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F. JOHENNING ET AL
METHOD AND MECHANISM FOR UNFOLDING, REFOLDING, SETTING
UP, AND TRANSPORTING TUBULAR CARTONS
IN SPACED RELATIONSHIP

2,671,385

Filed Feb. 13, 1952

2 Sheets-Sheet 1

Fig. 1.

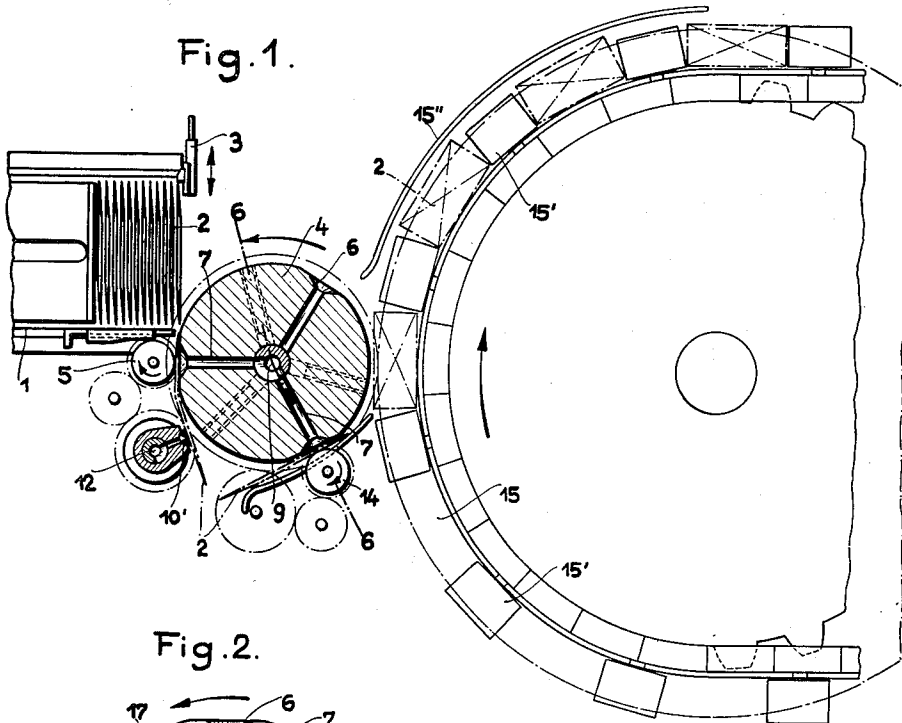


Fig. 2.

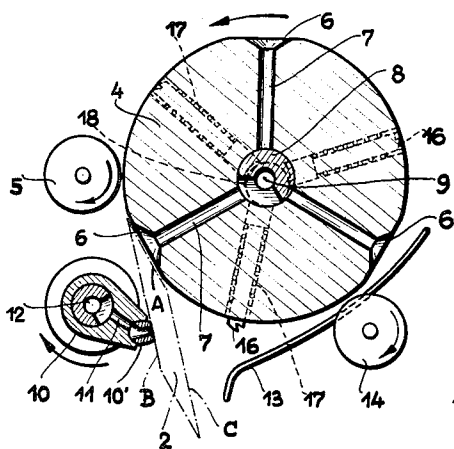
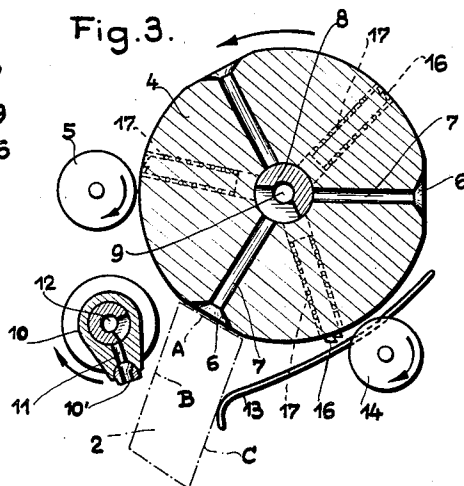


Fig. 3.



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Fig. 4.

