

No. 807,140.

PATENTED DEC. 12, 1905.

R. SUNDERMAN.
CARTON MAKING AND SEALING MACHINE.

APPLICATION FILED JUNE 25, 1904.

4 SHEETS—SHEET 1.

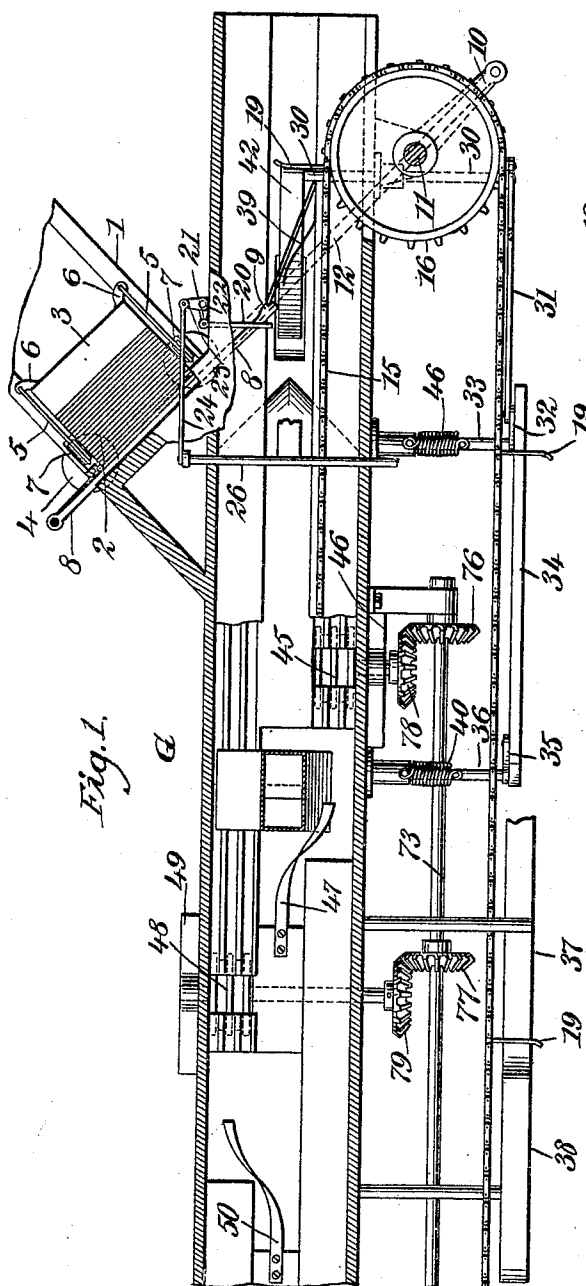


Fig. 1.

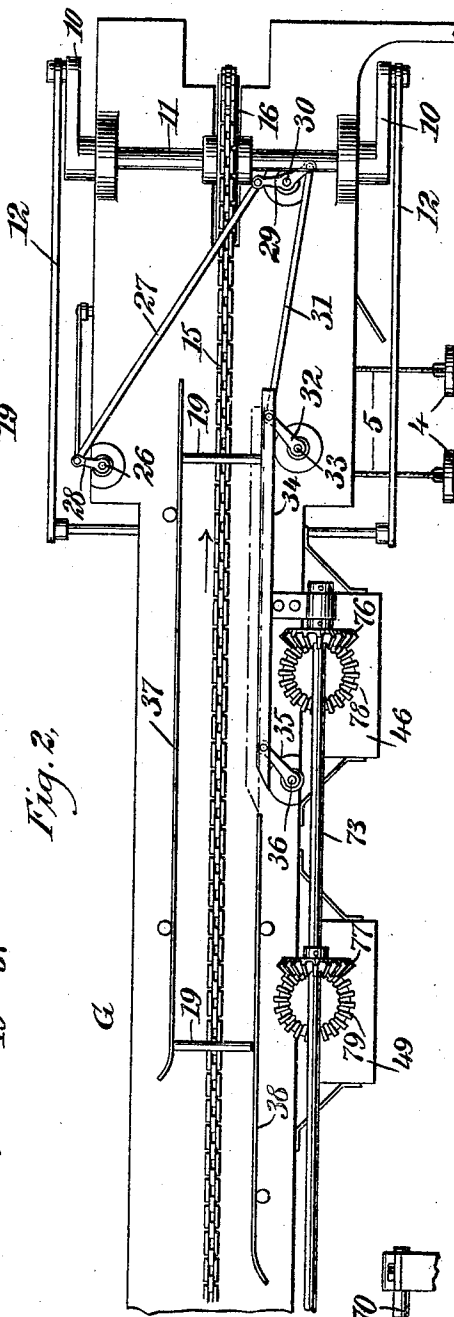


Fig. 2.

