

Dec. 1, 1931.

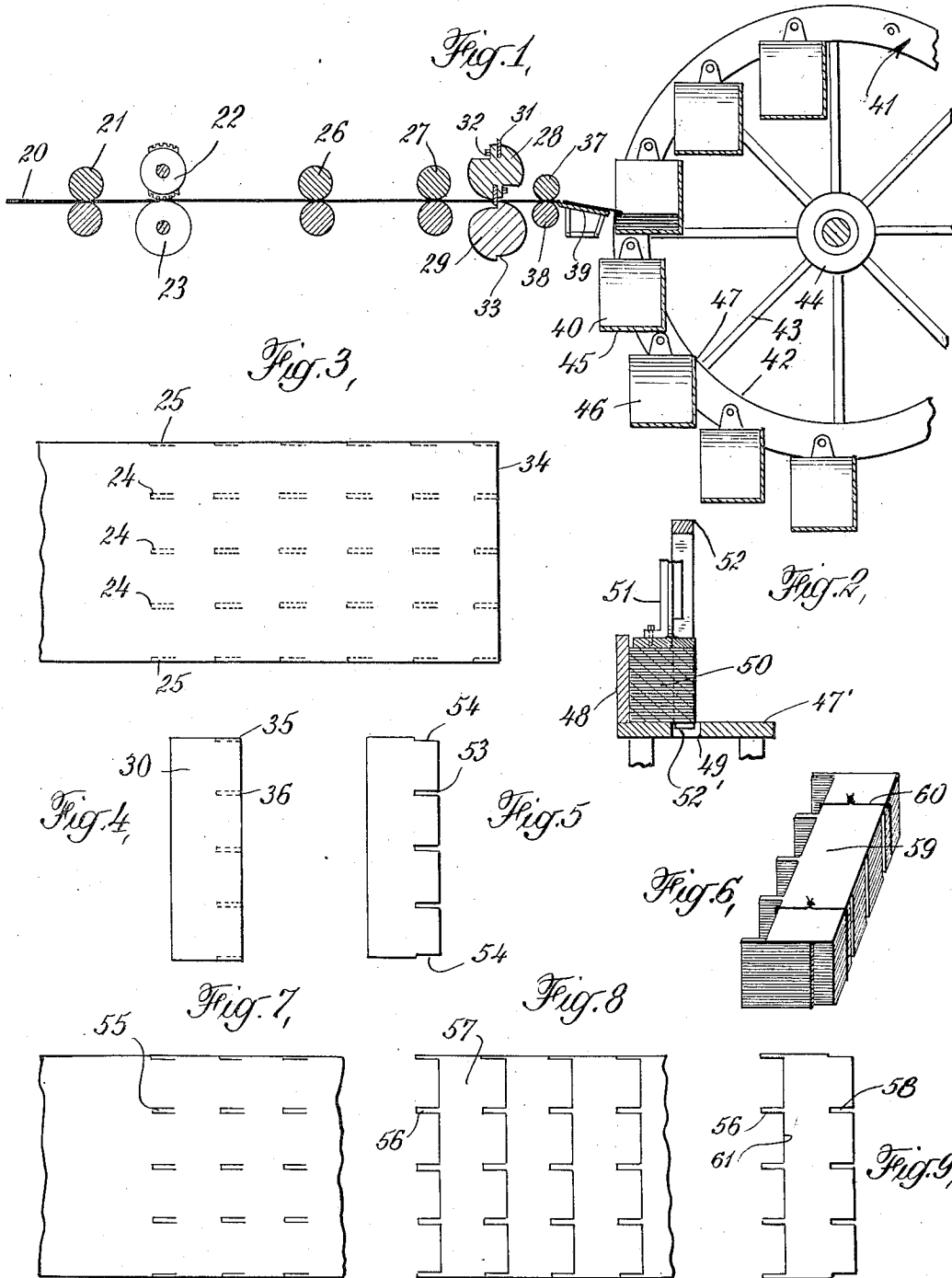
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1,834,004

