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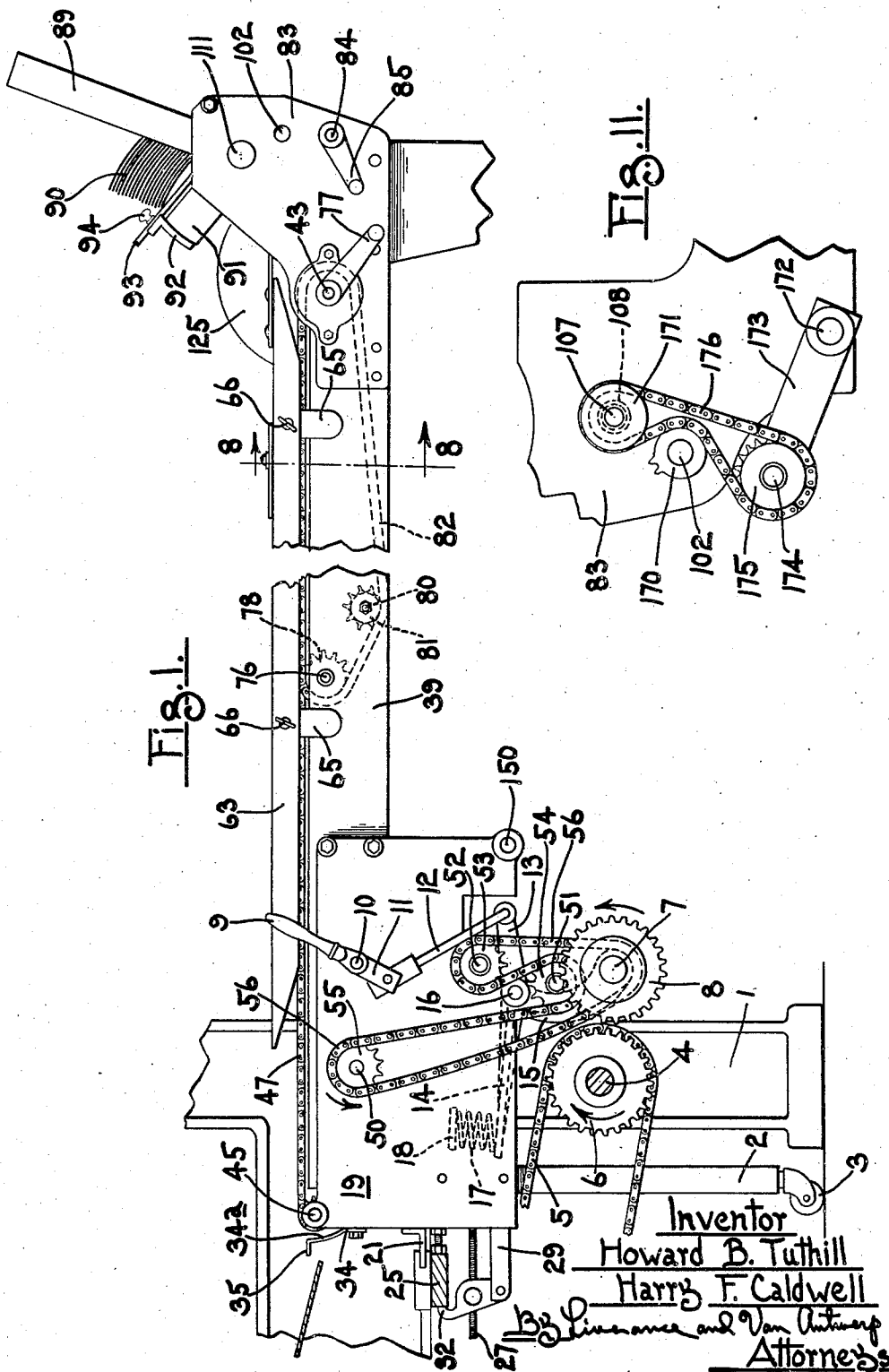
H. B. TUTHILL ET AL

2,239,945

FEEDING AND FOLDING MECHANISM FOR WRAPPING MACHINES

Filed April 26, 1939

6 Sheets-Sheet 1



April 29, 1941.

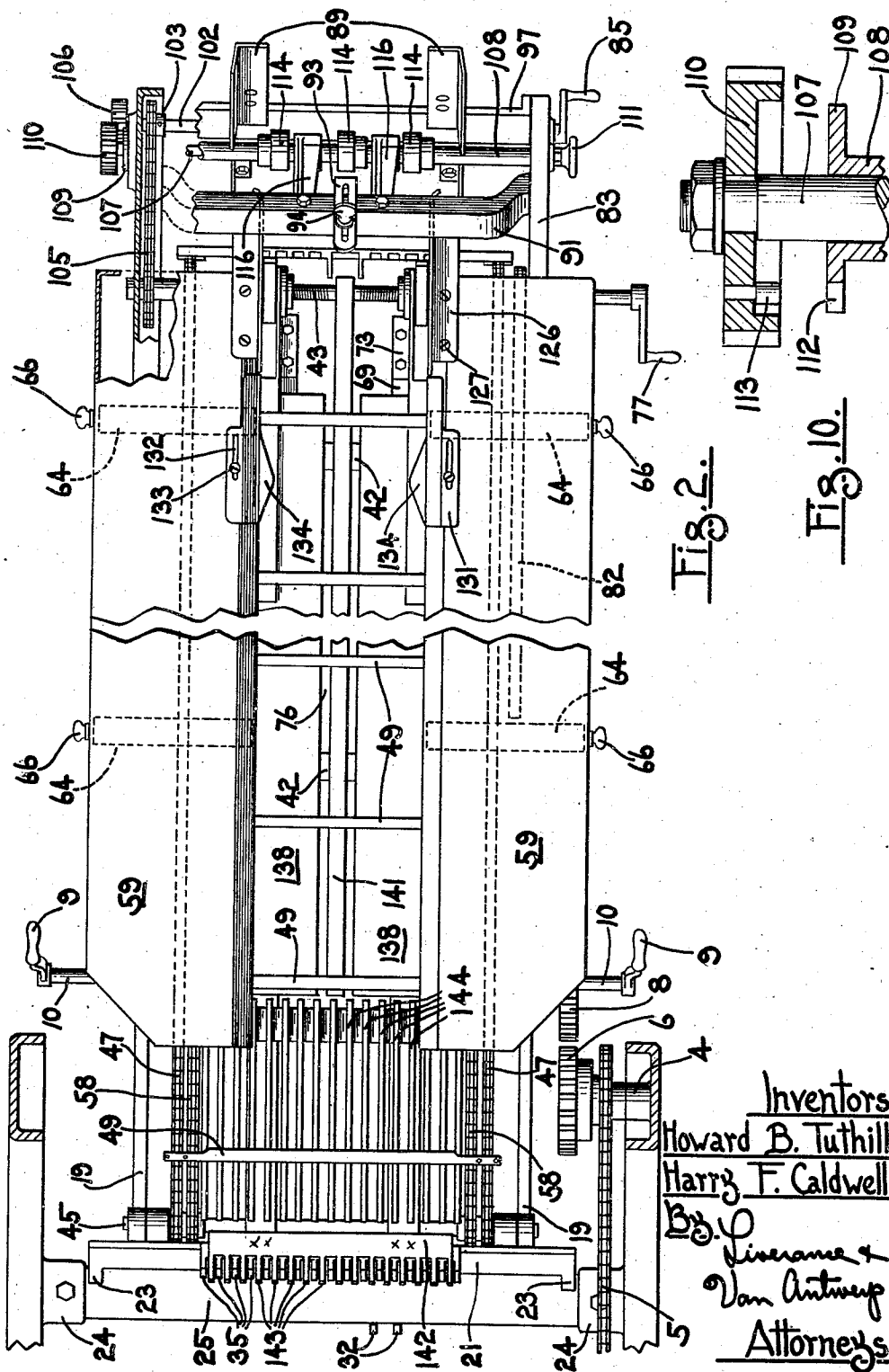
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6 Sheets-Sheet 2



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6 Sheets-Sheet 3



April 29, 1941.

