

Nov. 17, 1959

R. E. WALTHER

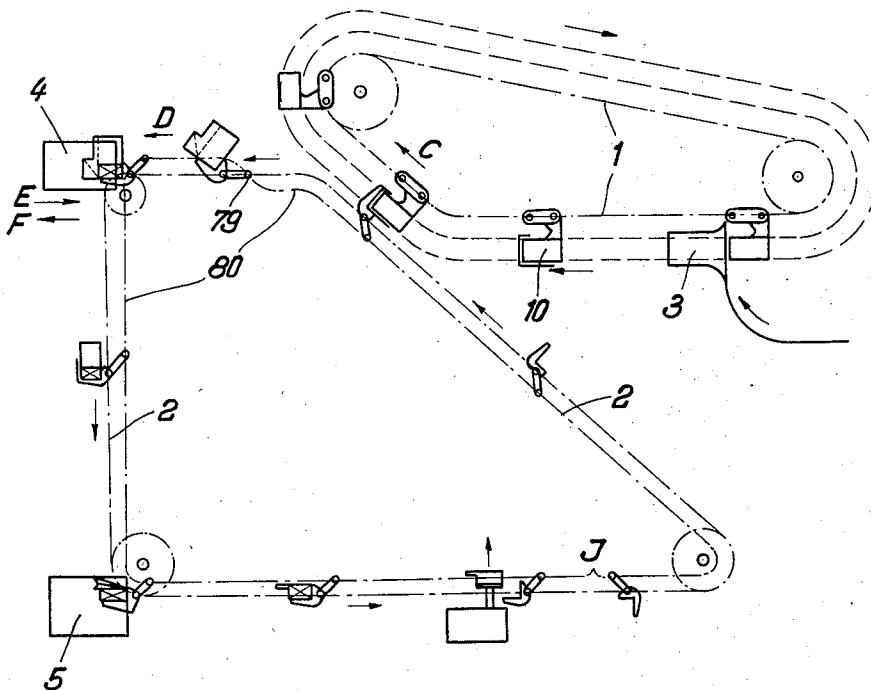
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PROCESS AND APPARATUS FOR THE MANUFACTURE OF FOLDED CARTONS

Filed Oct. 28, 1957

4 Sheets-Sheet 1

Fig. 1



Inventor:

RUDOLF ERHARDT WALTHER

Bailey, Stephens & Hunting
ATTORNEYS

ATTORNEYS

Nov. 17, 1959

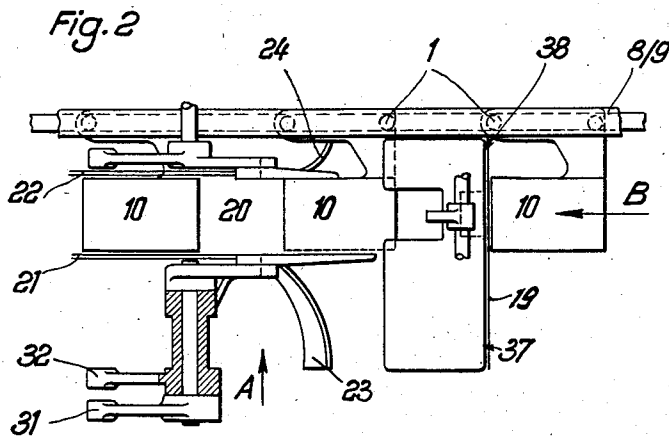
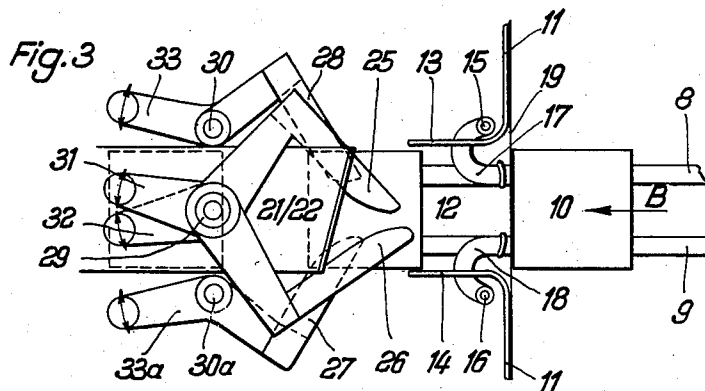
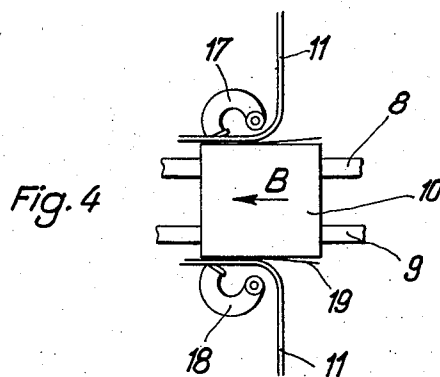
R. E. WALTHER

