

Sept. 18, 1951

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2,567,967

DIAGONAL CREPING METHOD AND APPARATUS

Filed Feb. 24, 1949

3 Sheets-Sheet 1

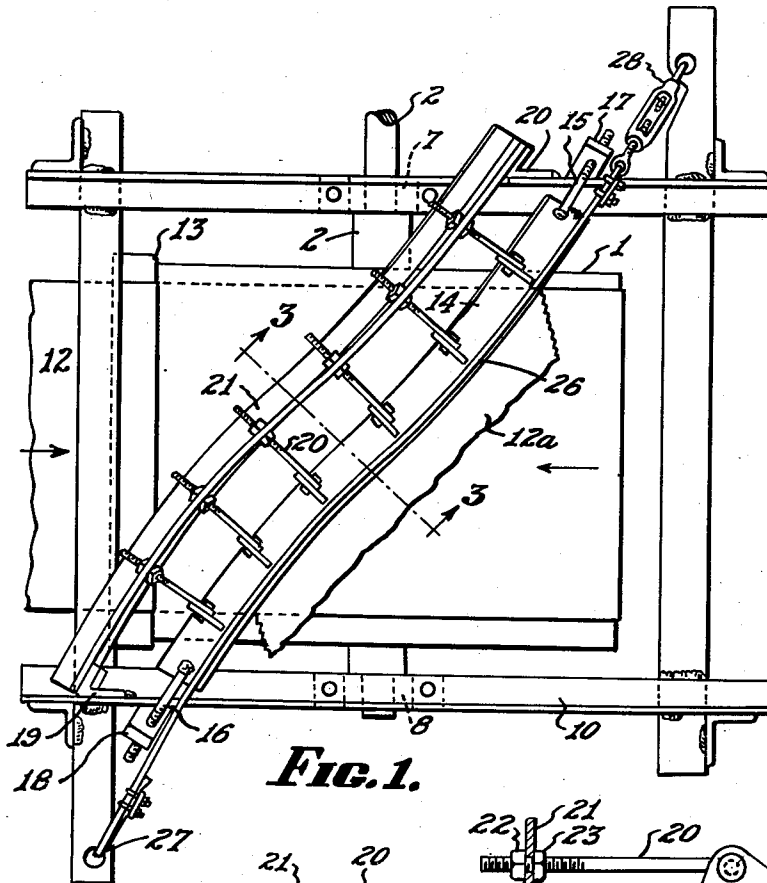


FIG. 1.

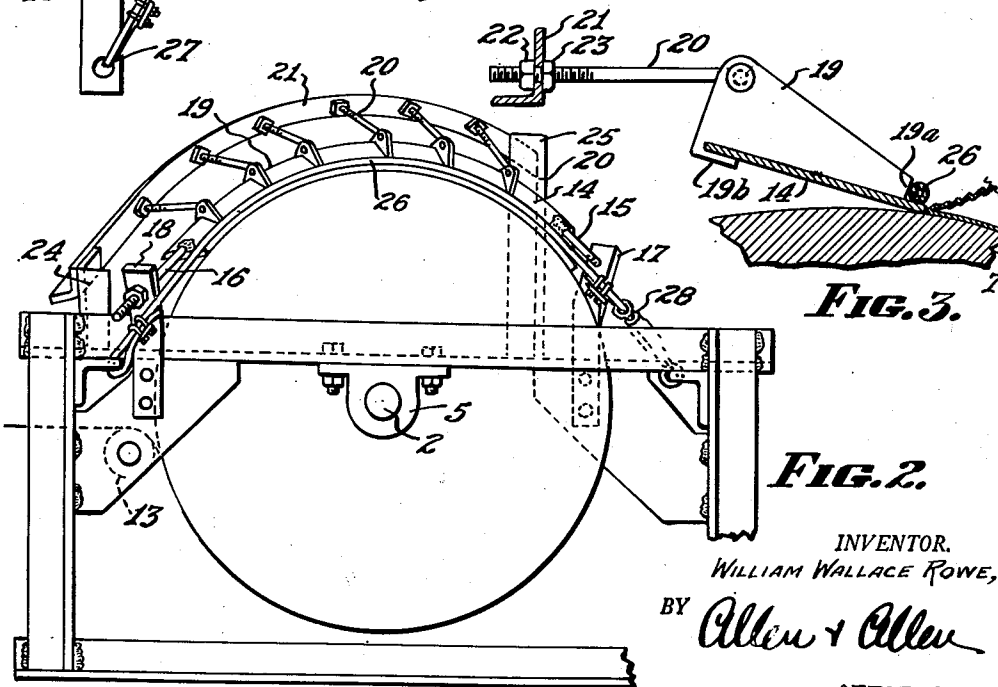


FIG. 2.

