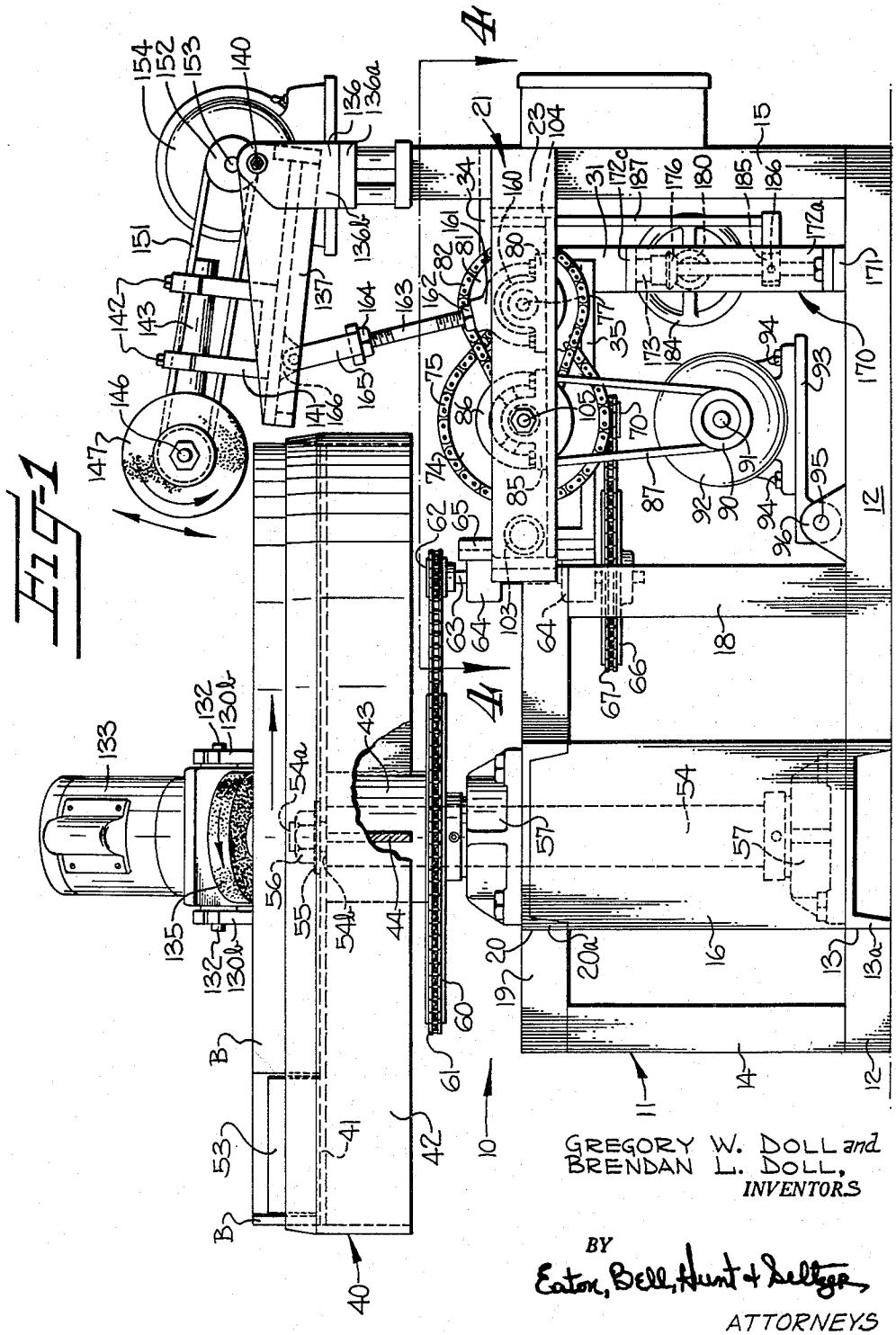
March 2, 1965 G. W. DOLL ETAL 3,171,233

APPARATUS AND METHOD FOR FORMING A SCALLOPED EDGE ON DOCTOR BLADES

Filed Dec. 21, 1962

4 Sheets-Sheet 1

Fig-1



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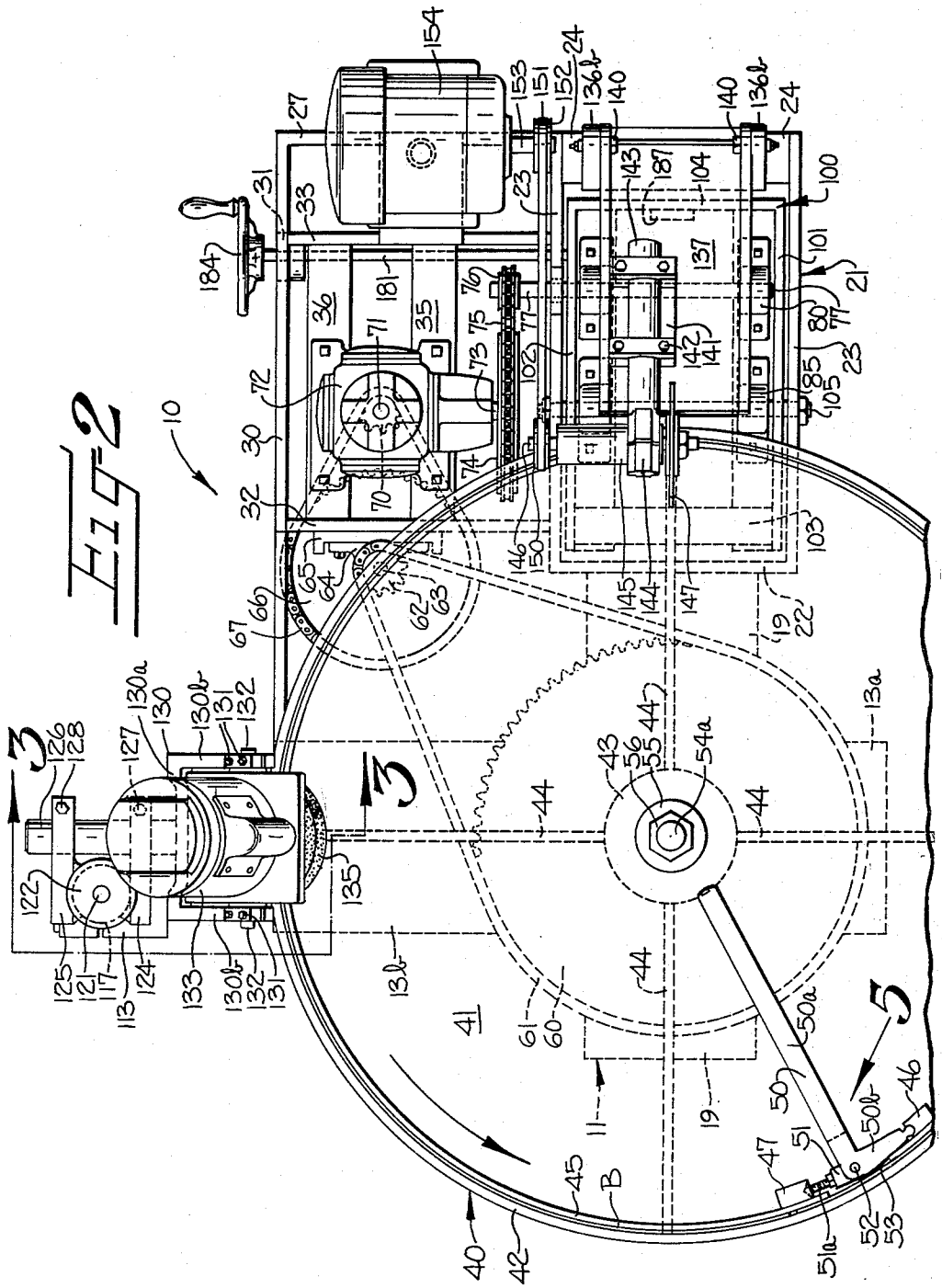
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APPARATUS AND METHOD FOR FORMING A SCALLOPED EDGE ON DOCTOR BLADES