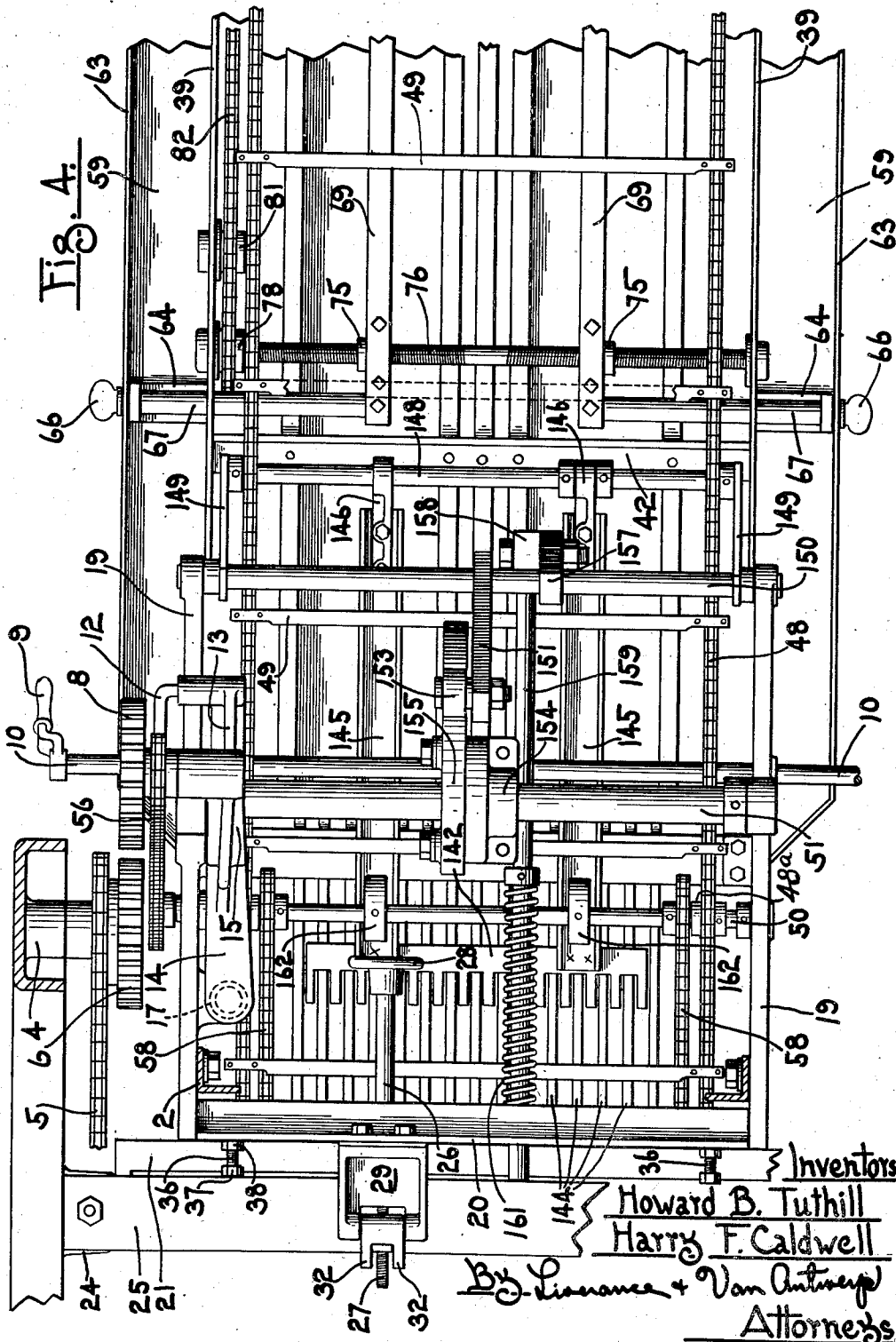
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Filed April 26, 1939

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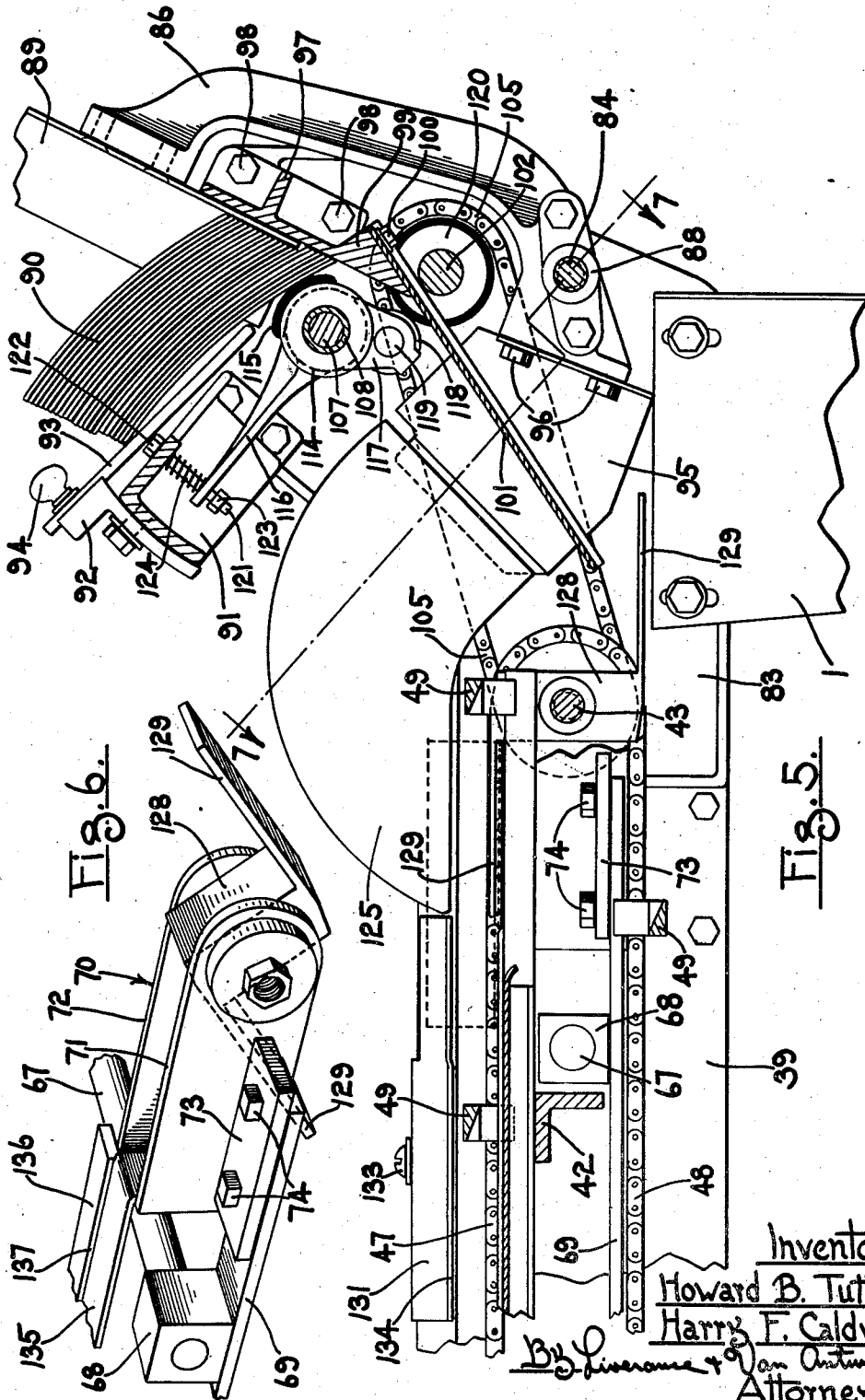
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Filed April 26, 1939