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Filed Oct. 28, 1957

4 Sheets-Sheet 2



Inventor:

RUDOLF ERHARDT WALTHER

Bailey, Stephens & Huetly
ATTORNEYS

Nov. 17, 1959

R. E. WALTHER

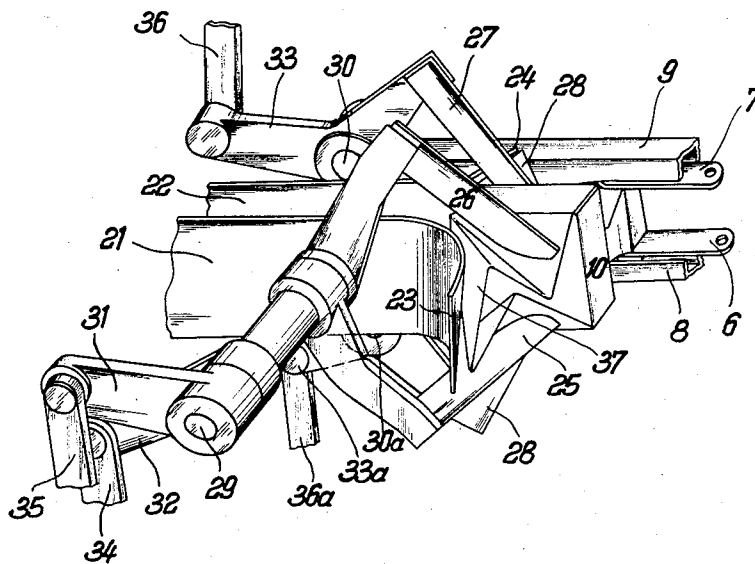
2,912,907

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Filed Oct. 28, 1957

4 Sheets-Sheet 3

Fig. 5



Inventor:
RUDOLF ERHARDT WALTHER

Bailey, Stephens & Huetty
ATTORNEYS

Nov. 17, 1959

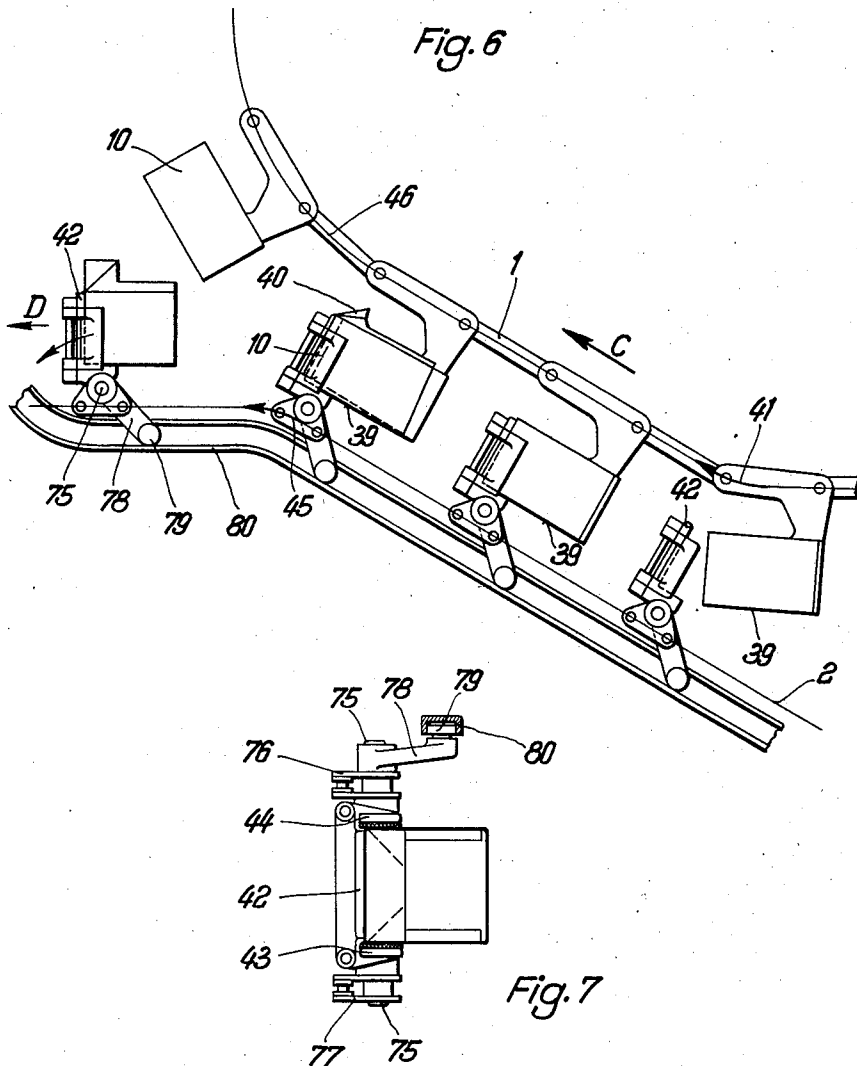
R. E. WALTHER

2,912,907

PROCESS AND APPARATUS FOR THE MANUFACTURE OF FOLDED CARTONS

Filed Oct. 28, 1957

4 Sheets-Sheet 4



Inventor:

RUDOLF ERHARDT WALTHER

Bailey, Stephens & Huetty
ATTORNEYS

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2,912,907

PROCESS AND APPARATUS FOR THE MANUFACTURE OF FOLDED CARTONS

Rüdolf Erhardt Walther, Forchheim, Oberfranken, Germany

Application October 28, 1957, Serial No. 693,502

Claims priority, application Germany December 8, 1952

8 Claims. (Cl. 93—44)

The invention relates to a process of and apparatus for the manufacture of folded cartons, intended especially for the packing of foodstuffs and luxuries, such as biscuits, chocolates, cigarettes, deep frozen foods and the like, for which the cartons must be steam-tight and aroma-tight, the content thus remaining fundamentally in the condition they were in when packed, even after long storage.

It is an object of this invention to provide a carton forming apparatus comprising a conveyor having carton blank shaping blocks thereon, means for partially folding a blank over a block, a grabber belt, grabbers carried by said belt for pulling said partially folded blank off from said block, and means causing the blocks carrying the partially folded blanks to travel at a velocity increased with respect to the grabbers supported by the grabber