April 3, 1934. J. V. JOHANSEN 1,953,680

MACHINE FOR FORMING COMPOSITION SHINGLES

Filed Aug. 22, 1932 3 Sheets-Sheet 1

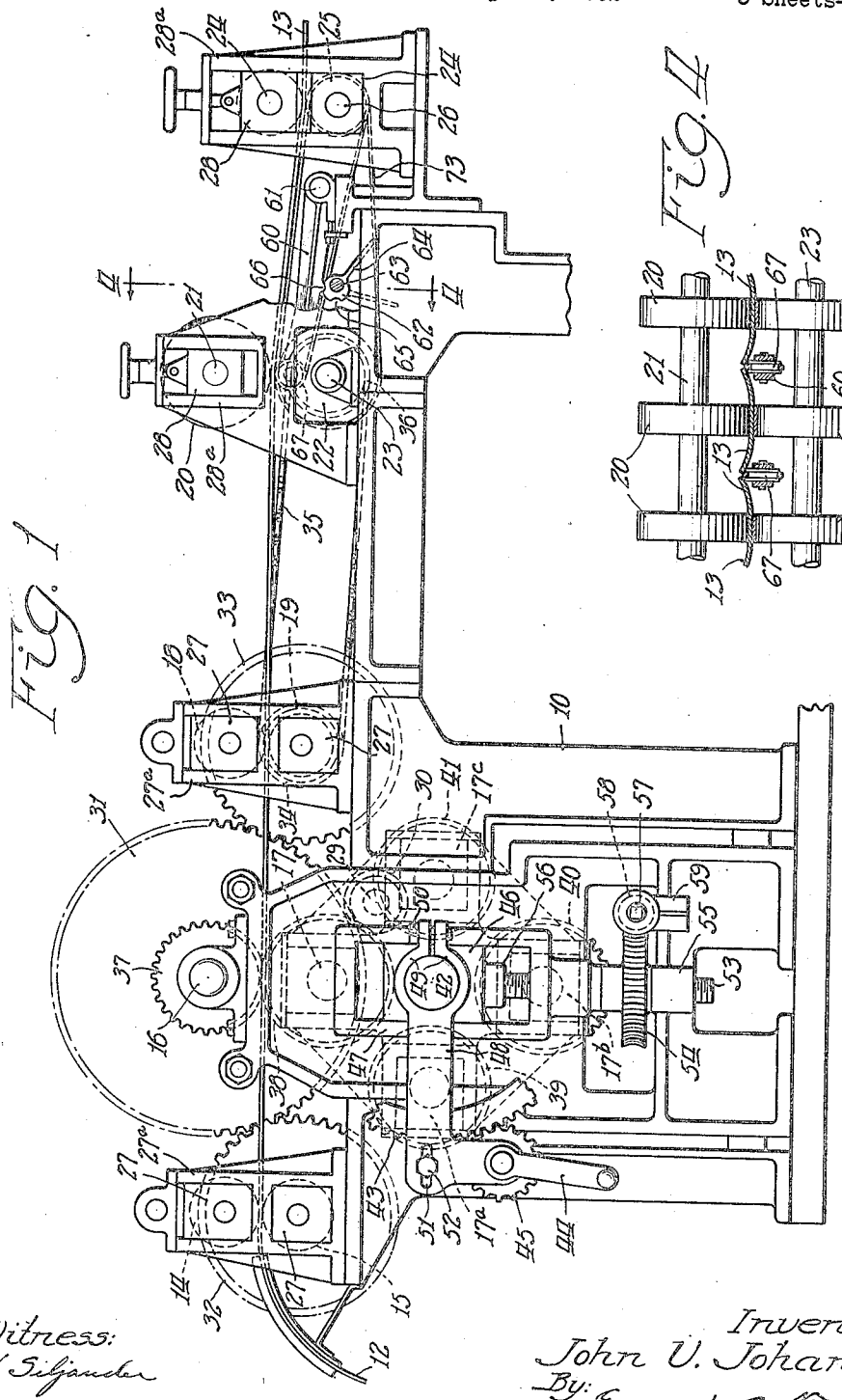

Fig. 1

Fig. 4

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Filed Aug. 22, 1932 3 Sheets-Sheet 2

