

Sept. 15, 1953

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2,652,247

FEED MECHANISM FOR CARTON BLANK FORMING APPARATUS

Filed May 29, 1950

5 Sheets-Sheet 1

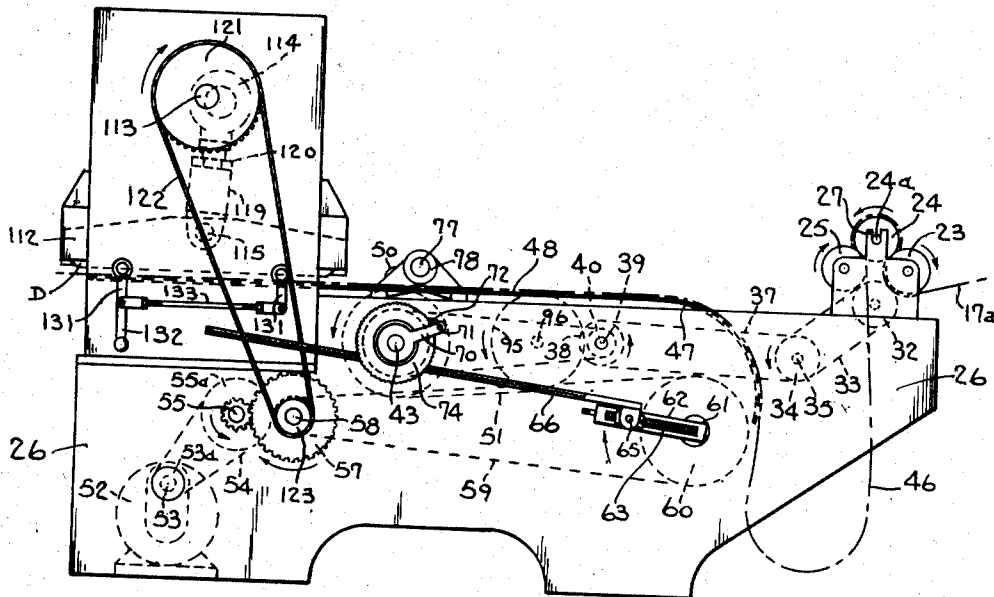


FIG. 1

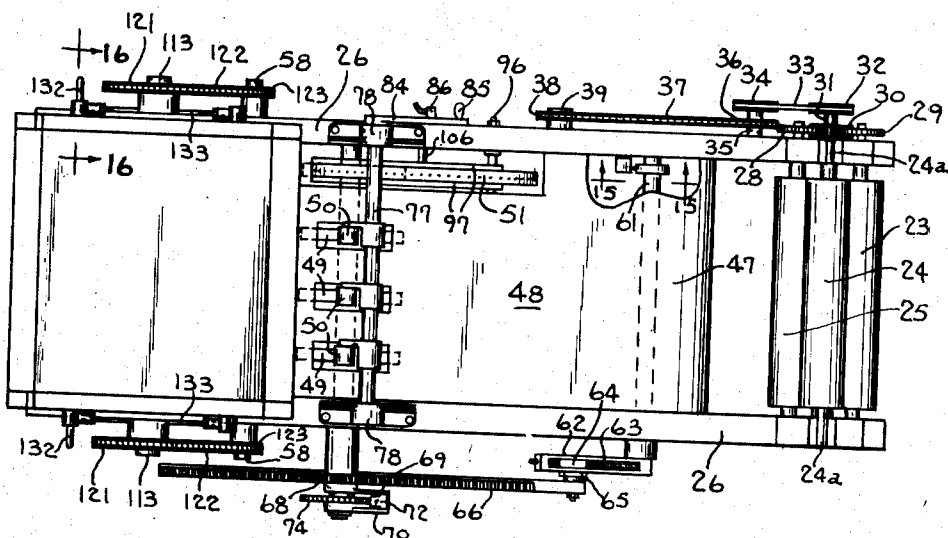


FIG. 2

