Oct. 20, 1953 J. R. BAUMGARTNER 2,655,842

BLANK FORMING APPARATUS

Filed Aug. 18, 1950 3 Sheets-Sheet 1

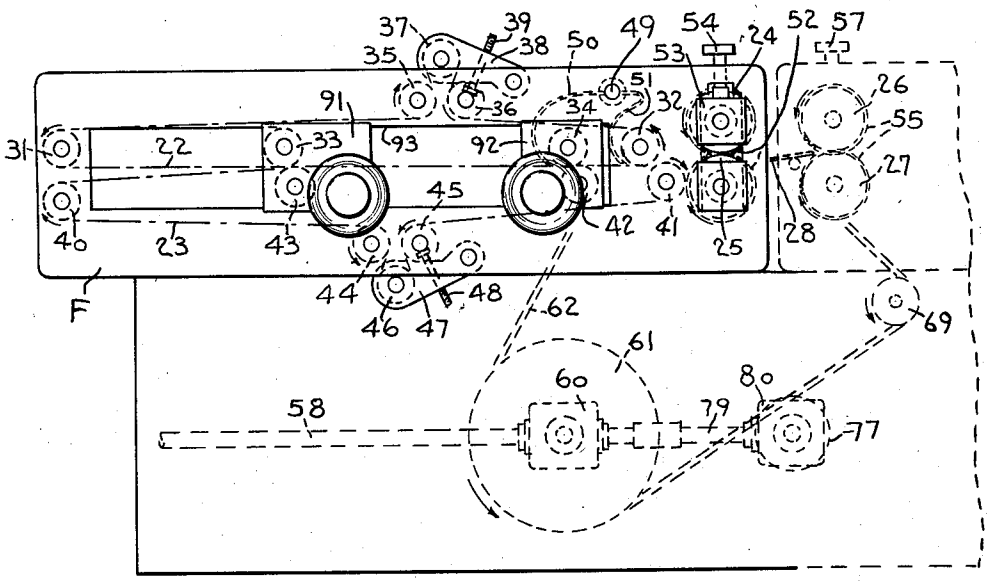

FIG. 1

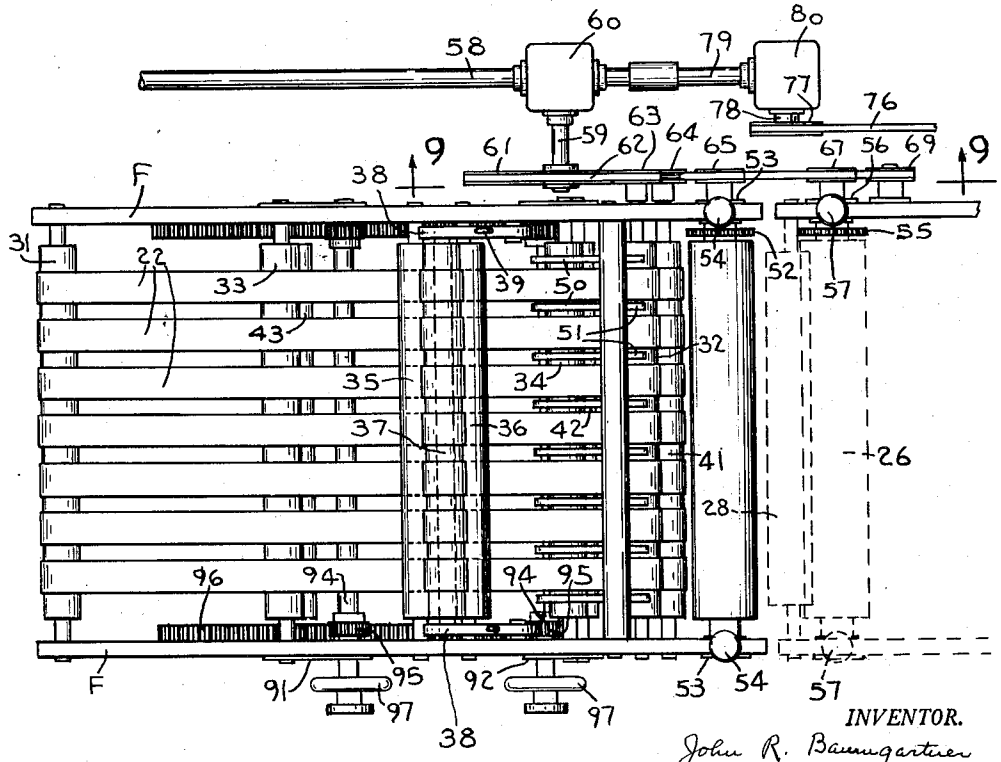

FIG. 2

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BLANK FORMING APPARATUS

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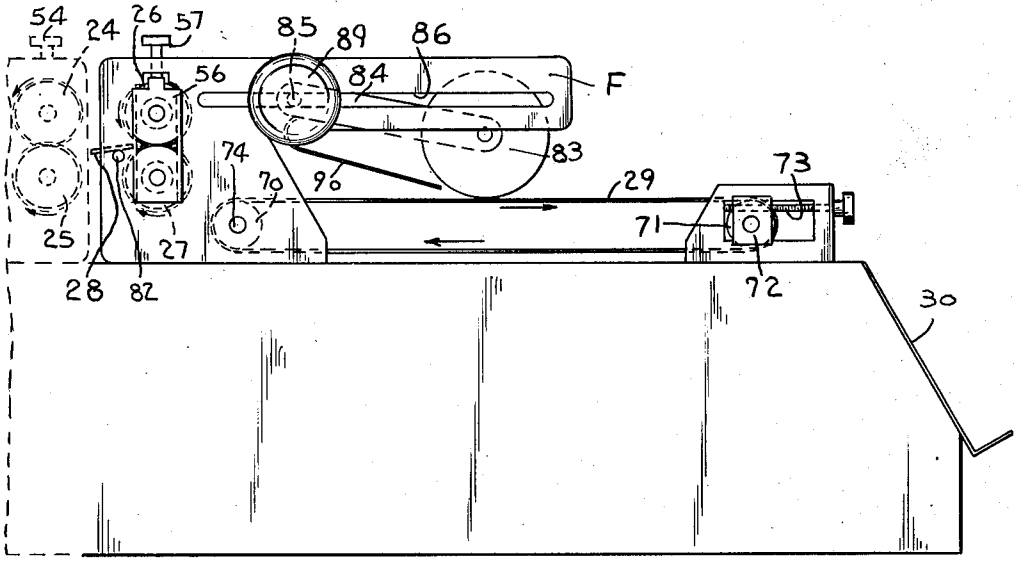