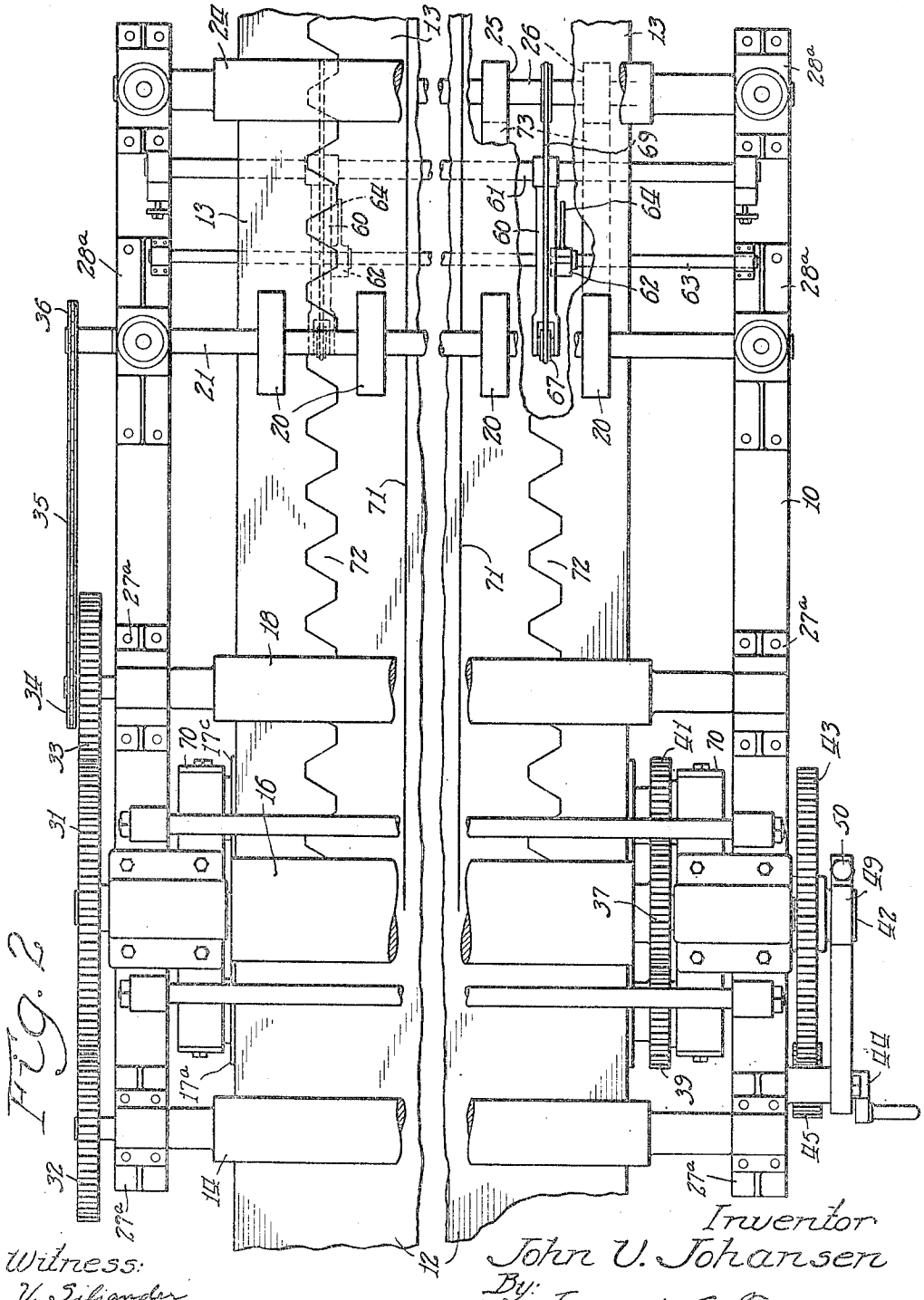

Fig. 2.