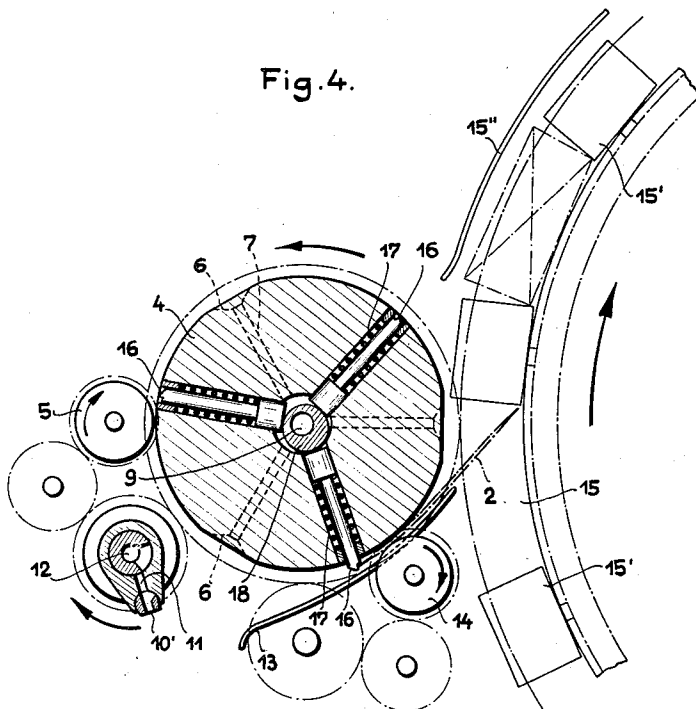


Fig. 5.

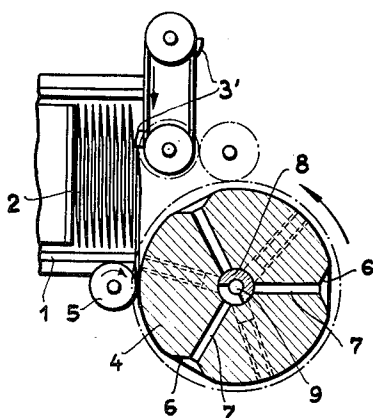
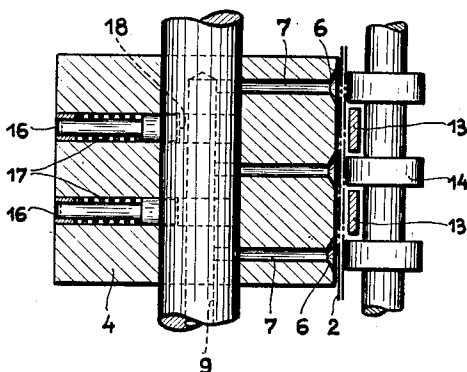


Fig. 6.



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METHOD AND MECHANISM FOR UNFOLDING, REFOLDING, SETTING UP, AND TRANSPORTING TUBULAR CARTONS IN SPACED RELATIONSHIP

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19 Claims. (Cl. 93—53)

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The present invention relates to the art of handling tubular cartons.

More particularly the invention relates to a method and mechanism for unfolding, refolding, setting up and transporting tubular cartons in spaced relationship.

Specifically the invention relates to improved mechanism for effecting the removal of carton blanks from a stack of blanks, manipulating the same through a series of steps providing for unfolding the blank from its flattened condition, refolding the blank into a reversely flattened condition and moving the carton to a spacing conveyor arrangement in a manner permitting the carton to automatically set itself up into an opened condition so that a series of cartons continuously move through the various steps embodied in the mechanism in an effective manner.

Specifically the invention relates to mechanism for spacing, unfolding, refolding, setting up and conveying tubular cartons in spaced relationship utilizing vacuum applying heads in combination with feed rolls and conveyor means all operating in a continuous cycle.

In the art of handling cartons involving manipulation of a blank that has been cut, scored, flattened, and glued so that the tubular carton is in flattened condition it has been known to partly or entirely remove folded cartons from the front plane of a stacker mechanism and to preliminarily open the same by suction heads in order to permit the introduction of a mandrel or blade into the carton and by a subsequent swinging or rotating movement of the carton relative to the blade effect the setting up of the carton. It is obvious that in such arrangement the reciprocation of the suction head in accordance with its working cycle as well as the timed and synchronized insertion of the mandrel or blade into the preliminarily opened carton will impose limitations upon the mechanism as regards the speed of operation thereof.