6 Sheets-Sheet 5



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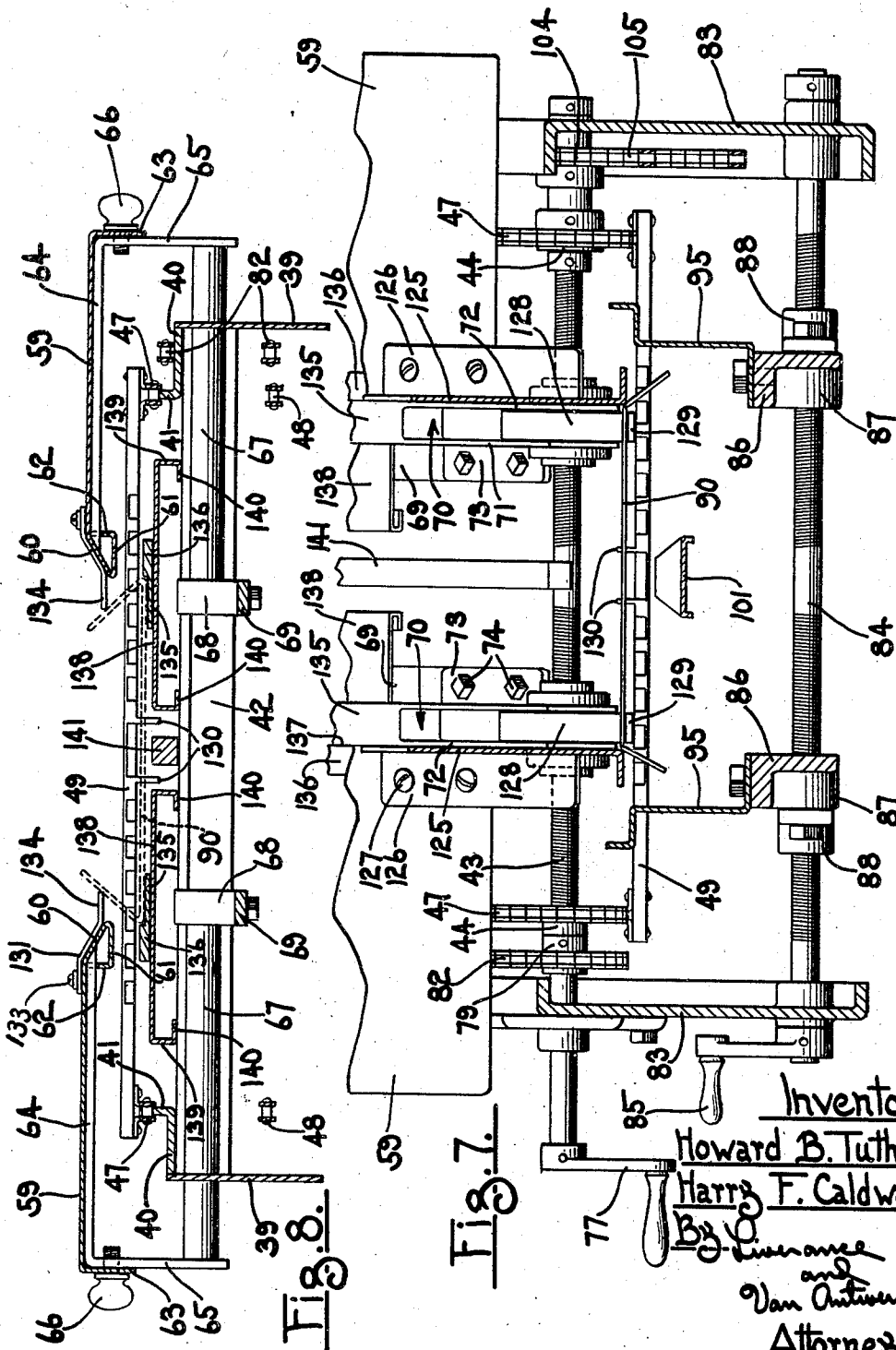
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FEEDING AND FOLDING MECHANISM FOR WRAPPING MACHINES

Filed April 26, 1939

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,239,945

FEEDING AND FOLDING MECHANISM FOR WRAPPING MACHINES

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Application April 26, 1939, Serial No. 270,066

15 Claims. (Cl. 93—1)

This invention relates generally to feeding and folding mechanism and is particularly adapted for feeding and folding inwardly the ends of pasteboard blanks, which have previously been scored, to form what is commonly known as U boxes.

These U boxes are adapted to be filled between the upturned ends thereof with articles of any desired shape or contour. The boxes are then wrapped and placed on sale. The economical feature of these boxes will be immediately apparent upon considering the fact that the sides and covers are omitted, and they are ordinarily wrapped with a transparent material such as Cellophane so as to be enable the prospective purchaser to view the contents thereof.

Heretofore, these U boxes have been formed by hand before filling and wrapping, but my invention is chiefly directed to a mechanism whereby these boxes may be formed automatically. It is to be understood that these boxes are adapted to receive any type of article, but they are commonly used in the baking industry for containing articles such as cakes, cookies, buns and sweet rolls. Since articles of this nature are usually round or at least have curved corners, they are difficult to wrap unless some means of stiffening is provided at the ends thereof so that the article, in its final wrapped condition, will be similar to a box having square corners.

It will be obvious that round cookies or round cakes, or even such cakes that have been cut in half, would be most difficult to wrap unless stiffening means were provided at each end, and this is precisely the object of the U box, namely, the upturned ends thereof are adapted to lie against the cake or cookies and is wrapped in that condition. When the article is enclosed within the ends of a U box it adapts itself admirably to being wrapped automatically by any of the well-known wrapping machines in use at the present time.

Specifically our invention is also directed to mechanism for feeding only flat pieces of cardboard which do not have the ends thereof turned upwardly. When substantially square cakes or cookies are to be wrapped, it is not always necessary that reinforcing means at each end be provided and in this case the cardboards are fed in the usual manner and conveyed to the wrapping machine except that the ends thereof are not folded upwardly.

The folding machine of the present invention may be either made integrally with a wrapping machine of the character such as shown in our

previously filed application filed December 21, 1938 and bearing Serial No. 247,063, or may be made as a separate unit adapted to be connected to a wrapping machine and operated in conjunction therewith in the manner shown by our copending application filed June 15th, 1938 bearing Serial No. 213,806. The operation of the folding machine itself will be the same whether it is integral with or a separate unit from the wrapping machine.

It is the principal object of our invention to provide means for feeding a single pasteboard blank to a mechanism designed to fold the ends thereof inwardly.

Another object of the invention is to provide a magazine or rack to hold a plurality of pasteboard blanks from which the blanks are delivered intermittently to the folding mechanism.

A further object of the invention is to provide adjacent the folding mechanism a conveyor onto which the U boxes are delivered where they may be filled with the desired articles and from which they are delivered to the wrapping machine.

Still another object is to provide near the end of the conveyor on the folding machine nearest the wrapping machine certain means which will remove the box from the conveyor and deposit same in the wrapping machine independent of the conveyor means.

A still further object is to provide means which will actuate the aforementioned independent means at a speed greater than the speed of the conveyor.

Other objects of the invention will appear more fully as the description proceeds.

To the accomplishment of the foregoing and related ends said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and following description set forth in detail certain means for carrying out our invention, said means constituting, however, but one of various ways in which the principle of the invention may be employed.

In said annexed drawings, wherein like reference numerals refer to like parts throughout the various views:

Fig. 1 is a broken side elevational view of the folding machine.

Fig. 2 is a top plan view of the machine as shown in Fig. 1.

Fig. 3 is a fragmentary enlarged vertical section taken longitudinally through the machine showing particularly the means which actuate

the bar which deposits the box onto the wrapping machine.

Fig. 4 is a fragmentary under plan view of the machine.

Fig. 5 is an enlarged fragmentary sectional view taken on a longitudinal vertical plane through one end thereof showing particularly the means used in delivering a single pasteboard blank to the folding mechanism and the folding mechanism itself.

Fig. 6 is a fragmentary perspective view of the fingers and parts associated therewith which carry a blank through the folding elements and onto the conveyor.