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Filed Aug. 22, 1932 3 Sheets-Sheet 3

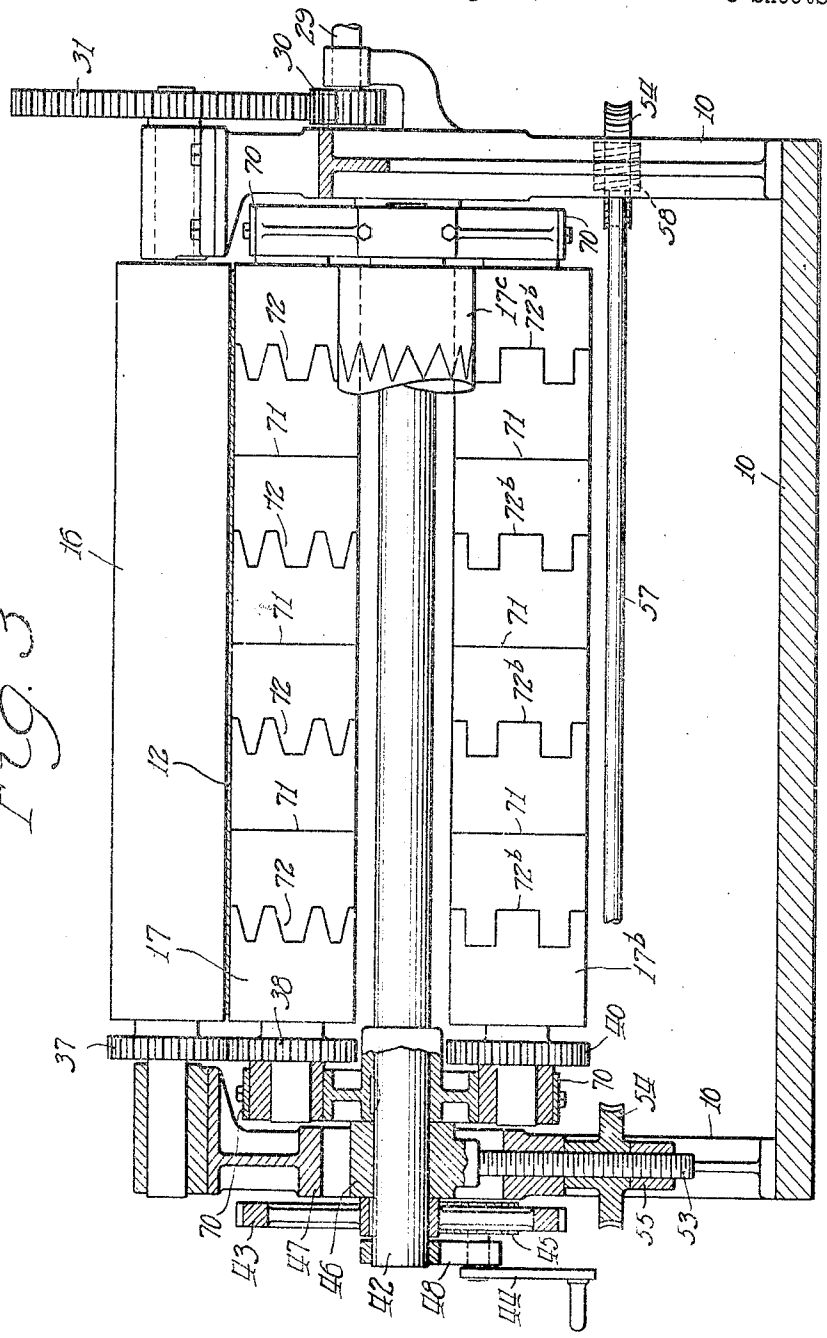

Fig. 3

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1,953,680

UNITED STATES PATENT OFFICE

1,953,680

MACHINE FOR FORMING COMPOSITION SHINGLES

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Application August 22, 1932, Serial No. 629,801