Filed Dec. 21, 1962

4 Sheets-Sheet 2

Fig-2



March 2, 1965 G. W. DOLL ETAL 3,171,233

APPARATUS AND METHOD FOR FORMING A SCALLOPED EDGE ON DOCTOR BLADES

Filed Dec. 21, 1962 4 Sheets-Sheet 3

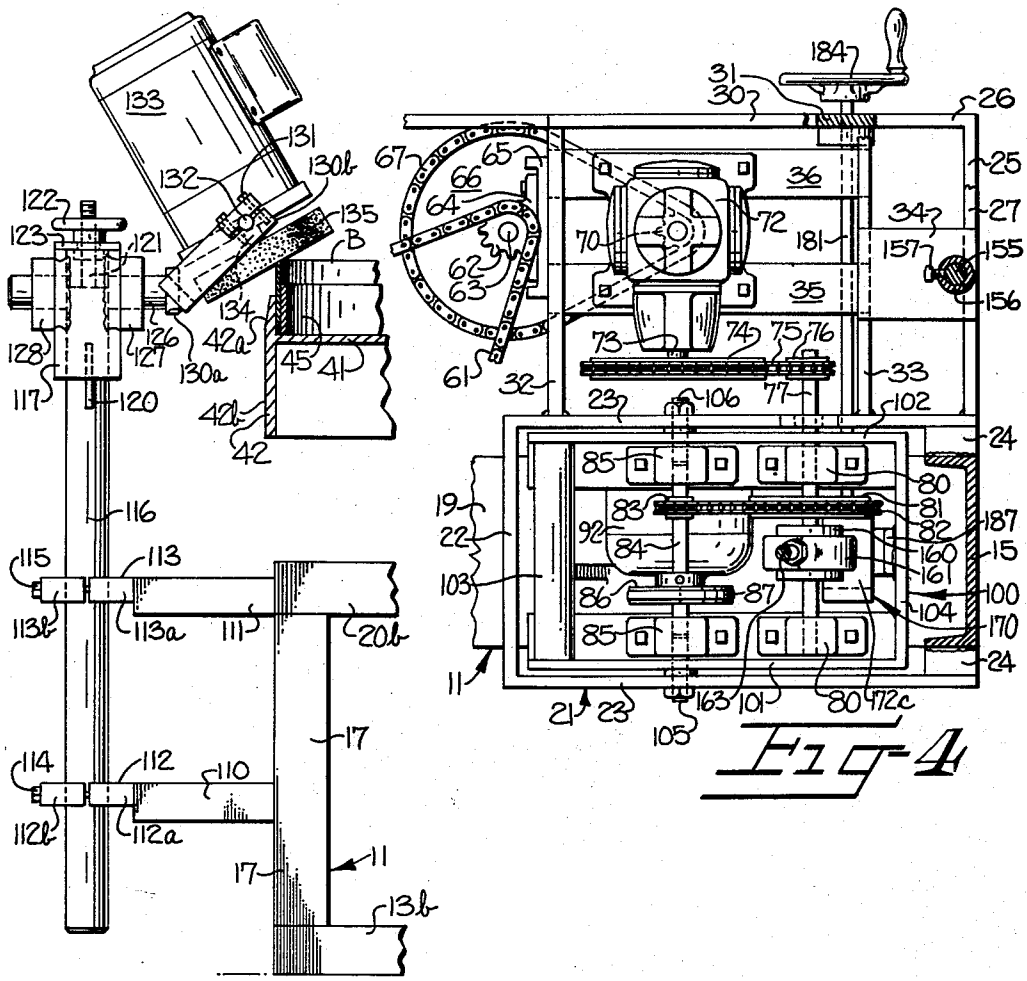


Fig-4

Fig-3

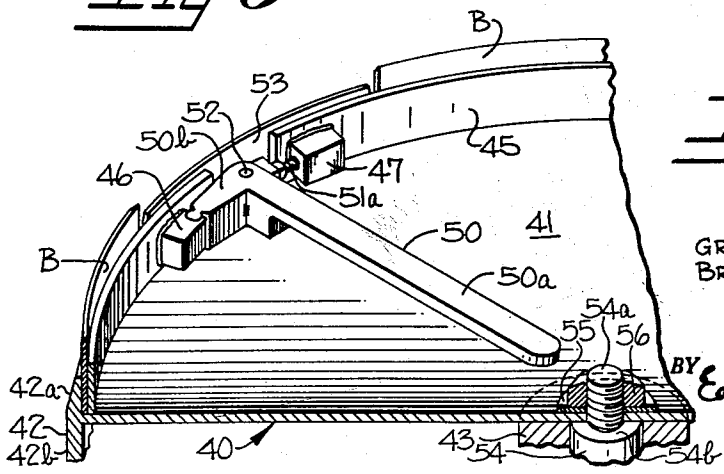


Fig-5

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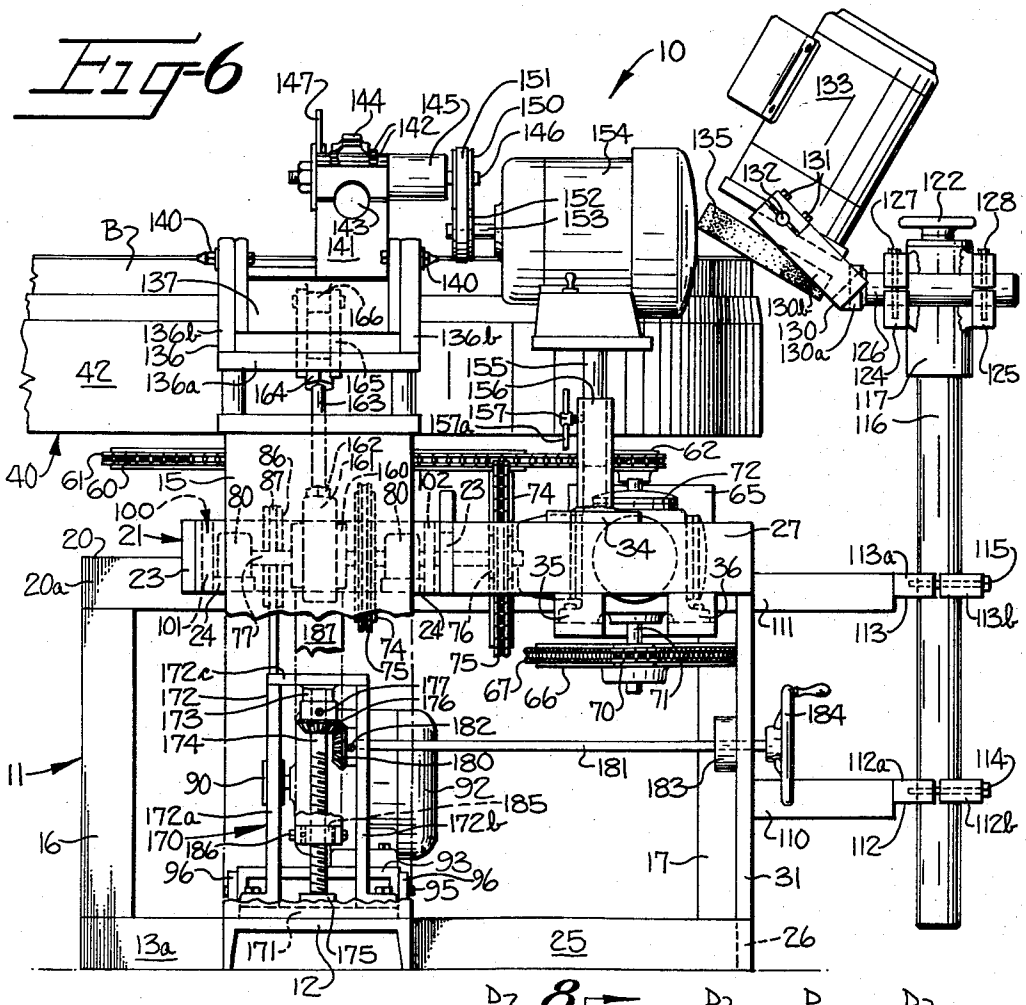
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March 2, 1965 G. W. DOLL ETAL 3,171,233

APPARATUS AND METHOD FOR FORMING A SCALLOPED EDGE ON DOCTOR BLADES

Filed Dec. 21, 1962 4 Sheets-Sheet 4

Fig-6



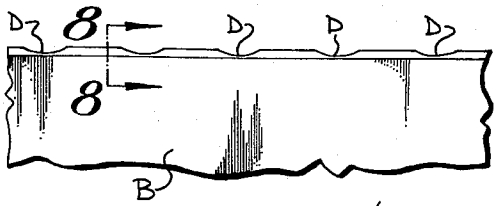


Fig-7

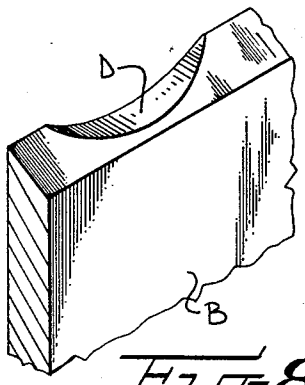


Fig-8

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United States Patent Office 3,171,233 Patented Mar. 2, 1965

3,171,233

APPARATUS AND METHOD FOR FORMING A SCALLOPED EDGE ON DOCTOR BLADES

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Filed Dec. 21, 1962, Ser. No. 246,523
12 Claims. (Cl. 51—3)

The present invention relates to an apparatus and method for forming a scalloped, working edge on a doctor blade, which doctor blade is particularly adaptable for use with a paper making machine for removing the web of paper from a drying cylinder with the scalloped edge thereof forming alternating longitudinal bands of coarsely and finely creped areas of the paper.

It can readily be appreciated that the working edge of a doctor blade of this type must be very straight throughout its length, which length is usually considerable, so that the doctor blade will evenly and completely engage the drying cylinder of the paper making machine across the face thereof. Also, the depressions in such a working edge must be of a predetermined depth and must be uniform in nature throughout the length of the doctor blade so that all of the depressed areas of the doctor blade will likewise evenly engage the drying cylinder. Otherwise, uneven wear will result on the surface of the drying cylinder, and the paper may not be smoothly and completely removed from the drying cylinder thereby interfering with the efficient operation of the paper making machine.

It has also been determined that the working edge of the doctor blade is preferably beveled in the portions thereof between the depressions, so that the areas of the paper which are removed from the drying cylinder by these portions will be coarsely creped as opposed to the finely creped areas which are removed from the drying cylinder by the depressed areas. Also, such beveled portions provide a greater difference in the number of crepes per inch of the paper web between the coarsely and finely creped areas thereof.