METHOD OF PRODUCING SHINGLE STRIPS

Filed Nov. 28, 1925

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 10,

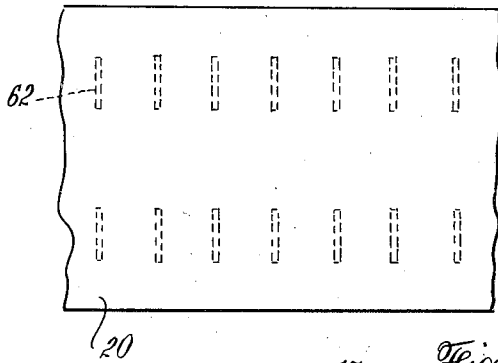


Fig. 11,

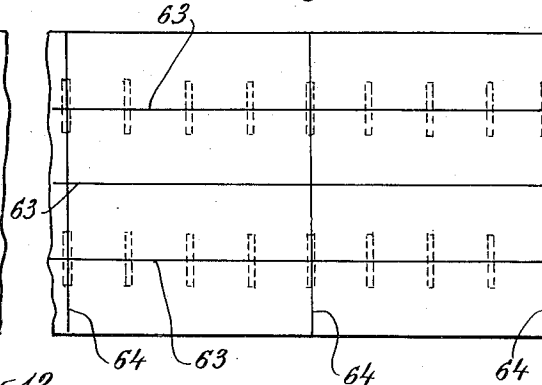


Fig. 12,

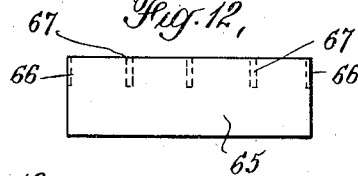


Fig. 13,

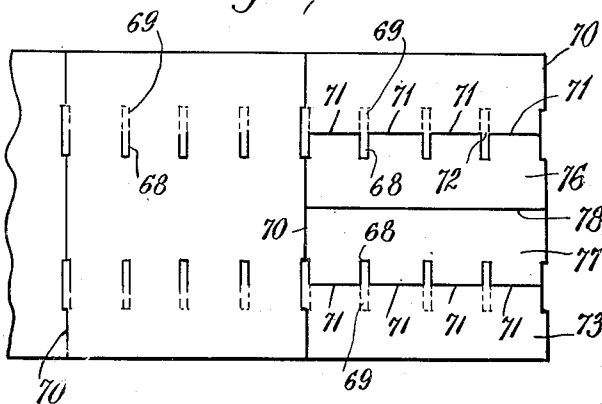


Fig. 14,

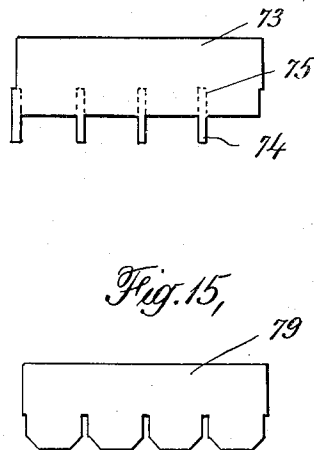


Fig. 15,

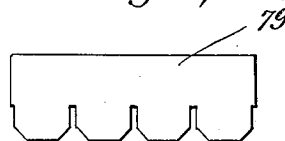
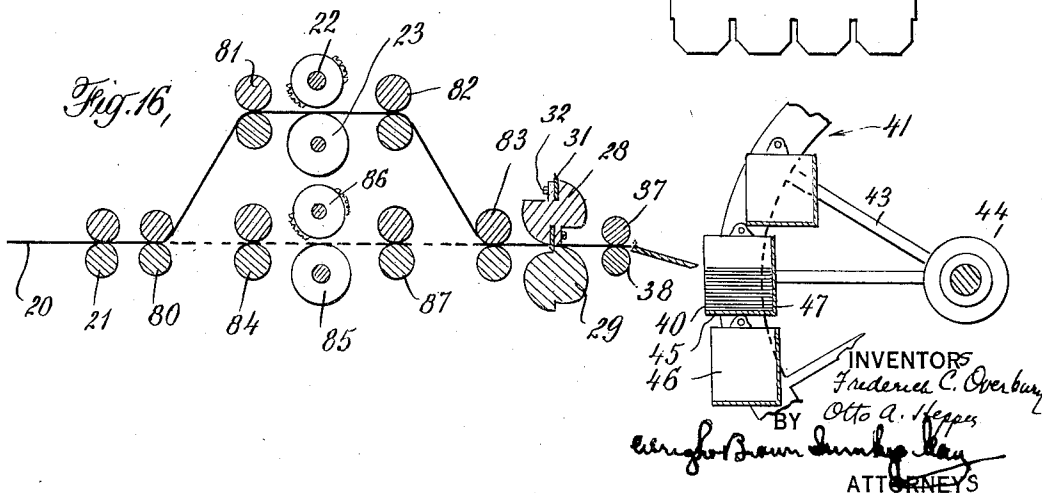


