July 3, 1951

G. S. SILLARS

2,558,788

WEB-FLEXING APPARATUS

Filed April 16, 1948

2 Sheets-Sheet 1

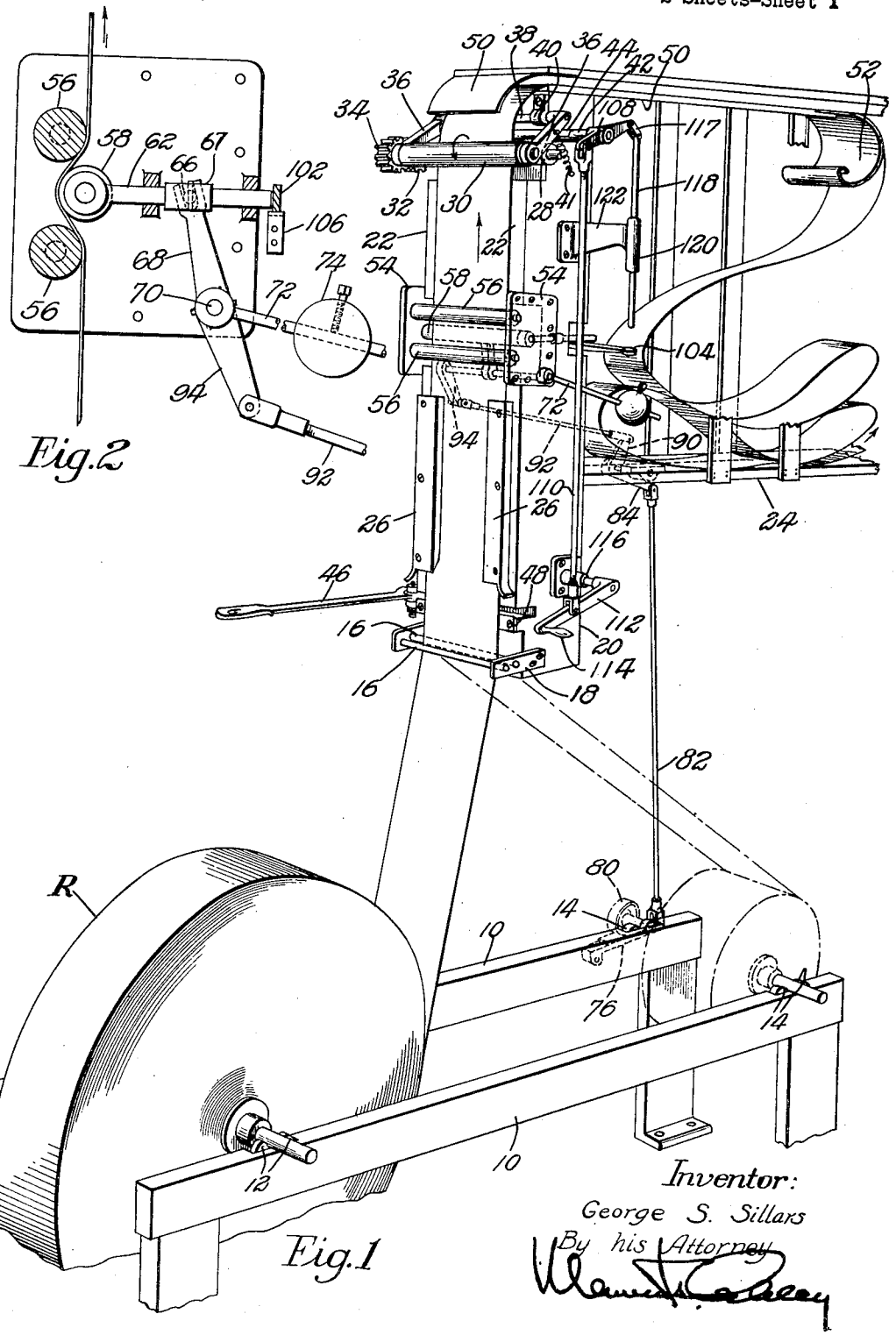

Fig. 2

Fig. 1

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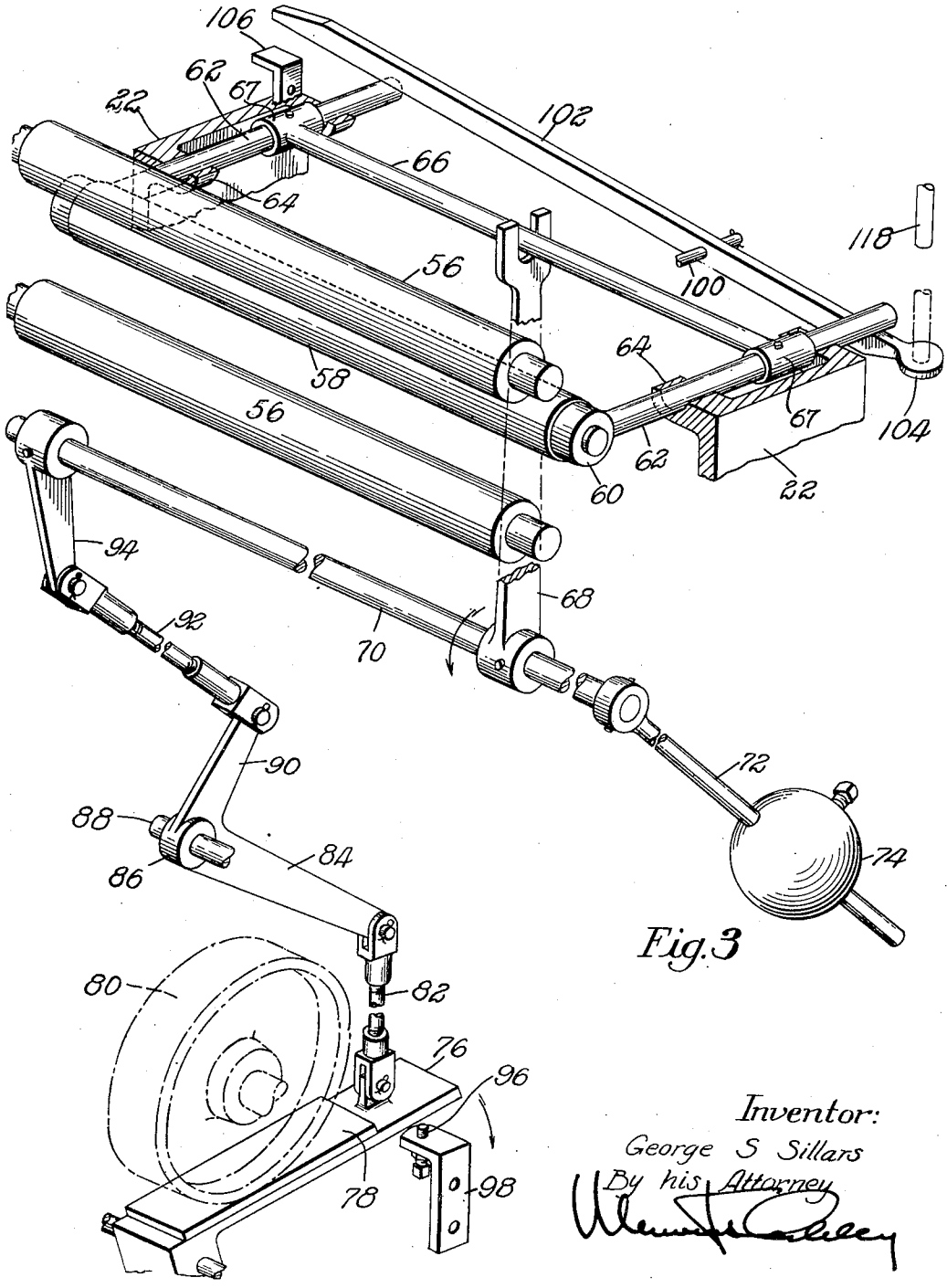

Fig. 3

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UNITED STATES PATENT OFFICE

2,558,788

WEB-FLEXING APPARATUS

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Application April 16, 1948, Serial No. 21,423

5 Claims. (Cl. 242—55)

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This invention relates to web feeding and more particularly to the feeding of webs of shell material such as are used in the manufacture of box blanks. The invention is shown herein as embodied in web-feeding mechanism of the type illustrated and described in Letters Patent of the United States 1,988,451, granted January 22, 1935, on an application of C. D. Knowlton.