belt at the relative approach of the paths of the block conveyor and the grabber belt, whereby the blocks and blanks are pushed between respective grabber cheeks, and means causing the grabbers engaging a blank to travel at a velocity increased with respect to the carton shaping blocks, where the paths of the grabber belt and the block conveyor separate, whereby the blanks are disengaged from the respective blocks by the grabbers.

An apparatus arranged in the manner described will provide a smooth and reliable transfer of the partially folded carton blanks from the shaping blocks to the grabbers, and will prevent the carton blanks from suffering damage during that operation. The use of grabbers having stationary cheeks eliminates the requirement of means for opening and closing the cheeks which were required in previous installations where the grabber cheeks had to perform grabbing movements. The invention, therefore, results in a substantial saving of material and labor.

It is a further object of this invention to provide an apparatus of the type described, wherein the means for causing the blocks and the grabbers to travel at different velocities in definite portions of their paths comprises means for changing the direction of travel of the block conveyor or the grabber belt, respectively, and means for mounting each block, or each grabber, in a position offset from the center line of the path of the conveyor, or the belt, respectively.

It is a further object of the invention to provide an apparatus of the type described, wherein the means for causing the blocks and grabbers to travel at different velocities where the paths of the conveyor and the belt separate are so designed that each block, when being disengaged from the prefolded blank, opens certain prior folded portions of the respective blank.

