Sept. 7, 1937. H. A. CUMFER 2,092,052

CUTTING ROLL

Filed Nov. 27, 1935 4 Sheets-Sheet 1

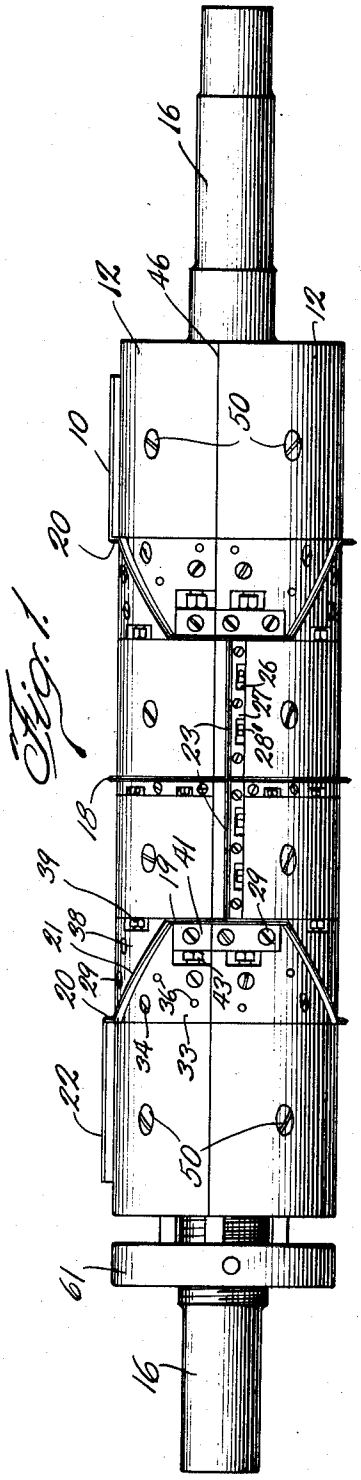


Fig. 1.

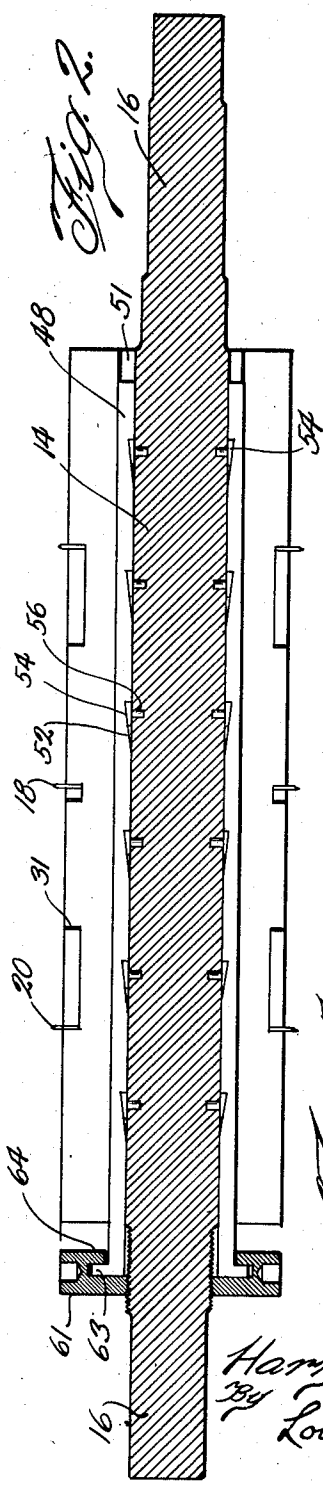


Fig. 2.

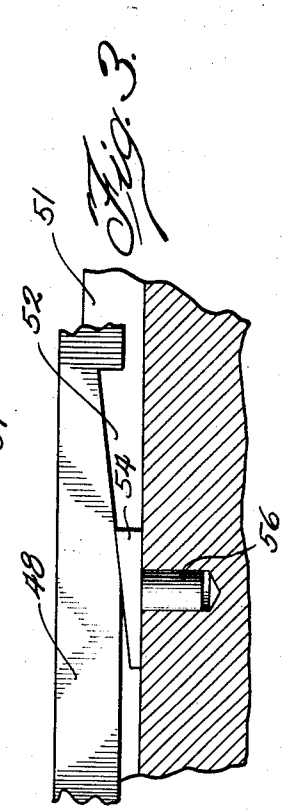


Fig. 3.