As shown in the Knowlton patent, the shell material is delivered from large diameter supply rolls from which it is fed at a rate slightly in excess of that at which the material is to be used in the manufacture of the blanks. Between the supply roll and the blank-forming mechanism the material slowly accumulates, by reason of its rate of feed, in a cage, the purpose of which is to permit continuous operation of the blank-forming machine during the splicing of material from a new supply roll onto the trailing end of the web after the roll from which it has been drawn is exhaused. During the time that the material is being drawn from a fresh roll the diameter of the roll is great enough so that no substantial curl is present in the material after it is withdrawn from the roll and is formed into discrete box blanks. However, after the roll is substantially exhausted and its diameter has decreased appreciably, the curvature of the roll is such that the web of material has a great tendency to curl and because of the thickness of the shell material as commonly employed in the manufacture of box blanks, the finished blanks may not be flat.

It is an object of the present invention to provide improved mechanism for flexing the web of material in a direction opposite to that in which it is curved on the supply roll during the withdrawal of the material from the roll after it has been substantially exhausted. As shown in the Knowlton patent, the supply roll is initially placed on one support but after it is nearly exhaused it is moved onto another support without interrupting withdrawal of material therefrom so that a fresh roll of material can be moved into place on the first support for use after the other roll is completely exhausted. This movement of the roll onto the second support is utilized, in accordance with a feature of the invention, to operate a flexing roll for imparting a bend in the material opposite to that in which it is curved when being withdrawn from the supply roll. This reverse bend counteracts the normal tendency of the material to bend in one direction, thus facilitating the formation of flat blanks. The flexing roll is locked in operative position until the roll is exhaused and the feeding of the web is temporarily suspended to permit splicing the end of the web roll onto the trailing end of the web from the exhausted roll. When the feed is thus suspended, however, the flexing roll is rendered ineffective until the new roll has been substantially exhaused and is moved onto the second support.

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The above and other features of the invention, including novel combinations of parts and details of construction, will now be described by reference to the drawings and pointed out in the claims.

In the drawings,

Fig. 1 is an angular view of one form of mechanism in which the invention is embodied;

Fig. 2 is a section through the flexing rolls of Fig. 1; and

Fig. 3 is an angular view of the flexing rolls and associated mechanism.

Referring to Fig. 1, a pair of rails 10 are provided for supporting supply rolls of shell material. These rails are supported at a sufficient height above the floor and are suitably spaced to accommodate between them the rolls of material. Carried by the rails are transversely alined pairs of bearing rolls 12, 12, 14, 14, the rolls 12, 12 being provided for supporting a fresh roll R of shell material which is transferred to the rolls 14, 14 after the roll has been substantially exhausted. The web of material is drawn from the roll R upwardly between guide rods 16, 16 carried by plates 18 secured to depending portions 20 of spaced walls 22 at the end of a cage or accumulator 24. The web passes upwardly between guides 26 carried by the walls 22 and is fed by feed rolls 28, 30 located near the upper end of the accumulator. The roll 28 is driven in any suitable manner (not shown) and carries a pinion 32 engageable with a pinion 34 on the shaft of the roll 30 so that during the normal operation of the apparatus the rolls rotate in unison. The roll 30 is journaled in the ends of arms 36 carried by a shaft 38 which is, in turn, journaled in brackets 40 in the walls 22. A spring 41, connected between one of the arms 36 and the adjacent wall 22 acts to maintain the roll 30 in feeding relationship with the roll 28. Journaled in the walls 22 below the arms 36 is a shaft 42 having slabbed-off portions 44 which, with the rolls in the positions shown in Fig. 1, lie just below the arms 36. By rotating the shaft 42, the portions of the shaft adjacent to the slabbed-off portions 44 engage the arms and raise them, thus moving the roll 30 out of feeding relationship to the roll 28 so that the feeding movement of the web from the supply roll is interrupted.

Near the lower end of one of the walls 22 is pivoted a knife 46 which is arranged to sever the web when the knife is moved inwardly across a ledge blade 48 fastened to the walls 22. The knife is moved by the operator after the web is stopped, to sever the web from the trailing end thereof, after which the leading end of the new supply roll on the rolls 12, 12 is spliced to that portion of the web just above the knife.

