Feb. 28, 1967 R. COUZENS ETAL 3,306,188

EMBOSSING MACHINE

Filed Sept. 22, 1965 3 Sheets-Sheet 1

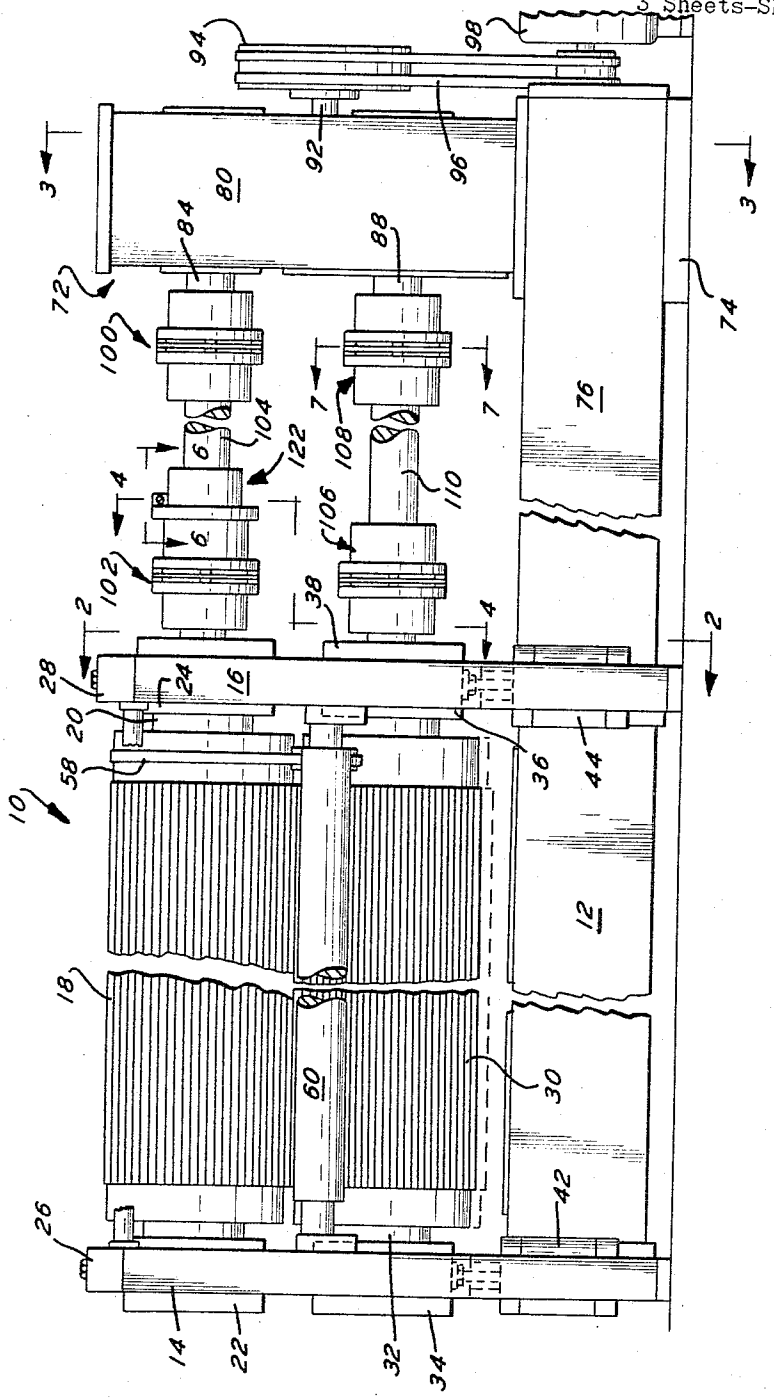

FIG. 1

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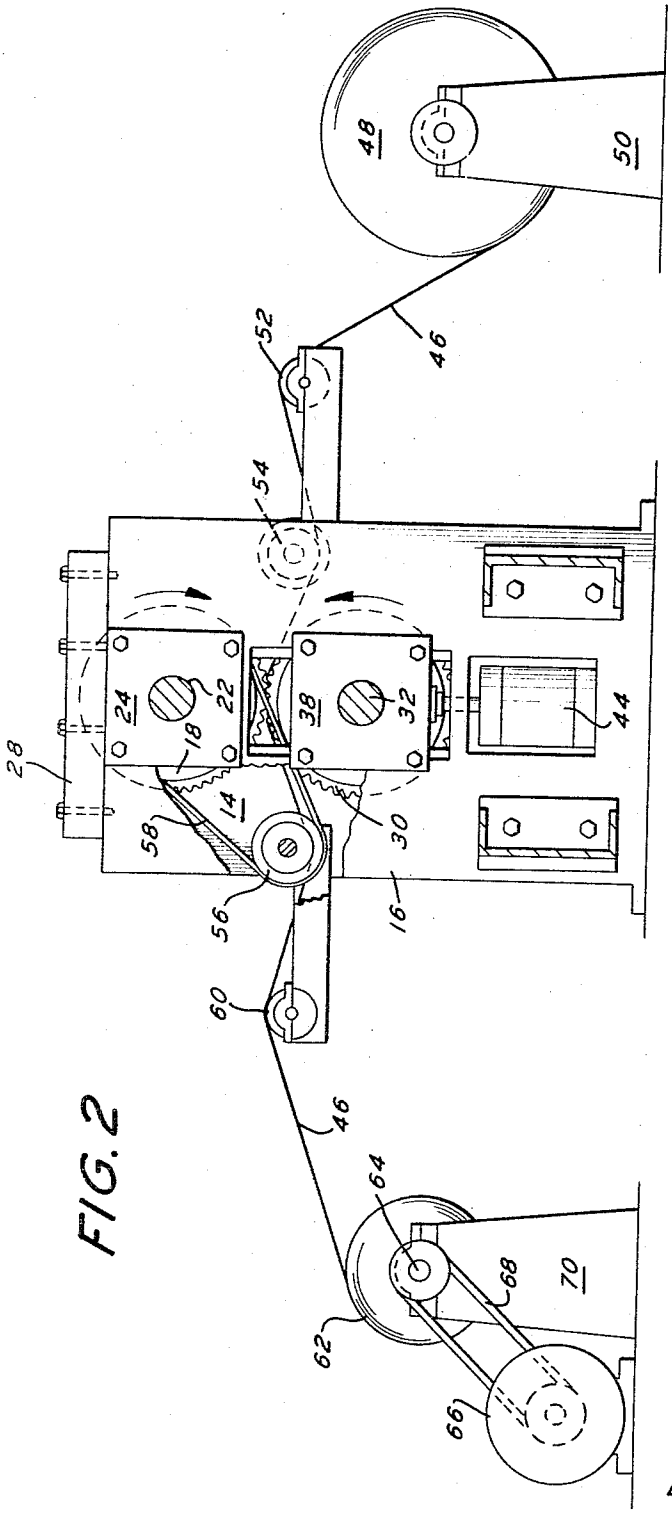

