April 3, 1934. C. C. WILLIS 1,953,142

COATING BREAKING MACHINE

Filed Jan. 7, 1932 5 Sheets-Sheet 1

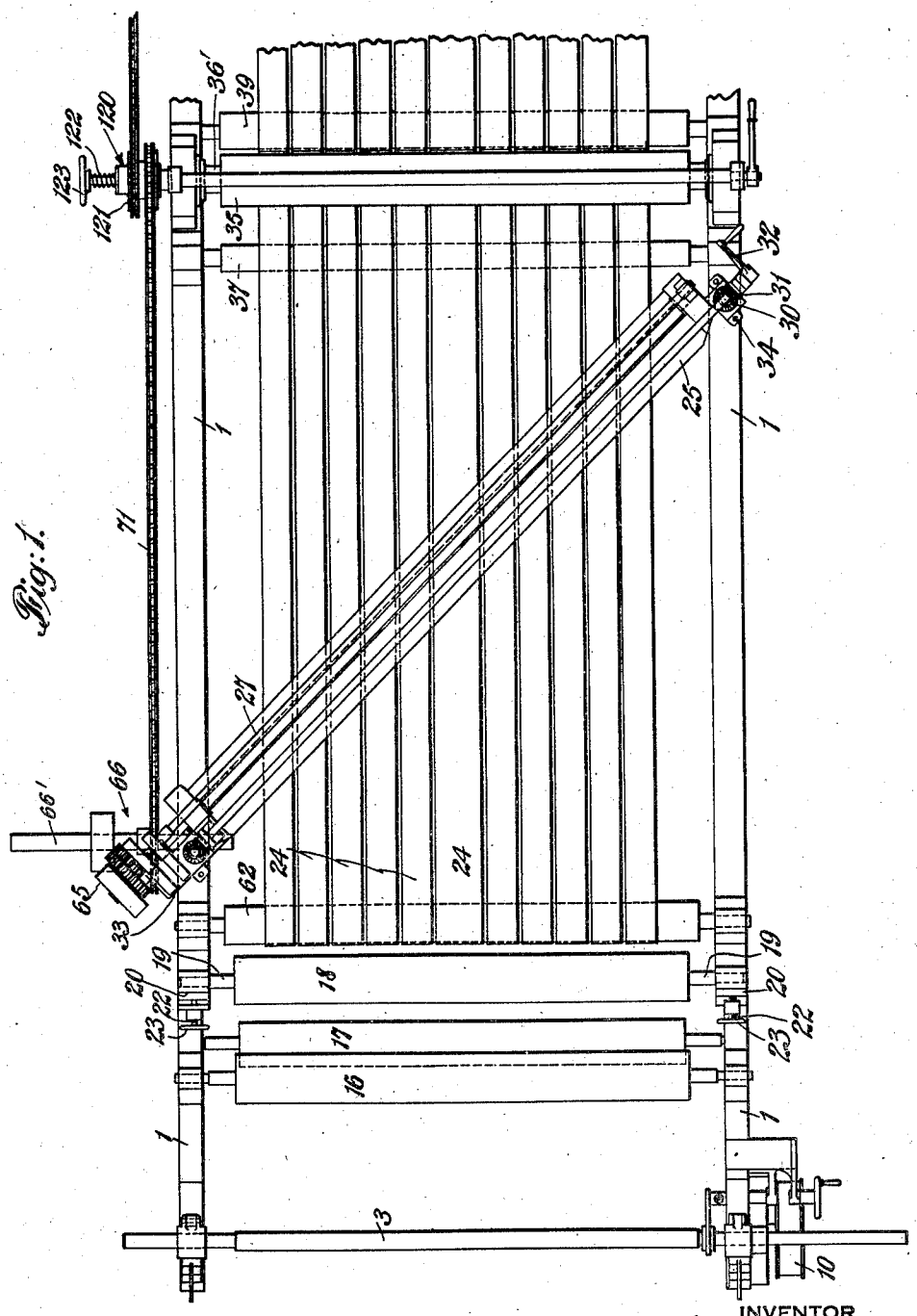


Fig. 1.