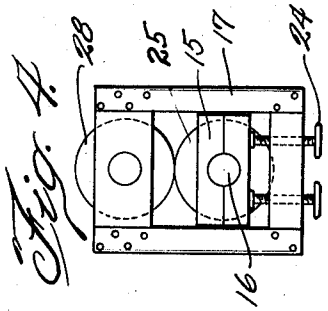


Fig. 4.

Inventor:
Harry A. Cumfer
By Louis Robertson Atty.

Sept. 7, 1937. H. A. CUMFER 2,092,052

CUTTING ROLL

Filed Nov. 27, 1935 4 Sheets-Sheet 2

Fig. 5.

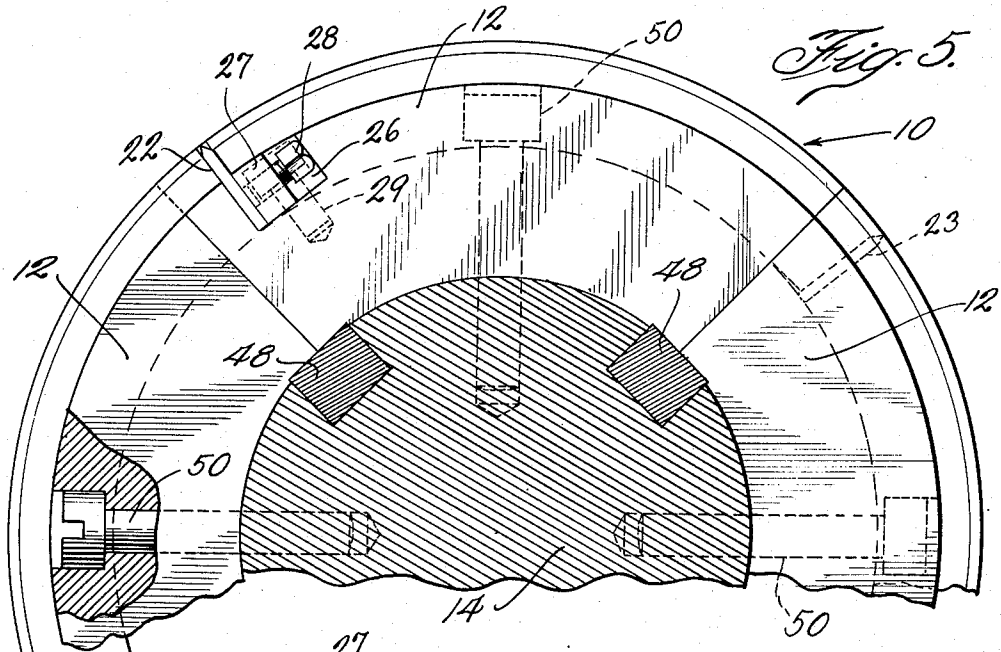
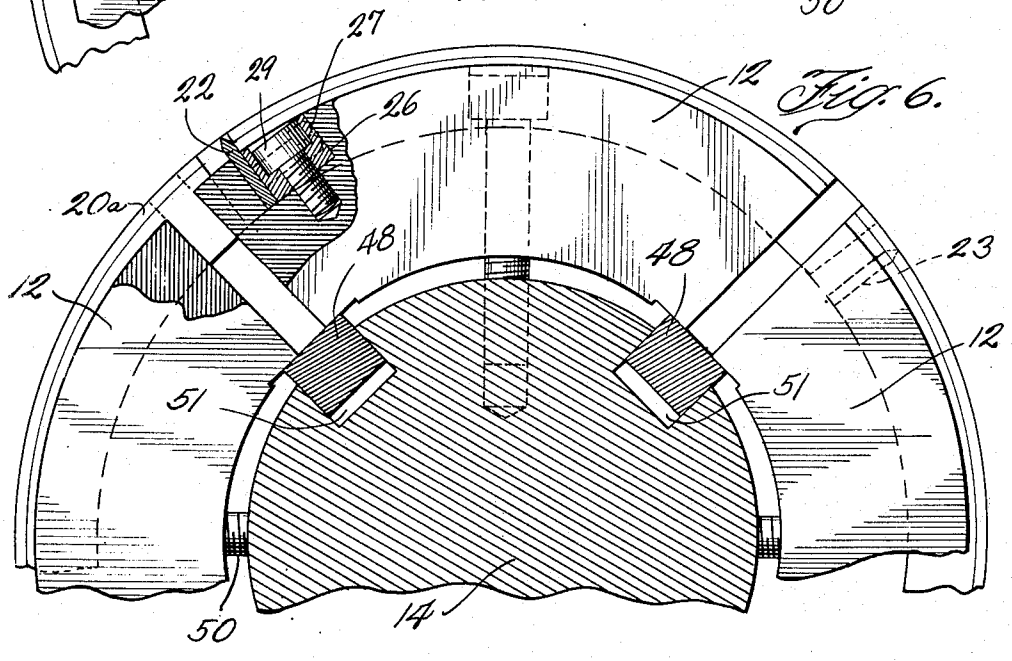