FIG. 2

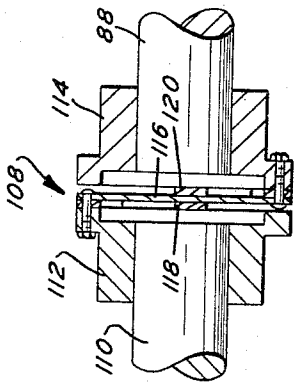

FIG. 8

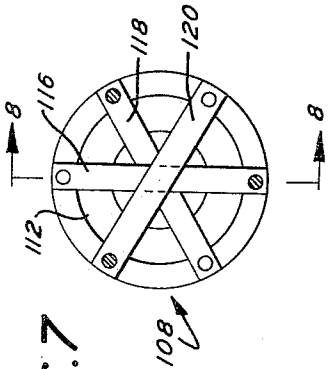

FIG. 7

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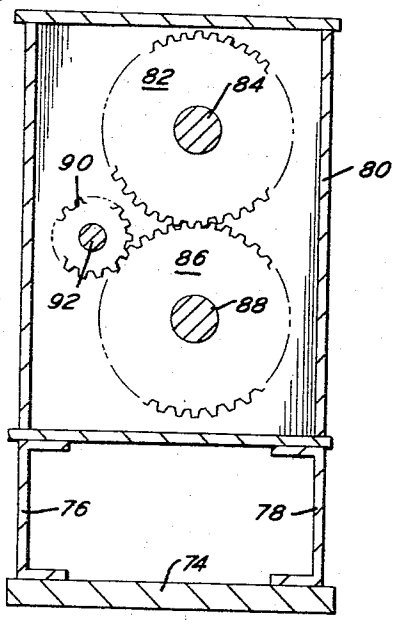
FIG. 3