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COATING BREAKING MACHINE

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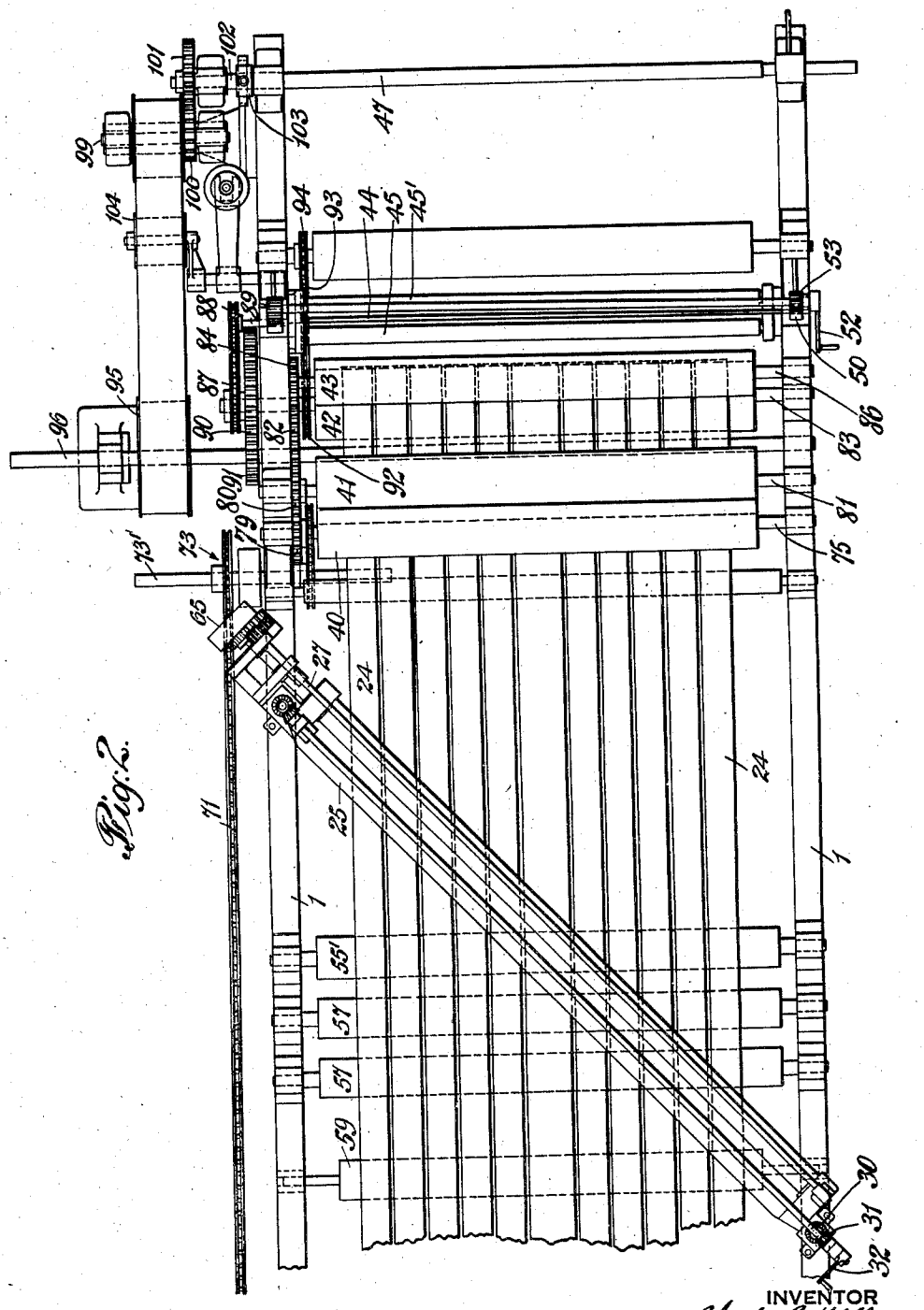


Fig. 2.

