

Aug. 7, 1928.

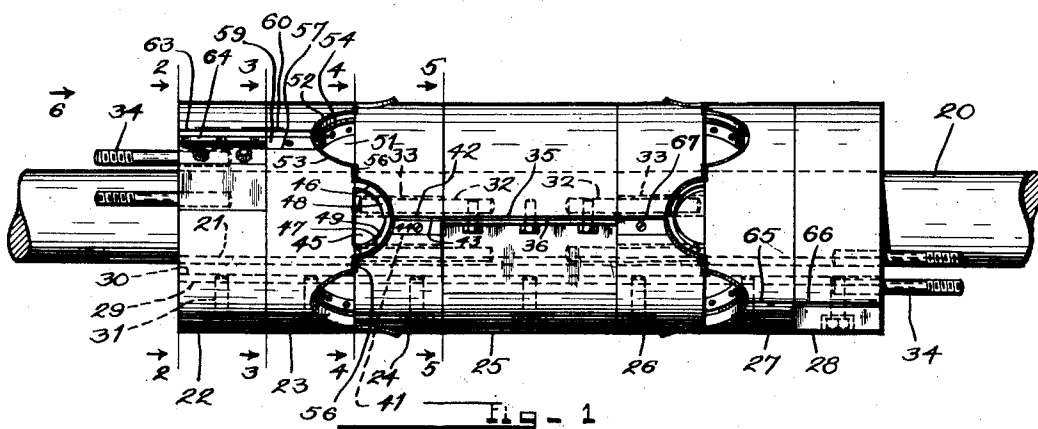
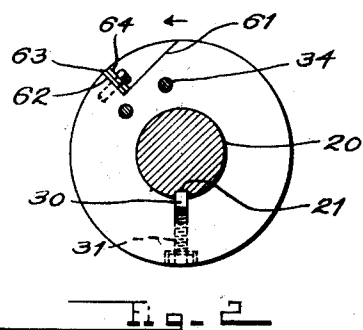
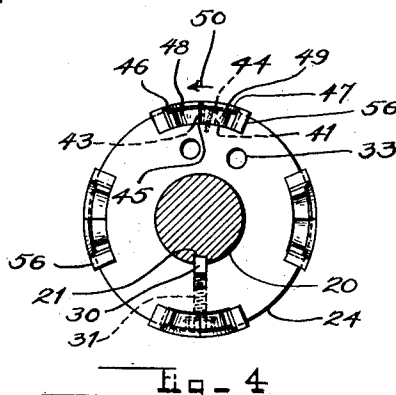
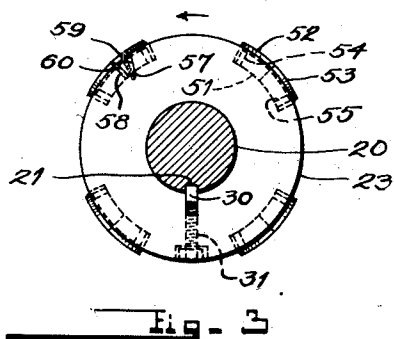
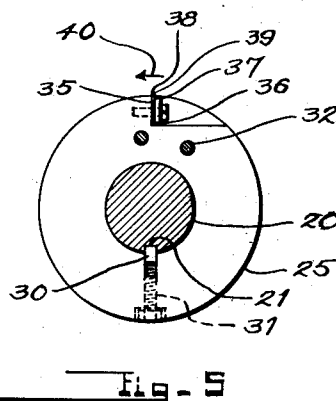
1,679,351