Fig. 6.



Inventor:
Harry A. Cumfer
By Louis Robertson Atty.

Sept. 7, 1937. H. A. CUMFER 2,092,052

CUTTING ROLL

Filed Nov. 27, 1935 4 Sheets-Sheet 3

Fig. 7.

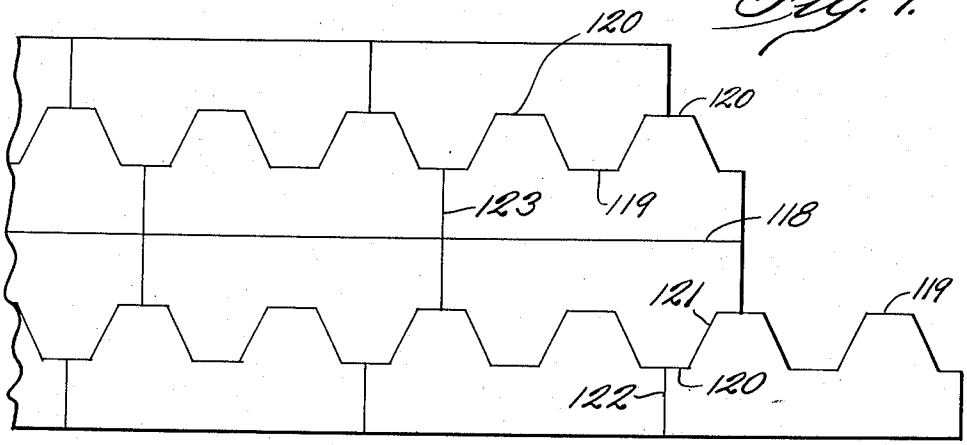


Fig. 8.

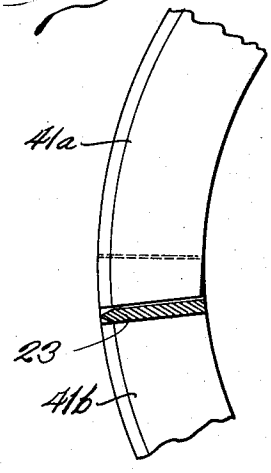


Fig. 9.

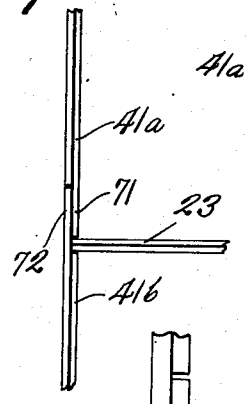


Fig. 10.

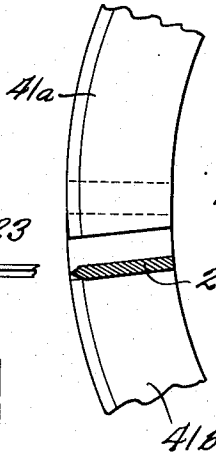
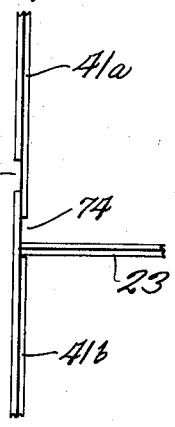


Fig. 11.