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COATING BREAKING MACHINE

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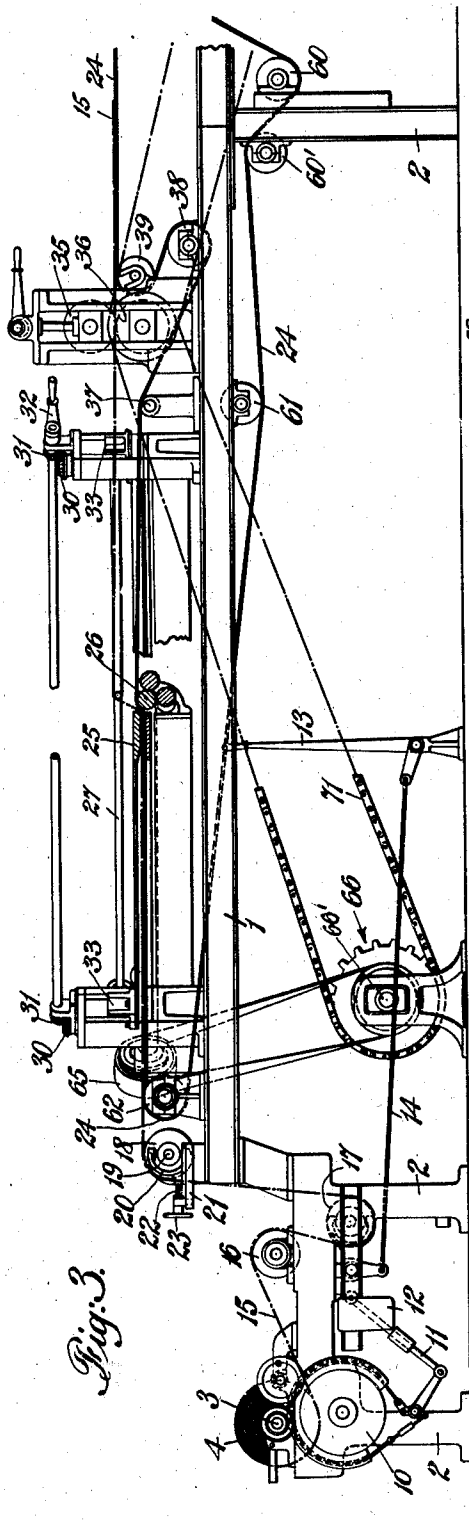


Fig. 3.

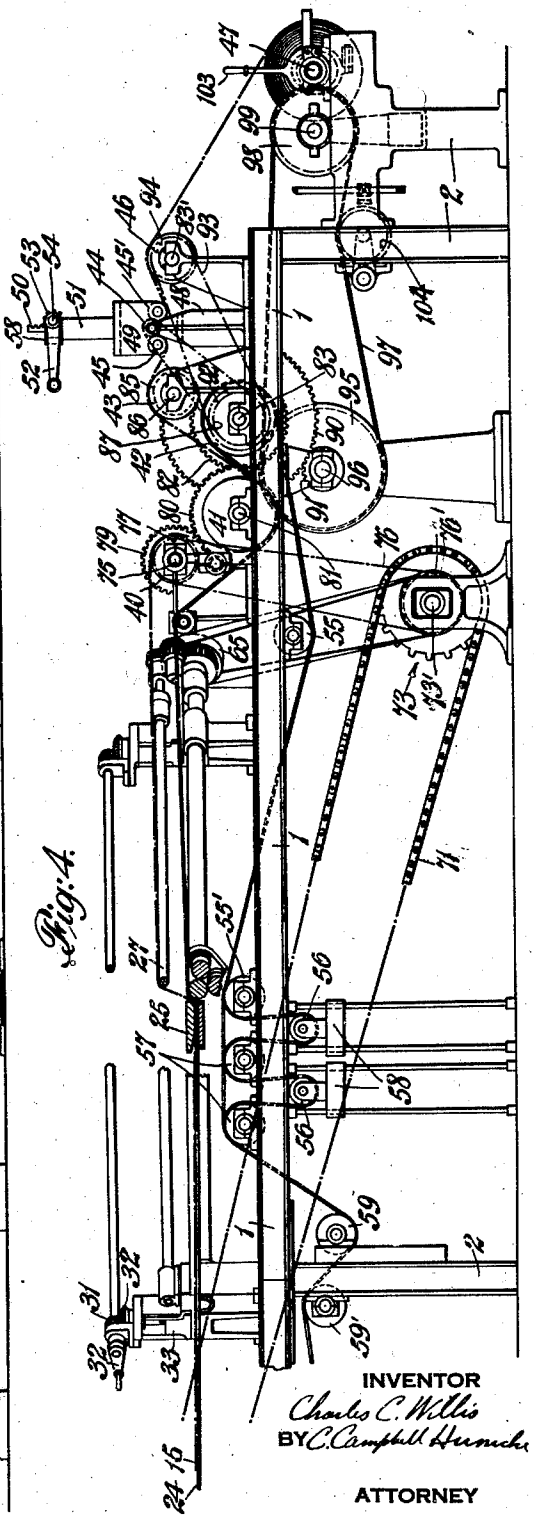


Fig. 4.

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COATING BREAKING MACHINE

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Fig:5.