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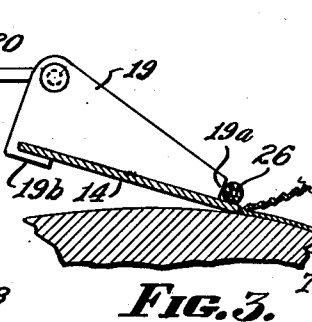


FIG. 3.

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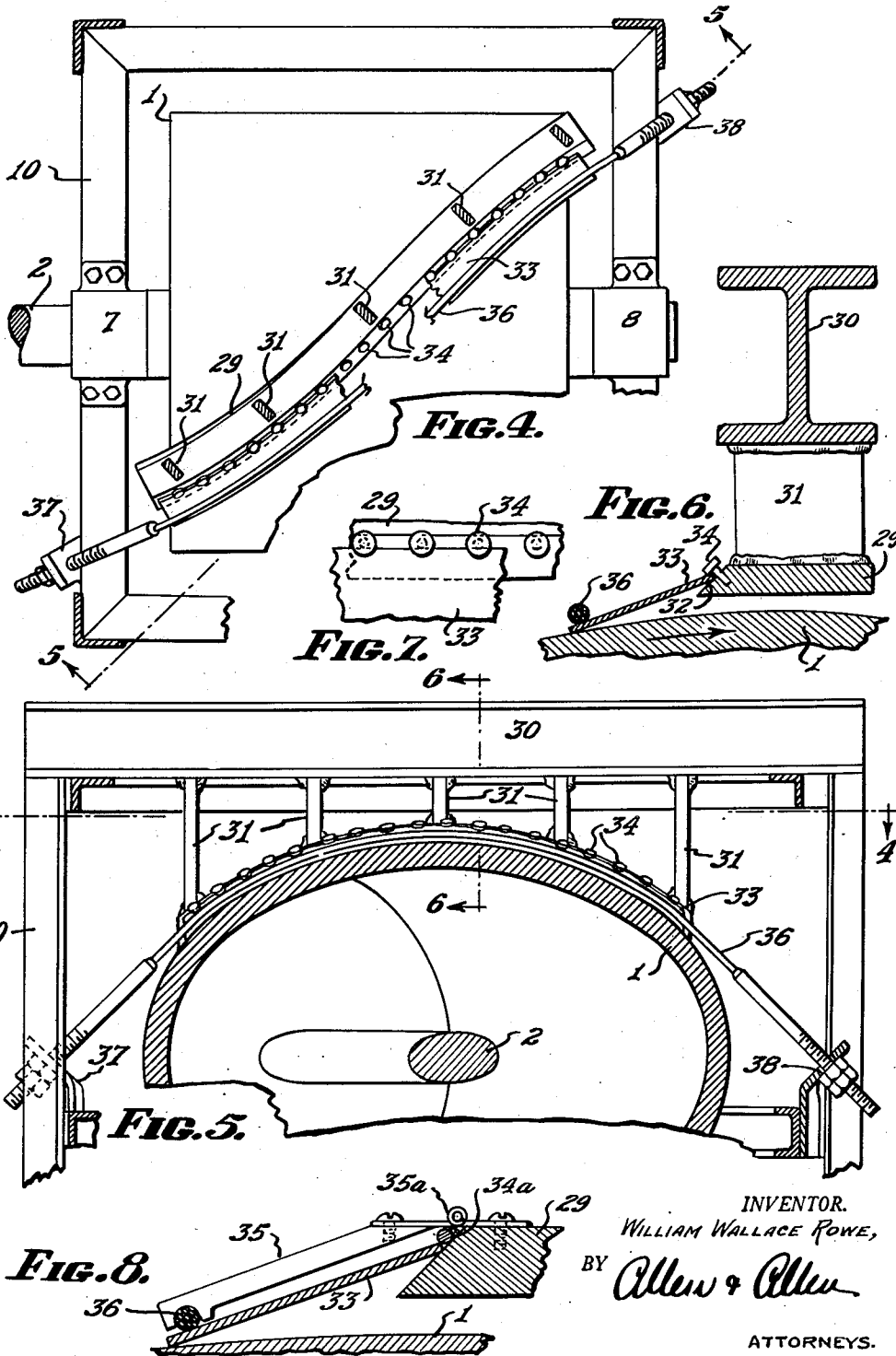
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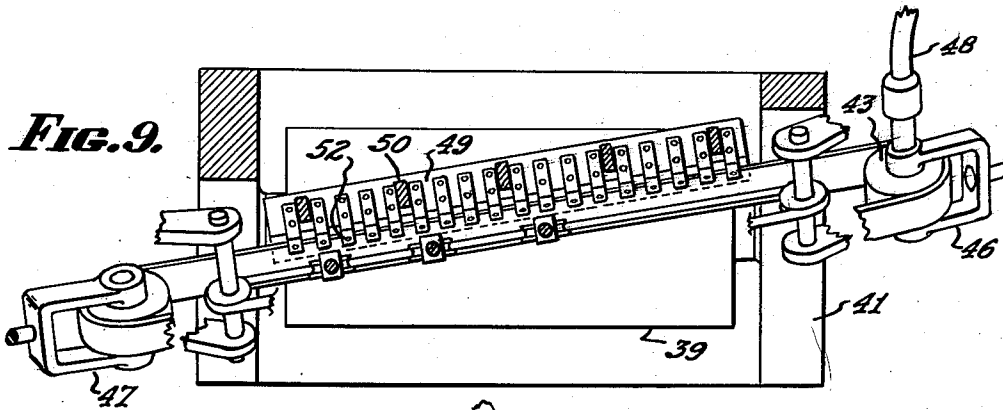