From the feed rolls 28, 30, the web passes between guide plates 50 between which it is directed along the top of the cage after which it passes downwardly over a curved guide plate 52 and falls in folds in the cage 24 as illustrated.

Journaled in plates 54 secured to and projecting outwardly from the walls 22 is a pair of spaced flexing rolls 56. A third flexing roll 58 cooperates with the flexing rolls 56, when the roll 58 is in the position shown in Fig. 2, to bend the web of material as illustrated. The flexing roll 58 is journaled in bearings 60 (Fig. 3) which are carried by the ends of rods 62 slidable in bearings 64 extending inwardly from the walls 22. These rods and the roll 58 are normally urged away from the rolls 56 so that no flexing is imparted to the web as it passes between the rolls. For thus holding the roll 58, the rods 62 are connected by a transversely extending rod 66 having sleeves 67 at its ends encircling the rods 62. The rod 66 is straddled by the forked end of an arm 68 secured to and extending upwardly from a shaft 70 journaled in the plates 54. Also secured to the shaft 70 externally of one of the plates 54 is an arm 72 to which is adjustably secured a heavy weight 74. The weight 74 acts normally to move the shaft 70 in a clockwise direction (as viewed in Figs. 2 and 3) so that the rods 62 and the roll 58 are moved as a unit away from the rolls 56.

Pivotally carried by one of the rails 10 adjacent to the bearing rolls 14 is an arm 76 provided on its upper surface with a layer of brake material 78 arranged to be engaged by a brake drum 80 on the shaft of the partially exhausted supply roll upon movement of the supply roll onto the bearing rolls 14, 14. The plate 76 is connected by an adjustable link 82 with one arm 84 of a bell crank lever 86 pivoted at 88 to the bottom of the cage 24. Another arm 90 of the bell crank lever is connected by a link 92 to an arm 94 secured to and depending from the shaft 70. As long as no supply roll is positioned on the bearing rolls 14 the plate 76 is held in the elevated position shown in Fig. 3 by the weight 74 acting to turn the shaft 70 in a clockwise direction. However, the weight of the roll of material when moved into the right-hand position on the rails 10, 10 is sufficient to overcome the effect of the weight 74, thus moving the plate 76 downwardly into engagement with the end of a stop screw 96 on a bracket 98 secured to the adjacent rail 10. This downward movement of the plate 76 causes the shaft 70 to turn in a counterclockwise direction whereupon the flexing roll 58 is moved into the position shown in Fig. 2. Thus the movement of the flexing roll into operative position is simultaneous and automatic with the movement of the supply roll onto the bearing rolls 14, 14.

As the material continues to be drawn from the now substantially exhausted supply roll, the weight of the roll decreases to such an extent that it is no longer able to counterbalance the weight 74. Accordingly, mechanism is provided for locking the flexing roll 58 in its operative position after it has been thus moved. Pivoted in the cage about a pin 100 which extends parallel to the rods 62 is a bar 102. The pin 100 is located substantially nearer one of the rods 62 than the other so that the bar is unbalanced and tends to rotate in a counterclockwise direction (as viewed in Fig. 3) about the pin. With the flexing roll 58 in its retracted position, one end of the bar 102 rests on the top of the left-hand rod 62 and its other end 104 underlies the other rod 62, which rods thus prevent turning of the arm about the pin 100. However, as soon as the roll 58 has been moved into operative position, as heretofore explained, the rods 62 move out of engagement with the bar 102 which then swings in a counterclockwise direction until one end of the bar engages a bracket 106 carried by the adjacent wall 22. This bracket is so disposed that movement of the bar will be arrested when the ends thereof are directly behind the ends of the rods 62 (as shown in Fig. 2). Accordingly, as long as the bar 102 is held in this position, the flexing roll 58 is locked in operative position against the action of the weight 74.