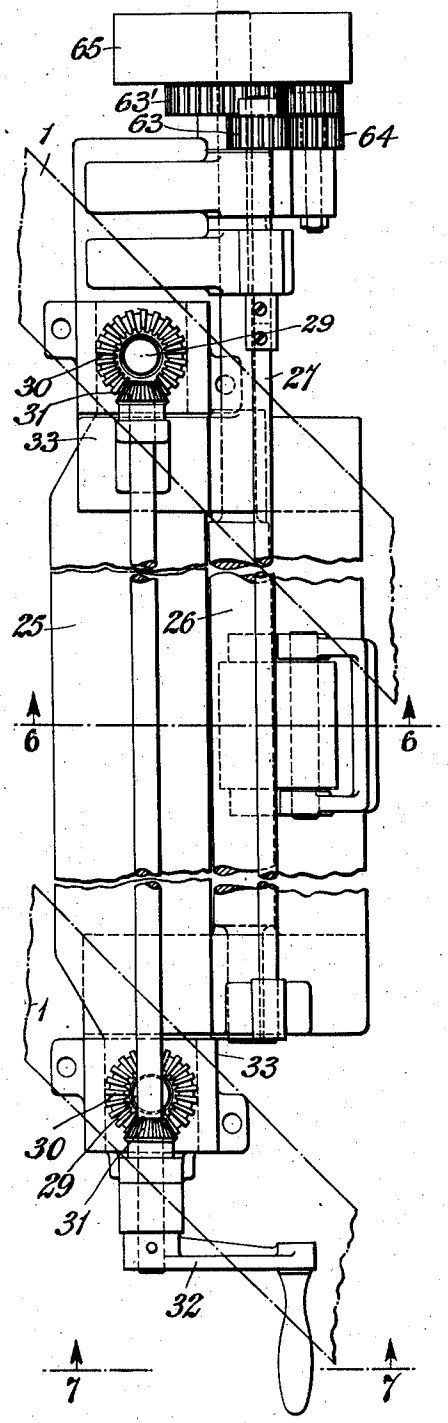


Fig:6.

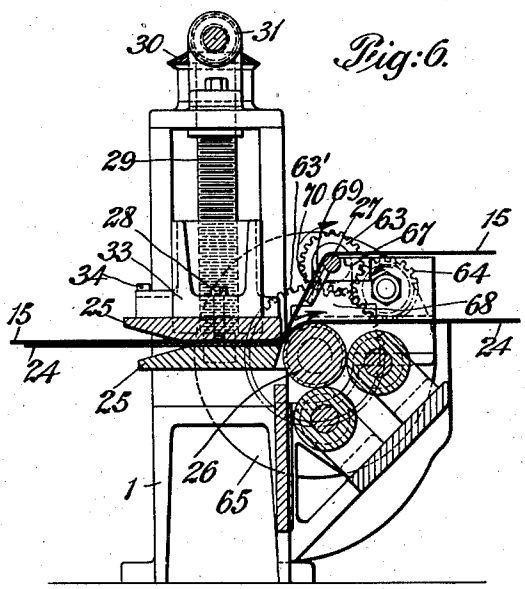
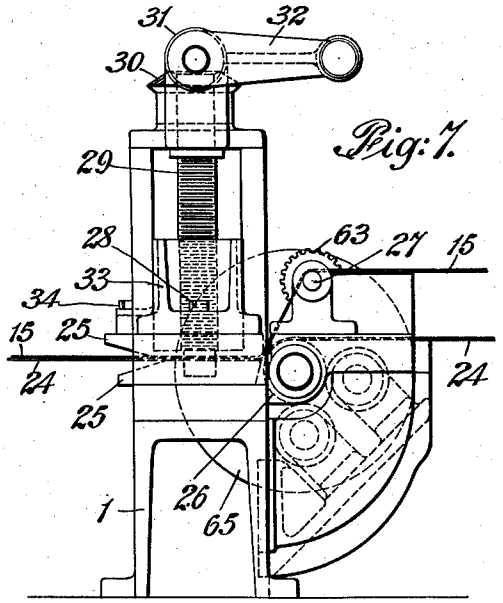


Fig:7.



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April 3, 1934. C. C. WILLIS 1,953,142

COATING BREAKING MACHINE

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Fig:8.

