

June 18, 1940.

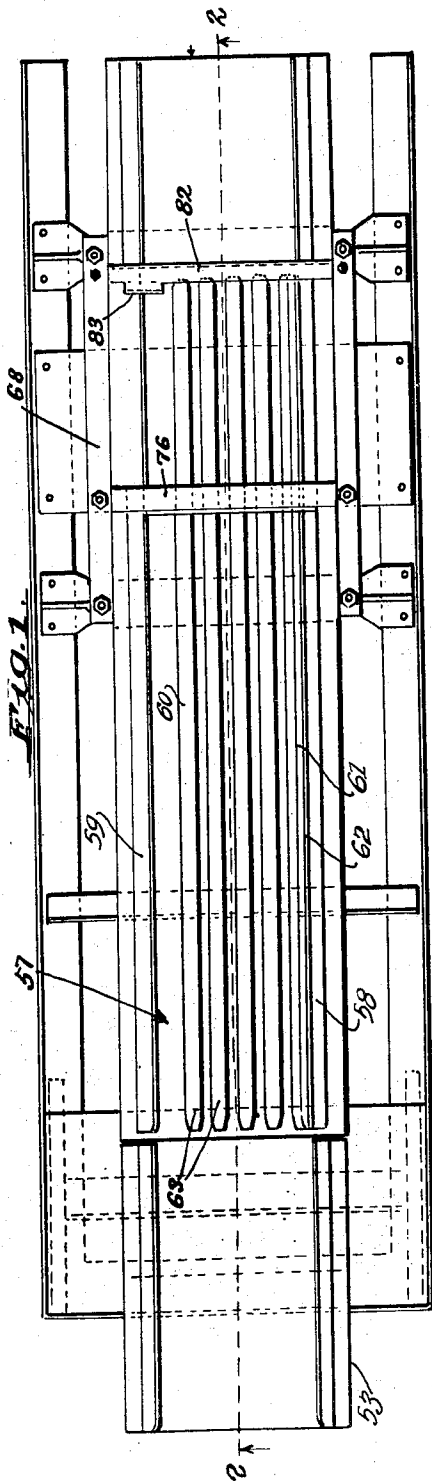
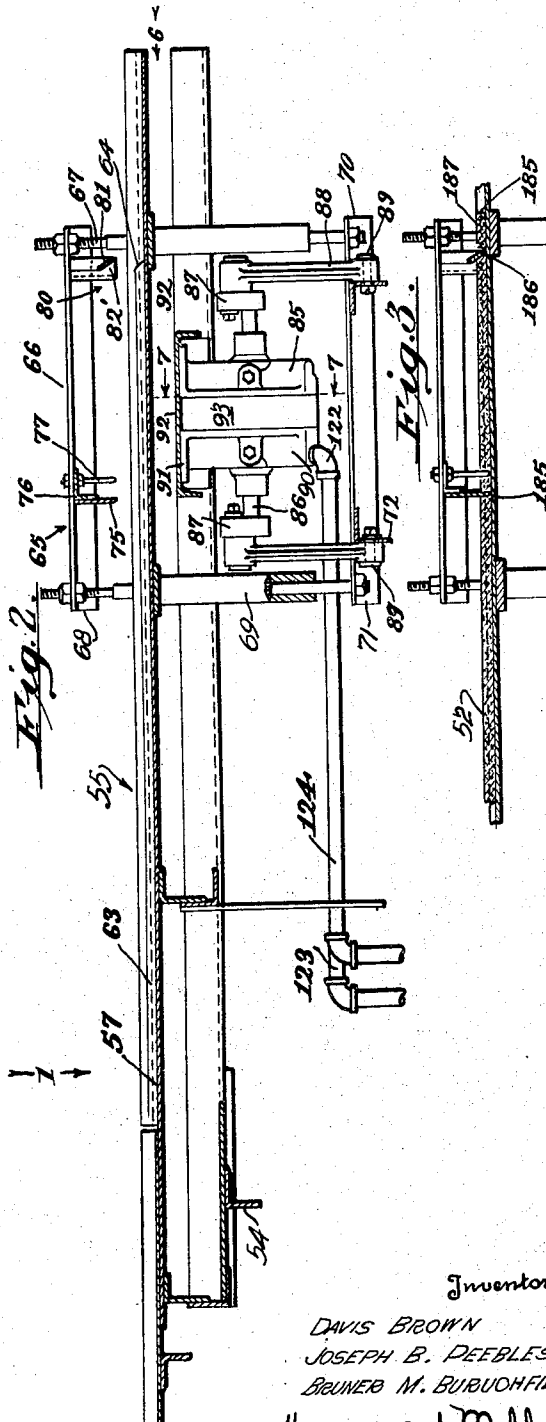
D. BROWN ET AL