According to the present invention there is provided a process of manufacturing folded cartons including the steps of causing a pre-scored blank to abut a continuously moving shaping block, passing said block between a pair of parallel walls so as to fold the blank to a U-shape, subsequently folding the ends of the blank and finally removing the folded blank from the block.

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According to a further feature of the invention, an apparatus for carrying out the process comprises a prefolding space defined by two short parallel walls between which a shaping block is adapted to pass so that a blank carried thereby will be folded to a U-shape and a main folding space defined by two walls adapted after the folding of the ends of the blank to press the said ends against the shaping block.

The invention is specially suitable—but by no means for this purpose only—for the manufacture of folded cartons provided with fastening strips, folded from a complete whole folio, by making folded triangles, the outer folding surfaces of which on three sides are dimensioned in such a way that when in a folded condition they form in one continuous surface, the flap lid covering the whole of the carton opening, and in addition have fastening strips on all outer folds, which overlap each other when the box is closed.

The invention will be described further by way of example, with reference to the accompanying drawings in which:

Figure 1 shows diagrammatically the sequence of operations of manufacturing a carton according to the present invention;

Figure 2 is a side view of part of a preferred form of apparatus;

Figure 3 is a bottom view corresponding to Figure 2 in the direction of arrow A;

Figure 4 is a fragmentary view corresponding to Figure 3, but showing a shaping block entering the pre-shaping space;

Figure 5 is a perspective view of another part of the apparatus;

Figure 6 is a side view of part of the shaping block chain and of the grabber chain at the position where they run parallel; and

Figure 7 is a cross-sectional view of a grabber end of a folded carton held by a grabber.

Figure 1 shows, diagrammatically, the whole operating cycle of a shaping block chain 1, and of a grabber chain 2. It shows how both chains 1 and 2 move over part of their paths parallel to one another, namely after the shaping block chain 1 has left a folding point shown at 3. The figure also shows that the grabber chain 2 repeatedly changes its direction and runs past a filling point 4 and a sealing point 5.

The construction and mode of operation of the parts of the apparatus at folding point 3, the filling point 4, and the sealing point 5 are as follows:

As shown in Figures 2–5, the shaping block chain 1 consists of two parallel cords 6 and 7 running in U-shaped guide rails 8 and 9 and carrying between them shaping blocks 10. These shaping blocks 10 are preferably heated. A table 11 is arranged under the rails 8 and 9, this table having in the middle an opening which forms an entrance to a prefolding space 12 bordered or defined by two side walls 13 and 14 which curve round to conform with the vertical surfaces of table 11. At each side of the prefolding space 12 is a counter holder 17, 18, these being spring-loaded and swingable about pivots 15, 16. The counter holders 17, 18 hold a prepared blank 19, resting on the table 11 and bridging the prefolding space 12, in the proper position to be engaged by a shaping block 10, until folded to a U-shape as shown in Figure 4, which folding is sufficient to make displacement of the blank impossible. The shaping block 10 moves in the direction indicated by the arrow B. A main folding space or station 20 is arranged behind prefolding space 12, which main folding space is defined by two parallel walls 21, 22 set at an angle of 90° to walls 13, 14 of prefolding space 12. The walls 21, 22 may be heated by means not shown. The ends 23, 24

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of the walls 13, 14 are curved outwardly, as seen from the drawings, turning slightly in cross direction. The distance between the beginning of the walls of the main folding space 20 and the end of the walls of the prefolding space 12 is less than the length of a shaping block 10, so that a block 10 will bridge the space therebetween as shown in Figure 3.

Two pairs of folding fingers 25, 26 and 27, 28 are provided, carried on shafts 29, 30 and 30a and capable of being swung, by means of levers 31, 32, 33a and draw bars 34, 35, 36, 36a. These are operated by means of cams, not shown in the drawing. The pivots of the levers, and the arrangement and shape of the folding fingers, are arranged so that the latter, when in their final positions, coincide exactly with the position of a pre-scored fold in the blank 19. The arrangement is such that folding fingers 25, 26 swing from underneath, and folding fingers 27, 28 swing from above the shaping block 10, and the fingers of each pair are arranged to swing towards each other when a folding block 10 enters main folding space 20. The apparatus operates as follows:

