July 16, 1968 L. BACK 3,392,637

REGISTRATION MEANS FOR COMBINING CARTONS AND LINERS

Filed Feb. 1, 1966 2 Sheets-Sheet 1

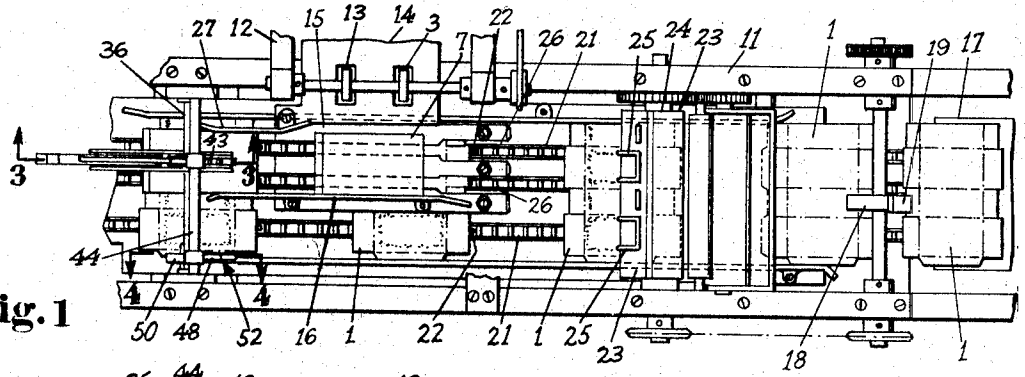


Fig. 1

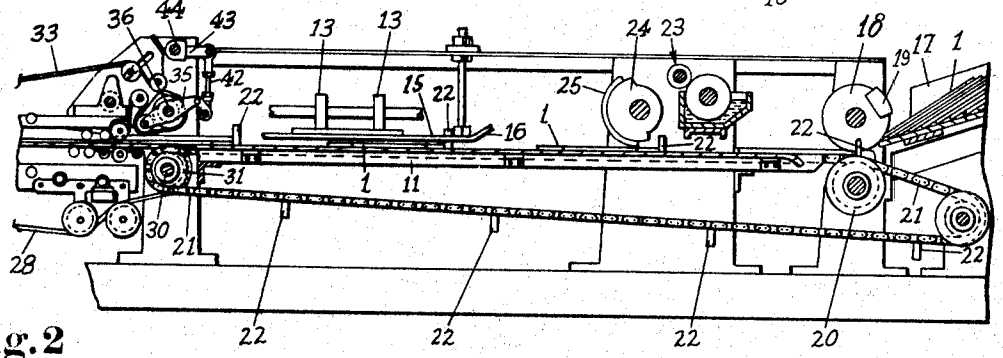


Fig. 2

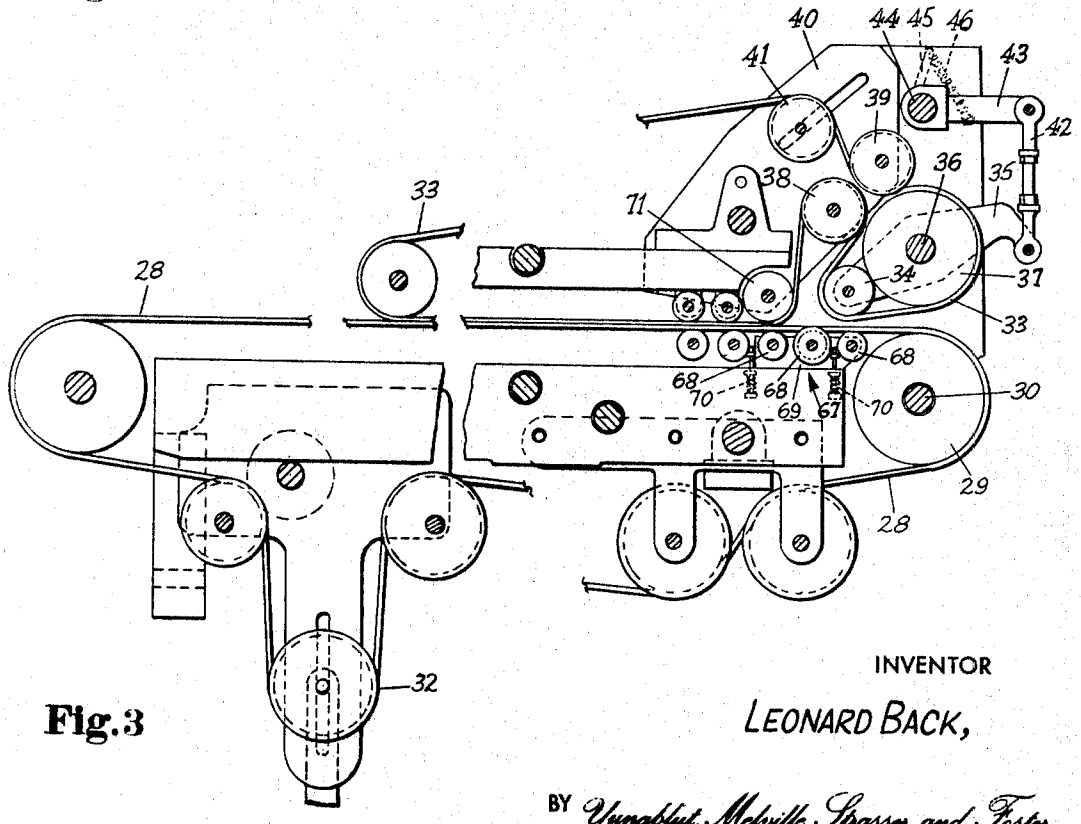


Fig. 3

INVENTOR

LEONARD BACK,

BY Yungblut, Melville, Strasser and Foster

ATTORNEYS

July 16, 1968 L. BACK 3,392,637

REGISTRATION MEANS FOR COMBINING CARTONS AND LINERS

Filed Feb. 1, 1966 2 Sheets-Sheet 2

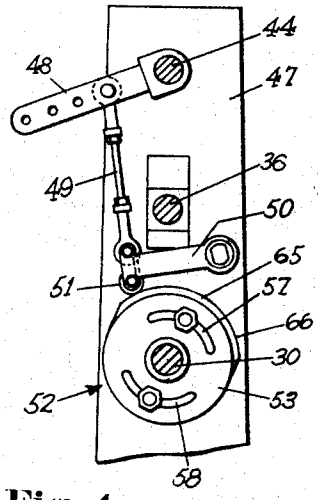


Fig. 4

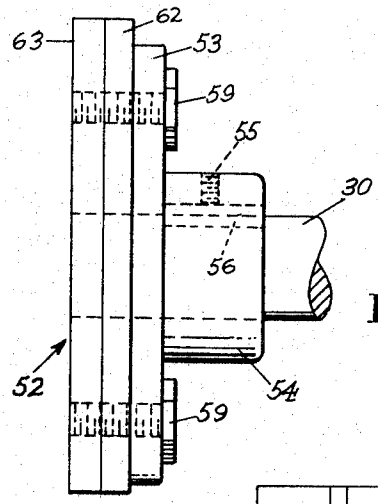


Fig. 5

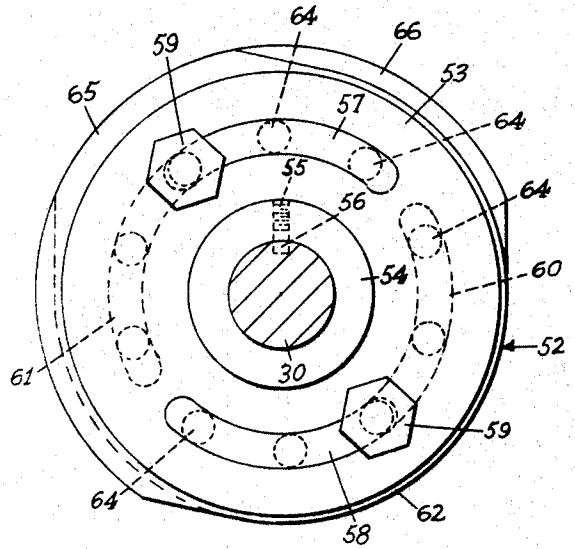


Fig. 6

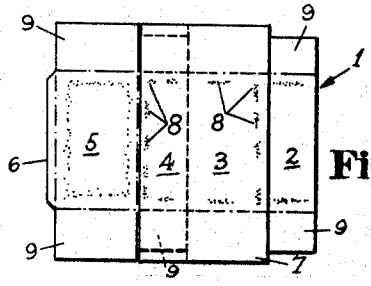


Fig. 8

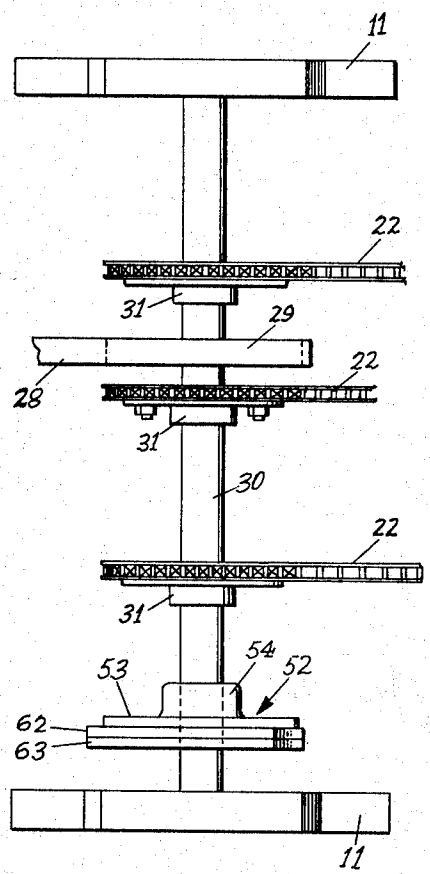


Fig. 7

INVENTOR

LEONARD BACK,

BY Yungblut, Melville, Strasser and Foster
ATTORNEYS

United States Patent Office 3,392,637 Patented July 16, 1968

3,392,637

REGISTRATION MEANS FOR COMBINING CARTONS AND LINERS

Leonard Back, Middletown, Ohio, assignor to The Interstate Folding Box Company, Middletown, Ohio, a corporation of Ohio

Filed Feb. 1, 1966, Ser. No. 524,290
12 Claims. (Cl. 93—36.01)

ABSTRACT OF THE DISCLOSURE

A combining and conveying means operating in timed relation to a delivery conveyor on which the parts of multiple part carton structures are deposited one upon the other in predetermined registry, the combining and conveying means having an upper belt contacted by a timing wheel movable from an open position