Fig. 7 is a sectional view taken substantially on the plane of line 7-7 of Fig. 5.

Fig. 8 is a vertical section taken substantially on the plane of line 8-8 in Fig. 1.

Fig. 9 is a perspective view of the resulting U box having an article therein ready to be wrapped.

Fig. 10 is an enlarged horizontal sectional view of the means for disengaging the feeding mechanism and,

Fig. 11 is an elevational view showing a portion of one side of the machine wherein there is a modification of the means for intermittently feeding the pasteboard cards.

Referring now more particularly to the drawings and more especially to Fig. 1, the machine is supported by legs 1 at the front end and the legs 2 at the rear end. The particular device illustrated is adapted for use as a separable unit from the wrapping machine, but it is to be understood that the same mechanism embodied in the present machine can be built integral with a wrapping machine without in any way departing from the spirit of the invention. In this particular embodiment of the invention, the front and rear legs are provided with castors 3 to enable the unit to be easily separated and moved away from the wrapping machine.

The manner in which the operation of the folding machine is made to coincide with that of the wrapping machine is quite similar in most respects to the driving means between the slicing and wrapping machines of our previously referred to application Serial No. 213,806 and consists generally in a stub drive shaft 4 provided with a sprocket wheel. A chain 5 passes around said sprocket wheel and is driven from any desired source such as an electric motor. Also secured to the shaft 4 and driven thereby is a gear 6. The shaft 4 together with the sprocket wheel and the gear 6 are all mounted at one end of the wrapping machine. The folding machine near one end thereof is provided with a stub shaft 7 which has secured thereto the gear 8 adapted to mesh with the gear 6 on the wrapping machine.

The stub shaft 7 is adapted to be moved in such a manner as to engage or disengage the gears 6 and 8. This is accomplished by means of the levers 9, one at each side of the machine, which are connected at their lower ends to the shaft 10. Then at one side of the machine a short arm 11 extends downwardly from the shaft 10 and is pivotally secured at its lower end to a second arm 12. Another member having an arm 13, a second arm 14 and a third arm 15 is pivotally mounted as at 16. The outer end of the arm 13 is pivotally secured to the lower end of the arm 12; the arm 15 is curved as shown in Fig. 1 and has its lower end mounted on the shaft 7, while the arm 14 extends rearwardly in substantial alinement with the arm 13 and is

connected to a compression spring 17. The other end of the compression spring is secured to a member 18 extending inwardly from one side of the machine. The position of the member provided with the arms 13, 14 and 15 determines whether or not the gears 6 and 8 are in mesh; the action of the spring 17 tending to rotate the three arms in a counter-clockwise direction, will maintain the two gears out of mesh, but when the lever 9 is moved toward the left as viewed in Fig. 1, the arm 12 and arm 13 to which it is connected, will be moved downwardly thus causing the arm 15 to rotate in a counter-clockwise direction against the force of the spring 17 on the arm 14 to thereby engage the gears 6 and 8 for operation of the folding machine.

The rear portion of the machine is provided with side plates 19 at each side thereof between which at their rear ends is secured a plate or casting 20 having a cross-section of the general configuration shown in Fig. 3. Across the plate 20 in substantially a horizontal plane is positioned an angle 21 secured to the plate by means of the bolts 22 or any other desired means. Each end of the angle 21 is provided with an ear 23. On the wrapping machine at each side thereof are inwardly extending members 24 which cooperate with the ears 23 on the angle 21 to guide the folding machine when it is being moved to operative position. That is, the ears 23 are situated a distance apart slightly less than the distance between the members 24 and the ears are moved into place between the members 24 to prevent any side motion of the machine and to hold it in operative alinement with the wrapping machine.

The wrapping machine is also provided with a bar 25 which extends the entire distance across the machine and is secured at each end to the members 24. The plate 20 is provided with an elongated rod having an enlarged portion 26 and a smaller portion 27 which is threaded. There is an opening in the plate 20 to admit the smaller threaded portion of the rod and the shoulder between the larger and smaller portions 26 and 27 is adapted to abut against the inner side of the plate 20. The outer end of the portion 26 is provided with a handle or knob 28 in order to more easily operate said rod for the purpose intended. The lower edge of the plate 20 is provided with a bracket 29 having a rod 30 extending between the outer ends thereof on which is pivotally mounted a member 31. Said member 31 is provided at its outer end with two hooks 32 between which extends a rod 33 provided with a screw threaded opening in the center thereof adapted to receive the threaded portion of the rod 27. Viewing the mechanism as shown in Fig. 3, it will be evident that a rotation of the knob 28 will cause the hooks 32 to be moved either toward the left or the right, depending upon the direction of rotation. These hooks are so located with respect to the bar 25 that when the two machines are in operative relation the hooks 32 abut tightly against an edge of the bar 25 to hold the folding machine securely in place.

A horizontal bar 34 having a plurality of fingers 34a provided with horizontal portions 35 at the upper end thereof is secured to the upper portion of the plate 20. Said horizontal portions are adapted to extend and bridge the gap between the end of the conveyor on the folding machine and the conveyor on the wrapping machine to provide a support for the U boxes in their transfer from one machine to the other. It is some-

times necessary to vary the distance between the two machines depending upon the size of the boxes and for this purpose a plurality of nuts 36 provided with heads 37 are screwed into screw-threaded openings in the plate 20. Nuts 38 on the bolts 36 may be adjusted to vary the distance between the heads 37 and the plate 20. When the two machines are in operative relation the heads 37 will abut against an edge of the bar 25 opposite to that which is in contact with the hooks 32. Obviously, therefore, the distance that the heads 37 are from the plate 20 determines the distance between the two machines in their operative relation and will also determine the position of the fingers 34 with respect to the two machines. The nuts 38, then, are utilized to adjust the position of the fingers 34a.

At each side of the machine and positioned vertically is a siding plate 39 extending substantially the full length thereof and is secured to the inner side of each side plate 19. Extending in a horizontal plane from the upper edge of each side plate 39 is a horizontal member 40 which may either be integral with or rigidly secured to said side plate such as by welding. The horizontal members 40 each at its inner edge has an upturned portion 41. A plurality of angles such as at 42 extending across the machine between the side plates have their upper horizontal portions secured to the under side of the members 40, thus making a more rigid structure.

A shaft 43 extends at the front end of the machine between the two side portions 39 and is screw-threaded in opposite directions for a considerable distance each side of its center for purposes of adjusting certain parts of the machine which will be more fully described hereinafter. Near each end of the shaft 43 are loosely mounted sprocket wheels having bearings 44. Also at the rear end of the machine toward the wrapping machine and extending between the side plates 19 is a shaft 45 at each end of which is a sprocket wheel 46. A chain at each side of the machine having an upper run 47 and a lower run 48 extends the full length of the folding machine and passes around the sprockets on the two shafts 43 and 45. A plurality of spaced apart cross-flights 49 extend between the two chains and are secured at each end thereto and in order to insure the upper run of the chains extending in a horizontal direction, each of said upper runs is adapted to ride on the upturned portions 41 of the members 40.

Also extending between the side plates 19 is a shaft 50 which has sprocket wheels 49a near each end thereof (one of which is shown in Fig. 4) freely riding thereon and adapted to contact the lower run 48 of the chains. Below the shaft 50 but above the stub shaft 7 and extending across the machine between downwardly extending portions of the side members 19 is located a shaft 51. Above this shaft is a short stub shaft 52 which has thereon a sprocket wheel 53. Secured to the outer end of shaft 51 and rotatable therewith is a sprocket wheel 54. Still another sprocket wheel is secured to the stub shaft 7 and is adapted to rotate with the gear 8 when it is in mesh with the gear 6, and another sprocket wheel 55 is secured to the outer end of the shaft 50. All of the sprocket wheels 53, 54 and 55, together with the one just mentioned secured to the outer end of the stub shaft 7, are in substantially the same vertical plane and have in contact therewith and passing therearound in the manner shown in Fig. 1 an endless chain 56. Also

on the shaft 50 and secured thereto one at each side of the machine are sprocket wheels 57 which have endless chains 58 therearound extending to and in contact with similar wheels on the shaft 45, which, when rotated, will also rotate the shaft 45 together with the sprocket wheels 46 thereon.