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5 Sheets-Sheet 2

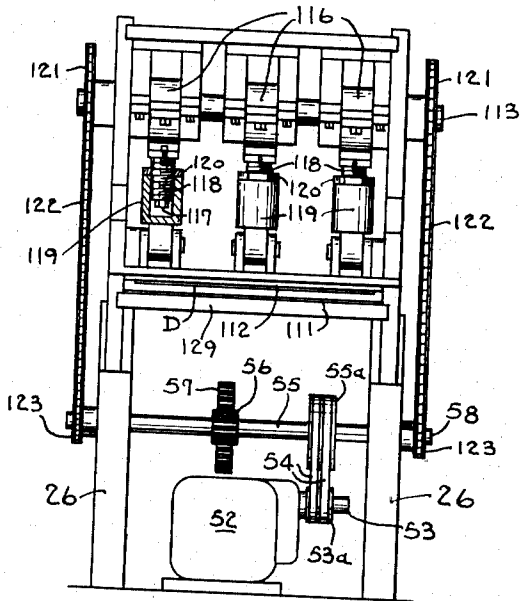


FIG. 3

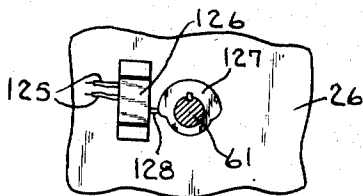


FIG. 15

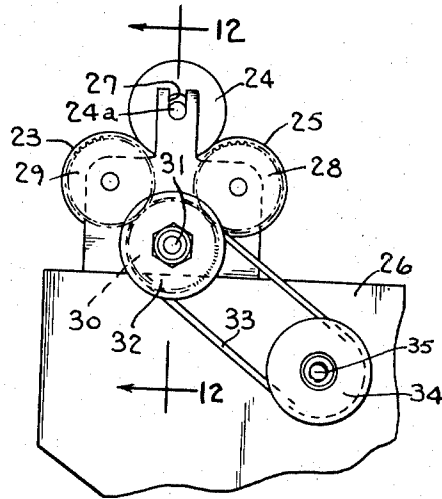


FIG. 11

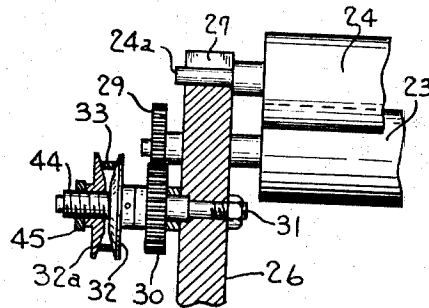


FIG. 12

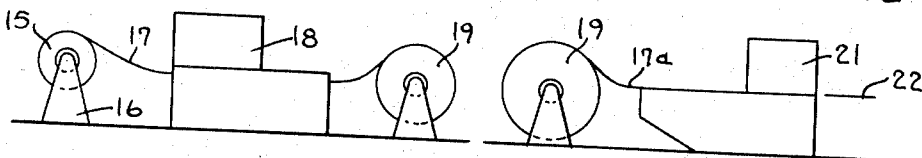


FIG. 13