in which the upper belt is spaced from a coacting lower belt so as to freely receive the registered carton parts therebetween, to a closed position in which the carton parts are clamped between the upper belt and the coacting lower belt, the timing wheel being moved from one position to the other in timed relation to the movement of the feed conveyor.

This invention relates to machines for applying a preformed liner to a carton blank and thereafter forming the carton about the liner while adhesively securing the liner to the blank, and has to do more particularly with improved means for registering the liners and carton blanks as they are assembled.

The instant invention is specifically directed to the type of combining mechanism disclosed in Bergstein U.S. Patent 2,166,388 wherein flat carton blanks are advanced in a path of travel and preformed liners are delivered in timed relation to a position overlying the path of travel of the carton blanks, whereupon the liners are caused to move with the cartons blanks and are juxtaposed and adhesively secured thereto. In such equipment, the liners are delivered to a support overlying the path of travel of the carton blanks which are advanced by a conveyor means, usually in the form of a series of spaced apart chains provided with upwardly projecting abutments which engage the trailing edges of the carton blanks and also project upwardly through lengthwise passageways in the liner support, thereby engaging the trailing edges of the liners and advancing them beyond the support where they will be deposited in correct position on the underlying carton blanks. As the carton blanks and their juxtaposed liners pass beyond the support they are engaged and pressed together by upper and lower conveyor belts which advance the juxtaposed structures toward the carton folding and gluing mechanism. The upper and lower conveyor belts are usually in the form of rubber padded chains which are guided by sheaves, the sheaves at the leading ends of the conveyors defining a closed or tight nip into which the carton blanks and juxtaposed liners are forced. While the upper and lower conveyors are driven in synchronism and are intended to maintain the carton blank and liner in the position in which the liner is deposited upon the carton, considerable difficulty has been encountered with slippage as the assemblies are fed into the closed nip, resulting in the liners being improperly registered with respect to the carton blanks. This is usually the result of one of the conveyors engaging the assembled articles before the other, thereby causing either the carton blank or the liner to kick ahead of the other. If the carton and liner blank are moved too far out of registry, the carton cannot be used; and even in some instances where the degree of mis-alignment does not visually appear to be too great, the mis-alignment may nonetheless be sufficient