Fig. 16,



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UNITED STATES PATENT OFFICE

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METHOD OF PRODUCING SHINGLE STRIPS

Application filed November 28, 1925. Serial No. 71,914.

This invention relates to the manufacture of shingle strips, and provides a novel method by which such strips may be formed or cut from a web or sheet of prepared roofing material.

Prepared roofing material now in common use consists of a felt or paper made of rags, asbestos, or other like material, saturated with waterproof compounds of which asphalt or similar bituminous products are the most common examples. On one face of the saturated web is usually applied a coating of asphalt, which has a higher melting point than that used as the saturant, and over this coating a surface of crushed slate or other mineral material is applied by being partially embedded in the coating while the latter is still in the plastic condition. Owing to the character of the material, and especially to the gummy nature of the saturant and coating compositions, cutting the material into shingle strips is a difficult operation. In the manufacture of these strips, the common practice is to remove pieces from the sheets so as to form slots, which are to extend inwardly from one edge of the finished strips so that when the strips are laid in overlapping courses in the usual way, the slots or cut-outs define spaced tabs which have the appearance of single shingles. These slots are usually long and narrow, and it is a difficult matter to remove the excised material cleanly from the web.

The two methods of cutting shingle strips from a web involve the cross cutting or lengthwise cutting of the web. By the first operation, the finished strip has a length which is the same as the width of the felt sheet from which it is formed, (or, if a sheet of double width is employed, one-half of the width of such sheet) while by the second, a plurality of strips, usually four, are formed so as to lie side by side with their long axes parallel to the long axis of the web. In the formation of each of these kind of strips, the slots are made in the web before the shingles are completely severed, or are completed by the final cut by which the strip shingles are severed from the sheet.

The methods heretofore employed for

slotting the sheet or web to produce "cut-outs" which later define shingle tabs along the edge of the strip, have involved the attempted removal of the waste piece outlined by the edges of the slot prior to the severance of the shingle strip from the web. The cutting of the slot is usually done in one or more cutting operations performed by devices of appropriate form, although by one method which is in common use, the preliminary cutting of the web defines only three sides of the waste piece to be removed, and the knife which severs the strips from the end of the web cross-wise of the latter, at the same time completes the cut which outlines the waste piece. Regardless of what particular method is used, however, the usual practice up to the present has been to attempt to remove the waste pieces to form the slots prior to the completion of the finished strip, and when a failure of the mechanism occurs, these waste pieces remain in place and are carried along with the strips. Injury to the finished product is thus likely to result when the waste or cut-out pieces are removed by the workmen, and in some cases, the waste pieces lie on the faces of the strips and when the strips are stacked, these pieces cause the strips to be indented. In either case, an inferior product results.

In the formation of shingle strips cut lengthwise of the web, the methods of producing the slots are in general similar to those above described, although there may be slight differences in the cutting mechanism used. In this case, as before, however, the attempt is made to remove the waste pieces prior to the final severance of the shingle strips from the web, or their separation from each other, and when the mechanism fails to remove the cut-outs cleanly the difficulties previously mentioned are encountered.