It will be evident that when the gears 6 and 8 are in mesh and the gear 6 rotates in a clockwise direction (Fig. 1) the gear 8 and shaft 7 with the sprocket wheel thereon in contact with the chain 56 will be rotated in a counter-clockwise direction. This direction of rotation of the shaft 7 and the chain 56 will cause a clockwise rotation of the shaft 51 together with the sprocket wheel 54 thereon and a counter-clockwise rotation of the shaft 50 and the sprocket wheel 55. This, in turn, will also cause a counter-clockwise rotation of the sprocket wheels 57 and, through the chains 58 will cause a similar rotation in the shaft 45. A counter-clockwise rotation of the shaft 45 together with the sprocket wheels 46 thereon will cause the upper runs 47 of the chains which extend the length of the machine, together with the cross-flights 49 therebetween, to move toward the left as viewed in Fig. 1.

Also extending substantially the full length of the machine and on each side thereof are the horizontally positioned plates 59 (Fig. 2), the inner edges of which extend downwardly at an angle as at 60 (Fig. 8). The edges are then return bent horizontally as at 61 and then again upwardly as at 62. The outer longitudinal sides thereof extend downwardly as at 63. These members 59 not only serve as surfaces on which the operator of the machine may work but their inner edges also provide guides for the ends of the U boxes as they are moved along the conveyor by the cross-flights 49.

A plurality of narrow angles on each side of the machine and spaced apart throughout the length thereof are provided which have horizontal inwardly extending arms 64 and downwardly or vertically extending arms 65. Openings are provided in the upturned portions 62 of the plates 59 to receive the inner ends of the horizontal portions 64 of said angles, while the vertical portions 65 have screw-threaded holes therein in alignment with similar screw-threaded holes in the downwardly extending portions 63 of the plate 59 adapted to receive a wing nut 66 whereby the plates and the angles are secured together. Extending inwardly from the lower ends of each the portions 65 are rods 67 which have blocks 68 secured thereto at their inner ends. To the under side of the blocks 68 are secured elongated members 69 which extend forwardly to the front end of the machine where there is located a U-shaped bracket indicated generally at 70 and which is provided with inner and outer sides 71 and 72 respectively. The forward ends of the sides 71 and 72 are secured to the screw-threaded shaft 43, and the inner side 71 is provided with an extension 73 which is secured to the forward end of the member 69 by means of the screws 74. The rear of the members 69, adjacent the point where they are secured to the blocks 68 on the rods 67, are also secured to the bearing members 75 through which passes the rearmost shaft 76 which is also screw-threaded in opposite directions for a distance each side of its center similar to the screw-threaded shaft 43. The shaft 76 also extends across the machine and has its ends mounted in bearings on the side members 39.

Obviously, since it is desired to have the dis-

tance between the plates 59 accommodate various size boxes, it is important that they be adjustable. Said side plates 59 are connected indirectly through the angle members 64, the rods 67 and the elongated members 59 to the front and rear screw-threaded shafts 43 and 76 respectively. The outer end of the screw-threaded shaft 43 is provided with a crank member 77 secured thereto so that the screw-threaded shaft 43 may be manually rotated. To avoid the possibility of one end of the guide plates 59 being closer together than at the other end, it is advisable that both of the shafts 43 and 76 be rotated simultaneously at the same speed, and to accomplish this the shaft 76 is provided at one end thereof with a sprocket wheel 78 in alignment with a similar sprocket wheel 79 (Fig. 7) on the end of the shaft 43. A stub shaft 80 supports an idler sprocket wheel 81 and around the three sprocket wheels 78, 79, and 81 a chain 82 is passed (Fig. 1) so that when the shaft 43 is rotated manually by means of the crank handle 77, the chain 82 will cause a similar rotation of the shaft 76, and since the elongated members 69 are connected at both ends to these shafts, the guide plates 59 will be moved simultaneously either toward or away from each other depending upon the direction of rotation of the shafts.

At the front end of the machine two plates or castings 83 of the configuration shown in Fig. 1 are secured, one at each side, to the side plates 39, and between the plates 83 is located the rack which holds a plurality of pasteboard blanks, together with the mechanism which feeds said blanks intermittently to the conveyor and folds the ends thereof inwardly to form the U box. A shaft 84 extends across the front of the machine which is screw-threaded in opposite directions for a distance on each side of the center thereof, and secured to the outer end of the shaft is a handle or crank member 85 which is used to manually rotate the shaft 84. Brackets 86 are provided, one at each side of the machine, having a configuration substantially as shown in Fig. 5 and which have bearings 87 at their lower ends surrounding the shaft 84 (Fig. 7). Each of the bearings is provided with a screw-threaded member 88 integral therewith adapted to receive the threaded portion of the rod or shaft 84. The upper portion of the brackets 86 are provided with flat faces normally set at an angle to the vertical and the supporting angle members 89 are adapted to be secured thereto. The stack of pasteboard blanks 90 is adapted to be placed between the angle members 89 and, to accommodate various size blanks it is necessary that the angle members 89 be adjustable. Furthermore, some of the blanks, although they may be longer than others, may be adapted for boxes having a greater depth than others in which case the guide members 59 and parts associated therewith would need no adjustment to accommodate different size blanks. For this reason the shaft 84 is adapted to be rotated independently of the other two similar shafts 43 and 76. Obviously, a rotation of the shaft 84 by means of the handle 85 will cause the brackets 86 together with the supporting angles 89 secured thereto to move either toward or away from each other depending upon the direction of rotation of said shaft, and this adjustment is made independently of the longitudinal side guides above the conveyor.

As an illustration of the above, consider a U box which is to be ten inches long having a depth

of one inch, the over all length of the pasteboard blank would then be twelve inches. This would mean that the supporting angles 89 would be positioned approximately twelve inches apart whereas the longitudinal guides extending the length of the machine above the conveyor would be located only ten inches apart. Also, if a U box is to be made having a length of ten inches but a depth of two inches, the over all length of the pasteboard blank would then be fourteen inches. The distance between the longitudinal guides above the conveyor would remain the same to accommodate this size box, but it would be necessary to adjust the supporting angles 89 so that the distance between them would be fourteen inches. Thus is demonstrated the necessity for having the adjusting means for the supporting angles 89 separate and independent from the adjusting means for the guide plates 59 and parts associated therewith.

Rearwardly of the angles 89, in a direction toward the wrapping machine, a casting 91 is provided which extends across the machine and is secured at each end to the cast plate 83. In substantially the center of the casting 91 and to the upper side thereof is secured a member 92 (Fig. 5) which is grooved and is adapted to receive a slotted member 93 adapted to be secured to the member 92 by means of the wing nut 94. The slot in the member 93 enables it to be adjusted either toward or away from the angle members 89. The member 93 aids in supporting the stack of pasteboard blanks 90 as shown in Fig. 5 and is made adjustable to accommodate blanks of different stiffness which are being fed to the folding machine.

Each of the brackets 86 at its lower end is curved inwardly, as shown in Fig. 5, and terminates in a flat portion adapted to have secured thereto the side guide plates 95 by means of the bolts 96. The side guides 95 maintain each of the pasteboard blanks in alignment with the conveyor as they are fed downwardly intermittently from the supporting angles 89, and being secured to the same member as the supporting angles and spaced apart the same distance they will also be adjusted simultaneously with said supporting angles 89.

Between the supporting angles 89 and the bracket 86, and extending across the front of the machine is an elongated cast bar 97 which is secured at each end by means of the bolts 98 to the side plates 83. The lower end of the bar 97 is provided with a flat surface on an enlarged portion 99 (Fig. 5) to which is secured by means of the bolt 100 the strip or plate 101. This plate is located substantially midway between the ends of the bar 97 and serves as a support for each pasteboard blank as it is fed downwardly from the supporting angles 89 and before it is picked up and fed to the conveyor.