A similar disadvantage as regards speed of operation is attendant in other known arrangements in which suction heads are applied to either side of the carton plane since in order to permit of the attachment of the suction heads to the cartons or the gripping of the cartons, the flattened carton has to be, in the known mechanisms, completely removed from the front face of the stacker and at least one of the suction heads must perform a reciprocating movement according to the direction of opening movement of the carton.

Additionally it has been proposed, in mechanisms of this character which utilize only one

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suction head, to control the motion of the head in such a fashion that the vacuum cup contacts, at the end of a determined curved path, the front surface of the stacker and withdraws from the latter after the removal of a carton along a path of another curve. This known mechanism in addition to necessitating a plurality of parts for controlling the movement of the suction head so that the change of direction of motion of the same is effected is also limited in its efficiency and does not insure an effective removal and unfolding of the carton.

It is therefore an object of the present invention to provide mechanism for handling and manipulating cartons to effect removal of a flattened blank from a stacker and manipulate the same through stages until the cartons are set up and conveyed away in spaced relationship which is effective as regards the movement of the carton through the successive stages of removal from the stack and the unfolding, and includes a refolding and automatic setting up, incorporated with the simultaneous arrangement of the set up cartons in spaced relationship on a conveyor for removal and subsequent handling.

It is a specific object to provide mechanism of the aforementioned character which operates in a continuous cycle, eliminates the necessity of complex controls and is effective in all stages of its operation so as to accelerate the working cycle and thereby handle more cartons in a given period of time.

Specifically the present invention has for an object to provide mechanism that partially removes the foremost flattened carton blank from the front face of the stacker to move the same into the sphere of action of continuously circulating vacuum heads which attack or grasp the blank from opposite sides of its flattened plane to effectively unfold or open the carton and so controlling the action of the suction heads that the grip on one side of the plane is released while it is maintained on the opposite plane and in the continuous circulation of the open carton the same is refolded in a reverse flattened condition and positively fed to a continuously circulating conveyor mechanism in such fashion that the carton is automatically set up and arranged in spaced relationship on the conveyor for removal for subsequent handling or processing.

It is a more specific object to provide mechanism which moves the suction heads that effect the unfolding, assist in the refolding and refolding of the carton in its opposite flattened condition in a closed circulating path in such manner

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that there is no necessity to change the direction of motion of the suction head.

It is an additional object to provide mechanism which not only effectively removes the front carton blank from the stacker but also positively insures the unfolding of the carton by grasping the same on opposite sides of the plane of the flattened carton.

It is a further and more specific object to provide in combination with the continuously circulating suction heads an arrangement of continuously rotating feed rolls cooperating therewith which permit of a quicker cycle of operation and therefore substantial improvement in the overall efficiency of the various stages of manipulating the carton blank between its flattened condition and its ultimate arrangement in set up spaced relationship and thereby substantially improving the efficiency of this carton handling operation.

It is an additional more specific object to provide in combination with the feed rolls and suction heads an ejector mechanism which cooperates with the rear of each blank in its re-flattened condition to positively assist the movement of the blank in its cycle of movement between the unfolding and refolding means and the conveyor which retransports the set up carton for subsequent processing.

Further and more specific objects will be apparent from the following description of the invention taken in connection with the accompanying drawings in which:

Figure 1 illustrates the invention diagrammatically and is a top plan view partly in section.

Figure 2 illustrates on an enlarged scale the suction members in the position assumed during the unfolding operation.

Figure 3 is a similar view but illustrating the suction heads at the stage when a carton blank is substantially unfolded.

Figure 4 illustrates the invention partly in section and with particular reference to the position of the suction heads and the ejector mechanism during the delivery of the reflatented carton to the conveyor mechanism; and

Figure 5 is a partial view in top plan illustrating a modification of the ejector means cooperating with the stacker for assisting the removal of the flattened blanks from the stack.

Figure 6 is a sectional side view of Fig. 1 inasmuch as it is indicated by line 6—6.

