Nov. 6, 1923. 1,473,377

S. M. LANGSTON

MACHINE FOR CUTTING COMPOSITION SHINGLES

Filed July 28, 1922 2 Sheets-Sheet 1

Fig. 1.

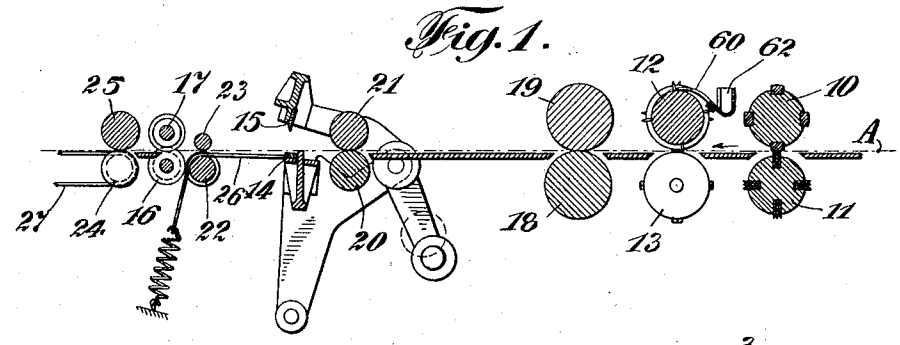


Fig. 2.

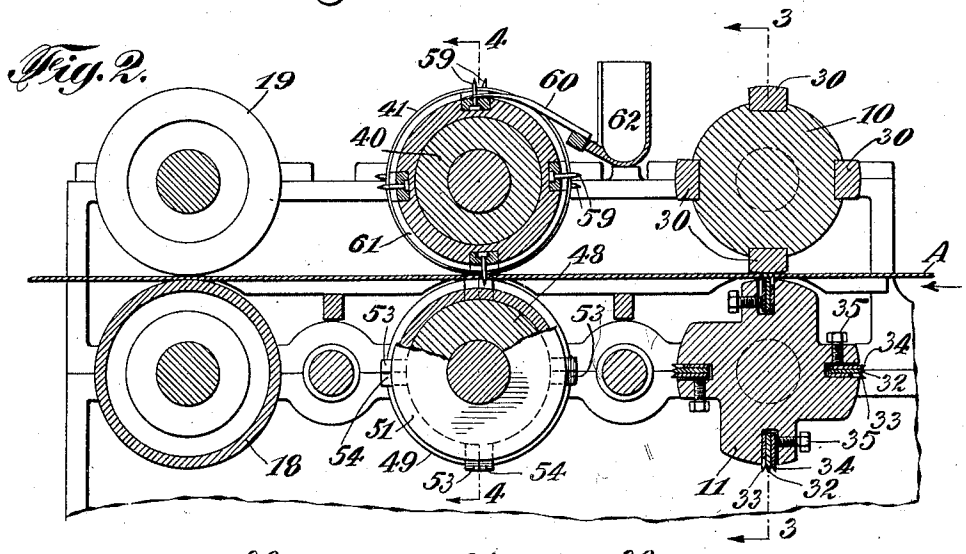


Fig. 3.

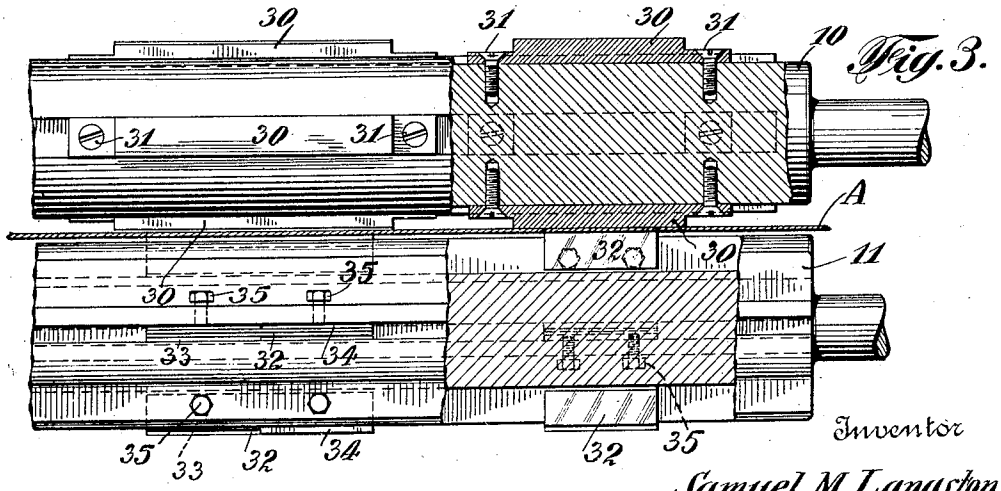
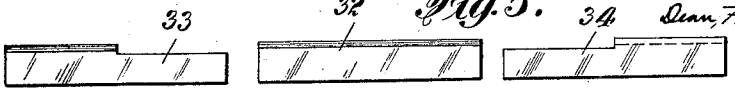