The present method and apparatus constitute an improvement over the methods and apparatus as heretofore used, and according to the new method, no attempt is made to form slots or notches in the web by the removal of waste pieces prior to the formation of the completed shingle strip. On the contrary, this new method involves

the outlining of the waste pieces in the sheet in such a way that these pieces may be carried along through the following steps of the process and at an appropriate time may be easily removed, preferably after the strips have been cut from the web and have been stacked ready for bundling. In outlining the waste pieces of the sheet, various devices may be used, as, for instance, the web may travel forward through cutting devices of appropriate form having cutting edges which are notched or interrupted, these cutting devices having a form corresponding to the form of the waste piece to be cut out, and making slits, perforations or holes in the sheet along the line of the waste piece. After such treatment, the web, perforated and thus weakened along the outline of the waste piece, is next acted on by devices which cut the shingle strips from the web. In case these strips are to be crosscut, a device is used which cuts transversely of the web, and makes the cuts at intervals corresponding to the width of the finished strips. When the strips are to be cut lengthwise of the sheet, this device operates less frequently so that the cuts made by it are spaced apart a distance corresponding to the length of the shingle strips. The formation of the strips lengthwise further requires that the web be slit longitudinally and this slitting action may be carried on by devices of the usual type placed either before or behind the cross-cutting mechanism.

The strips formed in the manner above described are collected by suitable mechanism in groups corresponding in number to the number of shingle strips in the usual commercial package. These shingle strips have the same general outline as the final product, but contain waste pieces which are removed to complete the strips. This removal may be done by devices of different kinds, depending on the manner in which the pieces are attached to the strips, and may take place either before or after the group of strips has been bundled together in the final package.

The apparatus by which the new method may be practiced, includes not only cutting devices of suitable form and construction for outlining the waste pieces in the web, and for severing the strips from the web, but also mechanism by which the severed strips may be delivered under complete control to a stacking device where the strips are collected in groups corresponding to commercial bundles. From the stacking mechanism, these groups of strips are taken to devices of convenient construction by which the waste pieces may be removed, after which the strips are bundled. In some cases, the strips are first bundled and thereafter the waste pieces are removed. It will be seen, however, that

in each case no attempt is made to remove the waste pieces completely from the web, prior to the severance of the shingle strips therefrom and consequently these waste pieces remain in position in the plane of the strip and cannot do damage to the finished product.

In the accompanying drawings there are illustrated different features of the invention, and

Fig. 1 is a view partly in section, and largely conventional, of apparatus for practicing the preliminary steps of the method,

Fig. 2 is a sectional view of a portion of the present mechanism, by which the waste pieces are removed from the strips,

Fig. 3 is a plan view of a portion of the web showing the action of the cutting devices illustrated in Fig. 1,

Fig. 4 is a plan view of a cross-cut shingle strip with the waste pieces in position,

Fig. 5 is a similar view showing the waste pieces removed,

Fig. 6 is a view in perspective of a bundle of strips tied together, prior to the removal of certain of the waste pieces,

Fig. 7 is a view of a web showing the action of a different type of cutting mechanism,

Fig. 8 is a view showing the action of the cross-cutting devices on the blank illustrated in Fig. 7,

Fig. 9 is a view of a shingle strip detached from the web by the cross-cutting devices, the action of which is illustrated in Fig. 8,

Figs. 10 and 11 are plan views of portions of the web showing the action of the perforating, severing, and slitting devices,

Fig. 12 is a view of a single lengthwise strip having the waste pieces in place,

Fig. 13 is a view of a portion of the web, showing the action of modified types of cutting mechanism,

Fig. 14 is a view of a shingle strip produced by the devices, the action of which is illustrated in Fig. 13,

Fig. 15 is a view of a different type of strip which may be made by the present method and apparatus, and

Fig. 16 is a view of a modified form of apparatus partly in section, this apparatus being designed to produce strips of different types.

Referring now to the drawings, the production of cross-cut shingles will first be described. The web shown at 20 enters the cutting mechanism from the left in Fig. 1, and from any convenient source of supply. Ordinarily the cutting mechanism is placed at the end of the roofing machine and the web which enters the machine is of raw felt, and the web passing through the machine is first saturated, then coated, and finally given its grit surface. In the present illustration the cutting mechanism is shown as placed at the end of the roofing machine, so that the web 20 entering the cutting mechanism, is the

finished prepared roofing, but if desired the preliminary cutting mechanism may be placed so as to act on the raw felt prior to saturation, or it may be placed to act on the felt at any convenient stage in its travel through the roofing machine.