FIG. 3

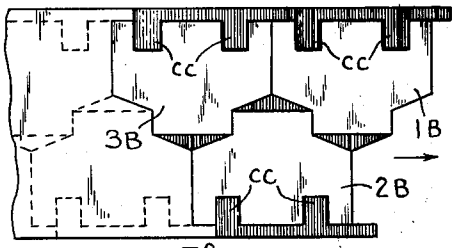

FIG. 11

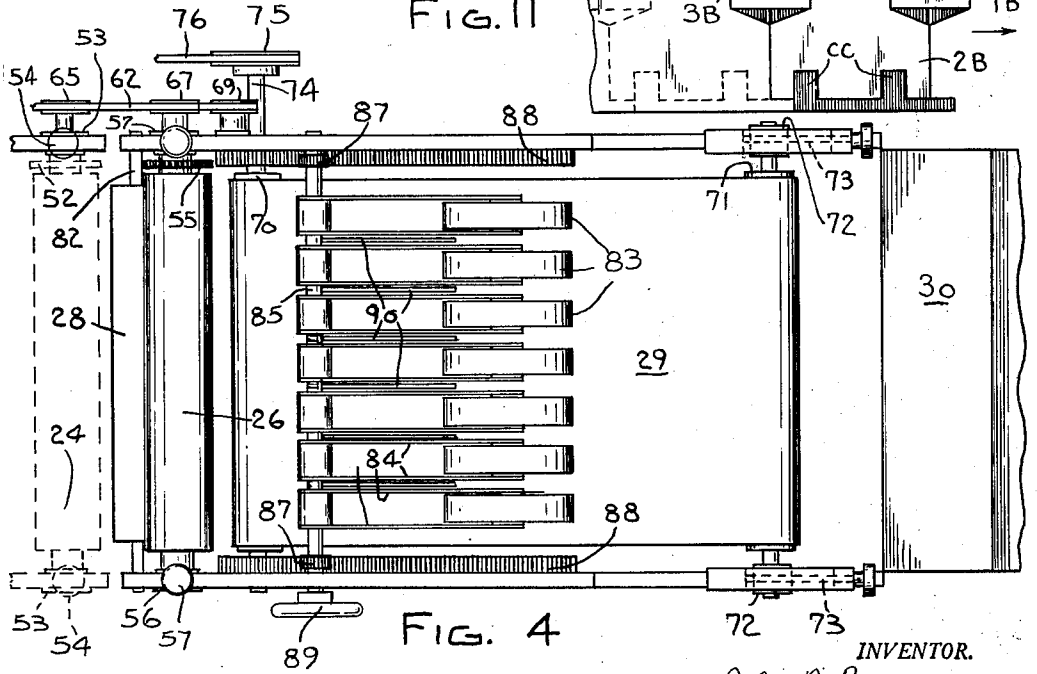

FIG. 4

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