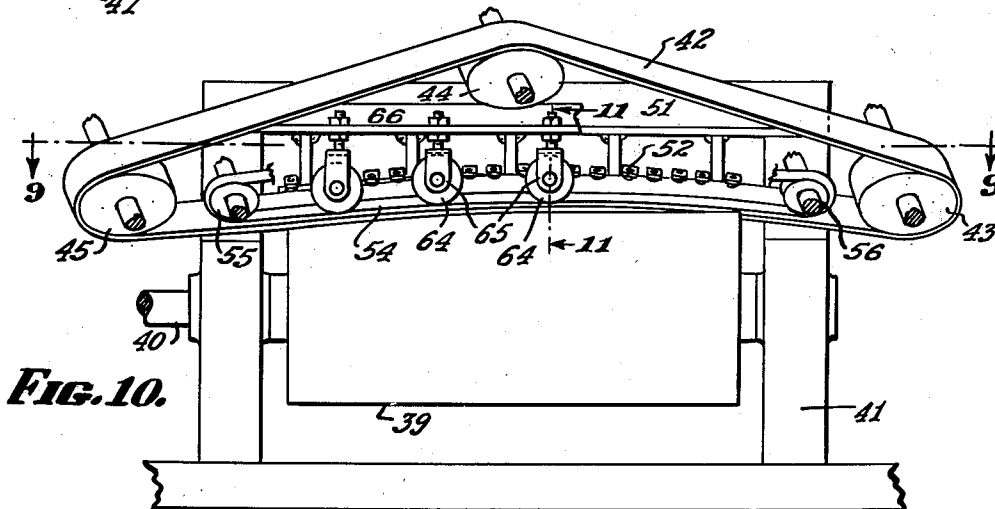
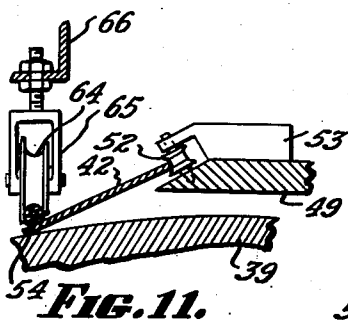
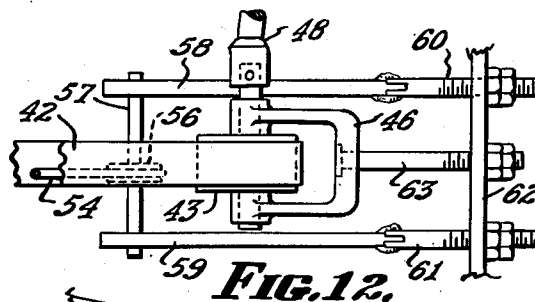
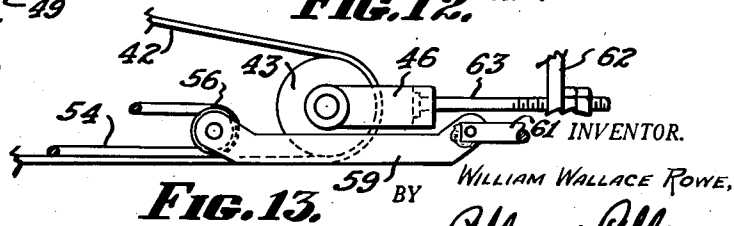
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DIAGONAL CREPING METHOD AND APPARATUS