C. W. DOHM

CUTTING ROLL

Filed April 13, 1926

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

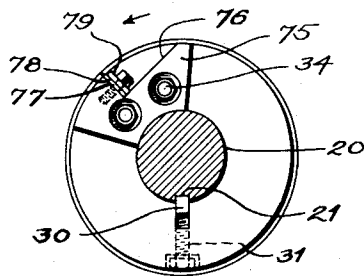


Fig. 6

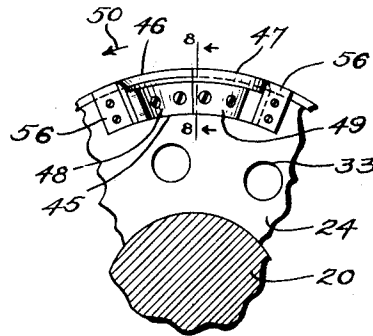


Fig. 7

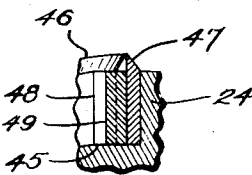


Fig. 8

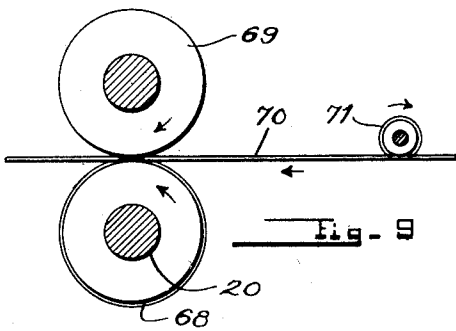


Fig. 9

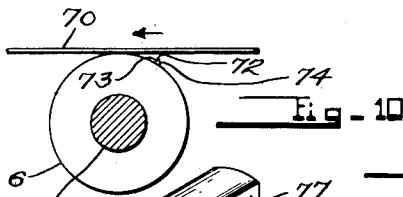


Fig. 10

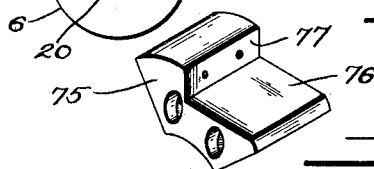


Fig. 11

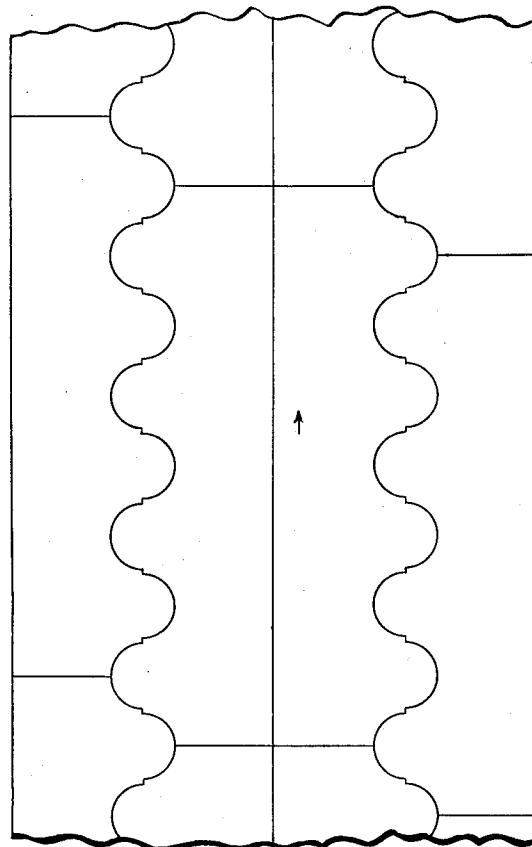


Fig. 12

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UNITED STATES PATENT OFFICE.

CHARLES W. DOHM, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE CONTINENTAL ROOFING & MANUFACTURING COMPANY, OF BALTIMORE, MARYLAND, A CORPORATION OF DELAWARE.

CUTTING ROLL.

Application filed April 13, 1926. Serial No. 101,646.

My invention relates to cutting rolls.

The principal object of my invention is to devise a roll for the cutting of fanciful designs from a continuous, or single, sheet, which is so constructed and arranged that said designs, usually in the form of strips, may be cut to any predetermined width without removal of said roll from its supporting structure.

A further object resides in the novel arrangement of the knives, whereby the cutting edges in the revolution of the roll approach the sheet material in the most effective position for performing the severing operation without a pinching of the moving sheet, or other undesirable results, and also without breaking or otherwise damaging the knife edges.

My invention is more particularly directed towards providing a roll which is adapted for cutting shingle strips without waste from a continuous, moving sheet of appropriate material. These strips are customarily provided along one edge with a plurality of spaced tabs, or projections, having any desired configuration and are usually made in not less than two widths, the dimensions of the tabs remaining unchanged. The strips are ordinarily cut lengthwise from the original sheet and for any given size of strip, said sheet is of a width that permits of the cutting of four strips. If the shingle is of a design that may be cut without waste from the sheet, then each strip is cut therefrom with its tabs fitting into and matching the spaces intervening between the tabs of the adjoining strip. However, my improved roll is not to be considered as restricted to the cutting of the foregoing type of strips, as the principle involved is readily adaptable to strips having different characteristics.