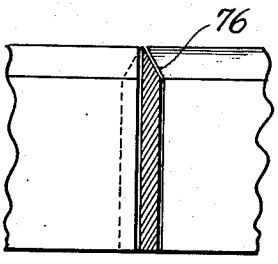


Fig. 12.

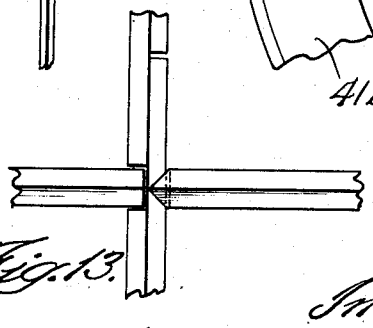


Fig. 13.

Inventor:
Harry A. Cumfer
By Louis Robertson
Atty.

Sept. 7, 1937. H. A. CUMFER 2,092,052

CUTTING ROLL

Filed Nov. 27, 1935 4 Sheets-Sheet 4

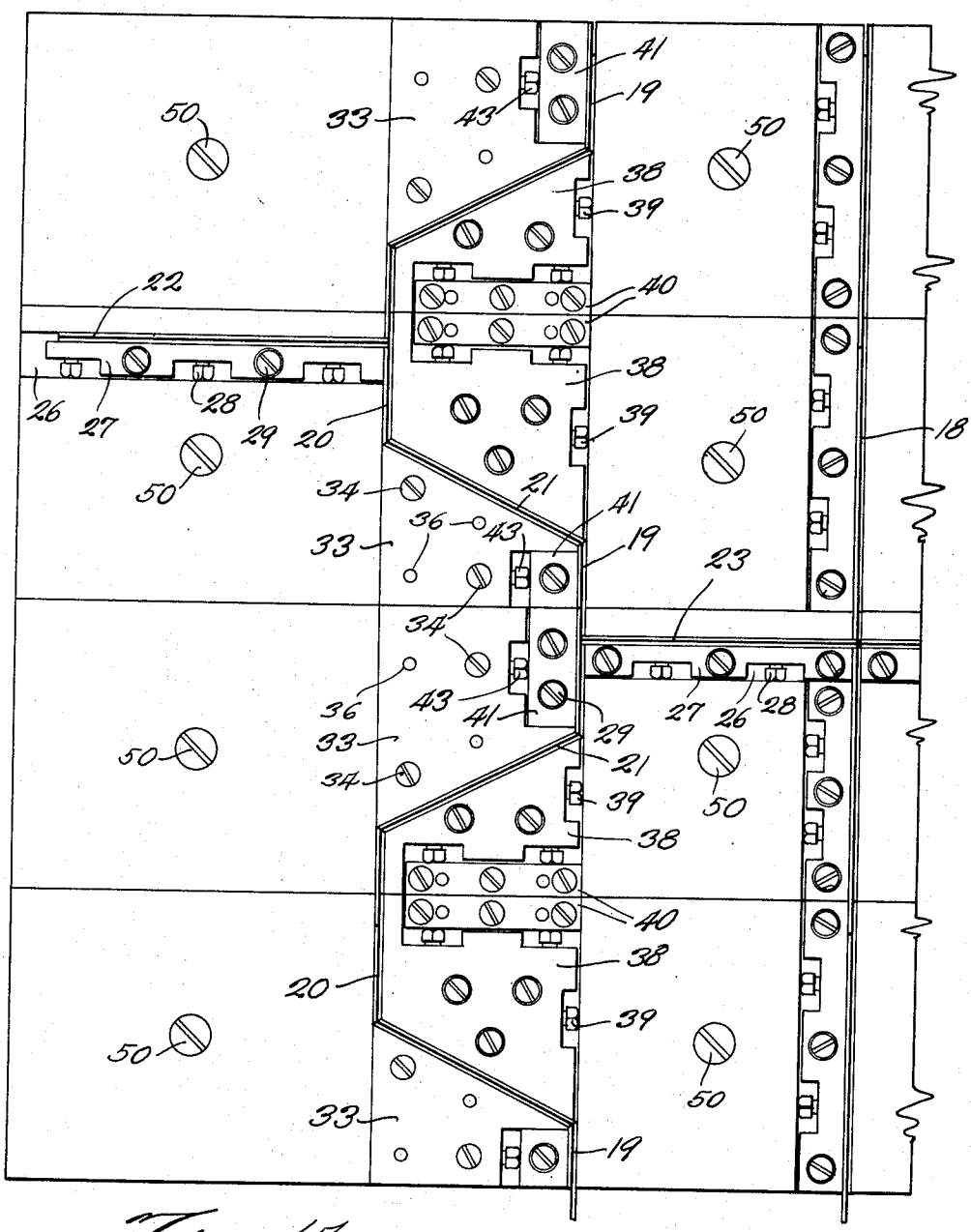


Fig. 14.

