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J. R. BAUMGARTNER

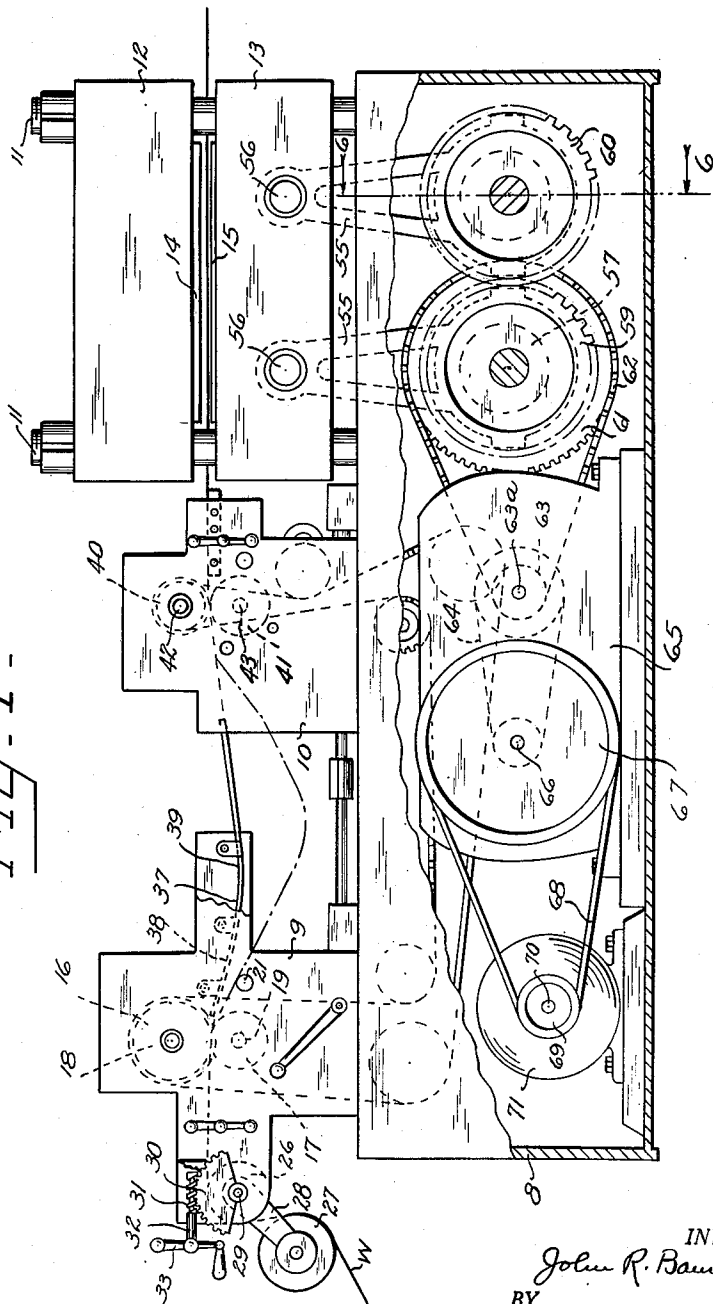
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WEB FEEDING MECHANISM FOR CARTON BLANK FORMING MACHINES