As illustrated in the drawings the tubular flattened carton blanks are arranged in a stack in a stacker mechanism and the ejector or pusher member 3 reciprocating in the direction of the arrow shown in Figure 1 abuts the rear folded edge of the front blank 2 and removes same from the front face of the stacker a distance sufficient so that the front folded edge passes into the bight between the pair of feed rolls 4 and 5 disposed immediately adjacent the stacker mechanism 1. As indicated in the drawings the plane of reciprocation of the ejector member 3 lies in the plane substantially coinciding with the plane of the front face of the stacker and which plane also passes through the plane of contact of the feed rolls 4 and 5. The feed rolls 4 and 5 are arranged on opposite sides of the plane of the front face of the stacker and are so dimensioned and timed that as the ejector pushes the carton partially off of the stack it is gripped by these rolls and then subsequent movement of the blank until it is fully removed from

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the stack is effected by the rolls and suction heads associated therewith.

As illustrated in Figure 5 the ejector member can constitute feeding pins 3' arranged on a continuously circulating chain belt or the like

The particular carton illustrated is of the type which includes opposite short sides and opposite long sides, in other words the type that has narrow end faces and wide front and rear faces. The feed roll 4 is provided in the embodiment shown with three circumferentially spaced suction heads or vacuum cups 6 communicating with the periphery of the roll. The space between the heads is such that the perimeter of the roll 4 between the heads cooperates with the perimeter of the roll 5 in completely removing the blank from the stack and moving the same downwardly as viewed in the drawings a distance such that by the time the suction head is horizontal as shown in Figure 1 it is adjacent the narrow side of the carton. As illustrated the suction heads are in communication with the suction conduit 9 arranged in a stationary axle 8 during the interval between their horizontal movement when the heads are adjacent the stacker through an arc of movement to the right of Figure 1 of approximately 120° so that during this swinging motion the narrow face or surface A of each carton will be grasped by one of the suction heads 6 on the roll 4. Each suction head of course is in communication through a conduit 7 with the suction conduit 9 in the axle or shaft during this particular arc of movement.

As the carton blank is removed from the stack and passed between the rolls 4 and 5 it is moved into the sphere of action of the second, likewise continuously rotating suction head 10. This suction head 10 nearly contacts the swing cycle of the suction head 6, and is similarly provided with a suction conduit 12 likewise stationary and by means of the channel 11 is in communication with the nozzle or head during a determined portion of its path of rotation which as shown, is during an approximate 90° movement of the head in moving from right to left in the direction of the arrow. The suction head 10 grasps the flattened carton at its broad or wide surface or face B, that is adjacent the narrow surface or face A grasped by the head 6. As is apparent from the relationship of Figure 1 the two heads seize the carton on opposite sides of its folded plane but grasp adjacent sides when considering the carton as set up.

The carton thus grasped on either side of its plane by the heads 6 and 10 will be positively opened as is apparent from Figure 2 during the subsequent rotating motion of the heads in their movement away from one another. The suction head 10 is provided with a nozzle 10' which is swiveled with respect to the head 10 so that it can adapt itself to the particular position of the carton surface grasped by it. It is thus apparent that in the continued movement of the heads 6 and 10 away from one another the carton blank 2 is unfolded almost completely. As this movement continues the channel 11 passes out of communication with the suction conduit 12 so that the gripping action of the nozzle 10' ceases and the carton is merely retained in the grasp of the suction head 6 as shown in Figure 3. Continued rotation of the roll or drum 4 carries the unfolded carton forward until the broad surface C abuts a switch or abutment plate 13. Since the face A is still grasped by the suction head 6 the

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continued movement of the roll or drum 4 causes the carton to be refolded between the abutment 13 and the perimeter of the roll 4 and this refolding is in the opposite direction as compared with the direction of fold of the plane in the stacker 1. As indicated the switch 13 is disposed tangentially with respect to the circulating path of movement of the suction head 6. As is clear from Figure 1 the refolded carton blank is gripped by the head 6 until the leading folded edge thereof, as regards its direction of motion, is gripped between the conveying roll 14 and the feed roll or cylinder 4. The suction head 6 now has swung through an arc such that the suction conduit or channel 7 is no longer in communication with the channel 9 so that the carton is no longer grasped by the suction heads and it is no longer positively held against the face of the cylinder 4 so that the conveying roll 14 continues the movement of the reflattened blank in a direction toward the continuously circulating chain conveyor noted at 15. As indicated this conveyor is provided with spacer means 15'.