As now practiced in the art, the rolls are arranged to form strips of a single width only and it is accordingly necessary, in the event that the machine is set to cut strips of one width and strips of a different width are desired, to remove the first roll and substitute a second roll having the required dimensions. Obviously, this procedure is highly undesirable, requiring not only additional time but an entire roll for each width of strip.

In order to avoid this objection, I have

devised the roll hereinafter described, which consists essentially of a plurality of disks and segments, provided with suitable knives, that are individually adjustable along the supporting shaft. These knives are arranged in the manner of the proposed strip design and when said disks and segments are mounted in contiguous relation on the shaft, will cut strips of a designated width from the original sheet. If now strips of a different width are desired, it is only necessary to remove, or add, segments to the assembly as may be required, the disks being loosened and moved along the shaft to obtain the necessary clearances. In this construction, the segments are the width adjusting elements and it is therefore obvious that, since the tab dimensions remain unchanged, the strip widths obtainable will depend solely upon the width of the segments used, thus rendering possible the obtention of a variety of widths from a single roll. As the segments are arranged for removal from the shaft without disturbing the mounting of the latter in the machine, the advantages of my type of cutting roll may be readily visualized.

Associated with the foregoing improvement is a disposition of the knives in which the cutting edges are presented to the moving sheet in such a manner that crowding and possible buckling of the sheet are prevented and further, in which wear and breakage of the edges are reduced to a minimum. To accomplish this purpose, the cutting edge of each knife is formed by the intersection of two surfaces, one flat and one beveled relative thereto. At the instant of cutting, the flat surface is approximately normal to the surface of the moving sheet. The knives are mounted on the disks and segments hereinbefore described, so that the cutting edge is rotationally in advance of its accompanying bevel surface, thereby improving the severing characteristics and increasing the longevity of the knives, as is set forth in more detail hereinafter. The foregoing arrangement of the cutting edges pertains only to those knives which, at the instant of cutting, are angularly disposed to the direction of movement of the material from which the strips are being cut. For those knives which sever the moving sheet parallel to the sides thereof, it is obvious that the

special arrangement of cutting edges, heretofore noted, is not required.

For purposes of illustration, my improved roll is shown as being adapted for the cutting of two widths of shingle strips, but I do not desire to be limited to this precise number of sizes, as it is obvious that the roll may be easily arranged to cut any desired number of widths.

These and further objects of my invention will be set forth in the following specification, reference being had to the accompanying drawings, and the novel means by which said objects are effectuated will be definitely pointed out in the claims. In the drawings:

Fig. 1 is an elevation of my improved roll, showing the same assembled for the cutting of the smaller of two possible strip widths.

Figs. 2, 3, 4 and 5 are views taken along the lines 2—2, 3—3, 4—4 and 5—5, respectively, in Fig. 1 looking in the direction of the arrows.

Fig. 6 is a view looking in the direction of the arrow 6 in Fig. 1 and showing the end of the roll as it would appear when arranged for the cutting of a strip wider than that capable of being cut by the roll as shown in Fig. 1.

Fig. 7 is an enlarged view of a portion of Fig. 4.

Fig. 8 is an enlarged view along the line 8—8 in Fig. 7, looking in the direction of the arrows.

Fig. 9 is a diagrammatic view in elevation of my improved cutting roll and its co-operating roll.

Fig. 10 is a diagrammatic view, showing the relation of the cutting edge of a knife to the moving sheet just prior to the severing operation.

Fig. 11 is a perspective view of the segment utilized for increasing the length of the roll.

Fig. 12 is a plan view of the sheet showing the relation of the strips when cut by a roll provided with an arrangement of knives as shown in Fig. 1.

In the drawings:—

The numeral 20 represents a shaft which is to be journaled in any approved bearings carried by a suitable supporting structure and which is provided, intermediate of its ends, with a keyway 21 having any desired length.