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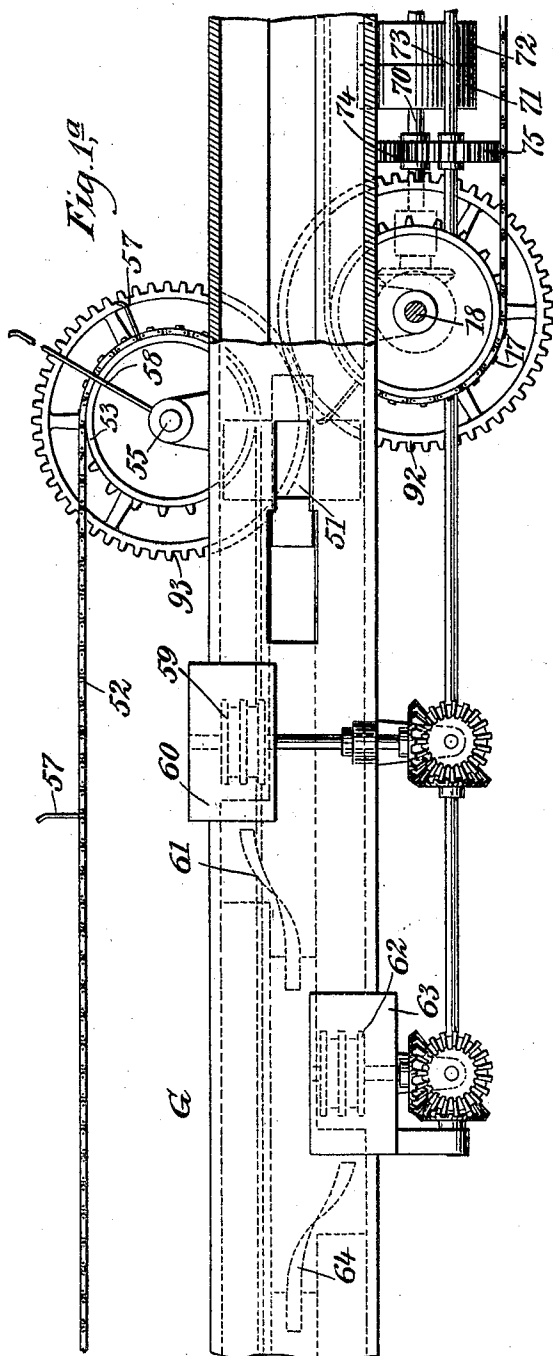
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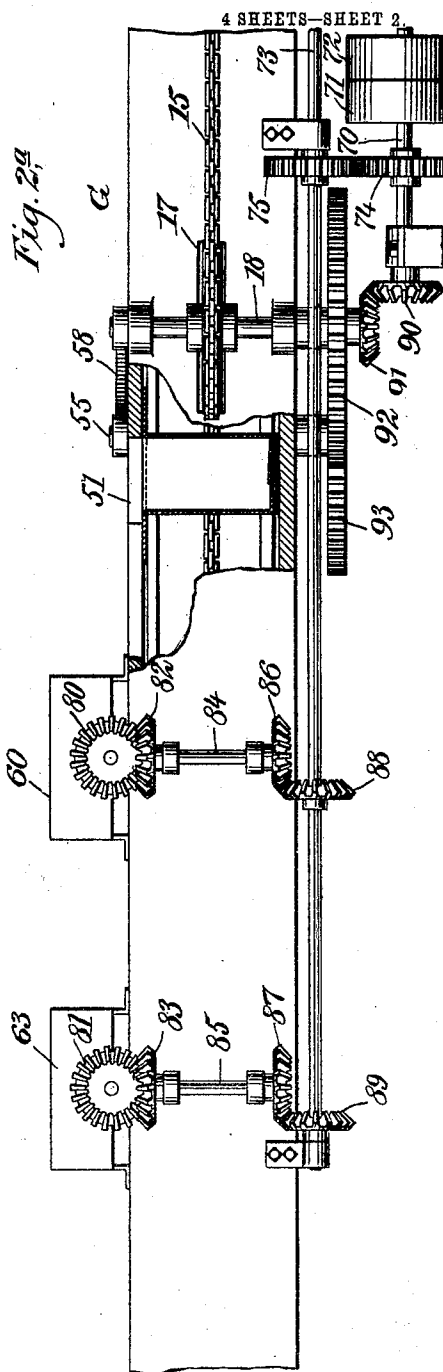
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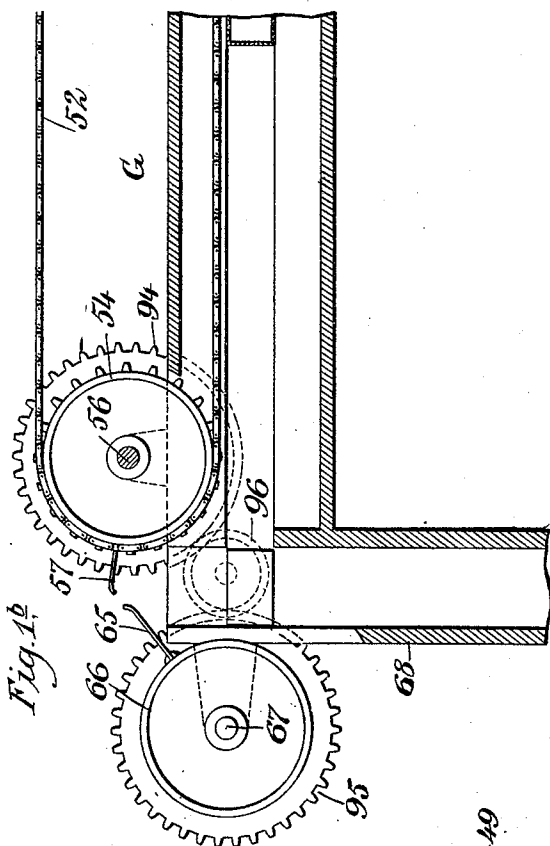