to adversely affect subsequent filling and sealing operations, as where the extending ends of the liners are engaged by a sealing means intended to effect a heat seal across the end edges of the liners.

In contrast to the foregoing, the instant invention provides an improved registration means for combining the carton blanks and liners which assures that the blanks and liners will be accurately maintained in registry with each other, while at the same time providing positive engagement of the assembly as it is advanced to the cartons folding and gluing mechanism.

A principal object of the instant invention is the provision of improved registration means for engaging and advancing a carton blank and liner assembly, the mechanism including an oscillating or reciprocating timing wheel forming a part of one of the conveyors, the timing wheel coacting with the other conveyor to define what may be characterized as an open nip, the timing wheel being arranged to close upon delivery of the carton and liner assembly between the timing wheel and the opposing conveyor, thereby engaging the assembly while at the same time maintaining the proper registry of the carton blank and liner and causing them to be adhered together as the assembly is advanced to the carton folding and gluing stations.

A further object of the instant invention is the provision of conveyor mechanism of the character described wherein the oscillating timing wheel is mounted on one end of a pivoted arm in such a way that it will be raised and lowered relative to the other conveyor without creating slack in the conveyor belt passing around the timing wheel, and to this end the last named conveyor belt is wrapped around the timing wheel and a coacting guide sheave so as to move in an arc of relatively short radius without effectively altering the speed of travel of the conveyor belt as the nip is opened and closed.

A further object of the instant invention is the provision of conveyor mechanism of the character described wherein the conveyor belt which passes around the timing wheel is again guided into operative position with respect to the other conveyor belt a short distance beyond the nip, where it again engages the assembly and coacts with the other belt to adhere the carton and liner together and advance the assembly to succeeding operating stations, the distance between the timing wheel and the point at which the assembly is again contacted by the said conveyor belt being shorter than the length of the shortest carton assembly being handled so that the assembly will be reengaged between the belts before being released by the timing wheel and yet the timing wheel will return to the open position before the next succeeding assembly is presented to the open nip.

A further object of the instant invention is the provision of conveyor mechanism of the character described wherein the oscillating timing wheel is driven in timed relation to the conveyor means which delivers the carton blanks and liners to the open nip, the timing means including adjustable cam means which facilitates accurate adjustment of the operating mechanism.

Still a further object of the instant invention is the provision of mechanism of the character described wherein the oscillating timing wheel coacts with a floating pressure wheel defining the other half of the carton receiving nip, the timing wheel and floating pressure wheel coacting to assure positive non-slip engagement of the conveyors with the assembled carton blanks and liners.

The foregoing, together with other objects of the invention which will appear hereinafter, or which will be apparent to the skilled worker in the art upon the reading of this specification, are accomplished by that construction and arrangement of parts of which an exemplary embodiment shall now be described.

Referring to the drawings:

FIGURE 1 is a fragmentary plan view of the leading end of a carton blank and liner combining device incorporating the improved registration means.

FIGURE 2 is a central longitudinal section of the mechanism shown in FIGURE 1.

FIGURE 3 is an enlarged fragmentary vertical sectional view taken along the line 3—3 of FIGURE 1.

FIGURE 4 is an enlarged fragmentary vertical sectional view taken along the line 4—4 of FIGURE 1.

FIGURE 5 is an enlarged fragmentary side elevational view of the adjustable actuating cams for the oscillating roller.

FIGURE 6 is a side elevational view of the cams taken from the left side of FIGURE 5.