Fig. 5.



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MACHINE FOR CUTTING COMPOSITION SHINGLES

Filed July 28, 1922. 2 Sheets-Sheet 2

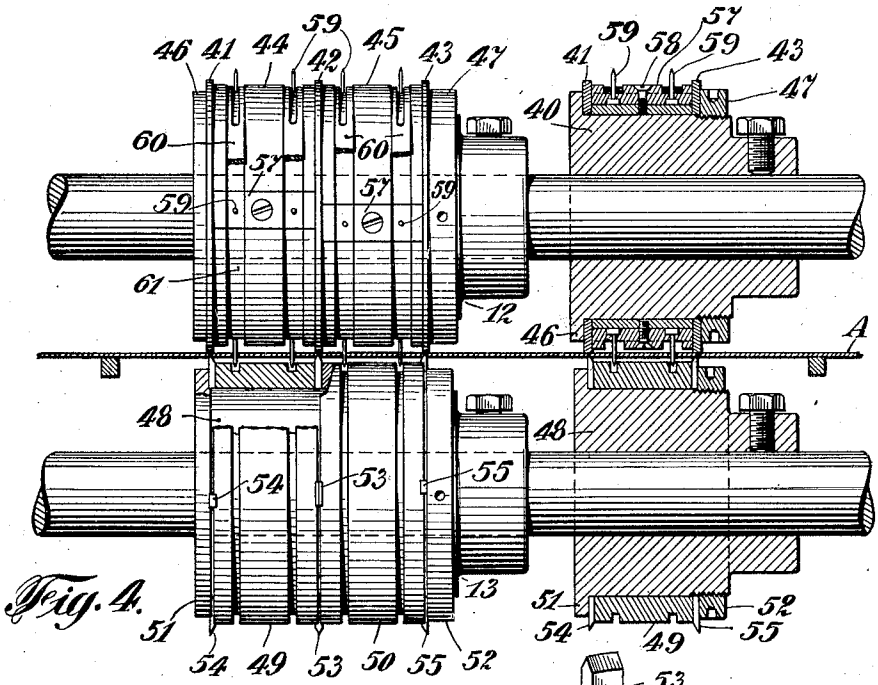


Fig. 4.

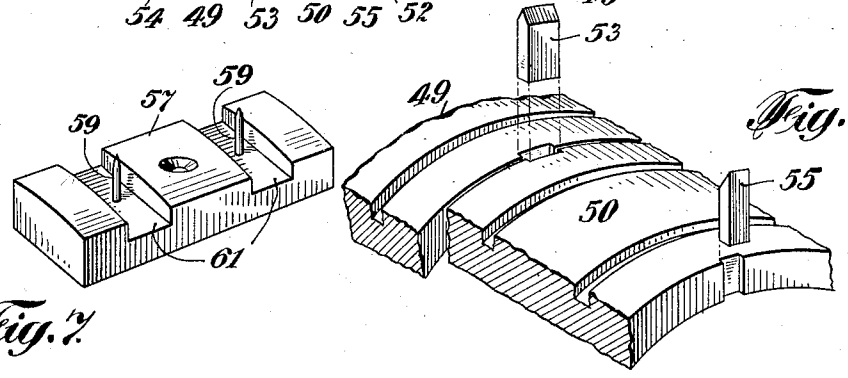


Fig. 7.

