July 28, 1931. P. LANGHAMMER 1,816,085

WRAPPING MACHINE AND PROCESS

Filed March 25, 1930 4 Sheets-Sheet 1

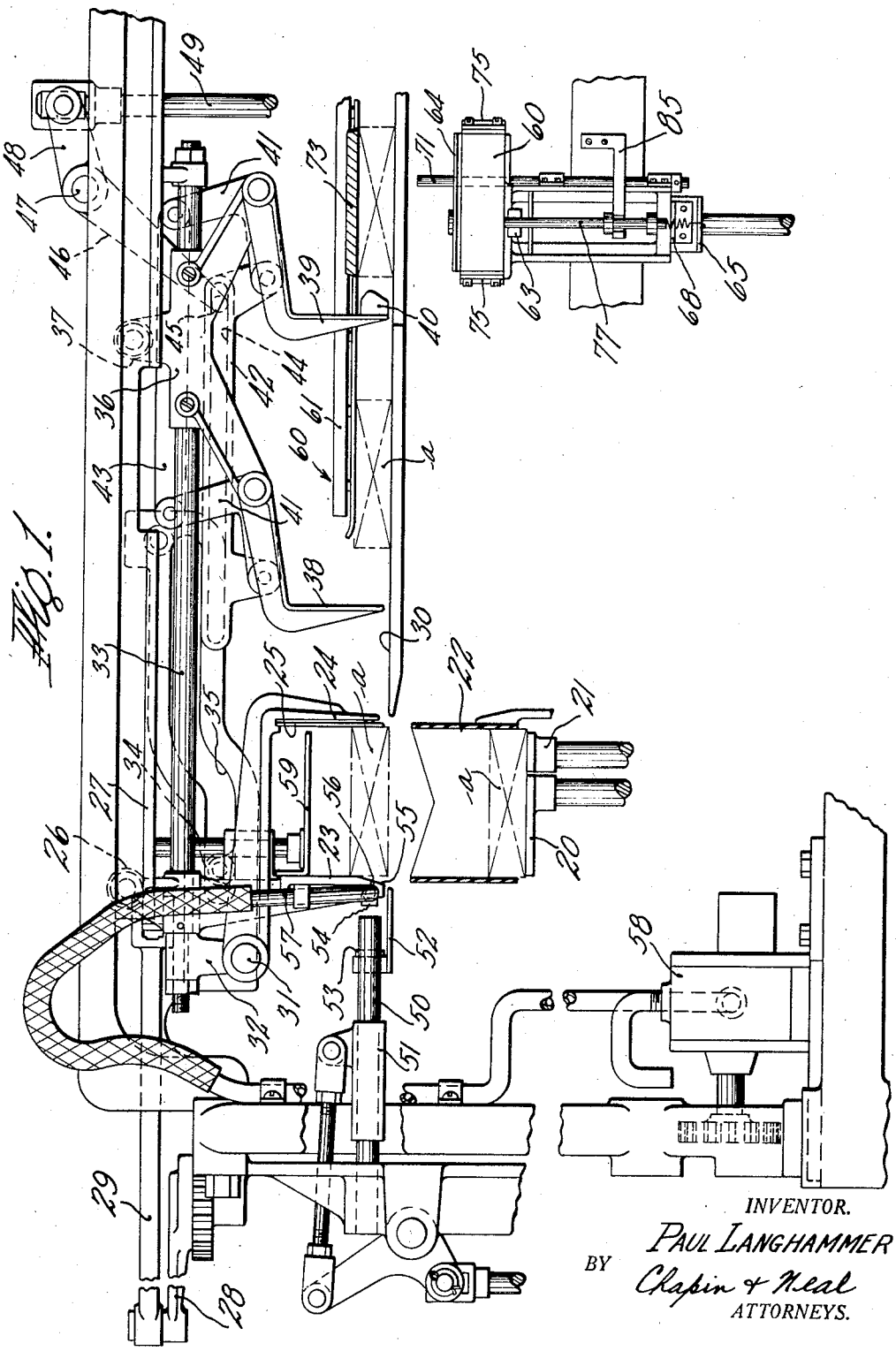


Fig. 1.

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Fig. 2.