FIGURE 7 is an enlarged fragmentary plan view illustrating the manner in which the movement of the cams is timed to the movement of the conveyors.

FIGURE 8 is a plan view of a carbon blank with a liner juxtaposed thereon.

Referring first to FIGURE 8 of the drawings, the typical type of lined carton structure to which this invention relates comprises a carton blank **1** having enclosing body walls **2**, **3**, **4** and **5** articulated together in the order named and adapted to be formed into a flat folded tubular body upon the infolding of body walls **2** and **5** accompanied by the adhesive attachment of the attachment flap **6** to the outermost side edge of the body wall **2**. The liner **7** overlies the body walls **3** and **4** and will be deposited on the carton blank in the manner to be hereinafter described, the adhesive stripes or spots **8** being applied to the carton body walls prior to the liner being deposited thereon. Subsequent to the liner being deposited on the carton blank, the outlying body walls of the blank will be infolded in the manner previously described, thereby securing the liner within the knocked down tubular structure. One end of the liner, which is in the nature of a flat folded tube, may be sealed prior to its association with the carton blank or else sealed either subsequent to their association or subsequent to the joint erection of the carton and liner. It will be understood that the liner will be automatically expanded when the body walls of the carton are erected, i.e., displaced at right angles to each other, due to the adhesive attachment of the liner to the carton body walls. Product may then be introduced into the open end of the liner, whereupon it will be sealed and infolded, followed by the infolding and sealing the end closure flaps at the ends of the carton body, such closure flaps being indicated generally at **9**.

Referring now to FIGURES 1 and 2 of the drawings which illustrate the portion of the mechanism for feeding the carton blanks in timed relation, appling adhesive and depositing the liners or bags in predetermined position on the blanks, the reference numeral **11** indicates the main machine frame, whereas the reference numeral **12** indicates the frame parts of a liner forming mechanism, or at least a mechanism over which the liners are fed, as by means of feed rolls **13**, to which the liners are supplied in succession over a plate or conveyor belt **14**. The liners **7** are thus fed to a platform **15** mounted on machine frame **11** where they contact a stop **16** which positions the liners above the path of travel of the carton blanks with which they are to be associated.

The carton blanks **1** are located in a suitable hopper **17** so that the topmost blank is engaged by a feeding wheel **18**, having a suitable contact pad **19** for withdrawing the carton blanks one at a time from the supply. The feeding wheel **18** coacts with an underlying feeding wheel **20** to deposit the carton blanks on a series of conveyor chains **21**, in this instance three in number, with the outermost chains acting to advance the carton blanks in a path of travel extending longitudinally of the machine frame **11**. In order to time the movement of the blanks, abutment pins **22** are located in spaced relation along the conveyors **21**.

As the carton blanks are advanced, they are first contacted by a timed adhesive applying mechanism, indicated generally at **23**, driven synchronously with the conveyors, the glue applying mechanism including glue roll **24**, the pads **25** of which are shaped to correspond with the desired areas of adhesive to be applied to the carton blanks **1**. As will be understood by the worker in the art, the glue roll **24** will apply the spots or stripes of adhesive **8** to the body walls of the carton blanks so that the liners, when juxtaposed thereto, will be adhered to the body walls of the blanks.

The platform **15** upon which the liners are fed one at a time have longitudinal passageways **26** therein in alignment with the conveyor chains **21**, the conveyor chains passing beneath the longitudinal passageways **26**, but with the abutment pins **22** of at least the middle chain projecting upwardly through the passageway so as to engage the trailing edge of a deposited liner and push it along in time with the carton blank and in the desired position with relation to the carton body walls lengthwsie of their path of travel, so that when the liner drops away from the platform it will be deposited in correct position on the carton blank. To this end, the side guide **27** coacts with the stop **16** to assure proper transverse alignment of the liner relative to the underlying carton blank.

The combining mechanism just described is essentially the type of combining mechanism disclosed in U.S. Patent 2,166,388 and is representative of the type of mechanism with which the registration mechanism of the instant invention may be employed.