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3 Sheets-Sheet 1

FIG. 1 -



INVENTOR.
John R. Baumgartner
BY
Charles & French
Attys

Nov. 4, 1952

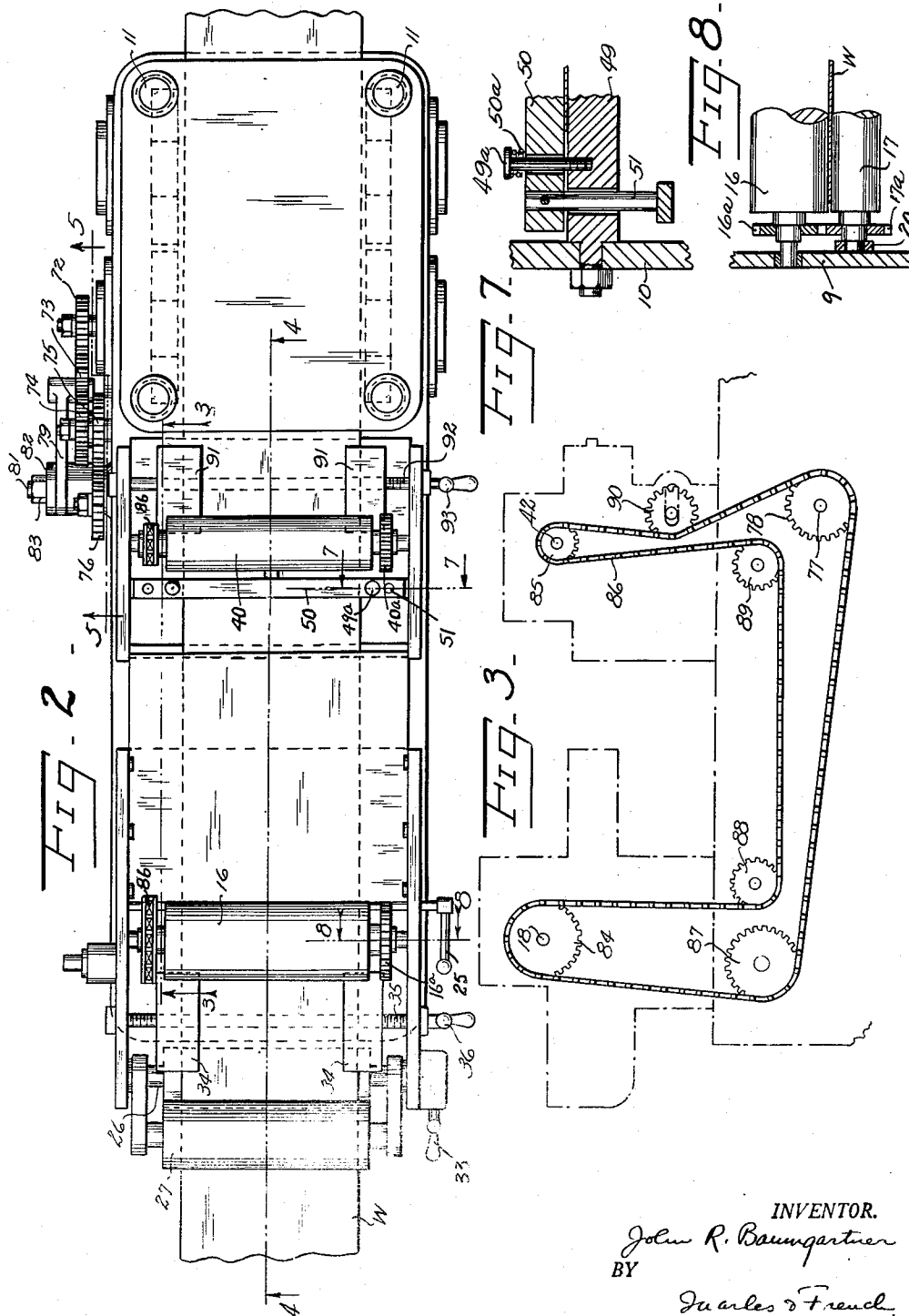
J. R. BAUMGARTNER

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3 Sheets-Sheet 2



INVENTOR.
John R. Baumgartner
BY
Charles D. French,
Attys

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J. R. BAUMGARTNER

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3 Sheets-Sheet 3

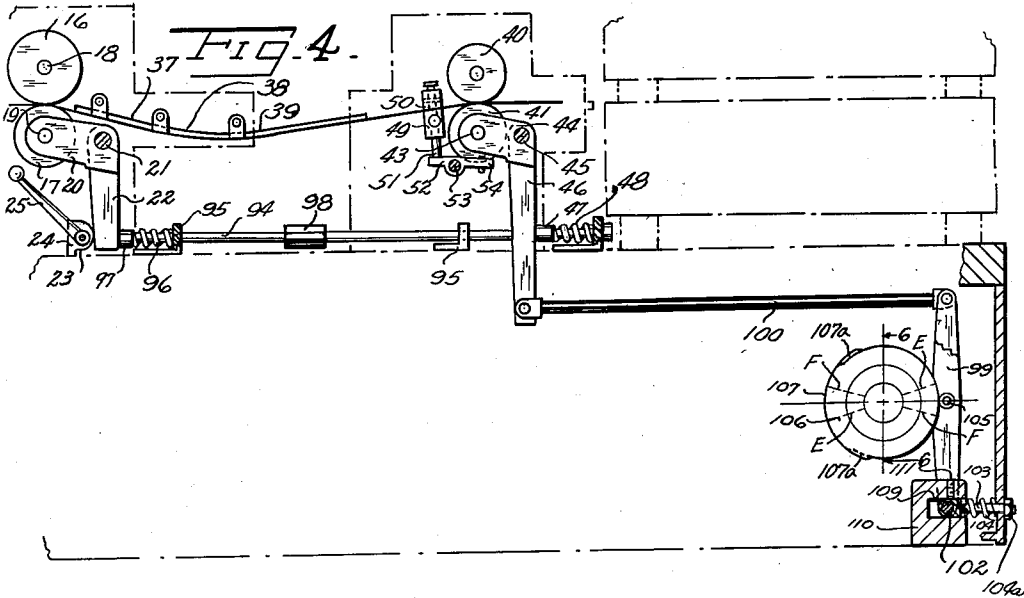


FIG. 6.

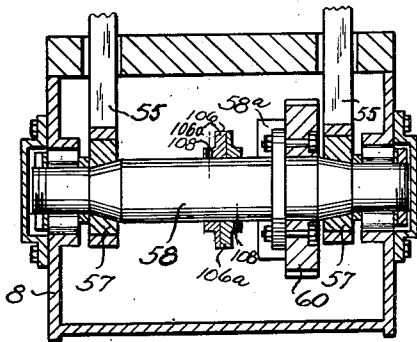
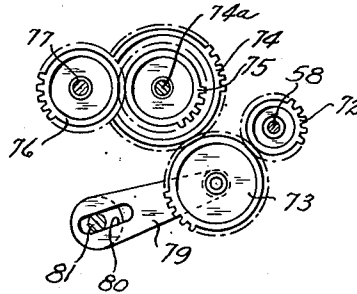


FIG. 5.



INVENTOR.
John R. Baumgartner
BY
Charles F. French
Att'ys

UNITED STATES PATENT OFFICE

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WEB FEEDING MECHANISM FOR CARTON
BLANK FORMING MACHINES

John R. Baumgartner, Milwaukee, Wis.

Application October 17, 1949, Serial No. 121,725

3 Claims. (Cl. 271—2.4)

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The invention relates to carton blank forming machines.

The general object of the invention is to provide a machine of the character described in which a web of paper from a supply roll is intermittently fed into and out of a creasing and cutting or blank forming press from a pair of intermittently active feed rolls to which the paper is supplied by continuously active metering feed rolls, with means for creating a loop in the paper web between said sets of rolls during the cutting operation of the press.

In machines of the character above described the timing of the active operation of the intermittently acting feed rolls, the feed of the web after the looped portion is taken up, and the arresting of the movement of the paper to said rolls during their non-feeding period is of importance so that equal increments of the paper web may be fed into the press for