Fig. 6.

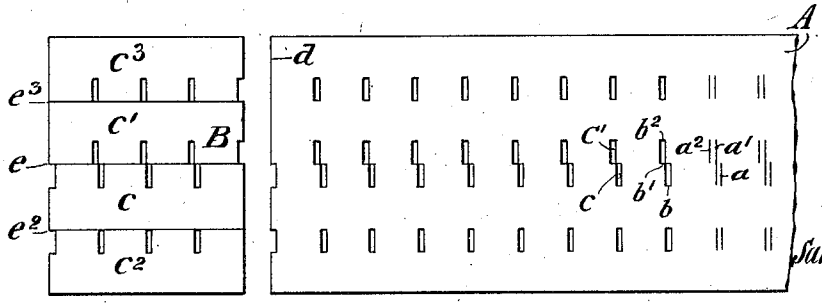


Fig. 8.

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UNITED STATES PATENT OFFICE.

SAMUEL M. LANGSTON, OF WENONAH, NEW JERSEY.

MACHINE FOR CUTTING COMPOSITION SHINGLES.

Application filed July 28, 1922. Serial No. 578,172.

To all whom it may concern:

Be it known that I, SAMUEL M. LANGSTON, a citizen of the United States, and resident of Wenonah, in the county of Gloucester and State of New Jersey, have invented certain new and useful Improvements in Machines for Cutting Composition Shingles, of which the following is a specification.

This invention is a machine for cutting up sheet material, the preferred embodiment hereinafter described being designed primarily for cutting sheets of roofing material into strips each having notches or recesses in a longitudinal edge thereof which subdivide into sections simulating individual shingles, the portion which is exposed when the strips are laid in overlapping relationship on the roof.

There are many advantages secured by so cutting the sheet that the strip extends lengthwise of the sheet instead of transversely thereof, but if a row of the apertures in the sheet which correspond to the desired slots or notches in the finished strips, open out at the side edges of the sheet, the corners or edges of the portions between adjacent notches or slots are liable to catch on parts of the machine and either bend or tear the sheet or interfere with the rapid endwise feeding of the sheet. Furthermore, the shingle strips as laid in forming a roof have the ends of the tabs or individual portions exposed, while the opposite longitudinal edge of each strip is concealed beneath the strip or strips of the next row. As the original edges of the sheet are often somewhat irregular, it is desirable that said original edges form the non-slotted or concealed edge of the strip rather than the edge of the strip formed by the ends of the tabs which are exposed. In other words, it is desirable that all of the exposed edges be accurately cut in order that uniformity and regularity in appearance may be produced. From the standpoint of simplicity of the machine it is important that the transverse cuts between adjacent strip ends be along straight lines extending the full width of the sheet whereby either a plurality of the finished strips are severed from the body of the slotted sheet by a single straight line cut, or the sheet is severed into sections which are later slitted lengthwise into finished strips.

In order that there may be the proper notch or recess between the individual shingle simulating portions of two strips which abut when laid, a half-width slot may be formed at each end of each strip, or a full-width slot may be formed at one end only of each strip. The latter is desired by many purchasers or users, and possesses certain advantages, but if this design be used it is important to have all of the strips with the terminal notch or slot at the same end, rather than having some rights and some lefts.

The main object of my invention is to provide cutting means so designed as to form a series of apertures arranged in rows lengthwise of the sheet, and intermediate of the side edges thereof, the apertures being so positioned and arranged that when the sheet is slitted lengthwise to intersect said rows and cut transversely along straight lines there will be produced shingle strips each having notches or recesses along one longitudinal edge thereof, and all having a full width slot or recess at one and the same end of the notched edge, and with all portions of the notched edge formed by accurately positioned cuts.