2,205,080

METHOD OF MAKING INTERLOCKING ROOFING TILE

Original Filed Aug. 4, 1936

2 Sheets-Sheet 1



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Fig. 4

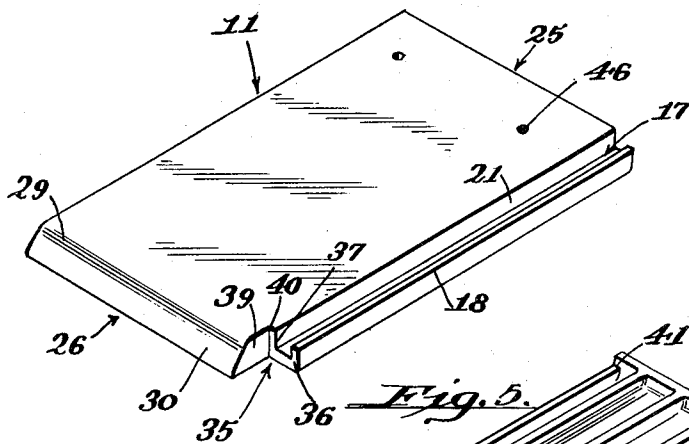


Fig. 5.

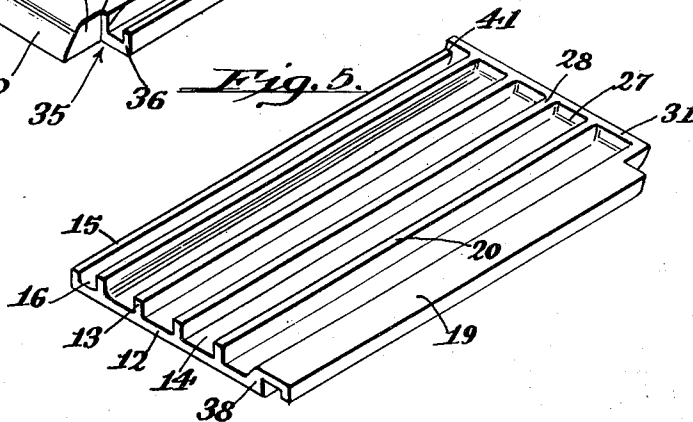


Fig. 7.

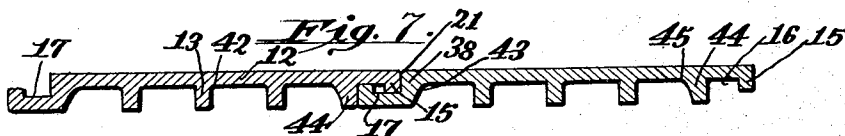
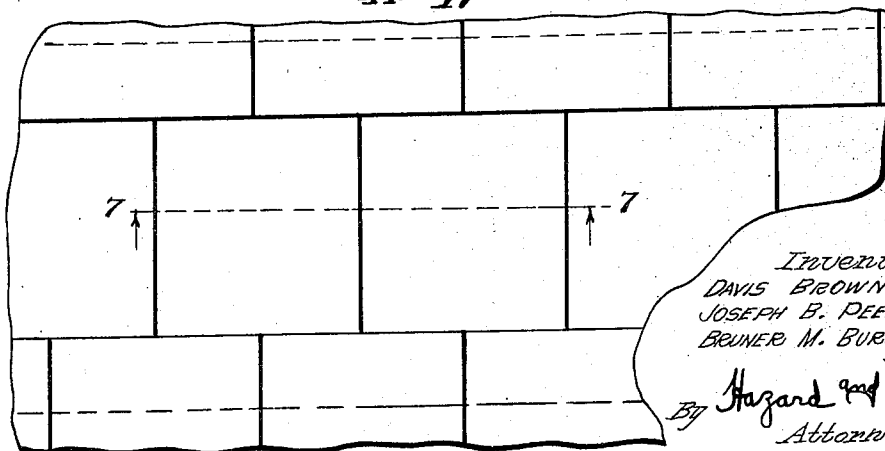


Fig. 6.