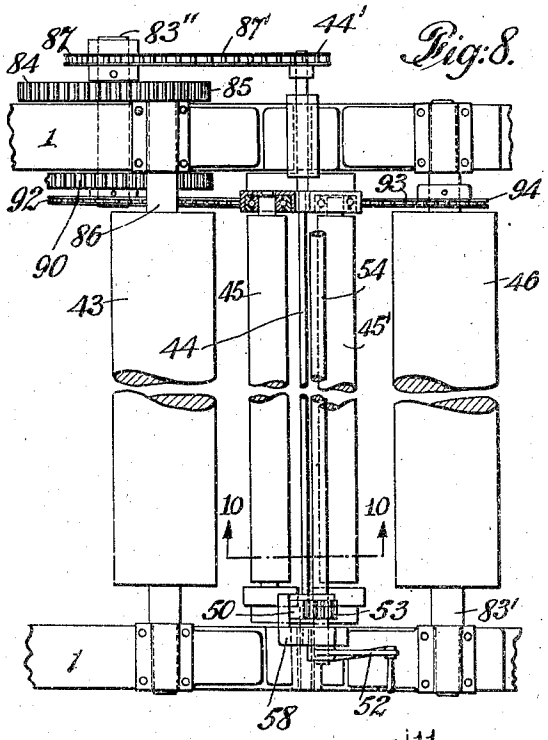


Fig:10.

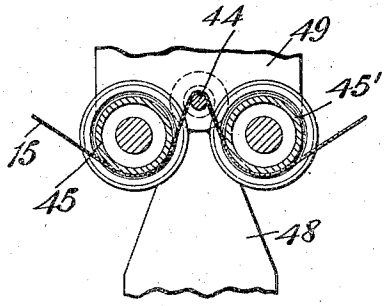


Fig:9.

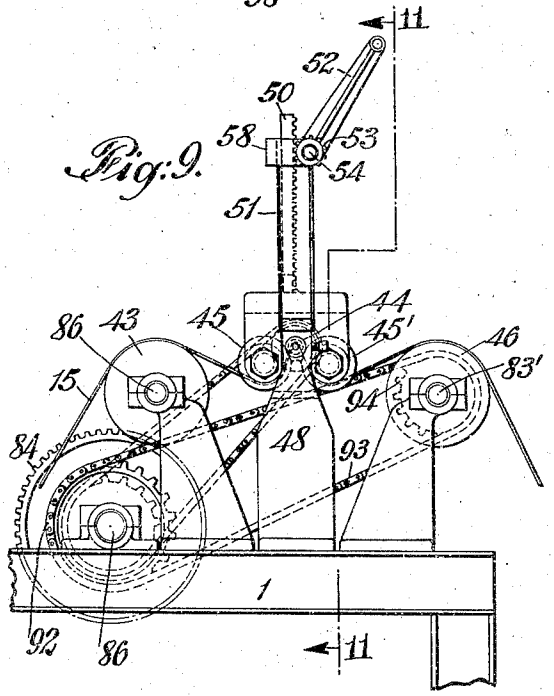
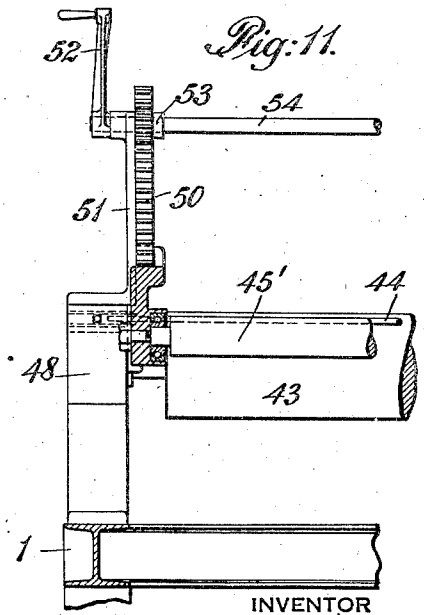


Fig:11.



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Patented Apr. 3, 1934

1,953,142

UNITED STATES PATENT OFFICE

1,953,142

COATING BREAKING MACHINE

Charles C. Willis, Bound Brook, N. J., assignor to John Waldron Corporation, New Brunswick, N. J., a corporation of New Jersey

Application January 7, 1932, Serial No. 585,371

11 Claims. (Cl. 91—18)

This invention relates to a paper coating breaker machine.

When paper is coated with a gum or certain other coatings which cause a curling of the paper when dried, difficulty is had when the paper is subsequently utilized for printing thereon. The curled sheet cannot be readily fed into the printing presses and printed into labels and the like nor can the curled sheets be easily packed or handled.

One of the objects of this invention is to provide a machine to remove the curl of the gummed paper or the like. Still another object of the invention is to provide a machine that will flatten coated paper without losses due to paper breakage or flaking off of the coating. Other objects will appear more fully hereinafter.