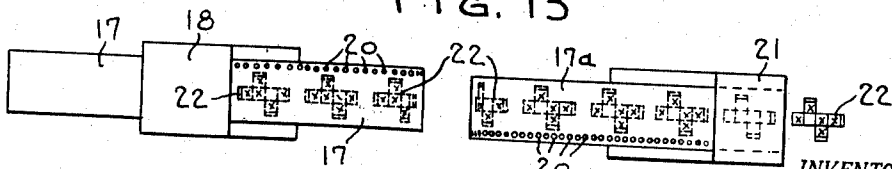


FIG. 14

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FIG. 4

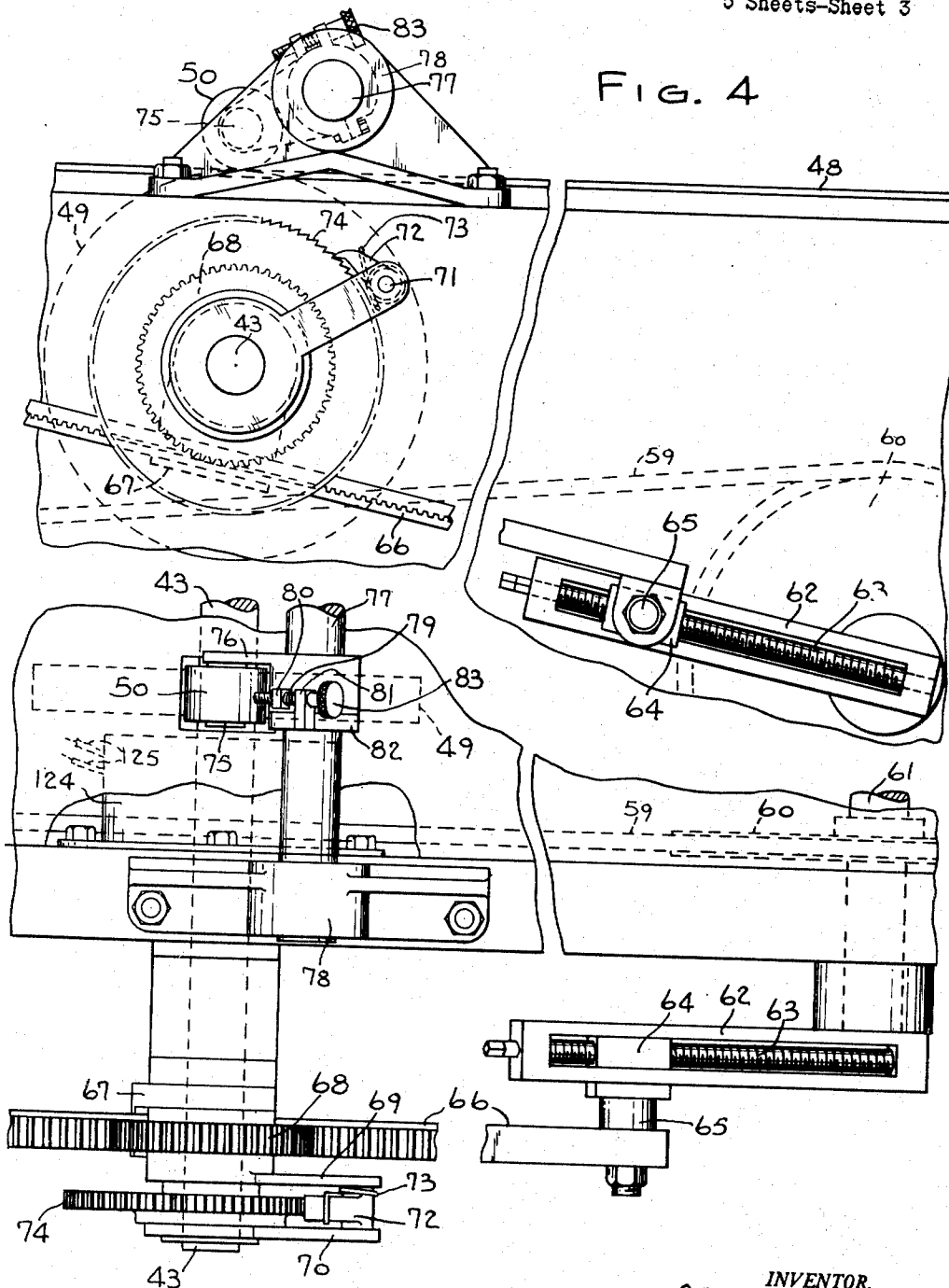


FIG. 5

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FIG. 6

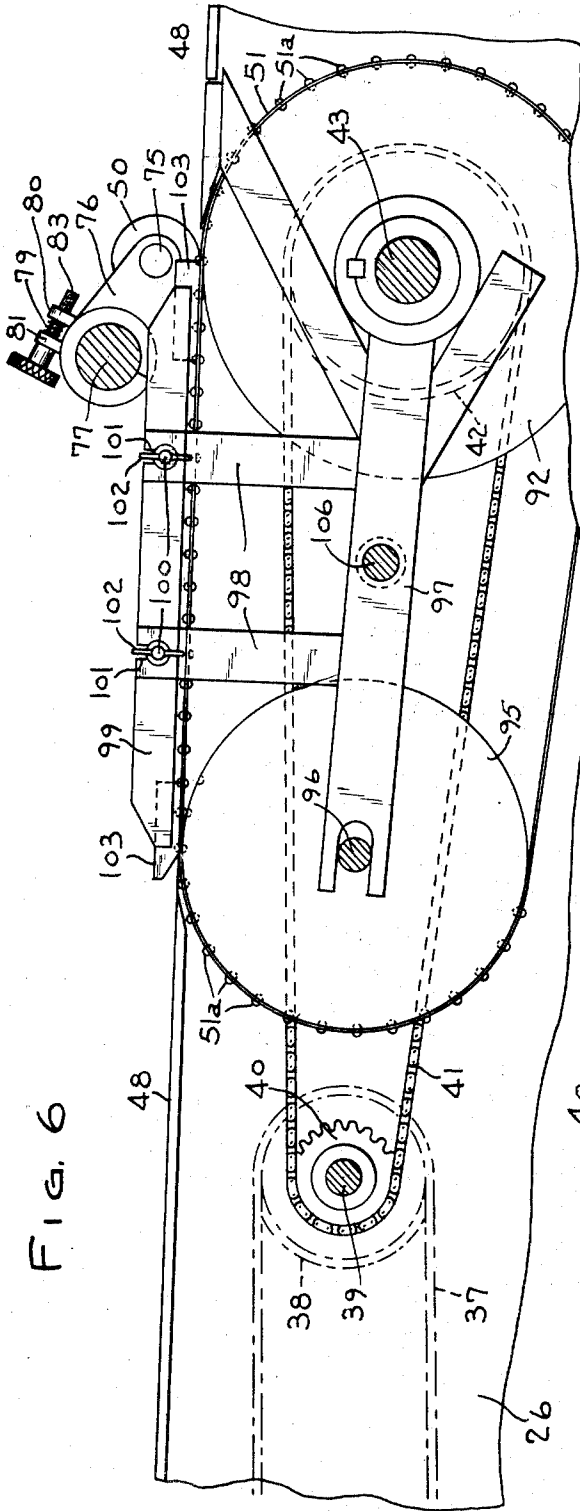
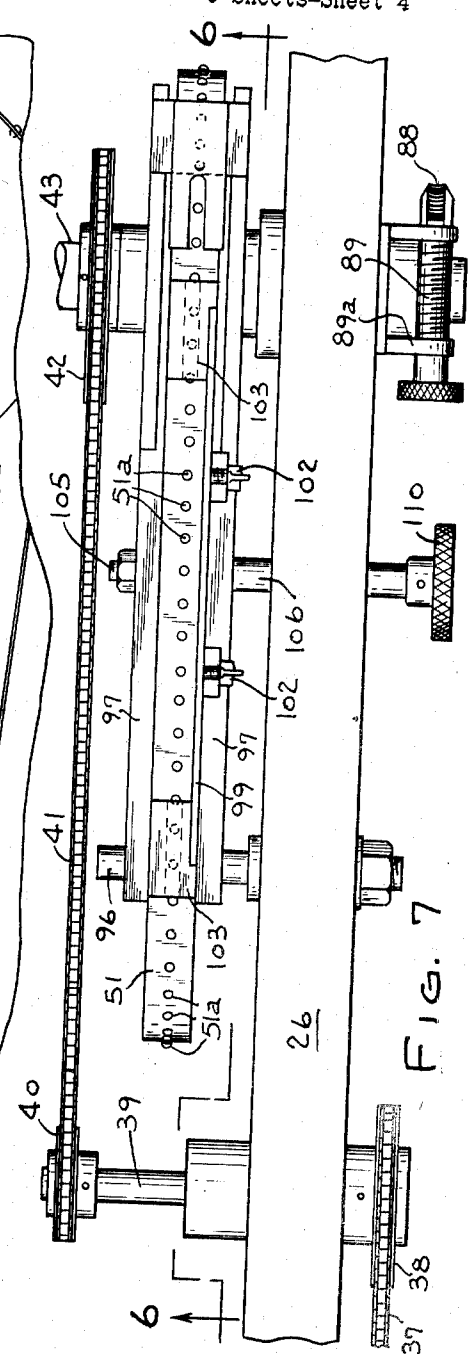