The specific means which we have chosen to intermittently feed a single blank from the rack to the supporting strip 101 consists of a shaft 102 which extends across the front of the machine and is mounted in bearings at each side thereof in the side plates 83. Near one end of the shaft 102 a sprocket wheel 103 is secured thereto and is adapted to rotate with a similar sprocket wheel 104 in the same vertical plane therewith near one end of the shaft 43. The previously described sprocket wheel 44 is integral with or secured to the sprocket wheel 104 and rotates continuously therewith. The sprocket chain 105 extends around the sprocket wheel 103

on the shaft 102 and the wheel 104 on the shaft 43 thereby causing a continuous rotation in a counter-clockwise direction of the shaft 102.

At the outside of the machine and secured to the end of the shaft 102 is a gear 106 which also continuously rotates in a counter-clockwise direction with the shaft 102. Above and slightly rearwardly of the shaft 102 is another shaft 107 which extends across the front of the machine in parallel relation to the shaft 102 and is adapted to be freely movable longitudinally within the hollow shaft 100. The hollow shaft 108 is mounted between the side plates 83 and at the outer end thereof a disk 109 is provided either integral therewith or secured thereto. At the same end of the inner shaft 107 a gear 110 is secured adapted to be enmeshed with the gear 106 on the shaft 102. As previously pointed out the shaft 107 is freely slidably longitudinally within the hollow shaft 100 and at its opposite end it is provided with a knob 111 which may be pushed or pulled for a purpose which will be more fully described hereinafter.

Referring for the moment to Fig. 10 which shows the detailed construction of the disk 109 and the gear 110 on an enlarged scale it will be noted that the plate 109 is provided with a slot 112. The gear 110 is of the shape shown in Fig. 10 and is provided at its inner face with a pin 113. The gears 106 and 110 are in constant engagement, the gear 106 rotating continuously, and when the knob 111 is pulled, the pin 113 will enter the slot 112 thereby transmitting a rotative movement in a clockwise direction of the outer hollow shaft 108. There is usually a covering or guard (not shown) over the gears 106 and 110 which limits the outward sliding movement of shaft 107 thereby preventing disengagement of the two gears.

A plurality of rollers 114 are secured to the shaft 108 in spaced apart relation as shown in Fig. 2, and rotate in a clockwise direction. Each of the wheels 114 has provided around a portion of its circumference a rubber pad 115 (Fig. 5). When the shaft 108 and the wheels 114 secured thereto rotate in a clockwise direction, the pad 115 will intermittently strike a pasteboard blank 90 and the friction between the two will cause the lowermost blank to be moved downwardly and fed to the supporting member 101. If, for any reason, it is desired that the machine be kept running without the feeding mechanism operating, the knob 111 may be pushed to disengage the pin 113 from slot 112 thereby preventing any further rotation of the shaft 108 and consequent feeding of a pasteboard blank.

It will be obvious that the size of the wheels 114 which the space will permit will not be large enough to move each of the pasteboard blanks the entire distance they are to travel, since the machine is designed to contact each blank near the lower edge thereof, and it therefore becomes necessary to provide further means to continue movement of each blank after it has been started in the proper direction by contact with the pads 115. This mechanism which continues movement of the blanks consists in a plurality of spaced apart castings 116 which are mounted loosely on the shaft 108 and which have upwardly extending arms terminating beneath the cast bracket 91. The casting 116 is in the form of a bell crank and has integral therewith a lower arm 117 extending downwardly and provided with a roller member 118 freely rotatable with respect thereto. The arm 117 may be made in

the form of a fork provided with a pin 119 on which the roller 118 is mounted to rotate. In cooperation with the rollers 118 are the rubber rollers 120, which may either be solid rubber or a metal roller having an outer rubber covering entirely therearound. These rollers are mounted on the shaft 102 and rotate continuously therewith. The upwardly extending arm of the cast member 116 has an opening therein adapted to receive an elongate threaded pin 121 which also extends through an opening in the casting 91 and is provided with a head 122. A nut 123 is placed on the lower end of the threaded pin 121 to prevent the arm of the casting 116 from being disengaged therefrom. A compression spring 124 extends around the pin 121 and between the under side of the casting 91 and the upper side of the arm 116. The spring 124 acts to move the lower arm 117, together with the roller thereon, toward the right as viewed in Fig. 5 and forces the roller 118 against the rubber surface of the roller 120. The continuous rotation of the shaft 102 and rollers 120 in contact with the rollers 118, will also cause a continuous rotation in a clockwise direction of said rollers 118.

Since these rollers are positioned adjacent the rollers 114 with the rubber pads 115 thereon, each time the lowermost blank is contacted by the rubber pad 115 and moved downwardly, the lower edge of the blank will be forced between the rollers 118 and 120 which are continuously rotating in a direction such that the blank will be picked up and forced to move onto the supporting plate 101 from which point it is picked up and transferred to the conveyor, during which movement the ends thereof will be folded inwardly in a manner which will presently be described.

The pasteboard blanks 90 are each previously scored at a distance in from each end thereof equal to the depth of the final U-box before they are stacked in the rack provided by the supporting angles 89, and when they are fed downwardly to the supporting plate 101 and transferred to the conveyor each one passes between the side members 125 having the general configuration as shown in Fig. 5 and which is curved in the manner shown. Each of the side members 125 has a horizontal outwardly extending flange 126 thereon which is secured by means of the screws 127 to the side cover plates 59. Thus the side members 125 are held rigidly with respect to the cover plates 59 and will move therewith when the adjusting crank 77 is rotated.

Mounted loosely on the shaft 43 at each side of the machine and between the open ends of the U member 70 is a block 128 which has integral therewith oppositely extending fingers 129, one at the bottom and one at the top thereof. The block 128 together with the fingers 129 thereon is adapted to be rotated each time a cross-flight 49 approaches said block at the under side thereof and as said cross-flight moves upwardly to the top run 47 of the sprocket chain. Fig. 5 will illustrate the manner in which this operation occurs where it is seen that a cross-flight moving toward the right on the bottom run 48 of the sprocket chain comes against the lowermost finger 129 and carries the finger upwardly during which time a pasteboard blank will have been fed to the supporting member 101. As the fingers 129 move upwardly, carried by a cross-flight 49, they will pick up said pasteboard blank, and in transferring it to the conveyor will pass between

the side members 125 which are set a distance apart equal to the final length of the box. This movement will cause the ends of the blank beyond the scored section to be folded inwardly. The U box is, then, formed before it reaches the conveyor. Each of the cross-flights 48 is provided in substantially the center thereof with spaced apart downwardly extending fingers 130 (Figs. 2, 7 and 8) which engage against a side edge of the box and move it toward the wrapping machine. The fingers 129 are adapted to come within the side members 125 and after one blank has been deposited on the conveyor, the next succeeding cross-flight will again contact the oppositely extending finger 129 which will then pick up a succeeding blank to repeat the operation.

It has been found that if the ends of the blank are folded merely to a ninety degree position, there will be a tendency for the ends to spring outwardly and it is therefore necessary for some additional force to be applied to the ends which will bend them inwardly still farther for only a short period of time after which the ends will normally remain in an upright position. This succeeding operation on the upturned ends is accomplished by means of the members or plates 131 positioned at each side of the machine. These members are provided with slots 132 through which a screw 133 passes and which secures the members to the top covers 59. The cross section of the plates 131 is as shown in Fig. 8 and is provided with inwardly extending portions 134 (Fig. 2). The portions 134 are of a substantially triangular shape and as the U box moves toward the rear of the machine the ends thereof will contact the portions 134 which extend inwardly, thereby forcing the end members inwardly during the time they are passing that particular point. After the box has passed the inwardly extending portions 134, the scored section has been sufficiently broken so that there will no longer be any tendency for the end portions to move outwardly.