I secure this object by so designing and positioning the cutters that certain or all of the apertures formed in the sheet are arranged in two rows lengthwise of the sheet, each aperture of one row having one corner registering with one corner of an adjacent aperture in the other row. In other words, the two apertures of each pair are on opposite sides of a line extending lengthwise of the sheet, and also upon opposite sides of a line extending transversely of the sheet. The sheet is thereafter cut transversely along certain of said transverse lines, and along said longitudinal line, so that certain of the apertures come at the corners of the strips into which the sheet is sub-divided.

Further objects of my invention are to provide improved means whereby the aforementioned cutting action may be secured, and to provide improved means whereby the severed pieces may be removed from the sheet and the various parts adjusted to vary the size, proportion and positioning of the slits and parts cut out.

In the accompanying drawings I have illustrated one embodiment of my present invention, which is also one embodiment of the invention broadly claimed in my Patent

1,462,138, issued July 17th, 1923, but it will of course be obvious that various changes in the construction and arrangement of the parts may be made within the scope of my invention. In these drawings:

Fig. 1 is a vertical longitudinal section showing diagrammatically certain of the essential operating parts of the machine.

Fig. 2 is a section similar to a portion of Fig. 1, but on a very much larger scale.

Figs. 3 and 4 are transverse sections on the lines 3—3 and 4—4 respectively of Fig. 2.

Fig. 5 shows the knives employed in making certain of the transverse slits.

Fig. 6 is a perspective view of a portion of one of the members showing the knives for making the longitudinal slits.

Fig. 7 is a perspective view of a part of the tab-removing mechanism, and

Fig. 8 is a plan view of a sheet showing the successive cuts formed therein by the machine.

In the form illustrated there is provided a pair of rotary coacting members 10 and 11 which are provided with cutting means to effect certain transverse slits a, a' and a^2 in a sheet A of prepared material. In making shingle strips this material is ordinarily of paper, felt, asbestos, or other sheet material saturated or coated with a waterproofing material, and coated on one surface with a fire-proofing mineral substance such as crushed slate, sand, or the like. The sheet then passes between a pair of rotary coacting members 12 and 13 which cut longitudinal slits b, b' and b^2. The two sets of rotary members are so adjusted and positioned that the set or group of slits produced by one pair of rotary members registers with those produced by the other pair of rotary members to define apertures or slots c and c'. Suitable apparatus hereinafter described operates to remove the pieces circumscribed or defined by the slits. The sheet then passes between a pair of coacting members 14, 15, which act to cut the sheet into sections B and along properly spaced transverse lines d which register with the transverse slits a'. The sheet then passes between a pair of rotary members or slitters 16, 17 which cut each section along the line e connecting the slits b', and thus subdividing each section into the final roofing strips C and C'.

Any suitable sheet feeding means may be employed, as for instance a pair of feed rollers 18, 19, a second pair, 20, 21, a third pair 22, 23, and a fourth pair 24, 25. The rollers 23, 24 are so constructed as to permit the back and forth movement therethrough of a series of supporting straps or belts 26, and they have such surface speed as to maintain the sheet taut or at least to prevent slack between the rollers 20, 21 and the rollers 22—23, and while passing between the cut-off members or chopper 14—15. The lower feeding roll 24 may have a conveyer belt 27 for delivering the finished strips. The cut-off mechanism which is illustrated somewhat diagrammatically in Fig. 1, is preferably, although not necessarily, constructed substantially as disclosed and broadly claimed in my prior Patent 1,359,076, issued November 16th, 1920.

So far as the present invention is concerned, the machine acts to form the strips C and C' which are of the same shape, and having their notched or recessed edges facing in opposite directions. Each strip has one of the recesses or apertures at one corner thereof, but due to the fact that the recessed edges face in opposite directions one strip has its corner recess or notch at the front or advancing end and the other strip has its corresponding notch or recess at the rear end.

The present invention relates primarily to the forming of the strips C, C', but in practice the use of wider sheets makes the simultaneous formation of additional strips advisable. The mechanism may cut two sets of strips C, C', slitting the sheet between the two sets, or additional strips may be formed on either or both sides of the strips C, C'.

As shown, the machine cuts an additional strip C^2 adjacent to the strip C, and with the notched edge facing in the same direction as that of the strip C, and also cuts a fourth strip C^3 adjacent to the strip C' and with the notched edge facing in the same direction as that of the strip C'. Obviously a larger number of the strips C^2 or C^3, or both, may be simultaneously formed, and separated by slits e^2 and e^3.