Referring to the drawings:

Figure 1 is a plan view of one-half of a machine embodying the principles of my invention.

Figure 2 is a plan view of the other half of the same machine.

Figure 3 is a view in side elevation of Figure 1 with parts broken off.

Figure 4 is a view in side elevation of Figure 2 with parts broken off.

Figure 5 is a broken plan detail view of the knife or breaker.

Figure 6 is an end detail view of the knife or breaker mechanism along the line 6, 6, of Figure 5, looking in the direction of the arrows.

Figure 7 is the other end view of the knife or breaker mechanism along the line 7, 7, of Figure 5, looking in the direction of the arrows.

Figure 8 is a broken plan view of the final paper straightening mechanism.

Figure 9 is a detail end view of the final paper straightening mechanism.

Figure 10 is a cross sectional view of Figure 8 along the line 10, 10, looking in the direction of the arrows.

Figure 11 is a sectional view of parts in elevation of Figure 9 along the line 11, 11, looking in the direction of the arrows.

I have found that certain coated papers such as gummed papers, curl when the coating dries due to the contraction of the coating. If the coating is cut or broken into small areas the coated paper can be smoothed out. Breakage of the gum or other coating usually will cause flaking off of particles of the coating and tearing of the paper base. I have found that such losses can be avoided by proper support of the sheets during the operations. I therefore propose to place my knives or breakers at 45° to the travel of the paper and to support the gummed paper during the breaking. I break the surface by drawing the gummed paper around a sharp corner or knife and support the gummed or coated surface by a yielding support such as a belt. This causes the formation of 45° cracks hardly visible to the eye and puts a reverse curl in the coated paper at 45° to the length of the paper. The reverse curl is then smoothed out but not quite entirely by a smoothing roll at 45°. Then by drawing the gummed paper around a second knife or breaker at 90° to the first, invisible cracks are formed at 90° to the first, leaving a resultant surface of diamond shapes almost invisible to the human eye. The reverse curl is then again smoothed out, but not entirely, leaving a slight resultant reverse curl wherein the sides of the paper curl with the gummed side out. This resultant reverse curve is then removed by drawing the paper over a final small diameter roll at right angles to the paper and its direction of travel. The coated paper is supported around the knives by the belting which enables the procurement of a positive, mechanical breaking without entire dependence upon the tension in the material. Were the supporting belts not used tearing more often occurs due to the increased tension required and flaking sometimes occurs which difficulties are almost entirely overcome by my invention. In addition, more delicate materials may be used. To prevent side travel of the paper by reason of the 45° knives or breakers and the difficulties inherent in wide belts travelling at high speeds, I prefer to utilize a number of relatively narrow belts each of which are separately maintained under uniform tension and driven at the same speed as the paper.

In carrying out my invention, I provide a frame 1 with supporting legs 2. At one end I provide an unwind mechanism comprising a shaft 3 journaled on frame 1 to support the roll of coated material 4. Shaft 3 is adapted to maintain the material under tension through brake mechanism 10 controlled by linkage 11 kept in constant tension by weight 12 or it can be operated to be released or "thrown in" by hand lever 13 through linkage 14. The paper 15 of roll 4 on shaft 3 passes over idler roll 16 and thence around idler roll 17 and up over roll 18. In order to compensate and maintain the coated paper in correct tension and direction of travel, roll 18 is adjustable with respect to the frame. The shaft 19 of roll 18 is mounted in universal joints 20, in turn carried by brackets 21. Screws 22 are threaded through

brackets 21 and are secured to universal joints 20, to permit rotation of screws 22 by hand adjustment wheels 23 and the movement of the universal joints 20, shaft 19 and roll 18 with respect to the brackets 21 and frame 1.

Paper 15 then passes onto belts 24 which support same to and through the knife or breaker blades 25 and around same. Roll 26 supporting belts 24 also supports paper 15 around blades 25. Paper 15 separates from belts 24 and passes around small diameter roll 27 taking the paper and removing most of the reverse curl caused by the knife 25. The relative positions of roll 26 with respect to the knife or breaker determines the amount and depth of the break. In addition, roll 26 supports belts 24 which in turn support the paper bending the latter around the edge to prevent flaking and secure proper breaking. Knife or breaker blade 25 has preceding chamfered guides to permit easy ingress of paper and belts. The breaker blade 25 may be removed and rotated to present a different edge in case of wear of any of the edges to give longer life. In order to procure correct functioning of the knives or breakers they are designed for adjustment with respect to each other by adjustment screws 28 and with respect to roll 26 by adjustment of screws 29 rotated by miter gears 30, 31, operated by hand crank 32. Screws 29 being journaled at their ends in knife or breaker blades 25 and in frame 33, the latter being bolted by bolts 34 to frame 1.