9 Claims. (Cl. 164—65)

The invention relates to roofing machines and more particularly it relates to improvements in machines providing means for advancing a sheet of roofing material and means for cutting the sheet into a plurality of shingle strips of a predetermined pattern. The pattern or configuration of the strips depends upon the arrangement of the knives mounted on the outer periphery of a cutting roller and as such machines are constructed at present a change in the design of the shingle strips requires removal of the cutting roller from the machine and the substitution therefor of a cutting roller adapted to form the desired pattern.

As such machines are now constructed the exchange of cutting rollers takes considerable time during which the machine is out of operation and the output of a machine is greatly curtailed where the change in cutting rollers is frequent as is often the case. The substitution of cutting rollers requires the attention of several workmen and also enforces the idleness of others, all of which contributes to making such a change of rollers expensive.

The invention contemplates a novel mechanism enabling an exchange or substitution of cutting rollers to be accomplished by one person in a small fractional part of the time hitherto required for its accomplishment by several, and an object of the invention is the provision of improved means for mounting a plurality of cutting rollers on machines of the kind described and for quickly shifting the same from operative to inoperative positions and vice versa.

The material sheets are passed between a driving roller and a cutting roller in a position to cooperate therewith, the cooperating rollers being spaced apart sufficiently that the knives on the cutting roller stop short of contact with the driving roller to avoid dulling their cutting edges. The knives as a result do not completely sever the material sheet and a second operation is necessary to completely sever the strips following the cutting process and another object of the invention is the provision of improved means for completing the severance of such strips.

A further object of the invention is the provision of a device of the kind described which is simple, compact, economical and satisfactory for its intended purpose. Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts,

Fig. 1 is a side elevational view of a roofing machine embodying the principles of the invention;

Fig. 2 is a plan view of the machine shown in Fig. 1;

Fig. 3 is an end view, partially in section, of the machine shown in Figs. 1 and 2; and

Fig. 4 is a view along the line 4—4 of Fig. 1.

Referring now more particularly to the drawings, the roofing machine comprises a supporting frame 10, a plurality of rollers cooperating to advance a material sheet 12, mechanism operable to actuate the rollers, means operatively connecting the rollers to actuate the same at a rate causing their cooperation in moving the material sheet through the machine, a cutting roller operable to substantially sever the material sheet along spaced apart lines of predetermined configuration and form a plurality of shingle strips 13, and means operable to completely sever the material sheet along the partially severed lines connecting the strips 13.

The material sheet 12 enters the rear of the machine where it is initially engaged and advanced by upper and lower cooperating rollers 14 and 15 respectively, then passes between an upper roller 16 and one of a plurality of cooperating cutting rollers 17, 17*a*, 17*b* and 17*c* by means of which the sheet is cut along lines providing a plurality of the longitudinal strips 13 of the desired pattern. The partially severed sheet 12 is then advanced in turn between an upper roller 18 and a lower roller 19 arranged in closely spaced cooperating relation, next between a plurality of upper rollers 20 fixedly mounted on a shaft 21 and corresponding cooperating lower rollers 22 fixedly mounted on a shaft 23, and is finally discharged from the machine as a plurality of completely severed strips 13 after passing between an upper continuous roller 24 and a plurality of lower cooperating rollers 25 fixedly mounted on a shaft 26.