A plurality of disks, 22, 23, 24, 25, 26, 27 and 28 are slidably mounted on said shaft in juxtaposed relation, each of said disks having a keyway 29 in which is slidably mounted a key 30 for securing a driving connection between the corresponding disk and the shaft 20. A set screw 31 is threaded in each of said disks and serves to maintain the key 30 in the keyway 21, thus preventing endwise movement of each of said disks on

the shaft 20. As viewed in Fig. 1, the disk 25 comprises the central portion of the roll, with the disks 24, 23 and 22, disposed successively to the left thereof and the disks 26, 27 and 28, disposed successively to the right thereof.

A pair of studs 32—32 project from each face of the disk 25 and when the disks heretofore mentioned are assembled in contiguous relation as shown in Fig. 1, are encased in holes 33—33 formed in the disks 24 and 26, respectively. Similar studs 34—34 project from the outer faces of the disks 22 and 28, all of said studs being provided for a purpose hereinafter explained.

The peripheral surface of the disk 25 is notched for its full width to form the radial surface 35 and a knife plate 36 is secured to said surface by a retaining plate 37 provided with suitable cap screws or other approved means. Said knife plate carries a cutting edge 38 which is formed by the intersection of one side surface with a beveled surface 39 obtained by chamfering a long edge of said plate. As shown in Fig. 5, the knife plate 36 is secured to the surface 35 so that, assuming the roll to be turning in the direction of the arrow 40, the edge 38 will be rotationally in advance of the accompanying bevel surface 39, this arrangement being provided for a purpose hereinafter explained.

A notch 41 is formed in the disk 24, extending from the side surface adjacent the disk 25 approximately half way across the peripheral surface of the disk 24, said notch creating the radial surface 42 which is aligned with the surface 35 of the disk 25. A knife plate 43 is positioned in said notch and retained therein by means of the wedge 44 carrying appropriate screws. The plate 43 is similar to the plate 36, the cutting edges of both plates being aligned and the edge of the former plate being rotationally in advance of its accompanying bevel surface.

A plurality of equally spaced, semi-circular recesses 45 are also formed in the peripheral surface of the disk 24, extending from the face of said disk that is remote to the disk 25 approximately half way across the width of said disk. One of said recesses is disposed to be substantially bisected by the radial surface 42, if continued in length, and to the vertical wall of each recess are secured curved knife plates 46 and 47, respectively, as by retaining plates 48 and 49, respectively. Said plates are coextensive with the semi-circumferential length of each recess wall and their abutting faces are positioned half way from the ends thereof. The cutting edges of said plates form a continuous curve and, assuming that the roll is turning in the direction of the arrow 50 in Fig. 4, the plate 46 will be secured to that portion of the recess wall which is rotationally in advance of the remaining half thereof, thereby plac-

ing the plate 47 in a relative lagging position. The edge of each of said plates is formed as hereinbefore described for the plates 36 and 43 and is disposed rotationally in advance of the accompanying bevel surface, the relation of the cutting edges of the plates 46 and 47, and of their bevel surfaces being clearly shown in Fig. 8. In that recess which is adjacent the knife plate 43, the knife plates 46 and 47 are arranged so that the cutting edges of the three plates meet, thereby securing an unbroken cutting edge.

The disk 23, which is disposed next to the disk 24, is provided with a plurality of equally spaced, semi-circular recesses 51 formed in the peripheral surface of said disk and extending from that face adjacent the disk 24 approximately half way across the width of the disk 23. Said recesses are disposed on the disk 23 to lie in staggered relation with the recesses on the disk 24 and curved knife plates 52 and 53 are secured to the wall of each recess, as by the retaining plates 54 and 55, respectively. Said plates are similar in construction to the curved plates which are positioned in the recesses of the disk 24, the plate 52 being arranged rotationally in advance of the plate 53 and the cutting edge of each of said plates having a similar position with relation to its accompanying bevel surface.

For the character of design of strip which the roll as illustrated in Fig. 1 is intended to cut, the spacing of the recesses 45 and 51 leaves short lengths on the surface of the roll, between adjacent ends of the curved knife plates hereinbefore described, which are closed by the knife plates 56, the same being secured, as desired, to either the disk 23, or the disk 24. The plates 56 may be of any approved design, but the cutting edges thereof must meet the edges of the adjacent curved plates so that the cutting edge around the roll will be continuous.