Prior to the present invention, no apparatus was available for forming a straight beveled edge on a doctor blade having spaced apart uniform depressions therein. There were grinding apparatuses for grinding a straight working edge on doctor blades, but such apparatuses were not capable of forming the desired bevel or the spaced apart, uniform depressions therein. Therefore, doctor blades of this type have heretofore been formed by manually moving a doctor blade and a grinding element relative to each other to form the beveled edge thereon and then manually engaging the thusly beveled edge by a grinding element at spaced points therealong to form the spaced apart depressions.

It can readily be appreciated that such a manual operation requires a highly skilled operator to achieve any degree of uniformity or accuracy in the beveling of the working edge and the forming of the depressions therein. However, even the most highly skilled workman cannot readily form the straight, beveled edge and the depressions therein with the necessary degree of accuracy and uniformity to provide a satisfactory working edge. Also, such manual operations are very tedious, time-consuming and resulted in great mental and physical fatigue in the operator. In addition, such manual operations are very expensive.

It is therefore an object of the present invention to provide an apparatus and method for forming a scalloped working edge on a doctor blade of the type to be used in connection with a paper making machine to form alternating longitudinal bands of coarsely and finely creped areas in the paper web wherein a doctor blade and a grinding element are moved relative to each other for

grinding a bevel on the one edge of the doctor blade to remove any irregularities thereform and to thereby form a smooth, straight working edge thereon and wherein spaced apart, uniform depressions are formed in the thusly beveled working edge of the doctor blade by a second grinding element.

A more specific object of the present invention is to provide an apparatus and method of the character described wherein the doctor blade is continuously moved through a predetermined path past a grinding element which bevels one edge of the doctor blade to form the straight working edge and wherein spaced apart depressions are formed in the beveled working edge by a second grinding element intermittently moved into engagement therewith in timed relation to the movement of the doctor blade and while such movement is continued in an uninterrupted manner to form uniformly spaced depressions of uniform character.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a front elevational view of the apparatus of the present invention;

FIGURE 2 is a top plan view of the apparatus shown in FIGURE 1 with a portion broken away;

FIGURE 3 is a fragmentary vertical section taken substantially along line 3—3 in FIGURE 2;

FIGURE 4 is a fragmentary sectional plan taken substantially along line 4—4 in FIGURE 1;

FIGURE 5 is a fragmentary isometric detail looking in the direction of the arrow 5 in FIGURE 2 with portions shown in section;

FIGURE 6 is a fragmentary side elevational view looking from the right-hand side of FIGURE 1;

FIGURE 7 is an enlarged fragmentary elevation detail of a finished doctor blade according to the present invention; and

FIGURE 8 is a further enlarged fragmentary isometric detail taken substantially along line 8—8 in FIGURE 7.

Referring now to the drawings, and more particularly to FIGURE 1, the apparatus of the present invention is generally indicated at 10. Apparatus 10 includes various operative elements which, while cooperating to form the desired working edge on the doctor blade, will be described separately under appropriate sub-titles for ease of description.

Framework

Apparatus 10 comprises a frame 11 which includes a first base member 12 formed of suitable channel material and extending for the full width of the apparatus 10. A second base member 13 (FIGURES 1 and 3) is formed in two sections with one section 13*a* being disposed on one side of base member 12 and the other section 13*b* thereof being disposed on the opposite side of base member 12. Sections 13*a* and 13*b* are connected to base member 12 by any suitable means such as welding or the like (not shown) and extend laterally, outwardly from base member 12.

Frame 11 also includes a pair of end standards 14, 15 (FIGURE 1) mounted on base member 12 at opposite ends thereof and front and rear standards 16, 17 (FIGURES 1 and 4) mounted on base member 13 at opposite ends thereof. An intermediate standard 18 is mounted on base member 12 intermediate the ends thereof and cooperates with end standard 14 to support a top frame member 19 which is mounted thereon at its opposite ends in vertically spaced, parallel relation to base member 12. Front and rear standards 16, 17 support a top frame member 20 (FIGURE 2) which is formed in two sections 20*a* and 20*b*, respectively, which are mounted

on opposite sides of top frame member 19 in like manner to sections 13*a* and 13*b* relative to base frame member 12.

Frame 11 further includes a rectangular frame section 21 (FIGURE 4) including an end member 22 mounted on the end of top frame member 19 at intermediate standard 18 and having side members 23 mounted on opposite ends thereof and extend laterally outwardly therefrom. The other ends of side members 23 are connected to blocks 24 which are in turn mounted on opposite sides of end standard 15.

A base frame member 25 (FIGURES 4 and 6) is connected at one end to the side of base member 12 at end standard 15 and extends laterally, rearwardly therefrom. The other end of base end frame member 25 is connected to one end of a base rear frame member 26 which is connected at its other end to the side of section 13*b* of base frame member 13. A top end frame member 27 (FIGURES 2 and 4) is disposed above base end frame member 25 and is mounted at one end on one of the side members 23 of frame section 21. The other end of top end frame member 27 is connected to one end of a top rear frame member 30 which is connected at its other end to one side of section 20*b* of top frame member 20. Said one end of top rear frame member 30 is supported above base rear frame member 26 by a post or standard 31 (FIGURE 6) which is mounted on base rear frame member 26 and is connected to top rear frame member 30 at its upper end.

A pair of spaced apart, intermediate frame members 32, 33 (FIGURE 4) are mounted at one end on said one side member 23 of frame section 21 and are mounted at their other end on top rear frame member 30. Intermediate frame member 33 is spaced from top end frame member 27 and cooperates therewith to support a cross frame member 34. A pair of spaced apart generally U-shaped frame members 35, 36 have the upper ends of the legs thereof mounted thereon and the bight portions thereof extending generally therebetween, but at a lower elevation.

Turntable and drive therefor

A preferably circular turntable 40 (FIGURES 1 and 2) includes a circular plate 41 having a flange 42 formed around the periphery thereof. Flange 42 has a portion 42*a* (FIGURES 1 and 5) extending upwardly from plate 41 and a portion 42*b* extending downwardly therefrom. A hub member 43 is mounted on the lower surface of the central portion of circular plate 41 and has an opening therethrough alined with an opening in the center of circular plate 41. It is noted that the opening in the plate 41 is of a smaller diameter than the opening through hub 43. Four rib members 44 (FIGURES 1 and 2) are connected at one end to hub 43 and extend radially outwardly therefrom and are connected at their outer ends to the downwardly extending flange portion 42*b*. The upper edges of rib members 44 are connected to the lower surface of plate 41 by any suitable means, such as welding (not shown). It is noted that flange 42, hub 43 and rib members 44 impart the necessary rigidity to turntable 40.