Suitable adjustable bearings generally designated by the numeral 27, positioned in a frame 27*a*, provide mountings for the cooperating rollers 14 and 15 and for the cooperating rollers 18 and 19. Similarly, adjustable bearings 28, positioned in a frame 28*a*, provide mountings for the shafts 21 and 23 and for the roller 24 and the shaft 26.

The rollers and shafts are actuated and operatively connected by a system of gears driven by

a shaft 29 which is suitably connected with any source of power, not shown. The system of gears includes a pinion 30 mounted on the shaft 29 in mesh with a gear 31 fixedly mounted on the end of the upper roller 16. The gear 31 operatively engages a gear 32 which is fixedly mounted on the lower roller 15. The relative sizes of the meshing gears 31 and 32 and of the rollers 15 and 16 are such that the rollers tend to advance the material sheet 12 at the same rate. The upper roller 14 is actuated by the roller 15 through pressure exerted on the material strip 12.

The gear 31 also meshes with a gear 33 which is mounted on the lower roller 19. The diameters of the gear 33 and of the roller 19 are such as to move the material strip 12 between the roller 19 and the upper roller 18 at the same rate as the rollers 15 and 16. The upper roller 18 is actuated by the advancing material sheet 12 through pressure exerted thereon by the roller 19.

The shaft 23, carrying the rollers 22, is operatively connected with the roller 19 through a sprocket chain 35 whch operatively engages a sprocket wheel 34 mounted on the roller 19 and a sprocket wheel 36 mounted on the shaft 23. The shaft 21 and the rollers 20 carried thereby are driven by engagement of the rollers 20 with the advancing partially severed material strips 13. The forward lower rollers 25, mounted on the shaft 26, are actuated by belts 73 connecting the rollers with the rollers 22 mounted on the shaft 23. The upper roller 24 is driven by the advancing material strips 13 through the pressure of the lower rollers 25 exerted thereon through the belts 73.

The cutting rollers 17, 17*a*, 17*b* and 17*c* are each rotatably mounted upon a pair of spider frames 11 mounted on and revolvable about a shaft 42 as an axis in such a manner that rotation of the shaft successively brings the cutting rollers 17, 17*a*, 17*b* and 17*c* into operative engagement with the upper driving roller 16. Means is provided whereby rotation of the upper roller 16 correspondingly rotates the particular cutting roller in operative engagement therewith. The means includes a gear 37, fixedly mounted on the end of the roller 16, opposite to the gear 31 in a position to mesh with corresponding gears on the cutting rollers when the latter are revolved into a position to cooperate with the roller 16. The cutting rollers 17, 17*a*, 17*b* and 17*c* have gears 38, 39, 40 and 41 respectively positioned in the plane of the gear 37.

In Fig. 1 the spider frames 11, carrying the cutting rollers, are shown in the position where the gear 37 meshes with the gear 38 and actuates the cutting roller 17 at a rate wherein its periphery travels at the same rate as the periphery of the roller 16.

Rotation of the shaft 42 and of the spider frames 11, to revolve the cutting rollers 17*a*, 17*b* and 17*c* successively into cooperating relation with the driving roller 16 with their corresponding gears 39, 40 and 41, respectively, meshing with the gear 37, is accomplished by actuating a gear 43 fixedly mounted on the shaft. A pinion 45, adapted for actuation by a crank 44 is mounted on the frame 10 in mesh with the gear 43. Manual operation of the crank 44 revolves the spider frames 11 and the cutting rollers carried thereby as desired to successively bring the cutting rollers into and out of operative engagement with the roller 16. The axial shaft 42 is locked against rotation by a member 48, one end of which comprises bands 49 closely fitting the shaft 42 and adapted to be clamped thereon by means of a bolt 50. The end of the locking member 48, opposite to the bands 49, is fastened against movement by a bolt 52 extending through a slot 51 into threaded engagement with the frame 10. The shaft 42 is normally locked against rotation as described with one of the cutting rollers in operative engagement with the roller 16 and when it is desired to move another cutting roller into operative position, the bolts 50 and 52 are turned to release the member 48 and permit rotation of the shaft to any desired position where it is again locked by the member 48 by tightening the bolts 50 and 52.