Fig. 2b

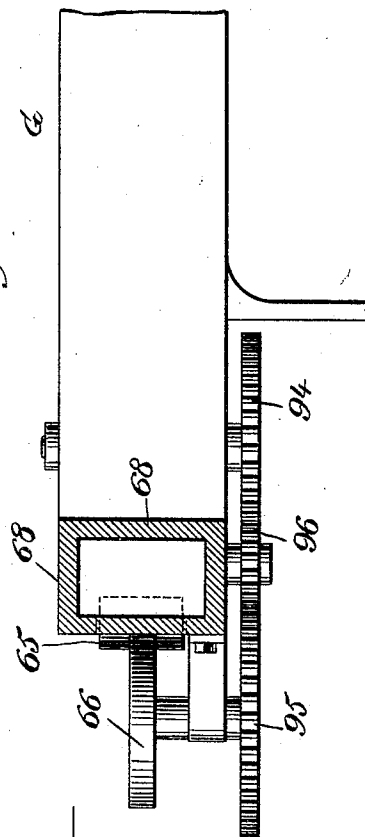
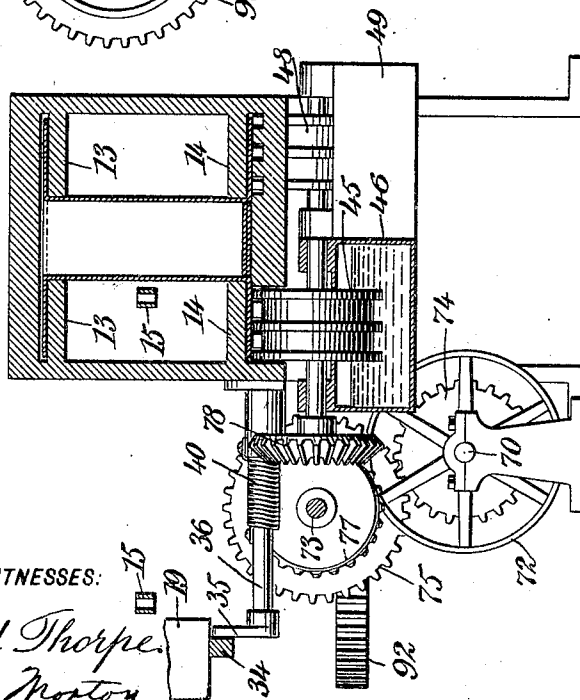


Fig. 3.