In order to insure the effective delivery of the cartons to the conveyor mechanism 15 the feed cylinder 4 is provided with a plurality of radial feed pins 16 as shown in Figure 4. Each pin, in the particular example there being a number corresponding to the number of suction heads, is located between a pair of suction heads a distance such that, as is apparent from Figures 1 and 2, when the suction head 6 holding the narrow face of the carton is about to pass out of communication with its suction conduit 7 the feed pin 16 is adjacent the rear folded edge of the refolded blank. Each pin 16 is provided with a nose which engages this rear folded edge and the several pins are each normally urged inwardly of the periphery of roll or cylinder 4 by springs 17 acting on plunger heads on the inner end of the pins which plunger heads ride in contact with an eccentric head or cam 18 which is likewise stationary so that as the cylinder 4 rotates the pins 16 are projected against the action of springs 17 as they reach the position assumed in Figure 2 so that the nose or edge thereof in continued movement of the feed cylinder grasps the rear folded edge of the reflattened blank and positively ejects the same from between the rolls 4 and 14 along the rear or upward portion of the switch plate 13 and feeds the cartons between two of the spacer elements 15' on the continuously circulating conveyor mechanism 15. The arrangement is such that the carton which had been flattened in an opposite condition between the rolls 14 and 4 when ejected from between these rolls in its action to resume its original flattened condition automatically sets itself up or reopens so that by the time it is grasped between the two spacing devices on the conveyor chain it is fully set up for conveyance to subsequent processing. A guide plate 15'' cooperates with the conveyor to retain the cartons in set up spaced condition during their subsequent movement.

It is thereby clear that the present invention provides for applying movement to one folded edge of a flattened blank to partially eject the same from a stack and project the same a distance such that it will be grasped between cooperating rolls which continue the ejecting movement and remove the flattened blank from the stack and in the removal thereof the narrow face of the carton, on the front side of the plane of the flattened blank in relation to the direction

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of feed, is grasped by one of the suction heads or cups 6 so that this face is held against the periphery of the feed cylinder 4 and as the opposite end of the carton blank is projected beyond the rolls 4 and 5, the universally mounted nozzle head 10' of the continuously rotating suction head 10 comes into contact with and grasps the rear broad or wide face B of the carton on the rear side of the plane of the flattened blank, that is the face when considering the flattened plane of the carton blank opposite to the face grasped by the head 6 so that the continued movement of the heads 6 and 10 away from one another positively unfolds the blank until it is fully unfolded. Immediately prior to the blank assuming its fully unfolded condition, the suction to the head 10 is cut off so that the carton is only retained by the head 6 and the broad face C of the carton opposite to that previously grasped by the head 10 abuts a switch blade or plate while the carton is still grasped at its narrow face. The continued circulating movement of the head grasping the carton effects a refolding and reflattening of the blank in the opposite direction, first of all between the switch plate and the feed roll and subsequently between the feed roll 14 and an additional feed or conveying roll located adjacent the periphery of the feed roll 4 with its axis disposed approximately at the point where the arc of movement of the head 6 reaches when suction is cut off to this head so that the reflattened carton is moved between the rolls 14 and 4. In order to effectively eject the carton from between these rolls, ejector mechanism including radial projectable pins located in alternate relationship with the suction head 6 and cooperating with a cam means abuts the rear folded edge of each of the reflattened cartons and ejects the same into the path of movement of the spacing devices on the conveyor mechanism so that the carton when it leaves the sphere of action of the rolls 14 and 4 is automatically set up by its effort to resume its original flattened condition.

In connection with the mechanism illustrated it is of course to be understood that the stacker 1 is provided with a conventional stack advancer which feeds the stack of flattened blanks so that each outer or end blank is successively partially removed by the movement of the pusher member 3.