BLANK FORMING APPARATUS

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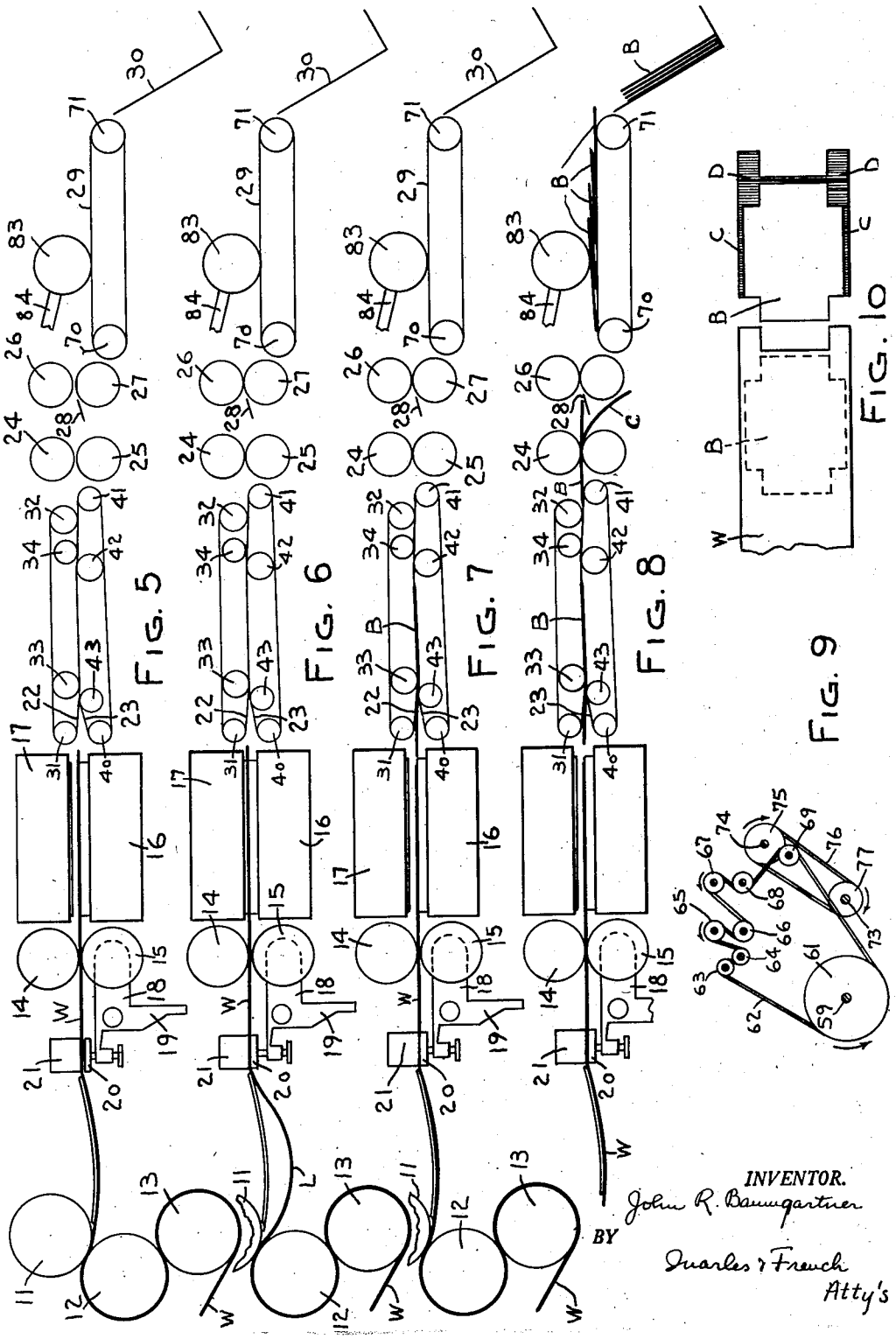