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UNITED STATES PATENT OFFICE

2,205,080

METHOD OF MAKING INTERLOCKING
ROOFING TILE

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Original application August 4, 1936, Serial No.
94,184. Divided and this application January
31, 1938, Serial No. 187,902

3 Claims. (Cl. 25—156)

This application is a division of our patent application for Interlocking roofing tile and method and apparatus for making, Ser. No. 94,184, filed August 4, 1936, matured to Patent No. 2,177,607, issued October 24, 1939. As it is necessary to describe certain parts of the machine or equipment in relation to the method of making the tile and the tile as an article, we use some of the drawings of the parent application.

Our invention relates to a method of making roofing tile having a longitudinal edge interlocking between adjacent tile, such interlock being of a type in which the drainage or seepage of water at the longitudinal tile joints is carried downward in part of the interlocking construction and thus drains on to the lower tiles of a roof. Another feature of our invention is in providing a sealed end closure for a tile with ribs on its underside, such closure thus when interfitted by an overlap with other tiles prevents seepage of water upward in the grooves formed between the ribs on the underside of the tile and also permits a lesser overlap of the tiles. Another feature involving the sealed end and the interlocking channel of adjacent tiles is in having the channel terminate slightly short of the sealed end so that an adjacent tile has its sealed end extend over and below the end of the channel used for interlocking the adjacent tile.

A characteristic therefore of our invention, is that each individual tile has a series of longitudinal ribs on its underside thus forming grooves between the ribs. At the margin or longitudinal side of each tile a longitudinal channel is formed and the edge of the adjacent tile has a downturned partial rib which interfits with the said channel. In addition the lower end of each tile is rounded over forming a seal across the ribs. This gives a convex curve to the lower end of each tile considered on a longitudinal section and thus forms with the ribs flat under-surface portions to fit on the flat top of an under tile. The sealed lower end of each tile where it is turned downwardly engages over the end of the marginal channel of the adjacent tile, such channel being slightly shorter than the total length of the tile.

A further object and feature of our invention is in the method of manufacturing tile in a continuous and in effect, automatic manner. In this a ribbon of clay is forced through a suitable extruding machine which forms the ribbon with continuous longitudinal ribs on its underside, these ribs being all of the same depth. In addition

at one edge there is a partial rib, this being about half the depth of the other ribs. On the other margin a channel is formed facing upwardly and this has a longitudinal rim on its outer edge, such rim terminating in a plane of the underside of the main body of the rib. A further feature in the method of making the tile is passing this ribbon through an automatic cutting machine which has a travelling carriage, such carriage moving with the same speed as the ribbon after a predetermined amount of such ribbon has been fed on to the carriage and then the cutting of the ribbon to form both ends of the tile and the sealed end is done in one operation, this operation also cutting off a short waste strip. The cutting is done during a longitudinal motion of the cutters and the press for sealing the end so that the longitudinal speed of these cutters equals the longitudinal speed of the ribbon of clay. Thus, in the action of cutting the ribbon into tile lengths, a notch is cut out of one corner at the end of the interlocking channel, the lower end of each tile is sealed or rounded off, this also forming a short waste strip, the opposite end is cut by a shear cut transverse to the clay ribbon and at the same time nail holes are punched adjacent the upper edge of the tile.

Our invention is illustrated in connection with the accompanying drawings, in which:

Fig. 1 is a plan of a portion of the machine showing the part of the carriage taken in the direction of the arrow 1 of Fig. 2, omitting however, the hydraulic operating mechanism.

Fig. 2 is a vertical longitudinal section on the line 2—2 of Fig. 1 taken in the direction of the arrows showing part of the oscillating hydraulic motor in elevation and a portion of the cutters and dies for forming the shingle, these being in an elevated position.

Fig. 3 is a partial longitudinal section similar to Fig. 2 but showing the cutters and dies in their lowermost position when severing and depressing the shingle end.