The cutting rollers 17, 17*a*, 17*b* and 17*c* may all be of the same diameter and if so the corresponding gears 38, 39, 40 and 41, which respectively actuate the cutting rollers, will have the same diameter. The diameters of the various cutting rollers and their respective actuating gears may be different, if desired. I have provided adjustable mounting means whereby the shaft 42, the spider frames 11 and the cutting rollers mounted thereon may be raised and lowered to accommodate cutting rollers and gears of different diameters and to bring the driving roller 16 and the different cutting rollers into exact cooperating relation for material sheets of different thicknesses. The means for vertical adjustment of the shaft 42 and the cutting rollers carried thereby includes a pair of vertical threaded shafts 53 positioned one at each end of the shaft 42. The shafts 53 have their upper ends journalled in a hollow member 56, projecting from the lower ends of bearing blocks 46 slidably mounted in frames 47. The ends of the shaft 42 are journalled in and supported by the blocks 46. A worm gear 54, threaded on each vertical shaft 53, rests upon members 55 forming part of the frame 10. The weight of the cutting rollers, the spider frames 11 and of the shaft 42 is thereby carried through the shaft 53 and the gears 54 into the frame members 55.

The shafts 53 are raised and lowered to provide the desired space between the cutting rollers and the roller 16 by rotating a shaft 57 extending transversely through the frame 10 and supported at each end by brackets 59 mounted on the frame. A gear 58 is mounted on each end of the rod 57 in meshing engagement with the corresponding adjacent worm gear 54. The shaft 57 has projecting angular ends adapted for engagement by a socket wrench to rotate the same and thereby correspondingly rotate the worm gears 54. Since the worm gears 54 rest upon and are rotatable relative to the frame members 55, their rotation causes the shafts 53 to be correspondingly raised and lowered. The raising and lowering of the shaft 53 correspondingly raises and lowers the shaft 42 and the cutting rollers carried thereby and as a result adjustment of the device to cutting rollers of different diameters and for different thicknesses of material sheets is quickly and easily accomplished.

Either or both of the operations of exchange of rollers and adjustment of the spacing thereof from the roller 16, can be accomplished by one person in a comparatively short space of time. The device has been illustrated and described as comprising four cutting rollers successively revolvable into operative position but it is adapted for the mounting of any number of rollers thereon. Repair and replacement of the various knife or cutting sections mounted on the cutting rollers not in use can be easily accomplished while the

machine is in operation. Individual removable bearing blocks 70 on each end of the spider frames 11 permit the removal of one or more of the cutting rollers and replacement by others while the machine is in operation.

The cutting rollers 17, 17*a*, 17*b* and 17*c* are each provided with a plurality of annular knives, generally designated by the numeral 71, each operable to partially sever the material sheet along continuous longitudinal straight lines. The roller 17 is provided with a plurality of irregular shaped cutting knives 72 which provide angular cutting lines in the material sheet as shown in Fig. 2. The cutting roller 17*b* is provided with a plurality of irregular shaped knives 72*b* which will cut the material sheet along generally longitudinal continuous lines of regular pattern differing from the lines of cut shown in Fig. 2. Similarly the cutting rollers 17*a* and 17*c* are provided with knives, not shown, which will provide longitudinal strips 13 bounded by continuous longitudinal lines of cut of a different pattern from that produced by knives 72 or 72*b*.

The depths of the knives on the cutting rollers are such that they stop short of contact with the driving roller 16 to avoid dulling their cutting edges. The vertical adjusting device hereinbefore described enables the cutting rollers to be accurately spaced relative to the upper roller 16 in a position where the knives will substantially sever the material sheet 12 along the respective lines of cut leaving a thin section of unsevered material holding the partially severed strips 13 together.