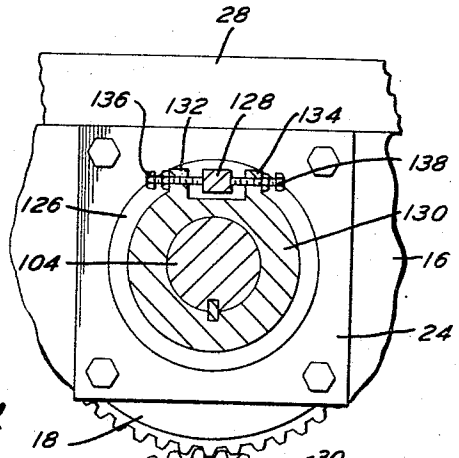
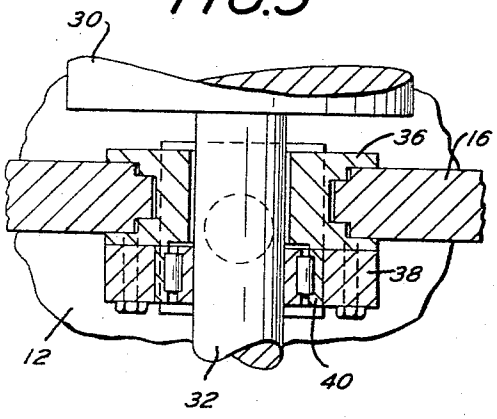
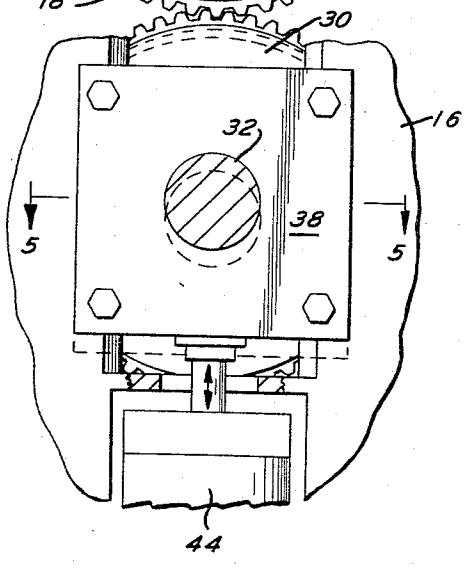


FIG. 4

FIG. 5





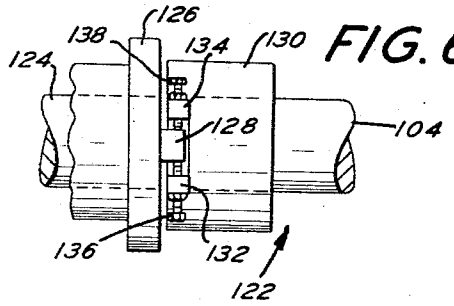


FIG. 6

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3,306,188

EMBOSSING MACHINE

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Filed Sept. 22, 1965, Ser. No. 489,251
3 Claims. (Cl. 101—23)

This invention relates to an embossing machine, and more particularly, to an embossing machine having mating rolls mounted for rotary movement with one of the rolls being mounted for movement toward and away from the other roll.

Heretofore, embossing machines have been constructed in a manner which have two disadvantages. The first disadvantage of the machines proposed heretofore is associated with the structural interrelationship which causes the driving gears of the gear train to become disengaged when moving one roll toward or away from the other roll. Such movement generally occurs during a threading operation or when there is a jam-up. The separation of the driving gears creates problems when the gears are again placed in mesh. Thus, when the gears are again placed in mesh there is a tendency to slightly rotate one of the gears and thereby place the embossing rolls out of mesh or alignment.

The second disadvantage of the embossing machines proposed heretofore is concerned with adjustment with one roll with respect to the other. While adjusting means have been proposed heretofore, they have been complicated, expensive, located in a position which affords difficulties in manipulation, etc. In accordance with the present invention, an adjustment means is provided in a convenient area. The adjustment means is simple and easy to manipulate. At the same time, the adjustment means does not in any way interfere with the meshing engagement of the driving gears.