each operation thereof, and the present invention is designed to satisfy these requirements. More particularly, according to the present invention, one of the intermittently active feed rolls is driven continuously in direct synchronism with one of the continuously active metering feed rolls and the other of the intermittently active feed rolls is brought into feeding relation with the first named driven roll at the desired time, and during the inactive period of the intermittently active feed rolls, brake means stops the feed of the web thereto. To insure efficient operation of the press an apron is provided at the exit end of the continuously driven feed rolls against which the loop of paper engages to limit the snap of the paper as its loop is taken up and prevent it from buckling when the intermittently active feed rolls become active and to create friction on the web to prevent the intermittently active feed rolls from overpowering the metering rolls.

A further object of the invention is to provide a press mechanism in which the movable bed of the press is reciprocated by spaced sets of eccentric cranks and balanced drive shafts.

In the drawings:

Fig. 1 is a side elevation view of apparatus embodying the invention, parts being broken away;

Fig. 2 is a plan view of the apparatus;

Fig. 3 is a detailed diagrammatic view looking along the line 3—3 of Fig. 2 and showing the drive for certain parts of the machine;

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a detailed vertical sectional view taken on the line 5—5 of Fig. 2;

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Fig. 6 is a detailed vertical sectional view taken on the line 6—6 of Fig. 1;

Fig. 7 is a detailed vertical sectional view through the brake taken on the line 7—7 of Fig. 2;

Fig. 8 is a detailed vertical sectional view taken on the line 8—8 of Fig. 2.