The partially severed strips 13 are advanced by the machine from the cutting roller to a point just in advance of the upper rollers 20 and of the lower rollers 22 where means is provided for completely severing the strips. The severing means comprises a plurality of arms 60, each pivotally mounted on a rod 61 extending transversely to and underneath the strips 13. The arms 60 are positioned in longitudinal alignment with the cutting roller knives 71 and 72 and as a result the lines of cut formed by the knives pass immediately over the arms. The ends of the arms 60, opposite to the rod 61, are bifurcated to provide a mounting for a sheave 67. A rod 63, extending underneath and transversely to the arms 60, provides a mounting for a plurality of cam discs 62 on which the arms rest intermediate their ends. The cam discs 62 are each rotatable about the rod 63 by means of a handle 64 and are so constructed that the sheaves 67 mounted on the free end of the arms are out of contact with the material sheet 12 when the discs are in the full line position of the arms 64 as shown in Fig. 1. Lugs 66, on the underside of each of the arms 60, are adapted to enter notches 65 in the discs 62 and hold the discs against accidental rotation. The individual discs 62 are manually rotatable from the full line position of the handles 64 in Fig. 1 to the dotted line position thereof and vice versa. Movement of the discs 62 to the dotted line position of Fig. 1 elevates the free end of the arm 60 and the sheaves 67 carried thereby to a point where the sheaves contact with the partially severed strips 13 as best shown in Fig. 4. The sheaves 67 in their elevated position bend the advancing material strips 13 as shown in Fig. 4 in a manner to separate the contiguous edges of the strips and by a tensile pull sever the material connecting the strips. The sheaves 67 are rotated in a direction tending to advance the material strips in contact therewith and are each actuated by a driving belt 69 connected with a sheave 68 mounted on the shaft 26.

The individual cam discs 62 being separably operable, any number or all of the sheaves 67 may be positioned in or out of contact with the advancing material strips 13. This selective feature is advantageous in that it enables the sheaves 67 to be moved to clear the material sheet if complete severance of the sheet is not desired or the line of cut at the point of contact of the sheaves is omitted. In the construction of shingle strips it frequently happens that it is desirable to produce strips of double the normal width, in which case alternate cutting knives are omitted from the cutting rollers and the particular sheaves normally pos tioned in alignment therewith are lowered to clear the advancing material strip.

Thus it will be seen that I have provided in a machine of the class described a device enabling an exchange of cutting rollers to be quickly and easily accomplished and have also provided improved means operable to completely sever partially severed shingle strips and for movement into and out of engagement with the partially severed strips.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not w'sh to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In a machine of the kind described, a roller and a shaft rotatably mounted in spaced apart relation, a plurality of cutting rollers arranged in substantially circumferential relation to said shaft, a pair of members mounted on the shaft and each providing a mounting for the corresponding ends of said cutting rollers, means operable to rotate the shaft, the position of said shaft and rollers being such that rotation of the shaft revolves said cutting rollers successively into and out of spaced cooperative relation with said first mentioned roller, means operable to rotate said roller, means operable by rotation of the roller to correspondingly rotate the cutting roller in cooperative relation therewith at the same peripheral rate as said roller, means operable to lock the shaft against rotation at any desired point, and adjustable means operable to vary the spacing between said roller and the cutting roller in cooperative relation therewith.

2. In a machine of the kind described, means operable to advance a material sheet and to continuously cut said sheet along a longitudinal line, the depth of said cut being slightly less than the thickness of the material sheet leaving the contiguous edges of the partially severed portions connected by a relatively thin unsevered section, means operable to hold said partially severed portions against lateral movement, and means so positioned as to press against and bend said contiguous edges out of the plane of the remainder of the sheet sufficiently to sever the connecting material by the resulting tensile stress.