Inventor:
Harry A. Cumfer
By Louis Robertson
Atty.

Patented Sept. 7, 1937

2,092,052

UNITED STATES PATENT OFFICE

2,092,052

CUTTING ROLL

Harry A. Cumfer, Glen Ellyn, Ill.

Application November 27, 1935, Serial No. 51,853

15 Claims. (Cl. 164—28)

This invention relates to a cutting roll and has been illustrated as embodied in a roll suitable for cutting shingle strips with a plurality of tabs thereon. It relates more broadly, however, to an expandable cutting roll, no matter what material may be cut thereby and no matter what shapes may be cut.

In the use of any cutting roll the cutting blades will eventually wear down. In some instances this might be immaterial, since they can be resharpened, without detriment. However, in the case of a pattern roll, such as cutting rolls heretofore used for cutting roofing strips, worn blades must be thrown away, since wear or resharpening changes the circumference of the roll and hence changes the dimensions of the resulting product cut by the roll. In roofing this is especially objectionable since the decrease in circumference shortens the strips and since the strips are laid end to end so that the errors are cumulative. Since the problem is particularly acute in connection with roofing, this application will refer only to roofing, although it must be borne in mind that this reference is illustrative and that the apparatus has other uses.

If in the course of being worn and resharpened one or more times a mere sixteenth of an inch were taken off of all of the blades, this would reduce the circumference of the roll by over three-eights of an inch. This would obviously make difficult the calculation of the amount of roofing necessary for a given area and may occasionally cause dissatisfaction among customers because of the short measure. A worse difficulty from even slight wear arises, however, when short shingle strips are mixed with full-sized shingle strips. In this case if, say, six of each are laid end to end, the shorter in one row and the longer in another row, the difference in length with the facts supposed, would be about two inches or more, and, unless the shorter shingles are spaced apart, the tabs would not all lie in the desired staggered relation with the tabs below. Furthermore, if a design is printed on a continuous web of roofing by one roll and another roll cuts the roofing in registry with the design, the difficulty arising from wear on the cutting roll is obvious.

The present invention solves the problem of avoiding difficulties due to wear of the cutting roll by providing an expandible cutting roll which may be expanded to compensate for wear. The roll may comprise a plurality of sections spread apart evenly, as by jointly controlled wedge means. The knives may be expandibly spliced so as not to produce an irregular cut, by having the cutting edges of the knives adjacent one another at the overlapping portions, each knife having a single bevel at this portion extending away from the contacting cutting edges. Except for the overlapping zone, the knives may be double-beveled, as heretofore. The invention also provides an improved means for holding the knives in place comprising a clamped block secured to the roll and operated by screws bearing fixed portions of the roll.

Other objects and advantages of my invention will be apparent from the following description, taken with the drawings, in which:

Fig. 1 is an elevational view of a roll embodying this invention.

Fig. 2 is a diametric sectional view through the roll of Fig. 1, and taken approximately on a vertical plane.

Fig. 3 is a fragmentary detailed view showing the wedge rod of Fig. 2 in an operated position.

Fig. 4 is a somewhat diagrammatic view illustrating apparatus for using the roll of Figs. 1 to 3.

Figs. 5 and 6 are fragmentary vertical sectional views partly broken away, showing the roll respectively in its initial and its expanded positions.

Fig. 7 is a view showing one way in which a continuous roofing strip may be cut up into individual roofing strips by the use of the roll of this invention.

Figs. 8 and 9 are fragmentary side and edge views showing the interfitting of the blades of this invention in their initial positions.

Figs. 10 and 11 are views corresponding to Figs. 8 and 9, but showing the blades partially expanded.