A preferred form of the coacting rotary members 10 and 11 which act to form the transverse slits a, a', and a^2, is shown in Figs. 2 and 3. The upper member 10 serves as a platen member and presents a hardened steel surface against which the cutters or knives on the member 11 may act. As shown, the member 10 has a body portion provided with removable hardened steel plates 30 which are of a width somewhat greater than the distance between the slits a and a^2. These steel blocks or platen plates are preferably mounted in longitudinally extending grooves in the surface of the body portion, and are secured in place in any suitable manner, as for instance by screws 31. The member 11 has a body portion provided with radially disposed longitudinally extending grooves within which the knives or cutters are removably mounted. The knives are three in number, and may be of the form illustrated in Fig. 5. A middle knife 32 has a cutting edge of a length equal to the desired slit a', while the two side knives 33 and 34 have cutting edges, each of a length equal to one-half the length of

the cutting edge of the middle knife 32. The two side knives 33—34 are preferably beveled on the sides toward the middle knife, while the middle knife 32 is beveled on both sides. The knives are of the proper thickness so that when they are clamped together in the slot, as for instance by clamping screws 35, the cutting edges of the three knives will be properly spaced in accordance with the desired distance between the slits a and a' and between a' and a^2. The half-length knives 33 and 34 are not only on opposite sides of the middle knife, but have their cutting edges opposed to opposite end portions of the middle knife. The two members 10 and 11 are rotatably adjusted so that the edges of the knives properly coact with the platen surface, and may also be adjusted to bring new portions of the platen surface into position if said surface becomes scarred, cut, or worn. I have not illustrated any specific means for effecting such adjustment, as any suitable means may be employed for this purpose. In my Patent 1,462,138, issued July 17, 1923, there is illustrated suitable adjusting means for this purpose, and there is also illustrated supports, gearing, and driving and timing mechanism which may be employed for operating the various corresponding elements of the present machine.

The pair of rotary coacting members employed for forming the longitudinal slits may be constructed substantially as shown in Figs. 2, 4, 6 and 7. The upper member 12 serves as the platen member, and includes a body portion 40 carrying three platen rings 41, 42 and 43. These have polished and hardened peripheral surfaces against which the knives on the lower member 13 engage. The two platen rings 41, 42 are separated by a spacing ring 44, and the platen rings 42, 43 are separated by a spacing ring 45. All of these rings encircle the body portion and may be clamped together and clamped to the body. A simple clamping means includes a flange 46 formed on or integral with the body at one end, and a nut 47 threaded on to the opposite end of the body. By tightening the nut, all of the ring members are clamped in place.

The lower member 13 includes a body portion 48 provided with a pair of spacing rings 49, 50. The body portion is provided with a flange 51 at one end and a threaded portion for receiving a nut 52 at the opposite end, whereby the parts may be rigidly connected. This lower member carries the knives which coact with the platen rings 41, 42 and 43 to form the slits b, b' and b^2. These knives are three in number and include a middle knife 53 for forming the slit b' and two side knives 54, 55 for forming the slits b and b^2. The knives 54 and 55 are each of one-half the length of the middle knife 53, and are not only on opposite sides thereof, but are axially displaced from opposite end portions.

For holding the knives in place, the flange 51 and the opposite side edges of the spacing rings are provided with radially extending comparatively shallow grooves within which the knives are placed. The grooves in the opposing faces of the flange 51 and the spacing ring 49 and in the opposing faces of the spacing rings 49 and 50, are each of a depth slightly less than one-half the thickness of a knife so that when the parts are clamped together the full pressure will come on the sides of the knives to retain them.

The nut 52 is not provided with any such recesses or grooves, so that it may be rotated in respect to the other parts but the several knives will prevent any relative rotation of the spacing rings in respect to the body portion, and thus the knives will have proper and permanent relative positions.