3. In a machine of the kind described, means operable to advance a material sheet and to continuously cut said sheet along a plurality of spaced apart lines to form a plurality of strips, the depth of said cuts being slightly less than the thickness of the material sheet leaving the adjacent edges of said strips connected by relatively thin un-

severed sections, means operable to hold said strips against lateral movement, and a plurality of members each positioned adjacent a line of cut and adapted to bend the contiguous edge portions of said advancing strips out of the plane of the remainder of the sheet sufficiently to sever the connecting material by the resulting tensile stress.

4. The combination with a machine operable to partially sever a material sheet of the kind described along a plurality of continuous spaced apart lines of cut, of a device comprising means operable to advance said sheet and hold the partially severed portions against lateral movement, a plurality of members each positioned adjacent a different line of cut, and means operable to selectively move said members into and out of contact with said sheet, said means being adapted to hold the member controlled thereby in a position whereby the material adjacent the lines of cut is bent out of the plane of the remainder of the sheet and complete severance thereof is effected.

5. A device operable to completely sever a material sheet along a preformed continuous line of cut partially severing the sheet, said device comprising means for advancing the sheet and holding the partially severed portions against lateral movement, a sheave, a tiltable arm providing a mounting for the sheave, and a cam manually operable to control the position of the arm and to cause the arm to move the sheave into and out of contact with said sheet said cam cooperating with said arm to hold the sheave in contact with and to bend the sheet in a manner to complete the severance along the line of cut.

6. A device operable to completely sever a material sheet along preformed spaced apart continuous lines of cut partially severing the sheet, said device comprising means for advancing the sheet and holding the partially severed portions against lateral movement, a plurality of sheaves each rotatable adjacent a line of cut, tiltable arms each providing a mounting for one of said sheaves, and individual cams each selectively operable to control the position of an arm and to cause the sheave mounted thereon to be moved into and out of contact with said sheet contiguous to the adjacent line of cut each of said cams and the arm controlled thereby being adapted to hold the corresponding sheave in a position to bend the sheet adjacent the line of cut out of the plane of the remainder of the sheet and to thereby complete the severance of said portions.

7. In a machine of the kind described, a supporting frame, a member and a roller each rotatably mounted on the frame with their axes of rotation in spaced apart relation, a plurality of cutting rollers rotatably mounted on said member with their axes of rotation arranged in substantially circumferential relation to the axis of rotation of the member, means operable to rotate said member and thereby bring said cutting rollers successively into spaced apart cooperative relation to said first-mentioned roller, and means operable to rotate each cutting roller when in said cooperative relation and thereby to advance and cut a material strip positioned between the cooperating rollers.

8. In a machine of the kind described, a supporting frame, a member and a roller each rotatably mounted on the frame with their axes of rotation parallel, a plurality of cutting rollers rotatably mounted on said member with their axes of rotation arranged in parallel and in substantially circumferential relation to the axis of rotation of the member, means operable to rotate said member and thereby bring said cutting rollers successively into spaced apart cooperative relation to said first mentioned roller, means operable to lock said member against rotation at points corresponding to the cooperative relation of a cutting roller to the first-mentioned roller, and means operable to positively drive the first-mentioned roller and the particular cutting roller operatively related thereto at the same peripheral rate.

9. In a machine of the kind described, a supporting frame, a member and a roller, each rotatably mounted on the frame with their axes of rotation parallel, a plurality of cutting rollers rotatably mounted on said member with their axes of rotation arranged in parallel and in substantially circumferential relation to the axis of rotation of the member, means operable to rotate said member and thereby bring said cutting rollers successively into spaced cooperative relation to said first-mentioned roller, means operable to lock said member against rotation at the various positions wherein a cutting roller is operatively related to the first-mentioned roller, adjustable means operable to vary the spacing between said first-mentioned roller and the cutting roller in cooperative relation thereto, and means operable to positively drive the first-mentioned roller and the particular cutting roller operatively related thereto at the same peripheral rate.

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