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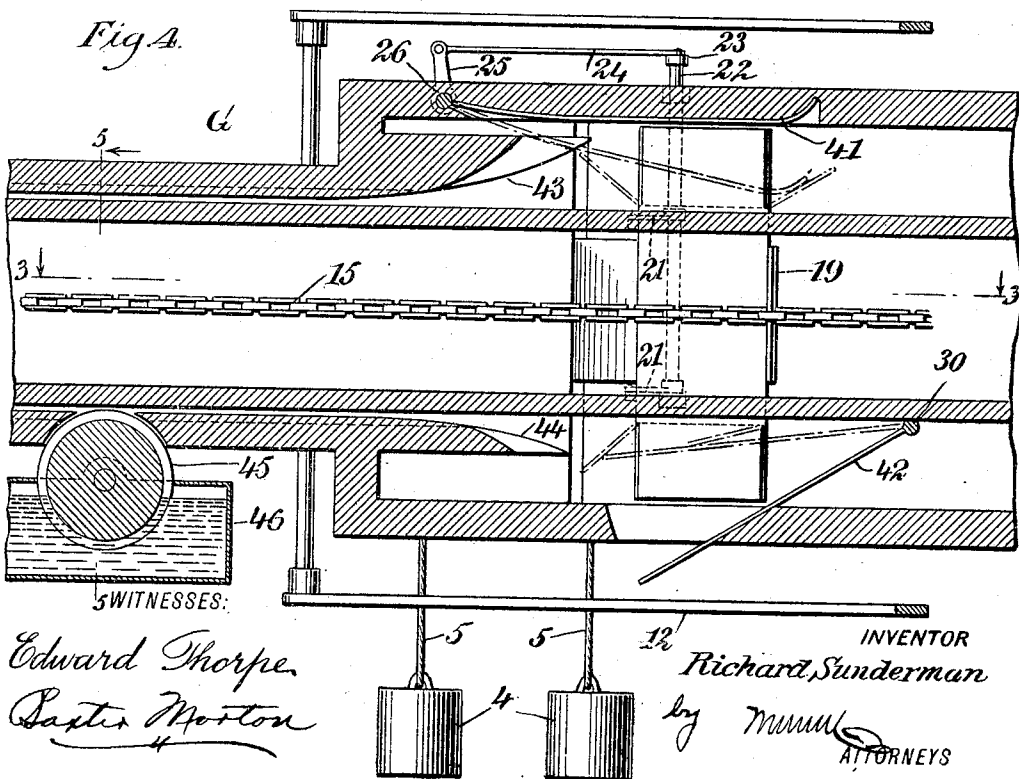
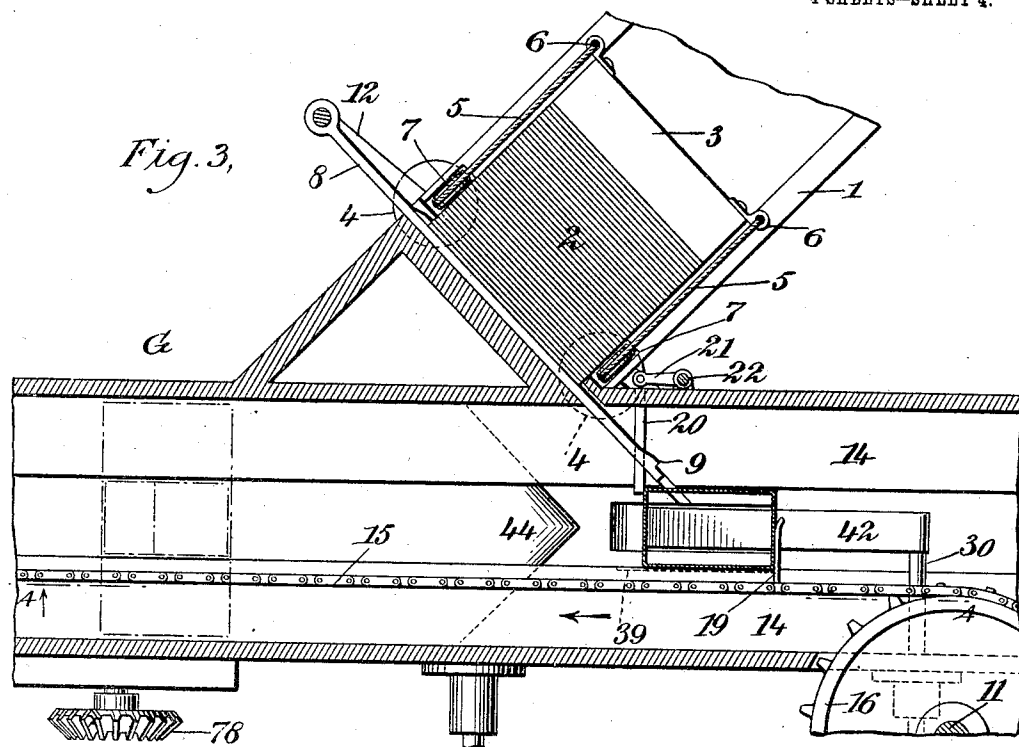
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4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

RICHARD SUNDERMAN, OF BUFFALO, NEW YORK.

CARTON MAKING AND SEALING MACHINE.

No. 807,140.

Specification of Letters Patent.

Patented Dec. 12, 1905.

Application filed June 25, 1904. Serial No. 214,159.

To all whom it may concern:

Be it known that I, RICHARD SUNDERMAN, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented a new and Improved Carton Making and Sealing Machine, of which the following is a full, clear, and exact description.

This invention relates to machines for making and sealing cartons, and has special reference to a machine provided with instrumentalities by which flattened carton shells or tubes may be expanded or opened, then formed into a carton by folding and securing flaps at the bottom of the shell or tube, and the cartons finally closed and sealed after they have been filled.

The principal object of the invention is to provide a simple, durable, and easily-controlled machine by which flattened carton-shells will be fed successively from a stock of such shells into the machine, expanded or opened to tubular form, formed into cartons by folding and securing the bottom flaps at the lower ends of each tube, and finally closed, sealed, and discharged from the machine.

A further object of the invention is to provide a machine adapted for the purposes above specified and having mechanism within the machine for carrying the cartons through the machine so constructed that each carton will be brought into position for filling with any material which it is desired to pack in the cartons and will be held stationary for a sufficient time to permit the manual filling thereof before the carton is carried on to the closing and sealing devices.

Still other objects of the invention are to cheapen the cost of machines of the type specified, to simplify the construction of such machines, and to provide a machine that may be operated at a relatively small expenditure of power.

A machine embodying the various features of the invention is hereinafter described in detail; but it is to be understood that various changes in the form, proportions, and in the mode of assemblage of the elements described may be made without departing from the spirit of the invention, and the actual scope of the invention is defined in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figures 1, 1^a, and 1^b form collectively a plan view of a machine constructed in accord with the present invention, part of the top of the machine being broken away to disclose the structures below. Figs. 2, 2^a, and 2^b form collectively a view in side elevation of the machine shown in Figs. 1, 1^a, and 1^b, parts being broken away to show the operation of the carton-closing devices. Fig. 3 is an enlarged sectional view on the line 3 3 of Fig. 4 of a portion of the structures shown in Fig. 1, disclosing the operation of the devices for expanding or opening the carton-shells. Fig. 4 is a longitudinal sectional view on the line 4 4 in Fig. 3, and Fig. 5 is a transverse sectional view on the line 5 5 of Fig. 4.