FIG. 7



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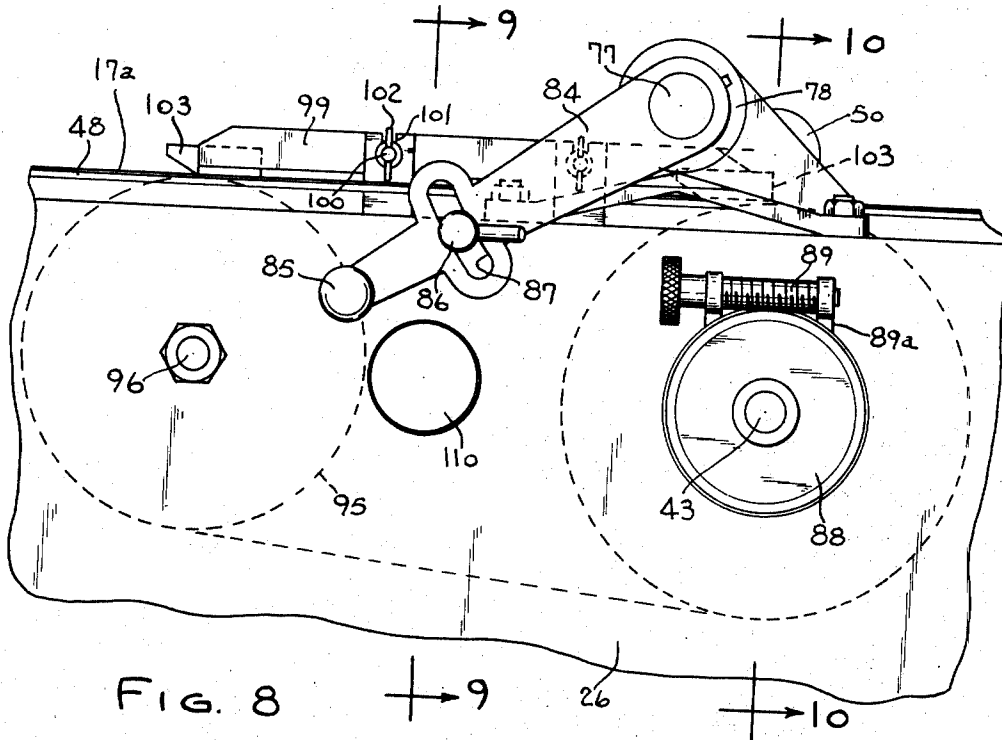