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3 Sheets-Sheet 3



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2,567,967

DIAGONAL CREPING METHOD AND APPARATUS

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Application February 24, 1949, Serial No. 78,198

19 Claims. (Cl. 154—30)

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My invention pertains to creping operations in which creping crinkles are continuously formed aslant to the longitudinal and lateral axes of a web whereby to impart to the web stretchability in a plurality of directions. In one such operation a web to be creped is caused to adhere to a creping cylinder and is removed therefrom and creped by a knife or doctor contacting the cylinder along a substantially helical line, which line is therefore aslant to the longitudinal axis of the web. In such operations the web is most usually subjected to two creping steps resulting in the superposition of crossing sets of slantwise creping crinkles and a universally stretchable quality in the web. Operations of this type, and apparatus for the purpose, are set forth in Patents Nos. 2,071,347; 2,008,181; and 2,008,182 in the name of William C. Kemp.

Another type of operation is set forth in the copending application of Paul W. Dorst, Serial No. 686,899, filed July 29, 1946, now Patent No. 2,494,334, and entitled The Making of Longitudinally and Laterally Stretchable Creped Webs, wherein diagonal creping crinkles are formed in a web by removing it from a creping surface by a knife or doctor which moves in a direction transverse to the direction of motion of the approaching web. My invention is applicable also to such an operation.

The objects of this invention are the securing of improvements in these operations and apparatus, as will be set forth more fully hereinafter, or will be apparent to the skilled worker upon reading these specifications. Reference is first made to the accompanying drawings wherein:

Figure 1 is a plan view of apparatus elements illustrative of my invention.

Figure 2 is an end elevational view of the same elements.

Figure 3 is a partial sectional view taken along the line 3—3 in Figure 1.

Figure 4 is a view, partly in plan and partly in section, of a creping cylinder and doctor in a modified embodiment, the section being taken along the line 4—4 of Figure 5.

Figure 5 is a vertical sectional view taken along a line following the knife edge, namely the line 5—5 of Figure 4.

Figure 6 is a sectional view across the doctor and supporting structure taken along the line 6—6 of Figure 5.

Figure 7 is a partial plan view of the knife and holder.

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Figure 8 is a partial sectional view showing another organization of doctor and support.

Figure 9 is a partial plan view with parts in section showing yet another embodiment of my invention, the section being taken along the line 9—9 of Figure 10.

Figure 10 is an elevational view thereof.

Figure 11 is a partial sectional view taken along the line 11—11 of Figure 10.

Figures 12 and 13 are respectively plan and sectional views of another mounting means.

In the apparatus of the Kemp Patent 2,008,181 it has been found commercially most feasible to employ a knife or doctor which is in the form of a band sufficiently flexible to be caused to conform to the surface of the cylinder along a substantially helical line. The ends of the knife may be held against the frame of the machine. It has been the practice to tilt the knife by raising its rear edge. This brings the leading edge of the knife into an arcuate curvature diverging from a true helical line principally in that the central portion of the knife moves forwardly in the direction from which the web approaches it. This divergence is not ordinarily objectionable; but it can be corrected if desired by grinding the leading edge of the knife to a hollow curvature. The tilting of the knife was accomplished by providing brackets at intervals along its rear edge and connecting these brackets by means of adjustable thrust bolts to a suitable support. The tilting of the knife not only relieved friction between the knife and cylinder to a substantial degree, but concentrated pressure at the creping point and tensioned the leading edge of the knife.

It was also necessary to hold the knife at its forward edge down into contact with the cylinder since the web being creped exerts a powerful lifting action on the knife edge. This was accomplished by adjustable thrust bolts extending downwardly from an overhead support and engaging the leading edge of the knife at intervals. The arrangement had numerous disadvantages. A uniform pressure of the knife edge against the cylinder could not be attained in practice because the points of bearing of the overhead thrust bolts could not be located closely enough together. An attempt to even up the pressure resulted in a multiplication of the number of thrust bolts. Even so, the knife had to be made quite thick so that its stiffness would tend to equalize the pressure between the points of bearing of the thrust bolts. The use of a thick knife was expensive and made the knife more resistant to curving

and twisting into perfect contact with the cylinder surface. Moreover, the thrust bolts had to be individually adjusted, which was time consuming and made for inaccuracy. In spite of the best adjustments which could be made, commercial operations encountered a strong tendency for the cylinders to become grooved or scored and for the knives to wear unevenly.

One of the principal objects of my invention is the elimination of these defects in a more flexible, less expensive and more readily adjustable apparatus. In Figures 1 and 2, I have shown a creping cylinder 1 on a shaft 2 journaled as at 7 and 8 in a framework 10, which has been shown more or less diagrammatically and which may be varied in accordance with the requirements of any particular machine. The web 12 to be creped may be thought of as precoated with a suitable creping adhesive and is shown as being pressed against the creping cylinder 1 by a pressure roll 13. In the particular embodiment the web passes beneath the cylinder 1 and then, returning above it in the direction of the right-hand arrow in Figure 1, is removed from the cylinder surface by means of a knife disposed substantially helically against that surface.

The knife is of band form as has been discussed above, but may be made quite thin. At its ends it may be attached to bolts 15 and 16 which extend through brackets 17 and 18 on the frame 10 and are provided with nuts. By this construction the knife ends are held in position, and the knife may also be tensioned to some extent, but not enough for the purposes of this invention. In a tilted knife, formed of thin material, substantial tension on the knife ends may tend to cause collapse of the knife. This is because the leading edge of the knife is supported by the creping drum and the trailing edge by a backstop, so that too much end tension tends to curve a thin knife transversely and cause its collapse.

At intervals along the rear edge of the knife, I provide brackets 19 to which are pivoted thrust bolts 20. These bolts extend through a rear supporting beam 21 and are provided with nuts 22 and 23 by which the positions of the bolts may be fixed. The support 21 extends between and is attached to brackets 24 and 25 on the frame of the machine.