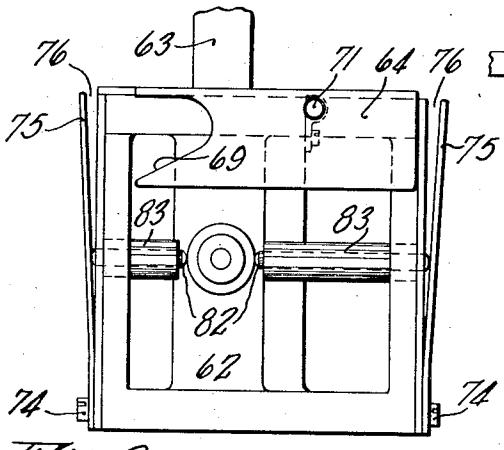


Fig. 3.

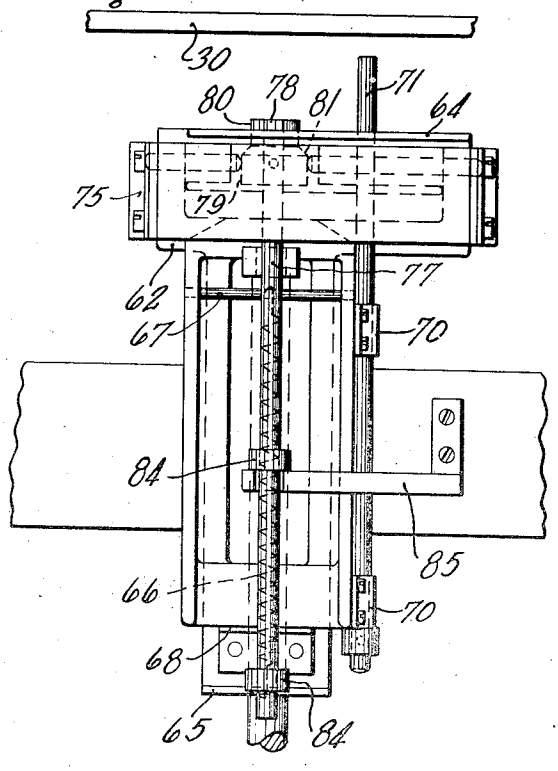


Fig. 5.

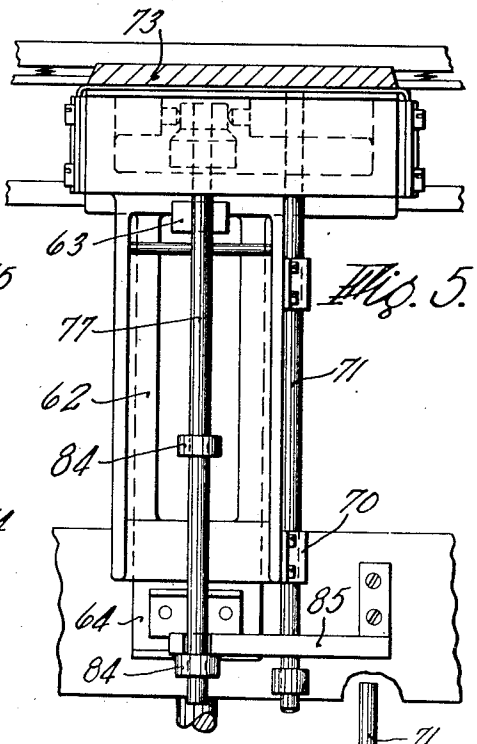
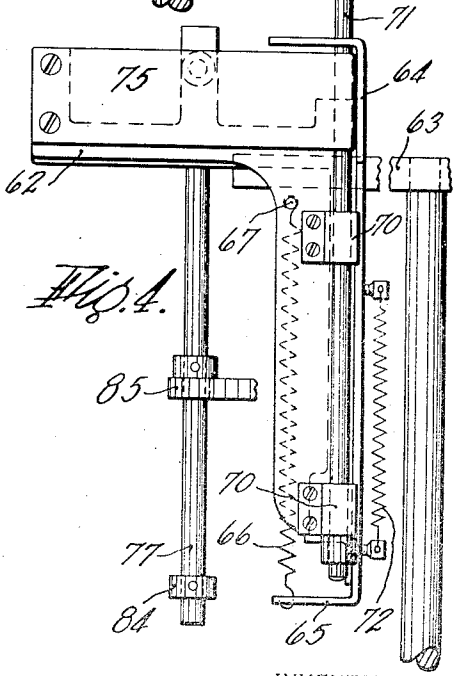


Fig. 4.



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Fig. 6.