As the carton blank and liner leave the combining device, the combined articles come under the influence of lower conveyor belt **28** which, at its leading end, passes around driven sheave **29** mounted on driving shaft **30** which also mounts sprockets **31** about which the trailing ends of the conveyor chains **21** pass, with the conveyor belt **28** preferably traveling at a somewhat faster rate than the conveyor chains **21** so that upon engagement with the conveyor belt **28** the carton and liner assembly will be drawn away from the pins **22**. The belt **28** is provided with suitable tensioning means, indicated generally at **32**, which serve to maintain the belt in taut condition.

An upper conveyor belt **33** overlies the path of travel of the conveyor belt **28** and is driven in timed relation with the belt **28** and hence at a somewhat faster speed than the conveyor chains **21**.

In accordance with the instant invention, the upper conveyor belt **33** passes around an oscillating timing wheel **34** rotatably journaled to one end of a rocker arm **35** pivotally mounted on shaft **36** which also journals guide sheave **37** about which the belt also passes, the wrap of the belt around the timing wheel **34** and guide sheave **37** being established by the idlers **38** and **39** rotatably journaled on housing **40** which also mounts suitable belt tensioning means **41**.

The opposite end of rocker arm **35** is connected through adjustable linkage **42** to an arm **43** fixedly secured to rock shaft **44** which extends transversely of the machine frame **11**, the rock shaft **44** being provided with a lever arm **45** to which one end of a spring **46** is secured, the opposite end of the spring being affixed to the housing **40**, with the arrangement of parts being such that the spring **46** will tend to rotate the shaft **44** in a clockwise direction (as seen in FIGURE 3) thereby normally biasing the timing wheel **34** upwardly so that it lies in spaced relation with respect to the lower conveyor belt **28** and defines what may be termed an open nip into which the carton blank and liner assembly will freely enter.

The rock shaft **44** extends transversely of the machine frame and is supported at its ends by brackets, such as the bracket **47** seen in FIGURE 4, extending upwardly from the machine frame. A rocker arm **48** is fixedly secured to the rock shaft and is interconnected by means of adjustable linkage **49** to a cam follower **50** pivotally connected to the bracket **47**, the cam follower mounting a cam roller

51 which engages the periphery of a segmented multiple part cam 52 which is also mounted on the driving shaft 30. The cam 52 is thus driven in synchronism with the conveyor chains 21, as will be clearly apparent from FIGURE 7.

As previously indicated, the cam 52 is a multiple part cam which, as seen in FIGURES 5 and 6, is composed of a mounting plate 53 having an integral collar 54 by means of which the mounting plate is fixedly secured to the shaft 30, as by means of set screw 55 and key 56. The plate 53 has an opposing pair of radially disposed arcuate slots 57 and 58 therein through which the threaded bolts 59 are adapted to be passed, the bolts also extending through corresponding pairs of arcuate slots, indicated at 60 and 61, formed in a first cam segment 62 to which a second cam segment 63 is juxtaposed, the latter cam segment having a plurality of radially disposed threaded openings 64 therein positioned to selectively receive the opposite ends of the bolts 59. The cam segments 62 and 63 have rises 65 and 66, respectively, which may be adjusted relative to each other to determine the total rise of the cam assembly 52. Preferably, the length of the rises 65 and 66 will be equal, although it will be evident that the length of the combined rises may be effectively varied by rotating the segments 62 and 63 relative to each other, thereby effectively causing one of the rises to extend in prolongation of the other, in the manner illustrated in FIGURE 6, the cam segments being fixed in their desired position of use by means of the bolts 59. With such arrangement, it is possible to accurately adjust the operating cycle of the cam mechanism.

Referring again to FIGURE 3 of the drawings, the lower belt 28, as it passes beyond the leading sheave 29, is supported from beneath by a floating support 67 composed of a series of belt contacting idlers 68 rotatably journaled in a housing 69 which is spring-biased to belt supporting position by means of spring 70. Such floating support coacts with the timing wheel 34 to effect positive engagement of the carton and liner assemblies between the upper and lower belts when the nip is closed.