FIG. 5

FIG. 6

FIG. 7

FIG. 8

FIG. 10

FIG. 9

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BLANK FORMING APPARATUS

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Application August 18, 1950, Serial No. 180,221

4 Claims. (Cl. 93—36)

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The invention relates to carton or box blank forming apparatus and more particularly to mechanism for separating the blank from the web and removing the waste from a blank or blanks cut from a web of blank stock.

The main object of the invention is to provide a mechanism associated with the blank forming press whereby the blank and its waste is separated from the supply web of stock and the waste is stripped from the blank as the blank and its waste are carried from the press by continuously operating feed mechanism. More particularly, the object of the invention is to provide a stripper mechanism in which the stripping is accomplished by pulling the waste from the blank by feed rolls hereinafter described.

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

In the drawings:

Fig. 1 is a side elevation view of a forward half or part of mechanism embodying the invention;

Fig. 2 is a plan view of the mechanism shown in Fig. 1;

Fig. 3 is a side elevation view of the rear half or part of mechanism embodying the invention;

Fig. 4 is a plan view of the mechanism shown in Fig. 3;

Figs. 5, 6, 7 and 8 are diagrammatic views showing different stages in the feed of the blank from the press through the stripper mechanism to a point of delivery;

Fig. 9 is a diagrammatic view of the stripper drive;

Fig. 10 is a plan view of the web and a blank with its waste after severance from the web.

Fig. 11 is a plan view of the web after the blanking operation.

Figs. 5 to 8 show diagrammatically the complete blank forming apparatus whereby the stock from a supply roll is fed continuously to an intermittently operating blank forming and creasing press, is cut in said press into one or more blanks and is then carried to a point of delivery, the waste being automatically removed from the cut blank or blanks between the press and said point of delivery.

Details of the press and the feed mechanism associated therewith will be found in my copending application Serial No. 173,409, filed July 12, 1950 for Blank Forming Press, now U. S. Patent No. 2,638,821. Certain of the parts of this press are shown in Figs. 5 to 8 as they have a direct cooperative relation with the mechanism shown in detail herein in the separation of the blank or blanks from the web.

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Referring to Figs. 5 to 8, the numerals 11, 12 and 13 designate a set of continuously rotating feed rolls by which the web W of paper or other suitable stock material is fed from a supply roll (not shown) to a pair of continuously driven intermittently active feed rolls 14 and 15 which rotate at a faster speed than that of the feed rolls 11, 12 and 13 and carry the web into the blanking press which includes a fixed platen 16 and a movable platen 17, one of which carries the blanking and forming dies and the other of which carries a flat bed plate. The roll 15 is mounted in the arms of a swingable support 18 having a crank arm 19 whose movement is controlled by the mechanism shown in the aforementioned application, said support also carrying the movable member 20 of a brake 21 whereby on the swinging of said support to a position where said rolls 14 and 15 are operative to feed the web to the press, the brake is released as shown in Fig. 5 and on the swinging of said support to a position separating the rolls 14 and 15, the brake is applied as shown in Fig. 6 and the blanking press then cuts the blank from the web.