After the paper passes through and around knife or breaker blades 25 and over roll 27 it passes between threading and booster rolls 35, 36. Meanwhile belts 24 pass over idler roll 37 and under rolls 35, 36, and around roll 38 then up and around roll 39 on a level with the paper passing through rolls 35, 36, to support paper 15 to and through the second knife or breaker blades 25 which are the same as the first except that they are positioned at 90° to the first.

The purpose of rolls 35, 36, is to enable the paper to be threaded through the first knife or breaker blade and through rolls 35, 36, and thence through the second knife or breaker blade otherwise without such rollers a snubbing action would take place and the paper would be difficult to thread and the tension would be so increased as to cause excessive breakage. Rolls 35, 36, are adapted to compensate for the increased tension due to the friction in passing through the first knife and no more. This is accomplished by a friction clutch 120 of any well known type whereby only a certain maximum tension can be exerted by rollers 35, 36. The friction clutch 120 comprises two sprocket wheels 121 journaled on shaft 36' and frictionally held by disks 121 keyed to the shaft 36', the spring 122 and adjustment screw 123. These rolls likewise distribute the pull on paper 15 reducing the amount required to be exerted by the windup mechanism to pull the paper through the machine and hence reducing the total tension on the sheet at the windup that would otherwise be required.

After paper 15 leaves the second roll 27 it passes around roll 40 where it again meets belts 24 which latter pass around roll 41 at a lower level. Paper 15 above roll 42 and belts 24 then pass around roll 42. Rolls 40 and 42 being driven rolls, distribute the tension and the support of the belts 24 prevents breakage, loss of power and permits easy threading. Paper 15 after passing roll 42 leaves belts 24 and passes over driven roll 43 and thence under roll 45 and over small diameter roll 44 and under rolls 45', and thence over driven roll 46 to rewind roll 47.

The purpose of rolls 45, 44, 45', is to remove any remaining reverse curl. Roll 44 is mounted in bearings in brackets 48 carried by frame 1. Straddling rolls 45, 45', are parallel and adjustable with respect to roll 44 and are carried in bearings in block 49 secured to rack 50 in frame 51. A crank 52 carries pinion 53 to raise or lower rack 50, the pinion shaft 54 being journaled in frame 51 of brackets 48. By rotating crank 52 the proper adjustment can be made to remove any remaining reverse curve.

After belts 24 leave roll 42 they pass under idler rolls 55, then over idler roll 55', then under tension pulleys 56 (on sliding weights 58) and around idler 57 mounted on frame 1. Alternate belts 24 pass over alternate rolls 56 and 57, in order to have sufficient room for the weights. Thence belts 24 pass around idler rolls 59, 59', 60, 60', 61, and roll 62 where the entering paper 15 is met. It will thus be seen that belts 24 are continuous and travel at the same rate of speed as paper 15 but each belt is separately kept under a constant tension.

The various drives are as follows:

Shaft 96 is driven by electric motor or other form of drive in any well known manner. From shaft 96 the different mechanisms are driven. The rewind mechanism is driven by pulley 95 on shaft 96 through belting 97 and pulley 98 on shaft 99 through gears 101.

The principal drive is through gear 91 on shaft 96 driving gear 90 on shaft 83.

The final straightening roll 44 is driven by sprocket gear 87 on shaft 83 through sprocket chain 87' and gear 44' on roll 44.

Paper drive roll 46 on shaft 83' is likewise driven from shaft 83 through sprocket gear 92, chain 93 and gear 94. Paper drive roll 43 on shaft 86 is driven by gear 85 thereon, the latter being driven by gear 84 on shaft 83. Paper drive roll 40 on shaft 75 is driven through gear 79 by gear 80 on shaft 81, the latter gear 80 being driven by gear 82 on shaft 83. Shaft 75 of roll 40 through pulley or sprocket 77 in belting or chain 76 drives pulley or sprocket 76' on shaft 73'. Sprocket wheel 73 on shaft 73' through chain 71 drives sprocket 121 of clutch 120 to rotate booster rolls 35, 36, and through clutch 120 and chain 71 drives sprocket 66 on shaft 66'. Rolls 26, 27, adjacent the unwind end are driven from shafts 66' through belts and pulleys 65 and rolls 26, 27, adjacent the rewind end are driven from shaft 73' by belts and pulley 65.