FIG. 8

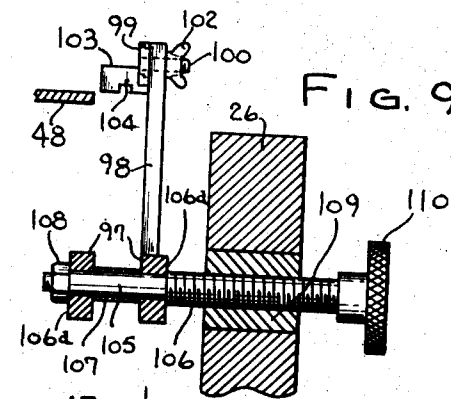


FIG. 9

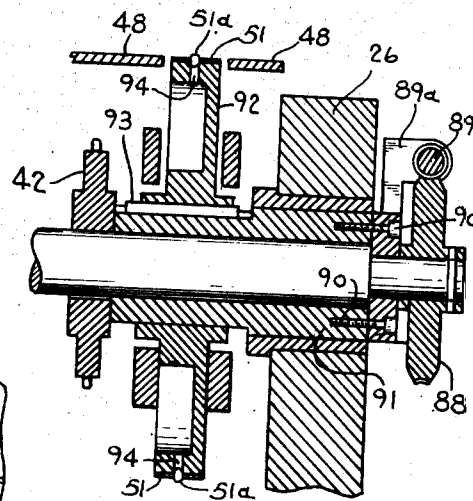


FIG. 10

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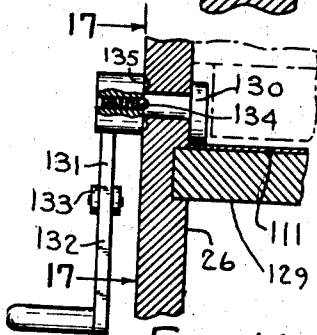


FIG. 16

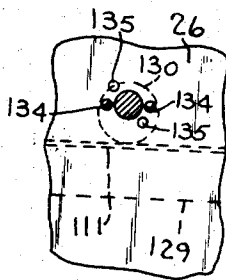


FIG. 17

UNITED STATES PATENT OFFICE

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FEED MECHANISM FOR CARTON BLANK FORMING APPARATUS

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Application May 29, 1950, Serial No. 165,015

4 Claims. (Cl. 271—2.4)

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The invention relates to a method and apparatus for forming printed box or carton blanks.

The general object of the invention is to provide a method and apparatus whereby paper or box board in roll form is fed as a continuous web through a printing machine and is also perforated along one side and is then rewound into a roll and this rewound roll is then fed as a continuous web intermittently into and out of a creasing and cutting or blank forming press by feed mechanism which moves the web by engagement with the previously formed perforations of the web whereby accurate registry of the printed portions of the web with the dies of the blanking press is assured and the printed web expeditiously formed into finished printed box or carton blanks.

A further object of the invention is to provide a blank forming press which takes a previously printed and registry perforated web and intermittently feeds this web to the cutting and creasing dies of the press under the control of the perforations in the web, so that the dies will operate successively on the printed portions of the web to form finished printed box or carton blanks.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a side elevation view of a blank forming press embodying the invention;

Fig. 2 is a plan view of the press;

Fig. 3 is a rear elevation view of the press;

Fig. 4 is a detailed side elevation view of the drive for the feed belt, parts being broken away;

Fig. 5 is a side elevation view of parts shown in Fig. 4;

Fig. 6 is a vertical sectional view taken on the line 6—6 of Fig. 7;

Fig. 7 is a plan view of the feed belt and its associated mechanism;

Fig. 8 is a side elevation view of a portion of the feed mechanism;

Fig. 9 is a detailed vertical sectional view taken on the line 9—9 of Fig. 8;

Fig. 10 is a vertical sectional view taken on the line 10—10 of Fig. 8;

Fig. 11 is an enlarged side elevation view of certain of the feed rolls;

Fig. 12 is a detailed vertical sectional view taken on the line 12—12 of Fig. 11;

Fig. 13 are diagrammatic views of apparatus used in carrying out the method described herein;

Fig. 14 is a plan view of the apparatus shown in Fig. 13;

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Fig. 15 is a detailed vertical sectional view taken on the line 15—15 of Fig. 2;

Fig. 16 is a detailed vertical sectional view taken on the line 16—16 of Fig. 2.

Fig. 17 is a detailed vertical sectional view taken on the line 17—17 of Fig. 16.

Referring to Figs. 13 and 14, I have shown apparatus for carrying out the method embodying the invention. In these figures, the numeral 15 designates a supply roll of paper or box board stock suitably mounted for rotation on standards 16 and from which the paper, as a web 17, is fed through a printing press and perforating mechanism 18 of any suitable construction and is then wound up as a roll 19 of printed and perforated stock, Fig. 14 showing the web 17 as having printed designations X representative of any desired printing at spaced intervals along the web to appear on the finished box blanks and having equidistantly spaced registry perforations 20 along one side of the web. The roll 19 with its printed forms and perforated side edge is fed as a web 17a through the blanking press 21, features of which form parts of the present invention, to form the finished printed box or carton blank 22.