The pre-grooved blank 19 which bridges the entrance to the prefolding space 12 and which is accurately constructed, is pressed by means of the counter holders 17, 18 against the forward face of a shaping block 10 and is thus held firmly in position. Upon movement of the chain 1 and the shaping block 10 in the direction of the arrow B, the shaping block 10 hits the flat blank 19 and presses it against the pressure of the counter holders 17, 18 into the prefolding space 12. The blank then takes the U-shape shown by Figure 4. Upon further movement the shaping block 10 moves the U-shaped blank into the main folding space 20, where its lower and upper ends 37, 38, Figures 2 and 3, on passing through the main folding space 20 are folded against shaping block 10, the swinging folding fingers 25, 26 serving to fold these parts on both sides of shaping block 10. The fingers 25, 26 operate sideways one after the other so that the folded-in corners are laid either one above the other or against each other.

After the shaping block 10 on its chain 1 has left the main folding space 20, the folded-in parts of the folded blank lying on the shaping block are heat-sealed on their surface 39, Figure 6, while the folded-in parts at the upper side remain unsealed at 40.

Continuing its way, the shaping block chain conveyor 1 approaches a straight section of the path of the grabber belt which it meets tangentially after a change in direction. Both the block conveyor 1 and the grabber belt 2 are driven at an equal velocity. In the portion of the path in which the block chain 1 first changes its direction, the shaping blocks 10 follow an arcuate path having a radius larger than the path of the shaping block chain center line. This results in the shaping blocks passing this portion of their path at a velocity increased with respect to that of the grabbers, which are approaching along a straight line. As a result of this velocity relation, the shaping block passing this curved section of its path catches up with its respective grabber and is inserted between cheeks 43, 44, Figure 7, of the respective grabber 42, together with the prefolded blank. This process is completed by the time the block conveyor leaves the curved section of its path indicated at 41. At the turning point 45, the velocity relation between shaping blocks and grabbers is reversed in that the grabbers 42, being offset from the center line of their belt 2, pass this curved portion of their path at a velocity increased with respect to that of the shaping blocks, which, in this portion, are still traveling along a straight line. As a result, the grabbers commence to pull the carton blanks off the shaping blocks 10, and such action is preferably utilized for opening the folded-in corners 40 of the upper front side of the blank, as indicated in Figure 6, as the folded-in corner is pulled against its

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respective side of the block. Such opening action is encouraged by guiding the blocks away from the path of the grabbers at a point further along the path of the blocks, as indicated at 46 in Figure 6.

If it is desired, a parallel transverse may be provided between turning points 41 and 45, in which the paths of the two conveying means 1 and 2 are parallel, and the paths of the shaping blocks and the grabbers coincide, as shown in Figure 6. The mode of operation, however, is not affected by selecting an arrangement in which the pulling of the carton blank off the shaping block by a grabber is commenced immediately upon completion of the insertion of a shaping block and carton into a grabber.

Although in most cases it will be desired to open the folded-in corners as indicated at 40 while the carton blank is being pulled off the shaping block, such opening action may be eliminated if not required. That is, the shaping block path may be curved to the left as viewed in Figure 6 at a point opposite turning point 45, instead of continuing in a straight line to a right turning point such as 46. This permits a deceleration of the velocity of the shaping blocks, or even a reversal of the direction of their travel at this point, depending on the shape and radius of curvature of said path, and on the offset of the shaping blocks with respect to the block chain center line. This, in turn, permits the prefolded carton blanks of being pulled off the shaping block in a substantially longitudinal direction and in a substantially faster action. Thus, it will be understood, that any of a wide variety of velocities of both the blocks and the grabbers may be derived from any given belt or conveyor velocity, by selecting the shape and radius of curvature at a turning point and the offset of the block and grabber from its conveying means.

For their action, the grabber cheeks require no operating means, but they are preferably of a resilient nature, or spring-biased, and their faces contacting the carton blanks can be provided with a coating of adhesive, sponge rubber or any other suitable material, which will prevent the carton blanks held by the grabbers from slipping out of engagement with the grabber cheeks.