The thrust bolts 20 not only take up the thrust of the web 12 against the knife as the web is creped, but also tilt the knife as will be most clearly seen in Figure 3. The forward thrust on the knife causes a lifting of the heel or rear edge and a pressure of the toe or forward edge of the knife against the cylinder surface, but also creates danger of collapse if too much end tension is applied to the knife or if radial pressure is applied to the knife at points too far removed from the leading edge of the knife. The bracket 19 is preferably formed, as shown, with a portion lying along the face of the knife, and a nose 19a serving to hold in place the cable hereinafter described. The bracket has a portion 19b serving as a backstop for the knife and engaging beneath it, as shown. The thrust bolt is pivoted to the bracket well above the face of the knife so as to produce the tilting mentioned above.

In my mechanism and operation, I do away with overhead thrust bolts serving to hold the knife edge down against the cylinder, and instead I employ a tensioned member for that purpose. This tensioned member is, in my preferred embodiment, a metallic cable 26 of stranded character, combining strength with flexibility. The

cable is fastened at one end to the frame 10 as at 27, and at the other end it is also fastened to the frame but through the medium of a tensioning means. For purposes of illustration, I have indicated a turnbuckle at 28; but it will be understood that other tensioning and tension adjusting means may be employed, such as heavy springs, weights, fluid cylinders, etc.

The points of attachment of the cable to the machine frame are so located that the cable will overlie the knife 14 along a line adjacent its front edge. Since the cable follows an arcuate path along the knife, when the cable is tensioned, it will act to hold the front edge of the knife against the cylinder with a force which is not only proportional to the tension in the cable, but is also substantially uniform throughout the operating length of the knife or doctor. Hence I am enabled to use thinner and less expensive knives, which in themselves would not stand the required end tension without collapsing, and to maintain them in operation longer and at the same time prevent scoring of the cylinder, by the exertion of the substantially uniform hold-down pressures all along the forward edges of such knives.

For any given tension in the cable 26 the pressure exerted by it against the knife will be determined by the curvature of the arc followed by the knife and the cable, and hence by the diameter of the creping cylinder 1. As the diameter of the cylinder increases, the length of the cylinder remaining the same, the curvature of the knife and cable becomes less and the pressure exerted by a given tensioning of the cable likewise decreases. This can usually be compensated for by an increase in the tension on the cable, it being understood that the frame 6 of the machine is built to withstand heavy tensions. In instances where a given cable cannot be tensioned sufficiently, it is within the scope of my invention to employ a cable of larger diameter or two or more parallel cables as may be desired.

The cable or cables do not interfere with the operation of the knife in creping or with the removal of the creped web which, as shown at 12a in Figures 1 and 3, leaves the knife in an upsidedown position and in a direction more or less axially of the cylinder. While I have illustrated the invention in connection with a single creping cylinder, a similar construction may be employed for the second cylinder in a double creping apparatus as will be readily understood.

In my invention the pressure of the knife against the cylinder is attained by tension and has the advantage of being evenly distributed throughout the effective length of the knife. The apparatus requires no vertical thrust bolts, and by consequence the tedious adjustment of these elements has been eliminated. By providing adjustability in the brackets 17 and 18 or a plurality of brackets in different positions and by providing for a shift in the positions of attachment of the cable 26 to the frame of the machine, it becomes an easy matter to vary the angularity of the knife helix to the axis of the creping cylinder. The rear thrust bolts 20 are easily adjusted to accommodate such shifts in the angularity of the knife to the direction of movement of the web.

Another embodiment of my invention is shown in Figures 4 to 8, inclusive. Here, the creping cylinder 1 on the shaft 2 is again journaled at 7 and 8 on the machine frame 10. I provide,

in this instance, a rigid knife holder 29 of heavy steel which is curved as by rolling or in another suitable way to conform to the surface of the cylinder 1 along a substantially helical line. I mount a heavy beam 30 across the machine frame 10 following the general direction of the helical line; and I attach the knife holder 29 to the beam 30 by means of struts 31 of sufficient stiffness and so placed as to support the knife holder 29 rigidly in position. The knife holder has a beveled front edge 32 on which the heel of the knife 33 will be supported. It also has means for sustaining the thrust on the knife in the direction of the plane of the knife. Such means may take various forms. A simple grooved backstop on the knife holder may be employed or a series of headed studs 34, as most clearly shown in Figures 6 and 7.