Means are provided for removing the pieces which are circumscribed by or cut out in forming the several slits a, a', a^2, and b, b' and b^2. As shown, each of the spacing rings 44, 45 of the upper member 12 is provided with removable blocks or plates 57, one of which is shown particularly in Fig. 7. Each block sets in a longitudinally extending groove in the surface of the ring, and is held in place in any suitable manner, as for instance by a screw 58. Each member 57 carries two or more radially extending pins 59 which are adapted to pierce the material as it passes between the members 12 and 13. The member 12 or the spacing rings 44, 45 of the latter, is so adjusted in respect to the member 13 that the pins will pierce the material between the knives 53, 54, 55, and between the slits formed by the knives 32, 33, and 34. Thus, each piece as it is severed from the sheet is forced on to a pair of the pins of the upper member 12 and as the sheet continues to advance, and the member to rotate, the piece will be removed from the sheet and carried upwardly on the surface of the member 12.

Any suitable stripping means may be employed for removing these pieces from the pins. As shown, there are provided bifurcated strippers 60, traveling in grooves 61 in the outer surface of the spacing rings 44 and 45. These grooves are wider than the pins, and extend across the blocks 57 in the same transverse planes as the pins, so that the strippers pass upon opposite sides of the pins, and within the grooves so as to be below the severed pieces. The strippers may deliver to a trough 62 or to any other suitable receiving means for the severed pieces. The platen rings 41, 42 and 43 may be rotatably adjusted by a slight loosening of the nut 47, and thus new surfaces of the platen

rings may be brought into service at any time. As only a small portion of each ring is in use at any one time, it will be obvious that platen sections of comparatively short length might be employed in place of the complete rings. Preferably the rings are made in sections so as to facilitate removal and the insertion of new ones when used or broken.

The mechanism above described is intended for forming two rows of apertures extending lengthwise of the sheet, each aperture of one row having one corner only registering with one corner of an aperture of the other row. In other words, the slit a' forms a side of the aperture c as well as of the aperture c' and the slit b' crosses the slit a' intermediate of the ends of the latter, and forms one side of each of the apertures c and c'. Thus, by means of two sets of three knives each, two apertures are formed which are independent of each other, except that they have a common corner formed by the intersection of the slits a' and b'. Substantially the same mechanism may be employed for forming additional slits for additional strips c^2 and c^3. Such mechanism may be substantially the same as that above described, except that for the lower member 11 there would be only two instead of three knives, and these would have their cutting edges of the same length as the knives 33 and 34. Also, the members 12 and 13 would have only a pair of platen rings and a pair of knives, and these knives would be of the same length as the knives 54 and 55. Thus, so far as certain novel features of the cutting mechanism are concerned, it may be incorporated in machines for forming independent rows of apertures such as those of the side strips 52 and 53.

As to most features of my invention, the parts are particularly designed for carrying out the method disclosed and claimed in my Patent 1,455,342, issued May 15th, 1923.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A machine for cutting shingle strips, from sheet material, including sheet feeding means, means for forming a plurality of slots extending transversely of the sheet and arranged in two rows extending lengthwise of the sheet, each slot of one row having one corner only registering with one corner of a slot in the other row, and means for cutting the sheet longitudinally along lines intersecting all of said registering corners, and transversely along lines intersecting certain only of said registering corners.

2. A machine for cutting shingle strips from sheet material, including sheet feeding means, means for forming two rows of apertures lengthwise of the sheet, all of the apertures in both rows having one edge thereof in the same longitudinal line, the apertures of one row being on one side of said line and those of the other row being on the other side, and each aperture of one row having one edge in the same transverse line with one edge of an aperture in the other row, the two apertures being on opposite sides of said transverse line, and means for cutting the sheet along said longitudinal line and along certain of said transverse lines.

3. A machine for cutting sheet material into shingle strips each having a notch or recess at one corner thereof, said machine including sheet feeding means, cutting means adapted to form a longitudinally extending row of transversely extending slits, certain of said slits being of twice the length of the desired notch or recess and the remaining slits being of half the length of the first mentioned slits and arranged in pairs, the two slits of each pair being on opposite sides and adjacent to opposite end portions of the corresponding one of the first mentioned slits, cutting means adapted to form a pair of longitudinally extending slits connecting the outer ends of each of the first mentioned slits with the outer ends of the second mentioned slits, cutting means for forming a longitudinally extending slit connecting the middle of the first mentioned slit with the adjacent ends of the second mentioned slits, cutting means for slitting the sheet along lines connecting the last mentioned slits in series, and cutting means for subdividing the sheet transversely along certain of the first mentioned slits.