As any suitable printing press and web perforating mechanism may be used to respectively print and perforate the web in my method of forming box blanks, no special mechanism has been shown, but so far as I am aware, the use of a previously printed and perforated paper supply roll in conjunction with a blanking and forming press in which the perforations of roll form of printed stock are used to obtain accurate registry of the printed portion of the web with the cutting and creasing dies of the press is new.

The blanking press includes reciprocatory creasing and cutting mechanism, and means for intermittently feeding the previously printed and perforated stock in web form to said mechanism. The feeding mechanism includes means for drawing the web of printed stock off its supply roll and taking out the curl that may be formed therein and advancing it to a feeding belt provided with pins for engaging in the perforations in the web and intermittently driven to advance the web in equal length increments determined by its printed portions through the creasing and cutting mechanism.

Referring to Figs. 1, 2, 11 and 12, at the forward end of the press three transversely extending feed rolls 23, 24 and 25 are journaled in the frame 26 of the press in spaced formation so that the upper roll 24 operates between the rolls 23 and 25 and in feeding relation therewith, the

roll 24 being a rubber friction roll which may move vertically because of the mounting of its trunnions 24a in vertically disposed slots 27 in the press frame. Each of the metal rolls 23 and 25 are positively driven by gears 29 and 26 on their shafts meshing with a drive gear 30 journalled on a stud shaft 31 and carrying an adjustable V-belt pulley 32 connected by a belt 33 with a similar adjustable pulley 34 on a shaft 35 which carries a sprocket 36 connected by a chain 37 with a sprocket 38 on a shaft 39 that carries a sprocket 40 connected by a chain 41 with a sprocket 42 on the main intermittent feed shaft 43, see Figs. 1, 2, 6 and 7. As shown in Fig. 12, the pulley 32 includes a coned disk 32a having a threaded connection with a threaded stud 44 forming a part of the hub of said pulley, said disk being locked in adjusted position on the stud 44 by a lock nut 45. This construction permits widening or narrowing of the belt groove of the pulley to change its diameter relative to the belt 33 so as to vary the speed of the gear 30. The pulley 34 is of the same construction as the pulley 32. During the active drive of the rolls 23 and 25 from the shaft 43 the rolls 23, 24 and 25 are driven in the directions indicated by the arrows in Fig. 1 and act to take the curl out of the web as it is drawn from the supply roll and advance it to form a loop 46 which passes upwardly over a curved apron 47 forming part of a flat bed 48 over which the web passes and along which it is drawn by sets of draw rolls 49 and 50 cooperating with a pin belt 51, to advance the web to the creasing and cutting mechanism of the press.

Referring to Fig. 1, I have shown a geared head electric motor 52 whose reduced speed shaft 53 carries a pulley 53a connected by multiple belts 54 with a pulley 55a on a shaft 55 carrying a pinion 56 meshing with a gear 57 on a lay shaft 58 which carries a pulley (not shown) connected by a belt 59 with a pulley 60 on a shaft 61. Referring to Figs. 1, 2, 4 and 5, the shaft 61 is provided with lengthwise adjustable crank in the form of a slotted crank arm 62 fixed to said shaft and having a feed screw 63 journalled therein on which the threaded hub 64 of a crank pin 65 is adjustably mounted, said hub being slidably mounted in and guided by said arm 62. Turning of the feed screw 63 relative to the arm 62 results in a longitudinal movement of the pin 65 toward or away from the center of the shaft 61 to adjust the effective length of the crank arm. A rack bar 66 is pivotally connected at one end to the crank pin 65 and works in a slotted guide formed in a collar 67 loose on the shaft 43 and is in engagement with a gear 68 also loosely mounted on said shaft. The hub of the gear 68 has formed integral with it or connected to it a crank arm 69 which with a crank 70, loose on the shaft 43, carries a pin or shaft 71 upon which a pawl 72 is pivotally mounted and urged by a spring 73 into engagement with the teeth of a ratchet wheel 74 fixed to the shaft 43. With this arrangement, the continuous rotary motion of the shaft 61 is converted through the reciprocatory rack 66 and the gear 68 into reciprocatory movement of the pawl 72 which acting on the ratchet 74 intermittently advances the same a part of a revolution for each revolution of the shaft 61, the degree of advance being determined by the stroke of the rack which is varied by the adjustment of the crank pin 65 relative to the center of the shaft 61.