A clamping device (FIGURES 2 and 5) is carried by plate 41 interiorly of flange 42 and includes a generally circular retaining band 45 which terminates in spaced end portions. It is noted that retaining band 45 is formed of suitable resilient metal and normally has a diameter less than the diameter of flange 42 on plate 41 so that in relaxed condition, retaining band 45 is spaced inwardly from the upstanding flange portion 42*a*.

Means is provided for spreading or expanding retaining band 45 to clamp a doctor blade B between the retaining band and the upstanding flange portion 42*a* with the edge of the doctor blade to be ground disposed uppermost. Such expanding means includes blocks 46, 47 (FIGURE 5) mounted adjacent opposite ends of retaining band 45 by any suitable means, such as welding, and

which have sockets (not shown) in the facing ends thereof. An over center latch mechanism is disposed between blocks 46 and 47 and includes an L-shaped latch member 50 having one leg 50*a* thereof longer than the other leg 50*b* and defining a handle for facilitating operation of the latch mechanism. The shorter leg 50*b* of latch member 50 has a ball or rounded free end portion which is disposed in the socket in block 46 such that latch member 50 may oscillate relative to block 46.

A second latch member 51 is pivotally mounted by a suitable bolt 52 on latch member 50 at the point of juncture of the legs thereof for relative pivotal movement. Second latch member 51 includes an adjustable bolt 51*a* which terminates in a rounded end portion which is disposed in the socket in block 47 for relative oscillatory movement of second latch member 51 relative to block 47. It is noted that when doctor blade B is of a length less than the circumference of plate 41, a spacer 53 may be disposed between the spaced ends of the doctor blade when the same is positioned between the retaining band 45 and the flange 42. It is noted that the latch mechanism is retained in latched position when latch member 50 is moved counterclockwise about pivot 52 (as seen in FIGURE 2) and thereby moves pivot 52 outwardly of a straight line drawn between the sockets in blocks 46, 47 until the latch member 50 is manually moved in a clockwise direction (as seen in FIGURE 2).

A shaft 54 has a reduced upper end portion 54*a* (FIGURE 5) which defines a shoulder 54*b* at its juncture point with the remainder of shaft 54. Reduced end portion 54*a* penetrates through the opening in circular plate 41 and is externally threaded for receipt of a washer 55 and a nut 56 to clamp the circular plate 41 downwardly against shoulder 54*b*. It is noted that the remainder portion of shaft 54 is of substantially the same diameter as the opening through hub 43 and penetrates therethrough.

Shaft 54 is journaled for rotation in a pair of bearings 57 mounted on base frame member 12 and top frame member 19, respectively, by suitable bolts. Turntable 40 is thereby mounted for rotation on frame 11.

Turntable 40 is rotated by a large sprocket 60 (FIGURES 1 and 2) drivingly mounted on shaft 54 and which supports one end of a sprocket chain 61. Sprocket chain 61 is supported at its other end by a drive sprocket 62 which is many times smaller than sprocket 60 (FIGURE 4). Drive sprocket 62 is mounted on a shaft 63 (FIGURE 1) which is journaled for rotation in a pair of spaced bearings 64. Bearings 64 are mounted on a bracket plate 65 which in turn is mounted on intermediate frame member 31.

Shaft 63 has a sprocket 66 drivingly mounted on the other end thereof which supports one end of a sprocket chain 67 (FIGURE 4). Sprocket chain 67 is supported at its other end by a sprocket 70 which is several times smaller than sprocket 66 and is mounted on an output shaft 71 of a speed reduction transmission 72 (FIGURE 4).

Speed reduction transmission 72 is mounted on U-shaped frame members 35, 36 and has an input shaft 73 on which is drivingly mounted a sprocket 74 (FIGURES 1 and 4). Sprocket 74 supports one end of a sprocket chain 75 which is supported at its other end by a sprocket 76 which is several times smaller than sprocket 74. Sprocket 76 is mounted on one end of a shaft 77 (FIGURE 4) journaled for rotation in bearings 80 and has a sprocket 81 drivingly mounted thereon. Sprocket 81 supports one end of a sprocket chain 82 which is supported at its other end by a sprocket 83 which is smaller than sprocket 81. Sprocket 83 is mounted on a shaft 84 for rotation therewith which in turn is journaled for rotation in bearings 85 and has a pulley 86 drivingly mounted thereon. Pulley 86 supports one end of a drive belt 87 (FIGURE 1) which is supported at its other end by a pulley 90 mounted on output shaft 91 of a motor 92.

Motor 92 is mounted on a plate 93 by suitable bolts 94 and plate 93 is pivotally mounted at one end by a shaft 95. Shaft 95 is supported at its opposite ends in spaced apart bearings 96 which are in turn mounted on base frame member 12. It is noted that the pivotal mounting of plate 93 permits the weight of motor 92 to maintain the proper tension in drive belt 87.

Bearings 80 and 85 are mounted on a frame 100 (FIGURE 4) comprising side members 101, 102 formed of suitable angle materials and end members 103, 104 connecting side frame members 101, 102 at their opposite ends. Frame 100 is in turn mounted on side members 23 of frame section 21 by bolts 105, 106 mounted on side members 23 and penetrating through suitable openings in side members 101, 102, respectively, of frame 100 and being journaled at their inner ends in bearings 85. Frame 100 is therefore pivotally mounted on frame section 21 for movement about a pivot defined by bolts 105, 106 which are in longitudinal alinement with shaft 84. Therefore, shaft 77 may oscillate about shaft 84 for reasons to be presently described.

First grinding means

A pair of spaced apart brackets 110, 111 (FIGURE 3) are mounted on standard 17 and the end of top frame member 20, respectively, and have mounted thereon one section 112*a*, 113*a* of split clamps 112, 113. The other sections 112*b*, 113*b* of clamps 112, 113 are adjustably mounted on sections 112*a*, 113*a* by bolts 114, 115 for moving the split sections of the clamps toward and away from each other to adjustably clamp a column 116 therein. Column 116 has a sleeve 117 mounted on the upper end thereof for sliding vertical movement relative thereto. Sleeve 117 is prevented from rotating relative to column 116 by a keyway 120 formed in column 116 and in which is disposed a cooperating key (not shown) mounted on the interior of sleeve 117.

