle panels 16 are mounted on the purlins. The shingle panels 16 are placed on the purlins 14 with the lower edge of each shingle 16 standing directly over one purlin, and the upper edge of the shingle resting on the next higher purlin. The flange 30 at the lower edge of each shingle stands on top of the upper edge of the next lower shingle, and extends up under the lip 32 thereof. The attachment clips 18 are placed one at each end of the shingle panels, and usually one about midway between the ends.

The bottom row of shingles is installed first, starting from one corner of each area, and working in toward the valleys, which may be flashed with a suitable flashing strip. The next and all succeeding courses of shingles are started with panels of greater or lesser length than the starting panel of the course below, so that the joints between the ends of adjacent panels are staggered from one course to the next.

As each course of shingles is laid, the shingle panel is placed down over the attachment clips that will lie underneath it, with the flange 30 at the lower edge of the panel standing on top of the upper edge of the next lower row of shingles, and with the flange 34 at one end extending down into the narrow channel 40 at the adjacent end of the next panel. The shingle panel is then shifted upwardly, so that the flange 30 comes under the lip 32 of the next

lower shingle, and abuts against the corner formed where the lip 32 is bent. The attachment clips 18 for the next higher course of shingles are then slid lengthwise along the purlins 14 and lip 32 until they are located at the proper places. As mentioned earlier, there will usually be three attachment clips 18 for each shingle panel, with one at each end and a third in the middle. However, in the case of a shingle panel that is shorter than about 3 feet, the middle attachment clip may be dispensed with, and only the two end clips used.

As best shown in FIGURE 2, the channel 40 at the end joints between shingle panels extends down to and bears against the top surface of the attachment clip 18 for the greater part of its length. The attachment clip thus provides bearing support for the ends of the shingle panels where they are weakest, and in this way the shingle is prevented from deflecting excessively and taking a permanent set under a localized load, such as a man stepping on the joint.

FIGURES 6 and 7 show a slightly modified version of the invention, wherein the purlins are secured to the rafters without using screws, nails, or the like. In this embodiment of the invention, parts that are similar to those described in the embodiment of FIGURES 1-5 are given the same reference numerals with the prime (') suffix. The rafters 12' are roll-formed of sheet metal and are made with a vertical web 70 and horizontal top flange 72; the latter having a downwardly turned stiffening lip 74 along the side opposite the web 70. Projecting upwardly from the top flange 72 at right angles thereto, are pre-punched tabs 76 which are spaced apart along the length of the rafter the same distance as the shingle exposure. The rafters 12' are installed on the roof so that the tabs on one rafter are horizontally aligned with the corresponding tabs on all of the other rafters.

The purlins 14' are otherwise like the purlins 14 of FIGURES 1-5, except that the bottom flange 22' has lengthwise-extending slots 78 formed therein, which are spaced apart the same distance as the distance between rafters. The purlins 14' are assembled on the rafters 12' with the tabs 76 projecting up through the slots 78, and the tabs are then bent over to lie flat against the top surface of the flanges 22', as shown in FIGURE 7. This secures the purlin to the rafter, and the shingles are thereafter installed on the purlins in the manner described in the previous embodiment, using attachment clips 18. The advantage of this arrangement is that no tools are required for installing the purlins and shingles, other than a pair of pliers to bend down the tabs 76 and to bend under the tip end portions 56 of the extensions 54 on the upper ends of the attachment clips 18.

While I have shown and described in considerable detail what I believe to be the preferred form of my invention, it will be understood by those skilled in the art that various changes may be made without departing from the broad scope of the invention as defined in the following claims.