With the above operation of the press and its feed mechanism in mind, Fig. 5 shows the web W being fed by the sets of feed rollers 11, 12 and 13 and 14 and 15 into the press, and Fig. 6 shows the cutting of the blank by the movement of the platen 17 while the feed rolls 14 and 15 are released, the brake 21 is applied and the feed rolls 11, 12 and 13 are feeding more of the web to form a loop L which is later taken up by the faster rotating rolls 14 and 15. After the blank is almost cut through by the press, the cut web is advanced to a feed mechanism comprising upper stripper belts 22 and lower stripper belts 23 which belts carry the cut web from the press at the same rate or surface speed that the feed rolls 14 and 15 feed it to the press, and when as shown in Fig. 7, the cut blank is well advanced between the belts 22 and 23 and new stock is in position in the press, the brake 21 is again applied, and when this occurs, the blank B with its waste C, shown in Fig. 10, is pulled away or separated from the web W and continues to be fed between the belts to a pair of rolls 24 and 25 which rotate at a faster speed than the belts 22 and 23, so that as shown in Fig. 8 the waste C is stripped from the blank B as the blank and its waste moves from the delivery end of the belts 22 and 23 into the rolls 24 and 25, it being noted that the projecting ends D of the waste enter the rolls 24 and 25 while the rear end portion of the blank itself is between the belts 22 and 23, so that the faster rotating rolls 24 and 25 strip or pull the waste

from the blank before the blank itself enters these rolls. Thereafter, the blank B is fed to delivery rolls 26 and 27 while the stripped waste C falls down between the sets of rolls 24, 25 and 26, 27 as indicated in Fig. 8. Deflection of the waste may also be assisted by a deflector 28, which, as shown in Figs. 1, 3, and 5 to 8 also acts as a support to guide the stripped blank to the nip of the rolls 24 and 25.

The cut blanks are delivered by the rolls 26 and 27 to a continuously operating delivery conveyor 29, and as the feed from the press is intermittent, these cut blanks are delivered to the conveyor in overlapping relation and are carried along until they successively drop from the delivery end of the conveyor into an open faced hopper or trough 30 from which they can be readily removed as they accumulate therein. From the above it will be noted that the stripping of the blank and its waste from the web is accomplished by the feed of the cut blank and its waste by the stripper belts while the web is held against movement and that the stripping of the waste from the blank is accomplished by feeding the waste at a faster rate than the blank during the feed of the blank by the stripper belts.

Referring to Figs. 1 and 2, the stripper belts 22, which form a feeding conveyor or travelling apron, are trained over end rollers 31 and 32 and on their lower run over intermediate rollers 33 and 34, all of said rollers being suitably journalled in the frame F of the machine. The belts 22 are maintained in suitable tensioned relation by a belt tightener including spaced fixedly journalled rolls 35 and 36 and a roll 37 mounted on swinging arms 38 which through adjustable jack screws 39 may be swung upwardly to raise the roll 37 relative to the rolls 35 and 36 to tension the belts.

The stripper belts 23 which form the lower feeding conveyor or travelling apron are trained over end rollers 40 and 41 and on their upper run over intermediate rollers 42 and 43, all of said rollers being suitably journalled in the frame of the machine.

The belts 23 are maintained in tensioned relation by a belt tightener similar to that for the belts 22 including fixed spaced rolls 44 and 45 and a roll 46 mounted on swinging arms 47 which through adjustable jack screws 48 carried by said arms and engageable with the shaft for the roller 45 may be swung downwardly relative to the rolls 44 and 45 to tension the belts.

An overhead shaft 49 carries resilient fingers 50 and 51 disposed between the belts 22 and assisting these belts to hold the blank and its waste upon the lower belts 23.

The rolls 24 and 25 are geared together by intermeshing gears, one of which 52, is shown in Fig. 2 so that they are positively driven, and they are journalled in bearings mounted in the frame of the machine, the bearings 53 for the roll 24 being vertically adjustable toward and away from the roll 25 by means of jack screws 54 suitably connected to said bearings 53. The delivery rolls 26 and 27 are geared together by intermeshing gears, one of which 55 is shown in Fig. 2, so that they are positively driven, and they are journalled in bearings mounted in the frame of the machine, the bearings 56 for the roll 26 being vertically adjustable toward and away from the roll 27 by means of jack screws 57 suitably connected to said bearings 56.

A drive shaft 58 which extends from the press section of the machine has a power take-off shaft 59 connected thereto through a gear box 60 and carries a pulley 61. As best shown in Fig. 9, the pulley 61 is connected by a belt 62 with a pulley 63 on the shaft for the end roller 32, a pulley 64 on the shaft for the end roller 41, a pulley 65 on the shaft for the roll 24, a pulley 66 on the shaft for the roller 25, a pulley 67 on the shaft for the roller 26, a pulley 68 on the shaft for the roller 27, and an idler tensioning pulley 69. Thus both of the stripper belt assemblies, the stripper rolls 24 and 25, and the delivery rolls 26 and 27 are all driven by the belt 62.