A notch 57 is formed in the disk 23 extending from that face which is remote to the disk 24 to that recess 51 which, for the roll as constructed in Fig. 1, is immediately adjacent to and rotationally in advance of the notch 41. Said notch creates the radial surface 58, to which is secured by means of a wedge 59 a knife plate 60, having a cutting edge arrangement similar to the plates 36 and 43, and said edge meeting the cutting edges of the curved plates 52 and 53.

The end disk 22 is provided with a notch 61 across the width of its peripheral surface to form the radial surface 62. A knife plate 63 is secured to said surface, as by the retaining plate 64, and the cutting edge of said knife is aligned with the edge of the knife plate 60, being formed in a manner similar to said last named edge and positioned similarly with reference to the direction of rotation of the roll.

As the disks 26, 27 and 28 are identical with the disks 24, 23 and 22, respectively, so far as their individual construction are concerned, they will not be further described, except to point out that the knife plates 65 and 66 of the disks 27 and 28, respectively, corresponding to the plates 60 and 63, respectively, are rotationally in rear of the plate 36 of the disk 25, for a purpose hereinafter explained. The knife plate 67 on the disk 26, which corresponds to the plate 43 on the disk 24, is aligned with the plate 36 on the disk 25 and accordingly with the plate 43. It will be understood that the knife edges hereinbefore described extend beyond the peripheral surfaces of the disks, said surfaces being smooth and unbroken except as indicated.

When the disks are assembled on the shaft 20, as shown in Fig. 1, the roll thus formed will cut four shingle strips of ten inches width from an original sheet of thirty-two inches width, the cutting being achieved without waste and the individual strips being relatively positioned as shown in Fig. 12. To effect this result, my improved roll 68 is mounted in an approved structure beneath a cooperating smooth roll 69, see Fig. 9, and the sheet material 70 is fed therebetween, passing first beneath a slitting roller 71 which severs the sheet parallel to the edges thereof. The interaction of the rolls 68 and 69 then cuts the strips as shown in Fig. 12, the disks, exclusive of the disks 22 and 28, cutting the inner strips and the disks, exclusive of the disk 25, cutting the outer strips.

It will be readily apparent that the fanciful edges of the strips are cut by the curved knife plates 46, 47, 52 and 53, in conjunction with the knife plates 56 which connect adjacent ends of said curved knife plates, while the end edges of the strips are cut by the knife plates 36, 43, 60, 63, 65, 66 and 67. The last named plates are formed in groups of three, as shown in Fig. 1, the intermediate group, composed of the plates 43, 36 and 67, cutting the end edges of the inner strips, and the end groups, composed of the plates 60 and 63, and 65 and 66, respectively, cutting the end edges of the outer strips, as the same are viewed in Fig. 12. The purpose of arranging these groups to cut the end edges of the strips in staggered relation is twofold, viz, it permits the cutting of strips from the original sheet without waste and further serves to prevent buckling of the sheet while passing between the rolls.

Efficient cutting of the strips, with a minimum of wear of the knife plates and of damage to the sheet material, is further improved by the novel means of forming the cutting edges of the plates as hereinbefore described. The advantages of this construction can be more readily understood by re-

ferring to Fig. 10, which shows diagrammatically the relation of the knife plates to the sheet material. The cutting edge 72, which is formed by the intersection of the side surface 73 of the plate with a beveled surface 74, is disposed rotationally in advance of said bevel surface. Accordingly, it is obvious that, at the instant of cutting, the edge 72 will occupy a substantially normal position relative to the sheet material, or in other words will lie in a plane having the same position, which is the most effective for achieving the severing operation. If the edge were disposed rotationally in rear of the surface 74, whether said edge was formed as described or by the intersection of two bevel surfaces, then at the instant of cutting or slightly before, it would lie in a plane that was disposed at an angle less than normal to the sheet material, thereby forming depressions in the latter and possibly fracturing the cutting edges. My improved construction avoids these disadvantages.