Likewise it is to be pointed out that the continuously circulating conveyor 15 is so arranged with relation to the spacing between the spacer elements 15' and the distance between the surface of the conveyor 15 and the perimeter of the feed cylinder 4 is such as to be at least slightly in excess of the thickness of a completely set up carton whereby the blanks that have been reversely reflattened and are ejected from between the cylinder 4 and the roll 14 can automatically set themselves up into open condition in the movement between the cylinder 4 and the adjacent surface of the conveyor 15 between the spacer elements 15'.

It is further apparent that while the present embodiment has been described and illustrated with relation to mechanism in which the axis of the cylinder and various rolls and the rotating head 10 are vertical, the invention is likewise susceptible to reduction to practice when the various axes are disposed horizontally. In other words the drawings illustrate top views but the invention can be effected in a manner such that the various mechanisms illustrated in top plan view in the drawings are arranged in such fashion

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that the appearances thereof, as shown in the drawings, would be the same but the views would be corresponding side views.

Having now described an embodiment of the invention, what is desired to secure by Letters Patent of the United States is:

1. In mechanism for removing folded and flattened tubular carton blanks from a stack and unfolding, refolding, setting up or squaring and conveying the same, the combination of means for partially removing the end blank from a stack and at least one continuously rotating suction head disposed on each of the opposite sides of the plane of movement of the blank for grasping the blank on opposite sides of said plane, the head on one side continuously rotating reversely as regards the continuous rotation of the head on the opposite side whereby the heads in moving away from one another unfold the blank while both heads are moving.

2. In mechanism as defined in and by claim 1, and means controlling the application of suction to said heads whereby suction is effective during part of the rotation of the heads and said means shutting off application of suction to one head prior to the cessation of application of suction to the other head.

3. In mechanism for removing folded and flattened tubular carton blanks from a stack and unfolding, refolding, setting up and conveying the same, the combination of means movable transversely of the axis of the stack and engageable with an edge of the end blank of the stack for pushing the same laterally of the stack and thereby at least partially removing the same from the stack, at least one continuously rotatable suction head rotatable about an axis in front of the plane of movement of the partially removed blank and rotatable in a direction toward said blank, means controlling the application of suction to said head so that suction is operative during part of the rotation of the head so that the head grasps the blank on the front thereof adjacent said edge, at least one continuously rotatable suction head rotatable about an axis disposed to the rear of said plane of movement and located in advance of the axis of said first mentioned head as regards the path of movement of the blank, said second mentioned head being rotatable in a direction toward said blank, and means controlling suction applied through said second mentioned head so that suction is operative during part of the rotation of said second mentioned head so that the same grasps the blank on the rear thereof at an area in advance of the area grasped by said first mentioned head whereby said heads in continuously moving away from one another unfold the blank.

4. In mechanism for removing folded and flattened tubular carton blanks from a stack and unfolding, refolding, setting up and conveying the same, the combination of means movable transversely of the axis of the stack and engageable with an edge of the end blank of the stack for pushing the same laterally of the stack and thereby at least partially removing the same from the stack, at least one continuously rotatable suction head rotatable about an axis in front of the plane of movement of the partially removed blank and rotatable in a direction toward said blank, means controlling the application of suction to said head so that suction is operative during part of the rotation of the head so that the head grasps the blank on the front thereof adjacent said edge, at least one continuously ro-

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tatable suction head rotatable about an axis disposed to the rear of said plane of movement and located in advance of the axis of said first mentioned head as regards the path of movement of the blank, said second mentioned head being rotatable in a direction toward said blank, means controlling suction applied through said second mentioned head so that suction is operative during part of the rotation of said second mentioned head so that the same grasps the blank on the rear thereof at an area in advance of the area grasped by said first mentioned head whereby said heads in continuously moving away from one another unfold the blank, and wherein said heads continuously rotate in closed paths without changing the direction of motion and said means for controlling the application of suction to said heads includes means individually controlling the application of suction to the respective heads operative to cut off suction to said second mentioned head prior to cutting off suction to said first mentioned head so that said first mentioned head holds and moves said unfolded carton, and means in the path of movement of said unfolded carton engageable therewith and cooperable with said head to reversely refold and reflatten said carton into a reversely folded blank.

5. Mechanism as defined in and by claim 4 wherein said last mentioned means also includes a continuously rotatable roll for feeding said reversely folded blank.