Figs. 12 and 13 are fragmentary side and edge views of interfitting blades where the blades extend in four directions from a given point.

Fig. 14 is a development of the roll showing its entire peripheral surface at one end, the other end being broken away.

Although this invention may take numerous forms, only one has been chosen for illustration. In this form the roll includes knives indicated generically by the numeral **10**, mounted on holders **12**, which in turn are carried on a core **14**, the ends of which form journals **16**, for which suitable bearings **15** (Fig. 4) may be provided. The bearing **15** may be slidable in framework **17** and adjusted by screws **24** so as to position the cutting roll **25** properly with respect to the anvil roll **28**. These rolls may be driven in any de-

sired manner, and feed rolls are also usually provided for drawing the roofing therethrough. The blades 10 have been illustrated in an arrangement which will cut the pattern shown in Fig. 7, but, of course, the particular arrangement of the blades is immaterial so long as the main features of the invention are present, and therefore it will be realized that this arrangement has been chosen solely by way of example. Rolls having this same positioning of the blades for cutting this same pattern have long been known.

It may be pointed out briefly that the blades include the circumferential blade 18 for slitting the roofing along the line 118. The arcuate and circumferentially-extending blades 19 for cutting the lines 119, similar circumferentially-extending blades 20 for cutting the lines 120, diagonally-extending blades 21 for cutting the connecting lines 121, and the transverse blades 22 extending axially for cutting the lines 122 which sever the outer strips at their ends, and the similar blades 23 which cut along the lines 123 to sever the inner strips at their ends.

When this roll is in its initial contracted position its function is the same as that of the conventional solid roll, and in fact the novel manner of holding the blades in place could be applied to a solid roll with equal advantage. The transverse blades 22 and 23 are set in axially-extending channels 26. The blades may be anchored in these channels in any suitable manner, but the preferred manner is by means of clamp plates 27 having bolts 28' therein, which butt against the side of the channel opposite that against which the blade is resting. Turning the bolts 28' in the proper direction presses the clamp plates 27 against the blades 22 to clamp these blades in place as in a vise. The sliding plates 27 may be secured to the holder 12, as by screws 29, if desired, the screw holes in the sliding plates through which the screws 29 extend being slightly oversize so as to permit these plates to slide with respect to the associated portions.

The blade 18 is secured in place in a similar manner, in this instance the channel in which it is located extending circumferentially around the roll. The blades 19, 20 and 21 may most conveniently be secured by cutting wide channels 31 circumferentially around the roll and securing fixed plates 33 therein, against which the blades and movable clamp plates may press. Thus, as seen in Figs. 1 and 14, a fixed clamp plate 33 is secured in place by screws 34, being accurately and dependably positioned, as by dowel pins 36. The blades 21 rest against these fixed plates 33, and the blades 20 rest against the edge of the channel 31. A sliding plate 38 may be urged against the blade 21 by a screw 39 screwing in the plate 38 and bearing against the right-hand side of channel 31, and it may be urged against blade 20 by a similar screw acting circumferentially of the roll and bearing against a fixed plate 40 (Fig. 14).

The blade 19 may be secured in place by sliding plates 41 operated by bolts 43 which in this instance screw into the fixed plates 33 and bear against the sliding plates 41, since the space available in plates 41 may be rather limited.

The securing of the blades as above described is independent of the next feature to be described, namely, the expansion of the roll, except that it should be noted that the circumferentially-extending blades are so constructed as to permit expansion in a manner to be described, and that the clamping means must not prevent any expansion. To this end the clamping means may be cut away, say 1/1000 inch, or even less at the point of their engagement with the portions of the circumferential blades which must slide to permit expansion, or that portion of the blades may be ground slightly thinner.

As shown most clearly in Figs. 5 and 6, there are a plurality of holders 12 grouped around the core 14 of the roll. In the illustrated form, each of these holders 12 extends through 90° of the circumference of the core. Of course, this number may be varied either to permit expansion which is more nearly uniform throughout the circumference or to bring the splits 46 between the holders 12 on circumferentially-extending portions of the pattern with different patterns.