Fig. 4 is a perspective view of one of the tiles showing the upper surface and the channel at one side.

Fig. 5 is a perspective reverse view of the tile showing the full ribs, the half rib on one edge and the underside of the channel.

Fig. 6 is a plan of an assembly of tiles in a roofing.

Fig. 7 is a transverse section of two adjacent tiles on the line 7—7 of Fig. 6 in the direction of the arrows.

Our invention as it relates to the tile is illustrated particularly in Figs. 4 through 7 in which the individual tile is indicated by the numeral 11. This is formed from a continuously molded ribbon of clay which has a web 12 with a series of internal ribs 13 formed on the lower side. The formation of the ribs thus forms wide longitudinal grooves 14. At one marginal edge a partial and designated half rib or rim 15 is formed, there being a narrow groove 16 between such marginal half rib or rim and the next adjacent full rib 13. It will thus be seen that the upper surface of the ribbon presents a smooth surface of the web of the tile except that on one margin there is formed a longitudinal channel 17, this being on the side opposite that having the half rib or rim 15. This channel has a marginal half rib or rim 18. The base or underside 19 of the channel is on the same plane as the bottom edge 20 of the main ribs 13 so that the half rim or rib 18 is approximately the same in vertical measurement as the half rib or rim 15 on the opposite side of the ribbon. The inner face 21 of the channel 17 is thus in effect a portion of the side face of a rib. It will be understood that as the ribbon of clay is extruded in a continuous operation that the web, the various interior ribs, the marginal rim 15 on one side and the channel structure 17 on the opposite side are formed in a continuous manner and that the individual tiles are made by cutting into proper lengths. In this cutting a transverse cut is made which forms the upper end 25 of an individual tile, this serving the web, the various internal ribs, the marginal rim 15 and the channel structure 17. This cut is at right angles to the plane of the ribbon. The lower end of the tile is formed with a sealed end 26. This is made by die-pressing the web portion downwardly forming connected cross blocks 27 between the ribs and also partially widening or spreading the ends of the ribs 13 adjacent their lower end as indicated at 28. The characteristic of the sealed end 26 is that it has a convex rounded curvature 29 merging with the top surface of the web 12 and this convex curve or nose merges into a sloping end edge 30 which forms an obtuse angle with the plane of the web of the tile. The sealed end has a transverse under edge 31 which is in the same plane as the bottom 19 of the channel and of the lower edges 20 of the main ribs 13.

In the same operation in which the sealed end is die-pressed in shape, a notch 35 is formed at the lower end of the channel structure 17. This is done by making a transverse cut which severs the half rib or rim 18 of the channel, the bottom of the channel leaving an end face 36. This action also makes an end cut 37 in a portion of the lateral rib 38. There is also a longitudinal cut 39 made in this rib from the sealed end 26. This leaves a right angular corner 40 at the transverse cut of the channel 17 at its end face 36 and the side face 39 cut in the rib 38.

To interfit with this the rim 15 joins with the sealed end 26 on a junction line 41 which is positioned slightly above the lower edge 31 of the sealed end as shown in Fig. 5. It will be noted that in forming the ribs, the center ribs 13 have a small fillet 42 where they join the web 12. The rib 38 adjacent the channel 17 has a larger fillet or sloping side wall 43. Also the rib 44 which is adjacent the groove 16 also has a large fillet 45 or sloping inner edge. This construction at the ribs 38 and 44 strengthens the connection of the

channel structure 17 on one side of the tile and the groove structure 16 with the rim 15 on the opposite side of the tile.

The tiles are provided with the usual nail hole perforations 46 spaced inwardly from the edge 25. In this construction of a sealed tile however, the nail holes may be made much closer to the upper end of the tile than in the usual tile as it is not necessary to have such an overlap of the tiles when laid up on a roof.

In setting up the tiles they interfit as shown in Fig. 7 in which it will be seen that the rim 15 on one side of a tile fits in the channel 17 on the edge portion of an adjacent tile. It will be noted that the rim 18 on the outside of the channel 17, being of half the rib height, substantially engages the underside of the web 12 whereas the edge of the rim 15 substantially engages the bottom of the channel 17. The outside of the rim 15 is in close engagement with the longitudinal edge surface 21 of the channel 17 and the rim 18 is in close engagement with the rib 44 of an adjacent tile.