The apparatus of the present invention includes first and second mating parallel rolls supported adjacent one another. Means are provided to support the ends of one of the rolls for movement toward and away from the other roll. A separate transmission means is connected to each roll for transmitting rotary motion to the rolls. The transmission means are coupled together by meshing gears. At least one of the transmission means includes a coupling which enables one of the rolls to move toward the other roll without interfering with the mesh of said gears. One of the transmission means includes an adjustment device which facilitates rotation of one roll with respect to the other without interfering with the mesh of said gears.

It is an object of the present invention to provide a novel embossing machine.

It is another object of the present invention to provide an embossing machine structurally interrelated in a manner so as to overcome disadvantages associated with machines proposed heretofore.

It is a further object of the present invention to provide an embossing machine wherein one embossing roller may be moved toward and away from the other roller without interfering with the mesh of gears associated with a transmission means coupled to each roll.

It is another object of the present invention to provide an embossing machine having upper and lower mating embossing rolls rotatably driven by meshing gears wherein one of the rolls may be rotated with respect to the other roll without interfering with the mesh of the gears.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a front elevation view of the embossing machine of the present invention.

FIGURE 2 is a sectional view taken along the line 2—2 in FIGURE 1.

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

FIGURE 4 is a sectional view taken along the line 4—4 in FIGURE 1.

FIGURE 5 is a sectional view taken along the line 5—5 in FIGURE 4.

FIGURE 6 is a view taken along the line 6—6 in FIGURE 1.

FIGURE 7 is a sectional view taken along the line 7—7 in FIGURE 1.

FIGURE 8 is a sectional view taken along the line 8—8 in FIGURE 7.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIGURE 1 an embossing machine designated generally as 10.

The embossing machine 10 includes a pair of side frames 14 and 16 mounted on or interconnected by a bed 12. The side frames 14 and 16 may rotatably support an upper embossing roll 18. The roll 18 may be provided on its outer periphery for substantially its entire length any particular embossing pattern that is desired. For purposes of illustration, the roll 18 is provided on its periphery with longitudinally extending ribs.

The embossing roll 18 is mounted on a shaft 20. The ends of the shaft 20 are rotatably supported on the side frames 14 and 16 by means of bearing supports 22 and 24. The bearing supports 22 and 24 are received in vertical slots on the side frames 14 and 16, respectively. A cap block 26 is bolted to the upper end of the side frame 14 to retain the bearing support 22 in position. A similar cap block 28 is bolted to the side frame 16 to retain the bearing support 24 in position.

A mating embossing roll 30 is provided. The embossing roll 30 is below the roll 18 and is provided on its periphery with an embossing pattern which mates with the pattern on roll 18. The roll 30 is mounted on a shaft 32. The ends of the shaft 32 are supported by bearing supports 34 and 36. The bearing supports 34 and 36 are provided on their sides edges with grooves adapted to receive ribs on the frames 14 and 16. Hence, the bearing supports 34 and 36 are mounted for reciprocation toward and away from the shaft 20. In this regard, see FIGURE 5. The bearings 40 for the shaft 32 are supported by a bearing plate 38 removably coupled to the bearing support 34. The other end of shaft 32 as well as the ends for shaft 20 are similarly supported.

A motor 42 is supported by frame 14 and a motor 44 is supported by frame 16. The motors 42 and 44 are adapted to be selectively operated to move roll 30 toward and away from roll 18. The motors 42 and 44 are preferably pneumatic motors having a cylinder, a piston within the cylinder, a piston rod connected to the piston, with the piston rods being connected to one of the bearing supports 34 and 36. Conduits (not shown) are to be provided to facilitate the selective introduction of motive fluid into the motors 42 and 44 to effect simultaneous operation of the motors which in turn reciprocate the bearing supports 34 and 36.

As shown more clearly in FIGURE 2, a web 46 of material to be embossed may be unwound from a roll 48. The roll 48 is rotatably supported by a stand 50. The web 46 extends over an idler roller 52 and partially around a spreader roll 54. Spreader roll 54 has a crown adjacent the center portion thereof so as to spread out the web 46 and eliminate any wrinkles. After passing partially around spreader roll 54, web 46 passes between the embossing rolls 18 and 30. The web 46 then passes partially around a second spreader roll 56.