Referring to the drawings, the numeral 8 designates a base structure on which housings 9 and 10 and spaced uprights 11 are mounted. The press itself includes a fixed platen 12 carried by the uprights 11 and a movable platen 13 slidably mounted on said uprights. One of the platens 12 or 13 carries the cutting and creasing dies while the other carries a base plate, these parts being indicated by the numerals 14 and 15.

A pair of feed rolls 16 and 17 are suitably mounted in the housing 9, the shaft 18 for the roll 16 being mounted on fixed bearings in said housing while the shaft 19 for the roll 17 is mounted in bearings at the outer ends of arms 20, see Fig. 4, carried by an oscillatory shaft 21 journaled in the housing and which shaft has a centrally located depending arm 22 which is engaged by a cam 23 on a rotatable shaft 24 journaled in the housing and carrying a hand crank 25 whereby the turning of said shaft 24 by said crank will act through the arms 22 and 20 and shaft 21 to move the roll 17 into and out of feeding relation with the roll 16, the movement of said roll 17 to an open position permitting of ready insertion of the web W of paper between the rolls 16 and 17. The shafts for the rolls 16 and 17 are geared together by intermeshing gears 16a and 17a which are always in mesh. A guide roll 26 is journaled in the housing 9, and another guide roll 27 is carried by arms 28 journaled on the shaft extensions of the roll 26, and one of these arms has a shaft extension 29 which carries a segmental worm wheel 30 meshing with a worm 31 on a shaft 32 mounted in the housing and provided with a hand crank 33 whereby the angular disposition of the roll 27 relative to the roll 26 may be varied. These guide rolls act to prevent kinking of the paper web W which after leaving the roll 26 passes between adjustable side guide plates 34 that are suitably mounted in the housing and connected to a feed screw 35 for adjustment toward and away from each other on the turning of said screw by a hand crank 36.

The roll 16 is preferably an expandable roll whereby the rate of feed of the paper may be varied by changing the diameter of said roll.

An apron 37 of sheet metal is mounted between the sides of the housing at the exit of the web

from between the rolls 16 and 17 and is curved or inclines downwardly from said rolls as indicated at 38 and then at 39 extends upwardly, but its outer end is somewhat below the line of centers between said rolls and the rolls 40 and 41. This apron checks the upward swing or snap of the web when it is drawn up from its looped or dotted line position shown in Fig. 1 to its full line position and also acts to produce a drag due to frictional contact of the paper with it as the web is fed through to the press.

The rolls 40 and 41 are feed rolls mounted in the housing 10. The shafts for these rolls are geared together by intermeshing gears similar to the gears 16a and 17a, and one of these gears 40a is shown in Fig. 2. The shaft 42 for the upper feed roll 40 is mounted in fixed bearings in said housing while the shaft 43 for the roll 41 is mounted in bearings at the outer ends of arms 44 carried by an oscillatory shaft 45 journaled in the housing and which shaft has a centrally disposed depending arm 46 which is engaged by a plunger 47 acted on by a spring 48 to swing the roller support to a position in which said roll 41 is urged into web feeding position as shown in Fig. 4.

Referring to Figs. 2 and 7, a brake means comprises a relatively fixed transversely extending lower bar 49 and a movable transversely extending upper bar 50 which has spaced pin projections 51 slidably mounted and guided in the bar 49. The bar 50 is constantly urged toward the bar 49 by spaced springs 50a interposed between said bar 50 and the heads of spaced bolts 49a anchored in the bar 49. Each projection 51 is engageable with one arm of a lever 52 mounted intermediate its ends on a pivot shaft 53 and engaged at its other end 54 by one of the arms 44 to move the bar 50 against the action of the springs 50a to release the bar 50 from frictional engagement with the web when the rolls 40 and 41 are in separated web threading position and permit the bar 50 to engage the web when the roll 41 is swung up into feeding contact with the web.

The movable platen 13 is reciprocated by two sets of eccentrically driven connecting rods 55, there being two rods in each set journaled at their upper ends on shafts 56 carried by said platen and mounted at their lower ends on eccentrics 57 mounted in spaced relation on spaced shafts 58 which are connected together by gears 59 and 60. One of the shafts 58 carries a sprocket 61 connected by a chain 62 with a sprocket 63 on the output shaft 63a of a variable speed transmission mechanism 65 which includes a belt and pulley drive connection 64 with the input shaft 66 thereof which shaft carries a pulley 67 connected by a belt 68 with a pulley 69 on the drive shaft 70 of an electric motor 71.