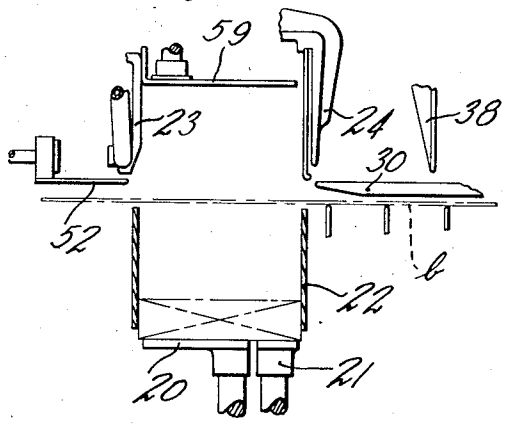


Fig. 7.

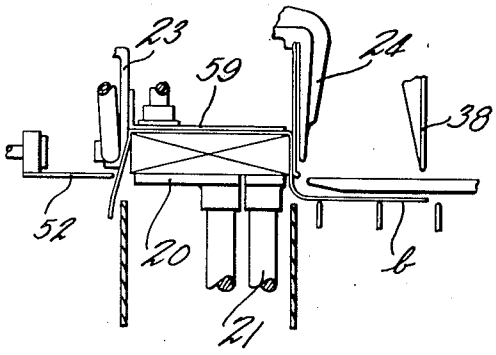


Fig. 8.

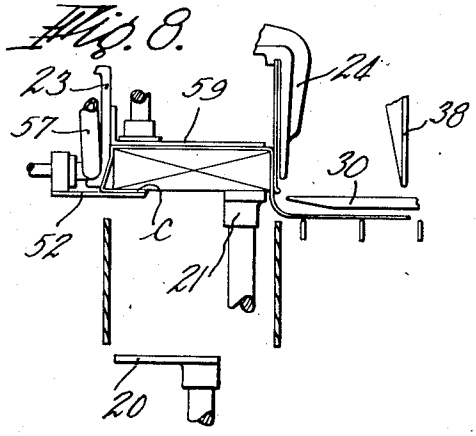


Fig. 9.

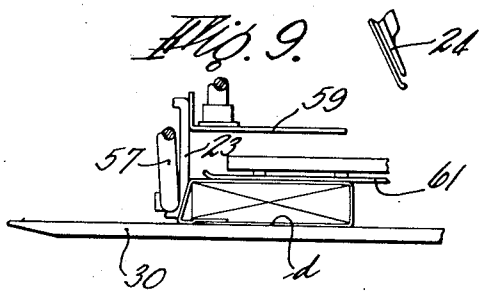
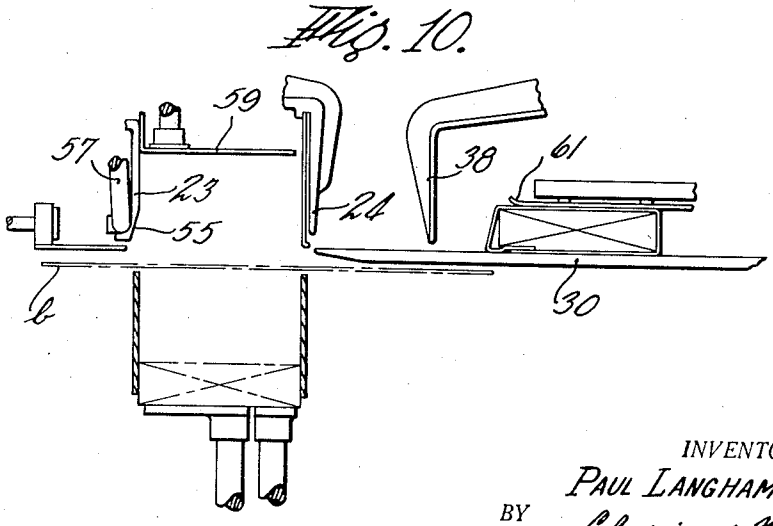


Fig. 10.



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Fig. 11.

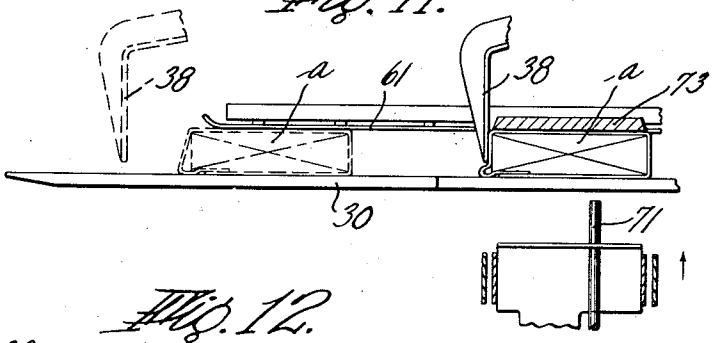


Fig. 12.