The grabbers 42 are rotatably secured on links 76, 77 of the grabber chain 2 by means of axles 75. Outside each chain link 76 is a lever 78 having a guide roller 79, the lever 78 being firmly secured to the axle 75. The guide roller 79 runs in a guide rail 80 and thus determines the position of the respective grabber 42. The grabbers 42 are carried on their chain to a filling point 4 where the cartons, front side open, are turned 90°, as shown in Figure 1, the guide rail 80 leading the roller 79 upwards and turning lever 78 through an angle of 90°. After filling and further closing, the cartons are conveyed from the filling point to a sealing point 5 and from here to an unloading station J, where the cartons are handed over by the grabbers, or are pushed out of them.

This application is a continuation-in-part of my application Serial No. 396,522, filed December 7, 1953, for "Process and Apparatus for the Manufacture of Folded Cartons," now abandoned.

Having now described the means by which the objects of the invention are obtained,

I claim:

1. A carton forming apparatus comprising a conveyor having carton blank shaping blocks thereon, means for partially folding a blank over a block, a grabber belt, grabbers having cheeks carried by said belt for pulling said partially folded blank off from said block, conveyor guide means for moving the blocks carrying the partially folded blanks in a plane at a velocity increased with respect to the grabbers carried by the grabber belt in the approach of the paths of the block conveyor and the grabber belt toward each other and for pushing the blocks and blanks between respective grabber cheeks,

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and grabber guide means for moving in said plane the grabbers engaging a blank at a velocity increased with respect to the carton shaping blocks where the paths of the grabber belt and the block conveyor separate and for disengaging the blanks by the grabbers from the respective blocks.

2. An apparatus as in claim 1, said guide means for moving the blocks and the grabbers at different velocities in definite portions of their paths comprising guide rail means for changing the direction of travel between the conveyor and the belt, and means for mounting each block in a position offset from the center line path of the belt.

3. An apparatus as in claim 2, said guide rail means for changing the direction of travel between the conveyor and belt having a curvature such that said grabbers open a folded portion of the blank as it is disengaged from its block.

4. An apparatus as in claim 1, further comprising resilient grabber cheeks.

5. An apparatus as in claim 1, further comprising an anti-slip coating on the blank contacting faces of the grabber cheeks.

6. An apparatus as in claim 1, said blank folding means comprising means for folding the blanks into a U-shape over the leading edge of the block, and for folding carton corner portions against opposite sides of the block.

7. An apparatus for folding a blank into a carton comprising a prefolding space defined by two short parallel walls between which a shaping block is adapted to pass so that a blank carried thereby will be folded to a U-shape, a main folding space defined by two walls set at a right angle to said short walls, an endless conveyor having a plurality of shaping blocks thereon, conveyor guide means for correctly aligning said shaping blocks with said prefolding space, laterally swingable spring-loaded arms positioned adjacent the entrance of said short walls, said arms being engageable over the entire corresponding surface area of a shaping block, folding finger means disposed between said short parallel walls and the main folding space for folding the ends of a blank prior to its entry into the main folding space,

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and outwardly curved portions on the entrance end of said main folding space walls, said portions being further slanted in a crosswise direction; an endless grabber belt, grabbers having cheeks carried by said belt for pulling said partially folded blank off from said block, and means for moving the blocks carrying the partially folded blanks at a velocity increased with respect to the grabbers carried by the grabber belt in the approach of the paths of the block conveyor and the grabber belt toward each other and for pushing the blocks and blanks between respective grabber cheeks, and means for moving the grabbers engaging a blank at a velocity increased with respect to the carton shaping blocks where the paths of the grabber belt and the block conveyor separate and for disengaging the blanks by the grabbers from the respective blocks.

8. A carton forming apparatus comprising a conveyor having carton blank shaping blocks thereon, means for folding a blank into a U-shape over the leading side of a block and folding carton corner portions against the upper and lower sides of the block, a grabber belt, grabbers carried by said belt, means mounting said belt at a side of the path of the blocks adjacent one of the folded corner portions of said blank and with a traverse parallel in part to the traverse of said conveyor and at an angle to said conveyor at the end of the parallel traverse, and cheek means for each grabber for grabbing a folded blank between the folded corner portions on a block during the parallel traverse of said conveyor and belt and drawing the folded blank from the block at the end of the parallel traverse with one of the folded corner portions being opened by being pulled against its respective side of said block.

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