Roll 56 is coupled to roll 18 by means of belt 58. To facilitate such driving relationship, the periphery of roll 18 adjacent one end thereof and spaced from the embossing surface is provided with a groove into which the belt 58 extends.

The web 46 then engages an idler roller 60 and is wound into a roll 62. Roll 62 may be supported by a shaft 64 on a support stand 70. Shaft 64 may be driven by motor 66 coupled thereto by belt 68.

Web 46 may be any one of a wide variety of materials which are to be embossed. For example, the web 46 may be paper, leather, plastics, cloth, etc.

A drive means designated generally as 72 is provided to rotatably drive the rolls 18 and 30 in opposite directions as indicated by the arrows in FIGURE 2. Such drive means includes a bed plate 74 connected to the side frames 16 by means of channel frames 76 and 78. A housing 80, such as a gear box, is supported by the channel frames 76 and 78.

Within housing 80, there is provided a gear 82 fixedly secured to a shaft 84. Gear 82 is in meshing engagement with gear 86 which in turn is fixedly secured to shaft 88. A gear 90 is fixedly secured to a shaft 92. Gear 90 is in driving engagement with gear 86. Shaft 92 is coupled to a pulley 94 outside of housing 80. Pulley 94 is driven by motor 98. To facilitate the last-mentioned driving relationship, one or more belts 96 may be utilized.

As shown more clearly in FIGURE 1, the shafts 84 and 88 extend through the housing 80 towards the side frames 16. Shaft 84 is coupled to shaft 20 by way of an upper transmission means which includes couplings 100 and 102 interconnected by a shaft 104. Shaft 88 is coupled to shaft 32 by means of a lower transmission means which includes similar couplings 106 and 108 interconnected by a shaft 110. The couplings 100, 102, 106 and 108 are identical. Hence, only coupling 108 will be described in detail hereinafter.

Referring to FIGURES 7 and 8, coupling 108 includes a hub 112 fixedly secured to one end of shaft 110. A similar hub 114 is fixedly secured to one end of shaft 88. The hubs are provided with axially directed rims on their juxtaposed faces.

The hubs 112 and 14 have their rims interconnected by a plurality of flexible straps 116, 118 and 120. The upper end of strap 116 is bolted to the rim on hub 112 while the lower end of strap 116 is bolted to the rim on hub 114. The strap 118 has its lefthand end bolted to hub 112 and its righthand end bolted to hub 114 in FIGURE 7. Strap 120 has its lefthand end bolted to hub 114 and its righthand end bolted to hub 112 in FIGURE 7.

Thus, it will be noted that the hubs 112 and 114 are interconnected at diametrically opposite points by the straps. Thus, hub 112 is connected to one of the straps at the twelve o'clock, four o'clock and eight o'clock position in FIGURE 7. Hub 114 is connected to the straps at the two o'clock, six o'clock and ten o'clock position in FIGURE 7. While only three straps are illustrated, a larger number such as five straps may be utilized. The couplings so constructed will transmit rotary motion while permitting one of the shafts to flex or otherwise be out of alignment with respect to the other shaft.

An adjustment means 122 is provided between the shaft 104 and the coupling 102. As shown more clearly in FIGURES 4 and 6, the adjustment means 122 will facilitate selective rotation of shaft 124 with respect to shaft 104. Shaft 124 is connected to the adjacent half of the coupling 102.

A hub 126 is fixedly secured to one end of shaft 124. A hub 130 is fixedly secured to one end of shaft 104. The hub 126 is provided with an axially directed projection 128 extending into a gap between ears 132 and 134 on the hub 130.

The transverse dimensions of the projection 128 is substantially less than the corresponding dimensions of the gap between the ears 132 and 134. A bolt 136 is threaded to the ear 134 and in engagement with a side face of the projection 128. A bolt 138 is threaded to the ear 134 and in engagement with an opposite side face on the projection 128.

The operation of the embossing machine 10 is as follows:

A roll 48 of material to be embossed is supported on the stand 50. The web 46 will be threaded over the idler roller 52 below the spreader roll 54 and then between the embossing rolls 18 and 30. To facilitate such threading of the web 46 between the embossing rolls, the roll 30 will be permitted by the motors 42 and 44 to descend to the phantom position in FIGURES 1 and 4.