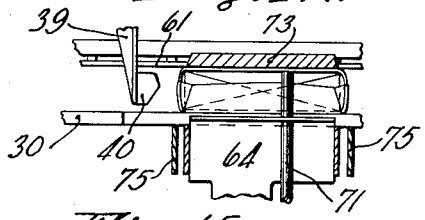


Fig. 14.

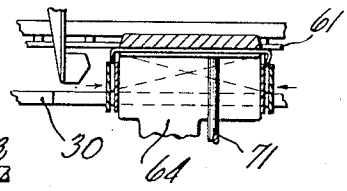


Fig. 13.

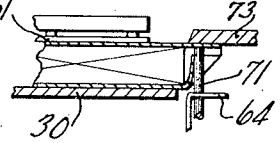


Fig. 15.

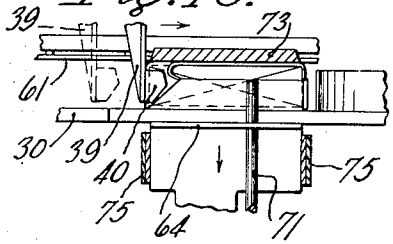


Fig. 16.

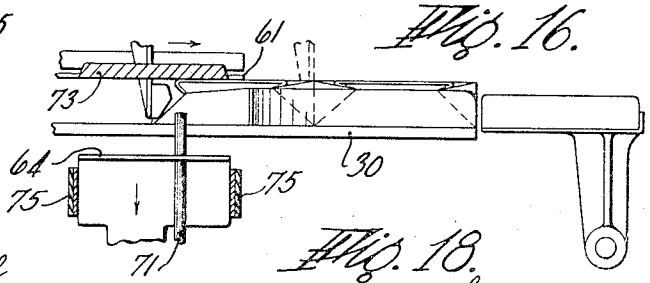


Fig. 17.

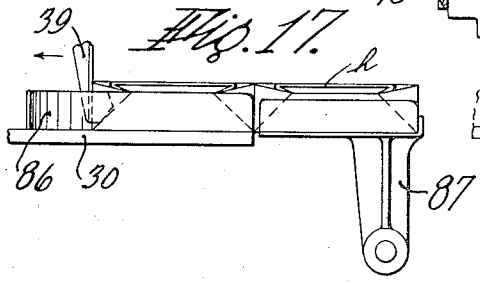


Fig. 18.

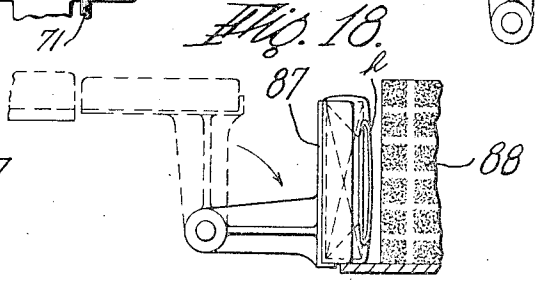
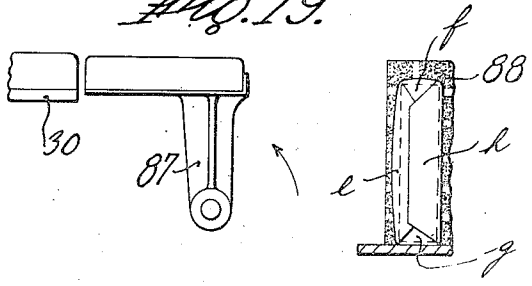


Fig. 19.



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UNITED STATES PATENT OFFICE

PAUL LANGHAMMER, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO PACKAGE MACHINERY COMPANY, OF SPRINGFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

WRAPPING MACHINE AND PROCESS

Application filed March 25, 1930. Serial No. 438,843.