#### I claim:

1. An attachment clip for assembling a metal shingle to a pair of spaced-apart, parallel purlins which are mounted horizontally on inclined roof rafters, said shingles being formed of sheet metal to simulate wooden shingles or shakes and being assembled on said purlins with their lower edges overlying the upper edges of the next lower shingles, each of said shingles having its lower edge bent downwardly and then rearwardly to form a narrow flange, the upper edge of said shingle being bent over to form a forwardly and upwardly inclined lip, each of said purlins being formed with parallel upper and lower flanges connected along one edge by a vertical web, said narrow flange at the lower edge of said shingle resting on the upper edge of the next lower shingle directly over said upper flange of the lower purlin, and the upper edge of said shingle resting on said upper flange of the upper purlin, said attachment clip comprising:

5

an elongated body of a length to span the distance between said upper and lower purlins;

means at the upper end of said body overlying said upper flange of said upper purlin and interlocking therewith; and

means at the lower end of said body interlocking with said lower purlin and hooking over said forwardly and upwardly inclined lip at the upper edge of the next lower shingle, to secure the lower edge of the one shingle and the upper edge of said next lower shingle to said lower purlin, the upper edge of said shingle being secured to said upper purlin by the attachment clip of the next higher shingle.

2. An attachment clip as specified in claim 1, wherein said means at the upper end of said body comprises a tab projecting between said upper edge of said shingle and said upper flange of the upper purlin, said tab having a portion thereof bent under said upper flange.

3. An attachment clip as specified in claim 1, wherein said means at the lower end of said body includes a portion extending between said upper and lower flanges of the lower purlin and bearing against the underside of said upper flange.

4. An attachment clip as specified in claim 1, wherein said body is in the form of an inverted channel having side walls and a bottom wall, said channel bottom wall projecting beyond the ends of said side walls to form a tab extending between said upper edge of said shingle and said upper flange of the upper purlin, said tab having a portion thereof bent under said upper flanges;

said side walls and said channel bottom having gaps between them at the lower end of said body, whereby said side walls form projections that extend into the space between said upper and lower flanges of said lower purlin, said channel bottom wall extending up over said forwardly and upwardly inclined lip at the upper edge of the next lower shingle and terminating in a downwardly bent tab that hooks over the edge of said lip.

5. A metal roof construction comprising a plurality of laterally spaced, inclined ratters of sheet metal, having upstanding tabs on the top surface thereof, said tabs being spaced apart a distance equal to the amount of shingle exposure, and the tabs on one rafter being horizontally aligned with the corresponding tabs on all of the other rafters;

a plurality of metal purlins mounted horizontally on said inclined rafters, each of said purlins having parallel upper and lower flanges connected along one

6

edge by a vertical web, said lower flange being slotted to receive said tabs, said tabs being bent over to secure said purlins to said rafters;

sheet metal shingles spanning the spaces between adjacent pairs of purlins, each of said shingles having an upper edge resting on an upper purlin and a lower edge supported on a lower purlin, said lower edge standing on the upper edge of the next lower shingle directly above said lower purlin;

said upper edge of said shingle including a portion bent over to form a forwardly and upwardly inclined lip, and said lower edge being bent downwardly and then rearwardly to form a narrow flange, said flange lying flat against the top surface of said next lower shingle and extending up under the forwardly and upwardly inclined lip thereof; and

an attachment clip comprising an elongated body of a length to span the distance between said upper and lower purlins, said body having means at its upper end engaging and holding to said upper purlin, and said body having means at its lower end engaging and holding to said lower purlin and to said inclined lip of said next lower shingle.

6. A metal shingle roof construction as specified in claim 5, wherein said attachment clip comprises an elongated body in the form of an inverted channel having side walls and a bottom wall, said channel bottom wall projecting beyond the ends of said side walls to form a tab extending between said upper edge of said shingle and said upper flange of the upper purlin, said tab having a portion thereof bent under said upper flange;

said side walls and said channel bottom having gaps between them at the lower end of said body, whereby said side walls form projections that extend into the space between said upper and lower flanges of said lower purlin, said channel bottom wall extending up over said forwardly and upwardly inclined lip at the upper edge of the next lower shingle and terminating in a downwardly bent tab that hooks over the edge of said lip.

#### References Cited

##### UNITED STATES PATENTS

|           |        |                        |          |
|-----------|--------|------------------------|----------|
| 2,042,890 | 6/1936 | Fulenwider et al. ---  | 52—529 X |
| 2,070,130 | 2/1937 | Johnson -----          | 52—472 X |
| 3,131,513 | 5/1964 | Grigas et al. -----    | 52—551 X |
| 3,320,709 | 5/1967 | Schropter et al. ----- | 52—478   |

HENRY C. SUTHERLAND, *Primary Examiner*.