A clutch 103 connects rewind roll shaft 47 and shaft 102. The usual belt tensioning roll 104 is mounted on supports 2.

Roll 27 is of small diameter and must rotate at a high speed necessitating specially designed construction. A relatively large bearing of bronze 67 or the like supports roll 27 throughout its length and partially surrounds it and is embodied in its support 68. The slanting face of support 68 has been cut away so that a felt or hair oil wick 69 bears against roll 27 and a face plate of brass 70 retains wick 69 in position.

What I claim is:

1. In a coating breaking machine, a breaker disposed across the coated material at an angle to the direction of travel of the coated material, means for drawing said coated material around the breaker edge, means for supporting said material to and around said breaker edge and means for varying the depth of the break.

2. In a coating breaking machine, a breaker disposed across the coated material at an angle, a second breaker also disposed across the coated material at an angle, means for drawing said coated material around said breaker edges and a plurality of means for supporting the coated material to and around said breaker edges.

3. In a straight line coating breaking machine, a frame, an unwind roll, a rewind roll, a breaker disposed across the coated material, a second breaker disposed across the coated material in spaced relationship lengthwise of the frame with respect to the first breaker, means for drawing said coated material to and around the breaker edges, means between said breakers to reduce the ultimate tension that would otherwise be required and means to support the coated material to and around the breaker edges.

4. In a coating breaking machine, an unwind roll for the coated material, a breaker disposed at an angle across the coated material, a second breaker disposed at an angle across the coated material, a series of endless belts to support the coated material to and around the breaker edges, means for separately maintaining each of said belts in tension, a rewind roll for said coated material, means for rotating said rewind roll, means for motivating said belts at the same speed as that of said coated material.

5. In a coating breaking machine, an unwind roll for the coated material, a breaker disposed at an angle across the coated material, a second breaker disposed in spaced relationship with respect to said first breaker, means to support said coated material to and around said breaker edges, said supporting means being a series of endless belts to prevent sidewise creep of the coated material, means for separately maintaining each of said belts in tension, a rewind roll for said coated material, means for rotating said rewind roll, means for motivating said belts.

6. In a coating breaking machine, an unwind roll for the coated material, a breaker knife disposed across the coated material, belts for supporting said material to and around said breaker edge, means adjacent said knife to support said belts, means to support and carry said breaker knife, said supporting means adjustable to vary the depth and width of the break in the coating, a pulling roll, means for rotating said pulling roll in conjunction with said belts and means for motivating said belts.

7. In a coating breaking machine, an unwind roll for the coated material, a breaker disposed across the coated material, belts for supporting said material to and around said breaker edge, a roll to remove the resultant curl in the coated material put therein by having been drawn around said breaker edge, a second breaker disposed across the coated material, a second roll to remove the resultant curl, a pulling roll for said coated material, means for rotating said pulling roll, means for motivating said belts.

8. In a coating breaking machine, an unwind roll for the coated material, a rewind roll, means for rotating said rewind roll, a breaker disposed across the coated material, means for removing resultant curl formed by said breaker in said coated material, a second breaker disposed across the coated material in spaced relationship with respect to said first breaker, a second means for removing resultant curl, means disposed between the two breakers to assist in drawing the coated material around the first breaker and over the first curl removing means, a series of endless belts to support said coated material to and around said breakers, means for motivating said belts, a small diameter roll for removing any remaining curl in said coated material.

9. In a coating breaking machine, an unwind roll, a breaker, a small diameter roll adjacent said breaker, a second breaker, a second small diameter roll adjacent said second breaker, means to assist in threading the coated material through the machine disposed between said breakers, endless belts to support said coated material, means for maintaining said belts in tension, means for motivating said belts, a third small diameter straightening roll adjacent the unwind roll, said coated material separating from said belts to pass over said small diameter roll while said belts pass thereunder, a pulling roll for said coated material and means for motivating said roll.

10. In a coating breaking machine, curl removing small diameter rolls, a bearing for supporting said rolls substantially throughout their length and means for continuously lubricating the face of the rolls throughout the entire length of the rolls.

11. In a coating breaking machine, a breaker knife disposed across the coated material at an angle to the direction of travel of the coated material, means for drawing said coated material across one face of the knife and around one edge of said knife whereby the breaking occurs in the coating as the material leaves the knife edge and means for supporting said material to, from and around said breaker knife.

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