Referring to the drawings, G indicates a long tubular guideway extending throughout the length of the machine, as shown in Figs. 1, 1^a, and 1^b. At one side of the guideway G, near its forward end, there is a feed-chute 1 for the stock 2 of flattened carton-shells. The feed-chute 1 is disposed at an oblique angle to the guideway G, and a follower 3 is arranged for sliding movement in the chute 1 under the influence of weights 4, attached to cords 5, which are fastened to lugs 6 at opposite sides of the follower 3. The cords 5 pass over guide-pulleys 7 or other equivalent structures to give the proper direction of movement to the follower 3. At the inner end of the chute 1 a feed-slide 8 is arranged for reciprocatory movement transversely of the chute and is provided with a shoulder 9 of suitable size to engage with a single flattened carton shell or tube and force it into the guideway G when the slide is moved inward. The slide 8 is operated by cranks 10, mounted upon a shaft 11 at one side of the guideway G, and pitmen 12, connecting the cranks 10 with the slide. When a carton is forced into the guideway G by the feed-slide 8, it is immediately engaged by a conveyer or carrier, which propels the carton shell or tube forward through the guideway and causes it to be acted on by the various instrumentalities, which expand or open the carton shell or tube and form the bottom of the carton. This conveyer leaves the carton in position for filling. As shown in Figs. 3 and 4, the carton-shells are moved horizontally into the guideway G, and this guideway is, as shown in Fig. 5, of such structure that all lateral or vertical movement of the cartons therein is prevented and the cartons are caused to pass forward and brought into en-

gagement with the bottom-forming and carton-closing devices. The guideway G is preferably a box of rectangular cross-section, as shown in Fig. 5, and it is provided with inwardly-projecting shelves 13 adjacent to the top, and similar ledges 14 adjacent to the bottom. The narrow spaces left between the shelves 13 and the top of the guideway and between the ledges 14 and the bottom of the guideway afford passages for the side flaps of the carton, as clearly shown in Fig. 5. The preferred form of conveyer or carrier by which the cartons are moved forward through the guideway is an endless chain 15, running over sprockets 16 and 17, the former being mounted upon the shaft 11 at the forward end of the guideway and the latter being carried by a shaft 18 near the middle of the guideway. The endless chain 15 is provided at intervals with flights 19, and these flights are spaced at such intervals that one flight passes each sprocket upon each revolution thereof, and consequently a flight enters the guideway G for every reciprocation of the feed-slide 8.

The opening or expanding of the flattened carton-shell within the guideway G is effected by the coöperation with the flights of the conveyer of dogs 20, carried by arms 21, projecting from a vertical shaft 22 at one side of the guideway. The shaft 22 has an arm 23, which is connected by a link 24 with an arm 25, carried by a horizontally-disposed shaft 26, which extends across the top of the guideway. The shaft 26 is rocked by a link 27, connected at one end with an arm 28 on the shaft and connected at its other end with a bent lever 29 upon a horizontally-disposed shaft 30 at the bottom of the guideway. The lever 29 is connected by a link 31 with an arm 32 upon a spring-actuated shaft 33. The arm 32 also affords support for one end of a shoe 34, the other end of which is carried by a similar arm 35 upon a spring-actuated shaft 36. The shoe 34 has the rear end thereof beveled, as shown in Fig. 2, and it is disposed adjacent to the line of travel of the endless chain 15, the normal position of the shoe being indicated by dot-and-dash lines in Fig. 2. As the chain travels in the direction indicated by the arrows, the flights will be caused to engage successively with the beveled end of the shoe 34, and the shoe will be depressed thereby, owing to the simultaneous engagement of the flights with the oppositely-arranged guide plate or strip 37, which prevents the flights from being forced upward by the shoe. To insure the proper contact of the flights with the forward ends of the shoe 34 and to prevent sagging of the conveyer-chain, a guide plate or strip 38 is arranged beneath the conveyer-chain just behind the shoe 34. The length of the shoe 34 and its position are such that when the feed-slide 8 forces a carton shell or tube into the guideway the shoe will be depressed to

the position shown in Fig. 2, and the dogs 20 will be projected into the guideway and will be held in that position until one of the flights upon the conveyer-chain engages the carton-shell and forces it forward into contact with the dogs, the contact of the forward edge of the flattened shell being insured by small leaf-springs 39, arranged at the opposite side of the guideway. The dogs 20 engage the forward margin of the flattened shells just long enough to insure the expansion of the shells to the tubular form shown in Fig. 3, and when the shells assume that form the shoe 34 will be released by the passage of the flight over the forward end thereof and will be allowed to rise to its normal position under the influence of the springs 40 upon the shafts 33 and 36. The movement of the shoe will be accompanied by the retraction of the dogs 20, and the forward movement of the carton-shell being no longer prevented by the dogs the shell will advance in the guideway.