Referring to Figs. 2 and 5, the shaft 58 carrying the sprocket 61 also carries a loose change gear 72 which meshes with a gear 73 that meshes with a loose change gear 74, said gears 72 and 74 being detachably mounted on the shafts 58 and 74a, respectively. The gear 74 is compounded with or connected to a gear 75 which meshes with a gear 76 on a shaft 77 that carries a sprocket 78, see Fig. 3. The gear 73 is mounted on a quadrant arm 79 that is adjustably clamped by a slotted connection 80 with a fixed stud 81 carrying a washer 82 and a nut 83. The gears 72 and 74 may be interchanged with other gears of different ratios to change the speed of the shaft 77 relative to the shaft 58.

Referring to Fig. 3, the shaft 18 for the roll

16 carries a sprocket 84, and the shaft 42 for the roll 40 carries a sprocket 85, and a chain 86 is trained over these sprockets and the sprocket 78 and also over idler sprockets 87, 88, and 89 and is engaged by an adjustable tensioning sprocket 90, so that both the rolls 16 and 40 are positively driven from the shaft 77 at predetermined rates, the roll 40 rotating faster than the roll 16 because of the sprocket ratios, it being noted that the rolls 40 and 41 feed only what the rolls 16 and 17 unwind from the roll of paper that constitutes the web and that the friction produced by the apron 37 prevents the rolls 40 and 41 overpowering the rolls 16 and 17.

On leaving the rolls 40 and 41 the web is guided between widthwise adjustable side guide plates 91 which are suitably mounted in the housing 10 and connected to a feed screw 92 for adjustment toward and away from each other on the turning of said screw by a hand crank 93.

Referring to Fig. 4, the cam 23 that engages the arm 22 to swing the roll 17 out of feeding relation with the roll 16 also acts to swing the roll 41 out of feeding relation with the roll 40 by an operative connection between the arm 22 and the arm 46 comprising a tappet shaft 94 slidably mounted in guides 95 and engaging said arms at its opposite ends and yieldingly urged toward the cam 23 by a spring 96 interposed between its headed end 97 and one of said guides. To accurately adjust the length of the shaft 94 it is preferably formed of two parts connected together by an adjustable coupling 98. The cam 23 is only operated to move the rolls 17 and 41 to an out-of-feed relation with the web and release the brake bar 50 as previously described during web threading operations prior to the actual starting of the feed of the paper web through the machine.

For the intermittent feed of the paper web by the rolls 40 and 41, positively driven means are provided for timing the movement of the roll 41 to an out-of-feed position relative to the roll 40 comprising means for moving the arm 46 toward the right as viewed in Fig. 4 against the pressure of the spring 48. This means includes a lever 99, and a link 100 operatively connecting said lever with the lower extended end of the arm 46. The spaced arms of lever 99 are pivotally mounted on a pin 102 carried by the outer headed end of a rod 103 which is adjustably anchored to the frame of the machine by a spring 104 interposed between the head of the rod 103 and said frame and held in tensioned engagement with the rod by a nut 104a on the outer threaded end of said rod. The arms of the lever 99 carry a roller 105 intermediate its ends engageable with a cam 106 on one of the shafts 58 and provided with a nose 107 whose effective length may be varied to vary the time during which the plunger 47 is retracted to thus vary the time during which the roll 41 is swung down out of feeding relation with the web. The length of the nose 107 is varied by making the cam 106 of two complementary parts 106a and 106b that are angularly adjustable relative to each other and each secured by a set screw 108 to the shaft 58 as shown in Fig. 6. As shown in Fig. 4, the cam nose 107 is formed by two parts 106a, each having a nose portion 107a so that portions of each nose face 107a of each member 106a project beyond what may be termed common nose faces. The dotted lines E-E and F-F indicate recess portions of the two members 106a. Relative angular adjustment of the cam parts 106a

lengthens or shortens the effective length of the nose 107. Cams of this kind are well known in the art—see U. S. Patent No. 2,591,013 of February 13, 1951. To provide a firm support for the pin 102 the headed end of the rod 103 is slidably mounted in the slot 109 of a fixed member 110 to which it may be clamped in the desired position of adjustment by a set screw 111. It is to be noted that the cam 106 does not swing the roll 41 to such an extent as to cause a release of the brake bar 50 when the roll 41 is moved to its inactive position.