Referring to Figs. 3 and 4, the delivery conveyor 29 comprises a wide endless belt running over a drive roll 70 and a front idler roll 71 journalled in bearings 72 horizontally slidably mounted in the frame of the machine and operatively connected to jack screws 73 mounted in the frame for adjusting the tension of said belt. The shaft 74 for the roll 70 carries a pulley 75 connected by a belt 76 with a pulley 77 on a power take-off shaft 78 connected to the extension 79 of the shaft 48 through a gear box 80.

The deflector plate 28 is carried by a shaft 82 mounted in the frame of the machine and directs the cut blank B in between the rolls 26 and 27. A series of hold down rolls 83 are each mounted between spaced arms 84 pivoted on a shaft 85 and rest by gravity upon the upper run of the conveyor 29. The shaft 85, at its ends, is slidably mounted in horizontally extending slots 86 in the frame of the machine and is movable to different positions lengthwise of the conveyor through pinions 87 on said shaft meshing with fixed racks 88 mounted on the frame. The shaft 85 carries a handwheel 89 and also a series of spring fingers 90 disposed between the rolls 83 and their arms 84 to prevent upward deflection of the blanks as they are carried along by the conveyor.

As shown in Figs. 1 and 2, the shafts for the intermediate rolls 33 and 43 are journalled in bearing blocks 91, and the shafts for the intermediate rolls 34 and 42 are journalled in bearing blocks 92. The bearing blocks 91 and 92 are each slidably mounted in elongated slots 93 in the sides of the frame of the machine, and each set of blocks carries a shaft 94 provided with pinions 95 meshing with fixed racks 96 and carrying a handwheel 97, so that turning said wheels 97 will shift the position of the set of blocks 91 or 92 associated therewith lengthwise of the frame. This longitudinal adjustment of the sets of intermediate rolls takes care of different lengths of cut blanks and different arrangements of cut blanks, it being noted that the stripper as shown is long enough to take two or more cut blanks fed into it from the press. For handling a single cut blank the belts 22 and 23 may be shortened and the rolls 34, 42 dispensed with. The sets of rolls 33 and 43 cooperate whether a single or multiple set of blanks is being handled to provide a bite to grip a previously cut blank and its waste so that it may be advanced while the main body of the web is held by the brake 21 to separate the single blank or multiple blank from the web. In the case of a single blank the rolls 32 and 41 provide a bite for the rear portion of this blank as the waste at the forward portion of said blank is introduced between the rolls 24 and 25 so that on the fast rotation of these rolls 24 and 25 the waste will be stripped from this single blank. The sets of rolls 34 and 42 may cooperate in two ways. First, by a holding of the first blank of multiple blanks while

the rolls 24 and 25 remove waste therefrom, and second, since multiple blanks are severed from the web in multiple, the separation of one of these blanks from the web by the action of the rolls 33, 43 in a manner similar to the separation of a single blank as above described only takes care of the last cut blank, and it is, therefore, necessary to separate the two cut blanks from each other. To do this the rolls 24 and 25 grip the forward of the two blanks, the waste having been removed previously through the operation above described as in connection with the single blank, and the rolls 34 and 42 grip the following blank so that by the more rapid feed of the first blank under the action of the rolls 24 and 25 the first of the two blanks is separated from the second blank after which the second blank comes through in a manner similar to the single blank previously described.

In order to bring about the cooperative action of the rolls as noted above in connection with the multiple blanks the longitudinal adjustment of the rolls 34 and 42 relative to the position of the rolls 24 and 25 is important and varies with the length or width of the blank. In special cases of single blanks where the waste would interfere with the stripping, if withheld by the rolls 32 and 41, these rolls would not be relied upon to form the bite but the rolls such as 34 and 42 would then be used to provide the bite so as to get the stripping action between these rolls and the rolls 24 and 25, so that again the longitudinal adjustment of these rolls 34 and 42 in this special case relative to the rolls 24 and 25 is important. It will thus be noted, particularly in the case of multiple blanks, that the rolls 34 and 42 cooperate in the removal of the waste of both blanks and in the severing of the forward blank from the rearward blank. The fingers 50 and 51 have been previously referred to as assisting the belts to hold the blank and its waste upon the lower-belts 23. These fingers, however, have the further important function of pushing down on those portions of the waste section of the blank which would ordinarily aline with tongue portions of the blank itself and thus interfere with a direct pull of the waste from a forward section of such waste since the fingers tend to bend this waste down out of the plane of the blank itself and thus permit the stripping of the waste, particularly from the side trim of the blank.