The web first passes between a pair of driven feed rolls 21, of conventional type, and then is led to driven perforating rolls 22, 23. The upper roll is provided with perforating knives arranged in diametrical pairs and acting on the material as illustrated in Fig. 3. The upper roll contains five pairs of such knives placed in proper spaced relation lengthwise. The lower roll 23 has a hardened surface, and may be made either continuous or in sections, each section forming an anvil surface against which the perforating knives act. The web passes between these co-acting cutting rolls and is there given a row of transverse U-shaped cuts 24, as shown in Fig. 3. The cuts 25, 25, at the edges of the web are of L-shape, and all of the cuts consist of a row of perforations which are short slits forming the desired outline. Other forms of cutting devices may similarly be used, but in each case the purpose is to form cuts which are not continuous, but which serve to define a portion of the outline of the piece which is left attached to the strip and then later removed.

Passing from the co-acting cutting devices, the web next passes between pairs of driven guide rolls 26, 27, which advance the web and also keep it taut and under control, the last pair being close to a pair of co-acting cutting rolls 28, 29. These cutting rolls are arranged to sever pieces from the web of the general shape shown at 30 in Fig. 4. The upper roll is provided with projecting blades 31, mounted in radial slots by means of bolts 32, while the lower roll has notches 33 formed in its periphery, into which the ends of the blades may project. As the rolls are rotated, the knives 31 pass through the web and enter the notches 33, thus severing the web transversely. The cutting rolls 28 and 29 are so timed with reference to the travel of the web and the formation of the U-shaped perforations in it, that the transverse cut, as illustrated at 34 in Fig. 3, connects the ends of the U-shaped cuts 24 so that the pieces 30 severed from the web by the action of the cutters, have the general dimensions of the finished product but the waste pieces 35, 36 still remain in place in the strip, being held there by the portions of the web which have not been cut through by the action of the perforating knives.

Beyond the cross-cutting knives 28, 29 are guide rolls 37, 38, which grip the end of the strip before it has been completely severed from the end of the web, thus retaining control of the severed piece after such severance. The strip is delivered from these guide rolls upon an inclined support which may be

formed either as a table or a conveyor of suitable design, indicated conventionally at 39, whence it passes into one of the baskets or holders 40 on the stacking wheel or conveyor generally designated 41.

This stacking wheel or conveyor may be similar in construction to an ordinary ferris wheel, the baskets or holders being suspended between spaced rims 42, which are in turn supported on spokes 43 from a central hub 44. Each basket is arranged to hold a number of strips corresponding to the number in the finished bundle, as, for example, 56, and as each strip is delivered from the guide rolls 37, 38, into a basket, the main stacking wheel is advanced by an amount corresponding to the thickness of the strip. Thus the strips are delivered one upon another into the baskets until the latter are filled, at which instant the wheel is advanced by a long step sufficient to bring the next basket above into position with reference to the table. The baskets have thin bottom plates 45, and side and back plates 46, 47, so that the strips delivered into the baskets are stacked in proper registry. For this purpose the forward edge of the side walls 46 may be made slightly flaring so as to center the strips properly as they are delivered into the baskets.

The mechanism for driving the stacking wheel is not illustrated, but may be of any conventional type having either an intermittent movement consisting of a succession of steps, each of which corresponds to the thickness of a shingle strip, followed by a long step sufficient in amount to bring the next basket into proper relation to the table 39, or else the wheel may be given a slow continuous movement at the proper rate, followed by a more rapid step movement, whenever a basket is filled.

As the stacking wheel revolves, the filled baskets come to a position where the bundles may easily be removed by workmen, and these bundles are next taken to a machine by which the waste pieces may be removed.