In the operation of the mechanism, as the abutment pins 22 on the conveyor chains 21 feed each carton blank and liner assembly between the conveyor belts 28 and 33, the cam assembly 52 will rotate so that the cam roller 51 will travel on to the rise of one or both of the cam segments 62, 63, thereby rocking the cam follower 50 in a clockwise direction (as viewed in FIGURE 4) which causes the linkage 49 to move upwardly carrying the arm 48 with it. In so doing, the rock shaft 44 is caused to rotate. The rotation of the rock shaft 44 is such that the arm 43 overlying the rocker arm 35 (see FIGURE 3) will be moved upwardly against the tension of spring 46, the arm 43 acting through linkage 42 to rotate rocker arm 35 in a counterclockwise direction, thereby causing timing wheel 34 to move downwardly into contact with the underlying carton assembly. The timing wheel will move in an arc of relatively short radius, pivoting about the axis of shaft 36, and in so moving the belt 33 will remain free from slack due to its wrap around both timing wheel 34 and guide sheave 37, which wrap is maintained by the idlers 38 and 39. The open nip is thus closed and the upper belt 22 is brought into contact with the liner 7, which is uppermost, while at the same time the undersurface of the carton blank will be pressed into positive contact with lower belt 28. Since the upper and lower belts are traveling in synchronism, there will be no relative movement between the carton blank and liner; and the timing of the cam mechanism will be such that the timing wheel 34 will be maintained in the liner contacting position until the leading end of the carton and liner assembly will have been engaged between the lower belt 28 and the portion of the upper belt 33 passing around the sheave 71 which leads the upper belt back into contact with the assembly at a point spaced from the nip defining timing wheel. Preferably the distance between the sheave 71 and the timing wheel 34 will be shorter than the length of the carton and liner assembly so that the assembly will be fed beneath the sheave 71 before it is released by the timing wheel, thereby assuring that the carton blank and liner will be held against relative movement at the time it is engaged by the belts in the area underlying sheave 71. The cam roller 51 will then travel off the trailing end of the rise and th erock shaft will be returned to its initial position, thereby acting through the previously described linkage to return the timing wheel to its elevated or open nip position to receive the next succeeding carton blank and liner assembly delivered by the chains 21. It will be evident from the foregoing that the single upper belt is made to perform a dual function in that the portion passing around the timing wheel acts to form an open nip which closes as a carton blank and liner assembly is fed therebetween, the belt additionally being led back into contact with the assembly a short distance beyond the nip where the lower flight of the belt coacts with the underlying conveyor belt to advance the assembly while maintaining the parts in registry. In spite of such dual function the construction maintains accurate timing of the upper and lower belts without slippage of the liner and carton blank relative to each other.

The construction just described has effectively eliminated the registry problems heretofore encountered where conventional conveyor means are employed to receive the assemblies delivered by the conveyor chains 21. The belts 28 and 33 remain taut at all times and there is no problem of compensating for slack occasioned by stretched conveyor chains, as has hitherto been encountered. The wrap of the belt 33 about both the timing wheel 34 and the coacting guide wheel 37 and idlers 38 and 39, is such that the speed of travel of the belt remains essentially constant even through it is being displaced vertically; and the underlying floating support 67 coacts with the idler to effect positive engagement with the carton blank and liner assemblies.

Modifications may, of course, be made in the invention without departing from its spirit and purpose, and it is not intended that the invention be limited other than in the manner set forth in the claims which follow.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a machine for assembling multiple part carton structures and the like wherein one of the parts is deposited on another in registry therewith on a first conveyor and the assembly so formed delivered to a combining and conveying means comprising upper and lower traveling belts between which the assemblies are to be engaged and advanced, the improvement which comprises means in association with one of said belts defining an open nip between said belts, and actuating means operatively connected to said nip defining means and acting upon the entrance of an assembly into said open nip to temporarily close the same, said actuating means also being operatively connected to said first conveyor and driven in timed relation thereto, whereby the said assemblies are engaged and advanced by said belts upon closing of said nip in timed relation to the movement of said first conveyor.