A bolt 121 (FIGURES 2 and 3) is mounted at one end on the upper end of column 116 and extends upwardly therefrom above the upper end of sleeve 117. A hand wheel 122 is threadably mounted on the upper portion of bolt 121 for rotation relative thereto and hence longitudinal movement therealong. Hand wheel 122 includes a hub having a circumferential groove therearound in which is disposed the portion of a plate 123 defining a central opening therethrough in which the hub is disposed. Plate 123 is mounted on the upper end of sleeve 117 so that sleeve 117 moves upwardly and downwardly along column 116 upon rotation of hand wheel 122 in the appropriate direction.

A pair of clamp members 124, 125 (FIGURES 2 and 6) are mounted on opposite sides of sleeve 117 and extend laterally outwardly therefrom. Clamp members 124, 125 terminate in split portions at their outer ends, which portions have alined horizontal openings therethrough in which is disposed a mounting bar 126 which extends inwardly toward turntable 40. Mounting bar 126 is adjustably clamped in clamping members 124, 125 by bolts 127, 128 to prevent rotation thereof, but to permit longitudinal adjustment thereof relative to the clamping members.

A U-shaped mounting member 130 has the bight portion 130*a* thereof mounted on the inner end of mounting bar 126 with the leg portions 130*b* thereof extending inwardly and upwardly therefrom at an acute angle to the horizontal. Leg portions 130*b* terminate in split clamp portions (FIGURES 3 and 6) having alined openings therethrough and which have a pair of spaced apart bolts 131 therein for releasably clamping pivot pins 132 carried by the housing of a motor 133 for pivotally mounting the motor on mounting member 130.

Motor 133 has an output shaft 134 (FIGURE 3) on which is mounted a first grinding element or disk 135 (FIGURES 3 and 6). First grinding element 135 is thereby positioned adjacent to turntable 40 for rotation about an axis normally disposed at an acute angle to the vertical and is adapted to engage the upper edge of the doctor blade B carried by turntable 40 for beveling the same and to provide a straight smooth edge thereon.

Second grinding means

A generally U-shaped bracket 136 (FIGURES 1 and 2) has the bight portion 136*a* thereof mounted on the upper end of end standard 15 and has the legs 136*b* thereof extending upwardly therefrom. A mounting arm 137 is mounted at one end between the legs of U-shaped bracket 136 by bolts 140 penetrating through alined openings therein for pivotal movement upwardly and downwardly about a horizontal pivot defined thereby. Mounting arm 137 has a U-shaped bracket 141 mounted thereon adjacent its outer end with the legs extending upwardly therefrom and terminating in split clamp portions having alined openings therethrough. The split portions of the legs of bracket 141 are releasably clamped together by suitable bolts 142 for clamping a mounting bar 143 therein for adjustment inwardly toward or outwardly away from turntable 40.

Mounting bar 143 has a split clamp 144 (FIGURE 2) mounted on the end thereof adjacent turntable 40 which clampingly mounts a sleeve bearing 145 for lateral adjustment relative thereto. A shaft 146 is journaled for rotation in sleeve bearing 145 and extends outwardly from opposite ends thereof. A second grinding element or disk 147 (FIGURE 1) is clampingly mounted on one end of shaft 146 (FIGURE 2) and a pulley 150 is mounted on the other end of shaft 145. Pulley 150 supports one end of a belt 151 which is supported at its other end by a drive pulley 152 mounted on an output shaft 153 of a motor 154.

Motor 154 is mounted on the upper end of a bar 155 (FIGURE 6) which has its lower end mounted in a sleeve 156 and is adjustably held therein by a lock screw 157 which is manually rotatable by means of a handle 157*a* into and out of engagement with bar 155. Sleeve 156 is mounted at its lower end on cross member 33 by any suitable means, such as welding.

Means is provided for oscillating the pivotally mounted arm 137 upwardly and downwardly relative to turntable 40 in timed relation to the rotation thereof to thereby move second grinding element 147 carried thereby into and out of engagement with the working edge of the doctor blade B to form spaced apart depressions D (FIGURES 7 and 8) therein. Such means comprises an eccentric 160 (FIGURES 1 and 4) mounted on shaft 77 for rotation therewith and around which is disposed a follower strap 161. Strap 161 has an internally threaded nut 162 mounted thereon which matingly receives one externally threaded end portion of a connecting rod 163. The other end portion of connecting rod 163 is also externally threaded but with an allochiral lead relative to said one end portion thereof. The other end portion is matingly mounted in an internally threaded nut 164 mounted on the bight portion of a U-shaped connecting link 165 which has the legs thereof straddling and pivotally connected to a bracket 166 mounted on the lower surface of arm 137. The effective length of connecting rod 163 may therefore be varied by rotating the same in the appropriate direction.

Means is provided for controlling the elevation of the lower limit of the oscillatory movement of arm 137 and hence second grinding element 147 relative to turntable 40 to control the depth of the depressions being formed in the doctor blade and to position the second grinding element in an inoperative position wherein the same will not engage the doctor blade B. This means comprises a mounting frame 170 including a base 171 on which are mounted the lower ends of legs 172*a*, 172*b* of an inverted U-shaped supporting bracket 172. Bracket 172 includes a bight portion 172*c* which has a bearing 173 mounted on

the lower surface thereof in which is journaled for rotation one end of a threaded shaft **174**. The other end of shaft **174** is journaled for rotation in a bearing **175** mounted on base **171**.

A bevel gear **176** is drivingly mounted on shaft **174** by a set screw **177** and is disposed in meshing relation to a bevel gear **180** mounted on one end of a shaft **181** for rotation therewith by a set screw **182**. Shaft **181** penetrates through and is journaled for rotation in an opening in leg **172***b* of bracket **172** and likewise penetrates through and is journaled in a bearing **183** mounted on vertical frame member **31**. Shaft **181** penetrates through an opening in frame member **31** and extends outwardly therefrom. A hand wheel **184** is mounted on the outer end of shaft **181** for facilitating rotation of shaft **181**.

A split nut **185** surrounds threaded shaft **174** and has an internally threaded opening defined by the split portions thereof which matingly receives the threads of shaft **174**. Split nut **185** is releasably maintained in surrounding relation to shaft **174** by bolts **186**. Split nut **185** is connected to the lower end of a connecting member **187** which extends upwardly therefrom and is connected at its upper end to end frame member **104** of pivotally mounted frame **100**.