This invention relates to wrapping machines designed particularly for the envelopment of boxes or other substantially rigid articles in a wrapper which possesses a tendency towards contraction under certain atmospheric conditions. On account of its perfect transparency and moisture-proof qualities the cellulose-base material known as cellophane has recently come markedly into vogue. The adoption of this material has created many new problems in wrapping machine construction. Besides being extremely elastic and resistant to creasing, thereby requiring special design of the wrapping mechanism to insure that the folds are held constantly until they are ultimately sealed; its tendency to contract when it is subjected to conditions of low humidity is so strong that it may either crush the container around which it is wrapped or become ruptured itself. Whereas previously one problem of wrapping articles has been to produce a tight enough wrap, I have discovered that the best results with this material will be secured if a very loose wrap is obtained.

It is one object of the invention to provide a machine which will enclose an article in a wrapper with the latter having a predetermined degree of looseness. A further object is to provide a wrapping machine capable of handling cellophane as a wrapping material. A further object is to provide new and useful wrapping mechanisms. Other and further objects will appear from the following description and claims:

Referring to the drawings—

Fig. 1 is a side elevation, partly in section, of so much of a wrapping machine (otherwise of standard type) as may be necessary for an understanding of my invention;

Fig. 2 is a top plan view of certain fold creasing mechanism;

Fig. 3 is a side elevation of the mechanism shown in Fig. 2;

Fig. 4 is an end elevation of the parts shown in Fig. 3;

Fig. 5 is a view generally similar to Fig. 3 but with the parts in different operative positions; and

Figs. 6 to 19 inclusive are details illustrating successive stages in the wrapping of an article by my improved mechanism.

The wrapping machine to which my invention is applied may be of any desired type. It is here shown as being generally similar to that shown in the Fischer Patent 1,196,094, August 29, 1916, although the mechanical details here illustrated are considerably varied from those shown in the patent. The packages *a* are delivered singly and successively by any desired means onto a pair of adjacent elevator plungers 20 and 21 reciprocable vertically by any suitable cam or link mechanism. These plungers, initially acting together, carry the article through a vertical guide chute 22 to the sheet of wrapping material *b* deposited over the chute (Fig. 6) by any suitable wrapper feed mechanism. The article and wrapper are moved together in the well known manner into a folding or receiving pocket formed by a rear wall 23 and a movable front wall 24, preferably having a spring-pressed article engaging surface 25. Any desired mechanism for actuating this pocket may be provided, but one illustrative form will be described.

The rear pocket wall 23 has an upward extension which bears rollers 26 riding upon spaced guide rails 27 which may form an integral part of the machine frame. A crank 28, driven by any suitable mechanism so as to rotate once during each cycle of the machine, is joined with the extending portion of the rear pocket wall by a connecting rod 29. As the crank rotates the pocket, and other parts connected therewith, will reciprocate back and forth to carry the partially wrapped packages from the elevator over the wrapping table 30.

The front wall 24 of the pocket is hinged at 31 to a bracket 32 secured upon one or more spacing bars 33 which are also secured to the rear wall of the pocket and to certain pusher members which will be described later. A roll 34 on the upper portion of the front wall member runs in a track 35 secured to the frame and formed so that while the pocket is closed in the position of Fig. 1, it opens as soon as the article has been carried well onto the table 30.

Also mounted on the bars 33 is a bracket member 36 having a roll 37 running on the guide rail 27. A pair of spaced pushers 38 and 39 are pivoted to the bracket; pusher 38 having a plain surface while pusher 39 is provided with a pair of spaced tucking plates 40, one at each side of the article being wrapped. To the pivot shaft of each of the pushers is also secured a bell crank lever 41, each having one arm pivoted to a plate 42 and the other pivoted to a link 43 joining the two cranks. The plate has a longitudinal slot 44 in which fits a roll 45 on the end of an arm 46 extending from a pivotally mounted shaft 47. Also fixed to this shaft is an arm 48 to which is pivoted a link 49 actuated by any suitable cam mechanism to cause one reciprocation of the link during each cycle of the machine. This portion of the mechanism is timed so that as the pushers move to the right as viewed in Fig. 1 they remain in the positions shown, but as they start their travel in the reverse direction they are raised by the elevation of plate 42 so as to pass over the article which has been advanced to its rear.

Slidable upon guide rods 50 extending from the machine frame adjacent the initial folding station is a member 51 carrying a folding plate 52. This plate is preferably made of polished bakelite or a similar material, as I have found that this substance offers the minimum of frictional resistance when used with a pyroxylin coated wrapping material such as moisture-proof cellophane. Also carried upon the member 51 are bumpers 53 coacting with bumpers 54 on the pocket member 23 to limit the travel of the folding plate relative to the movable pocket. The member 51 is reciprocated periodically, once during each cycle of the machine, by any suitable mechanism which it is not necessary to illustrate here.