The bar 102 is held in its locking position until the feed roll 30 is moved away from the feed roll 28, at which time the bar 102 is returned to the position shown in Fig. 3 permitting movement of the flexing roll 58 out of its operative position. For turning the shaft 42 by which the feed roll 30 is moved away from the roll 28, and arm 108 is secured to the outer end of the shaft 42 one end of which arm is connected by a downwardly extending link 110 to the arm 112 of a crank 114 pivoted at 116 in one of the walls 22 of the cage. Upon upward movement of the crank 114 the shaft 42 is turned in a clockwise direction to move the feed roll 30 away from the roll 28. Connected to the other end of the arm 108 by a link 117 is a rod 118 movable vertically in a sleeve 120 formed at the outer end of a bracket 122 secured to the cage. Upon clockwise movement of the arm 108 to interrupt the feeding of the web, the rod 118 is moved downwardly into engagement with the end 104 of the arm 102 to turn the arm in a clockwise direction, whereupon the weight 74, assuming the supply roll to be completely or nearly completely exhausted, overcomes the weight of the roll shaft and moves the flexing roll 58 back into its retracted position, in which position it remains until another roll of material has been moved onto the bearing rolls 14, 14.

From the above, it will be seen that the flexing roll 58 is automatically moved into operative position in response to movement of the supply roll into the position which it assumes when it is substantially exhausted and that the flexing roll will remain in this position until the feed of the web is interrupted. Thus the flexing rolls are effective to bend the web reversely of the direction in which the web is curled on the supply roll at that time when it is most needed, namely when the diameter of the supply roll is substantially smaller than the diameter of a new roll of shell material. The flexing rolls are operated and are rendered ineffective without any effort on the part of the operator additional to that which is commonly required in moving the rolls of material and making the splice of a new roll onto the end of an exhausted roll.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Web-feeding apparatus comprising a first supply roll support, a second supply roll sup-

port, cooperating feed rolls for drawing a web of material from a supply roll on either of said supports, means for flexing the web during its withdrawal from a roll on the second of said supports, means for separating said feed rolls to interrupt the feed of the web, and means operative in response to separation of said rolls for rendering said flexing means inoperative.

2. Web-feeding apparatus comprising a first supply roll support, a second supply roll support, a flexing roll past which said web is guided as it is drawn from a roll on either of said supports, means normally holding said flexing roll in inoperative position, and means operative in response to movement of a supply roll from the first supply roll support onto said second support for moving said flexing roll into operative position.

3. Web-feeding apparatus comprising a first supply roll support, a second supply roll support, a pair of feed rolls for drawing a web from a roll on either of said supports, means for causing separation of said feed rolls to interrupt the feeding of the web, a flexing roll past which said web is guided as it is drawn from a roll on either of said supports, means normally holding said flexing roll in inoperative position, means operative in response to movement of a supply roll from the first supply roll support onto said second support for moving said flexing roll into operative position, means for locking said flexing roll in operative position, and means operative upon separation of said feed rolls for releasing said locking means.

4. Web-feeding apparatus comprising a pair of feed rolls for drawing a web from a supply roll, a pair of spaced rolls engageable with one side of the web, a flexing roll engageable with the other side of the web and cooperating with said spaced rolls to bend the web reversely as it passes

over said rolls, means mounting said flexing roll for movement into and out of operative relation to said spaced rolls, means acting to move the flexing roll into inoperative position, means for moving said flexing roll into operative position, means operative upon movement of the flexing roll into operative position for locking said roll in said position, means for separating said feed rolls, and means operated by said separating means for releasing said locking means.

5. Web-feeding apparatus comprising a first supply roll support, a second supply roll support, a pair of feed rolls for drawing a web from a supply roll on either of said supports, a pair of spaced rolls engageable with one side of the web as it is withdrawn from either of said supply rolls, a flexing roll engageable with the other side of the web and cooperating with said spaced rolls to bend the web reversely as it passes over said rolls, means mounting said flexing roll for movement into and out of operative relation to said spaced rolls, means acting to move said flexing roll into inoperative position, means operative in response to movement of a supply roll onto said second support for moving the flexing roll into operative position, means for locking said flexing roll in operative position, means for separating said feed rolls, and means operated by said separating means for releasing said locking means.

GEORGE S. SILLARS.

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The following references are of record in the file of this patent:

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Number	Name	Date
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1,722,133	Freeman	July 23, 1929
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Certificate of Correction

Patent No. 2,558,788 July 3, 1951

GEORGE S. SILLARS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 55, for "exhaused" read *exhausted*; column 2, line 2, after the word "web", first occurrence, insert *of a new*; line 6, for "exhaused" read *exhausted*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of September, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.