A machine by which such removal of waste pieces may be easily carried on is illustrated in diagrammatic form in Fig. 2. This machine includes a table 47', having a back guide 48 and having openings 49, corresponding in position to the position of the waste pieces in a shingle strip. A bundle of strips 50 is placed on the table with the waste pieces above the openings, and above the table is mounted a reciprocating member 51, which can be lowered in position so as to bear against the top of the bundles and hold the shingle strips against movement. Associated with the member 51 is another reciprocating member 52, which has punches 52' corresponding in shape and position to the shape and position of the waste pieces. In the operation of the machine, the member 51 is first lowered against the top of the bundle of

strips and holds these firmly in place, whereupon the member 52 moves downwardly and the punches bear against the perforated waste pieces and force them down through the openings in the bottom of the table. This is a comparatively simple operation, owing to the fact that the felt along the outline of the waste pieces has been previously weakened by the perforations. After this action of the machine, the package of strips is removed and bundled in the usual way.

The finished strip is shown in Fig. 5, and this strip has notches 53 intermediate its ends and has notches 54 at either end. These correspond to the waste pieces 36 and 35 respectively, shown in Fig. 4.

Another simple method of removing the waste pieces similar to that above described, but differing therefrom in detail, is illustrated in Figs. 6 to 9. This method involves the cross-cutting of the shingles from the web, and in the first step the waste pieces are defined by continuous cuts on three sides, as shown at 55. These cuts are formed in rows spaced apart the width of the finished strip, and are made by cutters similar to 22 and 23, but having continuous rather than interrupted cutting edges. The web passes from the first cutters to the cross-cutting cutters, which are similar to those designated 28 and 29, except that the cross-cutting knife 31 is interrupted so that the waste pieces 56 remain attached to the body of the strip 57. The strip which results from the action of the two cutting devices is illustrated in Fig. 9 where it will be seen that the strip has cut-out notches 58 in one edge and projecting pieces 56 from the other.

These strips are delivered to the stacking mechanism and are then collected in the desired quantities and bundled together as shown in Fig. 6, having a board 59 on either face and being held together by wire ties 60. This package or bundle is then placed in a suitable press or cutting mechanism, similar to that illustrated in Fig. 2, and the projecting waste pieces 56 are then easily removed. This latter method is in some respects preferable to that previously described, in that it is not necessary that the projecting waste pieces 56 should be cleanly removed from the main body of the shingle strips since the edge 61 from which these pieces project is the edge of the strip which is covered when the latter is laid in place, and consequently it is not essential that this edge should be perfectly clean.

In Figs. 10 to 12, inclusive, there is shown the adaptation of the present method to the manufacture of lengthwise cut shingles. In Fig. 10 is shown a web 20 in which are formed two lengthwise rows of outlined waste pieces 62. The waste pieces of each row are in line transversely of the web, and in the illustration the waste pieces of each

row are of the same dimensions. If desired, other arrangements of the waste pieces may be used. For example, there may be formed a central row with outer rows of pieces of half the length of those of the central row. Whichever arrangement is employed, as the web passes through cutting mechanism similar to that previously described, the waste pieces are simply perforated or their outlines weakened by suitable cutting devices. As the web so acted upon continues through the machine, it is slit lengthwise by rotating slitters of suitable form along lines designated 63. The outer slits intersect the waste pieces, as illustrated, while the central slit divides the web along its median line. The cross-cutting devices cut the web transversely along lines 64, these cuts passing through a pair of waste pieces arranged in line transversely of the web. It is immaterial whether the cross-cutting or the slitting occurs first, but as a result of these operations there are produced strips 65, shown in Fig. 12, in which one edge of the strip has waste pieces 66, 67, outlined by perforations. Four such strips are formed at each operation of the transverse cutting device, and are delivered to the stacking mechanism from which they are removed in bundles to the machines by which the waste pieces may be removed.

In the method as shown in Fig. 13, a somewhat different type of cutting mechanism is used for outlining the waste pieces. One end of the cutting mechanism makes an uninterrupted cut, as shown at 68, while the other end makes an interrupted cut 69. The cross-cutting device does not have a straight line blade, but this blade makes a cut as shown at 70 in Fig. 13, where it will be seen that the cut passes around one edge of each of the waste pieces in line with the cut instead of passing through their centers, as was the case with the cut shown at 64.