With the above arrangement, the paper in the supply roll is unwound and carried in web form to the metering rolls 16 and 17 which feed the web to the intermittently active press feed rolls 40 and 41 which in turn feed a predetermined length of the web into the press. While the press is blanking and creasing the stock, the cam 106 is acting through the lever 99, link 100, and arm 46 to hold the roll 41 out of feeding relation with its companion roll 40. Also at this time the web adjacent the entrance to the rolls 40 and 41 is held by the brake means previously described, and the continued operation of the rolls 16 and 17 builds up a loop in the web between the rolls 16 and 40 indicated in dotted lines in Fig. 1. Thereafter, when the platen 13 moves down to separate the members 14 and 15, the roller 105 is then on the low part of the cam 106 so that the spring 48 acting on the plunger 47 and the arm 46 swings the roll 41 up into web feeding position, and the slack of the loop is then taken up, and as the web snaps up against the apron 37, more of the web is fed through the sets of rolls 16, 17 and 40, 41 until the cam nose 107 again releases the roll 41 from web feeding relation, it being noted that the brake means acts on the web at all times and that the apron 37 creates enough of a frictional drag on the paper to prevent the rolls 40 and 41 from overpowering the rolls 16 and 17 and permit the rolls 40 and 41 to slip or feed no more paper than the metering rolls supply. The operation of the crank 25 and the cam 23 is, as noted, only, to release the brake and open both sets of rolls sufficiently for threading through of the web prior to starting the press.

The drive connections including the eccentrics 57 and rod 55 on each of the shafts 53 are counterbalanced by weights 58a mounted on parts carried by said shafts.

In the drawings numeral 14 preferably designates the cutting and creasing die which is mounted on the fixed platen 12 and 15 the base plate mounted on the movable platen. Such an arrangement simplifies the construction of the cutting and creasing die since it may be a relatively simple form of die as it is not subjected to vibrations incident to the movement of its support.

Heretofore, so far as I am aware, the speed of lineal feet per minute of material handled by apparatus for forming carton blanks has not exceeded two hundred. With the present arrangement of apparatus I am able to run the web through the press at a speed of four hundred lineal feet per minute.

I desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except in so far as such limitations are included in the claims.

What I claim as my invention is:

1. In a creasing and blank forming press, mechanism for feeding a predetermined length of paper web to said press comprising a set of continuously active web feeding metering rolls and a set of intermittently acting web feeding rolls, means for rendering said intermittently active feed rolls inactive while a loop is built up in the web between said sets of rolls, means for positively driving the rolls of each set of rolls at predetermined speeds, the intermittently active web feeding rolls being driven at a higher speed than said metering rolls, and means engaging the upper surface of the web between said sets of rolls and disposed below a straight line extending between the nips of both sets of rolls and creating a tensioned frictional drag on the web between said sets of rolls to prevent the intermittently active rolls, during their active period when its loop is taken up, feeding more of the web than is metered to them by said metering rolls.

2. In a creasing and blank forming press, mechanism for feeding a predetermined length of paper web to said press comprising a set of continuously active web feeding metering rolls, and a set of intermittently acting web feeding rolls, means for rendering said intermittently active feed rolls inactive while a loop is built up in the web between said sets of rolls, means for positively driving the rolls of each set at predetermined speeds, the intermittently active web feeding rolls being driven at a higher speed than said metering rolls, and an apron between said sets of rolls against which the upper side of the web is frictionally engaged and having an intermediate portion disposed below a straight line extending between the nips of both sets of rolls acting to deflect the intermediate portion of the web between said sets of rolls downwardly to tension said web when its loop is taken up to prevent said intermittently active rolls, during their active period, feeding more of the web than is metered to them by said metering rolls.

3. The structure as defined in claim 2 having a constantly active brake means for the web acting in conjunction with said apron during the active period of said intermittently active feed rolls and restraining movement of the web during the inactive period of said rolls.

JOHN R. BAUMGARTNER.

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