The lower wall of the pocket member 23 adjacent the package is beveled as shown at 55, and this surface is provided with apertures 56 connecting with a suction tube 57. This tube connects with a suction pump 58 which runs continuously during the operation of the machine. Fig. 6 shows the article *a* about to be elevated between the walls of the pocket together with the sheet of wrapping material *b* positioned above it. As the article is raised (Fig. 7) the wrapping material is gripped between the article and the usual upper plunger 59 which may be actuated by any suitable mechanism, and is folded in U-form around three sides of the article by its entrance into the pocket. As the rear side of the wrapper passes the beveled surface 55 the suction holds it out in the position shown in Fig. 7, the front side being folded smoothly down against the side of the article in the usual manner. Of course the front side could be similarly or alternatively provided with suction apertures, if desired.

Before the pocket starts its forward movement the folder 52 is advanced as in Fig. 8, tucking the rear side of the wrapper under the article. It will be observed that the corner of the wrapper is not formed snugly around the article, on account of the effect of suction holding the wrapper against the beveled surface 55; this causing an accumulation or surplus of wrapping material at this point. The article is now supported by the folding plate 52 and the elevator 21, elevator 20 having receded to permit the folding plate to advance. As the pocket advances the folding plate moves with it until the wrapping table 30 is reached, the elevator 21 receding during this motion; whereby the front flap of the wrapper is folded over the rear flap in a well known manner.

This motion of the pocket carries the article to an intermediate position 60 shown in Figs. 9, 10, and 11, in which it passes under a spring-pressed top plate 61 which retains the package and the folds of the wrapper as the pocket returns to receive a new article. The front wall 24 of the pocket was raised during the advance so that it did not interfere with the top plate 61 and will not contact with the article during the pocket's retrograde movement. The suction in the rear pocket wall remains on, but the wrapper will peel off without exerting enough pull to cause it to become shifted. The package is thus left with the wrapper folded longitudinally around it in the form of a loose tube, providing enough slack in the wrapper to prevent damage by its subsequent contraction.

Pusher 38 now receives the partially formed package, as shown in dotted lines in Fig. 11, and carries it to the full line position of this figure. At this point the package is acted on by end folding members which form the bottom end folds and crease the triangular flaps thereby formed at the sides of the wrapper end extensions. One of these folders is shown in detail in Figs. 2 to 5 inclusive, it being understood that there is a second similar folder at the other side of the package path.

Each of these folders comprises a body portion 62 carried by a cross bar 63 common to the two folders and reciprocated vertically once during each cycle of the machine by any suitable cam mechanism. The body portion of the folder moves up and down at a point beyond the end of the package and does not itself act upon the wrapper. On the side of the body member nearest the article there is mounted a vertical plate 64 having a horizontal flange at its top extending over the top of the body member. A flange 65 at the bottom of the plate receives one end of a spring 66, the other end of which is joined to a pin 67 mounted on the body member. A stop flange 68, also carried by the plate, abuts the body member to permit the

plate only a limited motion (compare Figs. 3 and 5) under the influence of the spring. The top flange of the plate is cut away as at 69 to permit the passage of the adjacent tucker 40 on the pusher 39.

Secured in guides 70 at the sides of the body member is a fold breaking rod 71 joined to the plate 64 by a spring 72 so as to have a relatively long free travel. The normal position of the rod 71 is as shown in Fig. 3, but as the end folder ascends the rod is first pressed against the bottom flap *e*, starting the formation of the fold and finally pressing the upper flap *h* against a plate 73 extending sideways from the top plate 61 (Figs. 12 and 13). As the folder continues to ascend, the rod 71 remains stationary but the plate 64 continues to rise (Fig. 14), completing the formation of the fold *e*. Due to the spring mounting 66 the folding plate 64 reaches its ultimate position against the plate 73 slightly before the body member 62 has reached its highest point of travel. The slight overtravel of the body member is utilized in actuating certain fold creasing members which will now be described.