In order that the above explanation may be more readily understood, Fig. 11 shows a plan view of the web and multiple blanks with their waste before they pass through the stripper. In this view I have shown three blanks designated 1B, 2B and 3B in which the forward blank 1B has been previously cut but has not yet reached the stripper and in which the second and third blanks have also been cut in one operation of the press, the forward blank having been cut in a previous operation of the press. When such a blank assembly is fed from the press to the stripper, the rolls 33 and 43 of the stripper must be adjusted so as to nip the forward end of the forward previously cut blank 1B. Then when the brake 21 is applied, the pull of the rolls 33, 43 on the forward blank 1B acts to separate the blank 1B from the blank 3B and also to separate the blank 2B from the web so that the blanks 1B and 2B proceed through the stripper, and as they proceed first the waste is removed from the blank 1B through the coaction of the rolls 32, 41, and 24, 25 and at the same time the blank 2B advances to the rolls 34 and 42. Then the relative holding of the blank 2B by the rolls 34 and 42 and the rapid feed of the blank 1B by the rolls 24 and 25 causes the blank 1B to be stripped from the blank 2B after which as the blank 1B is delivered and the waste from the blank 2B is taken off through the interaction of the rolls 32, 41 and 24, 25, it being noted that during the time that this stripping action of the waste takes place either on the blank 1B or 2B that the fingers 50 and 51 of the stripper are so located as to push down on the waste portions CC of these blanks.

The arrangement above described provides a simple and efficient means for separating the cut blanks from the web and removing the waste material therefrom during the continuous travel of the blank from the press to a point of delivery.

What I claim as my invention is:

1. In a carton blank forming apparatus including a blanking press for cutting blanks of irregular side contour from a web of stock having side waste portions of irregular contour with part of said waste portions and part of the blank projecting respectively from opposite ends of the cut out part of the web, the combination of intermittently active means at the entrance end of the press engageable with the web, continuously active means at the exit end of the press for feeding the previously cut blank and its waste away from the press while the web is engaged by said intermittently active means to separate the blank and its waste from the web, and a pair of continuously active feed rolls separate from and spaced from said continuously active feed means in the direction of delivery at such a distance as to engage only the projecting part at one end of the separated part of the web while the projecting part at the other end of this separated part of the web is engaged with said continuously active feeding means, said feed rolls operating at a higher speed than said continuously active feeding means to produce a differential pull on the projecting portions of the separated part of said web to effect a lengthwise shearing action between the blank and its waste to strip said side waste from the blank itself, and means permitting the stripped waste to move in a different path vertically than that of the blank as said blank and its waste are delivered by said feed rolls.

2. In a blank forming apparatus including a blanking press for cutting multiple blanks from a web of stock with a side waste portion projecting from the front of the cut out part of the web and a part of each blank projecting from the rear of its associated side waste and one of said blanks being disposed in front of another of said blanks, and means for feeding the web through said press, the combination of intermittently active means adjacent the entrance side of the press for engaging the web, a conveyor comprising opposed sets of endless belts adjacent the delivery side of the press, a set of nipping rolls acting on said belts to feed the previously cut multiple blanks and their waste away from the press while the web is engaged by said intermittently active means to separate said blanks and their waste from said web, and a second set of nipping rolls acting on said belts to engage the separated blanks, and a separate pair of feed rolls spaced from said conveyor and operating at a higher speed than said second set of nipping rolls and engageable successively with the side waste of

said separated blanks as they are being advanced by said nipping rolls to exert a longitudinal shearing pull thereon to strip the waste portion of said blanks from said blanks and also engageable with the advancing one of said multiple blanks to separate said blank from the following blank being fed by said conveyor.

3. The combination with the structure as defined in claim 1 of an endless delivery conveyor to receive the blanks from said feed rolls and an open faced trough into which said conveyor successively discharges the cut blanks.

4. The combination with the structure as defined in claim 1 of an endless delivery conveyor to receive the blanks from said feed rolls, and pressure rolls and spring fingers mounted above said conveyor and engageable with said blanks.

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