The two outer slitters have interrupted blades so as to cut the web between the waste pieces, while not cutting the latter, this is, the slitters cut the parts 71, but do not cut at 72. As the pieces are then delivered to the stacker, the outer strips 73 have projecting waste pieces 74 held in place by portions 75, which are perforated along their outline, while the inner strips 76, 77, are the finished product, with no waste pieces in place. It is to be understood of course that the central slitter makes a continuous slit, as shown at 78. Upon removal from the stacking mechanism the inner strips 76 and 77 are finished and may be bundled for commercial distribution, while the outer strips 73 must have the waste pieces removed by operations previously described.

In Fig. 15 there is shown a slightly modified form of strip 79, in which the waste pieces to be removed have a different shape than those previously illustrated. Strips such as

these can easily be made in accordance with the present method by the use of cutting devices of appropriate form.

In Fig. 16 there is shown a modified form of the apparatus in which two sets of cutting mechanism are employed. The web 20 enters between a pair of feed rolls 21, thence through a pair of guide rolls 80. The web may then pass upwardly to upper guide rolls 81, thence through coating cutting devices 22, 23, as previously described, and then it passes through guiding and feeding rolls 82 down to a similar pair of rolls 83 and thence to the co-acting cutting devices 28, 29, to the stacking mechanism. Instead of passing upwardly to the upper cutting devices, the web may pass directly from the guiding and feeding rolls 80 to similar rolls 84, thence to a lower set of cutting devices 85, 86, from which it passes through guiding and feeding rolls 87 to the rolls 83 and the cutting devices 28, 29, as before. With this arrangement, shingles of different kinds may readily be produced without the necessity of dismantling the cutting mechanism and replacing it with other cutting devices of the proper shape. The cutting devices of the upper and lower rolls are of two different kinds, and the web is led through whichever of these devices will produce the shingle strips of the desired type.

It will be seen that in the manufacture of shingle strips by the method and apparatus herein described, the individual strips severed from the web have the same general outline as the completed strips, but the severed strips contain waste pieces which must thereafter be removed in order to complete the finished product. The difficulties encountered heretofore in the manufacture of strip shingles reside largely in the removal of the waste pieces from the web, owing to the gummy and sticky character of the latter. It will be understood that the cutting operations must be carried on while the web is still somewhat above ordinary atmospheric temperature and the saturating and coating compounds are therefore in a semi-plastic state. Also, the action of the cutting devices on the web causes these compounds to soften and it is difficult to make a clean cut through the saturated fabric material and at the same time remove the piece outlined by the cut. Incomplete removal of these waste pieces, as has been pointed out, results in waste, due either to injury to the strip caused by the workmen in pulling the waste pieces free, or else to indentations made in the faces of the strips when the waste pieces are retained through the stacking operation. By the present method such waste is entirely avoided, because the outlining of the waste pieces does not result in their complete severance. These pieces are partially severed, but still remain attached to the main body of the web

and later to the individual shingle strips severed therefrom. The attachment is sufficient to prevent the waste pieces from doing any injury whatever to the final product and after the strips are severed the removal of the waste pieces due to the previous partial severance may be carried on without difficulty. The new method does not require elaborate equipment, and the articles which are produced by it are all of first quality.

We claim:

1. A method of producing shingle strips from a sheet or web of prepared roofing material, each finished strip having notches cut in one edge to define a plurality of spaced tabs, which comprises weakening the web along the outlines of a plurality of pieces eventually to be removed to form the notches, the serving individual strips from the web which have attached thereto the pieces previously outlined, collecting the strips into a bundle, and thereafter completely detaching the outlined waste pieces from the bundled strips.

2. A method of producing shingle strips from a sheet or web of prepared roofing material, each finished strip having notches cut in one edge to define a plurality of spaced tabs, which comprises partially outlining in the web a plurality of pieces eventually to be removed therefrom to form the notches, cutting the web transversely and longitudinally to form individual strips to which the partially outlined pieces are attached, and finishing the strips by detaching the partially outlined pieces from the strips.

In testimony whereof we affix our signatures.

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