Secured by screws 74 to the upper portion of the body member are spring creasing plates 75 spaced apart a distance equal to the spacing of the rear and front triangular flaps *f* and *g* formed when the flap *e* is made. The normal tendency of these creasing plates is to press against the sides of the body member. The following mechanism is provided to hold the plates outwardly, as shown in Fig. 2, to provide spaces 76 into which the flaps *f* and *g* will be received. A rod is slidably mounted centrally of the body member and carries at its top a collar 78 having lower and upper cylindrical portions 79 and 80 and an intermediate conical portion 81. A pair of short round ended rods 82 are carried in bearings 83 on the body member and bear at their outer ends against the plates 75. Spaced collars 84 on the rod 77 contact alternately with an abutment 85 secured to the frame. As the folder reaches its top position the lowermost of the collars 84 contacts with the stationary abutment 85, causing the rod to move downwardly relatively to the still moving folder and to withdraw the cylindrical portion 79 of the collar 78 from contact with the plate spacing rods 82. The plates are thus freed to snap upon the wrapper flaps which have been received within the spaces 76. As the folder then descends the plates continue to bear upon the flaps, creasing them much as a sheet of paper is creased between the fingers. The top of the folding plate 64 remains stationary as the creasers first start down, holding the folds in place, and then moves downwardly also, keeping pace with the creasers so that the folds are maintained in smooth condition. When the creasers near their lowermost position the lower collar 84 strikes the abutment, opening the plates 75 so that they are positioned to receive the end flaps on their next upward movement.

As the end folders start to descend (Fig. 15) the pushers 39 start ahead, their tucking blades 40 turning down the now creased triangular rear flaps *f*. When the main part of the pushers contact with the article it is pushed further along under the top plate 61, and between side plates 86 which turn over the front flaps *g*. The package is left between the side plates by the pusher 39, and is finally pushed by contact with the succeeding package (Figs. 16 and 17) into an oscillating receiver which carries the article to and delivers it between a pair of spaced brush walls 88 which turn down the final end flaps *h*.

What I claim is:

1. A method of wrapping an article having substantially fixed dimensions which comprises bending the wrapper around the article and overlapping its edges to form a tube while holding the wrapper at least partially out of engagement with the article, whereby the article will be enclosed loosely in the wrapper and subsequent shrinkage of the wrapper will be permitted without injury.

2. A method of wrapping an article having substantially fixed dimensions which comprises bending the wrapper around the article and overlapping its edges to form a tube while holding the wrapper by externally applied suction at least partially out of engagement with the article, whereby the article will be enclosed loosely in the wrapper and subsequent shrinkage of the wrapper will be permitted without injury.

3. A wrapping machine comprising a pocket into which an article and a wrapper are introduced to fold the wrapper about three sides of the article, means for folding the wrapper about the fourth side of the article, and means for holding the wrapper away from the article during the folding of the fourth side of the wrapper.

4. A wrapping machine comprising means for folding a wrapper about four sides of an article, and means for holding the wrapper temporarily spaced from the article during the formation of said folds.

5. A wrapping machine comprising means for folding a wrapper about four sides of an article, and means for holding the wrapper temporarily and locally bowed away from the article during the formation of said folds.

6. A wrapping machine comprising means for folding a wrapper about four sides of an article, and a suction device for holding the wrapper temporarily spaced from the article during the formation of said folds.

7. A wrapping machine comprising a pocket into which an article and a wrapper are introduced to fold the wrapper about three sides of the article, means for folding the

wrapper about the fourth side of the article, and a suction device on the pocket for holding the wrapper away from the article during the folding of the fourth side of the wrapper.

8. A wrapping machine comprising a pocket into which an article and a wrapper are introduced to fold the wrapper about three sides of the article, means for folding the wrapper about the fourth side of the article, one side of the pocket being beveled off adjacent its entrance, and suction means for holding the wrapper against said bevel during the formation of the fourth side of the wrapper.

9. A wrapping machine comprising a reciprocating pocket, means for introducing an article and a wrapper into the pocket to fold the wrapper about three sides of the article, a folding blade movable in the direction of travel of the pocket to fold a portion of the fourth side of the wrapper under the article, a folding plate over which the partially wrapped article is carried by the pocket to complete the folding of the fourth side, and a suction device on the pocket for holding the wrapper away from the article locally during the folding of the fourth side of the wrapper.

10. A wrapping machine comprising means for folding a wrapper about four sides of an article, means for holding the wrapper temporarily and locally bowed away from the article during the formation of said folds, means for folding the wrapper flaps at the end of the article, and means for creasing said flaps.

In testimony whereof I have affixed my signature.

PAUL LANGHAMMER.