An advantage of this construction is that a relatively narrow and thin knife may be employed and easily replaced when worn. The front edge of the knife may be ground to give the desired angle of creping V with the surface of the cylinder 1. The knife is supported at its rear edge or heel by the knife holder 29 which also determines the line which the front edge or toe of the knife will follow on the surface of the cylinder. The pressure of the knife toe against the cylinder 1 may be effected solely by one or more flexible tensioned cables 36 tensioned against the machine frame as at 37 and 38 or in other ways as set forth above. In this mechanism it is not necessary to tension the knife as such, although it is desirable to provide a way of holding the knife in place at least until the cable is placed and tensioned. In my current procedure each knife blade is provided with a hole in the center of the blade near one end. This hole is hooked over a stud on the knife holder, and the opposite end of the blade may be tensioned slightly to draw the blade into position by twisting and curving it. These elements have not been illustrated in the drawing. When the cable is applied and tensioned, slack is usually thrown into the device which was used to draw the knife into place, and I usually operate with a slack knife tension. The hole in the blade is at the low edge of the knife (that end which first meets the approaching web) so that any tendency of the knife to climb up diagonally along the knife holder due to the force of the turning drum is thus counteracted by anchoring the low end of the knife.

In Figure 8 I have shown a modified structure in which the rear edge of the knife 33 engages suitable abutment means 34a on the knife holder 29. Those means may be either the studs hereinabove described or a rod or other abutment welded to the beveled face of the knife holder. In the modification of Figure 8 an arm 35 is attached by means of a hinge 35a to the knife holder 29 so that it can be swung downwardly over the knife 33. The forward end of the arm 35 is grooved or otherwise configured to accept the cable 36 and hold it in position at the forward edge of the knife.

The knife holder and the knife may be configured and may coact in various ways. For example, the leading edge of the knife holder may be configured to lie along a true helix of the creping cylinder. In this event, if a straight or rectilinear knife is employed, the edge of the knife contacting the cylinder will deviate from the true helical line as set forth above by reason of the tilt imparted to the knife. This, in turn,

will mean that the knife will follow a line on the beveled face of the knife holder 29 which is not parallel to the edges of that face. The positions of the backstop means, such as the studs 34 or abutment 34a, may be configured to accommodate the curvature of the back edge or heel of the knife on the knife holder.

In this arrangement the edge of the knife, which contacts the cylinder, not only follows a bowed line which is not a true helix, but also the angle of tilt of the knife will vary throughout the length of the knife, which in turn means that if the knife has a front edge of constant angularity, the angularity of the creping V will vary throughout the length of the knife. In some operations both of these factors are undesirable.

Where this is the case, I may conform the leading edge of my knife holder 29 to the bowed helix which has been mentioned; and I may use such a bowed knife holder in combination with a straight or rectilinear knife. The edge of the knife which contacts the cylinder will, of course, still follow the bowed line which is not a true helix; but the angle of tilt of the knife, and hence, the angularity of the creping V with a knife edge of constant angularity, will remain constant. This is the combination which I prefer to employ in practice because of the relative simplicity of a straight or rectilinear knife with its edge having a constant angularity with its face.

Where it is desired, with a straight knife and a knife holder following a bowed line as aforesaid, it is possible to reduce the forward bow by allowing the center portion of the knife to come higher than the ends on the bevel of the knife holder, with some sacrifice in the constancy of the creping V.

It is, however, possible to employ a knife holder, the leading edge of which is configured to the true helix, and a knife which, instead of being straight or rectilinear is so curved that it will conform to the true helix in its line of contact with the creping cylinder when its heel is supported by the truly helical knife holder. Under these circumstances, it is quite possible to maintain a constant creping V along a truly helical line on the cylinder surface, although the expense of forming a bowed knife will be greater.

Yet another embodiment of the invention is shown in Figures 9 to 13, inclusive. This embodiment is an adaptation of the principles of the invention to the type of creping operation taught in the copending application of Dorst, Serial No. 686,899, mentioned above. In the Dorst operation, a continuously moving knife or doctor is interposed in the path of the web on a creping cylinder, the mode of motion of the knife being transverse the longitudinal axes of the web and acting to contract the web in such a way that the resultant creping crinkles lie aslant to both axes of the web. Because the Dorst operation does not require any great angularity of the knife to the widthwise axis of the web and may be carried on with a knife disposed directly in line with the widthwise axis, it is more convenient to employ a creping cylinder with a very much smaller radius for a given width of web than those employed in the Kemp operation. A continuously moving knife is best obtained in the Dorst operation by making the knife in the form of an endless, flexible band which passes over sheaves, one or more of which are driven. It is preferable to tilt the knife into contact with the creping cylinder.

I have found that it is readily possible to adapt the teachings of this invention to the Dorst op-

eration. In Figures 9 and 10 a creping cylinder 39 on a driven shaft 40 is journaled in a machine frame 41. A band knife 42 which may be made of steel is shown as passing over sheaves or rollers, 43, 44 and 45. These sheaves may be mounted on shafts journaled in yokes 46 and 47 which may be mounted and tensioned on elements (not shown) on the machine frame. One or more of the sheaves may be driven in any way desired. I have diagrammatically illustrated a flexible shaft at 48.