The corner portion of the sealed end 26 of the tile at its junction with the rib 15 fits in the notch 35 formed by cutting the channel 17 a shorter length than the main body of the tile so this gives a seal across the end of the channel 17. Therefore any water seeping between adjacent tiles and flowing down this channel is directed downwardly onto the tiles immediately below in a roof structure.

Our invention, so far as the machine assembly is concerned, has the following main features in which an extruding machine extrudes through a die forming a ribbon of clay 52. This is received by a transfer table 53 mounted on a substantial frame structure 54. This frame structure forms a mounting and track for the carriage designated by the assembly numeral 55. The carriage is mounted on wheels in the usual manner to facilitate its reciprocating movement. The shingles after being formed are conveyed from the machine by an out-feeding conveyor, this travelling at a higher rate of speed than the ribbon of clay to lead the cut tiles quickly away from the machine.

Certain characteristics of the carriage 55 is that this has a carriage bed 57 with marginal guides 58 and 59 (note Fig. 1), these being formed of angle-irons and between such angle-irons there are longitudinal straps 60 which fit the grooves between the main rib. There is also a side strap 61 with a longitudinal recessed edge 62 which accommodates the marginal rim 15. These straps and the angles have a somewhat pointed end 63 to facilitate feeding the ribbon of clay over these straps. The straps have a slightly beveled end 64 remote from the end 63. The machine is provided with a cutting and die-pressing assembly 65. This has an upper frame 66 supported on four vertically reciprocating rods 67, these being connected to longitudinal angles 68 forming part of the top frame 66, this frame being adjustable on these rods. The rods pass downwardly through tubular guides 69 forming part of the carriage bed or secured thereto in any suitable manner. The lower ends of these rods are connected to a lower frame 70. This frame has longitudinal angles 71 and cross or transverse angles 72.

The cutters include a transverse severing blade 75 which is illustrated as secured to a transverse angle-iron 76 extending between the longitudinal angles 68 of the top frame 66 and is ad-

justable longitudinally to regulate the length of the tile. Punches 77 are also secured to the angle-iron 76 to punch the nail holes.

The die 80 for forming the sealed end on the tile has a sloping blade 81 depending from a cross strap 82 located between the longitudinal angles 68. This blade slopes at an angle upwardly and towards the severing blade 75 and forms the main portion of the end seal 26, giving the slope to the end 30 and by the downward flow of clay adjacent the top surface of the web forms the convex curve 29. This die has a longitudinally extending blade section 82' and an outwardly extending shearing blade 83 which forms the notch 35. The longitudinal shearing part 82' cuts the longitudinal cut 39 of the notch and the outwardly extending shearing blade 83 gives the transverse cut 36 and 37 at the end of the channel structure 17. Forming the notch causes a slight waste in the clay ribbon forming the tile.

The cutter assembly with the blade and the end seal forming die is vertically reciprocated by an oscillating engine 85. This engine has a crank shaft 86 extending therethrough with a crank 87 on each end. From each crank there depends a connecting rod 88 which is pivotally connected at 89 to a cross or transverse angle 72 which angles form in effect a cross head. The engine has two similar end heads 90 which have a supporting base 91 bolted to a cross channel 92 which forms part of the machine carriage. Between these heads there is a ring 93 cylindrical on its inside surface, this ring fitting against shoulders of the end heads and the assembly being attached by bolts.

The two supply pipes have elbows 122 and there are two longitudinal pipes 123 and 124 (note Fig. 2), which are supported in the carriage and from each of these there is a flexible hose leading to couplings of a control valve. This valve may be of the usual character and has an inlet connection from a hydraulic pump and return to the pump or a reservoir, thus by a suitable control of the oscillating engine 85 as described in the parent application above noted, such engine is operated to oscillate the shaft 86 and hence raise and lower the cutting and die pressing assembly 65.

The mechanism for initiating the movement of the carriage with the ribbon of clay and the return of the carriage at the end of its stroke may be arranged somewhat in the manner of the patent application to Davis Brown for Automatic brick and tile cutter, Ser. No. 44,727, filed October 12, 1935, matured to Patent No. 2,058,663, issued October 27, 1936.