Operation

In operation, a doctor blade to be ground is bent into a circular configuration and is positioned between flange portion **42***a* and retaining band **45** with one edge thereof resting on the upper surface of circular plate **41**. If required, spacer **53** is positioned between flange portion **42***a* and retaining band **45** between the ends of the doctor blade.

The doctor blade is then clamped in this circular configuration with the center of curvature disposed on the axis of rotation of turntable **40** by moving handle portion **50***a* counterclockwise until pivot **52** moves over center. Turntable **40** is then rotated by motor **92** by means of the belt and pulleys, and sprockets and sprocket chains connecting the same.

Prior to rotating turntable **40**, grinding element **147** and its supporting arm **137** are pivoted upwardly relative to turntable **40** by manual rotation of hand wheel **184** which rotates shaft **181** and then shaft **174**. Clamp nut **185** is thereby moved upwardly which pivots the end of frame **100** on the opposite side of shaft **77** from shaft **84** upwardly about bolts **105**, **106**. Shaft **77** is thereby moved upwardly in an arc having a radius equal to the distance between shafts **77** and **84** which in turn moves arm **137** upwardly through strap **161**, connecting rod **163** and connecting link **165**. The lower limit of oscillation of arm **137** and hence grinding element **147** is thereby disposed above the upper edge of the doctor blade B clamped on turntable **40** so that grinding element **147** will not engage the same.

Grinding element **135** is then positioned relative to the upper edge of the doctor blade B by suitable rotation of the hand wheel **122** to position sleeve **117** at the desired height on column **116** and the angle of the face of grinding element **135** is adjusted by pivoting motor **133** relative to mounting member **130** to provide the desired bevel to the working edge of the doctor blade. Preferably, grinding element **135** is positioned at such an elevation relative to turntable **40** that the same will grind away a slight amount of the upper edge of the doctor blade upon the initial revolution thereof with turntable **40**. Upon each additional revolution of the doctor blade B with turntable **40**, grinding element **135** is moved downwardly a slight amount until the desired depth of cut is formed on the upper edge of the doctor blade B to provide a beveled, straight working edge thereon.

While rotation of turntable **40** is continued, grinding element **135** is moved out of engagement with the doctor blade B by suitable rotation of hand wheel **122** and grinding element **147** is moved downwardly by rotation of hand wheel **184** in the appropriate direction to rotate

shaft **181** and hence, shaft **174**. This moves clamp nut **185** downwardly and pivots frame **100** about bolts **105**, **106** in a clockwise direction as seen in FIGURE 1. Preferably, the grinding element **147** is positioned relative to turntable **40** such that the lower limit of its oscillatory movement is slightly below the upper surface of the beveled edge of the doctor blade such that upon the initial revolution of the doctor blade, grinding element **147** will remove a slight amount of this upper surface at spaced points therealong to form very slight depressions. After each revolution of the doctor blade B by turntable **40**, the lower limit of the oscillatory movement of grinding element **147** is moved downwardly slightly until the depressions being formed by grinding element **147** are at the desired uniform depth. After the grinding operation is completed, turntable **40** is stopped and grinding element **147** is moved upwardly in the manner described above and the doctor blade B is released from turntable **40**.

While the above-mentioned mode of operation is preferred, it is noted that grinding elements **135** and **147** may be operated simultaneously on the working edge of the doctor blade B such that the working edge is beveled at the same time that the depressions D are being formed therein.

It will therefore be apparent that a novel apparatus and method for forming a scalloped edge on a doctor blade is provided wherein a beveled straight working edge is provided and wherein spaced apart depressions are formed in the working edge to impart a scalloped effect thereto so that when the doctor blade is used in connection with a drying cylinder on a paper-making machine, alternating bands of coarsely and finely creped areas of the paper will be formed.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:

1. A method of grinding an elongate doctor blade to provide a scalloped edge thereon which when used in a paper-making machine forms alternating longitudinal bands of finely and coarsely creped areas in the paper, said method comprising the steps of
   (*a*) continuously moving the doctor blade and a grinding element relative to each other while
   (*b*) grinding a bevel on one edge of the doctor blade, and then
   (*c*) forming uniformly spaced depressions in the thusly formed beveled edge to impart a scalloped appearance thereto by grinding the beveled edge at closely spaced apart points therealong while
   (*d*) continuously moving the doctor blade and a grinding element relative to each other.

2. A method of grinding an elongate doctor blade to provide a scalloped edge thereon which when used in a paper-making machine forms alternating longitudinal bands of finely and coarsely creped areas in the paper, said method comprising the steps of
   (*a*) continuously moving the doctor blade in a predetermined path of travel past a grinding element while
   (*b*) grinding a bevel on one edge of the doctor blade, and then
   (*c*) uninterruptedly continuing the movement of the doctor blade while
   (*d*) forming uniformly spaced depressions in the thusly formed beveled edge to impart a scalloped appearance thereto by intermittently moving a grinding element into engagement therewith for grinding the beveled edge at closely spaced apart points therealong.

3. A method of grinding an elongate doctor blade to provide a scalloped edge thereon which when used in a paper-making machine forms alternating longitudinal

bands of finely and coarsely creped areas in the paper, said method comprising the steps of

(*a*) positioning the doctor blade on a rotatable member,

(*b*) continuously rotating the rotatable member and doctor blade thereon while

(*c*) grinding a bevel on one edge of the doctor blade, and then

(*d*) continuing the rotation of the rotatable member and doctor blade while

(*e*) forming uniformly spaced depressions in the thusly formed beveled edge to impart a scalloped appearance thereto by intermittently moving a grinding element into engagement therewith for grinding the beveled edge at closely spaced apart points therealong.

4. A method of grinding an elongate doctor blade to provide a scalloped edge thereon which when used in a paper-making machine forms alternating longitudinal bands of finely and coarsely creped areas in the paper, said method comprising the steps of

(*a*) bowing the doctor blade into a generally circular configuration,

(*b*) clampingly positioning the thusly bowed doctor blade on a rotatable member concentric with the axis thereof and with the edge to be ground uppermost,

(*c*) continuously rotating the rotatable member and doctor blade thereon while

(*d*) grinding a bevel on the edge of the doctor blade disposed uppermost, and then

(*e*) continuing the rotation of the rotatable member and doctor blade while

(*f*) forming uniformly spaced depressions in the thusly formed beveled edge to impart a scalloped appearance thereto by intermittently moving a grinding element into engagement therewith for grinding the beveled edge at closely spaced apart points therealong.