In order to cause the forward edge or toe of the band knife to contact the cylinder along an arcuate line so that the pressure exerted by the tensioned cable hereinafter described will be substantially uniform throughout the line of contact of the knife edge with the creping cylinder, I orient the knife along a line other than a line parallel with the axis of the cylinder 39. The angularity need not ordinarily be great. Depending upon the radius of the cylinder, a substantial arcing or curvature of the line of contact may be attained with a small angularity to the axis of a cylinder of relatively small radius. The angle of the knife should be great enough on a creping cylinder of a given diameter to enable the proper radial thrust of the leading edge of the knife to be obtained, primarily through end tension applied to the cable.

In order to support the heel of the knife and tilt that portion of the band knife adjacent the cylinder with respect to the tangent line of the cylinder, I provide suitable guiding means for the knife. One such means may be a knife holder 49 similar to that hereinabove described and mounted by means of struts 50 to an overhead supporting beam 51 on the machine frame. Since the band knife will be driven, I prefer to provide an antifriction mounting or abutment for the heel of the knife on the knife holder. This may take various forms. In the illustrative embodiment, the heel of the knife abuts against a plurality of grooved rollers 52 mounted on studs on the beveled face of the knife holder, or on shafts journaled at one end in the knife holder, and at the other end in brackets 53 attached thereto. This is most clearly shown in Figure 11.

The toe of the knife is held against the cylinder by a tensioned flexible cable 54 which is an endless member passing over sheaves 55 and 56, which sheaves are mounted on shafts in holders urged away from each other so as to tension the cable. Any of the tensioning means hereinabove referred to may be employed. The sheaves for the cable may be driven, if desired, or the cable may be allowed to travel with the knife 42 by friction. Various mountings for the cable sheaves are possible. In Figures 12 and 13 I have shown an exemplary mounting wherein the sheave 56 has a shaft 57 journaled at its ends in a pair of link members 58 and 59 which lie beneath the yoke 46 for the sheave 43 of the band knife 42. The ends of these links are tensioned by means of bolts 60 and 61 to a machine frame member 62 to which the yoke 46 may also be tensioned by a bolt 63.

In this form of the apparatus I also prefer to provide means to prevent the cable from riding up or down the face of the knife. Such means may take various forms. A simple form is shown in Figures 10 and 11, where a grooved roller 64 engages the cable 54, and is journaled in a yoke 65 mounted on a brace or bar 66 extending across the machine. A series of these devices may be provided on the bar so as to guide the cable

throughout its operative contact with the band knife.

In modifications of apparatus disclosed herein, where a stationary knife is employed, the creping adhesive tends to build up under the creping knife, and if not cleaned out, under the knife holder as well, if the knife holder is located too close to the creping cylinder. This indicates an additional reason for the tilting of the knife and the location of the knife holder substantially above the surface of the cylinder. In the type of apparatus illustrated in Figures 9 to 13 inclusive, the moving knife carries away from the creping surface any incipient build-up of adhesive, and may readily be cleaned before it returns to the creping surface by means of a scraper or other suitable cleaning means.

Other modifications may be made in my invention without departing from the spirit of it. Having thus described my invention in an exemplary embodiment, what I claim as new and desire to secure by Letters Patent is:

1. A process of creping or contracting a web which includes binding it against the surface of a creping cylinder, disposing a band knife substantially helically across the surface of the cylinder, rotating the cylinder against the knife so as to cause the knife to remove and contract or crepe the web and, during this operation, supporting the knife from the rear against the thrust of the web, and holding the edge of the knife against the cylinder by tension.

2. The process claimed in claim 1 wherein a tensioned band element is applied against the knife adjacent the creping edge thereof.

3. The process claimed in claim 1 wherein a tensioned band element is applied against the knife adjacent the creping edge thereof, and wherein the knife is tilted with respect to the cylinder surface as an incident to supporting the knife against the thrust of the web.

4. In a process of creping involving the use of a creping cylinder and a band knife disposed substantially helically across the surface of the cylinder, the steps of supporting and tilting the knife by rear thrust members, and holding the creping edge of the knife against the surface of the cylinder by tension exerted endwise on an arcuate member.

5. In a creping apparatus the combination of a creping cylinder, a band knife disposed substantially helically across the face of the cylinder, means for supporting the knife against rearward thrust, and tensioned means for holding the leading edge of the knife against the surface of the cylinder under pressure.

6. In a creping apparatus the combination of a creping cylinder, a band knife disposed substantially helically across the face of the cylinder, means for supporting the knife against rearward thrust, and tensioned means for holding the leading edge of the knife against the surface of the cylinder under pressure, said last mentioned means including a strand-like element engaging the knife adjacent its leading edge and hence following a curved path, and means for applying endwise tension to said strand-like element.

7. In a creping apparatus the combination of a creping cylinder, a band knife disposed substantially helically across the face of the cylinder, means for supporting the knife against rearward thrust, and tensioned means for holding the leading edge of the knife against the surface of the cylinder under pressure, said last mentioned means including a strand-like element engaging

the knife adjacent its leading edge and hence following a curved path, and means for applying endwise tension to said strand-like element, said means for supporting the knife against rearward thrust comprising means for tilting the rearward edge of the knife away from the surface of the cylinder.