2. In a machine for assembling multiple part carton structures and the like wherein one of the parts is deposited on another in predetermined registry therewith and the assembly so formed delivered to a combining and conveying means comprising upper and lower conveyor belts traveling in timed relation between which the assembled parts are pressed into engagement with each other and advanced in a path of travel, the improvement which comprises a timing wheel in contact with a portion of said upper belt, said timing wheel being movable from an open position in which the portion of the upper belt in contact therewith is spaced from said lower belt so as to freely receive each assembly presented thereto,

to a closed position in which the portion of the upper belt in contact with said timing wheel is caused to contact each such assembly and press the same into engagement with said lower belt, and means operatively connected to said timing wheel for moving it from one position to the other in timed relation to the presentation of each said assembly to said combining and conveying means, said timing wheel being rotatably mounted on a rocker arm pivotally connected to a support overlying the portion of the belt contacted by said timing wheel, said timing wheel moving in an arc from the open to the closed position, pivoting about the pivot point of said rocker arm, said belt also passing around a guide wheel rotating about the pivot point of said rocker arm.

3. The machine claimed in claim **2** wherein said upper belt, upon passing said timing wheel, travels around a first idler spaced upwardly from said timing wheel, thence travels downwardly around a second idler positioned to return said belt into contact with each said assembly at a point along the path of travel thereof spaced from said timing wheel by a distance less than the effective length of said assembly, whereby said assembly is re-engaged and advanced by said upper and lower belts.

4. The structure claimed in claim **3** wherein said assemblies are delivered to said combining and conveying means by a delivery conveyor, wherein the means for moving said timing wheel from one position to the other comprises cam means moving in timed relation to the movement of said delivery conveyor.

5. In a machine for assembling carton blanks and liners wherein the liners are first deposited on the carton blanks as the latter are advanced by a first conveyor means which then delivers the assembly so formed to a second conveyor means wherein the assemblies are engaged and advanced between upper and lower conveyor belts, the improvement which comprises an oscillating timing wheel engaging a portion of said upper belt toward the leading end thereof, means mounting said timing wheel and the portion of the upper conveyor belt in contact therewith for oscillating movement toward and away from said lower belt, and timing means operatively connected to said oscillating wheel for moving it toward said lower belt upon presentation of a carton blank and a liner assembly therebetween and moving it away from said lower belt as the said assembly passes therebeyond, said timing means comprising cam means driven in synchronism with said first conveyor means, and linkage means including a cam follower operatively connecting said cam means to said oscillating wheel.

6. The machine claimed in claim **5** wherein the means mounting said timing wheel for oscillating movement comprises a rocker arm pivotally connected to a support intermediate its ends, said timing wheel being rotatively journaled to one end of said rocker arm, and linkage means operatively connecting the opposite end of said rocker arm to the linkage means connected to said cam follower.

7. The machine claimed in claim **6** wherein said cam follower linkage means and said rocker arm linkage means are each connected to a rock shaft which, when rotated by said cam follower linkage means, acts to rotate said rocker arm and thereby move said timing wheel.

8. The machine claimed in claim **7** wherein said cam means comprises a segmented cam having a pair of relatively movable cam segments each of which has a rise, the dimensions of said cam segments being such that, upon relative movement of said segments, said rises will lie in either side-by-side relation or in prolongation of each other, whereby the length of the rise may be adjusted.

9. The machine claimed in claim **8** wherein the combined length of said rises determines the length of time the oscillating wheel is maintained in its advanced position toward said lower belt.

10. The machine claimed in claim **9** wherein said cam segments are of circular configuration, wherein said segments are secured to a mounting plate by means of threaded bolts passing through arcuate slots in said mounting plate and in one of said cam segments, the other of said cam segments having threaded openings therein in alignment with said slots and of a size to selectively receive said threaded bolts.

11. The machine claimed in claim **5** including a floating support means underlying and supporting said lower conveyor belt in the area beneath said timing wheel.

12. The machine claimed in claim **11** wherein said floating support means comprises a movable housing mounting a plurality of idler rollers, and spring means biasing said housing upwardly toward said lower belt.

References Cited

UNITED STATES PATENTS

2,166,388	7/1936	Bergstein	93—36.01
2,995,976	8/1961	Weingart	271—69 X

WILLIAM S. LAWSON, *Primary Examiner.*