5. Grinding apparatus for forming a scalloped edge on an elongate doctor blade and the like comprising

(*a*) means for supporting the doctor blade,

(*b*) first grinding means disposed adjacent said supporting means and engageable with one edge of the doctor blade for grinding a smooth uniform surface thereon,

(*c*) second grinding means disposed adjacent said supporting means and intermittently engageable with the ground edge of the doctor blade to form uniformly and closely spaced depressions therein to form a scalloped edge, and

(*d*) means for effecting relative movement between said doctor blade supporting means and said first and second grinding means and being operatively connected to said second grinding means for intermittently moving said second grinding means into engagement with the edge of the doctor blade.

6. Grinding apparatus for forming a scalloped edge on an elongate doctor blade and the like comprising

(*a*) rotatable means for clampingly supporting the doctor blade,

(*b*) first grinding means disposed adjacent said supporting means and engageable with one edge of the doctor blade for grinding this edge to provide a smooth, even surface thereon,

(*c*) second grinding means disposed adjacent said supporting means and movable toward and away from said supporting means, and

(*d*) means operatively connected to said supporting means for rotating the same to move the doctor blade past said first and second grinding means and operatively connected to said second grinding means for intermittently moving the same into engagement with the ground edge of the doctor blade to form uniformly and closely spaced apart depressions therein.

7. The structure recited in claim 6 wherein said supporting means is mounted for rotation about a vertical axis and is adapted to support the doctor blade thereon in a curved configuration concentric with the axis of said supporting means with the edge to be ground uppermost, and wherein said first grinding means comprises a grinding element mounted for rotation about an axis disposed at an acute angle to the vertical to bevel the upper edge of the doctor blade and to form a smooth surface thereon.

8. A grinding apparatus for forming a scalloped edge on an elongate doctor blade and the like comprising

(*a*) a frame,

(*b*) a turntable rotatably mounted on said frame for rotation about a vertical axis, and including means for clamping the elongate doctor blade thereon in a curved configuration concentric with the axis of said turntable and with the edge to be ground uppermost,

(*c*) first grinding means disposed adjacent said turntable and being rotatable about an axis disposed at an acute angle to the vertical and engageable with the upper edge of the doctor blade for forming a smooth, uniform bevel thereon,

(*d*) second grinding means disposed adjacent said turntable and being mounted for rotation about a horizontal axis and for intermittent engagement with the upper edge of the doctor blade to form uniformly and closely spaced apart depressions therein to form the scalloped edge, and

(*e*) drive means for rotating said turntable to move said doctor blade past said first and second grinding means and being operatively connected to said second grinding means for intermittently moving the same into engagement with the edge of the doctor blade.

9. The structure set forth in claim 8 wherein said turntable comprises a circular plate member having a vertical flange portion around the periphery thereof and a generally circular retaining band mounted on said circular plate member interiorly of said flange portion and normally being disposed in spaced relation to said flange portion, and over-center latch means operatively connected to said retaining band and operable to move said retaining band into clamping relation with said flange portion to clamp the doctor blade therebetween and said over-center latch means maintaining said retaining band in clamping relation with said flange portion until released.

10. The structure set forth in claim 8 wherein first grinding means comprises a disc-like grinding element mounted for rotation about an axis disposed at an acute angle to the vertical so that one of the faces thereof is engageable with the edge of the doctor blade, means for rotating said first grinding element, and means mounting said first grinding element for vertical adjustment relative to said turntable for varying the depth of cut thereof on the edge of the doctor blade and for adjustment of the axis thereof relative to the vertical for varying the angle of the bevel formed on the edge of the doctor blade.

11. The structure set forth in claim 8 wherein said second grinding means comprises a second grinding element mounted for rotation about a horizontal axis and in a plane radially of said turntable, means for rotating said second grinding element about said axis, means mounting said second grinding element for oscillation about a horizontal pivot spaced outwardly from the periphery of said turntable, said drive means for said turntable oscillating said second grinding element in timed relation to the rotation of said turntable, and means for adjusting the lower limit of the oscillation of said second grinding element for varying the depth of the depressions being formed in the edge of the doctor blade.

12. A grinding apparatus for forming a scalloped edge on an elongate doctor blade and the like comprising

(*a*) a frame,

(*b*) a turntable rotatably mounted on said frame for rotation about a vertical axis and comprising

(1) a generally circular plate member having a

vertical flange portion around the periphery thereof,

(2) a generally circular retaining band supported about said axis, and on said circular plate member interiorly of said flange portion and normally being disposed in spaced relation to said flange portion but expandable outwardly into clamping relation therewith for clamping the doctor blade therebetween, and

(3) over-center latch means operatively connected to said retaining band for expanding the same outwardly into clamping relation to said flange portion and being operable to maintain said retaining band in clamping relation with said flange portion until released,

(*c*) means operatively connected to said turntable for rotating the same about said vertical axis,

(*d*) first grinding means disposed adjacent said turntable and comprising

(1) a grinding element mounted for rotation about an axis disposed at an acute angle to the vertical so that one of the faces thereof is engageable with the edge of the doctor blade,

(2) means for rotating said grinding element

(3) means mounting said grinding element for vertical adjustment relative to said turntable for varying the depth of cut thereof on the edge of the doctor blade and for adjustment of the axis of the grinding element relative to the vertical for varying the angle of the bevel formed on the edge of the doctor blade,

(*e*) second grinding means disposed adjacent said turntable and comprising

(1) a grinding element mounted for rotation about a horizontal axis and in a plane radially of said turntable and adjacent thereto and adapted to intermittently engage the beveled edge of the doctor blade at closely spaced points therealong to form uniformly spaced apart depressions therein,

(2) means for rotating said grinding element about said axis,

(3) means mounting said grinding element for oscillation about a horizontal pivot spaced outwardly from the periphery of the turntable,

(4) means responsive to rotation of said turntable for oscillating said grinding element about said horizontal pivot in timed relation to the rotation of said turntable, and

(5) means for adjusting the lower limit of the oscillation of said grinding element for varying the depth of the depressions being formed in the edge of the doctor blade.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,171,233 March 2, 1965

Gregory W. Doll et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 11, line 4, strike out "about said axis, and" and insert the same after "element" in line 25, same column 11.

Signed and sealed this 27th day of July 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
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