Each of the holders or sections 12 extends the length of the cutting portion of the roll and rests on wedge bars 48. These wedge bars are so positioned, as shown best in Fig. 6, that each one lies under the adjacent edges of two of the sections 12, and each of the sections 12 bridges across two of the wedge bars 18. The sections 12 are held in place on the core 14 by a plurality of screws 50 which extend through the angular center of the sections 12 and screw into the core 14. Of course, when the roll is in the contracted position, the sections 12 may rest directly against the core 14, although this is incidental and unnecessary.

The wedge bars 48 are slidably positioned in grooves 51 in the core 14 and have a plurality of wedge-shaped notches 52 cut along the bottom sides. Each of these wedge-shaped notches engages a wedge 54 positioned in the bottom of the groove 51 and anchored therein by a downwardly-extending lug 56 fitting into a corresponding hole in the core 14. Any desired number of such wedges 54 and wedge notches 52 may be provided. The wedge bars 48 extend out beyond the holders 12 and are engaged by an adjusting ring 61 which screws on the core 14, as illustrated best in Fig. 2. The protruding ends of the wedge bars 48 may be shaped to form lugs 63 so that the ring 61 having an inwardly-extending flange 64 may move the wedge bars 48 in either direction.

When the roll is new, it will be used in its contracted position shown in Fig. 5. As the blades wear down, however, their circumference becomes smaller, with the result that the length of the shingle strips becomes shorter. In the past it has been necessary to throw away these blades when they were worn relatively slightly, since a 1/8 inch wear radially of the roll reduces the circumference of the roll and consequently the length of the shingles by over 3/8 inch.

When it is desired to expand the roll, it is merely necessary to loosen the various screws 50 and then turn the ring 61 clockwise so as to screw it toward the sections 12. This will push the wedge bars 48 to the right, as seen in Fig. 2, or toward the position shown in Fig. 3, in which position it is seen that the wedge bar 48 and its notch 52 has ridden up on the wedge 54 so that it is radially spaced from its former position. The result of this is seen best in Fig. 6, in which it is seen that the radial displacement of the wedge bars 48 has thrust the sections 12 radially outwardly with the inevitable result that they have separated circumferentially.

It is, of course, necessary that the circumferentially-extending blades be lengthened by a corresponding amount. In order to permit this, these blades are spliced or overlapped as seen best in Figs. 9 and 10, which may be taken as

illustrating the blades 41 and 23, although, as seen in this figure, the blade 41 really comprises two parts 41a and 41b. In order to understand this figure, it should first be noticed that all the blades are of the double bevel type having the cutting edge at the center of the blade and being beveled therefrom on both sides.

As seen in Figs. 9 and 10, the blade 41a has an extension 71, and the blade 41b has an extension 72, each of these extensions being an extension of only half of the blade, but the two overlapping halves forming in effect a double-beveled blade. In other words, the cutting edges of the two extensions 71 and 72 are in contact, and one extension is beveled on one side and the other on the other side. When the roll is expanded, the blades 41a and 41b are drawn away from one another, so that these blades have a smaller overlap. In other words, the extensions 71 and 72 slide with respect to one another, forming the gaps 74 at their ends. Inasmuch as the cutting edge is along the center of the blades, it will be observed that this cutting edge is continuous throughout the length of the blade 41a and the blade 41b.

When two blades meet at an angle, it is desirable that their cutting edges substantially meet, and hence it has been the practice heretofore, in some instances, to undercut one of the blades, as at 76 in Fig. 12, so that its cutting edge may extend over the adjacent blade to meet its cutting edge. With the present construction this is avoided, as shown in Fig. 11, by placing the square cut blade 23 at the end of the double portion of one of the blades, i. e., between the extension 71 and the corresponding portion of the blade 41b. The blade is, of course, clamped in this position by the clamp members illustrated in Fig. 1, and hence when the blades 41a and 41b partially separate, the blade 23 remains firmly in position, as shown in Fig. 11.

Where blades are extending in four directions from a given point, as at the center of Fig. 1, and as shown in Fig. 13, one of the blades may be square cut and extend to the center of the blade extending perpendicularly thereto, while the other blade may be undercut as heretofore. This combination is shown clearly in Fig. 12, although it should be realized that the blades are shown slightly spaced apart merely for the sake of clarity, since they would ordinarily be in contact.