6. Mechanism as defined in and by claim 5 wherein a continuously movable conveyor is located in advance of said roll and spaced therefrom a distance at least slightly in excess of the thickness of a set up carton whereby said reversely folded blank automatically sets itself up in passing from said roll to said conveyor.

7. Mechanism for removing folded and flattened tubular carton blanks from a stack and unfolding, refolding, setting up and conveying the same, including means confining a plurality of folded and flattened tubular carton blanks in a stack, means movable transversely to the axis of the stack and successively engageable with an edge of the successive end blanks of the stack for successively moving each of the same laterally of the stack thereby at least partially removing each blank from the stack, a feed cylinder and a counter-roll each located on an opposite side of the plane of movement of the blank being removed and each continuously rotating toward the blank, said cylinder and counter-roll receiving the partially ejected removed blank and continuing the removal thereof from the stack, said feed roll incorporating suction heads and means controlling application of suction to said heads during at least that part of the rotation of the heads when each of the same reaches a position immediately adjacent said edge of the blanks being removed so that the heads are effective to grasp one side of each successive carton blank while the same is in flattened condition and continue the movement thereof, another suction head mounted for continuous rotation about an axis in alignment with the axis of the counter-roll and said second mentioned head being located in advance of the path of movement of the blank being removed whereby the same grasps the blank on the side opposite to that grasped by the first mentioned head, means controlling the suction applied through said second head during only a part of its rotational movement whereby as the heads rotate with the blank grasped thereby from opposite sides the move-

ment of the heads away from one another effects an unfolding of the blank.

8. A mechanism as defined in and by claim 7 in which at least one of said suction heads is provided with a movable nozzle operative to adapt itself to the momentary position of the carton face being engaged thereby.

9. A mechanism as defined in and by claim 7 in which the means controlling the suction applied through all said heads is operative so that suction is applied to said first mentioned heads during a longer arc of rotation than the arc of rotation passed through by said second mentioned head with the suction applied whereby said second mentioned head is released from engagement with said carton just prior to completion of the unfolding thereof.

10. A mechanism as defined in and by claim 9, and a stationary switch plate disposed in advance of the path of movement of the unfolded carton and engageable with the face thereof opposite to that grasped and released by said second mentioned head whereby said first mentioned heads in continuing the movement of the successive cartons will refold the same in a reversely flattened condition between said cylinder and said switch plate.

11. A mechanism as defined in and by claim 10, and a feed roll continuously rotatable about an axis parallel to the axis of said cylinder and located so that the periphery of said roll cooperates with said cylinder in grasping said refolded blank, said means controlling the suction applied to said first mentioned head cutting off suction when said head has reached a position immediately adjacent the blank contacting portion of said feed roll and projectable pins mounted radially within said cylinder rearwardly of said heads and cooperable with the rear edge of said refolded blanks when projected for positively ejecting the same from said cylinder and feed roll and a continuously circulating conveyor means receiving the ejected blanks, said conveying means being spaced from said cylinder and roll a distance such that each reversely refolded blanks in moving from said roll to said conveyor automatically unfolds and sets itself up.

12. A mechanism as defined in and by claim 11 in which said cylinder is provided with radial bores receiving each said pin, spring means within the bores normally urging said pins inwardly of the periphery of the roll and cam means operative against the action of said spring to successively project said pins during a portion of the rotation of said roll so that the pins when projected contact and move the rear edge of successive refolded blanks.

13. A mechanism as defined in and by claim 7 in which said feed cylinder and said second mentioned suction head are each mounted for rotation about stationary hollow shafts constituting suction cups constituting the means controlling the suction applied through the heads constituting an aperture in each of said shafts and conduit means movable with the heads during rotation about said shafts whereby said conduit means communicate with said apertures during only a part of the rotation of said heads.

14. A mechanism as defined in and by claim 7 in which the means movable transversely to the axis of the stack for successive engagement with the edge of successive blanks constitutes a reciprocable pusher member.

15. A mechanism as defined in and by claim 7 in which the means movable transversely of

the axis of the stack and successively engageable with an edge of successive end blanks constitutes rotatable means embodying a plurality of abutment portions each engageable with a successive blank.