8. In a creping apparatus the combination of a creping cylinder, a band knife disposed substantially helically across the face of the cylinder, means for supporting the knife against rearward thrust, and tensioned means for holding the leading edge of the knife against the surface of the cylinder under pressure, said last mentioned means including a strand-like element engaging the knife adjacent its leading edge and hence following a curved path, and means for applying endwise tension to said strand-like element, said means for supporting the knife against rearward thrust comprising means for tilting the rearward edge of the knife away from the surfaces of the cylinder, and constituting a rearward support, ears at intervals extending laterally from the knife, and thrust members interposed between said ears and said support.

9. In a creping apparatus the combination of a creping cylinder, a band knife disposed substantially helically across the face of the cylinder, means for supporting the knife against rearward thrust, and tensioned means for holding the leading edge of the knife against the surface of the cylinder under pressure, said last mentioned means including a strand-like element engaging the knife adjacent its leading edge and hence following a curved path, and means for applying endwise tension to said strand-like element, said means for supporting the knife against rearward thrust comprising means for tilting the rearward edge of the knife away from the surfaces of the cylinder, and constituting a rearward support, ears at intervals extending laterally from the knife and thrust members interposed between said ears and said support, said strand-like member being a flexible metallic cable.

10. The process of claim 1 wherein said knife is in the form of an endless band and is driven.

11. The process of claim 1 wherein said knife is in the form of an endless band and is driven, and wherein a tensioned endless band element is applied against the knife adjacent the creping edge thereof.

12. In a creping apparatus the combination of a creping cylinder, a knife holder on a machine frame, a creping cylinder journaled in said frame, said knife holder conforming to a substantially helical line on the face of the cylinder but spaced from said face, means on the machine frame for mounting said knife holder rigidly in position, said knife holder having a beveled face slanting toward said substantially helical line, a band knife, means on said beveled face for supporting the rear edge of said knife whereby said knife may be tilted into contact with said cylinder along said substantially helical line at its front edge, and tensioned means for holding the front edge of the knife against the surface of the cylinder under pressure, said last mentioned means including a strand-like element engaging the knife adjacent its leading edge and hence following a curved path, and means for applying endwise tension to said strand-like element.

13. The structure claimed in claim 12 in which said knife is in the form of an endless band pass-

ing over sheaves one at least of which is driven, and in which said strand-like element is also an endless element passing over sheaves.

14. The structure claimed in claim 12 in which said knife is in the form of an endless band passing over sheaves one at least of which is driven, and in which said strand-like element is also an endless element passing over sheaves, and in which said knife holder provides an antifriction support for said endless band knife.

15. The structure claimed in claim 7, in which the leading edge of said band knife is provided with a concave curvature whereby to compensate in part at least for the tendency of the tilting of the knife to cause its leading edge to depart from a truly helical line of contact with said creping cylinder.

16. The structure claimed in claim 7, wherein said means for supporting the knife against rearward thrust and for tilting the rearward edge of the knife away from the surface of a cylinder comprises a knife holder having a leading edge configured to lie substantially along a true helix of the creping cylinder, a supporting surface for the rearward edge of the knife adjacent said leading edge and abutment means in connection with said supporting surface, said abutment means configured to follow a line on said supporting surface which is bowed and non-parallel to the said leading edge of the said knife holder.

17. The structure claimed in claim 7, wherein the said means for supporting the knife against rearward thrust and for tilting the rearward edge of the knife away from the surface of the cylinder comprises a knife holder having a leading edge configured to conform substantially to a bowed helix produced by tilting the rearward edge of the knife away from the surface of the cylinder, said knife having parallel and rectilinear leading and rearward edges.

18. The structure claimed in claim 7, wherein the said means for supporting the knife against rearward thrust and for tilting the rearward edge of the knife away from the surface of the cylinder comprises a knife holder having a leading edge configured to conform substantially to a bowed helix produced by tilting the rearward edge of the knife away from the surface of the cylinder, the said knife having parallel and rectilinear leading and rearward edges, and wherein the said knife holder has a supporting surface for the rearward edge of the knife and abutment means in connection with said supporting surface, said abutment means being configured to demark a curved line on said surface whereby said knife can be flexed longitudinally to bring its leading edge more nearly into conformation with a true helix on said creping cylinder.

19. The structure claimed in claim 7, wherein said means for supporting the knife against rearward thrust and for tilting the rearward edge of the knife away from the surface of the cylinder comprises a knife holder having a leading edge configured to lie substantially along a true helix of the creping cylinder, and wherein the said knife has parallel rearward and leading edges and is curved longitudinally within its plane so that the leading edge of the knife will follow substantially the line of a true helix on said cylinder.

WILLIAM WALLACE ROWE.

No references cited.