As already pointed out, the roll as shown in Fig. 1 is arranged to operate upon sheet material of a designated width to form shingle strips of a predetermined width. If now, wider strips are desired, it is unnecessary by reason of my arrangement to insert a new roll, the following procedure being substituted. The screws 31 are loosened and the disks 22, 23 and 24 are moved to the left along the shaft 20, as viewed in Fig. 1, and the disks 26, 27 and 28 are moved to the right, both movements being sufficient to uncover the studs 32 and to permit securing thereon the segment 75 on each face of the disk 25. Said segment is provided with a notch 76, formed in its peripheral surface, which creates the radial surface 77 that is aligned with the surface 35 on the disk 25. A knife plate 78 is secured to the surface 77 by the retaining plate 79, the cutting edge of said plate being aligned with the cutting edge of the plate 36 and accordingly with the edge of the plate 43 on the disk 24 and with the edge of the plate 67 on the disk 26. The cutting edge of the plate 78 is formed as already described and is disposed relative to the direction of rotation of the roll in the usual manner.

The disks 22, 23 and 24 are then moved toward the disk 25 until the disk 24 touches the segment 75 and are secured in position on the shaft 20. A similar movement is made of the disks 26, 27 and 28. A segment 75 is then secured to the end faces of the disks 22 and 28, and the knife plate 78 of each segment is suitably aligned with the knife plate of the accompanying disk, the roll being then complete for the cutting of strips having a width greater than that cut by the roll as shown in Fig. 1. It will be

noted that the securing of the segments 75 to the disk 25 provides for increasing the width of the inner strips in Fig. 12, while the attaching of the segments 75 to the disks 22 and 28 serves a similar purpose for the outer strips in said figure.

The roll as illustrated shows an arrangement of the cutting knives which secures the formation of shingle strips from sheet material without waste, but I do not desire to be limited to such a construction, as the roll may be devised for the cutting of strips having other designs, and whether cut lengthwise or crosswise from the sheet. The essential conception of my invention resides in the provision of a built-up roll that may be utilized to cut strips having any desired width, if the strip is cut lengthwise, or any desired length, if the strip is cut crosswise of the sheet. Under certain circumstances, it may be necessary to remove the roll from the supporting structure in order to facilitate its assembly, or disassembly, for peculiar types of designs, but this condition will occur only under unusual requirements, and will not affect the manifest advantages inherent in a cutting roll of the character involved in this application.

While I have shown one set of elements and combinations of the same for effectuating my improved cutting roll, it is to be understood that the structure illustrated is for the purpose of defining one preferred form only and in nowise to limit the arrangement of the roll to the exact construction shown, for many changes may be made therein without departing from the spirit of my invention.

I claim:

1. A roll for cutting a strip from a sheet, comprising a plurality of associated cutting elements adapted for forming a strip of one predetermined width, said elements being separable for the insertion therebetween and mounting thereon of additional cutting elements for forming a strip of a second predetermined width.

2. A roll for cutting a strip from a sheet, comprising a plurality of cutting elements for forming a strip of one predetermined width, certain of said elements being detachably secured to the remaining elements for adapting said roll to form a strip of a smaller predetermined width.

3. A roll for cutting strips from a sheet, comprising a plurality of cutting elements for forming complementary strips of one predetermined width, certain of said elements being detachably secured to the remaining elements for adapting said roll to form strips of a smaller predetermined width.

4. A roll for cutting a strip from a sheet, comprising a shaft, a plurality of cutting elements adjustably mounted on said shaft

and attaching means carried by certain of said elements for the reception of additional cutting elements, whereby strips of varying widths may be formed as desired.

5 5. A roll for cutting a plurality of adjacent strips from a sheet, comprising a shaft, a plurality of cutting elements mounted on said shaft for forming strips of one predetermined width, said elements being
10 separable along said shaft to provide openings for the reception of additional cutting elements for increasing the width of said strips, and attaching means carried by certain of said first named elements for securing
15 said second named elements.

6. A roll for cutting a plurality of complementary strips from a sheet, comprising a shaft, a plurality of cutting elements mounted in complementary relation on said
20 shaft for forming strips of one predetermined width, said elements being separable along said shaft to provide openings for the reception of additional elements for increasing the width of said strips, and attaching
25 means carried by certain of said first named elements for securing said second named elements.