The shafts 26 and 30 above mentioned are provided, respectively, with a resilient flap-spreader 41 and a flap-folder 42. The flap-spreader 41 is bent to present a convex lower surface, while the flap-folder is normally straight. As the shafts 26 and 30 are rocked in opposite directions when the dogs 20 are retracted from the guideway the flap-spreader 41 will move downward into the position shown in dotted lines in Fig. 4 and the folder will move upward to the position indicated by dotted lines in the same figure. The flap-spreader 41 engages the front and rear flaps at the top of the carton-shell and spreads them apart, so that as the carton-shell moves forward in the guide the flaps will pass under the top of the guideway in the spread position. The flap-folder 42 folds the rear flap at the bottom of the carton-shell and holds it in folded position until the forward flap is folded over by contact with the bottom of the guideway and serves to hold the rear flap in folded position. The spreading of the front and rear flaps at the top of the carton-shell and the folding of the front and rear flaps at the bottom of the shell is facilitated by V-shaped projections 43 and 44 at the top and bottom, respectively, of the guideway G. These V-shaped projections present inclined and slightly-curved surfaces, which engage the front flaps at the top and bottom of the carton, and the diverging sides of the projections 43 and 44 also act upon the side flaps at the top and bottom of the carton-shell to spread them, so that they will pass easily into the spaces provided therefor between the top and bottom of the guideway and the adjacent shelves 13 and ledges 14. As each carton-shell advances in the guideway one of the side flaps receives a coating of paste or glue from a paste or gluing wheel 45, revolving in a receptacle 46 and projecting upward through an opening formed in the bottom of the guideway G at one side

thereof. Immediately after passage over the paste or gluing wheel 45 the side flap coated thereby is engaged by a fixed folder 47, provided in the bottom of the guideway and presenting a curved and inclined surface for engagement with the flap to fold the same upon the previously-folded end flaps at the bottom of the carton. After passing the folder 47 the carton-shell reaches a second gluing-wheel 48, revolving in a receptacle 49 and projecting upward through the bottom of the guideway. This wheel is so positioned that it applies a coat of paste or glue to the other side flap of the carton-shell while spread outward, as shown in Fig. 1. After passing the wheel 48 the shell reaches a stationary folder 50, by which the side flap coated by the wheel 48 is folded upon the other side flap and secured thereto. By the action of the wheels 45 and 48 and the folders 47 and 50 the formation of the bottom of the carton is completed, and the cartons are then advanced to the filling position indicated in Figs. 1^a and 2^a, in which position they are left by the conveyer-chain 15. To facilitate the filling of the carton, the top of the guideway G has an opening 51 formed therein, as shown in Fig. 2^a, and when the carton-shells are allowed to come to rest they are immediately beneath the opening 51, as shown, and remain in this position for a sufficient length of time for the filling to be accomplished by hand. If preferred, however, the filling may be accomplished by any suitable filling mechanism timed to operate properly in relation to the machine. As such filling mechanism forms no part of the present invention, the same is not described or illustrated in this application. After each carton has been filled it is carried forward along the guideway G by a conveyer or carrier arranged at the side opposite the conveyer already described and preferably similar in construction to the conveyer already described. In the form of the invention illustrated the secondary conveyer comprises an endless chain 52, traveling over sprockets 53 and 54, which are mounted upon vertical shafts 55 and 56, respectively. The chain 52 is provided with flights 57, so arranged that one flight passes each sprocket at each revolution thereof. The chain 52 is placed upon its supporting-sprockets in such relation to the chain 15 that after a carton is allowed to come to rest, when the flight upon the chain 15 passes out of engagement therewith, the carton will not be at once engaged by one of the flights 57 upon the chain 52; but instead a slight dwell in the movement of the carton is produced between the disengagement of the carton by one conveyer and its engagement by the other.

The closing of the carton after filling is accomplished as follows: The front flap at the top of the carton is folded by engagement with the top of the guideway G as the carton

moves forward, the natural elasticity of the top of the carton causing the flap to spring upward into the opening 51 sufficiently to be engaged by the top of the guideway as the carton is moved forward beyond the opening. Before the front flap of the carton is folded, however, the rear flap is folded by an arm 58, carried by the shaft 55 and moving slightly to the rear of each flight 57 upon the chain 52 as it passes around the sprocket 53. The arm 58 depresses the rear flap to the position shown in dotted lines in Fig. 2^a and holds it in this position until the carton has passed partly under the top of the carton beyond the opening 51 and the front flap is folded over upon the rear flap. After the front and rear flaps of the carton have been folded in the manner explained one of the side flaps is caused to pass under a gluing-wheel 59, supplied with glue or paste from a receptacle 60, and is then engaged by a stationary folder 61. The other side flap is then supplied with adhesive from a gluing-wheel 62, supplied from a receptacle 63, and this flap is then folded by a stationary folder 64, thus completing the closing and sealing of the carton. After the carton has been closed and sealed it passes on its way through the guideway G and is allowed to come to rest momentarily at the end thereof, as shown in Fig. 1^b. A moment after each carton reaches the end of the guideway G it is engaged by an arm 65, projecting radially from a horizontally-disposed wheel or disk 66 upon a shaft 67, and this arm 65 forces the carton into a discharge-chute 68. The cartons successively forced into the chute 68 by the revolving arm 65 fill the chute and are advanced therein step by step at the successive introductions of cartons thereinto. The chute may be of any desired length, and it is desirable that a sufficient length of time be required for the passage of a carton through the chute to insure the setting of the adhesive, by which the flaps at the top and bottom of the carton are secured.