16. A method of manipulating carton blanks comprising feeding a stack of successive flattened blanks of the type embodying opposite wide faces and opposite narrow faces and in which in flattened condition a wide and narrow face are flattened adjacent one another on opposite front and rear sides of the plane of the flattened blank in relation to the direction of feed, partially removing the end blank of the stack in a direction transverse to the axis of the stack, continuing the removal movement of the end blank and grasping the narrow face of the flattened blank on the front side of the plane containing the flattened blank, continuing the movement of the grasped blank and grasping the wide face of the blank on the opposite rear side of the plane of the flattened blank, and continuing the movement of the blank in an arcuate path while retaining the grasp on the adjacent narrow and wide faces of the blank to at least substantially unfold the blank.

17. A method of manipulating carton blanks comprising feeding a stack of successive flattened blanks of the type embodying opposite wide faces and opposite narrow faces and in which in flattened condition a wide and narrow face are flattened adjacent one another or opposite front and rear sides of the plane of the flattened blank in relation to the direction of feed, partially removing the end blank of the stack in a direction transverse to the axis of the stack, continuing the removal movement of the end blank and grasping the narrow face of the flattened blank on the front side of the plane containing the flattened blank, continuing the movement of the grasped blank and grasping the wide face of the blank on the opposite rear side of the plane of the flattened blank, continuing the movement of the blank in an arcuate path while retaining the grasp on the adjacent narrow and wide faces of the blank to at least substantially unfold the blank, releasing the grasp from the wide face of the blank while maintaining the narrow face grasped and continuing the movement of the now substantially unfolded blank, and abutting the wide face of the blank opposite to that originally grasped and removed while continuing the arcuate movement of the blank with its narrow face grasped to reversely refold the blank.

18. A continuous method of squaring collapsed or flattened carton blanks comprising feeding a stack of successive flattened blanks of the type embodying opposite wide faces and opposite narrow faces and in which in flattened condition a wide and narrow face are flattened adjacent one another or opposite front and rear sides of the plane of the flattened blank in relation to the direction of feed, partially removing the end blank of the stack in a direction transverse to the axis of the stack, continuing the removal movement of the end blank and grasping the narrow face of the flattened blank on the front side of the plane containing the flattened blank, continuing the movement of the grasped blank and grasping the wide face of the blank on the opposite rear side of the plane of the flattened blank, continuing the movement of the blank in an arcuate path while retaining the grasp on the adjacent narrow and wide faces of the blank to at least substantially unfold the blank, releasing

the grasp from the wide face of the blank while maintaining the narrow face grasped and continuing the movement of the now substantially unfolded blank, abutting the wide face of the blank opposite to that originally grasped and removed while continuing the arcuate movement of the blank with its narrow face grasped to reversely reflatten the blank, releasing the grasp from the narrow face of the blank while continuing the movement of the reversely flattened blank and finally releasing the blank permitting the same to automatically set itself up into a tubular carton in its effort to resume its original flattened condition.

19. A continuous method of squaring collapsed or flattened carton blanks comprising feeding a stack of successive flattened blanks of the type embodying opposite wide faces and opposite narrow faces and in which in flattened condition a wide and narrow face are flattened adjacent one another or opposite front and rear sides of the plane of the flattened blank in relation to the direction of feed, partially removing the end blank of the stack in a direction transverse to the axis of the stack, continuing the removal movement of the end blank and grasping the narrow face of the flattened blank on the front side of the plane containing the flattened blank, continuing the movement of the grasped blank and grasping the wide face of the blank on the opposite rear side

of the plane of the flattened blank, continuing the movement of the blank in an arcuate path while retaining the grasp on the adjacent narrow and wide faces of the blank to at least substantially unfold the blank, releasing the grasp from the wide face of the blank while maintaining the narrow face grasped and continuing the movement of the now substantially unfolded blank, abutting the wide face of the blank opposite to that originally grasped and removed while continuing the arcuate movement of the blank with its narrow face grasped to reversely reflatten the blank, releasing the grasp from the narrow face of the blank while continuing the movement of the reversely flattened blank and finally releasing the blank permitting the same to automatically set itself up into a tubular carton in its effort to resume its original flattened condition, while arranging the successive blanks in spaced relationship and successively moving the set up cartons in mutually equally spaced relationship.

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