7. A roll for cutting a strip from a sheet, comprising a shaft, a plurality of associated
30 cutting elements mounted on said shaft and adapted for forming a strip of one predetermined width, said elements being separable along said shaft from the mid-portion of said roll toward each end thereof to provide
35 openings for the reception of additional cutting elements, and attaching means carried by certain of said first named elements for securing said second named elements, thereby enabling said roll to cut a strip of a
40 larger predetermined width.

8. A roll for cutting a strip of predetermined width from a sheet, comprising a shaft, means for cutting said strip comprising a plurality of elements mounted on said
45 shaft and a second plurality of elements detachably secured to certain of said first named elements, said first named elements being arranged for adjustment on said shaft to shorten the length of said roll, when said
50 second named elements are removed.

9. A roll for cutting a strip from a sheet, comprising a shaft, a plurality of associated disks having knives on their peripheral surfaces mounted on said shaft and adapted for
55 cutting a strip of a predetermined width, said disks being adjustable on said shaft to provide openings for the reception of segments having knives in their peripheral surfaces, and attaching means carried by certain
60 of said disks for the securement of said segments, thereby enabling said roll to cut a strip of a larger predetermined width.

10. A roll for cutting a strip from a sheet, comprising a shaft, a plurality of disks having
65 knives on their peripheral surfaces

mounted on said shaft and adapted for cutting a strip of one predetermined width, said disks being separable along said shaft from the mid-portion of said roll toward each end thereof to provide openings for the recep- 70
tion of segments having knives on their peripheral surfaces, and attaching means carried by certain of said disks for securing said segments, thereby enabling said roll to cut a strip of a larger predetermined width. 75

11. A roll for cutting a plurality of strips of a predetermined width from a sheet, comprising a shaft, a central disk and a plurality of disks, disposed on each side thereof, mounted on said shaft, all of said disks having knives on their peripheral surfaces for cutting the side and end edges of said strips, said central disk carrying studs on the parallel faces thereof and the end disks carrying studs on the outer faces thereof, and all
80 of said disks being movable on said shaft to provide openings for the insertion therein and attachment on said studs of segments having knives on their peripheral surfaces, thereby enabling said roll to cut strips of
85 a wider predetermined width. 90

12. A roll for cutting a strip of a predetermined width from a sheet, comprising a shaft, a plurality of disks having knives on their peripheral surfaces adjustably
95 mounted on said shaft, and segments having knives on their peripheral surfaces detachably secured to certain of said disks, whereby a strip of a smaller predetermined width is formed when said segments are removed. 100

13. A roll for cutting a plurality of strips of a predetermined width from a sheet, comprising a shaft, a central disk and a plurality of disks, disposed on each side thereof, mounted on said shaft, all of said disks
105 having knives on their peripheral surfaces for cutting the side and end edges of said strips, said central disk carrying studs on the parallel faces thereof and the disks adjacent thereto being provided with holes for
110 the reception of said studs.

14. A roll for cutting a strip from a sheet, comprising a shaft, a plurality of carriers provided with cutting elements adjustably
115 mounted on said shaft, attaching means mounted on certain of said carriers, and additional carriers provided with cutting elements secured to said attaching means.

15. A roll for cutting a strip from a sheet, comprising a shaft, a plurality of carriers
120 provided with cutting elements adjustably mounted on said shaft, attaching means mounted on certain of said carriers, and additional carriers provided with cutting elements detachably secured to said attaching
125 means.

16. A roll for cutting a strip from a sheet, comprising a shaft, a plurality of disks having knives on their peripheral surfaces adjustably mounted on said shaft, attaching
130

means carried by certain of said disks, and segments having knives on their peripheral surfaces mounted on said attaching means.

17. A roll for cutting a plurality of strips from a sheet, comprising a shaft, a central disk and a plurality of disks, disposed on each side thereof, adjustably mounted on said shaft, all of said disks having knives on their peripheral surfaces for cutting the side and end edges of said strip, said central disk carrying studs on the parallel faces thereof and the end disks carrying studs on the outer faces thereof, and segments having knives on their peripheral surfaces mounted on said studs. 15
18. A roll for cutting a strip from a sheet, comprising a plurality of cutting elements for forming a strip of one predetermined width, certain of said elements being removable from said roll in directions transverse to the axis thereof for adapting said roll to form a strip of a smaller predetermined width. 20

In testimony whereof, I affix my signature.

CHARLES W. DOHM.