The main feed drive shaft 43 has the draw rolls 49 fixed thereto. The companion roll 50 for each roll 49 is journalled on a stud shaft 75 carried by a crank arm 76 loose on a throw out shaft 77 journalled in bearings 78 mounted on the frame of the machine. Each roll 50 is normally yieldingly urged toward its companion roll by a spring 79 interposed between an ear or boss 80 on the crank arm 76 and an ear 81 on a collar 82 fixed to the shaft 77. The tension of the spring 79 is adjusted by an adjusting screw 83 having threaded engagement with the ear 80 and loosely slidably and rotatably mounted in the ear 81 of the collar 82. For threading through of the stock, the shaft 77 is turned to move the rolls 50 away from the rolls 49 by a manually operable crank arm 84 provided with a handle 85 and adapted to be locked by a clamp bolt 86 mounted in the frame of the machine and working in an arcuate slot 87 in said arm 84, see Fig. 3.

Referring to Figs. 2 and 6 to 10, the shaft 43 driven by the pawl and ratchet drive above described and carrying the sprocket 42 has a worm wheel 88 pinned thereto and meshing with a manually adjustable worm 89 carried by a collar 89a connected by screws 90 with a sleeve 91 surrounding a portion of the shaft 43 and having the pin belt drive wheel 92 secured thereto by a key 93. The wheel 92 has equidistant circumferentially spaced perforations or depressions 94 in its periphery to engage the pins 51a of the pin belt 51. The adjustable worm 89 permits angularly advancing or retracting of the wheel 92 relative to the drive shaft 43, so that the pin belt 51 can be moved independent of the drive for preliminary adjustment of the web relative to the dies of the press. The pin belt 51 runs over an idler wheel 95 journalled on a stud shaft 96 and provided with pin receiving depressions similar to the depressions 94.

For lateral alinement of the web on the bed and for maintaining the perforated portions of said web in mesh with the pins 51a of the pin belt a laterally adjustable frame comprising a base frame member 97 slidably guided by the shafts 43 and 96, and carrying uprights 98 in which a frame member 99 is vertically adjustably mounted is provided. The member 99 is locked in vertically adjusted position relative to the uprights 98 by bolts 100 carried by said member and extending through slots 101 in said uprights and provided with wing nuts 102. At its ends, the member carries shoes 103 provided with pin clearance grooves 104, these shoes being disposed above the top side of the web above the wheels 92 and 95 in the operative position of the frame to prevent the web disengaging itself from the pins 51a. For threading through purpose, the member 99 may be raised up or removed. The uprights 98 form lateral guides along which the perforated edge of the web travels, and to secure the proper adjustment of these uprights, the frame member 97 has the end 105 of an adjusting screw 106 rotatably secured thereto by a collar 106a, a spacer sleeve 107, and a nut 108 on said screw which screw threads into a bushing 109 mounted in the machine frame and is provided with a hand knob 110.

Under the action of the draw rolls 49 and 50 and the feed belt 51 the printed and perforated web is advanced intermittently to the creasing and cutting dies of the press which are of known construction and include a stationary platen 111, usually a flat plate, and a reciprocatory platen 112 on which the dies D are mounted. For re-

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reciprocating the platen 112, a rotary shaft 113 carrying eccentrics 114 is operatively connected to said platen by lengthwise adjustable connecting rods pivotally connected by pins 115 to said platen. The connecting rods include eccentric engaging straps 116 which carry bolts 117. Each bolt 117 has a threaded sleeve 118 rotatably mounted thereon and in threaded engagement with the shank 119 of the rod, the adjustment of said sleeve relative to said shank acting to lengthen or shorten the connecting rod which is then locked in adjusted position by a lock nut 120. The adjustment of the length of the connecting rods allows for the desired pressure of the dies in the cutting operation. Both ends of the shaft 113 carry sprockets 121. Each sprocket 121 is connected by a chain 122 with a sprocket 123 on the shaft 58 which as heretofore noted is continuously driven from the motor 52.

Associated with the shaft 43 is an electric or dynamic brake 124 of a suitable construction which is energized during the non-feeding movement of said shaft by current supplied thereto from any suitable source whose supply lines 125 include a control switch 126 which is controlled by a cam 127 on the shaft 61, the switch being off when its operating member 128 engages the high side of the cam which high side is operative while the platen 112 is making its non-cutting stroke.

Referring to Figs. 16 and 17, the stationary platen 111 is shown as a flat plate mounted on the bed of the press 129 and clamped to the bed on opposite sides by sets of eccentrics 130. As shown in Fig. 1, the shafts for these eccentrics extend through the sides of the press housing and carry crank arms 131, one of the crank arms of each set having an operating handle 132 and the two arms of the set being operatively connected together by a link 133, so that by swinging the cranks 132 on each side of the press, all the eccentrics will be turned either to a position in which they tightly clamp the plate 111 to the bed 129 or to a position in which said plate is free of the bed, so that it can be shifted lengthwise thereof in case the knives of the press create too much of a roughened area in certain local areas of the plate. For holding the eccentrics in their operative clamping or release position in Figs. 16 and 17 spring pressed detents 134 are mounted in the hubs of the crank arms 131 in diametrically disposed positions and are adapted to engage in recesses 135 formed in the sides of the frame 26 at angularly spaced positions.