To obviate any possibility that the box itself will be moved laterally of the machine during the time the end portions are being bent inwardly by the members 134, means have been provided to contact the lower edges of the box to hold it in position until after the portion 134 has been passed. This means consists of an elongated bar 134 on each side which may either be integral with or secured to the rearmost portion of the U member 70 (Fig. 6). The outer longitudinal edge of each bar 135 is thickened as at 136 (Figs. 6 and 8) thereby providing a shoulder 137, and it is against this shoulder that the bottom edges of the U box are adapted to abut during its movement past the portion 134.

Spaced apart supporting members 138 extend longitudinally of the machine and are secured by means of welding, or any other desired means, to the cross bars or angles 42. The supporting members 138 are spaced apart a distance on each side thereof which extend downwardly and which terminate in inwardly extending portions 140 which are the portions secured to the cross bars. At the center of the machine and extending longitudinally thereof between the supporting members 138 is a bar 141 also secured to the cross bars 42. The supporting surfaces 138 together with the bar 140 serve as means to support the box as it travels toward the wrapping machine after it has been folded by means of the side members 125. The spaces on each side of

the bar 141 and between it and the supporting surfaces 138 are provided to permit movement therethrough of the downwardly extending fingers 130 on the cross-flights 49.

As the cross-flights move rearwardly toward the wrapping machine and carry the U boxes over the supporting surfaces 138 and the bar 141, operators may stand at either side of the machine and place the articles into the boxes which are to be eventually wrapped and placed on sale. When the boxes reach the end of the conveyor where the cross-flights move downwardly to begin their return to the front of the machine, it is necessary to provide additional means which will move the boxes from the conveyor onto the wrapping machine before the cross-flights reach the end of the conveyor and move downwardly. This is obviously necessary in view of the fact that if an edge of the box remains in contact with a cross-flight and is in contact therewith at the moment the cross-flight turns downwardly, the edge of the cross-flight will tend to either upset the box together with its contents or cut the edge thereof and remove a portion of the box. To overcome this difficulty we have provided automatic means which will engage the rear edge of a box before it reaches the end of the conveyor and push the same beyond the end thereof and onto the conveyor of the wrapping machine thereby removing the box from the path of the cross-flight before it turns downwardly. The means which performs this function must also move rearwardly at a rate of speed greater than that of the cross-flight.

The mechanism which we have particularly designed for this purpose includes a cross bar 142 which has a plurality of fingers 143 extending upwardly therefrom and which are adapted to extend upwardly through the spaces between the plurality of spaced apart bars 144 which act as a support for the box beyond the rearmost edge of the supporting plates 138. Near each end of the bar 142 the end of a channel member 145 is welded, which channel members extend rearwardly and have secured thereto a bearing member 146 by means of the screws 147. The bearing member 146 extends forwardly and is mounted on a shaft 148 which extends across the machine. At each side of the machine and pivotally mounted on the shaft 148 is an arm 149 which extends downwardly and has its other end mounted on the rock shaft 150 which also extends across the width of the machine. At substantially the center of the machine another arm 151 is secured to the rock shaft 150 and extends downwardly and rearwardly therefrom. The lower end of the arm 151 is provided with a pin 152 which has a roller 153 rotatably mounted thereon. Adjacent the roller 153 and secured to the shaft 51 is a split bearing member 154 which is secured to the shaft 51. The bearing member 154 at one side thereof is provided with a vertical face with a plurality of bolts extending therefrom. Also mounted on the shaft 51 and adjacent the split bearing 154 is a cam 155 having the configuration substantially as shown in Fig. 3 and provided with a plurality of arcuate slots 156 adapted to receive the bolts extending outwardly from the face of the split bearing 154. The cam 155 may then be secured to the face of the split bearing by means of washers and nuts as shown in Fig. 3. The particular manner of showing the relation of the cam to the bearing is of no specific importance in the present invention since it could be done also by providing

the split bearing with a plurality of screw-threaded openings adapted to receive bolts inserted therein through the slots 156. The obvious purpose of the plurality of slots is to regulate or set the cam 155 in any desired position, because it is this cam which controls the movement of the bar 142 and the fingers 143 extending therefrom.

Also secured to the shaft 150 is an arm 157 which extends upwardly and is secured to a block 158. An elongated rod 159 is either secured to or integral with the block 158 and extends rearwardly of the machine through an opening in the plate 20. At a distance away from the plate 20 along the rod a collar 160 is secured. Between it and the plate 20 is located a compression spring 161 coiled around the rod 159. With particular reference for the moment to Fig. 3 it will be evident that the spring 161 will force the rod 159 together with its associated parts 158 and 157 toward the right, tending to rotate the shaft 151 in a clockwise direction. This force will maintain the roller 153 in constant contact with the periphery of the cam 155 which rotates in a clockwise direction. When the enlarged part of the cam is in contact with the roller 153 the arm 149 together with the channel members 145 and the bar 142 with the fingers 143 extending therefrom will all be moved toward the left or rear of the machine, and this movement is designed to take place at a rate of speed greater than the movement of the cross-flights 49.

It is to be understood that the fingers 143 must be able to be positioned below the cross-flights during certain intervals to enable said cross-flights to move freely toward the wrapping machine, but at other times they must be raised in the path of a cross-flight in order to contact an edge of the box to move it rearwardly. Therefore, the movement of the fingers 143 is such that they will be moved upwardly at the moment the forward edge of a cross-flight is in vertical alignment therewith. This is permitted by reason of the recesses in said cross-flights as shown in Figs. 2, 7 and 8. The fingers 143 then move forwardly at a comparatively rapid rate of speed and as soon as the box has been deposited on the conveyor of the wrapping machine they are then lowered and returned to their original position in readiness for the next succeeding box. It has been seen by the above explanation the manner in which the rearward and forward movements of the fingers take place, and in order that the fingers may be raised and lowered at the proper moment, the cam members 162 are secured to the shaft 50 immediately below the channel members 145. During each revolution of the cams 162 their enlarged portion will contact the under side of the channel member thus raising the fingers 143, and by the time these fingers have reached the rear of the machine the cam will have passed its highest point at which time the fingers will be lowered during the forward or return movement thereof. By the time the next succeeding cross-flight with its box is in vertical alignment with the fingers, the cams 162 will have completed a rotation and will have raised the fingers again for the next succeeding operation.

In certain instances the pasteboard blanks may be covered with wax, depending upon the type of article to be wrapped, and when this occurs the use of the plain section of rubber 115 has been found to be rather unsatisfactory. When the blanks to be fed are waxed, the surface of the

rubber 115 should be roughened to a certain extent so that sufficient friction will occur between the rubber and the blank to enable said blank to be fed. Obviously the member 115 which frictionally feeds the blanks need not be rubber but could also be made of any other material with a sufficiently roughened surface to prevent slipping on the waxed surface of the blanks.

It has been stated heretofore that it is not always necessary to form a U box, it being permissible at times to feed merely flat cards on which the articles to be wrapped are placed before wrapping. When it is desired to merely feed a flat card and omit the folding operation, it is merely necessary to operate the above described adjusting mechanism so that the supporting angles 89 are the same distance apart as the side members 125 and the remaining guide members throughout the length of the machine. In this case the distance between the side folding members 125 will be equal to the length of the card being fed and the folding operation will thereby be omitted.

With particular reference to Fig. 11, wherein a modification of the intermittent feeding device is shown, the wheels or rollers 114 will be formed as a complete circle without any additional material lying around a portion of the circumference. When the full circular wheels are used, they are adapted to move or rotate approximately one-third of a revolution and then stop and remain stationary while the rollers 120 are turning approximately two-thirds of a revolution. This intermittent motion of the rollers 114 is caused by the mechanism shown in Fig. 11. In this case the gears 106 and 110 will be omitted entirely and in the place of the gear 106 there will be a sprocket wheel 170 which is provided with teeth around only a portion of its circumference. The wheel 170 is secured to the shaft 102 and rotates continuously therewith. The gear 110 will be replaced by the sprocket wheel 171 which is secured to the shaft 107. Below the shaft 102 at the same side of the machine and pivotally mounted to the side thereof by means of the stub shaft 172 is an arm 173. A stub shaft 174 extends through the outer end of the arm and has secured thereto the sprocket wheel 175. A round these various sprocket wheels extends a sprocket chain 176 in the manner shown in Fig. 11. Any desired means may be used for exerting a downward pressure on the arm 173 to prevent slipping of the sprocket chain 176.