In this cutting action the transverse cutter blade 75 is brought down at predetermined periods during which time a ribbon of clay has been fed, thus giving a series of cuts, two of which are indicated at 185 in Fig. 3. At the same time the die cutter 80 makes a severance cut 186 as well as die-pressing the end of the tile. Thus there is a small waste piece 187 left between the severance 186 and the transverse cut 185. This waste piece also includes the small waste block cut out at the notch 35. This waste piece drops through an opening and is not fed on the out-feeding conveyor belt 56.

An important feature from the construction and operational standpoint relates to the die designated by the assembly numeral 80 illustrated for instance in Figs. 1, 2, and 3. Such die has an upwardly and rearwardly sloping blade 81, this sloping towards the rear severing blade 75.

The cutting edge of this sloping blade is horizontal and thus parallel to the bed of the carriage. However the sloping part of this blade does not extend the full width of the clay ribbon from which the tile is formed and cut but at the left hand end considered facing in a forward direction of the movement of the ribbon, there is a longitudinally extending blade section 82' which is vertical as clearly shown in Fig. 2. At the rear end of this latter blade there is the shearing blade 83 which is also vertical as shown in Figs. 1 and 2. Thus in the operation as shown in connection with Fig. 3, the shearing blade 75 cuts through the ribbon of clay, making a vertical cut and completely severing the web and the various ribs. The action of the die and in particular the sloping blade 81 in its downward movement engages the ribbon back of the right hand cut 185 shown in Fig. 3. On account of the rearwardly and upwardly inclined slope of the sloping blade 81, the web is pressed downwardly and the ends of the ribs 20, note Fig. 5, must be expanded and this expanding action is taken care of by the beveled ends 64 of the longitudinal straps 60 forming a slight fillet shown in Fig. 5. The characteristics of the action of the longitudinal blade 82' and the cross blade 83 is at the same time to form a longitudinal cut in the clay forming the surface 39 shown in Fig. 4 and to make the cut crosswise at the right angular corner 40, leaving exposed the surfaces 36 and 37. This cuts out the notch designated as 35, Fig. 4. In this action the cutting edges at the bottom of the die, that is, the cutting edge of the sloping blade 81 and of the blades 82' and 83, are all on the same level and thus cut through the web, the ribs and the channel structure giving the formation at the end of the tile shown in Figs. 4 and 5 and developing a slight waste strip 187 which includes the portion cut out to form the notch 35.

Various changes may be made in the details of the construction without departing from the spirit or scope of the invention as defined by the appended claims.

We claim:

1. The method of making roofing tile in which a ribbon of clay is extruded to form a web with an upper surface for exposure to the weather and a plurality of downwardly extending ribs with spaces between the ribs and the web comprising while the ribbon is moving in a forward direction at the rate of extrusion, in a single operation severing the ribbon to form a tile length and at the same time deforming one end of the web and a portion of the ribs adjacent thereto to form an end seal integral with the web and the ribs and bringing the lower edge of the seal into alignment with the lower edge of the ribs whereby the said seal forms an end closure for the space between the ribs and the web when the tile is set up on a roof.

2. In the method of making roofing tile as claimed in claim 1, at the same time of severing the ribbon into a tile length forming a waste piece supporting the web with a moving support on the underside between the ribs except at the end which is deformed and in the deforming of the end of the ribbon and ribs pressing the under portion of the web and the side portions of the ribs into contact with the moving support.

3. The method of making roofing tile in which a ribbon of clay is continuously extruded to form a web with an upper surface for exposure to the weather and a plurality of ribs formed integral

with the web for positioning the web above a roof
and thereby leaving spaces between the web and
the plurality of ribs comprising while the web of
5 clay is moving at the same rate as during the ex-
trusion forming an end seal integrally connected
with the web at one end of the tile by distorting
a portion of the web to bring the same into
alignment with the lower portion of the said
10 ribs, severing the ribbon into tile lengths whereby
the said seal forms an end closure for the said

space when the tile is set up on a roof, supporting
the web of the portion of the ribbon to be severed
into a tile during its movement except at the end
in which the seal is formed whereby a portion of
the web is distorted downwardly and the end por- 5
tion of the ribs distorted laterally to form the
end seal.

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