In order to impart movement to the various instrumentalities entering into the construction of the machine, any suitable arrangement of shafts and gearing may be provided; but I have shown, by way of illustration, a simple arrangement of devices for this purpose. A main driving-shaft 70 is mounted in suitable bearings at one side of the machine and is provided with fast and loose pulleys 71 and 72. Motion is transmitted from the main shaft 70 to a counter-shaft 73 by intermeshing gears 74 and 75, and from the counter-shaft 73 motion is transmitted through beveled gearing to all of the gluing-wheels. Beveled pinions 76 and 77 on the counter-shaft 73 mesh with beveled pinions 78 and 79 directly connected with the gluing-wheels 45 and 48, respectively. The gluing-wheels 59 and 62 are connected with bevel-pinions 80 and 81, respectively, which are in mesh with pinions

82 and 83, mounted upon short vertical shafts 84 and 85, which bear at their lower ends pinions 86 and 87, which are in mesh with pinions 88 and 89, respectively, upon the counter-shaft 73. Power is transmitted from the main shaft 70 to the shaft 18, from which the conveyer-chain 15 is driven by means of intermeshing bevel-pinions 90 and 91. The conveyer-chain 52 is driven from the shaft 55, to which motion is imparted from the shaft 18 by intermeshing gears 92 and 93, and motion is imparted to the shaft 67, carrying the disk 66, by a train of gearing comprising a gear 94 on the shaft 56, a gear 95 on the shaft 67, and an intermediate gear 96.

From the foregoing description and the drawings illustrative thereof it will be observed that the carton-shells are fed successively into the machine in a flattened condition, are immediately expanded into tubular form, and are then carried through the machine in a substantially straight course. In their passage through the machine the successive operations of forming the bottom of the carton and closing and sealing the carton are performed without arresting the movement of the carton at all, and the only pause in the travel of the carton through the machine takes place between the formation of the bottom and the closing of the carton, this pause being provided to permit the filling of the carton with the material to be packed therein. It will also be noticed that while a dwell in the movement of the carton is provided to permit the filling thereof the devices for carrying the carton through the machine are continuously operated, and all the disadvantages inherent in intermittently-operating carriers or conveyers are overcome. It will also be observed that the construction of the machine is such that the operations of the various elements may be positively timed to occur in proper relation, so insuring the satisfactory performance by the machine of every part of its work.

The construction of the machine as a whole is characterized by unusual simplicity, and the parts are of such character and are so assembled that any derangement of the machine from use is comparatively infrequent, and when any portion of the machine becomes inoperative from any reason it may be readily removed and replaced.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with means for expanding flattened carton shells or tubes, means for forming bottoms for said shells or tubes, and means for sealing the cartons, of devices for transporting the cartons without pause during the operation of said expanding bottom-forming and closing means, but permitting the cartons to come to rest and remain stationary for a time between the operation of the bottom-forming means and the closing means.

2. The combination in a machine, of means

for expanding flattened carton-shells having foldable flaps at the ends, means for folding and securing the bottom flaps to form a carton, means for folding and securing the top flaps to close the carton, and means for transporting the shells or tubes through the machine, said transporting means being adapted to produce a dwell in the movement of the cartons between the operations of the bottom-forming devices and the operation of the carton-closing devices.

3. The combination with conveying means, of means for intermittently feeding carton shells or tubes to said conveying means, movable stops adjacent to said conveying means and coöperating therewith after the feeding of each carton shell or tube to expand the same, and means for retracting said stops after the expansion of each shell or tube.

4. The combination with the continuously-traveling conveying means, of means for intermittently feeding flattened carton shells or tubes thereto, movable dogs adapted to be projected into the path of shells or tubes carried by said conveying means to coöperate with said conveying means in expanding the shells or tubes, and means for alternately projecting and retracting said dogs.

5. The combination with a guideway and a conveyer traveling therein, of a feed-chute disposed obliquely to the guideway, a plunger moving transversely of the feed-chute and entering said guideway, and devices provided in the guideway to coöperate with the conveyer to expand flattened carton-shells when introduced into the guideway by said plunger.

6. The combination of means for conveying carton-shells having foldable flaps at the top and bottom thereof, and simultaneously-operated devices for folding flaps at one end of the shell and for spreading flaps at the other end of the shell.

7. The combination with means for conveying carton-shells having foldable flaps at the ends thereof, of simultaneously-operative spring-actuated devices for folding a flap at one end of the shell and for spreading flaps at the other end of the shell.

8. The combination with means for conveying carton-shells having foldable flaps at the ends thereof, of a pivoted resilient flap-spreader adjacent to said conveying means, and means operative upon the passage of a carton-shell to bring said flap-spreader into engagement with the flaps at the adjacent end of the carton-shell.