4. A machine for subdividing sheet material into a series of shingle strips each having a notch or recess at one corner thereof, said machine including cutting means for forming a series of groups of slits, each group including a transverse slit and a pair of parallel slits, each of half the length and upon opposite sides and adjacent to opposite end portions of the first mentioned slit, cutting means for forming a second series of groups of slits each group including a longitudinal slit and a pair of parallel slits, each of half the length and on opposite sides and adjacent to opposite end portions of the said longitudinal slit, the first and second named cutting means being so positioned and adjusted in respect to each other that the ends of the slits of the two groups register to define a series of pairs of corner connecting apertures, means for cutting the sheet longitudinally to connect said longitudinal slits, and means for cutting the sheet transversely along certain of said transverse slits.

5. A machine for subdividing sheet material into shingle strips, including a pair of rotatable coacting members including a

platen member and a cutter member, the cutter member having a radially disposed longitudinally extending slot and three parallel knives secured therein, the middle knife being of twice the length of the side knives and the latter being adjacent to opposite end portions of the middle knife, whereby there is formed in the sheet a series of groups of transversely extending slits, cutting means for connecting certain of the ends of the slits formed by said rotary coacting members to form corner connected apertures, means for cutting the sheet longitudinally along a line intersecting the middle of the slit formed by the middle knife and at right angles thereto, and means for cutting the sheet transversely along lines coinciding with certain of the slits formed by said middle knife.

6. A machine for subdividing sheet material into shingle strips, including a pair of rotatable coacting members including a platen member and a cutter member, the cutter member having a radially disposed longitudinally extending slot and three parallel knives secured therein, the middle knife being of twice the length of the side knives, and the latter being adjacent to opposite end portions of the middle knife, whereby there is formed in the sheet a series of groups of transversely extending slits.

7. A machine for subdividing sheet material into strips each having a series of notches or recesses along one longitudinal edge thereof and a notch or recess at one corner, said machine including a pair of rotary members coacting to form a series of groups of slits in the sheet, each group including three parallel slits, a second pair of rotary members coacting to form a second group of slits, each slit including three parallel slits at right angles to the slits of the first mentioned group and coacting therewith to form a series of pairs of corner connected apertures, means for cutting the sheet longitudinally along a line intersecting said corners, and means for cutting the sheet transversely along lines intersecting certain of said corners.

8. A machine for subdividing sheet material into shingle strips, including a rotatable member having axially spaced platen rings and a second rotary member coacting therewith and having spaced knives presenting edges for contact with the outer surface of said platen rings, said platen rings being rotatably adjustable on said first mentioned member to bring different portions of the surface thereof into operative engagement with said knives.

9. A machine for forming shingle strips, including a rotatable platen member and a second rotatable member coacting therewith, and having three axially spaced knives having their edges extending in a circumferential direction, the center knife having a cutting edge of twice the length of the side knives, and the latter being disposed on opposite sides of and opposite to opposite end portions of said first mentioned knife.

10. A machine for forming shingle strips, including a rotatable member having a body portion, a plurality of spacer rings mounted thereon, opposed faces of said rings having recesses or notches therein, a plurality of knives mounted in said recesses or notches, and preventing relative rotation of said rings, and means for clamping said rings together to hold said knives in position.

11. In combination, a pair of members, one of said members including a body portion presenting an end flange, a spacer ring having radial recesses in opposite end surfaces thereof, knife members in said recesses and a clamping ring for holding said spacing ring against said flange and the other of said members coacting with said knives to form a series of slits in a sheet of material passing between said members.

12. In combination, a pair of members, one of said members including a body portion presenting an end flange, a spacer ring having radial recesses in opposite end surfaces thereof, knife members in said recesses, and a clamping ring for holding said spacing ring against said flange and engaging with said knife members to hold the latter in said recesses, and the other of said members coacting with said knives to form a series of slits in a sheet of material passing between said members.