In order to permit a smooth sliding action, the outer faces of the wedge bars 48 and the corresponding fitting portions of the holders 12 should be plane surfaces perpendicular to the radius extending through the middle of the wedge bars 48 from the center of the core 14. Likewise, the bottom surface of the blade 41a and similar blades (as 20a in Fig. 6), should be along a plane perpendicular to the radius between the adjacent holders 12, as shown, and the portion of the adjacent holder on which it slides should be on the same plane. In short, all members should be so shaped as to permit expansion of the roll without interfering with the support of its parts.

After expansion the periphery of the blades will not form a perfect cylinder, but if the expansion is made often enough, so that it may be very slight each time, the action will be satisfactory, nevertheless. There is commonly a layer of asphalt and granular surfacing material on the roofing on its side farthest from the cutting roll, and since it is not necessary to cut entirely through this layer, considerable tolerance is provided. However, whenever necessary, the blades may be ground down either on the roll or by taking them off.

In some instances it will be unnecessary to provide the overlapping joints between the knives, since small webs left by a gap between the knives can be severed easily in subsequent handling of the roofing, especially when a frayed edge would not be objectionable.

Although but one embodiment of my invention is herein shown and described, it is to be understood that I am not limited thereby, but limit my invention only by the scope of the appended claims.

I claim:

1. A cutting roll including a plurality of sections, means for spreading said sections radially, and knives carried by each section, the knives of one section overlapping with the knives of an adjacent section whereby a continuous cut is made after expansion of said roll.

2. A cutting roll including a plurality of sections, means for spreading said sections radially, and knives carried by each section, the knives of two adjacent sections overlapping and having their cutting edges substantially in contact.

3. A cutting roll including a plurality of sections, means for spreading said sections radially, and knives carried by each section, the knives of two adjacent sections overlapping and having their cutting edges substantially in contact, said knives being beveled on each side of the cutting edge except at the overlapping portion and there each being beveled on one side and thus forming in their contracted position a continuous double-beveled knife.

4. A cutting roll including circumferentially-extending expandible knives overlapping with one another and having their cutting edges substantially in contact.

5. A pair of expandably associated knives for cutting a continuous line overlapping at their ends and having their cutting edges in contact along the overlapping portions.

6. A cutting roll including a plurality of sections, and knives carried by each section, means for spreading said sections radially comprising a plurality of independent wedge means and means for causing a uniform and simultaneous operation of said various wedge means.

7. A cutting roll including a core, spaced wedges on said core, wedge bars riding on said wedges, means for moving said wedge bars, sections secured to said core but separable therefrom by said wedge bars and knives secured to said sections and extending partially circumferentially.

8. A cutting roll including a core, wedges on said core, wedge bars riding on said wedges, means for moving said wedge bars, and sections secured to said core but separable therefrom by said wedge bars, each of said sections bridging across two of said wedge bars.

9. A cutting roll including a core, wedges on said core, wedge bars riding on said wedges, means for moving said wedge bars, and sections secured to said core but separable therefrom by said wedge bars, each of said sections bridging across two of said wedge bars, the outer surface of said wedge bars being perpendicular to a radius of said core passing therethrough and the surfaces of said sections engaging said bars being parallel to said outer surfaces of said bars.

10. A cutting roll including a holder portion having an abutment thereon, a blade resting against said abutment, and a clamp block resting

against said blade, said roll having a second abutment facing said first abutment, and a screw screwing into said clamp and bearing against said abutment, or vice versa.

11. A cutting roll including a plurality of knives disposed around said roll, and means for clamping said knives firmly and while holding them shifting said knives radially to compensate for their wear.

12. A rotating cutter including a rotating shaft, a knife, a holder for firmly securing said knife supported by said shaft, and means for shifting said holder radially away from said shaft with a movement uniform all along the length thereof.

13. A cutting roll including at least three sections radially movable, means to move said sections radially, and a circular knife extending around said roll and made up of at least three sections, one on each roll section.

14. A circular knife including at least three parts separate from one another to permit expansion of said knife and forming a circle when placed in alinement.

15. A pair of expandibly associated arcuate knives jointly forming an arc for cutting a continuous line from the first end of one blade to the far end of the other blade, said knives overlapping at their ends and having their cutting edges in contact along the overlapping portions.

HARRY A. CUMFER.