9. The combination with a conveyer for carton-shells, of a flap-spreader at one side of said conveyer and a flap-folder at the opposite side of the conveyer, and means operative upon the passage of a carton-shell for simultaneously operating said flap-folder and flap-spreader.

10. The combination with means for con-

veying carton-shells having foldable flaps, of a flap-folder adjacent to the conveyer, a spring-supported shoe adjacent to the conveyer and adapted for intermittent engagement by the conveyer, and connections between said shoe and said folder to impart movement to the latter.

11. The combination with a conveyer for carton-shells having foldable flaps, of a flap-spreader upon one side of said conveyer, a flap-folder upon the other side of said conveyer, connections between said folder and spreader to produce simultaneous movement thereof, springs for imparting movement to said folder and spreader, and mechanism intermittently operated by said conveyer to throw said folder and spreader into operative position.

12. The combination with a guideway for carton-shells, of a primary conveyer traveling in the forward portion of said guideway, and a secondary conveyer traveling in the rear portion of said guideway, said secondary conveyer being adapted to engage a carton-shell after having been allowed to come to rest after the primary conveyer has passed out of engagement therewith.

13. The combination of a guideway for cartons provided with an opening in the top, means in said guideway for bringing a carton-shell into position beneath said opening, and means in the guideway beyond the opening for removing the carton-shell from beneath the opening.

14. The combination with a guideway for cartons having an opening in the top thereof, of a primary conveyer at one side of said guideway extending to said opening, and a secondary conveyer at the opposite side of the guideway extending from and beyond said opening.

15. The combination with a guideway for cartons, of means for conveying cartons through the guideway, a discharge-chute projecting laterally from said guideway, and means for intermittently transferring cartons from said guideway to said discharge-chute.

16. The combination of means for feeding flattened carton shells or tubes provided with foldable flaps at the ends thereof, mechanism for compressing said shells or tubes edgewise, to reduce them to tubular form, and means for folding and securing said flaps to form bottoms for the cartons.

17. The combination of means for feeding flattened carton shells or tubes having foldable flaps at the ends thereof, mechanism for compressing said shells edgewise so as to reduce them to tubular form, and devices for forming bottoms for said cartons by folding and pasting together the flaps at the lower ends of the shells or tubes.

18. The combination of means for feeding flattened carton shells or tubes, means for compressing said shells edgewise so as to reduce them to tubular form, bottom-forming mechanism

for the cartons, sealing mechanism for the cartons, and carrying mechanism for passing the cartons from said bottom-forming mechanism to said sealing mechanism.

19. The combination of means for feeding flattened carton shells or tubes, means for expanding said shells or tubes, bottom-forming devices, means for carrying said shells or tubes to said bottom-forming devices, means for sealing the cartons, carrying mechanism for passing the cartons to the sealing devices, and means for causing said cartons to pause at a point intermediate of said bottom-forming devices and said sealing devices.

20. The combination with conveying means, of means for feeding flattened carton shells or tubes to said conveying means, and means cooperating with said conveying means to compress said shells or tubes edgewise, so as to reduce the same to cylindrical form.

21. The combination with conveying means, of means for feeding flattened carton shells or tubes to said conveying means, and means cooperating with said conveying means to compress said cartons edgewise so as to expand the same into tubular form.

22. The combination with conveying means, of means for intermittently feeding flattened shells or tubes thereto, and means cooperating with said conveying means after the feeding of each flattened shell, to compress the same edgewise and thus expand the shell or tube into cylindrical form.

23. The combination with a conveyer, of a feed-chute disposed obliquely to the line of travel of the conveyer, means at the end of the feed-chute for intermittently feeding flattened carton shells or tubes from the feed-chute to the conveyer, and means cooperating with the conveyer to compress said shells or tubes edgewise, so as to reduce the same to tubular form.

24. The combination with a guideway for carton-shells and a conveyer traveling therein, of devices for intermittently feeding carton-shells to the conveyer, a movable dog adapted to be projected into the guideway, means for projecting said dog into the guideway and holding said dog in projected position engaged for a time, and means adjacent to the conveyer, for compressing said carton-shells edgewise against said dog, so as to cause said carton-shells to spring into tubular form.

25. The combination with a guideway for carton-shells and a conveyer movable therein, of means for feeding carton-shells obliquely to said conveyer, movable dogs adjacent to the conveyer, means for projecting said dogs into said guideway and retracting them therefrom, and springs, coacting with said dogs, for compressing said carton-shells edgewise, thus causing them to spring into tubular form.

26. The combination with a guideway for carton-shells, which is normally unobstructed, and a conveyer traveling in said guideway, of

movable dogs oppositely arranged in the conveyor, means for intermittently projecting said dogs into the guideway, and means contacting with said dogs, for compressing said
5 shells edgewise, thereby causing the same to spring into tubular form.

In testimony whereof I have signed my name

to this specification in the presence of two subscribing witnesses.

RICHARD SUNDERMAN.

Witnesses:

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M. P. BREEN.