To summarize, applicant takes a roll of box or carton paper stock, runs it as a web through a printing and perforating press such as 18, during which state printed designations are placed on the stock in positions that they will assume on one or more of the sides of the finished carton blank, and the perforations being made adjacent one edge of the web and outside of the area forming the finished carton blanks, and may then lead this web either directly to the blanking and forming press herein described in detail, or may rewind this web into a roll and transfer this roll to a position adjacent the blanking and forming press forming this invention and then this pre-printed and perforated stock is threaded through the feed rollers 23, 24 and 25, looped as at 46, passed over the curved apron 47 and along the bed 48, so that its perforated edge will be brought into a position to register with the pins 51a of the pin belt 51, and the forward end of such stock is carried through between the fixed platen 111 and the reciprocating platen 112, and the rela-

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tive position of the printed area of the stock beneath the reciprocating platen relative to the cutting and creasing die D is noted, and by the turning of the hand operated worm 89, the web is advanced or retracted under the reciprocating platen to secure as near a correct positioning as possible. Then the machine may be started to cut one or more of the blanks and to check to see if the printed portions of the blank are in proper registry relation with the cut out final outline of the blank, and if not, further manual adjustment of the feed belt as above described is effected. Also at this time during this preliminary positioning of the web the side guide including the uprights 8 are adjusted so that the lateral alignment of the web relative to the cutting and creasing dies is correct. Also the effective throw of the crank 62 is adjusted by the adjustment of the crank arm 65, so that the rack 66 during one rotation of the shaft 61 will advance the pawl 72 through a sufficient crank angle to turn the ratchet wheel 74 and the shaft 43 through such an angle that the wheel 92 will advance the pin belt 51 through a sufficient length of movement to bring a succeeding printed area of the web into the position previously occupied by a preceding portion of such web, so that the stock will be intermittently fed in equal increments through the space between the die D and the platen 111 during the time that the platen 112 is out of engagement with the web. After the cutting and creasing operation, the flash from the web including the perforated edge 20 is removed in the usual manner, so that the finished blank 22 results, in which finished blank the printed portions 17 appear on those sides of the blank on which it is desired to display them.

It is to be noted that in most instances the perforations 20 are disposed outside of the area of the finished carton blanks, but in some instances, as for example, in connection with egg cartons and other special cartons the perforations 20 may go right through the blank itself so as to eliminate waste.

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. Paper web feeding mechanism for feeding a predetermined length of paper web previously perforated along one edge thereof to a press comprising intermittently driven draw rolls and an intermittently driven feed belt having pins engageable in the perforations on said web and having a portion active on the same section of the web as said draw rolls, said intermittent feed operating during the non-operating stroke of said press and an intermittently operated shaft operatively connected to said draw rolls and the pin belt for simultaneously operating said rolls and belt.

2. The structure as defined in claim 1 including means for effecting a pre-adjustment of the web through an angular adjustment of the pin belt.

3. Paper web feeding mechanism for intermittently feeding a web of stock having perforations adjacent one side edge thereof to a press, comprising a set of intermittently driven draw rolls for drawing the stock from a supply roll, decurling said stock and advancing it to form a loop, means for varying the speed of said draw rolls to vary the sizes of said loop to accommodate different size finished blanks, means for guiding the stock from its loop form to a creasing and blanking press, and means for intermittently ad-

vancing the stock through said press including draw rolls and a pin belt intermittently driven at the same speed during the non-working stroke of said press, said pin belt meshing with the perforations of said web to accurately advance equal increments of the loop of said web successively to the press and having a portion active on the same section of the web as said draw rolls, and means for simultaneously varying the feed of said last named draw rolls and said belt to accommodate the different size loop portions of the web as the web is fed to the press.

4. Mechanism for feeding a web of pre-printed and pre-perforated stock through a blanking press during the non-working stroke of the press including draw rolls engageable with the web, a belt having spaced pins engageable in the spaced perforations of the web and having a portion active on the same section of the web as said draw rolls and a drive wheel for said belt, and means for intermittently angularly advancing said draw rolls and said belt comprising a shaft carrying said draw rolls and the drive wheel for said belt, a ratchet wheel secured to said shaft, a reciprocatory pawl engageable with said ratchet wheel, a gear connected to said pawl, a reciprocatory

rack engageable with said gear, a continuously driven shaft, and a crank on said shaft operatively connected to said rack.

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