When the embossing roll 30 is in its inoperative position indicated by the phantom lines in FIGURES 1 and 4, the couplings 106 and 108 are flexed so that shafts 32 and 110 are no longer aligned with shaft 88. Coupling 106 will flex more than coupling 108. The provision of such couplings enables the gears 82 and 86 to remain in meshing engagement during the operation of threading the web 46 through the gap between the embossing rolls 18 and 30.

The web 46 is extended around the spreader roll 56, over the idler roll 60, and coupled to the shaft 64. The motors 42 and 44 are then actuated to raise the embossing roll 30 to its operative mating disposition. Motors 66 and 90 are then started.

Motor 98 rotatably drives the gears 82 and 86 which are rotatably coupled to the embossing rolls 18 and 30. Motor 46 rotates shaft 64 to wind up the web 46 which has been embossed by the rolls 18 and 30 and thereby form roll 62. By observation of the embossed pattern on web 46, it is possible to ascertain whether or not the rolls 18 and 30 are properly orientated. If the rolls 18 and 30 are not properly orientated, one of the bolts 136 and 138 will be loosened and the other one will be tightened.

The loosening and tightening of the bolts 136 and 138 facilitates rotation of the shaft 124, coupling 102, shaft 20 and embossing roll 18 with respect to shaft 84 and the gear 82. When the bolts 136 and 138 are being adjusted, the motors 66 and 98 are inoperative. Thus, it will be noted that one of the embossing rolls may be rotated with respect to the other embossing roll without interfering with the meshing engagement of gears 82 and 86. The adjustment means 122 is positioned in a location so that access may be had thereto without interfering with any other structure. After an initial start-up period of trial and error to attain the proper mating relationship between the embossing patterns on the rolls 18 and 30. The adjustment means 122 need not be manipulated until the embossing patterns are again out of alignment.

Thus, it will be seen that the present invention provides a simple reliable structure for enabling one embossing roller to be moved toward and away from the other and to facilitate rotary adjustment of one embossing roll with respect to the other, all while maintaining the meshing engagement between the driving gears of the transmission means coupled to each of the rolls.

Aside from the advantages discussed above, the couplings 100, 102, 106 and 108 materially simplify the design and installation of drive means 72. Since these couplings can transmit rotary motion and flex, meticulous care need not be exercised to assure exact alignment of shafts 32 and 88 or shafts 20 and 84.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

We claim:

1. Embossing apparatus comprising a frame, upper and lower mating embossing rolls coupled to said frame, means supporting the ends of said upper roll in fixed relation to said frame, means supporting the ends of the lower roll so that the lower roll may be moved toward and away from the upper roll, motor means connected to said means supporting the ends of the lower roll for effecting such movement of the lower roll, a driving gear and a driven gear disposed in spaced relation to said rolls and in meshing interengagement with respect to each other, motor means coupled to said driving gear for rotating the same, an upper tranmission means extending from one of said gears to said upper roll, said upper transmission means comprising a shaft, a pair of couplings disposed in spaced relation on said shaft, said couplings being of the type permitting flexing in any lateral direction, a lower transmission means extending from the other gear to said lower roll, said lower transmission means comprising a shaft, a pair of couplings disposed in spaced relation on said shaft, said couplings being of the type permitting flexing in any lateral direction to facilitate movement of the lower roll toward and away from the upper roll without interfering with the meshing engagement of said gears, and angular adjustment means on said shaft of said upper transmission means between said couplings for adjusting the rotary disposition of said upper roll with respect to said lower roll without interfering with the meshing engagement of said gears.

2. Apparatus in accordance with claim 1, including a spreader roll alongside said upper and lower rolls, and drive means extending between said spreader roll and said upper roll for transmitting the rotary motion of said upper roll to said spreader roll so that the upper roll and the spreader roll rotate simultaneously in the same direction, said spreader roll having a diameter substantially less than the diameter of said upper roll.

3. Apparatus in accordance with claim 1 wherein said coupling includes a pair of hubs, at least three flexible straps interconnecting said hubs, the respective ends of said straps being connected to the respective hubs at diametrically opposite points.

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