Obviously the same driving connection could be used between the shaft 107 and the hollow shaft 108 as is shown in Fig. 10, but it has been determined that a friction drive between a solid plate similar to the plate 109 and the flat side of the sprocket wheel 171 would operate equally as well. When the shafts 107 and 108 are in driving connection, the shaft 102 will rotate continuously and each time the teeth in the sprocket wheel 170 engage the sprocket chain 176, the shaft 108 together with the full circular rollers 114 thereon will rotate. The rollers will then remain stationary after the teeth leave the chain until contact between the two is again made.

Having thus described the mechanism of the machine the operation will be as follows:

Assuming the folding and wrapping machines to be separable, they will first be moved in longitudinal alinement and the gears 6 and 8 will be brought into contact by operation of the lever 9; the chain 54 will then cause a clockwise rotation of the shaft 51 and a counter-clockwise rotation of the shaft 50. By means of the chains 58 at

each side of the machine driven from sprockets on the shaft 50, the shaft 45 together with the sprocket wheels thereon will drive the chain having the upper and lower runs 47 and 48 respectively. The movement of the last named chain will cause a rotation of the sprocket wheel 104, and the chain 105 associated therewith will also cause a rotation of the shaft 102 and the gear 106. At this point the cross-flights 49 on the upper run of the chain 47 are moving rearwardly toward the wrapping machine.

Assuming that a pack of pasteboard blanks have been placed in the rack provided by the supporting angles 89, the knob 11 will then be pulled to engage the gear 110 with the gear 106 thereby causing a rotation of the shaft 107, the hollow shaft 108, and the rollers 114 associated therewith. As has been pointed out previously, each rotation of the rollers 114, by means of the pad 115 thereon, moves the lower-most blank to be fed downwardly between the rollers 118 and 120, and since the roller 120 is secured to the shaft 102 it will be continuously rotating to carry the blank downwardly and deposit it on the support 101. At this point a cross-flight 49 on the lower run 48 will have moved forwardly to begin its upward travel and bring with it the two fingers 129 which will pick up a blank previously deposited on the support 101 to carry it upwardly between the side members 125 which automatically bend the end portions inwardly. When the fingers 129 again reach their horizontal position the U box will then have been deposited on the supporting side members 135 with its outer edges abutting against the shoulders 137. The cross-flight then moves the box rearwardly past the inwardly extending portions 134 to bend the ends inwardly still farther to completely break the scored section thereof. Beyond this point the boxes are filled with cookies, sweet rolls, buns or cakes to be wrapped in the wrapping machine; then to avoid any damage to the box by a subsequent movement downwardly of the cross-flight, at the proper moment the fingers 143 will be raised upwardly and moved rearwardly and deposit the box across the intermediate support 35 onto the conveyor of the wrapping machine. The fingers will then be lowered and begin their forward or return movement to permit the cross-flight 49 to move downwardly and return to the front end of the machine.

As above pointed out, the folding mechanism can be made integral with the wrapping machine for use in smaller bakeries where they have only a limited line of goods. On the other hand it can be made in a separate unit for use in those bakeries which are already equipped with a wrapping machine and which do a large amount of bread slicing and wrapping.

The device is simple to operate, economical to manufacture and is very efficient in operation.

Other modes of applying the principle of our invention may be employed instead of the one here explained change being made as regards the mechanism herein disclosed provided, however, that the means stated by any of the following claims or the equivalent of such stated means be employed.

We, therefore, particularly point out and distinctly claim as our invention:

1. A pasteboard folding machine of the character described comprising, a rack for holding a plurality of pasteboard blanks, a conveyor, a support between said rack and said conveyor, means for delivering said blanks singly to said support,

means to transfer a blank from said support to said conveyor, and means to engage the ends of a blank before it reaches the conveyor to fold said ends inwardly.

2. A pasteboard folding machine of the character described comprising, a rack for holding a plurality of pasteboard blanks, a conveyor, a support between said rack and said conveyor, means for delivering said blanks singly to said support, means to transfer a blank from said support to said conveyor, and means interposed in the path of movement of the blank from the support to the conveyor to engage against the ends thereof, thereby folding said ends inwardly.

3. A pasteboard folding machine of the character described comprising, a conveyor, a rack for holding a plurality of pasteboard blanks, a support adjacent said rack, friction means to deliver a single blank intermittently from the rack to the support, means to deliver a blank from said support to said conveyor, and means adjacent said support to engage the ends of said blank as it is being delivered to the conveyor, whereby said ends are folded inwardly.

4. A pasteboard folding machine of the character described comprising, a conveyor, a plurality of spaced apart cross-flights thereon and movable therewith, a rack at one end of said conveyor adapted to hold a plurality of pasteboard blanks, means between said conveyor and said rack to fold the ends of a blank inwardly, thereby forming a U-box, means for depositing said U-box on said conveyor between successive cross-flights whereby it is carried to the opposite end of the conveyor.

5. The combination of elements defined in claim 4, combined with means adjacent said opposite end to transfer a U-box to a point beyond the end before the cross-flight immediately behind said blank reaches said end.

6. The combination of elements defined in claim 4, combined with means to fold the ends of said U-box inwardly still farther for only a short period of time.

7. A pasteboard folding machine of the character described comprising, a conveyor, means for folding inwardly the ends of a pasteboard blank to form a U-box, means for feeding single blanks to said folding means, means for transferring said U-box to said conveyor, and means to momentarily hold the ends of said U-box inwardly still farther.

8. The combination with a folding machine and a receiving conveyor to receive articles from the folding machine, of a conveyor on the folding machine, a cross-flight on the folding machine conveyor to push an article toward the receiving conveyor, and means to transfer the article from the folding machine conveyor to the receiving conveyor before said cross-flight reaches the end of the folding machine conveyor.

9. The combination of elements defined in claim 8, wherein said means moves said article at a speed greater than the speed of said folding machine conveyor.

10. The combination of elements defined in claim 8, said means including a bar provided with a plurality of fingers, a cam for moving said fingers upwardly immediately behind said article, and a cam actuated arm secured to said bar to move said fingers forwardly, whereby said article is deposited on said receiving conveyor.

11. A pasteboard folding machine for making U-boxes comprising, a conveyor, a rack for holding a plurality of pasteboard blanks, a support

extending between said rack and conveyor, means for intermittently depositing a single blank from the rack onto said support, fingers located at each side of said support and below the same, means for moving said fingers upwardly to pick up said blank and deposit same on the conveyor, and means mounted at each side of said conveyor in the path of movement of said blank to fold the ends thereof inwardly.

12. The combination of elements defined in claim 11, combined with a plate at each side of said conveyor having a portion thereof extending in the path of movement of said inturned ends, to momentarily hold said ends inwardly still farther.

13. The combination of elements defined in claim 11, combined with a plurality of spaced apart cross-flights on said conveyor, said cross-flights constituting said means for moving the fingers upwardly.

14. A pasteboard folding machine comprising, 20

a rack for holding a plurality of pasteboard blanks, a conveyor adjacent said rack, means to deliver blanks singly from said rack, means to deposit each of said delivered blanks to said conveyor, and means located between said rack and conveyor to fold the ends of said blanks inwardly.

15. A pasteboard folding machine comprising, a rack for holding a plurality of pasteboard blanks, a conveyor adjacent said rack, means to deliver blanks singly from said rack, means to deposit each of said delivered blanks to said conveyor, means to fold the ends of said blanks inwardly, means at the opposite end of the conveyor to receive said blanks, cross-flights on said conveyor, and means to deliver said blanks to said receiving means before each preceding cross-flight reaches the end of said conveyor.

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