13. In combination, a pair of members, one of said members including a body portion, a spacing ring encircling said body portion and having shallow radially extending slots in opposite end surfaces, knives mounted in said slots and of greater thickness than the latter, and a pair of annular members adapted to clamp said spacing ring therebetween and engage with the outer surfaces of said knives to retain the latter in said slots, and the other of said members coacting with said knives to form a series of slits in a sheet of material passing between said members.

14. In combination, a pair of members, one of said members including a body portion, a spacing ring encircling said body portion and having shallow radially extending slots in opposite end surfaces, knives mounted in said slots and of greater thickness than the latter, and a pair of annular members adapted to clamp said spacing ring therebetween and engage with the outer surfaces of said knives to retain the latter in said slots, one of said annular members being non-rotatable in respect to said body portion and having slots also receiving the adjacent knives whereby said spacing ring

is held against rotation in respect to said body, and the other of said members coacting with said knives to form a series of slits in a sheet of material passing between said members.

15. In combination, a pair of coacting members for forming a series of slits in a sheet of material, one of said members including a body portion presenting an end flange, a spacing ring encircling said body portion, a clamping ring, a pair of platens one disposed between said flange and said spacing ring, and the other between said spacing ring and said clamping ring and the other of said members having knives coacting with said platen rings to form slits.

16. In combination, a pair of coacting members for forming a series of slits in a sheet of material, one of said members including a body portion presenting an end flange, a spacing ring encircling said body portion, a clamping ring and a pair of platens, one disposed between said flange and said spacing ring and the other between said spacing ring and said clamping, and the other of said members having knives coacting with said platen rings for forming the slits.

17. In combination, a pair of coacting members for forming a series of slits in a sheet of material, one of said members including a body portion presenting an end flange, a spacing ring encircling said body portion, a clamping ring, a pair of platens one disposed between said flange and said spacing ring, and the other between said spacing ring and said clamping ring, said platens and said spacing ring being independently adjustable about the axis of said body and the other of said members having knives coacting with said platen rings to form slits.

18. In combination, a pair of coacting members for forming a series of slits in a sheet of material, one of said members including a body portion, a spacing ring encircling the same, a pair of platen rings one at each end of said spacing ring, and means acting axially of the body for clamping said rings and body together and the other of said members having knives coacting with said platen rings to form slits.

19. In combination, a pair of rotatable members having coacting means including knife and platen members for forming pairs of longitudinal slits in a sheet of material, one of said rotatable members having an annular member presenting a pin adapted to pierce the material between the slit forming means, said annular member and said slit forming means being relatively adjustable in respect to the axis of one of said first mentioned members.

20. In combination, a pair of rotatable members having coacting means for forming pairs of longitudinal slits in a sheet of material, one of said members having a body portion and an annular member encircling the same and presenting a pin adapted to pierce the material between the slit-forming means, said annular member and said body being relatively adjustable about their common axis.

21. In combination, a pair of rotatable members coacting to form a pair of longitudinal slits in a sheet of material, one of said members having a pair of spaced knives and the other of said members having an annular member provided with a pin adapted to pierce the material, said annular member and said knives being relatively adjustable to vary the position of the slits in respect to the point pierced by said pin.

22. In combination, a pair of coacting members for forming a pair of transverse slits in a sheet of material, a second pair of coacting members for forming a pair of longitudinal slits connecting said first mentioned slits to form an aperture in the sheet, one of said second mentioned members having a pair of knives and the other having an annular member provided with tab-extracting pins, said knives and pins being relatively adjustable in respect to their axes of rotation.

23. In combination, a pair of coacting members for forming a pair of longitudinal slits in a sheet of material, one of said members having a plurality of pairs of slit-forming knives and the other of said members having a spacing ring provided with a series of recesses in the periphery thereof, and pin carrying members mounted in said recesses.

Signed at Camden, in the county of Camden and State of New Jersey this 22nd day of July A. D. 1922.

SAMUEL M. LANGSTON.